TOSHIBA
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6F8C1290

Unified Controller
nv Series

Integrated Controller
V series

Engineering Tool 4

–Basic–

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Introduction

This document is one of the operation manuals for the Engineering Tool of the Unified Controller nv series and the Integrated Controller V-series (hereafter abbreviated as V-Tool).

- Engineering Tool Ver.4 user.
  All functions are supported.
- Engineering Tool Ver.3 user.
  The function added with Engineering Tool Ver.4 is not supported.
- Engineering Tool Ver.2 user.
  The function added with Engineering Tool Ver.3 and Ver.4 is not supported.
  Please read the What's new of Ver.3.

V-Tool is a software required in order to create user applications for the controller of the nv series and the V-series, and to monitor and maintain them.

This document is intended for users with basic knowledge of V-Tool setup and usage and contains the following topics:

The following V-Tool operation manuals are available:
Setup: 6E8C4891 (Japanese), 6F8C1291 (English)
Basics: 6E8C4890 (Japanese), 6F8C1290 (English)

The following related documents are also available. Refer to them as necessary.
Instruction Set: 6E8C4826 (Japanese), 6F8C1226 (English)
Ver. 1 Setup: 6E8C3843 (Japanese), 6F8C0873 (English)
Ver. 1 Introduction: 6E8C3917 (Japanese), 6F8C0874 (English)
Ver. 1 Basics: 6E8C3918 (Japanese), 6F8C0875 (English)

■ What's new of Ver.3

The following functions are added in V-Tool Ver.3.

- Program editor (Text)
  The Program editor (Text) is used for editing, downloadind and monitoring of the ST(Structured Text).
- Program editor (Full graphic)
  The Program editor (Full graphic) is used for editing, downloadind and monitoring of the LD(Ladder Diagram), FBD(Function Block Diagram) and SFC(Sequential Function Chart).

Use Regulation

- This product is not developed or manufactured for the system including the equipment directly related to human life (note 1). Do not use the product for that purpose.
- When using this product to the system that is related to the safety of human and seriously affects the maintenance of public function (note 2), contact our sales section as the necessary special consideration (note 3) is required for the system operation, its maintenance and management.

(Note 1) The equipment directly related to human life means the following:

- Medical equipment such as life sustaining equipment and equipment for operation.

(Note 2) The system that is related to the safety of human and seriously affects the maintenance of public function means the following:

- Main equipment control system for nuclear power plant, safety protection system of nuclear facility, other system important for safety.
- Operation control system of mass transportation system and aviation control system.

(Note 3) Special consideration means the sufficient consultation with our engineers to establish safe system (fool proof design, fail safe design, redundancy design).

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- Toshiba Corporation shall not be liable for the damage arising from the malfunction due to the connection with other equipment.
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● The Rules on Notation

This document uses following symbols for the rules on notation for better understanding.

◆ **Important:** Describes the matters that need special attention for appropriate product handling.

◆ **Note:** Describes the matters to be observed for appropriate product handling.

◇ **Supplementary:** Describes the supplementary matters to the described contents

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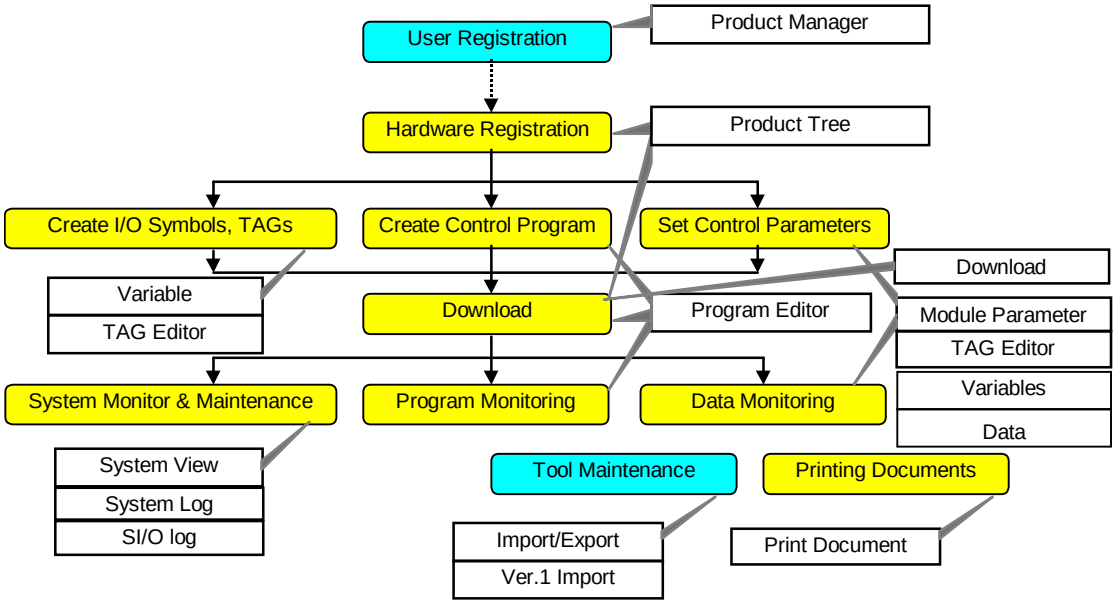
Chapter 1
nv Series & V Series Basic Knowledge

This chapter describes the basic usage flow and functions of this tool and the type of hardware and software that can be registered with the nv series and the V series by type.

1.1 Engineering Flow

This tool may be utilized for the design, production, test, tuning, and maintenance of the nv series and the V series. This guide describes the engineering flow and the role of each tool function.

<Engineering flow>



■ User registration

The system administrator registers the tool users and passwords. This is performed from the Product Manager. Only the registered users can login to the tool.

■ Hardware registration

Registers the V series Systems ,Stations ,Controllers and I/O modules. Each LAN card is connected to Network. These operations are performed from the Product Tree.

■ Variables and TAGs creation

Symbol names are assigned to process I/O signals, transmitted data between Controllers and controller memories . And also TAG No. can be assigned to TAG Parameters provides in advance. The symbol names can be used in user programs as Variables. These name registration are performed from Variables or TAG Editor.

■ Control program creation

Draws and saves a control program at each task entry of controller. These programming is performed from Program Editor using LD(Ladder Diagram) ,FBD(Function Block Diagram) or SFC(Sequential Function Chart) of IEC61131-3 ,which is international standard.

■ Control parameter setting

An initial value is assigned to each parameter and TAG parameter. This is performed from the Module Parameter, Variables, or TAG Editor.

■ Download

Downloads configurations, variables, and programs to the controller. Download is used to download to the controller as batch. Program Editor is used to download programs individually.

■ System monitoring and maintenance

Monitors the V Series LAN, station, controller, and I/O operation status after downloading. The operation status and control period of downloaded tasks may also be monitored. The log recorded in the controller may be monitored. Maintenance operations such as switching between RUN and HALT, backup and restore of data and codes in the controller can also be performed. These operations are performed from System View.

■ Program monitoring

The downloaded programs can be monitored online in their own graphic language. The LD power flow, FBD monitored value, and SFC active steps are refreshed and displayed. The variables in a program may be updated while monitoring the program. This is performed from Program Editor.

■ Data monitoring

Any global or local variable may be monitored online from Variables or Data View. TAGs can be monitored online from the dedicated TAG Editor.

■ Tool maintenance

Data can be exchanged with other programs in CSV format using Import/Export.

■ Printing documents

The hardware configuration, programs, and parameters can be printed out as a book. This is performed from Print Document.

1.2 Hardware Model of nv Series & V Series

■ Hardware model of nv series

The nv series provides sequence model (type 1) suited for high-speed sequence control, and DCS model (type 2) suited for instrumentation control.

CPU Module:
- Sequence model (type 1)
- DCS model (type 2)

I/O Module:
- TC-net I/O
- Parallel I/O
- Serial I/O

■ Hardware model of V series

The V series provides sequence control module (S module) suited for high-speed sequence control, loop control module (L module) suited for instrumentation control, and computer module (C module) suited for computer control. These modules can be used individually or in any combination.

Also, there are three station configurations with different size: Large (Model 3000), Small (Model 2000), and Very Small (Model 1000).

[Large type (Model 3000)]

CPU Module:
- Sequence Control Module (S Module)
- Loop Control Module (L Module)
- Computer Module (C Module)

I/O Module:
- Parallel I/O
- Serial I/O
- 5800 I/O

1

[Small type (Model 2000)]

CPU Module:
- Sequence Control Module (S Module)
- Loop Control Module (L Module)
- Computer Module (C Module)

I/O Module:
- Parallel I/O
- Serial I/O

[Very small type (Model 1000)]

CPU Module:
- Loop Control Module (L Module)

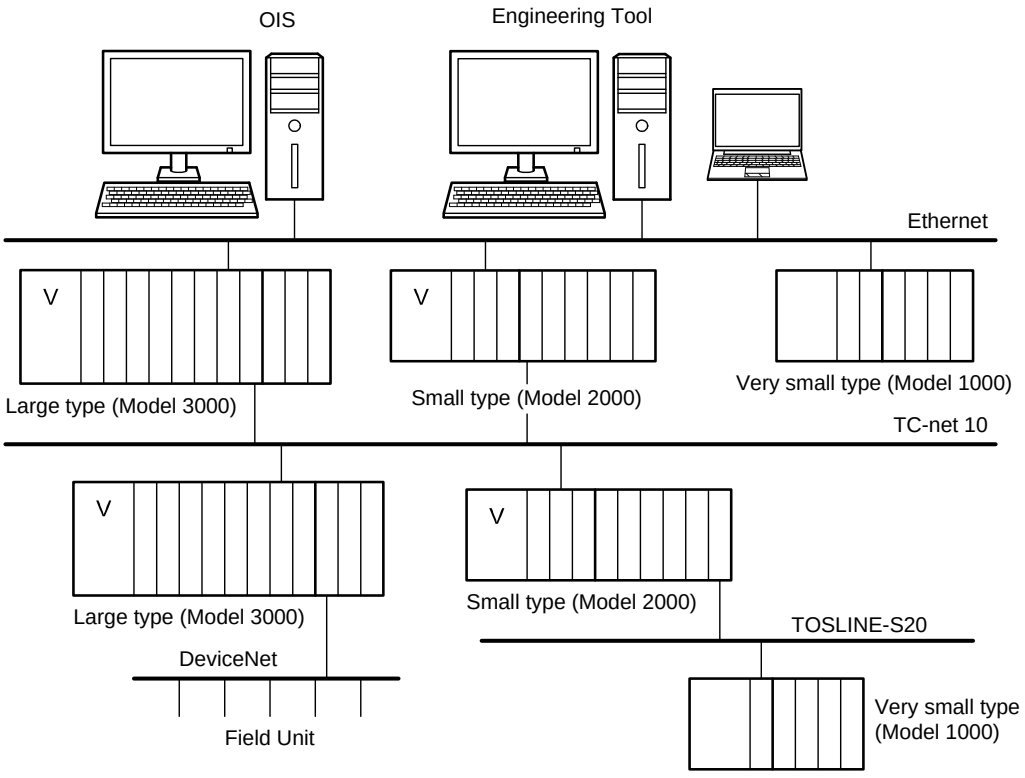
I/O Module:
- Serial I/O

1.2.1 System configuration

System consists of multiple Networks and Stations.
Ethernet, TC-net100, FL-net, MODBUS etc can be used as nv series Network to connect each station or field unit.

Ethernet, TC-net, ADMAP, Tosline, DeviceNet ,Profibus etc can be used as V series Network to connect each station or field unit.

The general system configuration is as follows. (The following system is V series.)



◇ **Supplementary**

- Refer to the LAN Card User Manual for the details concerning LAN.

1.2.1.1 Network

Network refers to a single LAN segment connecting multiple nodes (stations). Network is divided into the following three major levels.

- Network for monitor
- Network for system
- Network for field I/O

● Restrictions
In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the ReadMe.TXT file included with the setup package and check the latest information.

● Network for monitor
Connects process monitor and operation unit (such as OIS_DS) and the station of the nv series and the V series.

Name	Description
EtherLAN	Ethernet LAN (Single)
EtherLANDouble	Ethernet LAN (Double)

● Network for system
Mutually connects the station of the nv series and the V series.
For high speed transmission between controllers.

Name	Description
S20LAN	S20 LAN
S20LoopLAN	S20-Loop LAN
TC-net 10LAN	TC-net 10 LAN (Single)
TC-net 10LANd	TC-net 10 LAN (Double)
TC-net 20LAN	TC-net 20 LAN
TC-net 100LAN	TC-net 100 LAN (Single)
TC-net 100LANd	TC-net 100 LAN (Double)
FL-netLAN	FL-net LAN
FL-netControlLAN	FL-net Control LAN
ADMAP-5MLAN	ADMAP-5M LAN
ADMAP-100FLAN	ADMAP-100F LAN

* 'FL-netLAN' and ' FL-netControlLAN' are the same network for FL-net [OPCN-2].
But there are restrictions to register node of these networks. Please see the manual '1.2.1.2 Node'.

- Network for field
  Connects field units.

Name	Description
DevicenetLAN	Devicenet LAN
T_EthernetLAN	T-series Ethernet LAN
F10LAN	F10 LAN
ProfibusLAN	Profibus LAN
TL-30LAN	TL-30 LAN
TL-100LAN	TL-100 LAN
TL-1000LAN	TL-1000 LAN
ProfibusLAN	Profibus LAN
ModbusLANm	Modbus LAN (Master)
ModbusLANs	Profibus LAN (Slave)

1.2.1.2 Node

Node refers to transmission stations connecting to Network.

The nodes connected to Network at each level are shown below.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the Readme.txt file included with the setup package and check the latest information.
- Network for monitor
  EtherLAN, EtherLANDouble

  [nv series]

Name	Description
EN811	Ethernet GB/100MB for electric (Single)
EN812	Ethernet GB/100MB for TOSMAP-DS
EN821	Ethernet GB/100MB for optical (Single)
FN812	Ethernet GB/100MB for OIS-DS

1

[Large type (Model 3000)]

Name	Description
EN711	Ethernet LAN card 10BASE5 (Single)
EN721	Ethernet LAN card 10BASE5 (Double)
EN731	Ethernet LAN card 10BASE2 (Single)
EN741	Ethernet LAN card 10BASE2 (Double)
EN751	Fast Ethernet LAN card (Single)
EN761	Fast Ethernet LAN card (Double)
FN711	Ethernet card (DS type)

[Small type (Model 2000)]

Name	Description
EN611	Ethernet LAN card 10BASE5 (Single)
EN621	Ethernet LAN card 10BASE5 (Double)
EN631	Ethernet LAN card 10BASE2 (Single)
EN641	Ethernet LAN card 10BASE2 (Double)
EN651	Fast Ethernet LAN card (Single)
EN661	Fast Ethernet LAN card (Double)
FN611	Ethernet card (DS type)

[Very small type (Model 1000)]

Name	Description
EN531	Ethernet LAN card for L1PU11

[Other]

Name	Description
ENGW-5654	TL-8000 Message gateway
FMGW1	MDWS/TC-net gateway

- Network for control

<S20LAN>

[Large type (Model 3000)]

Name	Description
SN321	G3I/O S20 coxial type
SN322A	G3I/O S20 optical type
SN323	G3I/O S20 coxial/optical type

[Small type (Model 2000)]

Name	Description
SN621	G2I/O S20 coxial type
SN622	G2I/O S20 optical type
SN221	G2I/O S20 coxial type
SN222A	G2I/O S20 optical type

<S20LoopLAN>

[Large type (Model 3000)]

Name	Description
SN325	G3I/O S20LP optical loop type

[Very small type (Model 1000)]

Name	Description
L1PU12	L1-type2 with TL-S20LP

<TC-net 10LAN, TC-net 10LANd>

[Large type (Model 3000)]

Name	Description
CN711	TC-net 10 LAN card for coxial (Single)
CN712	TC-net 10 LAN card for coxial (Double)

[Small type (Model 2000)]

Name	Description
CN611	TC-net 10 LAN card for coxial (Single)
CN612	TC-net 10 LAN card for coxial (Double)

<TC-net 20LAN>
[Small type (Model 2000)]

Name	Description
CN623	TC-net 20 LAN card for optical loop (Dual)

<TC-net 100LAN, TC-net 100LANd>
[nv series]

Name	Description
TN821	TC-net 100 LAN card for optical (Single)
TN822	TC-net 100 LAN card for optical (Dual)

[Large type (Model 3000)]

Name	Description
TN711	TC-net 100 LAN card for electric (Single)
TN712	TC-net 100 LAN card for electric (Dual)
TN721	TC-net 100 LAN card for optical (Single)
TN722	TC-net 100 LAN card for optical (Dual)

[Other]

Name	Description
TNH11A	TC-net 100 shared hub electric/single
TNH11A_B	TC-net 100 shared hub electric/dual
TNH21A	TC-net 100 shared hub optical/single
TNH21A_B	TC-net 100 shared hub optical/dual
TNE21	TC-net 100 Ethernet bridge/single
TNGW-5652	TL-8000 gateway
FMGW1	MDWS/TC-net gateway

<FL-netLAN>
[nv series]

Name	Description
FL911	FL-net module

[Large type (Model 3000)]

Name	Description
FL311	G3 I/O FL-net module(Ver1.00)
FL312	G3 I/O FL-net module(Ver2.00)

[Small type (Model 2000)]

Name	Description
FL211	G2 I/O FL-net module(Ver1.00)
FL212	G2 I/O FL-net module(Ver2.00)
FL611	G2 I/O FL-net module(Ver1.00)
FL612	G2 I/O FL-net module(Ver2.00)

* For other type node like FL754, please use the node of 'other station'.

<FL-netControlLAN>
[Large type (Model 3000)]

Name	Description
FL754	FL-net G3 Remote I/O station

[Small type (Model 2000)]

Name	Description
FL654	FL-net G2 Remote I/O station

* For other type node like FL312, please use the node of 'other station'.

◇ Supplementary

- When FL-net Remote I/O station and FL-net module for controller are connected to same network, and FL-net Remote I/O station is registered with V-Tool, please register as follows:
  1) Register both 'FL-net LAN' and 'FL-net Control LAN'.
  2) On the each network, register normal node and other station node.

<ADMAP-5MLAN>
[Large type (Model 3000)]

Name	Description
AN712	ADMAP-5M Gateway module

<ADMAP-100FLAN>
[Large type (Model 3000)]

Name	Description
AN777	ADMAP-100F interface module

- Network for Field

<DevicenetLAN>
[Large type (Model 3000)]

Name	Description
DN311	G3I/O Devicenet master station

[Small type (Model 2000)]

Name	Description
DN611	G2 I/O Devicenet Master
DN211	G2 I/O Devicenet Master

<F10LAN>
[Large type (Model 3000)]

Name	Description
MS311	G3I/O T-F10 master station
MS321-128	G3I/O T-F10M master station with 128words
MS321-256	G3I/O T-F10M master station with 256 words
MS321-32	G3I/O T-F10M master station with 32 words
MS321-64	G3I/O T-F10M master station with 64 words
MS331	G3I/O T-F10L master station
RS311	G3I/O T-F10 remote station

[Small type (Model 2000)]

Name	Description
UN611	G2I/O F10 master station
UN612	G2I/O F10 remote station
MS211	G2I/O F10 master station
RS211	G2I/O F10 remote station

<TL-30LAN>

Name	Description
LK611	G2 I/O TOSLINE-30 for twisted pair type
LK612	G2 I/O TOSLINE-30 for optical type
LK11	G2 I/O TOSLINE-30 for twisted pair type
LK12	G2 I/O TOSLINE-30 for optical type
TL30_X	TOSLINE-30 station

<TL-100LAN>

Name	Description
TL100_X	TOSLINE-100 station

<TL-1000LAN>

Name	Description
TL1000_X	TOSLINE-1000 station

<ProfibusLAN>
[Large type (Model 3000)]

Name	Description
PF311	G3 I/O PROFIBUS-DP module
PF312	G3 I/O PROFIBUS-DP slave module

[Small type (Model 2000)]

Name	Description
PF611	G2 I/O PROFIBUS-DP master module
PF612	G2 I/O PROFIBUS-DP slave module

1

<ModbusLANm>

[nv series]

Name	Description
MD911-M	MODBUS-RTU module (Master)

<ModbusLANs>

[nv series]

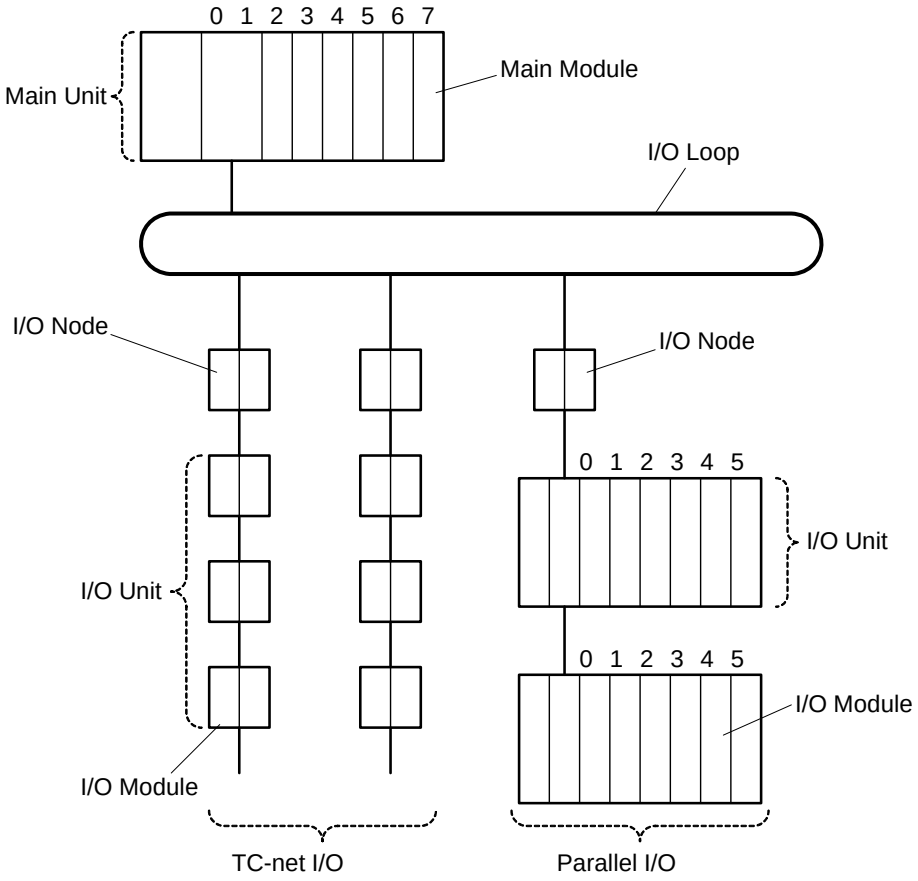
Name	Description
MD911-S	MODBUS-RTU module (Slave)

1.2.2 Station configuration

A station consists of one main unit and connected Main Modules, Buses, I/O Units, and I/O Modules.
I/O Modules are Parallel I/O and Serial I/O.

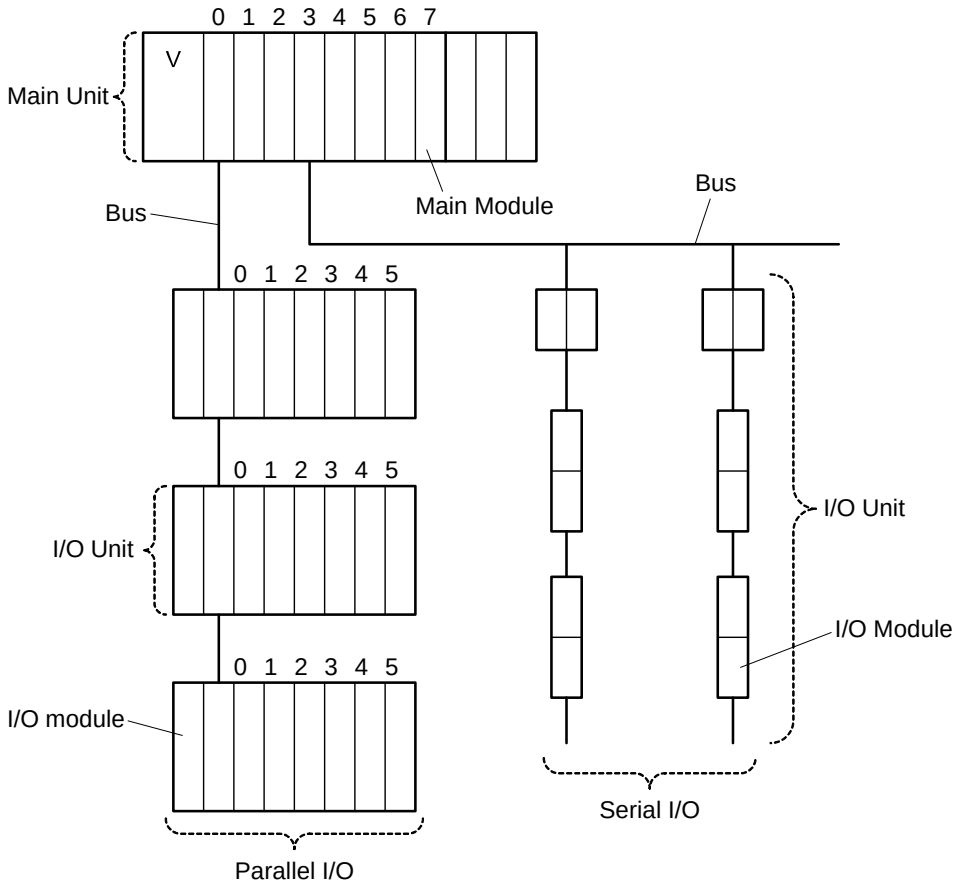
The station configuration for each model is shown.

■ Station configuration of nv series



■ Station configuration of V series

[Large Type (Model 3000)]



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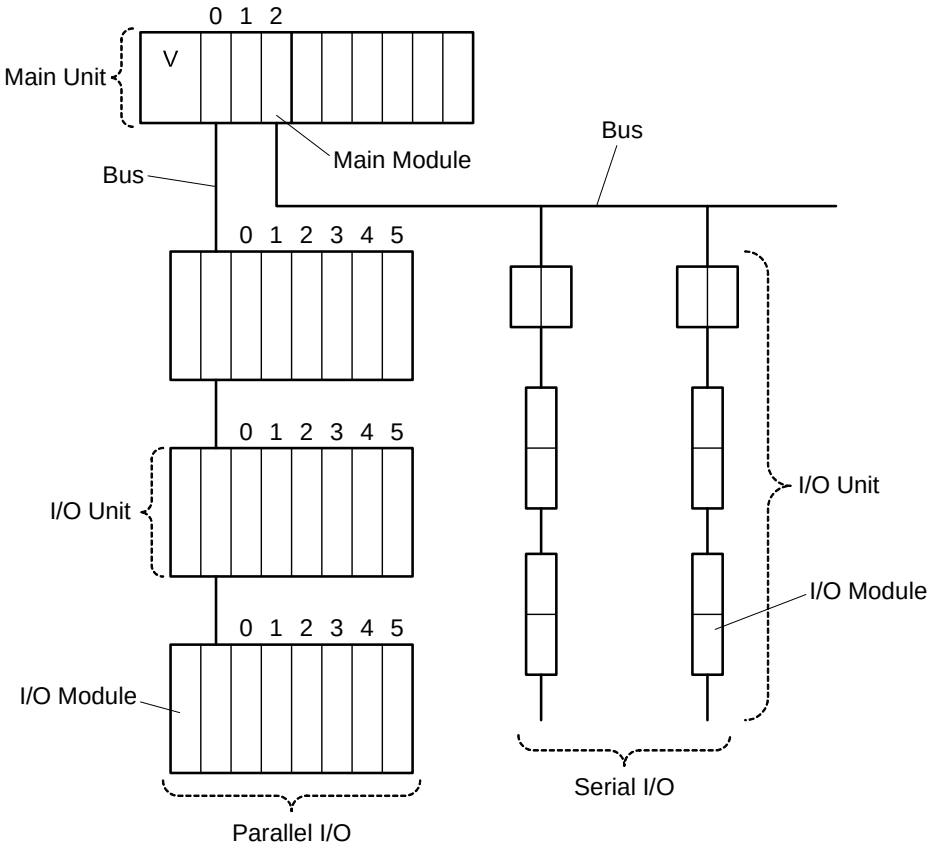
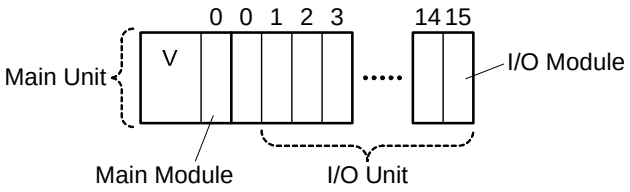
[Small type (Model 2000)]



[Very Small type (Model 1000)]



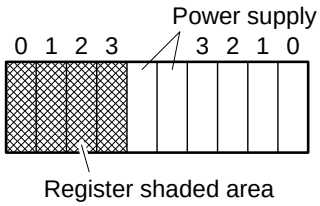
◇ **Supplementary**

- Refer to the Controller User Manual for details concerning main unit and main module.
- Refer to the User Manual for detail information concerning bus, I/O Unit, and I/O module.

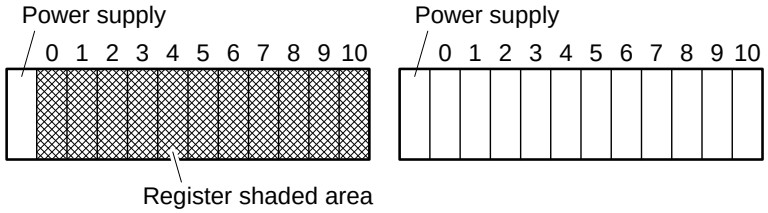
■ Duplexing concept

Duplexing is to be performed by "Selecting duplexing module" from the tool. Therefore, station configuration can be registered without setting the same module twice.

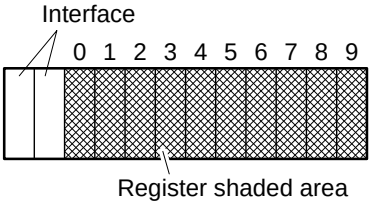
<Main Unit (for duplexing)>



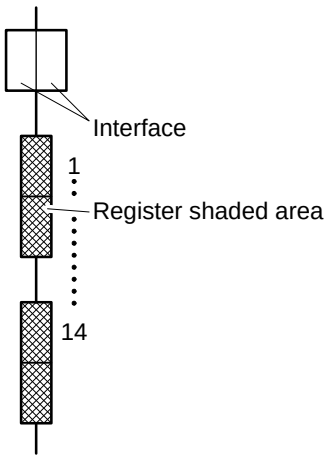
<Main unit (2 unit duplexing)>



<Parallel I/O unit (Bus interface duplexing)>



<Serial I/O unit (Bus interface duplexing)>



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1.2.2.1 Main unit

Main Unit refers to units consisting of modules including CPU such as controllers.
It is also called the "Base Unit."
Main Unit is divided in to single mode and duplex mode unit.
The main unit for each model is as follows.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool.
  Read the ReadMe.TXT file included with the setup package and check the latest information.

- Main unit of nv series

Name	Description
BU816	nv station main unit(Single) 7 main
BU816Double	nv station main unit(Double with 2 set) 7 main *2
BU825	nv station main unit(Double) 6 main
BU825Single	nv station main unit(Single) 6 main
BU866	nv station multi main unit(Single) 7 main

- Main unit of V series
  [Large type (Model 3000)]

Name	Description
BU719	Model3000 main unit(Single) 2 main + 9 I/O with no system bus
BU742	Model3000 main unit(Single) 2 main + 9 I/O
BU742Double	Model3000 main uinit(Double with 2 set) 2 main *2
BU744	Model3000 main uinit(Single)4 main + 7 I/O
BU744Double	Model3000 main unit(Double with 2 set) 4 main *2
BU746	Model3000 main unit(Single) 6 main + 5 I/O
BU746Double	Model3000 main unit(Double with 2 set) 6 main *2
BU748	Model3000 main unit(Single) 8 main + 3 I/O
BU748Double	Model3000 main unit(Double with 2 set) 8 main *2
BU784	Model3000 main unit(Double) 4 main
BU784Single	Model3000 main unit(Single) 4 main
BU74A	Model3000 RI/O Main Unit(Single) with 6 slots

[Small type (Model 2000)]

Name	Description
BU643D	Model2000 main unit(Single) 4 main + 3 I/O
BU643DDouble	Model2000 main unit(Double with 2 set) 4 main
BU648E	Model2000 main unit(Single) 5 main + 8 I/O
BU648EDouble	Model2000 main unit(Double with 2 set) 5 main
BU664	Model2000 main unit(Single) 2 main + 3 I/O
BU666	Model2000 main unit(Single) 1 main + 5 I/O
BU668	Model2000 main unit(Single) 1 main + 8 I/O

[Very small type (Model 1000)]

Name	Description
MainUnit11	model1000 main unit for L1PU11,EN531,L1LG11
MainUnit12	model1000 main unit for L1PU12,LC

- Main unit of other

Name	Description
ANStn	ADMAP station unit
DNStn	Devicenet station unit
F10Stn	F10 station unit
FLStn	FL-net station unit
PFStn	Profibus station unit
SNStn	S20 station unit
TL30Stn	TL-30 station unit
TL100Stn	TL-100 station unit
TL1000Stn	TL-1000 station unit
TL8000GWStn	TL-8000 gateway station unit
TNHub	TC-net100 hub unit
TNStn	TC-net100 station unit
FMGWStn	MDWS/TC-net gateway station unit

1

1.2.2.2 Main module

Main module refers to controller modules contained in the main unit. Large type G3I/O module and small type G2I/O module are treated as main module in the tool because they can connect to main unit in addition to I/O unit. The following main modules can be registered from main unit of each model.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the ReadMe.TXT file included with the setup package and check the latest information.
- Main module of nv series

  BU816,BU816Double,BU825,BU825Single

Name	Description
PU811	Unified Controller type1 256KS sequence model
PU821	Unified Controller type2 512KS DCS model
PU871	Unified Controller type2 (nuclear) 512KS
EN811	Ethernet GB/100MB for electric (Single)
EN812	Ethernet GB/100MB for TOSMAP-DS
EN821	Ethernet GB/100MB for optical (Single)
FN812	Ethernet GB/100MB for OIS-DS
FN862	Ethernet GB/100MB for OIS-DS (nuclear)
TN821	TC-net 100 LAN card for optical (Single)
TN822	TC-net 100 LAN card for optical (Dual)

  BU866

Name	Description
PU866	Unified Controller type1 (multi) 256KS
EN811	Ethernet GB/100MB for electric (Single)
EN821	Ethernet GB/100MB for optical (Single)
TN821	TC-net 100 LAN card for optical (Single)
TN822	TC-net 100 LAN card for optical (Dual)

- Main module of V series
  [Large type (Model 3000)]

  BU742, BU742Double, BU744, BU744Double, BU746, BU746Double, BU748, BU748Double, BU784

Name	Description
C3PU11	C3 RS3 8MB
C3PU22	C3 NT(Japanese) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU23	C3 NT(Japanese) 128MB Hard Disk 4.8GB, PCMCIA 2
C3PU35	C3 controller (Fast type)
C3PU62	C3 NT(English) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU63	C3 NT(English) 128MB Hard Disk 4.8GB, PCMCIA 2
CN711	TC-net 10 LAN card for coxial (Single)
CN712	TC-net 10 LAN card for coxial (Double)
EN711	Ethernet LAN card 10BASE5 (Single)
EN721	Ethernet LAN card 10BASE5 (Double)
EN731	Ethernet LAN card 10BASE2 (Single)
EN741	Ethernet LAN card 10BASE2 (Double)
EN751	Fast Ethernet LAN card (Single)
EN761	Fast Ethernet LAN card (Double)
FN711	Ethernet card (DS type)
IF719	DU3 with no G3I/O bus
IF721	PIF 2 G3I/O buses
IF728	DU3 with 2 G3I/O buses
IF735	SIF 3 SI/O buses
IF741	PIF 4 G3I/O buses
IF748	DU3 with 4 G3I/O buses
L3PU11	L3-type1 (MCS type)
L3PU21	L3-type2 (DS type)
S3PU45	S3-type3 112kstep 64kW
S3PU55	S3-type1 112kstep 128kW
S3PU65	S3-type5 112kstep 128kW Duplex Type
TS711	GPS Interface
TN711	TC-net 100 LAN card for electric (Single)
TN712	TC-net 100 LAN card for electric (Dual)
TN721	TC-net 100 LAN card for optical (Single)
TN722	TC-net 100 LAN card for optical (Dual)
AN712	ADMAP-5M card
AN777	ADMAP-100F interface module

* The I/O module cannot be registered in the main unit for the dual system.

BU742

Name	Description
FL754	FL-net G3 Remote I/O station

* G3I/O Module can be registered in addition to the above.

BU719

Name	Description
C3PU11	C3 RS3 8MB
C3PU22	C3 NT(Japanese) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU23	C3 NT(Japanese) 128MB Hard Disk 4.8GB, PCMCIA 2
C3PU35	C3 controller (Fast type)
C3PU62	C3 NT(English) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU63	C3 NT(English) 128MB Hard Disk 4.8GB, PCMCIA 2
CN711	TC-net 10 LAN card for coxial (Single)
CN712	TC-net 10 LAN card for coxial (Double)
EN711	Ethernet LAN card 10BASE5 (Single)
EN721	Ethernet LAN card 10BASE5 (Double)
EN731	Ethernet LAN card 10BASE2 (Single)
EN741	Ethernet LAN card 10BASE2 (Double)
EN751	Fast Ethernet LAN card (Single)
EN761	Fast Ethernet LAN card (Double)
FN711	Ethernet card (DS type)
IF719	DU3 with no G3I/O bus
IF721	PIF 2 G3I/O buses
IF728	DU3 with 2 G3I/O buses
IF735	SIF 3 SI/O buses
IF741	PIF 4 G3I/O buses
IF748	DU3 with 4 G3I/O buses
L3PU11	L3-type1 (MCS type)
L3PU21	L3-type2 (DS type)
S3PU21	S3-type4 64kstep 48kW with no system bus
S3PU45	S3-type3 112kstep 64kW
S3PU55	S3-type1 112kstep 128kW
S3PU65	S3-type5 112kstep 128kW Duplex Type
TS711	GPS Interface
TN711	TC-net 100 LAN card for electric (Single)
TN712	TC-net 100 LAN card for electric (Dual)
TN721	TC-net 100 LAN card for optical (Single)
TN722	TC-net 100 LAN card for optical (Dual)

* G3I/O Module can be registered in addition to the above.

BU74A

Name	Description
C3PU11	C3 RS3 8MB
C3PU22	C3 NT(Japanese) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU23	C3 NT(Japanese) 128MB Hard Disk 4.8GB, PCMCIA 2
C3PU35	C3 controller (Fast type)
C3PU62	C3 NT(English) 64MB, Hard Disk 4.8GB, PCMCIA 2
C3PU63	C3 NT(English) 128MB Hard Disk 4.8GB, PCMCIA 2
EN711	Ethernet LAN card 10BASE5 (Single)
EN721	Ethernet LAN card 10BASE5 (Double)
EN731	Ethernet LAN card 10BASE2 (Single)
EN741	Ethernet LAN card 10BASE2 (Double)
EN751	Fast Ethernet LAN card (Single)
EN761	Fast Ethernet LAN card (Double)
R3PU45 + IF721	R3 RI/O controller with PIF(2 G3I/O buses)
R3PU45 + IF71B	R3 RI/O controller with PIF(1 5800I/O bus)
R3PU45 + IF72C	R3 RI/O controller with MELPLAC I/O (2 buses)
S3PU45	S3-type3 112kstep 64kW
S3PU55	S3-type1 112kstep 128kW
S3PU45 + IF721	S3 controller (112ks 64kw) for RI/O with PIF(G3 2 bus)
S3PU45 + IF741	S3 controller (112ks 64kw) for RI/O with PIF(G3 4 bus)
S3PU55 + IF721	S3 controller (112ks 128kw) for RI/O with PIF(G3 2 bus)
S3PU55 + IF741	S3 controller (112ks 128kw) for RI/O with PIF(G3 4 bus)
S3PU65	S3-type5 112kstep 128kW Duplex Type
TN711	TC-net 100 LAN card for electric (Single)
TN712	TC-net 100 LAN card for electric (Dual)
TN721	TC-net 100 LAN card for optical (Single)
TN722	TC-net 100 LAN card for optical (Dual)

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[Small type (Model 2000)]
BU643D, BU643Ddouble, BU648E, BU648Edouble, BU664, BU666, BU668

Name	Description
C2PU11	C2 RS3 8MB
C2PU21	C2 NT(Japanese) 64MB, Flash Disk 160MB
C2PU22	C2 NT(Japanese) 64MB, Hard Disk 4.8GB
C2PU23	C2 NT(Japanese) 128MB, Hard Disk 4.8GB, PCMCIA 2
C2PU35	C2 controller (Fast type)
C2PU37	C2 controller (Hard disk pack type)
C2PU61	C2 NT(English) 64MB, Flash Disk 160MB
C2PU62	C2 NT(English) 64MB, Hard Disk 4.8GB
C2PU63	C2 NT(English) 128MB, Hard Disk 4.8GB, PCMCIA 2
CN611	TC-net 10 LAN card for coxial (Single)
CN612	TC-net 10 LAN card for coxial (Double)
CN623	TC-net 20 LAN card for optical loop (Dual)
EN611	Ethernet LAN card 10BASE5 (Single)
EN621	Ethernet LAN card 10BASE5 (Double)
EN631	Ether LAN card 10BASE2 (Single)
EN641	Ether LAN card 10BASE2 (Double)
EN651	Fast Ethernet LAN card (Single)
EN661	Fast Ethernet LAN card (Double)
FN611	Ethernet card (DS type)
IF617	EC bus interface
L2PU11	L2-type1 with 1 SI/O bus
L2PU12	L2-type2 with 3 SI/O bus
L2PU22	L2-type5 (DS type)
S2PU22	S2-type1 32Kstep with no system bus
S2PU32	S2-type4 64Kstep with no system bus
S2PU72	S2-type2 64Kstep
S2PU72D	S2-type5 64Kstep Duplex Type
S2PU82	S2-type3 64Kstep

* The I/O module cannot be registered in the main unit for the dual system.

BU648E

Name	Description
CN614	G2 RI/O for Optical transmission
R2PU72	G2 Remoto I/O Controller
CN624	TC-net 20 LAN card for optical loop (Dual)

* G2I/O Module can be registered in addition to the above.

BU668, BU666, BU664

Name	Description
FL654	FL-net G2 Remote I/O station

* G2I/O Module can be registered in addition to the above.

[Very small type (Model 1000)]
MainUnit11

Name	Description
L1PU11	L1-type1
L1LG11	L1 Logger
EN531	Ethernet LAN card for L1PU11

MainUnit12

Name	Description
L1PU12	L1-type2 with TL-S20LP
LC511	One loop controller (Current)
LC512	One loop controller (Pulse)
LC521	One loop controller (Current) for MC Bus
LC522	One loop controller (Pulse) for MC Bus

- Main module of other

ANStn

Name	Description
AN_X	ADMAP-5M station
AN_Y	ADMAP-100F station

DNStn

Name	Description
DN_X	Devicenet station

F10Stn

Name	Description
F10_X	F10 station

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FLStn

Name	Description
FL_X	FL-net station
FL_Y	FL-net station (For FLnetControlLAN)

PFStn

Name	Description
PF_X	Profibus station

SNStn

Name	Description
SN_X	S20-Loop LAN card
SN_Y	S20 LAN card

TL30Stn

Name	Description
TL30_X	TOSLINE-30 station

TL100Stn

Name	Description
TL100_X	TOSLINE-100 station

TL1000Stn

Name	Description
TL1000_X	TOSLINE-1000 station

TL8000GWStn

Name	Description
TNGW-5652	TL-8000 gateway
ENGW-5654	TL-8000 Message gateway

TNHub

Name	Description
TNH11A	TC-net 100 shared hub electric/single
TNH11A_B	TC-net 100 shared hub electric/dual
TNH21A	TC-net 100 shared hub optical/single
TNH21A_B	TC-net 100 shared hub optical/dual
TNE21	TC-net 100 Ethernet bridge/single

TNStn

Name	Description
TNI11	TC-net 100 LAN card electric/single
TNI12	TC-net 100 LAN card electric/dual
TNI21	TC-net 100 LAN card optical/single
TNI22	TC-net 100 LAN card optical/dual

FMGWStn

Name	Description
FMGW1	MDWS/TC-net gateway

1.2.2.3 I/O node / bus

In the case of the nv series, indicates the I/O Node between the main module and I/O module.

In the case of the V series, Indicates the bus connecting to I/O unit from main module.

Bus is divided into Parallel Bus,Serial Bus,5800I/O Bus and MELPLAC I/O Bus. In the tool, the bus is connected with the left end controller.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the ReadMe.TXT file included with the setup package and check the latest information.
- I/O Node of nv series
  PU811, PU821, PU866, PU871

Name	Description
SA911	TC-net I/O I/F for electric
SA912	TC-net I/O I/F for optical
SA931	TC-net I/O I/F (for LP918B)

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● I/O node of V series
[Large type (Model 3000)]

• Parallel I/O
IF721, IF728, IF741, IF748
R3PU45 + IF721, S3PU45 + IF721, S3PU45 + IF741, S3PU55 + IF721, S3PU55 + IF741

Name	Description
G3Bus	G3 Parallel Bus

• 5800 I/O
R3PU45 + IF71B

Name	Description
5800IOBus	5800 I/O bus

• MELPLAC I/O
R3PU45 + IF72C

Name	Description
M_IOBus	MELPLAC I/O Bus

• Serial I/O
IF735, L3PU11

Name	Description
SerialBus	Serial Bus

[Small type (Model 2000)]

• Parallel I/O
In the case of small type parallel I/O, the bus connects to dedicated G2I/O interface module rather than the main module. There is no bus registration in the tool, but the following bus is used for I/O unit selection.

Name	Description
G2Bus_V	G2I/O bus for G2 I/O unit
G2Bus_T	G2I/O bus for G2/T2 I/O unit
G2Bus_EX	G2I/O bus for EX I/O unit

- Serial I/O
  L2PU11, L2PU12

Name	Description
SerialBus	Serial Bus

[Very small type (Model 1000)]

- Serial I/O
  L1PU11, L1PU12

Name	Description
IOBus	For IO Bus L1

1.2.2.4 I/O unit

Unit used to expand the I/O module in addition to the main unit. Also called Expansion Unit.

In the case of the nv series, there are I/O units for TC-net I/O, Parallel I/O or Serial I/O.

In the case of the V series, there are I/O units for Parallel I/O, Serial I/O, 5800 I/O or MELPLAC I/O.

The following I/O units can be registered for I/O node or Bus of each model.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the ReadMe.TXT file included with the setup package and check the latest information.
- I/O Unit of nv series
  - TC-net I/O
    SA911, SA912

Name	Description
SIOUnit	TC-net I/O unit 16 slots

SA931

Name	Description
BU928F	TC-net I/O unit (LP918B) with 8 slots

● I/O Unit of V series
[Large Type (Model 3000)]

• Parallel I/O
G3Bus

Name	Description
BU356	G3I/O unit(Single) with 6 slots
BU35B	G3I/O unit(Single) with 11 slots

• 5800 I/O
5800IOBus

Name	Description
CHS-5807	5800 I/O unit with 17 slots
CHS-5839	5800 I/O unit(only Power I/O) with 9 slots

• MELPLAC I/O
M_IOBus

Name	Description
BS4706-03	BS series I/O unit with 1 slot
E7CPU	E series I/O unit with 11 slots
U1CPU	E series I/O unit with 5 slots
DSU	F series I/O unit with 3 slots
F1IOU	F series I/O unit with 10 slots
EIOU	K series I/O unit with 8 slots
E1IOU	K series I/O unit with 8 slots
E3IOU	K series I/O unit with 8 slots
E4IOU-F	K series I/O unit with 8 slots
E4IOU-B	K series I/O unit with 8 slots
IOU	K series I/O unit with 8 slots
DCPU	P series I/O unit with 1 slot
MDWU	P series I/O unit with 1 slot

- Serial I/O
  SerialBus

Name	Description
SBIF1	SI/O unit with 14 slots(Single)(Slow type)
SBIF1Double	SI/O unit with 14 slots(Double)
SBIF2	SI/O unit with 14 slots(Single)(Fast type)
SBIF2Double	SI/O unit with 14 slots(Double)(Fast type)
F-AI/AO	F series I/O unit (AI/AO)
F-DI/DO	F series I/O unit (DI/DO)
SSIF1Unit	Serial I/O Unit

[Small type (Model 2000)]

- Parallel I/O
  G2Bus_V

Name	Description
BU664_E	G2I/O unit with 4 slots
BU666_E	G2I/O unit with 6 slots
BU668_E	G2I/O unit with 8 slots

G2Bus_T

Name	Description
BU266	T2I/O unit with 6 slots
BU268	T2I/O unit with 8 slots
BU664_E	G2I/O unit with 4 slots
BU666_E	G2I/O unit with 6 slots
BU668_E	G2I/O unit with 8 slots

G2Bus_EX

Name	Description
UBB1	EXI/O unit with 5 slots
UBB2	EXI/O unit with 8 slots

- Serial I/O
  SerialBus

Name	Description
SBIF1	SI/O unit with 14 slots(Single)(Slow type)
SBIF1Double	SI/O unit with 14 slots(Double)
SBIF2	SI/O unit with 14 slots(Single)(Fast type)
SBIF2Double	SI/O unit with 14 slots(Double)(Fast type)
F-AI/AO	F series I/O unit (AI/AO)
F-DI/DO	F series I/O unit (DI/DO)
SSIF1Unit	Serial I/O Unit

[Very small type (Model 1000)]

- Serial I/O
  IOBus

Name	Description
IOUnit	SI/O unit with 16 slots for L1

1.2.2.5 I/O module

Indicates I/O modules forming I/O units.

In the case of the nv series, there are I/O modules for TC-net I/O, Parallel I/O or Serial I/O.

In the case of the V series, there are I/O modules for Parallel I/O, Serial I/O, 5800 I/O or MELPLAC I/O.

These I/O modules that can be registered for I/O unit of each model are as follows.

- Restrictions
  In some cases, there are restrictions on the equipment supported by the Engineering Tool. Read the ReadMe.TXT file included with the setup package and check the latest information.

- I/O Module of nv series
  - TC-net I/O
    SIOUnit

Name	Description
DI934	DC24V 5.2mA input with digital filter
DI934I	DC24V 5.2mA input with digital filter(for Instrumentation)
DI934T	DC24V 8mA input with digital filter (Temp. derating)
DI944	DC48V 2.6mA input with digital filter
DI935	DC24V 4mA input with digital filter
DI936	DC12/24V 10mA input with digital filter (point isolation)
IN956	AC/DC-100/110V input (point isolation)
IN966	AC200/240V 10mA input (point isolation)
DI937	DC24V 10mA contact input
DI947	DC48V 4.5mA contact input
DI957	DC100/120V 2.3mA contact input
DI934S	DC24V 5.2mA input with strobe
DO934	DC24V 100mA output
DO935	DC24V 100mA sync output
DO934P	DC12/24V 80mA/point 1.6A,16 points/com sync output
DO936	DC24V 2.0A FET-CH isolation output (no fuse)
AC963	AC100/240V- 2A/point output
RO966	AC240V/DC24V-2.0A output
AI914	0-5V 14bits input (1ms)
AI918	0-5V 14bits input (16bits format, 10ms)
AI918F	0-5V 16bits input (16bits format, 10ms)
AI919	0-5V 14bits input (16bits format, 50ms)
AI929D	0-5V 14bits input (16bits format, 50ms) with distributor
AI918D	0-5V 14bits input (16bits format, 10ms) with distributor
AI938	+ -10V 14bits input (S + 13bits format, 0.5ms) with distributor
AI928	0-20mA 14bits input (0.5ms)
AI969	With 16 mV/V input
TC919	Thermocouple (type B,R,S,J,K,T,E)
RT918C	RTD Pt100,JPt100 (common)
RT918	RTD Pt100,JPt100 (point isolation)
AO928	0-20mA 14bits output (16bits format, 1ms)
AO928F	0-20mA 16bits output (16bits format, 1ms)
AO929	0-20mA 14bits output (16bits format, 20ms)
AO918	0-5V 14bits output (16bits format, 10ms)
AO918F	0-5V 16bits output (16bits format, 10ms)

Name	Description
AO919	0-5V 14bits output (16bits format, 20ms)
AO938	-10V to 10V 14bits output (S + 15bits format, 5ms/8ch)
AO934F	-10V to 10V 16bits output (S + 15bits format, 0.175ms)
AO954F	-10mA to 10mA 16bits output (S + 15bits format, 0.175ms)
PI918	Pulse input (High speed DC-50kHz, Low speed 0-50Hz)
PI924	Bipulse input (DC-50kHz)
PI934	RS485 differential pulse input
PI948	With 8 voltage instrumentation pulse
PO918	Pulse output (DC24V-100mA, Width:72/9ms Row:28/111Hz)
PO928	Pulse output conforming TOSMAP(POC1)
FI913	Frequency input
FL911	FL-net module
MD911-M	MODBUS-RTU module (master)
MD911-S	MODBUS-RTU module (slave)
AB932J	Resolver type absolute single-turn encoder
AB933J	Resolver type absolute multi-turn encoder
AB934J	Resolver type linear encoder
AB932N	Resolver type absolute single-turn encoder
AB933N	Resolver type absolute multi-turn encoder
AB934N	Resolver type linear encoder
TP912M	Linear sensor

- BU928F

Name	Description
LP918B	AI12,MV8(4-20mA output),DI8,DO8 (Single)
LP918BDouble	AI12,MV8(4-20mA output),DI8,DO8 (Double)

- I/O Module of V series
  [Large Type (Model 3000)]
  - Parallel I/O
    BU356, BU35B

Name	Description
AB32N	G3 I/O absocoder converter 1 turn
AB33N	G3 I/O absocoder converter muti turn
AB34N	G3 I/O absocoder converter linear
AC354	G3 I/O 32 DO ,100Vac 0.5A/point
AC363	G3 I/O 16 DO ,100Vac/200Vac 2.0A/point
AC364	G3 I/O 32 DO ,100/200Vac 0.5A/point
AD318	G3 I/O fast 8 AI ,0-5V with channel isolation
AD328	G3 I/O fast 8 AI ,4-20mA with chanel isolation
AD334S	G3 I/O fast 4 AI ,-10to + 10V with chanel isolation
AD338	G3 I/O fast 8 AI ,-10to + 10V with chanel isolation
AD368	G3 I/O 8 AI, 10V,5V,0-20mA,4-20mA,0-5V,1-5V
AS311	G3 I/O ASCII interface
BS311	G3 I/O BSC protocol comm.
CD332	G3 I/O 8 CCDI
CD333	G3 I/O 16 CDDI
CD333-1W	G3 I/O 8 CDDI (CD332 compatible mode)
DA314S	G3 I/O fast 4 AO ,0-5V with chanel isolation (with output hold)
DA324S	G3 I/O fast 4 AO ,0-20mA with chanel isolation (with output hold)
DA334S	G3 I/O fast 4 AO ,-10to + 10V with chanel isolation
DA364	G3 I/O fast 4 AO ,-10to + 10V,-5to + 5V,0-10V,0-5V
DA364S	G3 I/O fast 4 AO ,output mode user setup, with chanel isolation (with output hold)
DA374	G3 I/O 4 AO ,0-20mA,4-20mA
DA374S	G3 I/O fast 4 AO ,output mode user setup, with chanel isolation (with output hold)
DA384S	G3 I/O fast 4 AO ,-10to + 10mA with chanel isolation
DI324S	G3 I/O 32 DI with strobe , 12/15Vdc
DI333D	G3 I/O DC12/24V Input 16 points
DI334	G3 I/O 32 DI ,24Vdc
DI334H	G3 I/O 32 DI ,24Vdc ,fast type
DI334S	G3 I/O 32 DI with strobe, 24Vdc
DI335	G3 I/O 64 DI ,24Vdc
DI335H	G3 I/O 64 DI ,24Vdc, fast type
DI344	G3 I/O 32 DI ,48Vdc

Name	Description
DI353D	G3 I/O DC110/AC100V Input 16 points
DL311	G3 I/O TMX1000 protocol comm.
DN311	G3 I/O Devicenet master station
DO333	G3 I/O 16 DO ,24Vdc ,2.0A/point
DO334	G3 I/O 32 DO ,24Vdc, 0.5A/point
DO334P	G3 I/O 32 DO source output ,24Vdc, 0.5A/point
DO334S	G3 I/O 32 DO with strobe ,24Vdc
DO335	G3 I/O 64 DO ,24Vdc ,0.1A/point
DO344	G3 I/O 32 DO ,48Vdc
EN311	G3 I/O Ethernet LAN card of T-series
FL311	G3 I/O FL-net module(Ver1.00)
FL312	G3 I/O FL-net module(Ver2.00)
IN354	G3 I/O 32 DI ,100Vac
IN364	G3 I/O 32 DI ,200Vac
M3ANY-iX + Y16W	G3 I/O 8W input with interruption 8W output
M3ANY-iX + Y2W	G3 I/O 1W inputwith interruption 1W output
M3ANY-iX + Y32W	G3 I/O 16W input with interruption 16W output
M3ANY-iX + Y4W	G3 I/O 2W input with interruption 2W output
M3ANY-iX + Y8W	G3 I/O 4W input with interruption 4W output
M3ANY-iX16W	G3 I/O 16W input with interruption
M3ANY-iX1W	G3 I/O 1W input with interruption
M3ANY-iX2W	G3 I/O 2W input with interruption
M3ANY-iX32W	G3 I/O 32W input with interruption
M3ANY-iX4W	G3 I/O 4W input with interruption
M3ANY-iX8W	G3 I/O 8W input with interruption
M3ANY-OPT	G3 I/O memory type module
M3ANY-X + Y16W	G3 I/O 8W input 8W output
M3ANY-X + Y2W	G3 I/O 1W input 1W output
M3ANY-X + Y32W	G3 I/O 16W input 16W output
M3ANY-X + Y4W	G3 I/O 2W input 2W output
M3ANY-X + Y8W	G3 I/O 4W input 4W output
M3ANY-X16W	G3 I/O 16W input
M3ANY-X1W	G3 I/O 1W input
M3ANY-X2W	G3 I/O 2W input
M3ANY-X32W	G3 I/O 32W input
M3ANY-X4W	G3 I/O 4W input
M3ANY-X8W	G3 I/O 8W input
M3ANY-Y16W	G3 I/O 16W output

Name	Description
M3ANY-Y1W	G3 I/O 1W output
M3ANY-Y2W	G3 I/O 2W output
M3ANY-Y32W	G3 I/O 32W output
M3ANY-Y4W	G3 I/O 4W output
M3ANY-Y8W	G3 I/O 8W output
MC352	G3 I/O 2 axis positioning
MC392	G3 I/O 2 axis positioning for OLB
ML311	G3 I/O MODBUS comm.
PF311	G3 I/O PROFIBUS-DP master module
PF312	G3 I/O PROFIBUS-DP slave module
PI312	G3 I/O 2 PI ,50kpps 5/12Vdc
PI312-20	G3 I/O 2 PI ,50kpps ,5/12Vdc
PI314	G3 I/O 4 PI ,50kpps 12/24Vdc
PI314-32	G3 I/O 4 PI ,50kpps 12/24Vdc
PI314-32R	G3 I/O 4 PI ,50kpps 12/24Vdc
PI318	G3 I/O 8 PI ,50kpps 12/24Vdc
PI318-32	G3 I/O 8 PI ,50kpps 12/24Vdc
PI318-32R	G3 I/O 8 PI ,50kpps 12/24Vdc
PI324	G3 I/O 4 PI ,2.6Mpps/650Kpps ,RS485 differential input with chanel isolation
PI324-16	G3 I/O 4 PI ,2.6Mpps/650Kpps ,RS485 differential input with chanel isolation
PI324-16R	G3 I/O 4 PI ,2.6Mpps/650Kpps ,RS485 differential input with chanel isolation
RD32T	G3 I/O absolution position detector
RO363S	G3 I/O 16 DO ,250Vac,30Vdc, 2.0A/point
RO364	G3 I/O 32 DO ,250Vac/30Vdc 2.0A/point
RT318	G3 I/O RTD(Pt100) Input 16 points
SV31N	G3 I/O Servo comm.
UW311-X + Y2W	G3 I/O Uniwire
UW311-X + Y4W	G3 I/O Uniwire 32 inputs 32 outputs
UW311-X + Y8W	G3 I/O Uniwire 64 inputs 64 outputs
UW311-X4W	G3 I/O Uniwire 64 inputs
UW311-X8W	G3 I/O Uniwire 128 inputs
UW311-Y4W	G3 I/O Uniwire 64 outputs
UW311-Y8W	G3 I/O Uniwire 128 inputs
SN321	G3 I/O S20 coxial type
SN322A	G3 I/O S20 optical type
SN323	G3 I/O S20 coxial/optical type

Name	Description
SN324	G3 I/O S20 optical type (long distance)
SN325	G3 I/O S20LP optical loop type
TM311	G3 I/O Telemeter communication module
TP312	G3 I/O Temposonic sensor I/F module
MS311	G3 I/O T-F10 master station
MS321-128	G3 I/O T-F10M master station with 128words
MS321-256	G3 I/O T-F10M master station with 256 words
MS321-32	G3 I/O T-F10M master station with 32 words
MS321-64	G3 I/O T-F10M master station with 64 words
MS331	G3 I/O T-F10L master station
RS311	G3 I/O T-F10 remote station

- 5800 I/O

  CHS-5807, CHS-5839

Name	Description
ACO-5881	5800 I/O 16 AC output
AI-5861	5800 I/O 8ch analog input
AIEX-5862	5800 I/O extension analog input
AO-5860	5800 I/O 4ch analog output
BF-5837	5800 I/O buffer interface
CDDI-5851	5800 I/O CDDI (non interrupt)
DCO-5882	5800 I/O 16 power output
DI-5857	5800 I/O 32 DC input (DC15-48V-4mA)
DI-5886	5800 I/O 128 DI self support type power I/O
DO-5852	5800 I/O 32 transistor output (DC15-48V)
DO-5887	5800 I/O 128 DO self support type power I/O
HDI-5855	5800 I/O 32 handshake DC input (non interrupt)
HDO-5856	5800 I/O 32 handshake transistor output(non interrupt)
INP-5880	5800 I/O 16 AC input
MC1-5631	5800 I/O 16-128W TOSLINE-100 station
MC2-5632	5800 I/O 64-1024W TOSLINE-1000 station
MSP-5627	5800 I/O 8-64W TOSLINE-30 station
PBF-5838	5800 I/O power I/O buffer
PI-5870	5800 I/O 8 pulse input (non interrupt)
PIB-5871	5800 I/O 4 bipulse input (non interrupt)
REO-5864	5800 I/O resistance output
RO-5853	5800 I/O 16 relay output (8 point/common)
RO-5854	5800 I/O 16 relay output (self support common)

Name	Description
RTD-5863	5800 I/O RTD input
SF-5847	5800 I/O slave interface
SN1-7885	5800 I/O 8-1024W TOSLINE-S20 station
SN2-7886	5800 I/O 8-1024W TOSLINE-S20 station

- MELPLAC I/O
  BS4706-03, E7CPU, U1CPU, DSU, F1IOU, EIOU, E1IOU, E3IOU, E4IOU-F, E4IOU-B, IOU, DCPU, MDWU

Name	Description
BS4118-01	JP-EI2000L IOB card for Hydraulic pressure controller
E4XF	NET II I/F card
E5VF	RIO Main card
E5XF	NET-10 I/F card
FF2F	Bus changer for Hydraulic pressure controller
FI2F	32 (16 Interrupts) DI, 48Vdc (High speed)
FI3F	32 DI, 48Vdc (High speed) with 2 inhibit
FI4F	32 DI, 48Vdc (High speed)
FI5F	32 DI, 24Vdc (High speed) with 2 inhibit
FO2F	32 open collector output with 2 inhibit
FO3F	32 open collector output
FQ2F	8 AI
FQ3F	8 AI (High speed type)
FR2F	8 AO
FR3F	4 AO, + -10V 50mA
FT2F	MDWS-600S2 I/F card
FTDF	MDWS-600S1 I/F card
FU2F-R	RIO Main for remote PY station (Remote I/O)
FU2F-C	RIO Main for remote PY station (CPU to CPU)
FU3F-R	RIO Main for remote PY station (Remote I/O)
FU3F-C	RIO Main for remote PY station (CPU to CPU)
FU6F-R	RIO system (Remote I/O)
FU6F-C	RIO system (CPU to CPU)
FU2F-R2	RIO Main for remote PY station (Remote I/O)-2
FU2F-C2	RIO Main for remote PY station (CPU to CPU)-2
FU3F-R2	RIO Main for remote PY station (Remote I/O)-2
FU3F-C2	RIO Main for remote PY station (CPU to CPU)-2
FU6F-R2	RIO system (Remote I/O)-2
FU6F-C2	RIO system (CPU to CPU)-2

Name	Description
FV2F	DIG-THY I/F card (Coaxial)
FV4F	DIG-THY I/F card (Coaxial)
K5AF	RIO MELPLEX-Main
K5GF	THY-I/F (Optical)
K5LF	A-NET II I/F card
K6GF	THY-I/F (Optical)
KC1A	Counter
KC3A	Counter
KI3A	16 DI, 100Vac
KI5A	32 DI, 48Vdc
KI5B	32 DI, 24Vdc
KI5C	64 DI, 48Vdc
KI5D	32 DI, 5Vdc
KI5E	64 DI, 24Vdc (CYCLIC)
KI5F	64 DI, 24Vdc
KI5G	32 DI, 48Vdc with inhibit
KI5H	32 DI, 24Vdc with inhibit
KI6C	16 (8 interrupts) DI ,48Vdc for P750
KI6D	16 (8 interrupts) DI ,24Vdc
KI7B	32 Shaft encoder input ,24Vdc
KI7C	Position detecting card
KO3A	32 Contact output (one side common)
KO3B	32 Contact output (independent common)
KO4A	32 Open collector output ,12-48Vdc
KO4C	64 Open collector output
KO5A	16 Triac output, AC solenoid valve (with fuse)
KO5B	16 Triac output, AC solenoid valve (with fuse & alarm)
KO5C	16 Triac output, AC solenoid valve (without fuse)
KO6A	16 FET output, 24-100Vdc solenoid valve
KO6B	16 Open collector output ,12-24Vdc solenoid valve
KO6C	16 FET output ,100Vdc solenoid valve (without fuse)
KO6D	16 Open collector output, 24Vdc solenoid valve(without fuse)
KO7A	LED display of 8 digits
KQ2A	8 AI, + -10Vdc
KQ2B	8 AI, 0-10Vdc
KQ2C	16 AI, 0-10Vdc
KQ2D	16 AI, 0-10Vdc with S/W filter
KQ2E	8 AI, + -10Vdc

Name	Description
KQ3A	8 AI & 8 AO, Current output
KQ3B	8 AI & 8 AO, Current output for Duplex system
KQ3C	8 AI & 8 AO, Current output for Duplex system
KQ5A	4 AO, + -10Vdc
KQ5C	8 AO, 0-20mA
KQ5D	8 AO
KQ5E	8 AO
P7GF-P	IOB for MDWS-515P/506E(PLC STN)
P7GF-D	IOB for MDWS-515P/506E(DRIO STN)

- Serial I/O

SBIF1, SBIF1Double

Name	Description
SAI01	SI/O module with 8 AI mV,V
SAI02	SI/O module with 4 AI ,1-5Vdc
SAI03	SI/O module with 4 AI ,1-5Vdc and distributor
SAO01	SI/O module with 8 AO ,4-20mAdc
SAO02	SI/O module with 4 AO ,4-20mAdc
SDI01	SI/O module with 32 DI ,24Vdc
SDI01A	SI/O module with 32 DI ,24Vdc,syncronous input
SDO01	SI/O module with 32 DO, 24Vdc
SPI01	SI/O module with 4 PI
SPO01	SI/O module with 4 PO
SRT01	SI/O module with 4 RTD
STC01	SI/O module with 8 TC

SBIF2, SBIF2Double

Name	Description
SAI06	SI/O module with 8 AI mV,V (Single)
SAI06Double	SI/O module with 8 AI mV,V (Double)
SAO06	SI/O module with 8 AO (Single)
SAO06Double	SI/O module with 8 AO (Double)
SPI06	SI/O module with 4 PI (Single)
SPI06Double	SI/O module with 4 PI (Double)

- F-AI/AO, F-DI/DO

Name	Description
SAIF1	F series I/O with 16 AI (Single)
SAIF1Double	F series I/O with 16 AI (Double)
SAOF1	F series I/O with 16 AO (Single)
SAOF1Double	F series I/O with 16 AO (Double)
SDIF1	F series I/O with 32 DI
SDOF1	F series I/O with 32 DO

[Small type (Model 2000)]

- Parallel I/O
  BU266, BU268, BU664_E, BU666_E, BU668_E

Name	Description
AC663	G2 I/O 12 DO ,100-240Vac, 0.5A
AD624	G2 I/O 4 AI ,4-20m/1-5V ,12bits
AD624L	G2 I/O 4 AI ,4-20m/1-5V 8bits
AD628S	G2 I/O 8 AI ,0-5V/0-20mA 12bits break
AD634L	G2 I/O 4 AI ,0-10V 8bits
AD638S	G2 I/O 8 AI ,-10- + 10V 12bits break
AD674	G2 I/O 4 AI ,-10to + 10V 12bits
CF611	G2 I/O general comunication RS232C 1ch 160word * 2
CD633	G2 I/O 16 CDDI
DA614S	G2 I/O 4 AO ,0-5V 16bits break
DA622	G2 I/O 2 AO ,4-20mA/1-5V 12bits
DA622L	G2 I/O 2 AO ,4-20mA/0-5V/1-5V/0-10V 8bits
DA624S	G2 I/O 4 AO ,0-20mA 16bits break
DA672	G2 I/O 2 AO ,-10- + 10V 12bits
DI633	G2 I/O 16 DI ,12-24Vdc/12-24Vac
DI634	G2 I/O 32 DI ,24Vdc
DI635	G2 I/O 64 DI ,24Vdc
DI635H	G2 I/O fast 64 DC , 24Vdc
DI643	G2 I/O 16 DI ,48Vdc
DI653	G2 I/O 16 DI ,110Vdc
DO633	G2 I/O 16 DO ,5-24Vdc 1A
DO633P	G2 I/O 16 DO ,12-24Vdc 1A
DO634	G2 I/O 32 DO ,5-24Vdc 100mA
DO635	G2 I/O 64 DO ,5-24Vdc 100mA

Name	Description
FL611	G2 I/O FL-net module(Ver1.00)
FL612	G2 I/O FL-net module(Ver2.00)
IN653	G2 I/O 16 DI ,100-120Vac
IN663	G2 I/O 16 DI ,200-240Vac
LK611	G2 I/O TOSLINE-30 for twisted pair type
LK612	G2 I/O TOSLINE-30 for optical type
M2ANY-iX + Y2W	G2 I/O 1W input with interruption1W output
M2ANY-iX + Y4W	G2 I/O 2W input with interruption 2W output
M2ANY-iX + Y8W	G2 I/O 4W input with interruption 4W output
M2ANY-iX1W	G2 I/O 1W input with interruption
M2ANY-iX2W	G2 I/O 2W input with interruption
M2ANY-iX4W	G2 I/O 4W input with interruption
M2ANY-iX8W	G2 I/O 8W input with interruption
M2ANY-X + Y2W	G2 I/O 1W input 1W output
M2ANY-X + Y4W	G2 I/O 2W input 2W output
M2ANY-X + Y8W	G2 I/O 4W input 4W output
M2ANY-X1W	G2 I/O 1W input
M2ANY-X2W	G2 I/O 2W input
M2ANY-X4W	G2 I/O 4W input
M2ANY-X8W	G2 I/O 8W input
M2ANY-Y1W	G2 I/O 1W output
M2ANY-Y2W	G2 I/O 2W output
M2ANY-Y4W	G2 I/O 4W output
M2ANY-Y8W	G2 I/O 8W output
MC612	G2 I/O 2 axis positioning
MC614	G2 I/O 4 axis positioning
PF611	G2 I/O PROFIBUS-DP master module
PF612	G2 I/O PROFIBUS-DP slave module
PI631	G2 I/O 1 PI, 5/12Vdc 100kppsMax
PI632	G2 I/O 2 PI, 5/12V/24Vdc 100kppsMax
PI672	G2 I/O 2 PI, RS422 100kppsMax
RO662S	G2 I/O 8 DO, 240Vac-24Vdc 2A
RO663	G2 I/O 16 DO, 240Vac-24Vdc 2A
SN621	G2 I/O S20 coxial type
SN622	G2 I/O S20 optical type
TC618	G2 I/O 8 Thermocouple input
UN611	G2 I/O F10 master station
UN612	G2 I/O F10 remote station
DN611	G2 I/O Devicenet Master

UBB1, UBB2

Name	Description
AC61	G2 I/O 12 DO, 100-240Vac, 0.5A
AD814	G2 I/O 4 AI, 0-20mA/0-5V 12bits
AI21	G2 I/O 4 AI, 4-20m/1-5V 8bits
AI22	G2 I/O 4 AI, 4-20m/1-5V ,12bits
AI31	G2 I/O 4 AI, 0-10V ,8bits
AI32	G2 I/O 4 AI, -10to + 10V ,12bits
AO22	G2 I/O 2 AO, 4-20mA/1-5V 12bits
AO31	G2 I/O 2 AO, 4-20mA/0-5V/1-5V/0-10V 8bits
AO32	G2 I/O 2 AO, -10to + 10V 12bits
AS11	G2 I/O ASCII/BASIC
CF211	G2 I/O general comunication RS232C 1ch 160word * 2
DA822	G2 I/O 2 AO, 0-20mA 12bits
DA832	G2 I/O 2 AO, 0-10V 12bits
DI234	G2 I/O 32 DI, 24Vdc
DI235	G2 I/O 64 DI, 24Vdc
DI235H	G2 I/O fast 64 DC, 24Vdc
DI31	G2 I/O 16 DI, 12-24Vdc, 12-24Vac
DI32	G2 I/O 32 DI, 24Vdc
DI33	G2 I/O 8 DI, 24Vdc
DI41	G2 I/O 16 DI, 48Vdc
DI832	G2 I/O 8 DI (non voltage contact)
DO233P	G2 I/O 16 DO, 12-24Vdc 1A
DO234	G2 I/O 32 DO, 5-24Vdc 100mA
DO235	G2 I/O 64 DO, 5-24Vdc 100mA
DO31	G2 I/O 16 DO, 5-24Vdc 1A
DO32	G2 I/O 32 DO, 5-24Vdc 100mA
FL211	G2 I/O FL-net module(Ver1.00)
FL212	G2 I/O FL-net module(Ver2.00)
IN51	G2 I/O 16 DI, 100-120Vac
IN52	G2 I/O 16 DI, 100-120Vac
IN61	G2 I/O 16 DI, 200-240Vac
IN62	G2 I/O 16 DI, 200-240Vac
LK11	G2 I/O TOSLINE-30 for twisted pair type
LK12	G2 I/O TOSLINE-30 for optical type
M2EANY-iX + Y2W	G2 I/O 1W input with interruption1W output
M2EANY-iX + Y4W	G2 I/O 2W input with interruption 2W output

Name	Description
M2EANY-iX + Y8W	G2 I/O 4W input with interruption 4W output
M2EANY-iX1W	G2 I/O 1W input with interruption
M2EANY-iX2W	G2 I/O 2W input with interruption
M2EANY-iX4W	G2 I/O 2W input with interruption
M2EANY-iX8W	G2 I/O 8W input with interruption
M2EANY-X + Y2W	G2 I/O 1W input 1 W output
M2EANY-X + Y4W	G2 I/O 2W input 2W output
M2EANY-X + Y8W	G2 I/O 4W input 4W output
M2EANY-X1W	G2 I/O 1W input
M2EANY-X2W	G2 I/O 2W input
M2EANY-X4W	G2 I/O 4W input
M2EANY-X8W	G2 I/O 8W input
M2EANY-Y1W	G2 I/O 1W output
M2EANY-Y2W	G2 I/O 2W output
M2EANY-Y4W	G2 I/O 4W output
M2EANY-Y8W	G2 I/O 8W output
MC11	G2 I/O 1 axis positioning
MC212	G2 I/O 2 axis positioning
PI21	G2 I/O 1 PI, 5/12Vdc 100kppsMax
PI232	G2 I/O 2 PI, 5/12V/24Vdc 100kppsMax
PI272	G2 I/O 2 PI, RS422 100kppsMax
RC831A	G2 I/O remote control relay ,24Vac
RO263	G2 I/O 16 DO, 240Vac-24Vdc 2A
RO61	G2 I/O 12 DO, 240Vac-24Vdc 2A
RO62	G2 I/O 8 DO, 240Vac-24Vdc 2A
RO832	G2 I/O 8 DO, 240Vac-24Vdc 2A
RT814	G2 I/O RTD pt100
SN221	G2 I/O S20 coxial type
SN222A	G2 I/O S20 optical type
TC218	G2 I/O 8 Thermocouple input
MS211	G2 I/O F10 master station
RS211	G2 I/O F10 remote station
DN211	G2 I/O Devicenet Master

- Serial I/O

SBIF1, SBIF1Double

Name	Description
SAI01	SI/O module with 8 AI mV,V
SAI02	SI/O module with 4 AI ,1-5Vdc
SAI03	SI/O module with 4 AI ,1-5Vdc and distributor
SAO01	SI/O module with 8 AO ,4-20mAdc
SAO02	SI/O module with 4 AO ,4-20mAdc
SDI01	SI/O module with 32 DI ,24Vdc
SDI01A	SI/O module with 32 DI ,24Vdc,syncronous input
SDO01	SI/O module with 32 DO, 24Vdc
SPI01	SI/O module with 4 PI
SPO01	SI/O module with 4 PO
SRT01	SI/O module with 4 RTD
STC01	SI/O module with 8 TC

SBIF2, SBIF2Double

Name	Description
SAI06	SI/O module with 8 AI mV,V (Single)
SAI06Double	SI/O module with 8 AI mV,V (Double)
SAO06	SI/O module with 8 AO (Single)
SAO06Double	SI/O module with 8 AO (Double)
SPI06	SI/O module with 4 PI (Single)
SPI06Double	SI/O module with 4 PI (Double)

F-AI/AO, F-DI/DO

Name	Description
SAIF1	F series I/O with 16 AI (Single)
SAIF1Double	F series I/O with 16 AI (Double)
SAOF1	F series I/O with 16 AO (Single)
SAOF1Double	F series I/O with 16 AO (Double)
SDIF1	F series I/O with 32 DI
SDOF1	F series I/O with 32 DO

[Very small type (Model 1000)]

- Serial I/O
  I/O unit

Name	Description
SAI01	SI/O module with 8 AI mV,V
SAI02	SI/O module with 4 AI, 1-5Vdc
SAI03	SI/O module with 4 AI, 1-5Vdc and distributor
SAO01	SI/O module with 8 AO, 4-20mAdc
SAO02	SI/O module with 4 AO, 4-20mAdc
SDI01	SI/O module with 32 DI, 24Vdc
SDI01A	SI/O module with 32 DI, 24Vdc,syncronous input
SDO01	SI/O module with 32 DO, 24Vdc
SPI01	SI/O module with 4 PI
SPO01	SI/O module with 4 PO
SRT01	SI/O module with 4 RTD
STC01	SI/O module with 8 TC
SAI06	SI/O module with 8 AI mV,V (Single)
SAO06	SI/O module with 8 AO (Single)
SLP01	SI/O module with 4 AI, MV, 2 AO, 3 DI ,4 DO
SLP02	SI/O module with 4 AI, PO, 2 AO, 3 DI ,4 DO
SLP03	SI/O module with 4 AI, MV, 2 AOv3 DI ,4 DO
SLP04	SI/O module with 4 AI, PO, 2 AO, 3 DI, 4 DO
SPI06	SI/O module with 4 PI (Single)

1.2.2.6 Hard address

In the case of the nv series, expresses the hardware location of main module, I/O node, I/O unit, I/O module, and I/O point. Each has the following address expression.

Name	Address expression	Description
Main Module	Main Slot No.	Slot no. in main unit
I/O Node	Node No.	I/O node no. unique for each interface
I/O Unit	Unit No.	I/O unit no. unique within a bus
I/O Module	Slot No.	Slot no. in I/O unit
I/O Point	Point No.	I/O Point No.

In the case of the V series, expresses the hardware location of main module, bus, I/O unit, I/O module, and I/O point. Each has the following address expression.

Name	Address expression	Description
Main Module	Main Slot No.	Slot no. in main unit
Bus	Bus No.	Bus no. unique for each interface
I/O Unit	Unit No.	I/O unit no. unique within a bus
I/O Module	Slot No.	Slot no. in I/O unit
I/O Point	Point No.	I/O Point No.

- Address expression range of nv series

  The range of address for nv series is as follows:

Address expression	Valid range			
	Common	TC-net I/O	Parallel I/O	Serial I/O
Main Slot No.	0-Max	—	—	—
Node No.	3-Max	—	—	—
Unit No.	—	1	1-Max	1-Max
Slot No.	—	0-15	0-Max	1-Max
Point No.	—	0-Max	0-Max	1-Max

- Address expression range of V series

  The range of address for each station model is as follows:

[Large type (Model 3000)]

Address expression	Valid range			
	Common	Parallel I/O	5800 I/O	Serial I/O
Main Slot No.	0-Max	—	—	—
Bus No.	—	0-Max	0-Max	1-Max
Unit No.	—	1-Max	1-Max	1-Max
Slot No.	—	0-Max	0-Max	1-Max
Point No.	—	0-Max	0-Max	1-Max

[Small type (Model 2000)]

Address expression	Valid range		
	Common	Parallel I/O	Serial I/O
Main Slot No.	0-Max	—	—
Bus No.	—	0-Max	1-Max
Unit No.	—	1-Max	1-Max
Slot No.	—	0-Max	1-Max
Point No.	—	0-Max	1-Max

[Very small type (Model 1000)]

Address expression	Valid range	
	Common	Serial I/O
Main Slot No.	0-Max (0 or 1)	—
Bus No.	—	1
Unit No.	—	1
Slot No.	—	0-15
Point No.	—	1-Max

- Hardware address expression
  In the tool, the location of main module, bus, I/O unit, and I/O module is expressed with hardware address combination as follows.

  {MM-BB-UU-SS}
  MM: Main Slot No.
  BB: Bus No. (In the case of the nv series, it is Node No.)
  UU: Unit No.
  SS: Slot No.

  "**" appears where this does not apply.
  The hardware address expression example is shown below.

  - In case of main module with Main Slot No. = 3
    {03-**-**-**}
  - In case of bus with Main Slot No. = 1 and Bus No. = 0
    {01-00-**-**}
  - In case of I/O unit with Main Slot No. = 1, Bus No. = 2, Unit No. = 5
    {01-02-05-**}
  - In case of I/O module with Main Slot No. = 1, Bus No. = 1, Unit No. = 3, Slot No. = 8
    {01-01-03-08}

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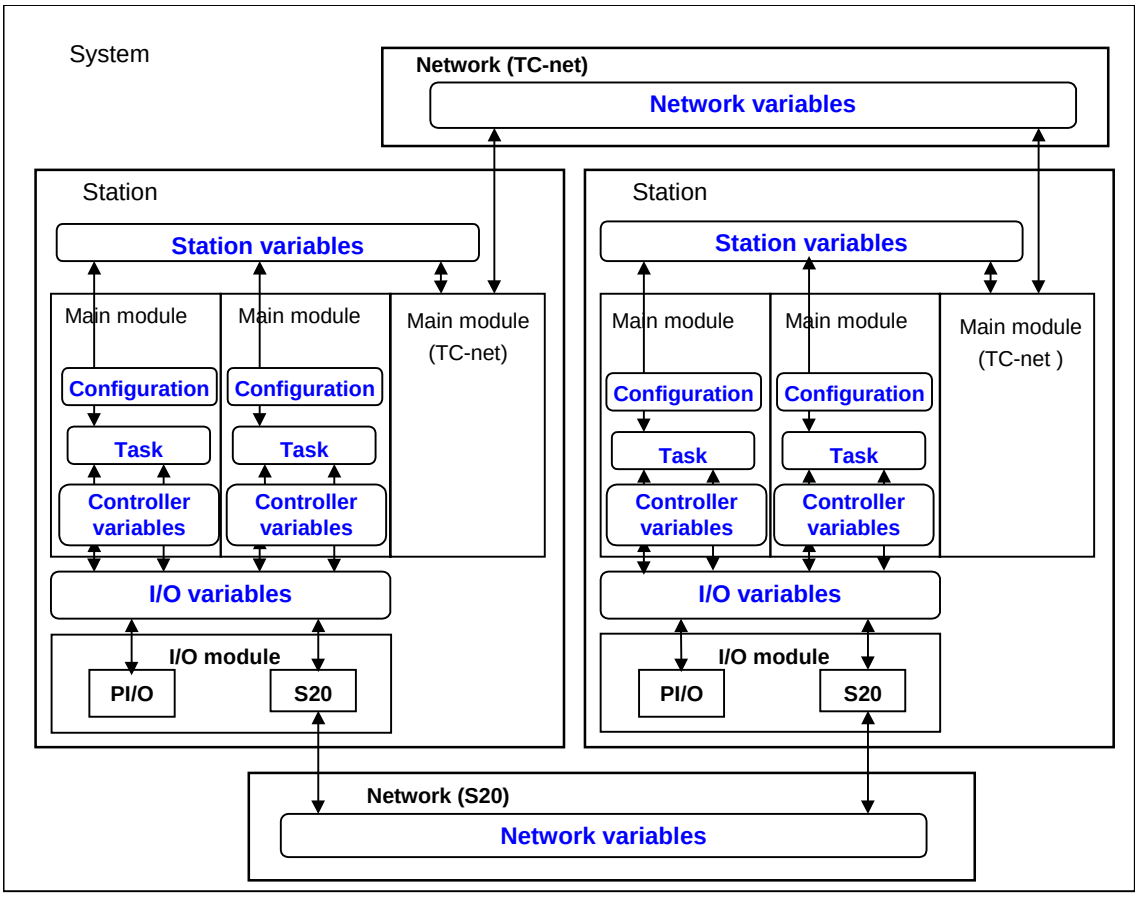
1.3 Software Model of nv Series & V Series

■ Software Configuration



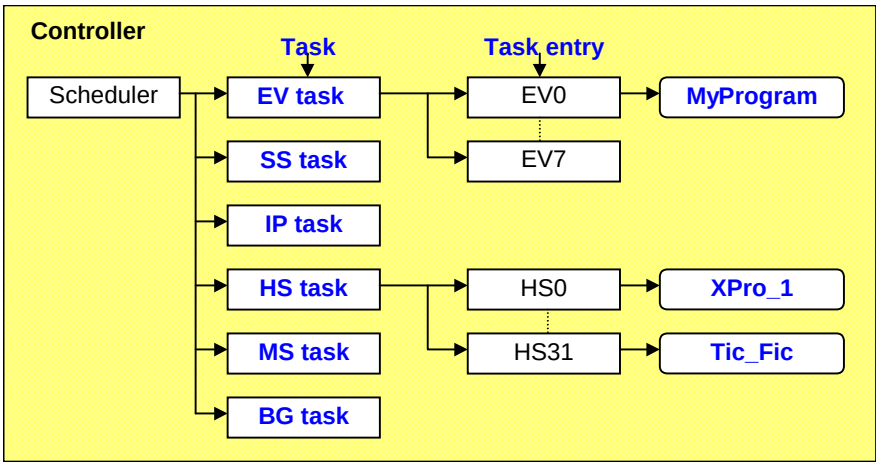
■ Meanings of software elements

Task	Control program created by user
Global variable	Various registers, parameters, data in controller
I/O variable	Process I/O signal; S20, F10 and other I/O data
Station global variable	Variable used to send and receive data between controllers
System global variable	Scan data on scan communication LAN
Configuration	Hardware configuration information on main units, I/O, etc.

These elements vary in use and capacity depending on the type of hardware as described on the next page.

1.3.1 Tasks

Task is a execution unit of user program on a controller, and is available in several types different depending on the way of execution. A task has two or more entry points, where a user program is registered to be executed. The entry points are called Task Entries. The V-tool can create, save ,download, and monitor control programs in units of task entry.



■ Types of tasks

Symbol	Name	Execution priority	Use
EV	Event task	1	Event task, Executing only once an interval event, such as of power on and I/O degeneration
SS	Ultra high speed task	2	Scan execution type of the highest priority in processing
IP	Interrupt task	3	Executing only once a PI/O interrupt, such as of CCDI and PI
HS	High-speed scan task	4	Scan execution type of the second highest priority in processing
MS	Main scan task	5	Scan execution type of the third highest priority in processing
BG	Background task	6	Scan execution type of the fourth highest priority in processing

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1.3.2 Task entries

■ Task entries of nv series

[type 1]

Controller name	EV	SS	IP	HS	MS
PU811	8	1	16	128	256

[type 2]

Controller name	EV	IP	HS	MS
PU821	8	16	128	512

■ Task entries of V series

[S controller]

Controller name	EV	SS	IP	HS	MS	BG
S3PU65	8	1	8	128	256	4
S3PU55	8	1	8	128	256	4
S3PU45	8	1	8	32	256	4
S3PU21	8	1	8	32	256	4
S3ST45	—	—	—	—	8	—
S2PU72	8	1	8	32	256	4
S2PU32	8	1	8	32	256	4
S2PU22	8	1	8	32	256	4

[L controller]

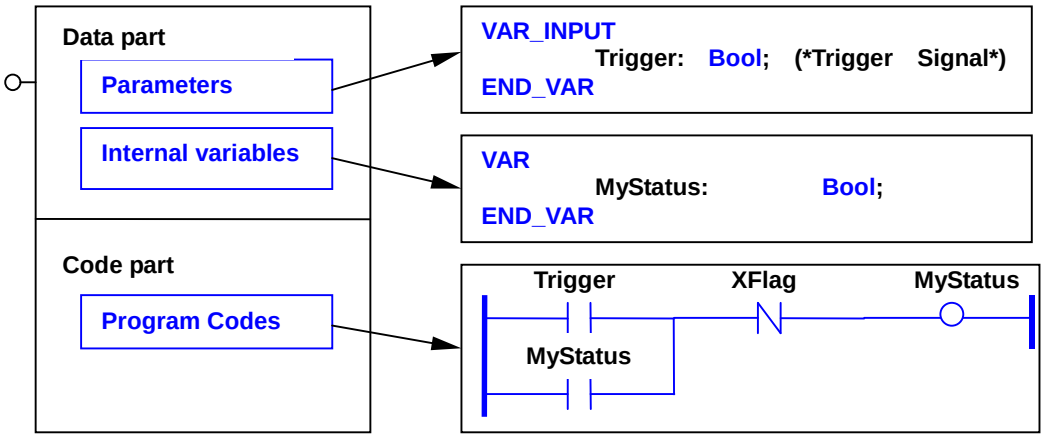
Controller name	EV	SS	IP	HS	MS	BG
L3PU21	16	—	32	128	256	4
L3PU11	8	1	8	32	256	4
L2PU22	16	—	32	128	256	4
L2PU12	8	1	8	8	64	1
L2PU11	8	1	8	8	64	1
L1PU12	—	—	—	—	8	—
L1PU11	—	—	—	—	8	—
LC512	—	—	—	—	8	—
LC511	—	—	—	—	8	—

◇ Supplementary

- With the V tool, task entries are expressed as [EV7] and [MS0] using task symbols and entry numbers. Entry numbers begin with 0.

1.3.3 Programs

■ Program organization



The program can first be divided into the data part and code part. The data part consists of parameters and internal variables. A parameter is externally given before calling the program as in the case of subroutine parameters of a general high-level language, and is used for operation with its value (or pointer) while the program is being executed. In this sense, the parameter may sometimes be called an externally open interface. As the name indicates, the internal variables are used only within the program, and will not be made open to the outside.

■ Program name

A program name is given by user when adding a new program. The program that already registered in Library can be also selected. For program naming, see Identifier topic.
Program names easy for anyone to remember are recommended because programs may be shared.

■ Types of variable declarations

The types of program variable declarations are shown below.

Classification	Type of VAR**	Name
Parameter	VAR_INPUT END_VAR	Input parameter
	VAR_IN_OUT END_VAR	Input/output parameter
	VAR_OUTPUT END_VAR	Output parameter
Internal variable	VAR END_VAR	Static variable (Static)
	VAR CONSTANT ENDVAR	Static (Static)
	VAR_TEMP END_VAR	Temporary variable (Temporary)

Difference between Parameters and External Variables
If program reads or writes external data via Parameters, it is not necessary to edit the program codes to change the external variables.
However, if program reads or writes external data directly, you must edit program codes to change the external variables. A program which does not use any external variable at all has higher reusability and reallocatability because it will not be affected by external variable declarations in any way. It will be meaningless to look for this perfection with programs which are not intended for reuse or reallocation. It is recommended that this should be taken well into consideration in using programs.

■ Difference among three parameters

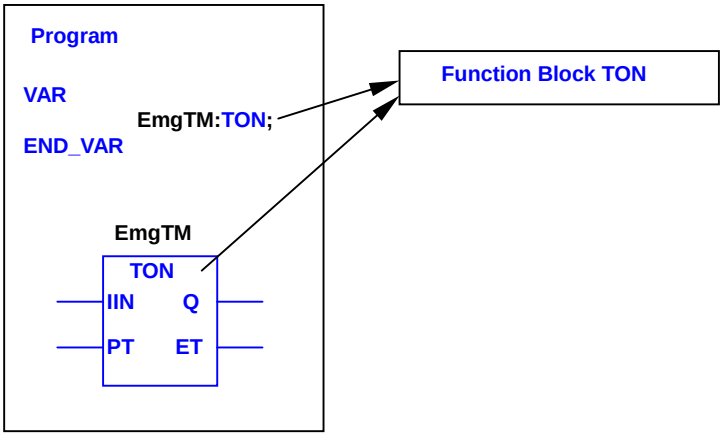
VAR_INPUT is a parameter whose value is referred to but not changed by the program.
VAR_IN_OUT is a parameter whose value is referred to and changed by the program.
VAR_OUTPUT is a parameter for simply changing by the program.

■ Difference among three internal variables

A static memory is provided for VAR in the program. The static memory can be used for static operations because it retains the values even after program execution. A temporary memory is provided for VAR_TEMP. This memory is valid only while the program in question is being executed, so the values are valid only during the period from calling the program to return. VAR CONSTANT is a variable simply for reference, that is, it is a constant. It cannot be changed by the program.

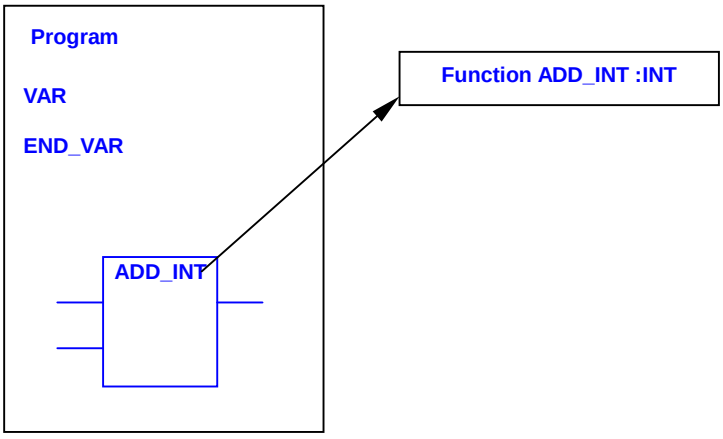
Function block invocation

A function block can be called from programs or other function blocks. Because a function block has static internal variables as described later, the declaration must be made in the static internal variable area in program which calls the function block.



Function invocation

A function can be called from programs, fucntion blocks or another functions. The function itself is non-static, so no internal variable declaration is necessary.



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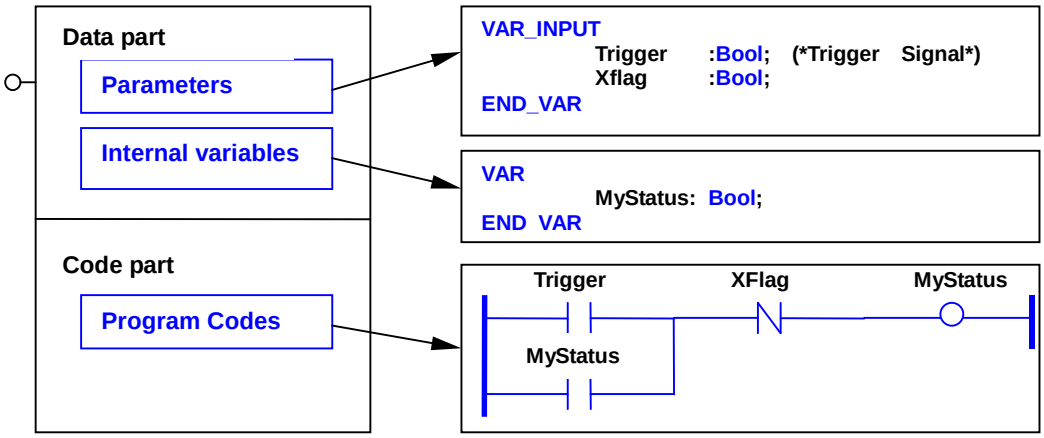
1.3.4 Function blocks

Function block organization



The function block can first be divided into the data part and code part. The data part consists of parameters and internal variables. A parameter is externally given before calling the function block as in the case of subroutine parameters of a general high-level language, and is used for operation with its value (or pointer) while the function block is being executed. In this sense, the parameter may sometimes be called an externally open interface. As the name indicates, the internal variables are used only within the function block, and will not be made open to the outside.

Function block name

A function block name is given by user when adding a new function block. The function block that already registered in Library can be also selected. For function block naming, see Identifier topic.
Function block names easy for anyone to remember are recommended because function blocks may be shared.

■ Types of variable declarations

The types of function block variable declarations are shown below.

Classification	Type of VAR**	Name
Parameter	VAR_INPUT END_VAR	Input parameter
	VAR_IN_OUT END_VAR	Input/output parameter
	VAR_OUTPUT END_VAR	Output parameter
Internal variable	VAR END_VAR	Static variable (Static)
	VAR CONSTANT END_VAR	Static (Static)
	VAR_TEMP END_VAR	Temporary variable (Temporary)

■ Difference between parameter and external variables

If function block reads or writes external data via Parameters, it is not necessary to edit the function block codes to change the external variables.

However, if function block reads or writes external data directly, you must edit function block codes to change the external variables. A function block which does not use any external variable at all has higher reusability and reallocatability because it will not be affected by external variable declarations in any way. It will be meaningless to look for this perfection with function blocks which are not intended for reuse or reallocation. It is recommended that this should be taken well into consideration in using function blocks.

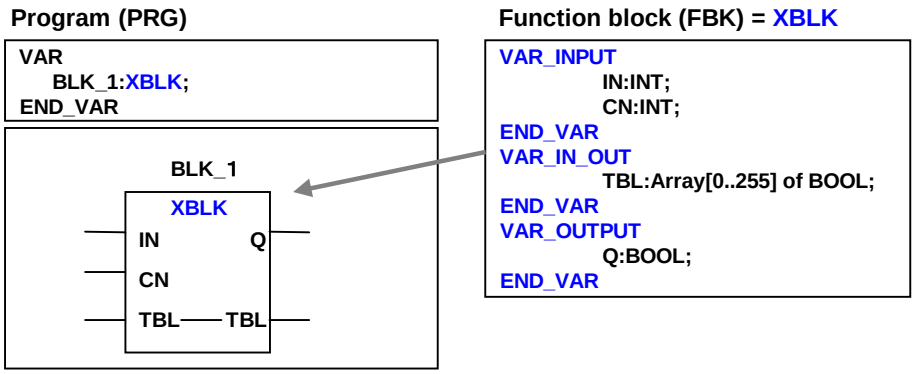
■ Difference among three parameters

VAR_INPUT is a parameter whose value is referred to by the function block but not changed by the function block.
VAR_IN_OUT is a parameter whose value is referred to and changed by the function block.
VAR_OUTPUT is a parameter for simply changing by the function block.

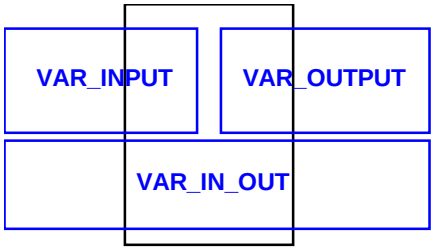
1

Parameters versus graphic symbols

If a parameter is properly declared, the graphic symbol of the function block is automatically drawn.



VAR_INPUT (input parameter), VAR_IN_OUT (input/output parameter), and VAR_OUTPUT (output parameter) are graphically allocated as shown below. They are allocated in the order of declarations within each parameter group. The total of input/output points must not exceed 15.



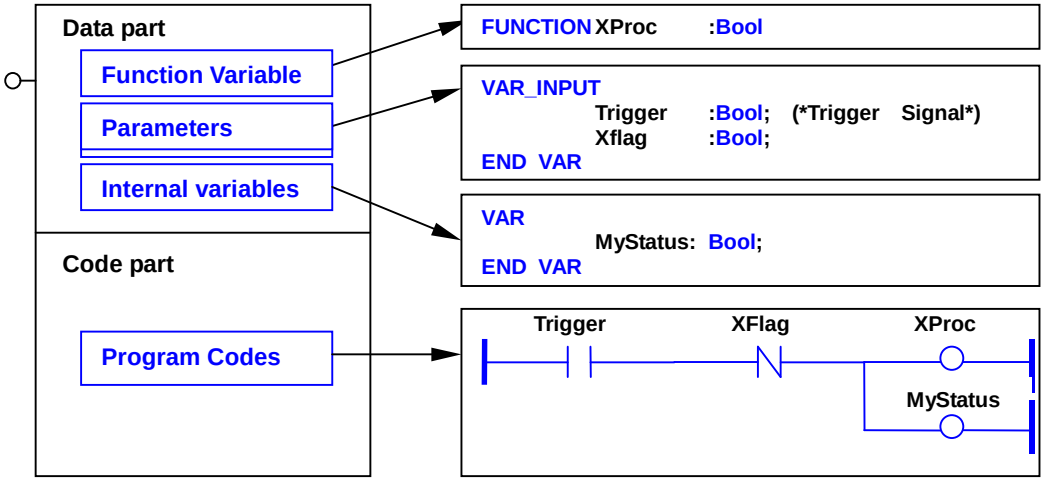
Difference among three internal variables

A static memory is provided for VAR in the function block. The static memory can be used for static operations because it retains the values even after function block execution.

A temporary memory is provided for VAR_TEMP. This memory is valid only while the function block in question is being executed, so the values are valid only during the period from calling the function block to return. VAR CONSTANT is a variable simply for reference, that is, it is a constant. It cannot be changed while the function block is being executed.

1.3.5 Functions

■ Function organization



The function can first be divided into the data part and code part. The data part consists of a function variable, parameters, and internal variables. Function variable is a return value resulting from an operation. Function name itself is a variable, and returns the result of operating a parameter as a variable. A parameter is externally given before calling the function as in the case of subroutine parameters of a general high-level language, and is used for operation with its value (or pointer) while the function is being executed. In this sense, the parameter may sometimes be called an externally open interface. As the name indicates ,internal variables are used only within a function , and will not be made open to the outside.

■ Function name

A function name is given by user when adding a new function. The function that already registered in Library can be also selected. For function naming, see Identifier topic.
Function names easy for anyone to remember are recommended because functions may be shared.

■ Types of variable declarations

The types of function variable declarations are shown below.

Classification	Type of VAR**	Name
Function	FUNCTION END_FUNCTION	Function variable
Parameter	VAR_INPUT END_VAR	Input parameter
	VAR_IN_OUT END_VAR	Input/output parameter
	VAR_OUTPUT END_VAR	Output parameter
Internal variable	VAR END_VAR	Temporary variable (Temporary)

■ Characteristics of function

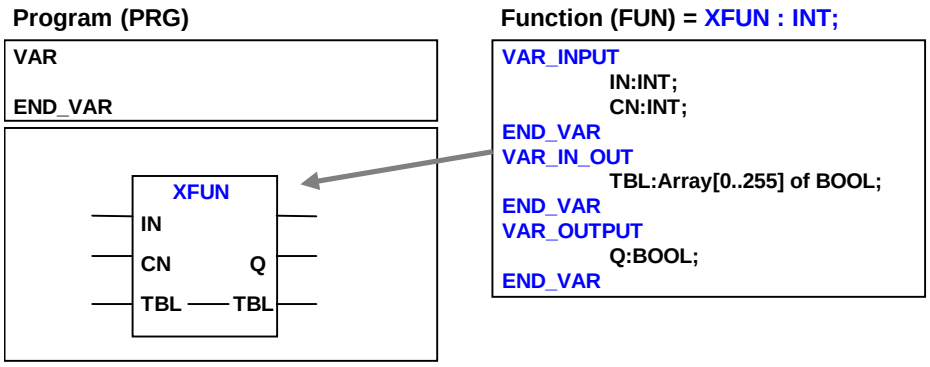
Function is used for static-free operation. Therefore, only a temporary memory is allocated to internal variables. Function is suited to static-free operations which return one function value. Generally, the function is better than the program and function block in terms of memory consumption and execution speed.

■ Difference among three parameters

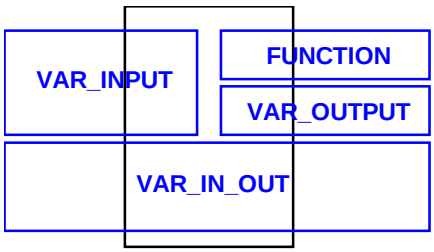
VAR_INPUT is a parameter whose value is referred to by the function but not changed by the function.
VAR_IN_OUT is a parameter whose value is referred to and changed by the function.
VAR_OUTPUT is a parameter for simply changing by the function.

Parameters versus graphic symbols

If a parameter is properly declared, the graphic symbol of Function is automatically drawn.



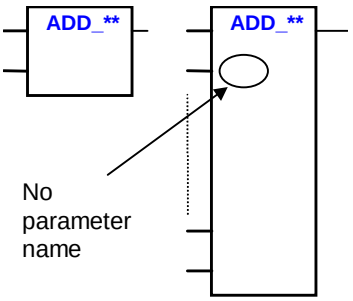
VAR_INPUT (input parameter), VAR_IN_OUT (input/output parameter), VAR_OUTPUT (output parameter) and FUNCTION are graphically allocated as shown below. They are allocated in the order of declarations within each parameter group. The total of input/output points must not exceed 15. Remember that, different from Function Block, Function name itself is a function variable and has a data type.



1

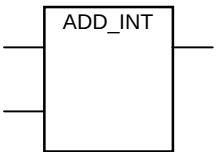
■ Functions which permit change in the number of input parameters

Some of the standard functions available permit changing the number of input parameters. ADD and AND, for example. With these functions, the number of input parameters can be changed within the range of 2 to 15 for purposes of convenience in use. Such functions can be identified by the absence of input parameter name. Some of the standard functions are valid as such, and cannot be made by the user.



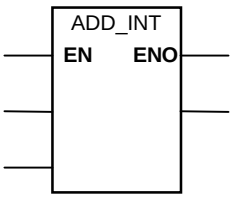
■ Function execution control

The ordinary function always executes function operation.



A normal value is output if the operation is normal.
An error value is output is if the operation is an error.

The input parameter EN and output parameter ENO are special parameters for executing function operation only when EN is 1 (True). They are called functions with EN/ENO.



Function operation is executed when **the input parameter EN is 1 (True)**.
When the operation is normal, the output parameter ENO is 1 (True) and a normal value is output.
If the operation is an error, the output parameter ENO is 0 (False) and an error value is output.
No function operation is executed when **the input parameter EN is 0 (False)**.
It makes the output parameter ENO 0 (False) and the default value is output.

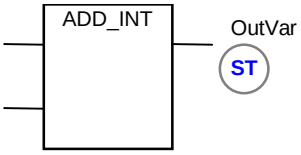
◇ Supplementary

- Error values and default values vary from function to function. For details, see the section on instructions.

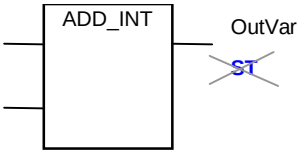
Function output and ST/SET instruction

The operation of storing a function output in a variable using the ST (store) or SET (set) instruction is as follows:

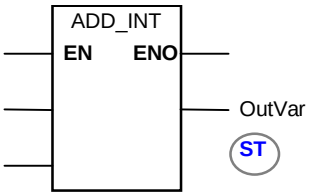
1) Connecting ST instruction to an ordinary function
A normal value or an error value is stored in the variable (OutVar).



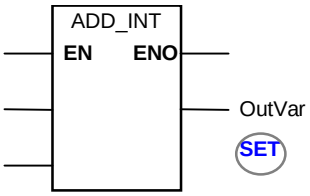
2) Connecting SET instruction to an ordinary function
OutVAR is constant. Do not use this way.



3) Connecting ST instruction to a function with EN or ENO
A normal value, an error value, or a default value is stored in the variable (OutVar).



4) Connecting SET instruction to a function with EN or ENO
The variable (OutVar) is refreshed only when EN is 1 (True). Therefore a normal value or an error value is output to the variable (OutVar).



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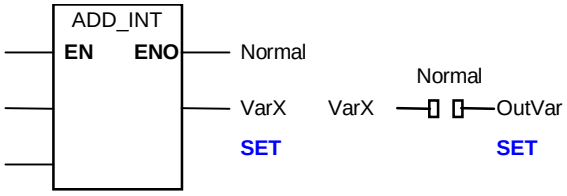
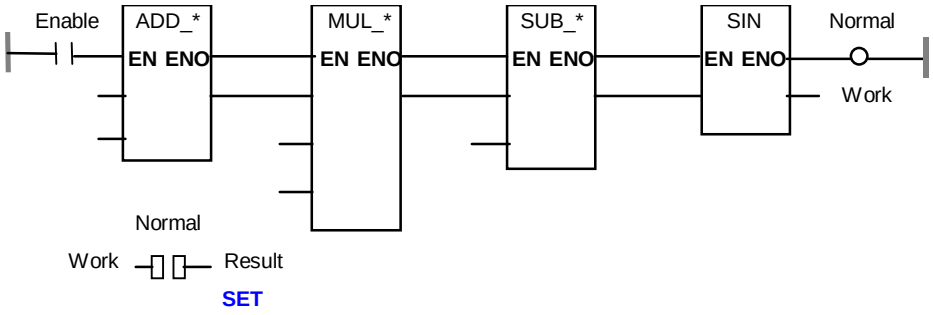
To make it a variable to be refreshed by normal values only, use the ENO status.



■ Function multiple connection and execution control

Use of a function with EN/ENO has the advantage of safe operation and easy identification of functions with an operation error. In the following example, only normal values are stored in the final operation result and the OFF display of the EN line makes it easy to locate where an error is.



1.3.6 Variables and types

Variables are registered in the spread-sheet of this tool. So the form of variables declaration that is described in this section is not always used. It is explained as a basic knowledge.

■ Form of variable declaration

Generally, variables are declared in the form shown below.

{VAR**}
    {Variable name} {:} {Data type} {;}
    {Variable name} {:} {Data type} {;}
    {Variable name} {:} {Data type} {;}
    {Variable name} {:} {Data type} {;}
{END_VAR}

{ } is used simply for purposes of explanation, and is not necessary. {:} separates the variable name from the data type. {;} signifies the end of a variable declaration. Space, Tab, Enter may be inserted as desired before and after {variable name}, {data type}, {:}, {;}. For ease of reading, the form may be indented using Tab. {VAR**} varies depending on the program module and the type of variable. See the Topics "Program," "Function Block," "Function," and "Global Variable."

■ Variable name

For the naming of variables, see the Topic "Identifiers." It is recommended that variables be so named that they are easy for anyone to remember.

Example 1:	120ABC	Invalid	The first character is not an English letter.
Example 2:	AB_C	Valid	
Example 3:	ab_C	Valid	Examples 2 and 3 are not taken as different.
Example 4:	Function	Invalid	FUNCTION is a keyword (reserved term) of IEC61131-3.

■ Variable comment

A comment may be added to a variable. In a variable declaration, the string enclosed in (*,*) is taken as a comment.

```
VAR
        Trigger :Bool ; (*Trigger signal*)
END_VAR
```

Write a comment for a variable after {;}. A comment must not be longer than 50 bytes (n quad 1 byte; m quad 2 bytes). (*,*) cannot be nested. A variable comment can be displayed and printed in the program circuit after compiling.

■ Data type name

For the naming of variables, see the Topic "Identifiers." In the arrays described later, 'ARRAY [ ]OF' cannot be included in the specified number of characters.

Example 1:	INT	Valid	
Example 2:	ARRAY[0..255] OF INT	Valid	
Example 3:	ARRAY[0..128] OF type X	Valid	
Example 4:	0typeUSER	Invalid	0 type USER runs counter to the identifier rules.

1

■ Data types

The data types supported by the nv series and the V series are as shown in the table below.

Major classification	Minor classification	Keyword	Data type	Bit	Word	Range of values
Elementary data types	Numeric value	INT	Integer	16	1	-32768 to 32767
		UINT	Integer without sign	16	1	0 to 65535
		DINT	Double integer	32	2	-2147483648 to 2147483647
		REAL	Real	32	2	-3.402823E38 to -1.401298E-45 1.401298E-45 to 3.402823E38
	Bit line	BOOL	BOOL	1	—	0 (False), 1 (True)
		WORD	Bit line 16 in length	16	1	0000h to FFFFh
		DWORD	Bit line 32 in length	32	1	00000000h to FFFFFFFFh
	String	STRING	Variable length string	16 + String	1 + String	64 characters maximum
	Time	TIME	Continuous time	32	2	-2147483648 to 2147483647 (ms) (596h31m23s647ms)
		DATE (Abbreviated to D)	Date	32	2	1998-01-01 to 2097-12-31
		TIME_OF_DAY (Abbreviated to TOD)	Time	32	2	00:00:00.000 to 23:59:59.999 (Note)
		DATE_AND_TIME (Abbreviated to DT)	Date and time	64	4	1998-01-01-00:00:00.000 to 2097-12-31-23:59:59.999 (Note)
		PTR	Pointer	—	—	—
		PTRB	Bit pointer	—	—	—
Derived data types	Array	ARRAY [*..*] OF	Array	—	—	—
	Structure	Any	Structure	—	—	—
	Mixed	Any	Combination of array and structure	—	—	—

◇ Supplementary

- Valid range is shown for the time. Internal range differs from it. Please use in valid range.

How to declare array

The array of any data type can be declared. Use ARRAY[ ]OF to declare an array. Specify the lower and upper limits of a subscript in the bracket [ ], separating them with {..}.

Example: VAR

MyTable: ARRAY [0..255] OF INT;
(*The array MyTable is declared using the integer element 256.*)

END_VAR

Restrictions on array declaration

Array name	Same as restrictions on variable names
Maximum number of subscripts	One subscript only
Number of elements	1-65536
Subscript range	0-65535
Subscript lower limit	0 fixed
Generating method	Static array whose size is determined in the design process

◇ **Supplementary**

- Array size is subject to further restriction with the memory size at the location of variable declaration (program, function, function, global variable, etc.).

Array variable literals

Add a subscript to an array-declared variable in using it. A subscript must be a constant within the subscript range or an index variable. Encode it with bracket [ ].

Example: MyTable[0]
MyTable[255]
MyTable[XI]

1

■ Index variable

Index variables are exclusive to qualifying indices. General variables cannot be used as array subscripts.

Index variable	Data type
XI	DINT
XJ	DINT
XK	DINT
XL	DINT
XM	DINT
XN	DINT
XP	DINT
XQ	DINT

1.3.7 Derived types

If the user wishes to create a data type different from the elementary types or an array thereof, the user must define his or her own data type in Library.

■ Type declaration

Generally, data type declarations are defined as follows:

TYPE
{Data type name}{:}{Data type or structure serving as base}{;}
{Data type name}{:}{Data type or structure serving as base}{;}
{Data type name}{:}{Data type or structure serving as base}{;}

END_TYPE

Example 1: This example defines an elementary type as an own data type.

```
TYPE
        FLOAT:   REAL;
        BIT:     BOOL;
END_TYPE
```

Example 2: This example defines an elementary type array as an own data type.

```
TYPE
        typeTable:Array[0..255] of INT;
        typeArray:Array[0..7] of BOOL;
END_TYPE
```

Example 3: In this example, the own data types typeMOTOR, type X are defined using a structure. STRUCT-END_STRUCT is called a structure, used to combine two or more types into a single type.

```
TYPE
        typeX:          STRUCT
                                B       :Array[0..15] Of BOOL;
                        END_STRUCT;
        typeMOTOR:      STRUCT
                                RUN     :BOOL;
                                RUNNING :BOOL;
                                OL      :BOOL;
                                SET     :DINT;
                                FB      :DINT;
                                STATUS  :Array[0..15] Of BOOL;
                        END_STRUCT;
END_TYPE
```

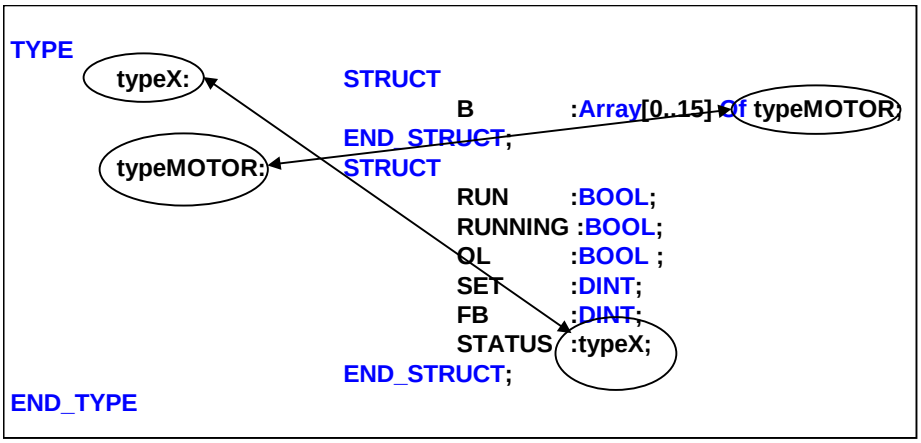
Example 4: Not only elementary types and arrays but also own-defined types can be used to serve as base.

```
TYPE
        typeX:          STRUCT
                                B       :Array[0..15] Of BOOL;
                        END_STRUCT;
        typeMOTOR:      STRUCT
                                RUN     :BOOL;
                                RUNNING :BOOL;
                                OL      :BOOL;
                                SET     :DINT;
                                FB      :DINT;
                                STATUS  :typeX;
                        END_STRUCT;
END_TYPE
```

1

■ Inhibiting looped reference

In the following declaration, typeX and typeMOTOR are are dependent on each other so that data type size and allocation cannot be determined. This kind of data type having looped reference cannot be declared.



■ Declaration and literals of variable using own data type

Shown below are examples of variable declarations using the types defined in Examples 1 to 4 and of variable literals in the program.

No.	Example of variable declaration	Example of variable literals
1	VAR X:FLOAT; Y:Array[0..255] of BIT; END_VAR	X Y[255] Y[XP]
2	VAR X:typeTable; Y:typeArray; END_VAR	X[0] Y[XJ]
3	VAR X:typeX; Motor:Array[0..15] Of typeMotor; END_VAR	X.B[15] Motor[1].SET Motor[XK].STATUS[XJ]
4	VAR X:typeX; Motor:Array[0..15] Of typeMotor; END_VAR	X.B[15] Motor[1].SET Motor[XK].STATUS.B[XJ]

1.3.8 Standard types

The nv series and the V series has several standard data declaration. Their contents and uses are as follows:

■ Common

Data type	Use
TYPE_ACT	Used in ACTION instruction of SFC
TYPE_ACT_T	Used in ACTION instruction of SFC
TYPE_STEP	Used in STEP instruction of SFC
type16BITS	Used in register variable declaration
TypeSTN_CNF	Used in communication function block
TypeUDP_OPEN	Used in communication function block (UDP)
TypeUDP_SEND_BC	Used in communication function block (UDP)
TypeUDP_RCV_BC	Used in communication function block (UDP)
TypeUDP_CLOSE	Used in communication function block (UDP)
TypeTCP_OPEN	Used in communication function block (TCP)
TypeTCP_SEND	Used in communication function block (TCP)
TypeTCP_RCV	Used in communication function block (TCP)
TypeTCP_CLOSE	Used in communication function block (TCP)

1

■ L controller (MCS type of V series)

Data type	Use
typeC_DATA	Data type of C: counter
typeC_PARA	Data type of C: counter
typeF_DATA	Data type of F: communication data (real)
typeF_PARA	Data type of F: communication data (real)
typeGD_DATA	Data type of GD: guidance
TypeHEAD	DL file header
typeI_DATA	Data type of I: communication data (integer)
typeI_PARA	Data type of I: communication data (integer)
typeLP_DATA	Data type of LP: regulator
typeLP_PARA	Data type of LP: regulator
typeP_RARA	Data type of P: polynomial line
typePB_DATA	Data type of PB: pushbutton
typePB_PARA	Data type of PB: pushbutton
typePV_DATA	Data type of PV: indicator
typePV_PARA	Data type of PV: indicator
typeSQ_DATA	Data type of SQ: sequence
typeSQ_PARA	Data type of SQ: sequence
typeT_DATA	Data type of T: timer
typeT_PARA	Data type of T: timer
typeVB_DATA	Data type of VB: batch interface
TypeXY	Data type of P: polynomial line

■ L controller (DS type of V series) and type 2 (nv series)

Data type	Use
TypeALIT_32BITS	Data type of 32 bit alarm array
TypeALM_MASK_BIT	Data type of FN user system alarm mask bit (Area)
TypeC_DATA_DS	Data type of C: counter
TypeC_PARA_DS	Data type of C: counter
TypeDB_PARA_DS	Data type of DB: Data Block TAG
TypeEXST_32BITS	Data type of 32 bit mask array
TypeG_ALM_BIT_N	Data type of FN user system alarm error bit
TypeG_MASK_BIT	Data type of FN user system alarm mask bit
TypeHEAD_DS	Data type of HEAD: Header
TypeLP_DATA_DS	Data type of LP: Loop TAG
TypeLP_PARA_DS	Data type of LP: Loop TAG
TypeP_PARA_DS	Data type of P: Polynomial Line Table
TypePB_DATA_DS	Data type of PB: Push Button TAG
TypePB_PARA_DS	Data type of PB: Push Button TAG
TypePV_DATA_DS	Data type of PV: Indicator TAG
TypePV_PARA_DS	Data type of PV: Indicator TAG
TypeRTT_HEAD_DS	Data type of RTT: Real time trend
TypeRTT_PARA_DS	Data type of RTT: Real time trend
TypeSQ_DATA_DS	Data type of SQ: Sequence TAG
TypeSQ_PARA_DS	Data type of SQ: Sequence TAG
TypeT_DATA_DS	Data type of T: timer
TypeT_PARA_DS	Data type of T: timer
TypeTC_DATA_DS	Data type of TC: Timer TAG
TypeTC_PARA_DS	Data type of TC: Timer TAG

■ Instrumention function block

Data type	Use
TypeDCL_PARA	Data type of DCL (Double Cross Limit) Instruction
TypeFF_PARA	Data type of FF (Feed Forward) Instruction

■ S controller of V series

Data type	Use
TypePID3_LP_P	Data type of PID3 Instruction
TypePID3_PV_D	Data type of PID3 Instruction

1

1.3.9 Identifiers

The program names, function block names, function names, variable names, and data type names that are defined by the user are called by the general term identifier.

■ Restrictions on identifiers

Identifiers must satisfy all the conditions in the table below.

Conditions	Description
Usable characters	Alphabetic letters from A to Z, numerals from 0 to 9, underscored (_) ASCII characters; both uppercase and lowercase alphabetic letters are permissible.
First character	Alphabetic letter only
String length	1 to 20 characters except for I/O variable names whose string length must not exceed 19 characters.
Rules on identification	No distinction is made between uppercase and lowercase. Example : typeX and TYPEX are taken as the same. Do not use consecutive underscores.
Non-use of reserved terms	Do not use the reserved terms shown in the table below as identifiers.

■ Reserved terms

Do not use identifiers identical with the following terms. These terms are reserved for IEC61131-3 or the V series.

ACTION, END_ACTION
ARRAY, OF
AT
CASE,OF, ELSE,END_CASE
CONFIGURATION, END_CONFIGURATION
CONSTANT
BOOL,SINT,INT,DINT,LINT,USINT,UINT,UDINT,ULINT,REAL,LREAL,TIME,DATE,TIME_OF_DAY, TOD,DATE_AND_TIME,DT,STRING,BYTE,WORD,DWORD,LWORD,WSTRING
EN,ENO
EXIT
FALSE
F_EDGE
FOR,TO, BY, DO, END_FOR
FUNCTION, END_FUNCTION

FUNCTION_BLOCK, END_FUNCTION_BLOCK
IF,THEN,ELSEIF,ELSE,END_IF
INITIAL_STEP, END_STEP
NOT, MOD, AND, XOR, OR
PROGRAM, WITH
PROGRAM, END_PROGRAM
R_EDIGE
READ_ONLY, READ_WRITE
REPEAT, UNTIL, END_REPEAT
RESOURCE, ON, END_RESOURCE
RETAIN
RETURN
STEP, END_STEP
STRUCT,END_STRUCT
TASK
TRANSITION, FROM, TO, END_TRANSITION
TRUE
TYPE, END_TYPE
VAR, END_VAR
VAR_INPUT, END_VAR
VAR_OUTPUT, END_VAR
VAR_IN_OUT, END_VAR
VAR_EXTERNAL, END_VAR
VAR_ACCESS, END_VAR
VAR_GLOBAL, END_VAR
WHILE, DO, END_WHILE
WITH
XI,XJ,XK,XL,XM,XN,XP,XQ
(Existing program names)
(Existing function block names)
(Existing function names)
(Existing variable names)
(Existing data type names)

1

1.3.10 Programming languages

Programming Languages of the nv series and the V Series
The programming languages supported by the controllers of the nv series and the V series are as follows:

1) Ladder Diagram (LD)

2) Function Block Diagram (FBD)

3) Sequential Function Chart (SFC)

4) Structured Text (ST)

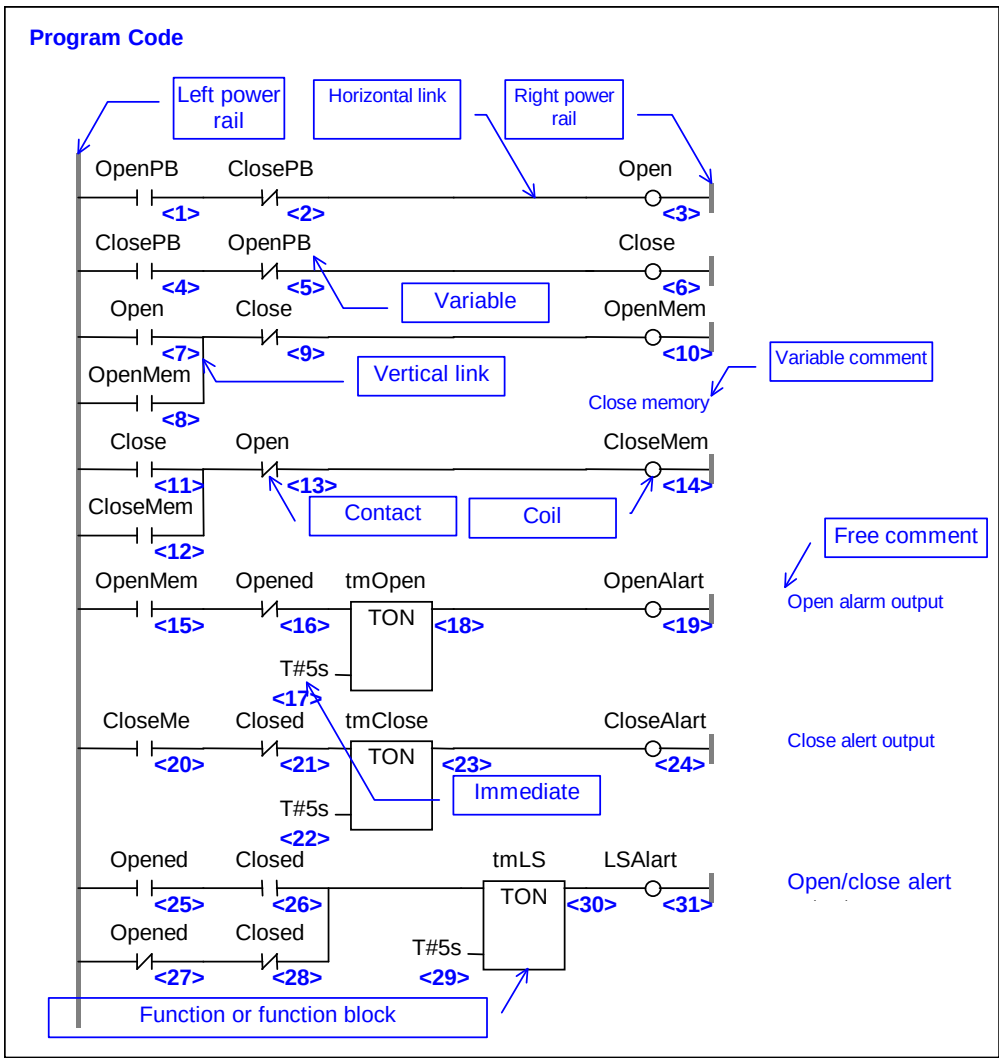
Use these programming languages to represent the program codes of programs, functions, or function blocks.

◇ **Supplementary**

- For individual instructions, see the section on instructions.

1.3.11 Ladder diagram (LD)

The ladder diagram (LD) is a graphic language for simulating a relay control circuit consisting of contacts and coils. In addition to the contacts and coils, it consists of such elements as left power rail, horizontal link, right power rail, vertical link, variable, immediate, function block, function, variable comment, and free comment. Since a power supply is connected between the two power rails to operate the relay control circuit, the data flow through it is called power flow. Execution order is automatically determined on the basis of interpretation that the power flows basically from left to right and from to bottom.



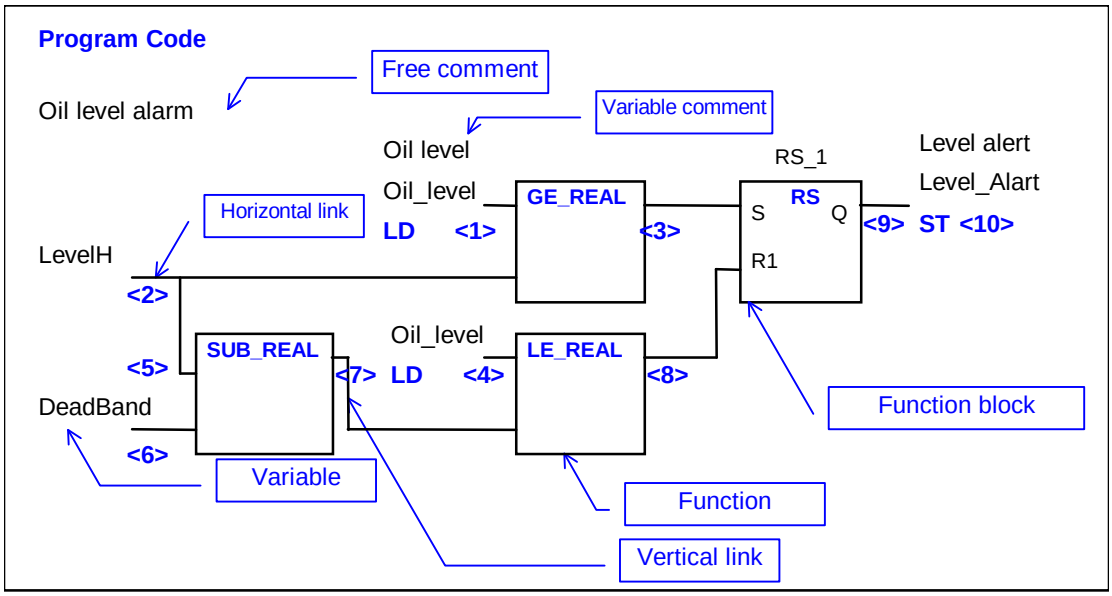
◇ Supplementary

- Power flow can be monitored using the program editor described later.
- The execution order automatically determined can be viewed with the program editor described later.
- The execution order of the above example is shown in numbers in brackets <>.
- For individual instructions, see the section on instructions.

1

1.3.12 Function block diagram (FBD)

The function block diagram (FBD) is a graphic language for processing signals and data that use functions and function blocks. In addition to the functions and function blocks, it consists of a horizontal link, vertical link, load, store, set, variable, immediate, variable comment, and free comment. Execution order is automatically determined on the basis of interpretation that the power flows basically from left to right and from to bottom.

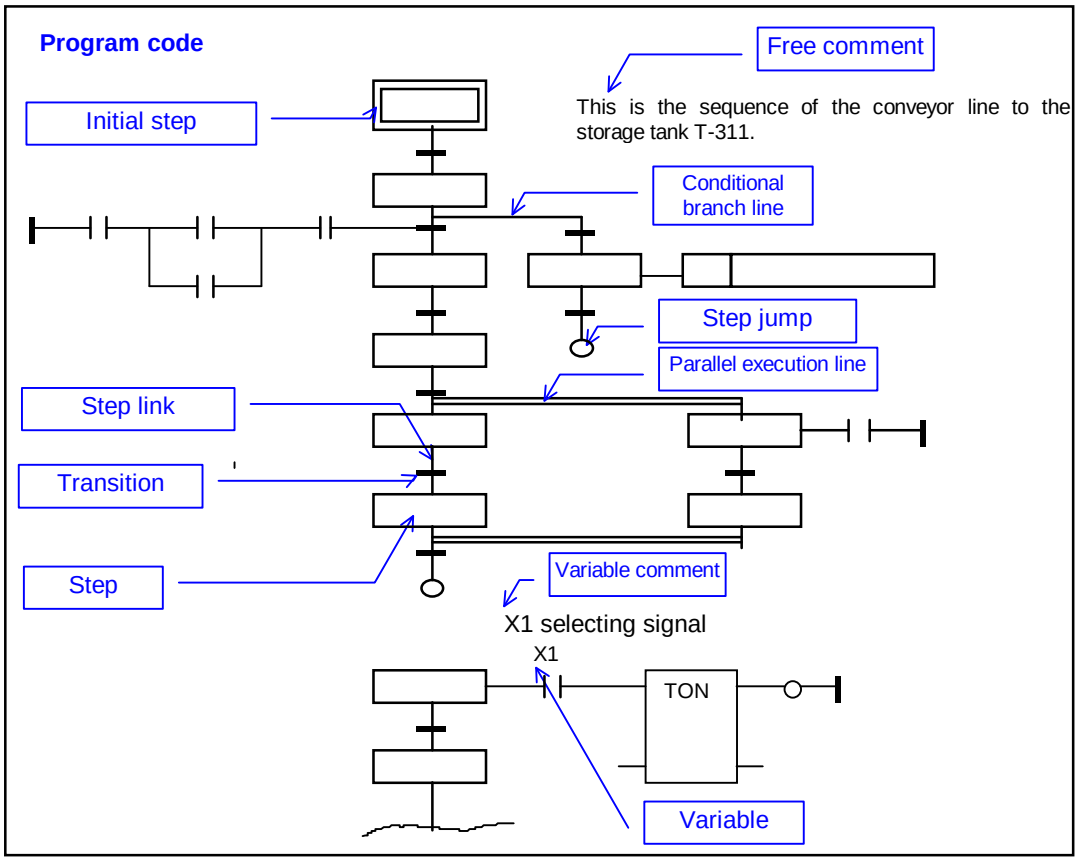


◇ Supplementary

- Data flow can be monitored using the program editor described later.
- The execution order automatically determined can be viewed with the program editor described later.
- The execution order of the above example is shown in numbers in brackets <>.

1.3.13 Sequential function chart (SFC)

The sequential function chart (SFC) is a graphical element for sequential operation. It consists of an initial step, step, transition, step link. conditional branch line, parallel execution line, variable, variable comment, and free comment. Transition conditions can be described by mixed use of the LD and FBD languages.



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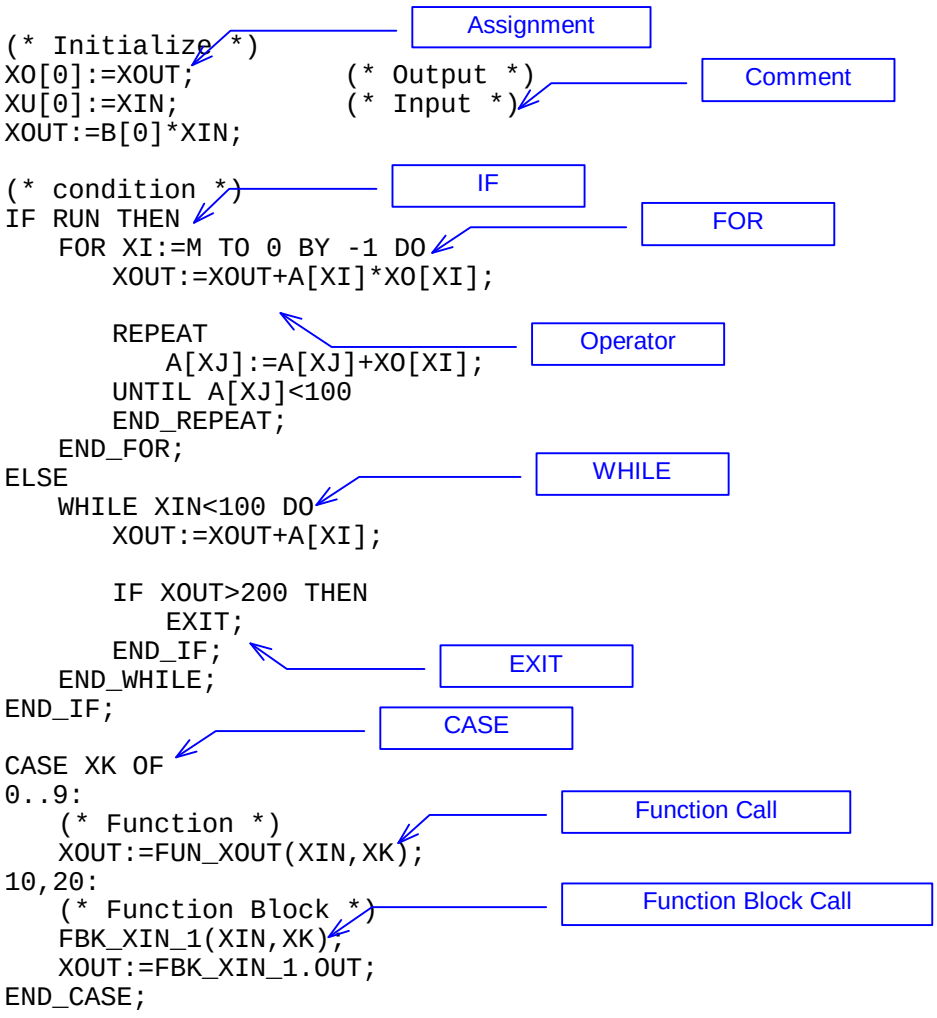
1.3.14 Structured text (ST)

Structured Text (ST) is a structured text language similar to PASCAL or C. ST consists of variables, data types, operators, assignment, IF, CASE, FOR, WHILE, REPEAT and Function call statement shown as follows.

This function is not supported in Engineering tool 2.

Program Code




```
(* Initialize *)
XO[0]:=XOUT;          (* Output *)
XU[0]:=XIN;           (* Input *)
XOUT:=B[0]*XIN;

(* condition *)
IF RUN THEN
    FOR XI:=M TO 0 BY -1 DO
        XOUT:=XOUT+A[XI]*XO[XI];

        REPEAT
            A[XJ]:=A[XJ]+XO[XI];
        UNTIL A[XJ]<100
        END_REPEAT;
    END_FOR;
ELSE
    WHILE XIN<100 DO
        XOUT:=XOUT+A[XI];

        IF XOUT>200 THEN
            EXIT;
        END_IF;
    END_WHILE;
END_IF;

CASE XK OF
0..9:
    (* Function *)
    XOUT:=FUN_XOUT(XIN,XK);
10,20:
    (* Function Block *)
    FBK_XIN_1(XIN,XK);
    XOUT:=FBK_XIN_1.OUT;
END_CASE;
```

<Variables and Data types>

See [1.3.6 Variables and Types] section about variables and data types used in ST.

'TRUE' (= 1) and 'FALSE' (= 0) can be used as BOOL type constant.

<Sentence Structures>

Sentence structures of ST are shown as follows.

Statement	Sentence structure	Note
Assignment	variable := expression ;	<expression> is the combination of variables, constants, operators and function calls.
Function call	variable := FUN_NAME(expression, ---); FUN_NAME(expression, ---);	<FUN_NAME> is a Function name.
Function Block call	FBK_INSTANSE_NAME(expression, ---);	<FBK_INSTANSE_NAME> is an instance variable of Function Block.

IF	IF bool_expression THEN
	statement
	ELSEIF bool_expression THEN
	statement
	ELSE
	statement
	END_IF;
		<bool_expression> is a boolean type expression.
		<statement> consists of Assignment, Function call, Function Block call or the other structured statement.

CASE	CASE index OF data : statement data , data : statement data .. data: statement ELSE statement END_CASE;	<Index> is a index variable. <data> is an integer type constant.
FOR	FOR Index := min TO max BY step DO statement END_FOR ;	<min>, <max>, <step> is a integer type expression.
WHILE	WHILE bool_expression DO statement END_WHILE;	
REPEAT	REPEAT statement UNTIL bool_expression END_WHILE ;	
EXIT	EXIT ;	EXIT statement should be in loop of FOR, WHILE, REPEAT.
RETURN	RETURN;	

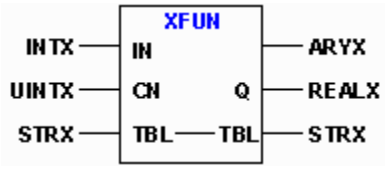
Note: See [Instruction Manual] document about the executing operations.
See [1.3.6 Variables and Types] section about index variables.

1

◇ Supplementary

- In Function or Function Block call statement, parameters of VAR_INOUT and VAR_OUTPUT needs to be set as parameters of VAR_INPUT. And also Function return which data size exceeds 4 bytes needs to be done.

  Example 1:

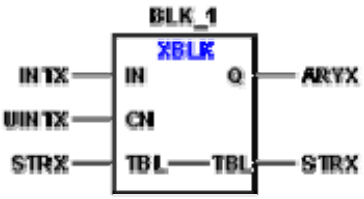


  - <IN>, <CN> are parameters of VAR_INPUT.
  - <TBL> is a parameter of VAR_INOUT.
  - <XFUN> is Function return which data size exceeds 4bytes.
  - <Q> is a parameter of VAR_OUTPUT.

- In this case the Function call statement should be described as follows.
  XFUN (INTX, UINTX, STRX, REALX, ARYX) ;

- Parameter order of Function needs to be follows.
  1: VAR_INPUT
  2: VAR_INOUT
  3: VAR_OUTPUT
  4: FUNCTION which data size exceeds 4bytes

  Example 2:



  - <IN>, <CN> are parameters of VAR_INPUT.
  - <TBL> is a parameter of VAR_INOUT.
  - <Q> is a parameter of VAR_OUTPUT.

- In this case the Function Block call statement should be described as follows.
  BLK_1 (INTX, UINTX, STRX, ARYX) ;

- Parameter order of Function needs to be follows.
  1: VAR_INPUT
  2: VAR_INOUT
  3: VAR_OUTPUT

<Operators>

The following operators can be used in ST.

Operator	Meaning	Priority
(,)	Parenthesis	1
NOT, to	Negation	2
**	Exponetiation	3
*	Multiplication	4
/	Division	4
MOD	Modulo	4
+	Addition	5
-	Subtraction	5
<, >, <=, >=	Comparison	6
=, <>	Equality, Inequality	7
AND, &	Boolean AND	8
XOR	Boolean Exclusive OR	9
OR	Boolean OR	10

Example 1: XO := A * B + (C - D) / E ;

This execution order is shown as follows.
(1): A * B
(2): C - D
(3): (2) / E
(4): (1) + (3)
(5): XO := (4)

Example 2: IF A >= 0 AND B < 100 THEN

This execution order is shown as follows.
(1): A >= 0
(2): B < 100
(3): (1) AND (2)

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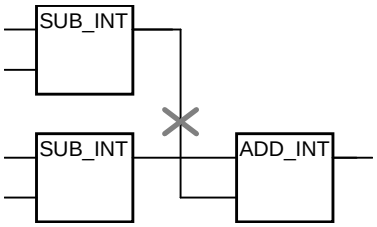
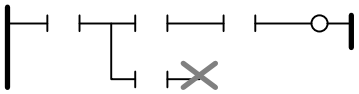
1.3.15 Specification of graphical languages

<Restrictions on Linking LD and FBD Languages>

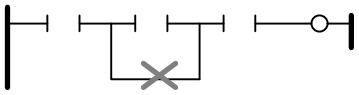
1) Links cannot be crossed.



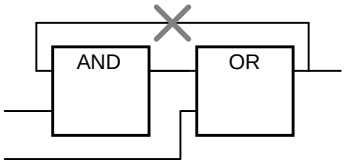
2) Links cannot be broken.



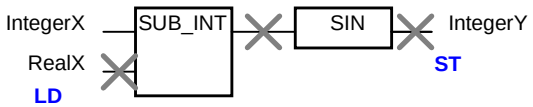
3) Links cannot be shorted.



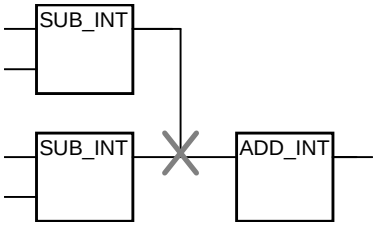
4) Links cannot be looped.



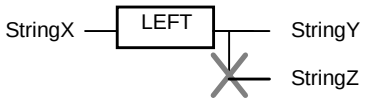
5) Different data types cannot be connected.



6) Links cannot be wired except for the BOOL type.



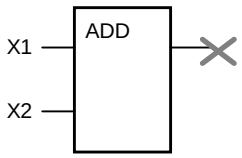
7) Links cannot branch a data type of over 4 bytes.



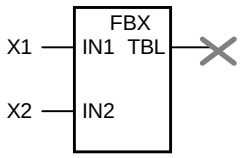
◇ **Supplementary**

- Data types of over 4 bytes include DATE_AND_TIME (DT), STRING, PTR, PTRB, and all other derived types.

8) Functions require correct connection of all input and output terminals.



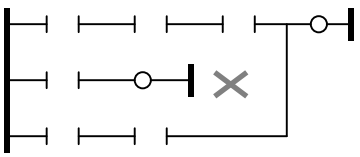
9) Function blocks require correct connection of all input/output terminals except for output parameters for data types of 4 bytes or less.



◇ **Supplementary**

- Data types of 4 bytes or less include BOOL, INT, DINT, UINT, REAL, WORD, DWORD, TIME, DATE, TIME_OF_DAY (TOD).

10) Coil cannot be closed in the links.



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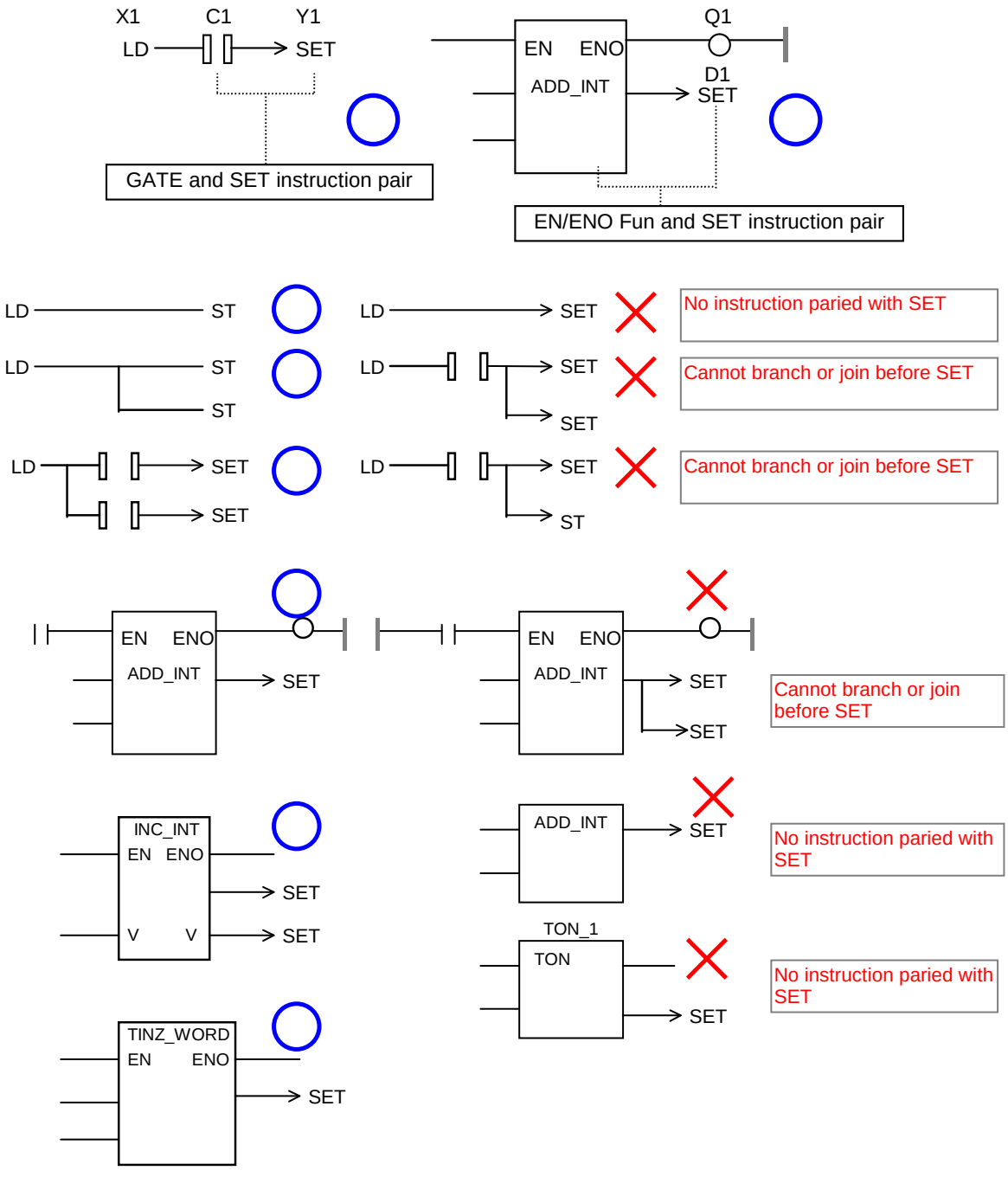
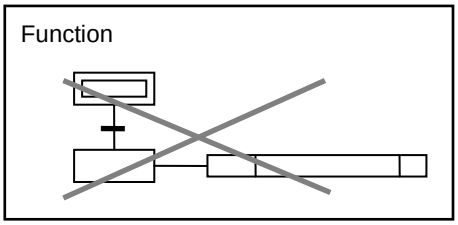
<SET Instruction Restrictions>

The SET instruction must have a preceding instruction pair (GATE instruction or EN/ENo Function) in the same linking circuit.

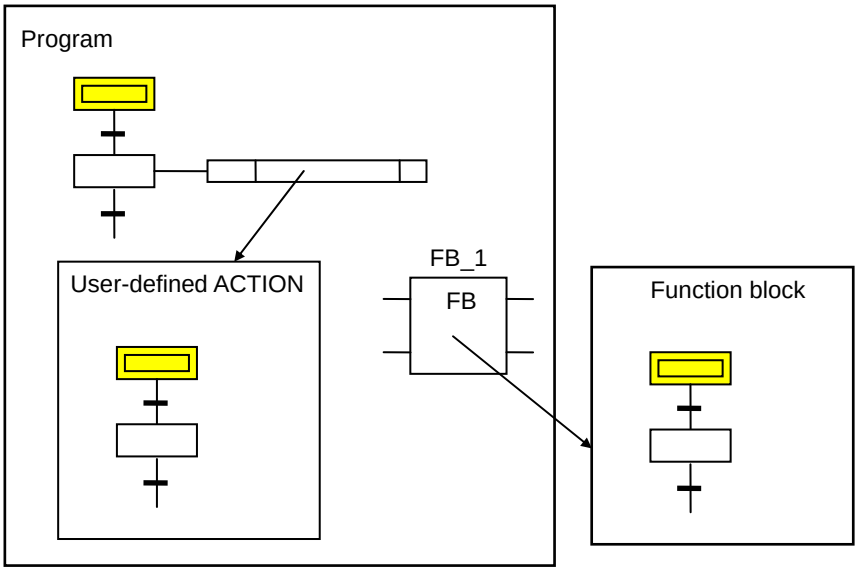


<Restrictions on SFC>

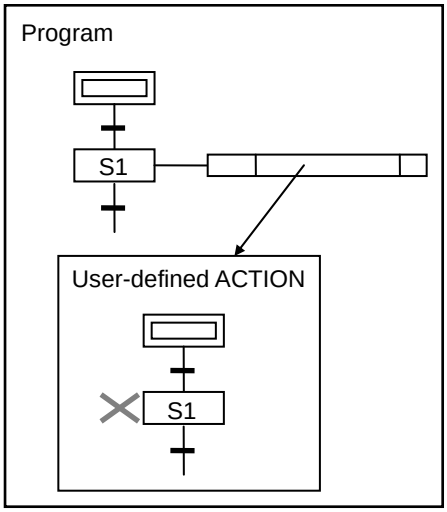
1) SFC can be used only in programs, function blocks, and user-defined ACTIONs, not in FUNCTIONs.



2) SFC may have only one initial step, not any more, in a program, a function block and a user-defined ACTION.



3) A program and the user-defined ACTION that is included in it cannot use the same step.



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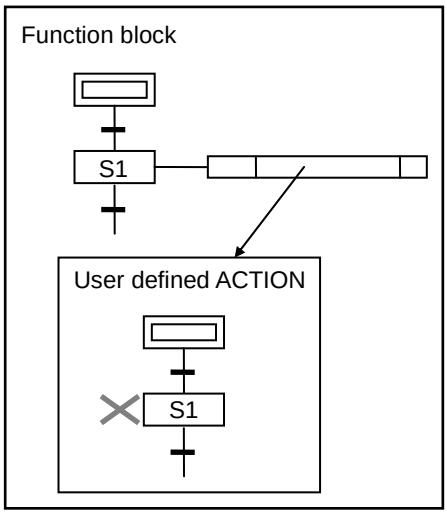
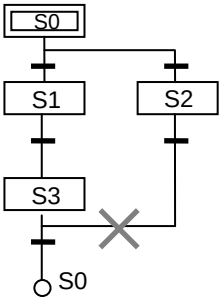
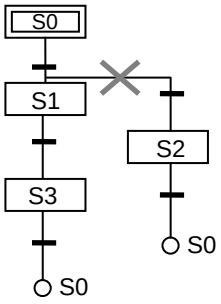
4) A function block and the user-defined ACTION that is included in it cannot use the same step.



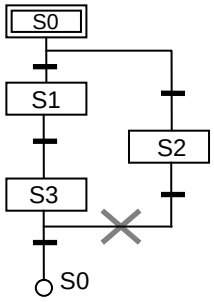
5) Whichever route of sequence SFC may pass, it must terminate in the order of step - transition - --- --- step - transition - step.



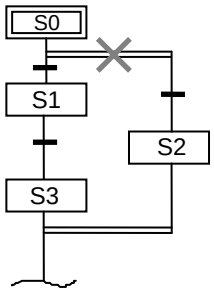
6) A conditional branch line must branch between step and transition.



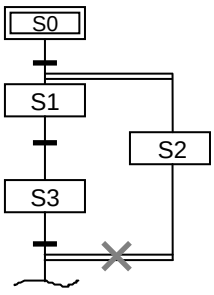
7) A conditional wired-OR line must be wired (…) between the transition and step.



8) A parallel branch line must branch between transition and step. There must be only transition to be shared by the subsequent steps.



9) A parallel wired-OR line must be connected between step and transition. There must be only transition to be shared by the subsequent steps.



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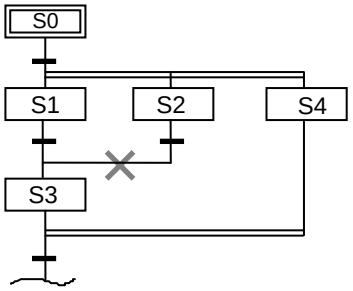
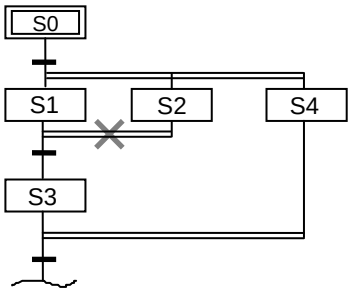
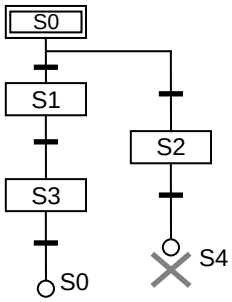
10) A parallel execution line cannot coexist with other execution line.



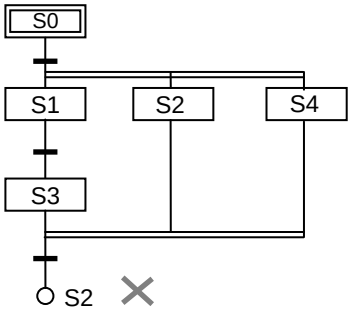
11) A parallel branch line and parallel wired-OR line must exist as a pair, and be correctly nested.



12) A step jump destination must be an existing step.

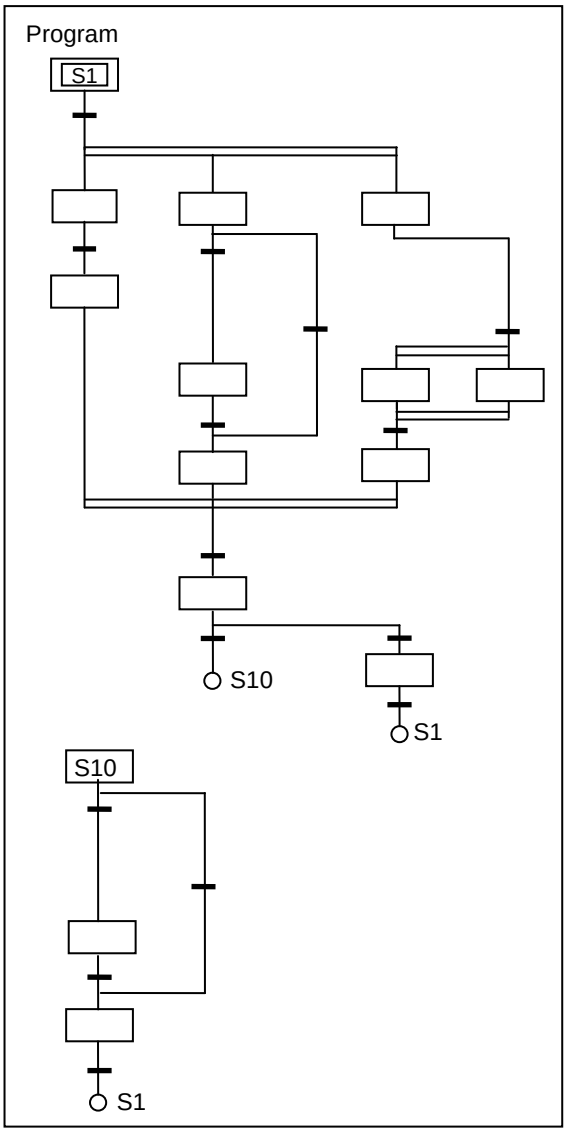


13) Conditional branch, wired-OR, and step jump are limited within a serial line of the same level. Branch or jump to a serial line of higher or lower level is not allowed.



1

< SFC Example >



◇ **Supplementary**

- If SFC has many steps, SFC may be drawn divided using step jump as shown in the figure above.

1.3.16 Graphical statements

<What are Statements?>
A graphical statement is an instruction, such as an IF statement and FOR statement of a high-level language, for processing conditional branch and repeat.

Graphical statements supported by the V series are as follows:

Graphical statement	Instruction symbol
IF statement	[IF], [THEN], [ELSE], [ELSEIF], [END_IF]
CASE statement	[CASE], [:], [.. :], [,], [.. ,], [ELSE], [END_CASE]
FOR statement	[FOR_DO], [EXIT], [END_FOR]
WHILE statement	[WHILE], [DO], [EXIT], [END_WHILE]
REPEAT statement	[REPEAT], [EXIT], [UNTIL], [END_REPEAT]
RETURN instruction	----<RETURN>
Jump instruction	---->>Label Label:
Bracket instruction	----[,]----||
Jump control instruction	----[JCS]----||, ----[JCR]---||
Master control instruction	----[MCS]----||, ----[MCR]---||

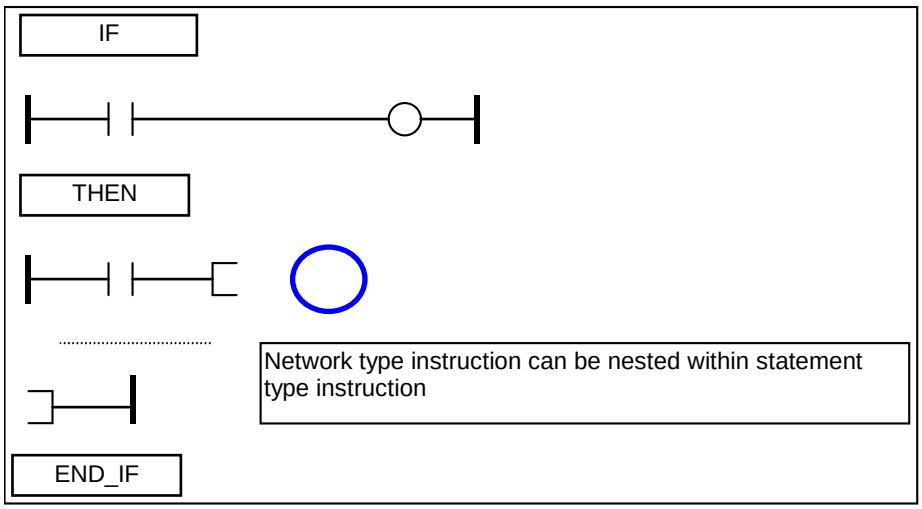
◇ **Supplementary**

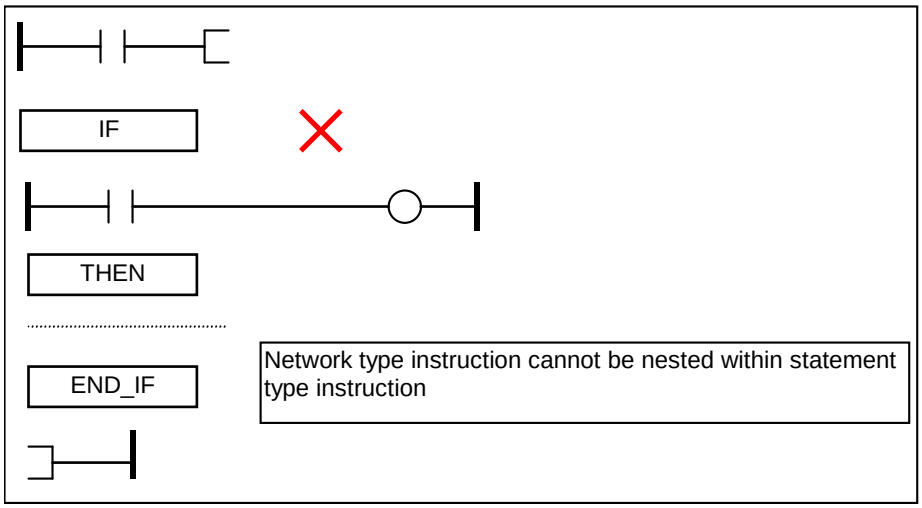
- Page delimiter is not a control statement, but is similar in some respects to others as an instruction symbol. It is explained in the final part of this section.

1

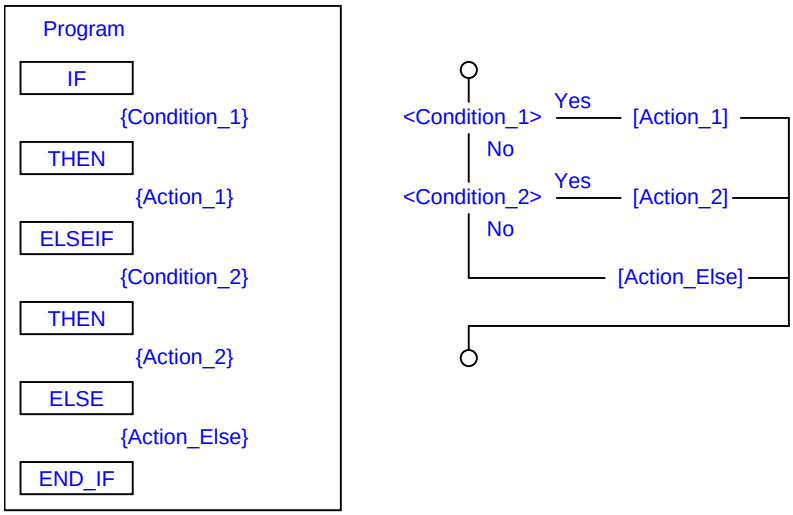
<Nesting Restrictions>

1) IF, CASE, FOR, WHILE, and REPEAT instructions can be nested within each other any number of times.
2) Bracket instructions and jump control instructions can be nested within each other any number of times.
3) Master control instruction cannot be nested.
4) The following restrictions apply when using statement type instructions such as IF, CASE, FOR, WHILE, and REPEAT and network type instructions such as bracket, jump control, and master control.





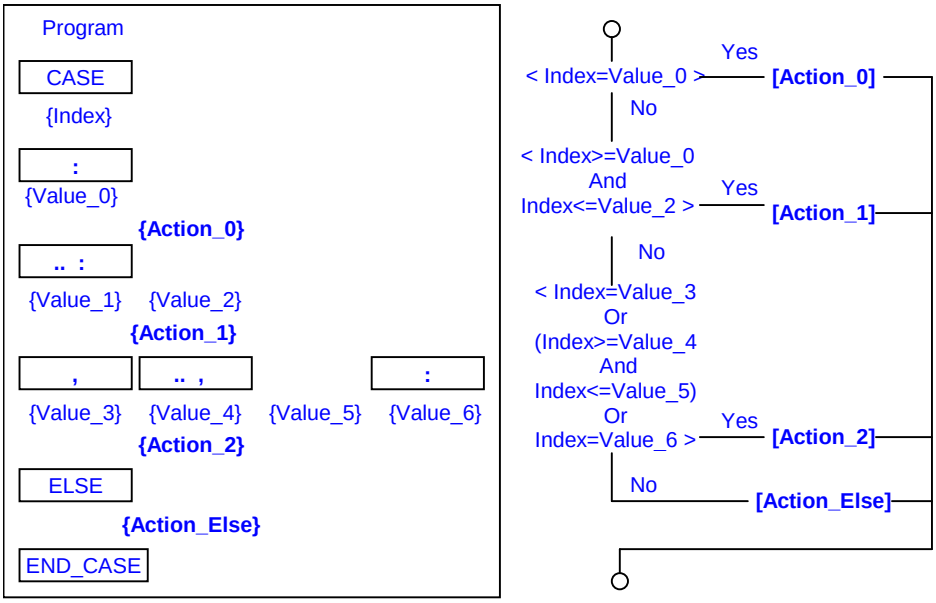
<IF Statement>



- An IF statement controls branch destinations using a (Condition) BOOL value.
- A circuit starting with the line next to IF, ELSEIF (Condition_1, Condition_2 in the figure above), a branch destination is determined by evaluating the last BOOL output (example: coil).
- An IF statement cannot have another instruction symbol on a line which has an instruction symbol.
- The {Action} part of an IF statement can be nested with other control statement. In one nest of an IF statement, IF, END_IF must be one in any case. Others may be omitted as appropriate.

1

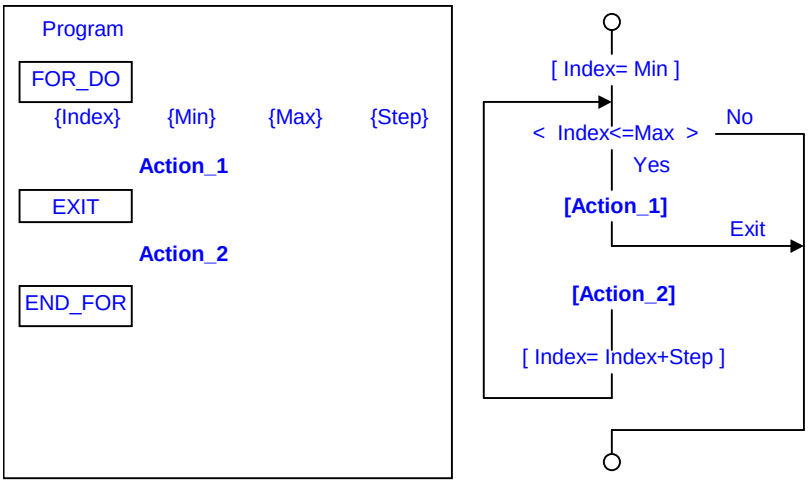
<CASE Statement>



- A CASE statement executes {Action} when it is consistent with {Index} or satisfies the conditions within the range.
- Use the specified index variable for [CASE].
- Specify a consistent condition value in [:].
- Specify the low and high values of the range conditions in [,, :].
- Enumerate the consistent conditions in [,].
- The range conditions and consistent conditions can be enumerated using [, , :].
- A CASE statement cannot have another instruction symbol on a line which has an instruction symbol.
- The {Action} part of a CASE statement can be nested with other control statement. In one nest of a CASE statement, CASE, END_CASE must be one in any case. Others may be omitted as appropriate.
  The CASE statement above is equivalent to the following when it is written in the ST language.

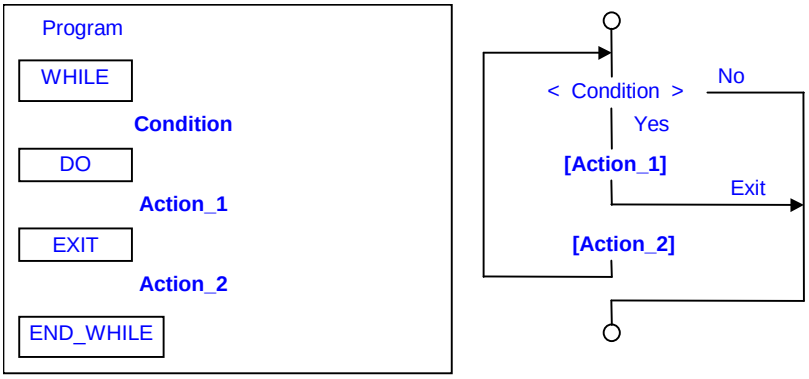
```
CASE      {Index} OF
{Value_0} :
          {Action_0} ;
{Value_1} .. [Value_2] :
          {Action_1} ;
{Value_3} , {Value_4} .. {Value_5} , {Value_6} :
          {Action_2} ;
ELSE
          {Action_Else} ;
END_CASE ;
```

<FOR Statement>



- A FOR statement increments {Index} from {Min} to {Min} with {Step}, and repeats {Action} when it is within the range. When [EXIT] is executed, the execution is shifted out of the nest concerned of the FOR statement.
- For [FOR_DO], specify an index variable in {Index}; a minimum index value in {Min}; a maximum index value in {Max}, and an index increment value in {Step}.
- A FOR statement cannot have another instruction symbol on a line which has an instruction symbol.
- The {Action} part of a FOR statement can be nested with other control statement. In one nest of a FOR statement, FOR, END_FOR must be one in any case. Others may be omitted as appropriate.

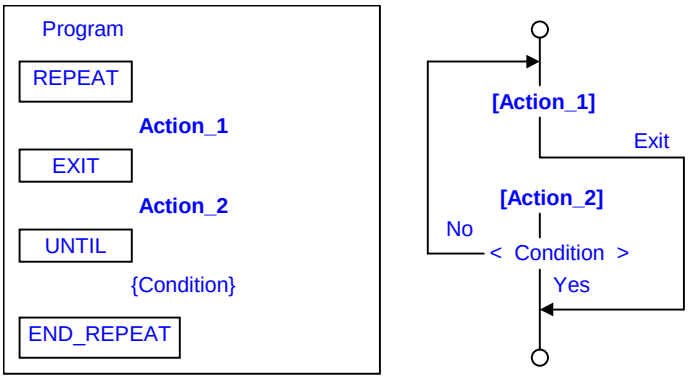
<WHILE Statement>



1

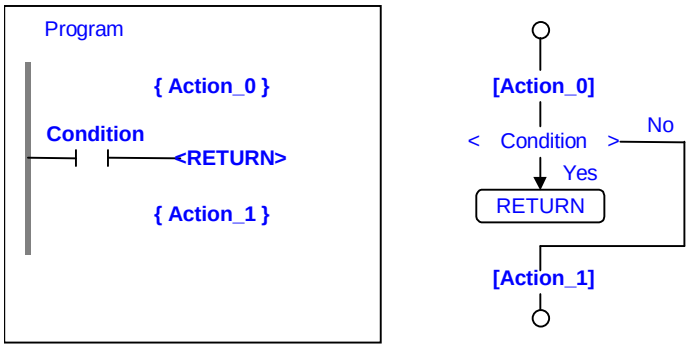
- A WHILE statement repeats {Action} circuit processing as long as {Condition} is satisfied. When [EXIT] is executed, the execution is shifted out of the nest concerned of the WHILE statement. Specify a condition circuit for BOOL output in {Condition}.
- A WHILE statement cannot have another instruction symbol on a line which has an instruction symbol.
- The {Action} part of a WHILE statement can be nested with other control statement. In one nest of a WHILE statement, WHILE, END_WHILE must be one in any case. Others may be omitted as appropriate.

<REPEAT Statement>



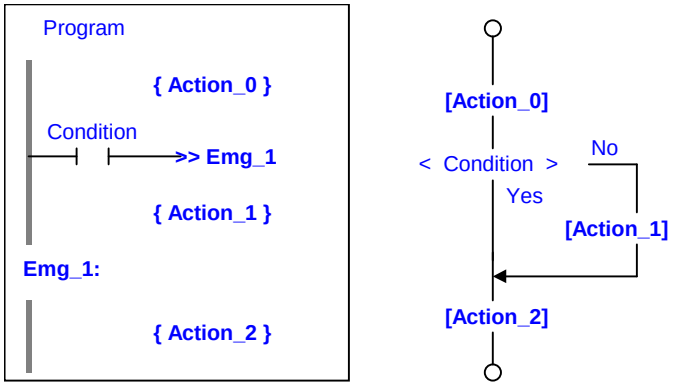
- A REPEAT statement first executes {Action} and, if {Condition} is not satisfied then, repeats {Action}. When [EXIT] is executed, the execution is shifted out of the nest concerned of the REPEAT statement. Specify a condition circuit for BOOL output in {Condition}.
- A REPEAT statement cannot have another instruction symbol on a line which has an instruction symbol
- The {Action} part of a REPEAT statement can be nested with other control statement. In one nest of a REPEAT statement, REPEAT, END_REPEAT must be one in any case. Others may be omitted as appropriate.

<RETURN Instruction>



- RETURN shifts the execution from the program, function block, or function to the source of invocation when the immediately preceding Boolean output (the contact in the figure) is True (1). When RETURN is not used, the execution generally returns to the source of invocation at the end of the execution circuit.
  In the figure above, however, it returns to the source of invocation without executing {Action_1} when {Condition} is satisfied.
- RETURN is treated as a circuit element as a bit input instruction symbol (example: coil).

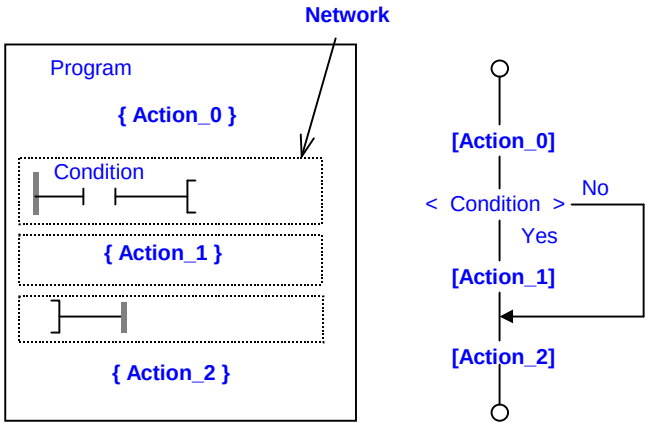
<JUMP Instruction>



- Jump (--->>) shifts the control to the specified label when the immediately preceding Boolean output (the contact in the figure) is True (1).
- The jump destination must be of the same POU as that of the jump source.
- Other instruction cannot be included on the label line.
- Either a number or string can be specified for a label. When specifying a string, observe the rules on identifiers.
- Jump is treated as a circuit element as a bit input instruction symbol (example: coil).

1

<BRACKET Instruction>



1) BRKT/BRKTE instructions ([ ]) executes the {Action_0} enclosed in [ ] when the immediately preceding Boolean condition (the contact in the figure) is True (1).

2) BRKT should be located in the end of the Network and unique in the Network.

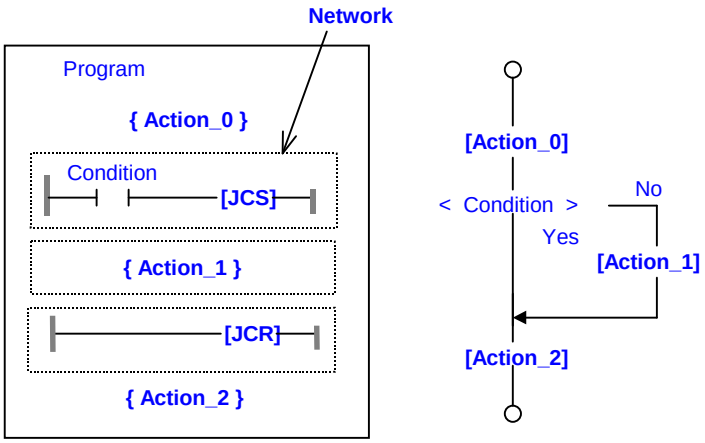
3) BRKT and BRKTE should be paired.

4) BRKT and BRKTE can be nested.

◇ **Supplementary**

- Network means the smallest unit of programming circuit that consists of instructions.

<Jump Control Instruction>



1) JCS shifts the execution to the processing next to JCR when the Boolean condition (the contact in the figure) immediately preceding JCS is True (1).

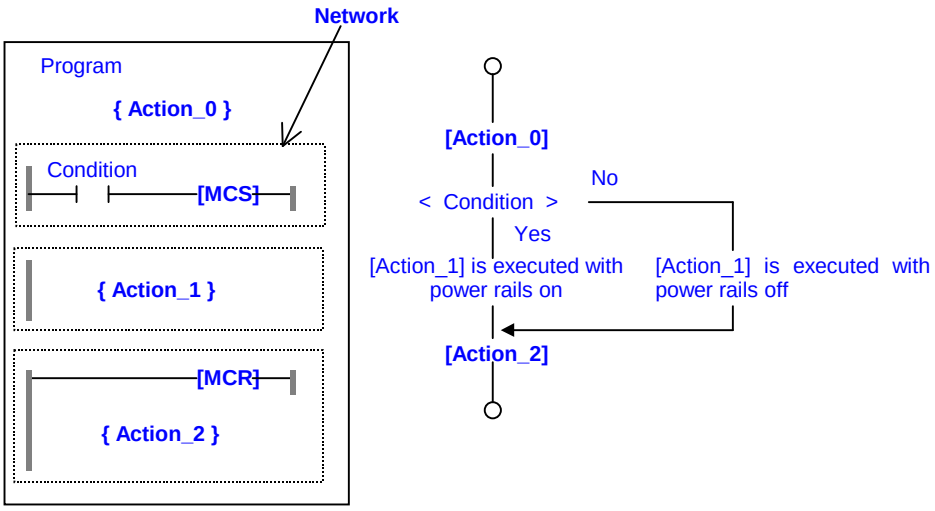
2) JCS should be located in the end of the Network and unique in the Network.

3) JCS and JCR should be paired.

4) JCS and JCR can be nested.

5) JCR should be directly connected to the left power rail.

<Master Control Instruction>



Master control instruction controls the master, that is, the power rails, of the ladder circuit.

1) The power rails of the ladder circuit, including the left power rail in the area enclosed by MCS and MCR instructions, are controlled.
The power rails are turned on when the Boolean condition (the contact in the figure) immediately preceding MCS is True (1), and the ladder circuit is executed as usual. The power rails are turned off when the Boolean output is False (0), and the ladder circuit is executed.

2) MCS should be located in the end of the Network and unique in the Network.

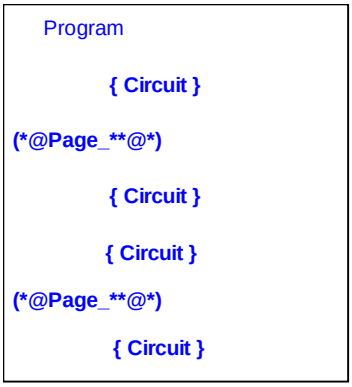
3) MCS and MCR should be paired.

4) MCS and MCR cannot be nested.

5) MCR should be directly connected to the left power rail.

1

<Page delimiter>

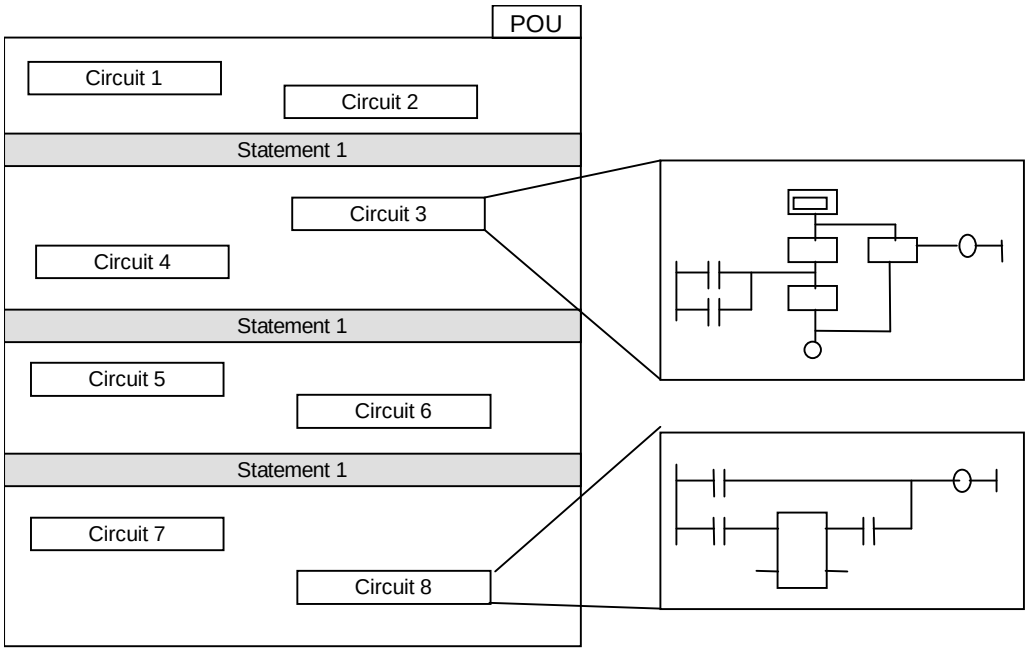


- Page Delimiter is for the user to insert in a line of a POU to separate one processing unit from another.
- Other instruction cannot be included on a line which has Page Delimiter.
- Page Delimiter is an instruction invalid for execution.
- When Page Delimiter is added, pages are changed in printing them.
- A page can be called back for display by the page number specified by Page Delimiter.

1.3.17 Execution order of graphical languages

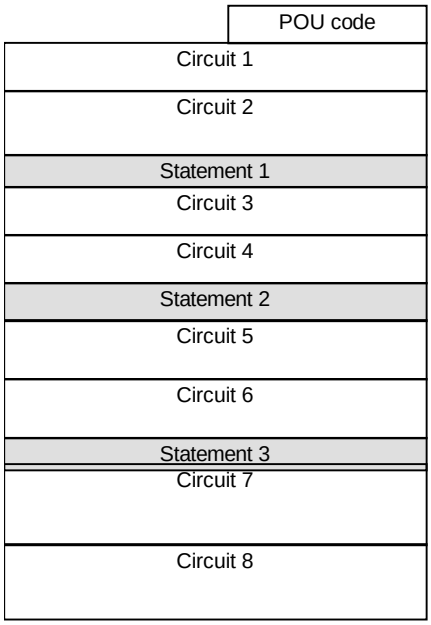
One of the features of this tool is that it can represent graphical languages, that is, LD, FBD, and SFC, mixedly in one POU (program, function block, function). These are compiled and converted into instruction codes that can be understood by the controller. In this process, the tool automatically decides the order of executing the instructions. Here is a brief description of how to decide the order of executing them. With the program editor, order of execution numbers are called step numbers, which can be displayed for confirmation after the compiling.

■ Statements and circuits



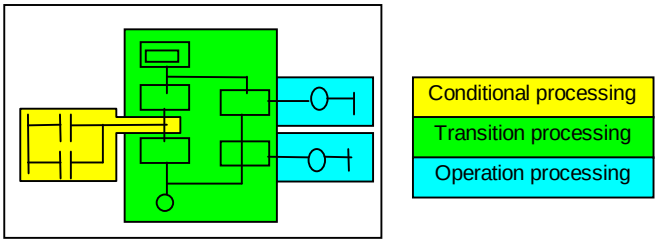
- Statements are instructions, such as IF statement, CASE statement, FOR statement, WHILE statement, REPEAT statement, label, and page delimiter. These instructions are characterized by not allowing other instruction to be present on their line.
- Circuit is a unit of assembly of connected instructions, prepared by the instructions of LD, FBD, and SFC. Unconnected instructions are taken as part of another circuit.
- The example in the figure above may be compiled into a code where the circuits are enclosed between statements as shown below.
- The order of executing circuits is such that the cell is traced from left to right so that the circuit where the instruction reaches first is executed first.

1



<Execution order of circuit including SFC>

A circuit which includes SFC is compiled, unit by unit, in the order of executing



1.3.18 Controller variables

Global variables are used in controllers, and can be accessed with two or more control programs. Size and use depend on the type of controller.

<Controller variables of nv series>

[type 1]

Variable	Name	Use	Download
SW	System register	Controller system register	No
DW	Data register	User data register	Yes in HALT mode
(User)	User register	User data register	Yes in HALT mode

Controller	SW	DW	(User)
PU811	8192	8192	10240

[type 2]

Variable	Name	Use	Download
ZW	System register	Controller system register	No
DW	Data register	User data register	Yes in HALT mode
(User)	User register	User data register	Yes in HALT mode
AW/BW/MW	Transmit data	User Transmit Data	No
PV_PARA	PV parameter	Indicator Tag parameter	Yes in HALT mode
LP_PARA	LP parameter	Regulator Tag parameter	Yes in HALT mode
PB_PARA	PB parameter	Pushbutton Tag parameter	Yes in HALT mode
TC_PARA	TC parameter	Timer Tag parameter	Yes in HALT mode
DB_PARA	DB parameter	Data set Tag parameter	Yes in HALT mode
SQ_PARA	SQ parameter	Sequence Tag parameter	Yes in HALT mode
P_PARA	P parameter	Polynomial table parameter	Yes in HALT mode
T_PARA	T parameter	Timer parameter	Yes in HALT mode
C_PARA	C parameter	Counter parameter	Yes in HALT mode
RTT_PARA	RTT parameter	DS scan parameter	Yes in HALT mode
PV_DATA	PV data	Indicator Tag data	No
LP_DATA	LP data	Regulator Tag data	No
PB_DATA	PB data	Pushbutton Tag data	No
TC_DATA	TC data	Timer Tag data	No
SQ_DATA	SQ data	Sequence Tag data	No
T_DATA	T data	Timer data	No
C_DATA	C data	Counter data	No
R_PARA	R parameter	Real parameter	Yes in HALT mode
W_PARA	W parameter	Integer parameter	Yes in HALT mode

Controller	ZW	DW	(User)	A,B,MW	PV	LP	PB	TC
PU821	8192	65536	16384	66560	1024	320	1280	128

Controller	DB	SQ	P	T	C	RTT	R	W
PU821	256	128	256	512	128	512	4096	2560

◇ **Supplementary**

- The numeric values above, those in the ZW, DW and (User) columns are the numbers of words, and those in the other columns are the numbers of tag and parameter points.

<Controller variables of V series>

[S controller]

Variable	Name	Use	Download
SW	System register	Controller system register	No
DW	Data register	User data register	Yes in HALT mode
User	User register	User data register	Yes in HALT mode

Controller	SW	DW	(User)
S3PU65	512	4096	10240
S3PU55	512	4096	10240
S3PU45	512	4096	10240
S3PU21	512	4096	10240
S3ST45	512	4096	1024
S2PU72	512	4096	10240
S3PU32	512	4096	10240
S2PU22	512	4096	10240
S2PU72D	512	4096	10240

◇ **Supplementary**

- The numeric values above are the numbers of words.
- Download means loading the initial values into the entire global variable area concerned from the V tool. Yes in HALT mode means that the variables can be downloaded when the controller is not in operating mode (that is, when program execution is halted).

[L controller (MCS type)]

Variable	Name	Use	Download
ZW	System register	Controller system register	No
User	User register	User data register	Yes in HALT mode
PV_PARA	PV parameter	Indicator Tag parameter	Yes in HALT mode
LP_PARA	LP parameter	Regulator Tag parameter	Yes in HALT mode
PB_PARA	PB parameter	Pushbutton Tag parameter	Yes in HALT mode
SQ_PARA	SQ parameter	Sequence Tag parameter	Yes in HALT mode
P_PARA	P parameter	Polynomial table parameter	Yes in HALT mode
T_PARA	T parameter	Timer parameter	Yes in HALT mode
C_PARA	C parameter	Counter parameter	Yes in HALT mode
F_PARA	F parameter	Communication data (real) parameter	Yes in HALT mode
I_PARA	I parameter	Communication data (integer) parameter	Yes in HALT mode
PV_DATA	PV data	Indicator Tag data	No
LP_DATA	LP data	Regulator Tag data	No
PB_DATA	PB data	Pushbutton Tag data	No
SQ_DATA	SQ data	Sequence Tag data	No
T_DATA	T data	Timer data	No
C_DATA	C data	Counter data	No
F_DATA	F data	Communication data (real) data	No
I_DATA	I data	Communication data (integer) data	No
R_PARA	R parameter	Real parameter	Yes in HALT mode
W_PARA	W parameter	Integer parameter	Yes in HALT mode
GD_DATA	GD data	Guidance data	No
VB_DATA	VB dat	Visual batch data	No

Controller	ZW	User	PV	LP	PB	SQ
L3PU11	8192	16384	1024	256	1024	128
L2PU12	8192	16384	128	96	288	48
L2PU11	8192	16384	288	32	128	16
L1PU12	1024	1024	128	8	32	–
L1PU11	1024	1024	128	8	32	–
LC512	1024	1024	128	8	32	–
LC511	1024	1024	128	8	32	–

Controller	P	T	C	F	I	R	W	GD	VB
L3PU11	128	512	256	128	128	2048	2048	8	128
L2PU12	48	192	96	48	48	768	768	3	48
L2PU11	48	192	96	48	48	768	768	3	48
L1PU12	16	–	–	32	32	128	128	1	–
L1PU11	16	–	–	32	32	128	128	1	–
LC512	16	–	–	32	32	128	128	1	–
LC511	16	–	–	32	32	128	128	1	–

◇ Supplementary

- The numeric values above, those in the ZW and (User) columns are the numbers of words, and those in the other columns are the numbers of tag and parameter points.
- The sign - in the above table means not supported by the corresponding controllers.

[L controller (DS type)]

Variable	Name	Use	Download
ZW	System register	Controller system register	No
DW	Data register	User data register	Yes in HALT mode
User	User register	User data register	Yes in HALT mode
AW/BW/MW	Transmit data	User Transmit Data	No
PV_PARA	PV parameter	Indicator Tag parameter	Yes in HALT mode
LP_PARA	LP parameter	Regulator Tag parameter	Yes in HALT mode
PB_PARA	PB parameter	Pushbutton Tag parameter	Yes in HALT mode
TC_PARA	TC parameter	Timer Tag parameter	Yes in HALT mode
DB_PARA	DB parameter	Data set Tag parameter	Yes in HALT mode
SQ_PARA	SQ parameter	Sequence Tag parameter	Yes in HALT mode
P_PARA	P parameter	Polynomial table parameter	Yes in HALT mode
T_PARA	T parameter	Timer parameter	Yes in HALT mode
C_PARA	C parameter	Counter parameter	Yes in HALT mode
PV_DATA	PV data	Indicator Tag data	No
LP_DATA	LP data	Regulator Tag data	No
PB_DATA	PB data	Pushbutton Tag data	No
TC_DATA	TC data	Timer Tag data	No
SQ_DATA	SQ data	Sequence Tag data	No
T_DATA	T data	Timer data	No
C_DATA	C data	Counter data	No
R_PARA	R parameter	Real parameter	Yes in HALT mode
W_PARA	W parameter	Integer parameter	Yes in HALT mode

Controller	ZW	DW	User	A,B,MW	PV	LP	PB	TC	DB	SQ
L3PU21	8192	65536	16384	67584	768	256	1024	128	256	128
L3PU22	8192	65536	16384	67584	768	256	1024	128	256	48

Controller	P	T	C	R	W
L3PU21	256	512	128	4096	1280
L3PU22	256	512	128	4096	1280

◇ **Supplementary**

- The numeric values above, those in the ZW and (User) columns are the numbers of words, and those in the other columns are the numbers of tag and parameter points.
- The sign - in the above table means not supported by the corresponding controllers.

1.3.19 I/O variables

I/O variables is a kind of global variables, reflecting the process I/O data of an I/O module. Process I/O signals can be acquired and set by referring to I/O variables with the program or function block.

<Combination of I/O module and controller>

With the nv series, three types of I/O modules, that is, TC-net I/O, G3I/O, and SI/O, can be used. The I/O modules may be combined with controllers as shown in the table below. For a description of the I/O modules, see the manual.

Controller	TC-net I/O	G3 I/O	SI/O
type 1	○	○	–
type 2	○	○	○

With the V series, three types of I/O modules, that is, G3I/O, G2I/O, and SI/O, can be used. The I/O modules may be combined with controllers as shown in the table below. For a description of the I/O modules, see the manual.

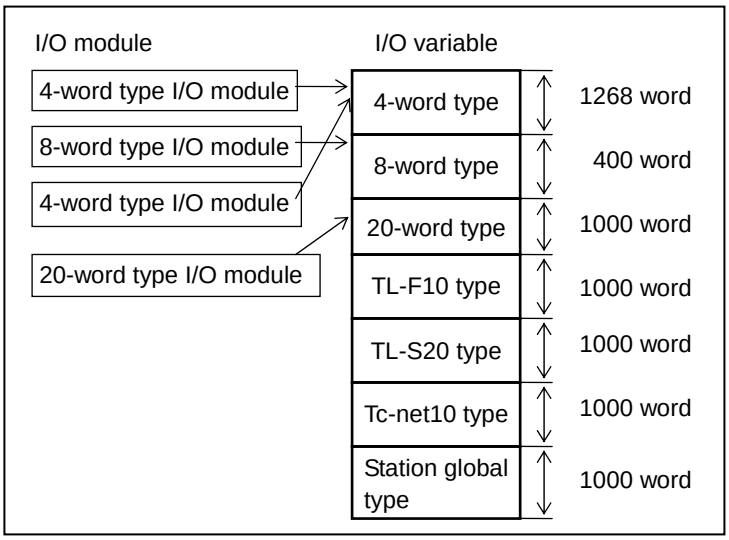
V series	Controller	G3 I/O	G2 I/O	SI/O	5800I/O
Model3000	S3*	○	–	–	○
	L3*	○	–	○	–
Model2000	S2*	–	○	–	–
	L2*	–	○	○	–
Model1000	L1*	–	–	○	–

<I/O variable of G3I/O>

The I/O variable size of G3I/O is shown below.

Controller	No. of words of I/O variable
S3PU65	8192 (8kw)
S3PU55	8192 (8kw)
S3PU45	5120 (5kw)
S3PU21	3072 (3kw)

A G3I/O module is automatically allocated to an I/O variable when the hardware configuration is entered and saved with the configuration editor of the tool. An I/O variable map is shown below. This mapping size is the default, which can be changed by the user. For the types of G3I/O modules, see the manual for the G3I/O.



An I/O variable file is automatically created when I/O variable names are registered with the [I/O variable] of the tool, thereby permitting programming by referring to the I/O symbols with the program.

<I/O variable of G2I/O>

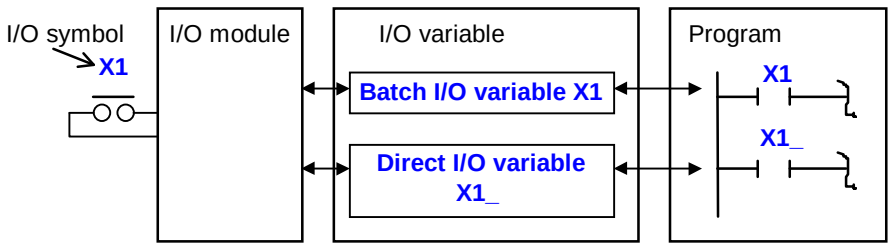
The I/O variable size of G2I/O is shown below.

Controller	No. of words of I/O variable
S2PU22	3072 (3kw)
S2PU72	3072 (3kw)
S2PU32	3072 (3kw)
S2PU72D	3072 (3kw)

The mapping of I/O modules and of I/O variables is similar to that of G3I/O.

<Direct I/O variable and Batch I/O variable>

There are two kinds of I/O variables for G2I/O and G3I/O: direct I/O variable and batch I/O variable. Both have the same capacity and are identical in I/O module mapping. As its name indicates, the direct I/O variable accesses the actual I/O module to acquire I/O data only when the program loads and stores data. The batch I/O variable acquires I/O data in synchronization with a scan processing type task, that is, HS or MS task. The I/O variable names registered with the [I/O Variable] of the tool becomes directly a batch I/O variable name. The direct I/O variable will have the same name except for the underscore (_) added to the end of it.



It is up to the user to decide which variable is to be used in the program. The batch I/O variable remains unchanged in value during a scan however often it is referred to in the same program. That is, this variable is often used because it is synchronized with the task. In contrast, the direct I/O variable is refreshed in value each time it is referred to.

1

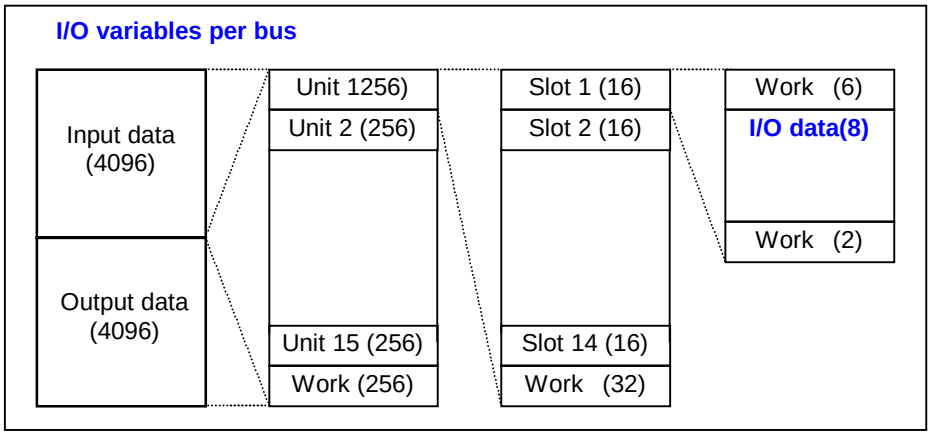
<I/O variable of SI/O>

The I/O variable size of SI/O is shown below.

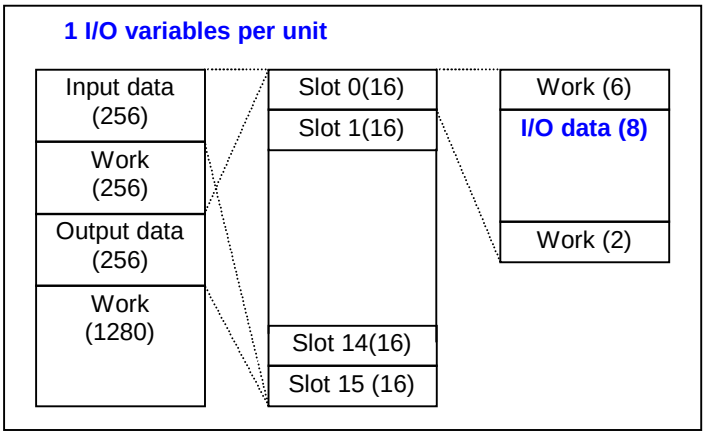
Controller	No. of words of I/O variable
L3PU21	8192 *4 (8kw*4)
L3PU11	8192 *4 (8kw*4)
L2PU22	8192 *3 (8kw*3)
L2PU12	8192 *3 (8kw*3)
L2PU11	8192 (8kw)
L1PU12	2048 (2kw)
L1PU11	2048 (2kw)

The L3 and L2 have an I/O variable capacity of 8 kw per SI/O bus.
The L1 has a capacity of 2 kw per unit.
The mapping of I/O variables is as shown below.
When I/O symbols (variable names) are registered with the 'I/O variable' of the tool, they can be used for programming. (DS type only)

- I/O variables of L3, L2



• I/O Variable of L1



<I/O Data structure of SI/O>

The SI/O module has an I/O data structure of 8 words per module. The structure of each type of SI/O module is shown below.

SI/O module type	Module name	Input/output	I/O data structure (+: word offset)
Digital input	SDI01	Input	+ 0 = DI1 - DI16 + 1 = DI17 - DI32
Digital output	SDI01	Output	+ 0 = DO1 - DO16 + 1 = DO17 - DO32
Analog input	SAI01 SAI02 SAI03 SRT01 STC01 SAI06	Input	+ 0 = AI1 + 1 = AI2 + 2 = AI3 + 3 = AI4 + 4 = AI5 + 5 = AI6 + 6 = AI7 + 7 = AI8
Analog output	SAO01 SAO02 SAO06	Output	+ 0 = AO1 + 1 = AO2 + 2 = AO3 + 3 = AO4 + 4 = AO5 + 5 = AO6 + 6 = AO7 + 7 = AO8

SI/O module type	Module name	Input/output	I/O data structure (+: word offset)
Pulse input	SPI01	Output	+ 0 = PI1 (Total) + 1 = PI2 (Total) + 2 = PI3 (Total) + 3 = PI4 (Total) + 4 = PI1 (Momentary value) + 5 = PI2 (Momentary value) + 6 = PI3 (Momentary value) + 7 = PI4 (Momentary value)
Pulse output	SPO01	Output	+ 0 = PO1 + 1 = PO2 + 2 = PO3 + 3 = PO4
Analog loop	LP01	Input	+ 0 = DI1, 2, 3 + 1 = AI1 + 2 = AI2 + 3 = AI3 + 4 = AI4
		Output	+ 0 = DO1, 2, 3 + 1 = MV + 2 = AO1 + 3 = AO2
Pulse loop	LP02	Input	+ 0 = DI1, 2, 3, R/M + 1 = AI1 + 2 = AI2 + 3 = AI3 + 4 = AI4
		Output	+ 0 = DO1, 2, 3 + 1 = PO + 2 = AO1 + 3 = AO2

Note: The LP01 and LP02 modules can be used with Model 1000 only.

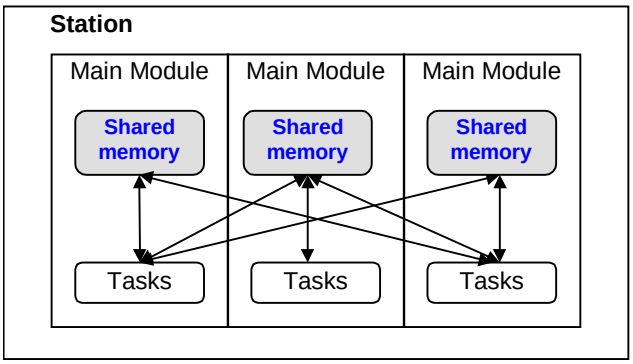
<Asynchronism of I/O data of SI/O>

The I/O variables of SI/O are automatically refreshed on the own cycle of the SI/O bus. In this sense, it is asynchronous with the task execution cycle. Direct reference to the I/O variables of SI/O in the program is the same as accessing the direct I/O variables of G3I/O or G2I/O. Use of its I/O data in synchronization with the program requires the user to take such steps as loading it to the internal variable in the program, then using that internal variable in the program. The I/O variables of SI/O are batch-input and output by standard controller processing when they are input and output with the standard TAG variables (indicator, regulator pushbutton), so they are processed in synchronization with the task so long as the TAG variables are referred to within the program.

1.3.20 Station variables

The station variable is a shared memory used in sending and receiving data between main modules (Controller, Ethernet, TC-net, etc). It is called station variable in the sense that it can be programmed in the same variable name in the station.

<Data flow>



The station variable is actually the memory in a main module, which can be accessed in the same variable name from other main modules in the same station.

<Capacity of station variable of nv series>

Controller	No. of words of shared memory
PU811	–
PU821	–
TN8*	524288
EN8*	262144

Note: The sign - in the table above means that the station global variable is not supported.

<Capacity of station variable of V series>

[Model 3000]

Controller	No. of words of shared memory
S3PU65	1024
S3PU55	1024
S3PU45	1024
S3PU21	–
S3ST45	512
L3PU21	1024
L3PU11	1024
C3PU*	32768
TN7*	524288
CN7*	65535
EN7*	262144

Note: The sign - in the table above means that the station global variable is not supported.

[Model 2000]

Controller	No. of words of shared memory
S2PU72	1024
S2PU32	–
S2PU22	–
L2PU22	1024
L2PU12	1024
L2PU11	1024
C2PU*	32768
CN6*	65535
EN6 +	262144

Note: The sign - in the table above means that the station global variable is not supported.

[Model 1000]

Model 1000 has no station variable.

1.3.21 Network variables

Network Variable is scan data on a scan communication type control network. It is called Network Variable in the sense that it can be programmed in the same variable name at system level among the stations connected to the network. The capacity of Network Variable differs depending on the Network and the type of node.

<Capacity of network variables of F10>

Station	Node	No. of scan data words
Model3000	MS311 RS311 MS321_32	32
	MS321_64 MS331	64
	MS321_128	128
	MS321_256	256
Model2000	MS211 RS211	32

<Capacity of network variable of S20>

Station	Node	No. of scan data words
Model3000	SN321 SN322A SN323	1024
Model2000	SN221 SN222	

<Capacity of network variable of S20 LP>

Station	Node	No. of scan data words
Model3000	SN325	4096
Model1000	L1PU12	

<Capacity of network variable of FL-net>

Station	Node	No. of scan data words
nv station	FL911	8704
Model3000	FL311	
	FL312	
Model2000	FL611	
	FL612	

<Capacity of network variable of devicenet>

Station	Node	No. of scan data words
Model3000	DN311A	756
Model2000	DN611A	256

<Capacity of network variable of profibus>

Station	Node	No. of scan data words
Model3000	PF311	256
	PF312	122

<Capacity of network variable of Tc-net 10>

Station	Node	No. of scan data words
Model3000	CN711 CN712 CN713	16384
Model2000	CN611 CN612 CN613	

<Capacity of network variable of Tc-net 20>

Station	Node	No. of scan data words
Model3000	CN623 CN624	16384

<Capacity of network variable of Tc-net 100>

Station	Node	No. of scan data words
nv station	TN821 TN822	131072
Model3000	TN711 TN712 TN721 TN722	

1.3.22 Configurations

Configuration means the hardware configuration information of the main units and I/O modules of a station. This information is automatically created when hardware configuration and module parameters are registered with the Product tree of the V tool, and batch-downloaded to the controller. The information includes the following, for example.Contents of Configuration.

<Configurations of nv series>

Item	Contents
Station configuration information	Main unit configuration, etc.
Controller parameter	Operation in case of power failure, task control cycle, and other information on settings
I/O connection information	Connection information for batch input/output of I/O signals of TC-net I/O etc
I/O loop information	I/O loop configuration information
I/O node information	I/O node and I/O module configuration information
Special TC-net I/O information	FL-net and MODBUS configuration information
G3/G2 I/O information	G3I/O and G2I/O module configuration information

<Configurations of V series>

Item	Contents
Station configuration information	Main unit configuration, etc.
Controller parameter	Operation in case of power failure, task control cycle, and other information on settings
PI/O module configuration information	G3I/O and G2I/O module configuration information
I/O connection information	Connection information for batch input/output of I/O signals of G3I/O and G2I/O
S20 module parameter	S20 module setting parameters
SI/O module configuration information	Serial I/O module configuration information
SI/O module parameter	Serial I/O module parameters
SIF shared map	Management information on serial I/O managing module SIF and L3 controller

◇ **Supplementary**

- Configuration is not accessed by user tasks, and will not be released as a variable.

Chapter 2
Registering Hardware

This chapter is intended for users with understanding of nv series and V series hardware models and describes how to register the hardware.
Registering hardware is the first task that must be performed.
You should prepare an outline of the hardware models to be registered in order to register them smoothly.

The hardware registration flow is as follows:

2.1 Registering the System

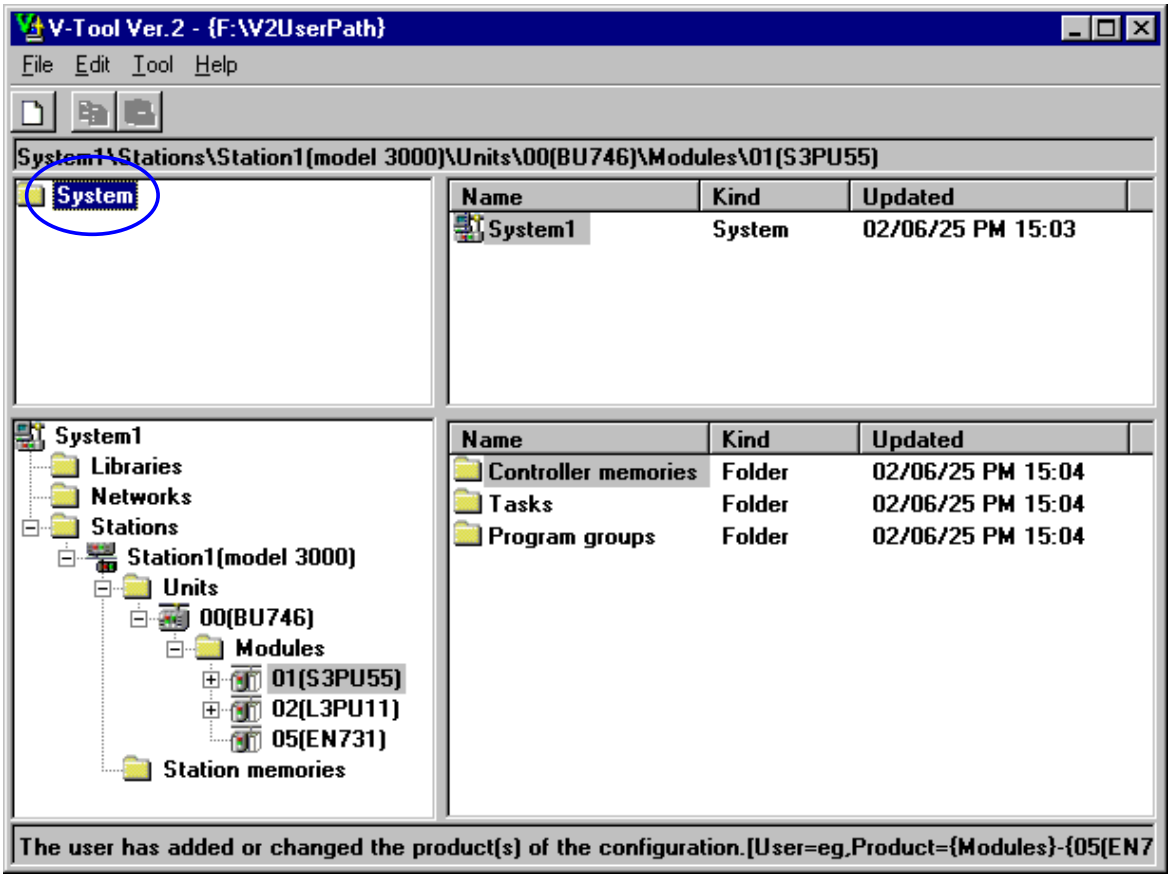
In order to register a system, you must start the Product Tree.

Select the [System] folder at the top left corner of the screen and select <New> from the <File> menu.
(Or, right-click and select <New> from the pop-up menu.)
When the input dialog appears, enter a desired system name.

Note

- The name must not exceed 64 characters.
- The characters # ' | \ @ [ ] : * . / < > ? " are not allowed.

When the system folder is registered, it appears at the top right corner of the screen.



2.2 Registering the Station Configuration

This section describes how to register the hardware configuration below the station.
Start the Product Tree and double-click the system to edit at the top right corner of the screen.
The editable sub folders in the selected system appear at the bottom left of the screen.

■ Registering the station

Select the [Station] sub folder and select <New> from the <File> menu.
When the registration dialog appears, input a model and name.

■ Registering the main unit

Select [Unit] directly below the station and select <New> from the <File> menu.
When the registration dialog appears, select Main unit.
If the controller is to be used in a redundant configuration, select the redundancy type.

■ Registering the main module

Select [Module] directly below the main unit and select <New> from the <File> menu.
When the registration dialog appears, select the Slot No. and Main module.
If a controller module is selected, the comment can be registered up to 64 characters.

■ Registering the I/O node or the bus

In the case of nv series, select [I/O Node] directly below the main module and select <New> from the <File> menu.
When the registration dialog appears, select the Node No. and I/O Node module.
In the case of V series, select [Bus] directly below the main module and select <New> from the <File> menu.
When the registration dialog appears, select the Bus No. and Bus module.
Bus is the cable connecting the main module and I/O unit and is registered here to control the connection.
In case of model 1000, register the default bus [I/O bus].
To register the bus to model 3000 SIF module, register the control controller with the module parameter.

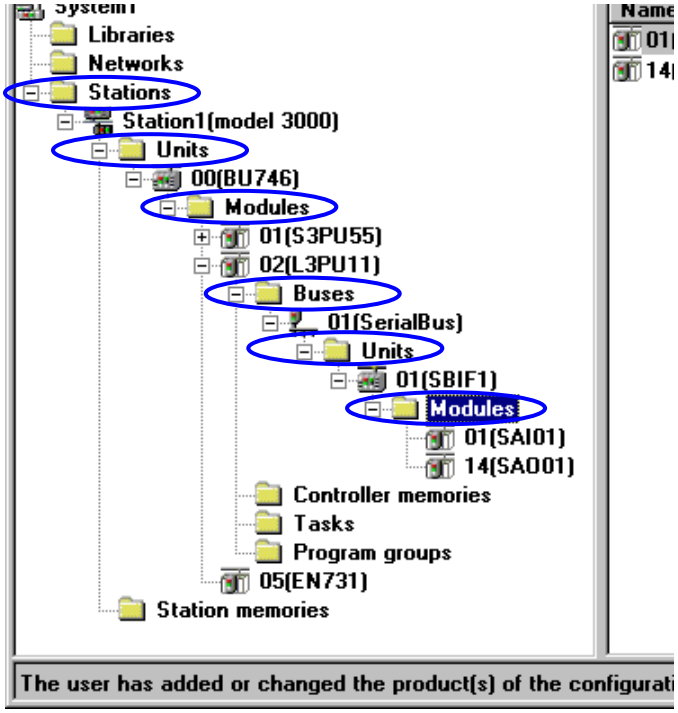
2

■ Registering the I/O unit

Select [Unit] directly below the bus and select <New> from the <File> menu.
When the registration dialog appears, select the I/O Unit No. and I/O Unit.
In case of model 1000, there is no corresponding I/O unit, but register the default I/O unit [I/O unit] in order to control the connection.
If you are using parallel bus with model 2000, select the bus type and then register the I/O unit.
Comment can be registered up to 64 characters.

■ Registering the I/O module

Select [Module] directly below I/O unit and select <New> from the <File> menu.
When the registration dialog appears, select the I/O Module No. and Module.



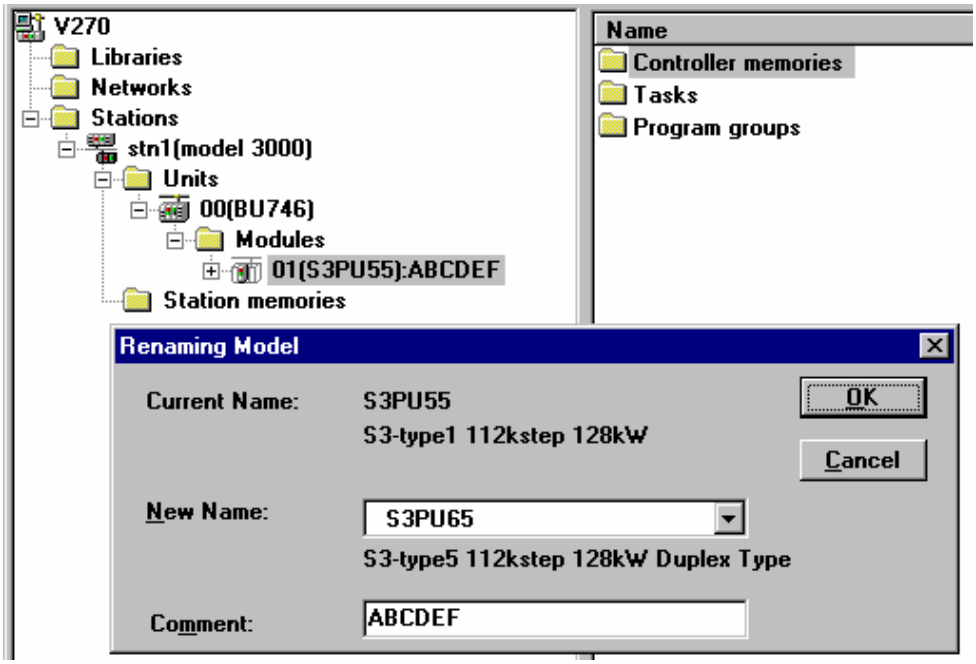
■ Changing the product name

Select [Unit] or [Module] at bottom left of the Product Tree and select <Rename> from the <File> menu.

Change dialog appears.

The name to change is chosen when changing a name.

Change comment is inputted when changing a comment.



- Compatible units

1	BU816 BU816Double
2	BU825 BU825Single
3	BU742 BU742Double
4	BU744 BU744Double
5	BU746 BU746Double
6	BU748 BU748Double
7	BU648E BU648EDouble
8	BU643D BU643DDouble

2

- Compatible modules

1	S3PU55 S3PU65
2	S2PU72 S2PU72D
3	S2PU72_X S2PU72D_X

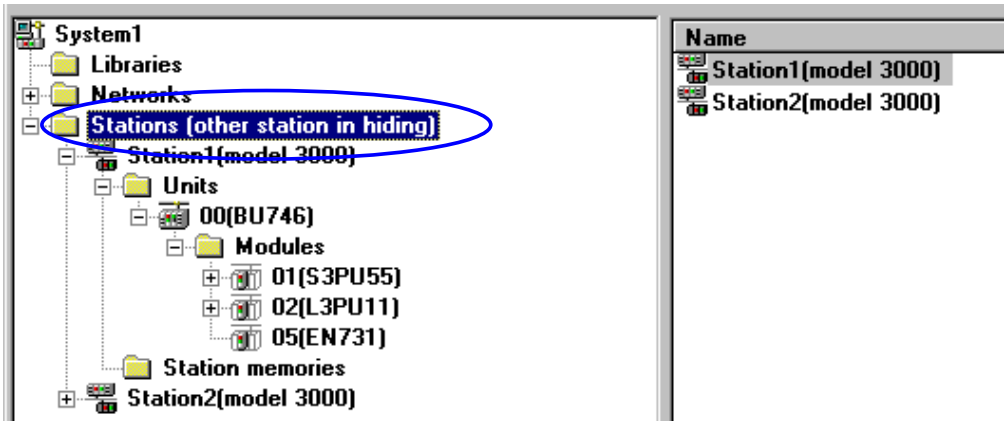
- Compatible modules of a unit ‘BU74A

	Before	After
1	S3PU55	S3PU55 + IF721 S3PU55 + IF741
2	S3PU55 + IF721	S3PU55
3	S3PU55 + IF741	
4	S3PU45	S3PU45 + IF721 S3PU45 + IF741
5	S3PU45 + IF721	S3PU45
6	S3PU45 + IF741	
7	S3ST45A	S3ST45A + IF721
8	S3ST45A + IF721	S3ST45A

■ Hiding the other stations

Select <Show other station> from the <View> menu, and the check mark of this menu is turned off.

If "other station" is hiding, "other station in hiding" is displayed on the right side of [Stations].



When showing "other station", select <Show other station> from the <View> menu again.

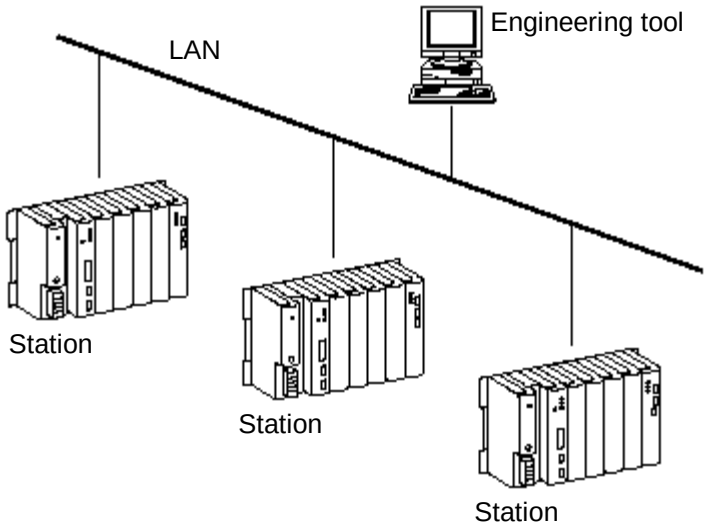
2.3 Registering the Network Configuration

This section describes how to register the LAN configuration which connects stations. This must be performed if you intend to transmit data using LAN. If you do not intend to use LAN, skip this procedure and continue.

LAN configuration

Multiple stations can share information such as process data over LAN.

The following figure is an example of a system with three stations and an engineering tool connected to a single LAN.



The procedure to implement a LAN in a system is as follows:

- Add a network module to the hardware configuration of each station
- Add LAN to the system
- Connect the network module of each station to the LAN

Add a LAN card to the hardware configuration of each station

Register the network module corresponding to the type of LAN to be used.

Refer to section "2.2 Registering the Station Configuration" for details.

Add LAN to the system

Select the [Network] folder at bottom left of the Product Tree and select <New> from the <File> menu.

Select the Network No. and LAN type. If it is necessary, the comment can be registered up to 64 characters.

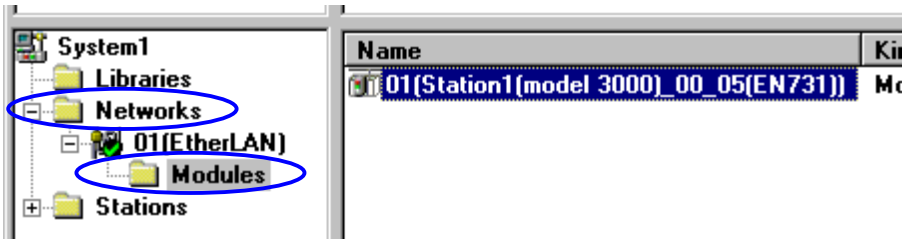
2

■ Connect the network module of each station to the LAN

Up to this point, the [Network module] and [LAN] have been added. In this state, the [Network module] and [LAN] are independent of each other and cannot communicate.

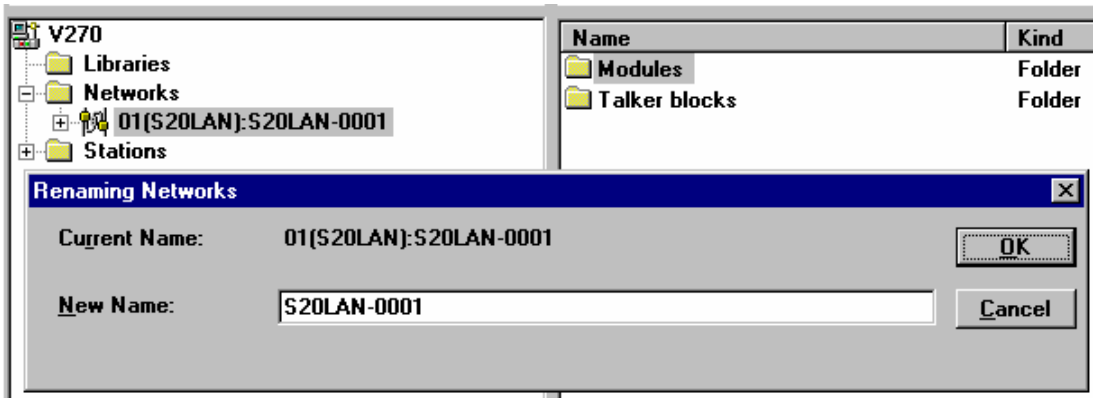
The procedure to connect [LAN] and [Network module] with software is as follows.

Select the [Module] folder at bottom left of the Product Tree and select <New> from the <File> menu.
Select the Node No. and Module name.



■ Changing the network name

The network is selected under the left of the product tree, and select <Rename> from the <File> menu. The change dialog is displayed, and input the changed comment.



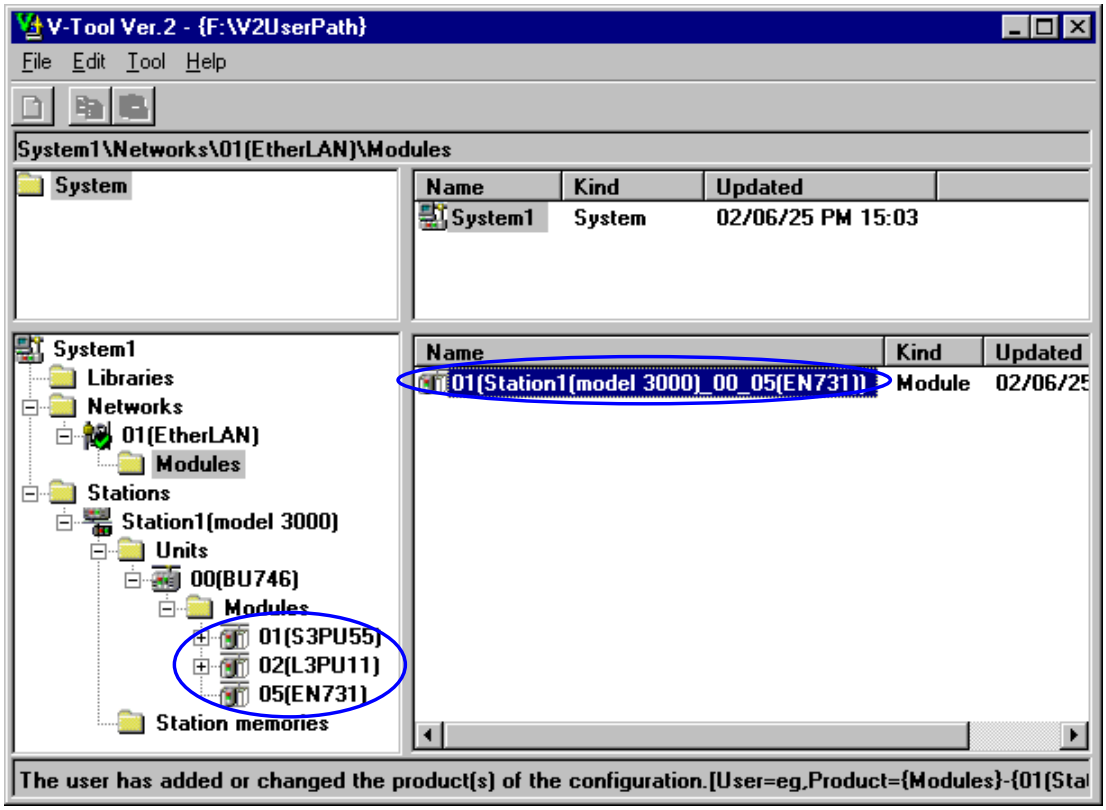
2.4 Registering Module Parameters

This section describes how to register the parameters of the main module and I/O module registered in the station configuration.

■ Opening the module parameter window

Select a main module or an I/O module at bottom left of the Product Tree and select <New> from the <File> menu.

In the case of network module, you can also select a network module at bottom right and select <Module Parameters> from the <File> menu.



■ Description of the module parameter window

This window contains the following:

<Module name>
Enables you to switch the module connected to the unit.
Select the desired module from the Slot No. and Module name list.

<View>
Enables you to switch the item to view.
Tool: Shows only the offline information.
Module: Shows the online information.
Tool and Module: Shows the offline and online information side by side.
* Appears for controller and transmission module

<Transmission>
Enables you to switch the transmission target.
You can select between primary and secondary path.
* Appears for transmission module

<Tab>
Parameters are organized into tabs according to view classification.
* The available tab is different for controller, I/O module, and transmission module.

<Refresh>
Reloads the display data.

<Write>
Writes the changed data to the module when viewing a module.

<Download>
Writes the entire tool content to the module.
* Valid for transmission module.

<Print>
Prints the displayed content.

<Close>
Closes the module parameter window.

<Verify>
The module parameters and the block transfer registration of MELPLAC I/O are checked.
* Appears for R3PU45 + IF72C and MELPLAC I/O module.

<Verify All>
The validity of all the module parameters is checked.
* Appears for FMGW1.

<Batch Download>
If it performs "Verify All" and there is no error, all the module parameters will be downloaded.
* Appears for FMGW1.

<Copy to Tool>
The module value is written in the value of the tool at the time of "Tool and Module" display.
* Appears for FMGW1.

■ Changing value

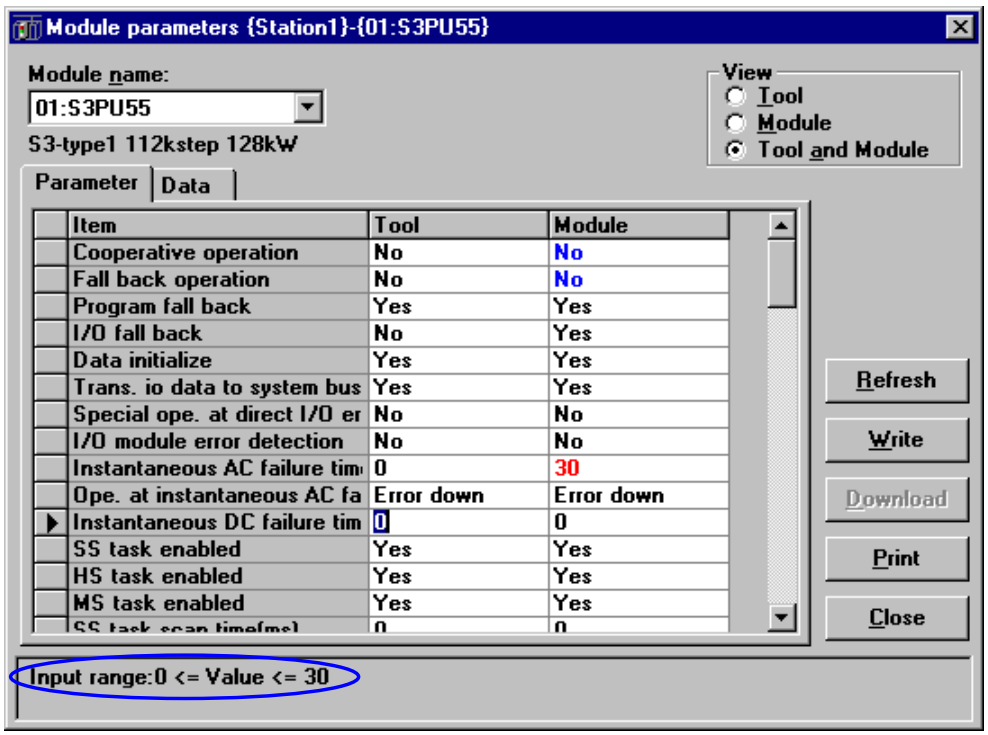
Move the cursor to each item and enter or select a value.

The range of values appears for item for which value is to be entered at the bottom of the window. Enter a value within that range.

There is no need to save the tool value because it is written immediately when confirmed.
The changed item appears in red for module value and all changes are written when the Write button is pressed.

◆ Important

- When changing the task scan cycle of S3 controller (OS: V02.5* or higher) on-line, there are the following restrictions.
  maximum >= change setting value > now setting value x 0.8

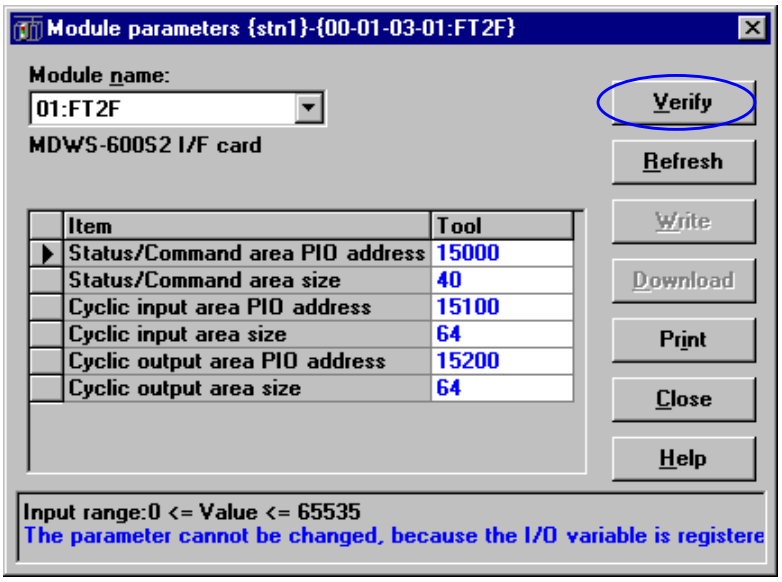


2

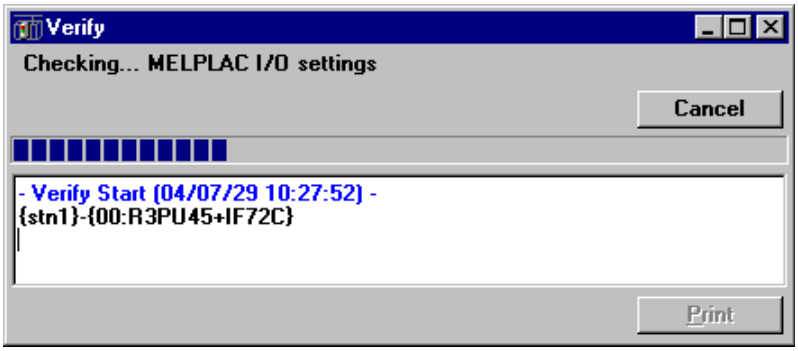
■ Verify (MELPLAC I/O)

This function checks settings of the module parameters and the block transfer registration of MELPLAC I/O.

1) Opening the verify dialog.
Select MELPLAC I/O module.
Open the window [Module parameters].



Click the [Verify] button to start the Verify dialog.



Moreover, it can be started from following dialogs.

- [Module parameters] window of [R3PU45 + IF72C].
- [Batch download] window. (The Verify dialog is started automatically.)

2) Canceling verification
Click [Cancel] to cancel verification.

3) Printing error list.
Click [Print] to print error list.

4) Messages & Measure.
When the error messages are displayed, please check to take actions in following list.

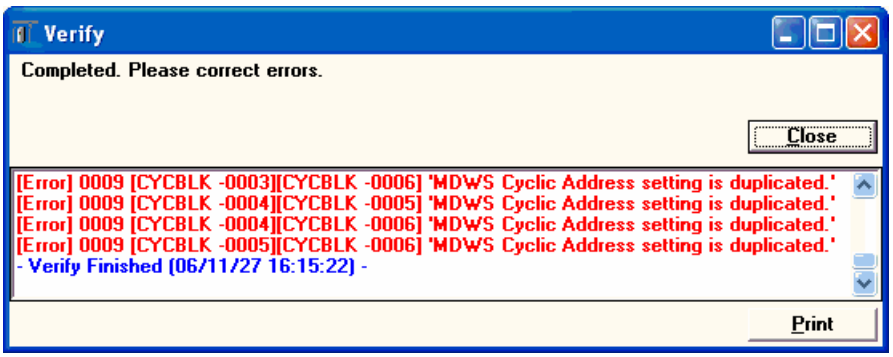
No.	Messages	Measure
101	IOW - 'Parameter not defined'	Please register module parameter(s). For unused area, please set 0 as size and minimum top-address in areas.
102	IOW - 'Out of Range'	Please repair top address and/or size in [Module Parameter] window. The IOW area total size must be within 64KW.
103	IOW - 'Area Override'	Please repair top address and/or size in [Module Parameter] window. The area overlaps with other area.
104	IOW - 'Area run over'	Please repair top address and/or size in [Module Parameter] window. When one module has two or more areas, all areas must be placed within continuous 16kW.
106	IOW - 'I/O Direction'	Please check the I/O variables registration. 'I/O Direction' setting has conflict with the I/O variable.
107	IOW - 'PIO Area Out of Range'	Please check the I/O variables registration. I/O variables are registered outside of the IOW area.
108	IOW - ' Invalid IOW'	Please check the I/O variables registration. I/O variable is registered with invalid IOW.
109	IOW - 'PIO Area Size Over'	Please repair size in [Module Parameter] window. Total of occupation size of an I/O module is beyond a range.
201	VAR - 'Not Defined'	Please assign I/O variables of MELPLAC I/O module as network variables.
301	BLK - 'TN7** Module Not Registered'	Please register TN7** module.
302	BLK - 'TN7** Module Not Connected'	Please connect TN7** module to TC-net100LAN.
303	BLK - 'Block Transfer Parameter not defined'	Please check the block transfer registration. Parameter items are insufficient.
304	BLK - 'I/O Module Parameter not defined'	Please register the parameter of I/O module which specified in [Target I/O module] of the block transfer registration.
305	BLK - 'PIO Area Out of Range'	Please check the block transfer registration. The [PIO Address] value is out of range, which is specified with the module parameter.

No.	Messages	Measure
306	BLK - 'Scan Area Out of Range'	Please check the block transfer registration. The [Scan data block No] value is out of range.
307	BLK - 'Scan Area Override'	Please check the block transfer registration. The [Scan data block No] area overlaps with other area.
308	BLK - 'TC-net 100 Talker not defined'	Please register the node and the output controller on TC-net100 LAN. The [Scan data block No] of block Transfer registration is invalid.
309	BLK/IOW - 'Area Override'	Please check the block transfer registration and/or I/O variable registration. The I/O variable is already registered in [Scan data block No].
310	BLK - 'I/O Direction'	Case of "Input", please register the R3 controller as output controller. Case of "Output", please register with the exception of R3 controller as output controller. The [I/O direction] of block Transfer registration is conflict.
311	BLK - 'Area Override'	Please check the block transfer registration and/or I/O variable registration. When the value [I/O direction] is 'Output', the I/O variable can not be registered as the batch output.
312	BLK/IOW - 'Size Over'	Please check the block transfer registration and/or I/O variable registration. The total size of batch I/O and [Block Transfer] area must be less than 4096 words.
313	BLK - 'PIO Area Out of Range'	Please check the block transfer registration. The IOW area total size must be within 64KW. (Top address + size <= 65536W)
314	BLK - 'PIO Area Override'	Please check the block transfer registration. The [PIO Address] area overlaps with other area.

■ Verify (FMGW1)

The validity of all the module parameters is checked.

1) Opening the verify dialog.
   Click the [Verify All] button to start the Verify dialog.



When the [Batch Download] button is clicked, the Verify dialog is started automatically.

2) Canceling verification
Click [Cancel] to cancel verification.

3) Printing error list.
Click [Print] to print error list.

4) Messages & Measure.
When the error messages are displayed, please check to take actions in following list.

No.	Messages	Measure
0001	The TC Word count value in Parameter tab is set to 1. Hence the valid range for TC Code is 0 to HFFFF.	Please repair the “TC code” of the [Message Transaction] into the value of "0-FFFF".
0002	The Size setting in Type1 is exceeding the corresponding request area size of Message Transmission Block setting.	Please repair the size of "Type 1" of the [Message Transaction] into the value within the limits.
0003	The Size setting in Type2 is exceeding the corresponding request area size of Message Transmission Block setting.	Please repair the size of "Type 2" of the [Message Transaction] into the value within the limits.
0004	MDWS data size setting is exceeding the MDWS Cyclic Address upper limit.	Please repair the “MDWS data size” of the [Cyclic Transfer] into the value within the limits.
0005	Req area scan offset and Req area size setting is exceeds the upper limit of Scan block No.	Please repair the offset and size of the “Response Area” of the [Message Transfer] into the value within the limits.
0006	TC Code setting is duplicated.	Please repair the “TC code” of the [Message Transaction] into the value not overlapping.
0007	Responce area scan block setting is duplicated.	Please repair the “Scan Block No.”, “Offset”, and “Size” into the value not overlapping.
0008	Scan block setting is duplicated.	Please repair the “Scan Block No.”, “Offset”, and “Size” into the value not overlapping.
0009	MDWS Cyclic Address setting is duplicated.	Please repair the “MDWS Address” and “Size” into the value not overlapping.
0010	Transmission direction does not match.	Please repair the “Transmission Direction” of the [Message Transfer] and the [Message Transaction] into the same value.
0011	Transmission block registration is necessary.	Please register the “Scan Block No.” into the [Talker block].

No.	Messages	Measure
0012	Responce area scan block related transmission block registration is necessary.	Please register the “Scan Block No.” into the [Talker block].
0013	Delete the transmission block registration.	Please delete the “Scan Block No.” from the [Talker block].
0014	Delete the response area scan block related transmission block registration.	Please delete the “Scan Block No.” from the [Talker block].
0015	Status T->M setting is duplicated.	Please repair the “Address” and “Size” of the Scan Healthy into the value not overlapping.
0016	The scan block setting of Request and Response is duplicated.	Please repair the “Scan Block No.”, “Offset”, and “Size” into the value not overlapping.
0017	The scan block setting of Response and Request is duplicated.	Please repair the “Scan Block No.”, “Offset”, and “Size” into the value not overlapping.

2.5 Meanings of Module Parameters

Among the hardware modules registered in station configuration, some have parameters (module parameters) and some have not.

Before setting module parameters, refer to the instruction manual for each module and thoroughly understand the meaning of each module parameter.

This section describes the meaning of each module parameter briefly.

2.5.1 Meanings of module parameters of nv series

■ Main modules

- PU811, PU821

Program fallback	Specify the operation in case where an error has occurred in a user program. Yes: Continue operation (fallback) by separating the program that caused an error. No: Cause an error down.
I/O fallback	Specify the operation in case where an error has occurred in the batch or direct I/O. Yes: Continue operation (fallback) by the I/O that caused an error. No: Cause an error down.
Global initialize	Specify whether to initialize user defined global variables.
Local initialize	Specify whether to initialize user defined local variables. System assigned local variables are initialized.
Log at setting clock at program	Specify whether to record time update from user program in event log.
Instantaneous DC failure time (s)	Specify the duration for detecting a momentary power failure when DC power of the power unit has dropped. Specify 0 for not detecting any power failure.
Priority *: Task kind	Specify the task kind.
Priority *: Enabled	Specify the execution task. Specify 'No' if not used.
Priority *: Scan time	Specify the execution cycle of scan task.
RIO middle speed I/O schedule number	Specify the number medium-speed I/O scan data is divided into by the high-speed scan cycle.
Duplex system alarm	Select the state in case the secondary side is on-line operation. Standard: Minor alarm Special: Normal
User global var. tracking	Specify whether to track user global variable.
Tracked User start No	Specify the top register No. when tracking User global variable.

Tracked User end No	Specify the last register No. when tracking User global variable.
Tracked DW start No	Specify the top register No. when tracking DW register.
Tracked DW end No	Specify the last register No. when tracking DW register.
Computer link Ethernet SlotNo	Specify the Ethernet slot when connecting equipment such as MMI with computer link protocol via Ethernet.
Computer link UDP PortNo	Specify the UDP Port No. for computer link.
Time zone bias	Specify the difference between GMT and the local time. Numerical input (-13 to 13)
Compensation unit	Specify the unit to be used for tag temperature and pressure compensation.
Scan sync. Tag data writing	Specify whether to synchronize update of tag data from OIS-DS with task scan.
DO read back processing	Specify whether to perform output readback with the standard controller function (linealize function) when control mode is M for digital tag with mode (push button tag).
Controller No.	Specify a unique number within the system assigned to the controller.
DS scan	Specify whether to perform realtime trend.
Inter-controller com.	Specify whether to broadcast any data.

■ Ethernet

- EN8

IP address type	Select the address type for the Ethernet card. ClassB type: 172.16.64.XX, subnet mask: 255.255.192.0 ClassC type: 192.168.0.XX, subnet mask: 255.255.255.0 Any: Any value can be set from the tool.
Primary IP address	Set the IP address of the network card on the primary side in a single-station configuration or duplex-station configuration.
Primary sub-net mask	Set the sub-net mask value of the network card on the primary side in a single-station configuration or duplex-station configuration.
Secondary IP address	Set the IP address of the Ethernet card on the secondary side in a duplex-station configuration.
Secondary sub-net mask	Set the sub-net mask value of the Ethernet card on the secondary side in a duplex-station configuration.
Total number of multicast	When setting a multicast group, set the number of multicasts that are used sequentially from [Multicast IP1].
Multicast IP	Set the values that do not overlap each other within the range from [225.224.0.1] to [225.224.0.15] as IP addresses for a multicast group.
Option switch 0	ON: A transmission-line diagnostic function is operated at the time of the free mode.
Default gateway IP address in the free mode	Specify the PI address of the default gateway (router).

■ TC-net

- TN8

IP address type	Select an address type. Vseries standard 1: 172.16.64.XX: subnet mask: 255.255.192.0 Vseries standard 2: 172.31.64.XX: subnet mask: 255.255.192.0 Any: Any value can be set from the tool.
Primary IP address	Set the IP address of the network card on the primary side in a single-station configuration or duplex-station configuration.
Primary sub-net mask	Set the subnet mask of the network card on the primary side in a single station configuration or duplex-station configuration.
Secondary IP address	Set the IP address of the network card on the secondary side in a duplex-station configuration.
Secondary sub-net mask	Set the subnet mask of the Ethernet card on the secondary side in a duplex-station configuration.
Total number of multicast	Specify the number to be used consecutively from [multicast IP1] when setting multicast group.
Multicast IP	Specify unique multicast group IP addresses between [225.224.0.1] and [225.224.0.15].
Scan enabled	Set the operation of scan communication (stopping of receiving cannot be set). Stop: Stop transmission. Start: Start transmission
High-speed scan cycle time (0.1ms)	Set the scan cycle for high-speed transmission blocks.
Middle-speed scan cycle time (ms)	Set the scan cycle for medium-speed transmission blocks.
Low-speed scan cycle time (ms)	Set the scan cycle for low-speed transmission blocks.
Scan stop at all hosts down	Scanning operation when the host device(controller) has shut down. No: Not stop Yes: Stop
Receiver	When communication line is duplicated, set which communication line is to be used. Automatic selection/forced receiving on the A system/forces receiving on the B system
Maximum distance between nodes (km)	Specify the farthest distance between nodes. However, specify 8 km if this is less than the default 8 km.
Maximum number of repeaters	Specify the value for the path with the most number of repeaters. However, specify 3 if this is less than the default 3.
Option switch 0	ON: Stand alone mode A scan is carried out by one set.
Option switch 1	ON: self healthy mode A local station transmitting block is surely made healthy.

2.5.2 Meanings of module parameters of V series

■ Main modules

S3, S2, R3, L3, L2, L1(LC), FN7, FN6

Cooperative operation	When multiple controllers are in operation, specify whether to participate in cooperative operation. If there are more than one controller in the station, set all controllers the same. Select “No” when a single controller is in operation. Yes: Cooperative operation No: Independent operation
Fallback operation	When multiple CPUs are in operation, specify whether this controller falls back if this controller has caused an error. Select “No” when a single controller is in operation. Yes: Other controllers continue to execute RUN. No: Other controllers transit come to the [R-HOLD] state.
Program fallback	Specify the operation in case where an error has occurred in a user program. Yes: Continue operation (fallback) by separating the program that caused an error. No: Cause an error down.
I/O fallback	Specify the operation in case where an error has occurred in the batch or direct I/O. Yes: Continue operation (fallback) by the I/O that caused an error. No: Cause an error down.
Data initialize	Specify whether to initialize user data in the initialization of user data (to be executed when initializing the system or executing RUN). Yes: Initialize No: Not initialize
Trans. I/O data to system bus	Specify whether to reflect the state of I/O variables obtained from batch or direct I/O to the system. When that I/O is used by multiple controllers, set “Yes.” Yes: Reflect No: Not reflect
Special ope. at direct I/O error	When any fault has occurred in direct I/O, specify whether to ignore that fault or not. Yes: Ignore the fault. Records are maintained in the error log. No: Perform fault handling.
I/O module error detection	Specify whether to detect any fault in the I/O module such faults in the module that will not case a fault in access such as blowing of a built-in fuse. Yes: Detect No: Not detect
Instantaneous AC failure time (ms)	Specify the duration for detecting a momentary power failure when AC power of the power unit has dropped. Specify 0 for not detecting any power failure.

Ore. at instantaneous AC failure	Select the operation when a momentary AC failure has been detected. Error down continuous operation
Instantaneous DC failure time (s)	Specify the duration for detecting a momentary power failure when DC power of the power unit has dropped. Specify 0 for not detecting any power failure.
SS task enabled	Set the execution of super-high-speed scan task. Specify No if not used.
HS task enabled	Set the execution of high-speed scan task. Specify No if not used.
MS task enabled	Set the execution of main scan task. Specify No if not used.
SS task scan time(ms)	Set the execution cycle of super-high-speed scan task.
HS task scan time(ms)	Set the execution cycle of high-speed scan task.
MS task scan time(ms)	Set the execution cycle of main scan task. Set 0 for floating scan.
BG task run mode	Background task execution mode Single execution: The mode where the task is executed once when its initialization is requested. Cyclic execution: The mode where the task is executed at intervals of a certain number of scans specified on the number of cycles while the initializing request continues.
BG task run time (ms)	In case where the main scan is a floating scan, set the execution cycle of background task. Set 0 (floating scan) when main scan is periodical scan.
BG task cycle count	Background task is executed at intervals of the number of cycles set.
Com. task wait time(ms)	This is the parameter to perform the tuning of sequence control processing and data communication processing. Set this parameter to the default value (0) if your are not familiar with the system.
RS485 station No	Specify the ID No. to identify the station connected to the RS485 cable.
RS485 boud rate (bit/s)	Select the communication rate for RS485.
RS485 parity	Specify the parity bit attached to unit data of RS485.
RS485 data length	Specify the data length to be transmitted on unit data of RS485.
RS485 stop bit	Specify the stop bit length to be attached to unit data of RS485.
I/O-less test	Specify whether to perform I/O without using actual I/O module.
Non I/O less bus No	Specify the Bus No. of the TOSLINE-S20 excluded from I/O-less test.
Non I/O less unit No	Specify the Unit No. of the TOSLINE-S20 excluded from I/O-less test.
Non I/O less slot No	Specify the Slot No. of the TOSLINE-S20 excluded from I/O-less test.
Log at setting clock at program	Specify whether to record time update from user program in event log.

Computer link Ethernet SlotNo	Specify the Ethernet slot when connecting equipment such as MMI with computer link protocol via Ethernet.
Computer link UDP PortNo	Specify the UDP Port No. for computer link.
SS task tracking	Specify whether to track super high-speed scan task.
HS task tracking	Specify whether to track high-speed scan task.
MS task tracking	Specify whether to track main scan task.
BG task tracking	Specify whether to track background task.
SW register tracking	Specify whether to track SW register.
DW register tracking	Specify whether to track DW register.
Tracked DW start No	Specify the top register No. when tracking DW register.
Tracked DW end No	Specify the last register No. when tracking DW register.
User global var. tracking	Specify whether to track user global variable.
Station global var. tracking	Specify whether to track station global variable.
IQ register tracking	Specify whether to track I/Q register.
Compensation unit	Specify the unit to be used for tag temperature and pressure compensation.
Time zone bias	Specify the difference between GMT and the local time. Numerical input (-13 to 13, 0 is treated the same as 9)
Scan sync. Tag data writing	Specify whether to synchronize update of tag data from OIS-DS with task scan.
DO read back processing	Specify whether to perform output readback with the standard controller function (linealize function) when control mode is M for digital tag with mode (push button tag).
Fast-speed I/O scan time (ms)	Specify the high-speed I/O scan cycle.
Middle-speed I/O schedule num	Specify the number medium-speed I/O scan data is divided into by the high-speed scan cycle.
Fall back I/O card Bus*-Unit* (hex)	Specify the I/O fallback operation for each card when I/O fault is detected. (hex) Specify input with bits. 0: Error down 1: I/O fallback
Local initialize	Specify whether to initialize user defined local variables. System assigned local variables are initialized.
Controller No.	Specify a unique number within the system assigned to the controller.
DS scan	Specify whether to perform realtime trend.
Inter-controller com.	Specify whether to broadcast any data.
Momentary judgment DI module No.	This item is currently unused.
Momentary judgment DI point No.	This item is currently unused.
LDU Alarm confirm type	The method of returning the alarm displayed on a loop display is chosen.

I/O Signal processing mode	Whether the I/O processing to G3I/O is done at high speed is specified. Combination condition:S3 V2.72 or higher
Target I/O module	Select the MELPLAC I/O module for the block transfer registration.
PIO Address	Input the area in process I/O for the block transfer registration.
Word Size	Input the word size for the block transfer registration.
Scan data block No.	Input the scan block number of TC-net100 for the block transfer registration.
Scan data word No.	The offset address of the scan block for the block transfer registration.
I/O direction	Select the direction where process I/O is input and output data for the block transfer registration.
Duplex system alarm	Select the state in case the secondary side is on-line operation. Standard: Minor alarm Special: Normal Combination condition:S3PU65A V02.79 or higher, S2PU82 V02.02 or higher

■ Ethernet

- EN7, EN6, EN5, FN7, FN6, ENGW-5654

IP address type	Select the address type for the Ethernet card. The offset value of the address on the secondary side on a duplex LAN configuration varies depending the address type. ClassB type: 172.16.64.XX, subnet mask: 255.255.192.0 TOSDIC-CIE 1200 type: 192.0.0.XX, subnet mask: 255.255.255.192 Arbitrary: Any value can be set from the tool.
Primary IP address	Set the IP address of the network card on the primary side in a single-station configuration or duplex-station configuration.
Primary sub-net mask	Set the sub-net mask value of the network card on the primary side in a single-station configuration or duplex-station configuration.
Secondary IP address	Set the IP address of the Ethernet card on the secondary side in a duplex-station configuration.
Secondary sub-net mask	Set the sub-net mask value of the Ethernet card on the secondary side in a duplex-station configuration.
Total number of multicast	When setting a multicast group, set the number of multicasts that are used sequentially from [Multicast IP1].
Multicast IP	Set the values that do not overlap each other within the range from [225.224.0.1] to [225.224.0.15] as IP addresses for a multicast group.
Option switch 0	ON: A transmission-line diagnostic function is operated at the time of the free mode.
Default gateway IP address in the free mode	Specify the PI address of the default gateway (router).

2

■ TC-net

- TN7, TNH, TNGW-5652, FMGW1, CN7, CN6

IP address type	Select an address type. Vseries standard 1: 172.16.64.XX: subnet mask: 255.255.192.0 Vseries standard 2: 172.31.64.XX: subnet mask: 255.255.192.0 Any: Any value can be set from the tool. • In the case of FMGW1 Fixed: 192.168.0.XX: subnet mask: 255.255.255.0 Any: Any value can be set from the tool.
Primary IP address	Set the IP address of the network card on the primary side in a single-station configuration or duplex-station configuration.
Primary sub-net mask	Set the subnet mask of the network card on the primary side in a single station configuration or duplex-station configuration.
Secondary IP address	Set the IP address of the network card on the secondary side in a duplex-station configuration.
Secondary sub-net mask	Set the subnet mask of the Ethernet card on the secondary side in a duplex-station configuration.
Total number of multicast	Specify the number to be used consecutively from [multicast IP1] when setting multicast group.
Multicast IP	Specify unique multicast group IP addresses between [225.224.0.1] and [225.224.0.15].
Scan enabled	Set the operation of scan communication (stopping of receiving cannot be set). Stop: Stop transmission. Start: Start transmission
High-speed scan cycle time (ms) / (0.1ms)	Set the scan cycle for high-speed transmission blocks.
Middle-speed scan cycle time (multiples)	Set the scan cycle for medium-speed transmission blocks (multiples of the high-speed scan cycle).
Middle-speed scan cycle time (ms)	Set the scan cycle for medium-speed transmission blocks.
Low-speed scan cycle time (ms)	Set the scan cycle for low-speed transmission blocks.
Scan stop at all hosts down	Scanning operation when the host device (S/L/C controller) has shut down. No: Not stop Yes: Stop
Scan run at hosts1 down	Scanning operation when Slot 0 of the host device (S/L/C controller) has shut down. No: Stop Yes: Not stop
Scan run at hosts2 down	Scanning operation when Slot 1 of the host device (S/L/C controller) has shut down. No: Stop Yes: Not stop

Scan run at hosts3 down	Scanning operation when Slot 2 of the host device(S/L/C controller) has shut down. No: Stop Yes: Not stop
Scan run at hosts4 down	Scanning operation when Slot 3 of the host device(S/L/C controller) has shut down. No: Stop Yes: Not stop
Receiver	When communication line is duplicated, set which communication line is to be used. Automatic selection/forced receiving on the A system/forces receiving on the B system
Link address	When the network is nested, set which network is to be selected (this is a parameter for future use).
High-speed talker block 1- head word No	Head word No. in the high-speed block area
High-speed talker block 1- number of words	Size of the high-speed transmission block area
Middle-speed talker block 1- head word No	Head word No. in the medium-speed block area
Middle-speed talker block 1- number of words	Size of the medium-speed transmission block area
Maximum distance between nodes (km)	Specify the farthest distance between nodes. However, specify 8 km if this is less than the default 8 km.
Maximum number of repeaters	Specify the value for the path with the most number of repeaters. However, specify 3 if this is less than the default 3.
Option switch 0	ON:Stand alone mode A scan is carried out by one set.
Option switch 1	ON:self healthy mode A local station transmitting block is surely made healthy.

■ TOSLINE-S20

- SN3, SN2, SN6, L1PU12

Scan enabled	Set the operation of scan communication. Yes: Perform scan communication. No: Stop scan communication.
Scan access	Se the continuity of the data transmitted and received by scan communication. Unit of 1Word Assure continuity of data in units of 1Word. Unit of 2Words Assure continuity of data in units of 2Words.
Message enabled	Set the operation of message communication. Yes: Start message communication. No: Stop message communication.

Scan cycle time	This is the parameter to control the transmission time for message communication. (Allowed transmission time for message communication)=(Target cycle time)-(Time interval between the acquisition transmission right in the former cycles and the acquisition of transmission right on the next cycle)
Standby startup	Yes: Enter standby state at startup (do not perform scan transmission). No: Start scan transmission upon startup.
Talker top address 1	Specify the head address of the transmission block area.
Talker word address 1	Specify the size of the transmission block area.

■ SIF

Slot n controller is parent	Set when placing this SIF under the control of slot n.

■ I/O module

Filter	Select the frequency to cut noises that contaminates into analog input signals.
Range	Select the input signal conversion range.
Input	Select presence or absence of input processing.
Scale at wire break	Set the output value when the signal wire to the sensor has been broken. Downscale:Equal to count 0
Output points num.	Select the number of analog output points. Output of the specified number of points is performed from the first point. The I/O renewal interval increases as the number of output points increases.
Output hold at emg.	Select the process when abnormal output of the module has occurred. No: Reset the output value to the level equal to count 0 (0V or 0A). Yes: Hold the output value.
CCDI hold time (100ms)	Hoed detection of changes in state (This a parameter for future use.)
Signal type	Select signal type of pulse.
Unit time for the instantaneous value (10ms)	Pulse count per specified time interval is defined as the momentary value.The unit is 10 ms.
Threshold	Se the threshold voltage. The unit is V.
Pulse slow / fast	Select the type of output pulse signal.
Pulse train/width	Select the type of output pulse signal.
Hold time	When the direction of pulse has been reversed, set the time until the stoppage of pulse output. The unit is 100ms.

Backlash compensation time	When the direction of pulse has been reversed, set the value to be added to correct the output of pulse. The unit varies depending on the type of output signal. Pulse width output In units of 100 pulse row output: In units of 1 count.
AI: Input	Select wither to perform input processing or not.
AI: Scale at wire break	Set the output value when the signal wire to the sensor has been broken. Downscale: Equal to count 0
AI: Range	Input signal conversion range. Fixed between 1-5 V
DI: CCDI holding time (100ms)	Hoed detection of changes in state(This a parameter for future use.)
PO: Pulse slow / fast	Select the type of output pulse signal.
Pulse train / width	Select the type of output pulse signal. (”Width” alone can be specified.)
Hold time (100 ms)	When the direction of pulse has been reversed, set the time until the stoppage of pulse output. The unit is 100ms.

2.6 Changing I/O Connection Area

This section describes how to set the area for each connection type.

◆ **Important**

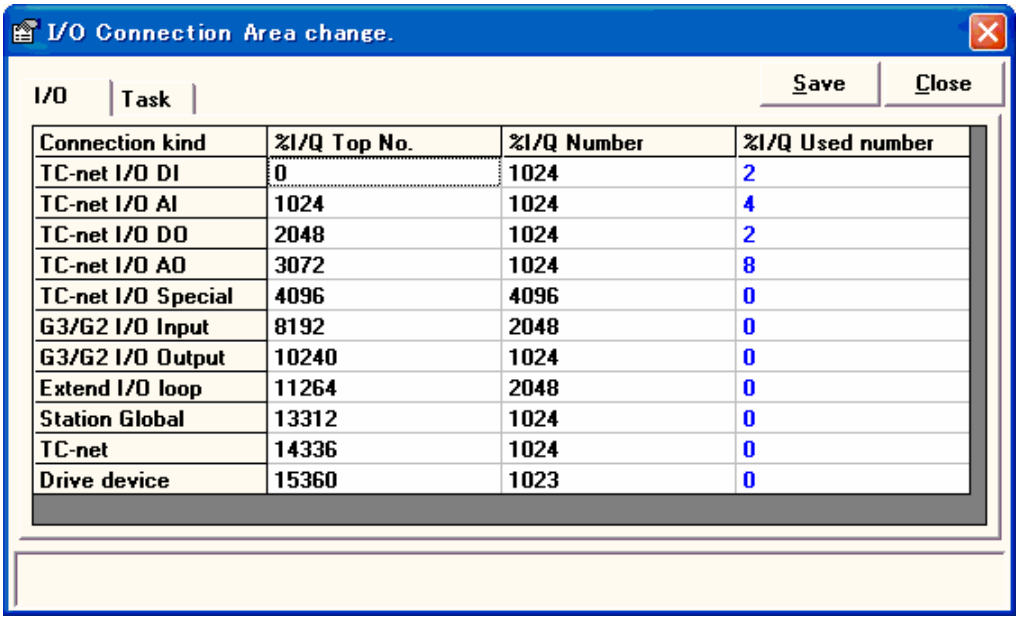
- Make sure the areas do not overlap.
- Make sure %IQ number is not less than the total words occupied by card for each type.
- Please input the even number to a set value.
- Please be the same as %IQ use number or input to %IQ number any more.

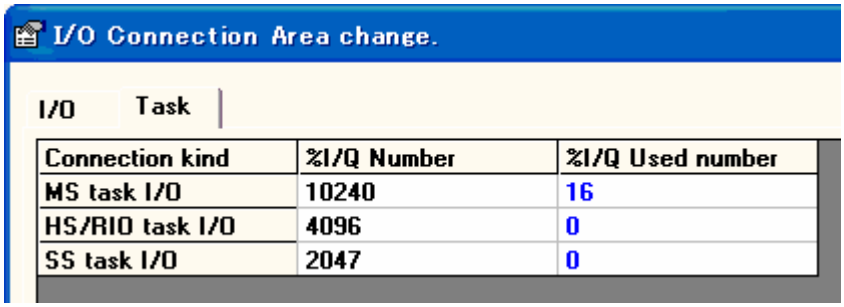
[nv series]

■ Displaying area assignment

Select a Station at bottom left of the Product Tree and select <I/O Connection Setting Range> from the <File> menu.

Tab <I/O>: Displaying and setting for each I/O type area.
Tab <Task>: Displaying and setting for each task type area.





Column <%IQ Used number>: Number of used registers. Blue letter means ''Read Only".

■ Changing area assignment

Click the column <%IQ Top No.> or <%IQ number> and enter the value. The characters turn red when changed. Select <Save> to save the change.

[Attention]
Because the address of the I/O variable and the station variable is changed when <%IQ top No.> is changed, it is necessary to compile the program again. Afterwards, please execute the batch download.

[V series]

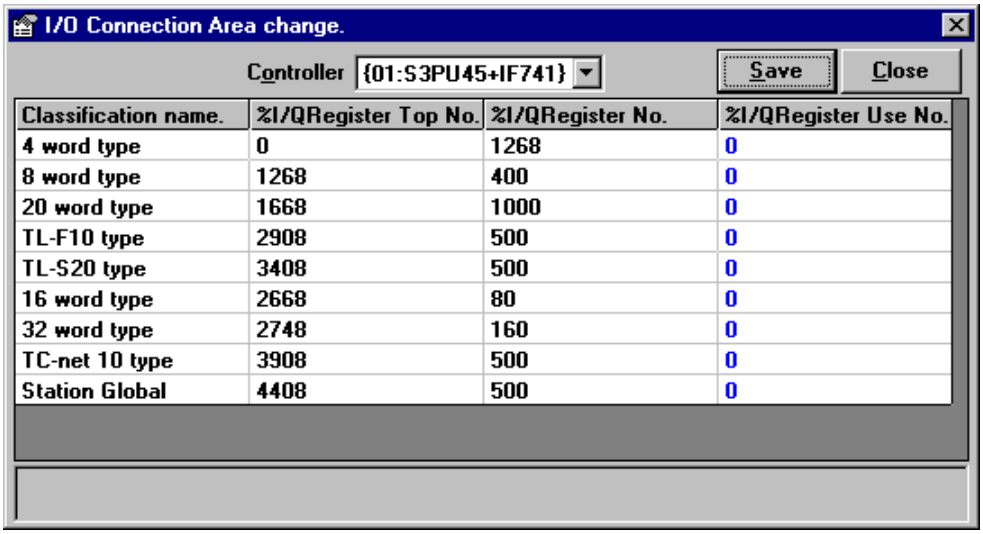
■ Displaying area assignment

Select a Station at bottom left of the Product Tree and select <I/O Connection Setting Range> from the <File> menu.

When the main unit of the selected station is BU74A (for RIO), it changes in each controller. Please select the controller who sets it on the screen.

The %IQ use number shows the number of registers which have already been used.

As for TC-net10 and a station global, the value of the controller who is using a lot of registers is displayed when two or more station registration of the controller (The main unit excludes BU74A).



Classification name.	%I/QRegister Top No.	%I/QRegister No.	%I/QRegister Use No.
4 word type	0	1268	0
8 word type	1268	400	0
20 word type	1668	1000	0
TL-F10 type	2908	500	0
TL-S20 type	3408	500	0
16 word type	2668	80	0
32 word type	2748	160	0
TC-net 10 type	3908	500	0
Station Global	4408	500	0

■ Changing area assignment

To change, click the %IQ Top No. or %IQ number column and enter the value. The characters turn red when changed. Select <Save> to save the change.

[Attention]
Because the address of the I/O variable and the station variable is changed when %IQ top No. is changed, it is necessary to compile the program again. Afterwards, please execute the batch download.

Chapter 3
Registering Variables

The following types of variable are available:

- Local variable
  Variables used only within a program and not made available externally.
- Controller variable
  Variables used within a controller and made accessible to more than one control program.
- Station variable
  Shared memory used to pass data between main modules (Controller, Ethernet, TC-net, etc.). The same variable name can be used to program within a station.
- I/O variable
  Process I/O signal available outside the station. Signals are input/output via I/O card configured for each station.
- Network variable
  Scan data on scan transmission method control LAN. The same variable name can be used to program among stations connected via this LAN.

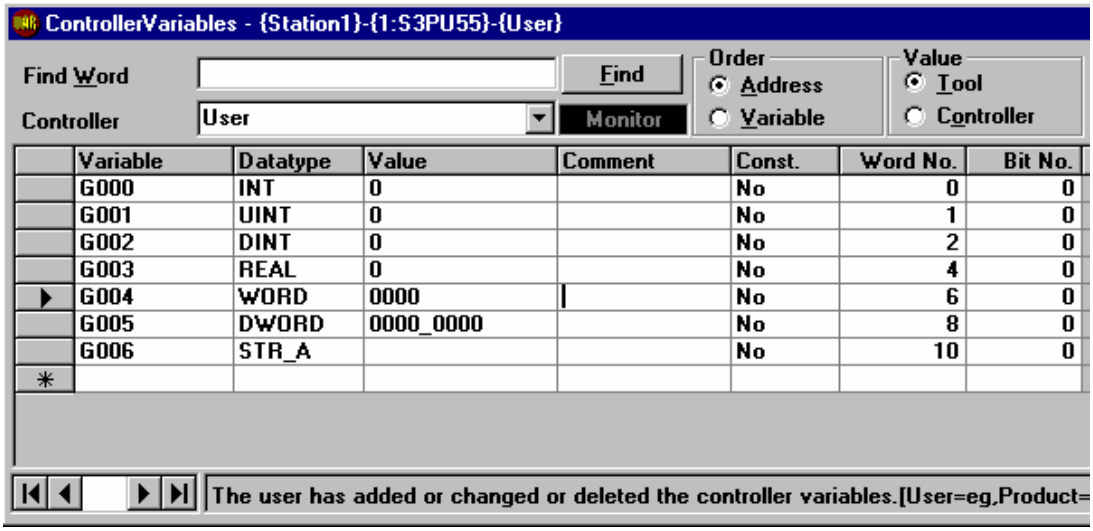
The following items are described:

3.1 Registering Controller Variables

This section describes how to register controller variables (variables shared used within a controller and shared among multiple control programs).

■ Opening a controller variable

1) In the [Product Tree], select [Controller memories] under a controller.
2) Click the [Controller memories] icon (example: SW, DW, User, etc.) on the right side of the [Product Tree] and select <Controller variables> from the <File> menu.



■ Edit lock

Editing is locked just after startup, so you cannot update and delete the variables.

Unlock the edit lock to perform input operation.

The line for adding which marked '*' is always available.

■ Registering variables

Click [Variable] in a blank row. Enter the variable name.

Enter the data type of the variable in [Data type].
Enter the value of the variable in [Value]. Input is enabled when the data type is basic type.

Enter the comment of the variable in [Comment].

Enter 'Yes' in [Const] if the value of the variable is to be constant.

Enter the word address within the controller in [Word No]. If input is omitted, it is assigned automatically.

Enter the bit number in [Bit No] if the variable type is [BOOL].

To delete a variable, click the column to the left of the row to delete and press the [Del] key while a row is selected.

◆ **Note**

For safety engineering, there are following restrictions after updating and deleting the variables.

1) After deleting registrations, used address is not available for automatically assignment.
2) After updating data-type, used address is not available for automatically assignment.
3) After updating address, used address is not available for automatically assignment.
4) Over and over again operated 1), 2) or 3), variables can not be assigned automatically. In this case, please try batch compiling. Used address is available again.

■ Searching variables

Enter the variable to search in [Find Word] and click the [Find] button.

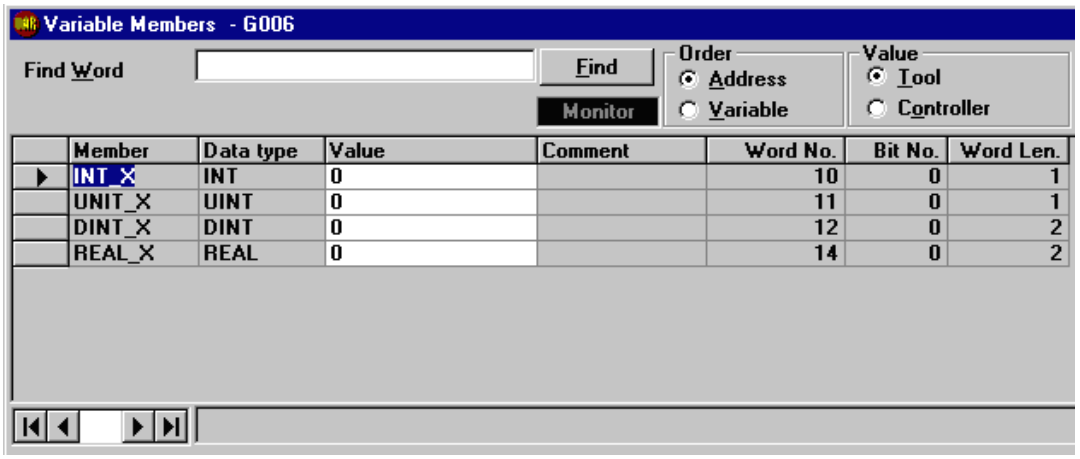
■ Changing variable display order

Change [Address] in [Order] to sort by Word No. Click [Variable] to sort by variable name.

Registering variable member

When the data type is user (structure) or array, expand [Variable member] and enter a value.

Double-click a row, or select a row and click a [Variable Member] button.



Drag & drop operation

Drag a variable name and drop in the [Data monitor], [Data view] window to register as monitor target.

Or drop in the [Program Editor] window to use it as variable name.

Registering default variables

The default variable of "1.3.17 Controller Variables" can be registered.

Unlock the edit lock and click [Default variable] button. Refresh the variable screen after registration.

Registering variables for RIO special register 'SW register' (MELPLAC I/O)

This registration is used in following case:

- 'SW Register(s)' of RIO controller for MELPLAC I/O assign as the Network Variables on Tc-net100.
- Using these variables, upper Controller can check the I/O Fallback status of RIO Controller.

For operation, please see the manual "3.3 Registering IO Variables".

After registering variables, using [Undefined network variables] window, they can be assigned as Network Variables.

The main information on SW register is as follows:

1) I/O No ACK, Parity, Card Error (Major Failure)
   SWNo. = 80 + BB*14 + UU (BB: Bus No., UU: Unit No.)
   Bit No.0 to 13 means each Slot No. status. (1: Error, 0: Normal)

2) I/O Fallback
   SWNo. = 110 + BB*14 + UU (BB: Bus No., UU: Unit No.)
   Bit No.0 to 13 means each Slot No. status. (1: Fallback, 0: Normal)

3.2 Registering Station Variables

This section describes how to register station variables (variables shared among main modules).

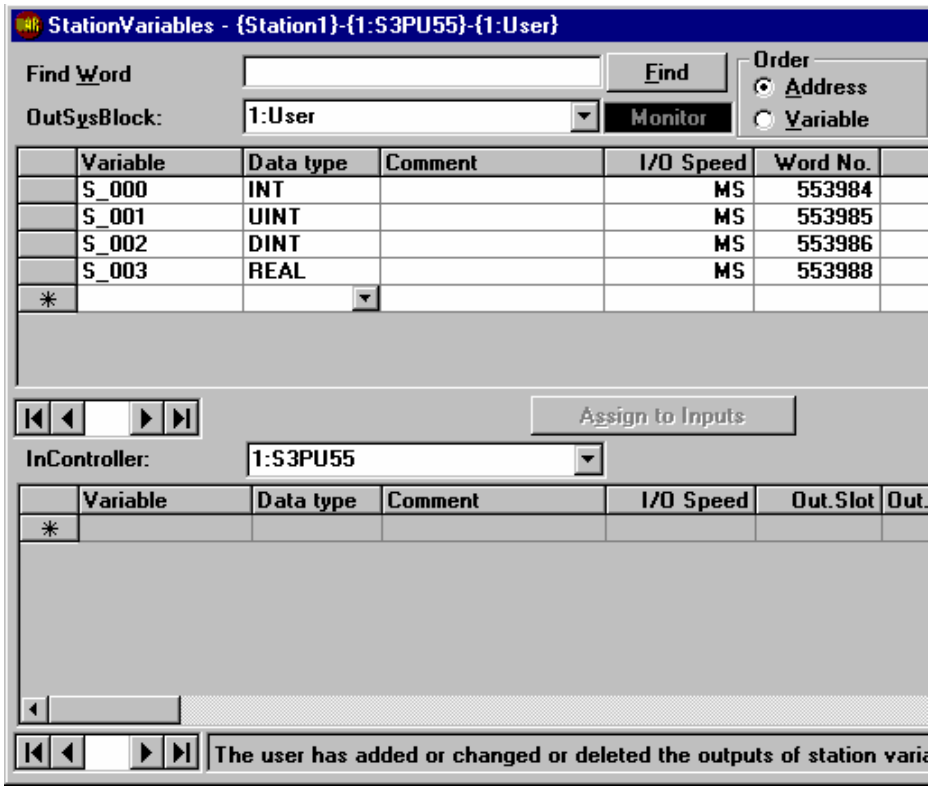
◆ Important

- When station variables are registered, please download configurations to controller. If configurations includes I/O connections are not downloaded, batch I/O processing can not be executed.
- Using 'I/O Connections Online Downloading' function, the controller don't need to be halted, and batch I/O processing can not be executed after adding variables.
- See '7.2 Batch Downloading to Controller' to know how to use 'I/O Connections Online Downloading' function.

■ Opening a station variable

1) In the [Product Tree], select [Station memories] under a station.

2) Click the 'User' icon on the right side of the [Product Tree] and select <Station variables> from the <File> menu. The output side controller appears in the window title.



Edit lock

Editing is locked just after startup, so you cannot update and delete the variables.
Unlock the edit lock to perform input operation.
The line for adding which marked '*' is always available.

Registering the output variable

Click [Variable] in a blank row at the top of the window. Enter the variable name.

Enter the data type of the variable in [Data type].
Enter the comment of the variable in [Comment].

Specify a task (MS: Main task, HS: High-speed task) to synchronize I/O in [I/O speed]. (S controller: MS fixed, L controller: MS, HS)

Enter the word address of the station global in [Word No]. If input is omitted, it is assigned automatically.

Enter the bit number in [Bit No] if the variable type is [BOOL].

To delete a variable, click the column to the left of the row to delete and press the [Del] key while a row is selected.

Searching variables

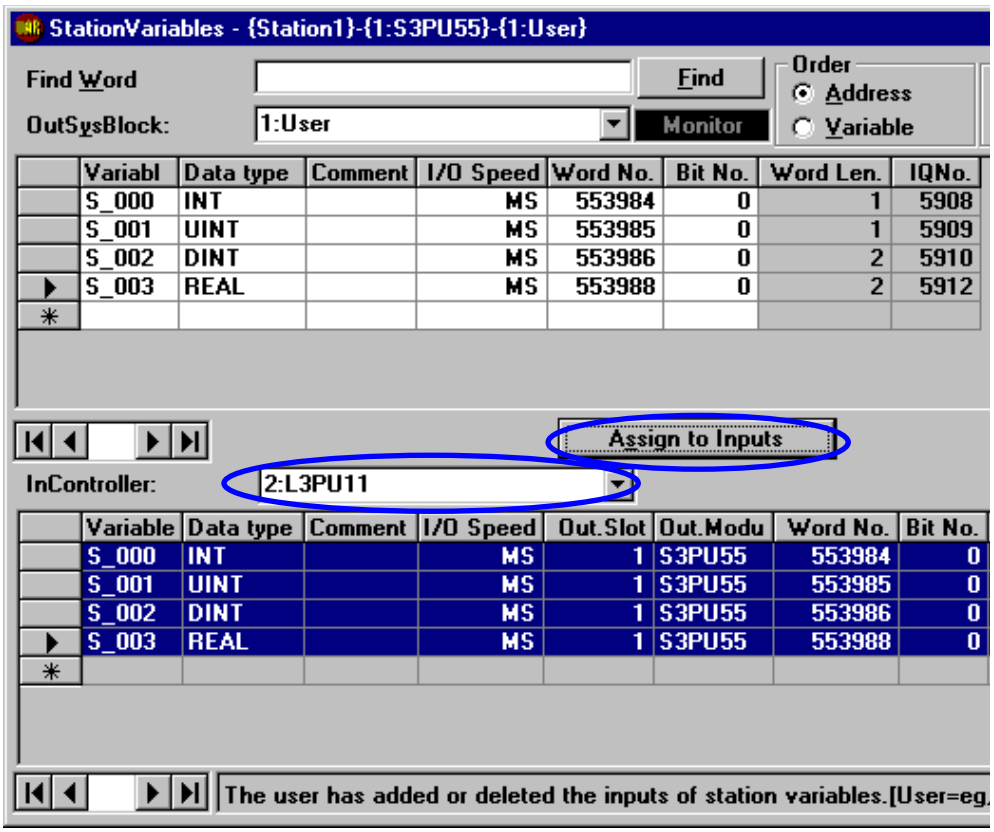
Enter the variable to search in [Find Word] and click the [Find] button.

Changing variable display order

Change [Address] in [Order] to sort by Word No. Click [Variable] to sort by variable name.

Assigning I/O variables to the controller

1) Select the controller to input the variable from the [InController] pull down list.
2) Click the left edge of the output variable row to select the row. Click while pressing the [Shift] key or [Ctrl] key to select multiple rows.
3) Click the [Assign to inputs] button. Then the variables selected as output variable appears as input controller variable (bottom of screen).



■ Drag & drop operation

Drag a variable name and drop in the [Data monitor], [Data view] window to register as monitor target.

Or drop in the [Program Editor] window to use it as variable name.

■ RAS variable of network card

When 'Standard' of the network card is displayed and click [Default variable] button, The RAS variable can be registered.

The model and the variable identifier are as shown in the following table. Slot No of the card is added at the end of the variable identifier. Please refer to the manual of each card for a detailed meaning of the variable identifier. The starting address is a relative address from the head of the station memory allocated to each card.

[RAS variable of nv series]

Module	No.	Variable Name	Data type	Start Address
TN821	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN821	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN821	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN821	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN821	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
TN822	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN822	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN822	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN822	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN822	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
EN811	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN811	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN811	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN811	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN812	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN812	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN812	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN812	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN821	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN821	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN821	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN821	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
FN812	1	FN_SOCKET_	ARRAY[0..127] OF WORD	130944
FN812	2	FN_SOCKET2_	ARRAY[0..127] OF WORD	130784
FN812	3	FN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
FN812	4	FN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928

[RAS variable of V series]

Module	No.	Variable Name	Data type	Start Address
CN611	1	CN_ONLMAP_	ARRAY[0..1] OF DWORD	65284
CN611	2	CN_HLTYMAP_	ARRAY[0..255] OF DWORD	64768
CN611	3	CN_STSTS_	DWORD	65320
CN612	1	CN_ONLMAP_	ARRAY[0..1] OF DWORD	65284
CN612	2	CN_HLTYMAP_	ARRAY[0..255] OF DWORD	64768
CN612	3	CN_STSTS_	DWORD	65320
CN711	1	CN_ONLMAP_	ARRAY[0..1] OF DWORD	65284
CN711	2	CN_HLTYMAP_	ARRAY[0..255] OF DWORD	64768
CN711	3	CN_STSTS_	DWORD	65320
CN712	1	CN_ONLMAP_	ARRAY[0..1] OF DWORD	65284
CN712	2	CN_HLTYMAP_	ARRAY[0..255] OF DWORD	64768
CN712	3	CN_STSTS_	DWORD	65320
CN623	1	CN_ONLMAP_	ARRAY[0..1] OF DWORD	65284
CN623	2	CN_HLTYMAP_	ARRAY[0..255] OF DWORD	64768
CN623	3	CN_STSTS_	DWORD	65320
CN623	4	CN_LOOPMAP_	ARRAY[0..63] OF DWORD	65408
TN711	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN711	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN711	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN711	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN711	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
TN712	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN712	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN712	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN712	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN712	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
TN721	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN721	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN721	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN721	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN721	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
TN722	1	TC_HLTYMAP_	ARRAY[0..63] OF DWORD	340608
TN722	2	TC_UHLTYMAP_	ARRAY[0..63] OF DWORD	340736
TN722	3	TC_TALKMAP_	ARRAY[0..2047] OF WORD	342016
TN722	4	TC_RASINF_	ARRAY[0..16383] OF WORD	344064
TN722	5	TC_SOCKET_	ARRAY[0..127] OF WORD	130944
EN611	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944

Module	No.	Variable Name	Data type	Start Address
EN611	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN611	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN611	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN621	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN621	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN621	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN621	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN631	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN631	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN631	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN631	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN641	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN641	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN641	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN641	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN651	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN651	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN651	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN651	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN661	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN661	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN661	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN661	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN711	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN711	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN711	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN711	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN721	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN721	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN721	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN721	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN731	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN731	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN731	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN731	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN741	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN741	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN741	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN741	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928

Module	No.	Variable Name	Data type	Start Address
EN751	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN751	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN751	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN751	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
EN761	1	EN_SOCKET_	ARRAY[0..127] OF WORD	130944
EN761	2	EN_SOCKET2_	ARRAY[0..127] OF WORD	130784
EN761	3	EN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
EN761	4	EN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
FN711	1	FN_SOCKET_	ARRAY[0..127] OF WORD	130944
FN711	2	FN_SOCKET2_	ARRAY[0..127] OF WORD	130784
FN711	3	FN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
FN711	4	FN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
FN611	1	FN_SOCKET_	ARRAY[0..127] OF WORD	130944
FN611	2	FN_SOCKET2_	ARRAY[0..127] OF WORD	130784
FN611	3	FN_NODEMAPA_	ARRAY[0..7] OF DWORD	130912
FN611	4	FN_NODEMAPB_	ARRAY[0..7] OF DWORD	130928
AN712	1	AN_HLTYMAP_	ARRAY[0..31] OF DWORD	28672
AN712	2	AN_UHLTYMAP_	ARRAY[0..31] OF DWORD	28736
AN712	3	AN_TALKMAP_	ARRAY[0..31] OF DWORD	28800
AN712	4	AN_INRINGMAP_	ARRAY[0..7] OF DWORD	28864
AN712	5	AN_ONLMAP_	ARRAY[0..7] OF DWORD	28880
AN712	6	AN_LVLS_	ARRAY[0..256] OF WORD	28896
AN712	7	AN_STSTS_	WORD	29153
AN712	8	AN_STNADR_	ARRAY[0..5] OF WORD	29154
AN712	9	AN_APIHLTH_	ARRAY[0..7] OF WORD	32256
AN712	10	AN_SOCKET_	ARRAY[0..127] OF WORD	32640
AN777	1	AN_ACSERR1_	WORD	130650
AN777	2	AN_ACSERR2_	WORD	130652
AN777	3	AN_STSTS_	WORD	262182
AN777	4	AN_ONLMAP_	ARRAY[0..15] OF WORD	262256
AN777	5	AN_RING_	ARRAY[0..511] OF DWORD	262272
AN777	6	AN_STSLST_	ARRAY[0..255] OF DWORD	263296
AN777	7	AN_HLTYMAP_	ARRAY[0..127] OF WORD	263808
AN777	8	AN_TALKMAP_	ARRAY[0..127] OF WORD	263936
AN777	9	AN_ACSSTS1_	WORD	4456448
AN777	10	AN_ACSSTS2_	WORD	4456450

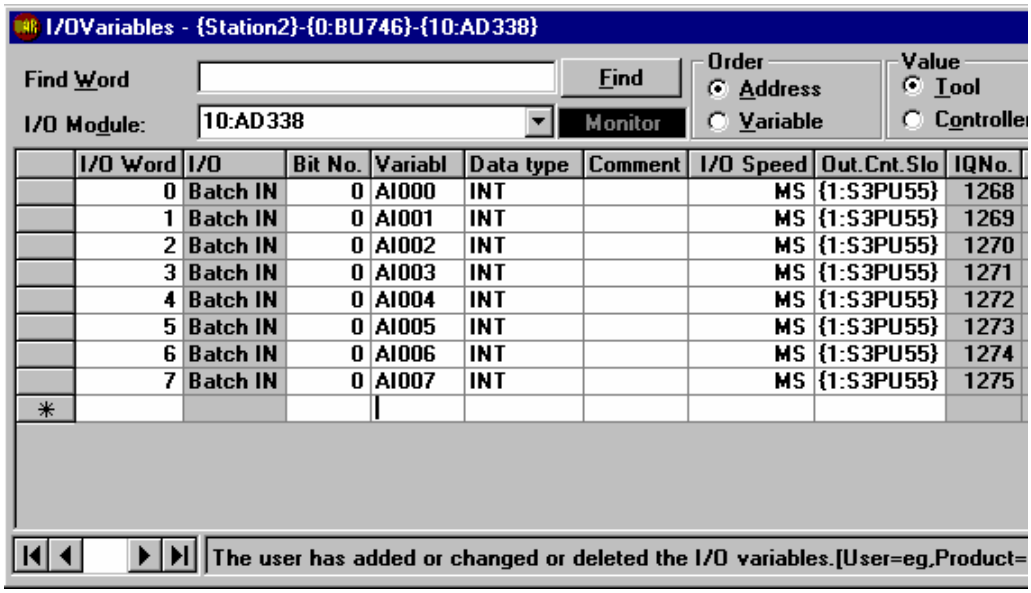
3.3 Registering I/O Variables

This section describes how to register I/O variables (process I/O signal).

■ Opening an I/O variable

1) In the [Product Tree], select [I/O module].

2) Select <I/O variables> in the <File> menu.



■ Edit lock

Editing is locked just after startup, so you cannot update and delete the variables.

Unlock the edit lock to perform input operation.

The line for adding which marked '*' is always available.

■ Registering I/O variables

Click [I/O Word No] in a blank row and enter the I/O module word No.

Enter the bit number in [Bit No] if the variable type is [BOOL].

Enter the variable name to be assigned to the I/O word No. and bit No. in [Variable].

Enter the data type of the variable in [Data type].

Enter the comment of the variable in [Comment].

Specify a task (MS: Main task, HS: High-speed task) to synchronize I/O in [I/O speed]. (S controller: MS fixed, L controller: MS, HS)

In [Out. Cnt. Slot], enter the controller to output the signal when output module.

To delete a variable, click the column to the left of the row to delete and press the [Del] key while a row is selected.

In case of using batch I/O variables, these I/O variables are used.

In case of using direct I/O variables, please add a charactor "_" (Under score) to the end of I/O variables name. (Ex.: "AI000" -> "AI000_")

◆ Important

- Even if "Direct IN/OUT" is selected on "I/O" field, a charactor "_" must be added on programing.

■ Searching variables

Partial characters are searched from all I/O variables name of the selected system.

Input the characters to search in [Find Word] and click the [Find] button.

If they are found, displaying cursor is moved to the I/O variable. If [Find] button is pushed again, it is moved to next target.

Special characters '*' and '?' can be used as follows:

Input characters	Found variables	Note
'ABC'	XABC, ABC345, XXXABC45	Characters included 'ABC'.
'A??C'	XAZZC, AXXC345, XYZA89C45	Characters included 2 characters between 'A' and 'B'.
'A*C'	XAZC, AXXXXXC345, XYZAB99C45	Characters included some characters between 'A' and 'B'.

■ Changing variable display order

Change [Address] in [Order] to sort by Word No. Click [Variable] to sort by variable name.

■ Drag & drop operation

Drag a variable name and drop in the [Data monitor], [Data view] window to register as monitor target.

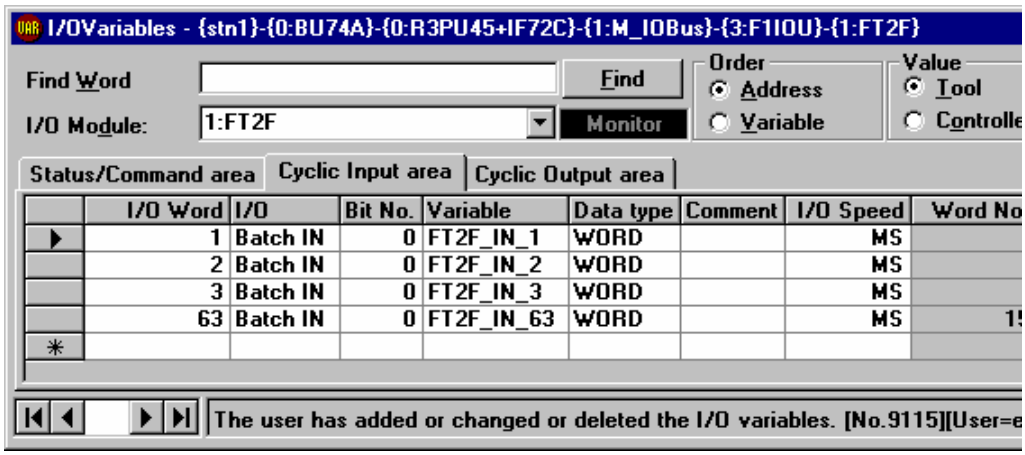
Or drop in the [Program Editor] window to use it as variable name.

■ Registering I/O variables (MELPLAC I/O)

1) Register module parameters before registering I/O variables.
Select [I/O module] on the [Product Tree]. Select <Module Parameters> in the <File> menu.
Input values on the [Module parameter] window
Please see the V-Tool manual '2.4 Registering Module Parameters'.

2) Open I/O variable window.
Select [I/O module] on the [Product Tree]. Select <I/O variables> in the <File> menu.

3) Select I/O area.
When the I/O area names appear in tabs, select the tab for which you want to register the value.



4) Register I/O variables.
Please see the V-Tool manual in this section: ' Registering I/O variables'.

◇ **Supplementary**

- In some module types, you need to select 'Batch IN' or 'Batch OUT' in [I/O] item. Please refer to the manual of MELPLAC I/O Modules to know which should be selected.

5) Assign I/O variables of RIO as network variables.
Please see the V-Tool manual '3.4 Registering Network Variables'.

3.4 Registering Network Variables

This section describes how to register network variables (variables shared among stations connected to scan transmission method control LAN).

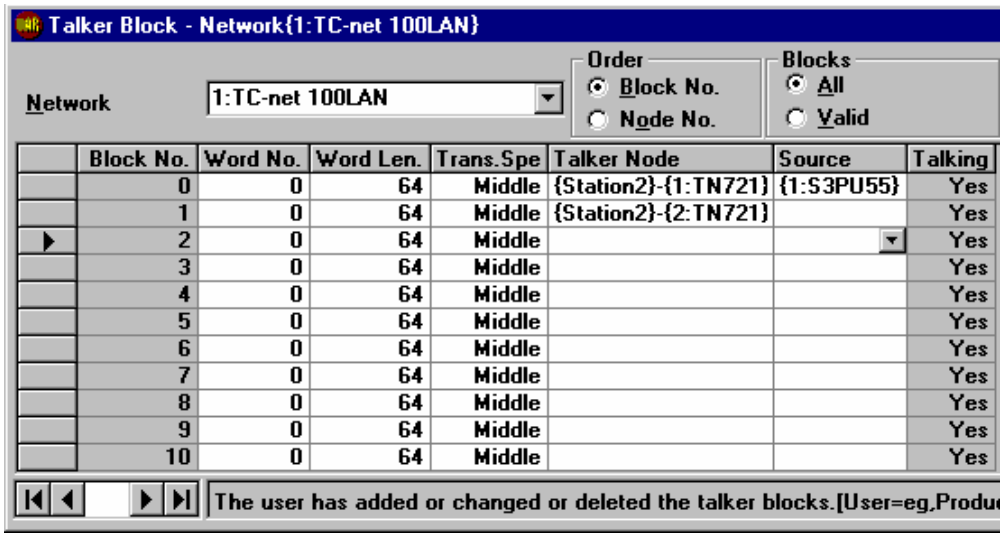
◆ **Important**

- When network variables are registered, please download configurations to controller. If configurations includes I/O connections are not downloaded, batch I/O processing can not be executed.
- Using 'I/O Connections Online Downloading' function, the controller don't need to be halted, and batch I/O processing can not be executed after adding variables.
- See '7.2 Batch Downloading to Controller' to know how to use 'I/O Connections Online Downloading' function.

■ Opening a transmit block

1) In the [Product Tree], select a network.

2) Click 'Talker blocks' on the right side of the [Product Tree] and select <Talker blocks> from the <File> menu. The network type name appears in the screen title.



■ Registering the transmit block data

Enter the start word address of the block in [Word No].

Enter the word size used by the block in [Word Len.].

Note: Selecting the multiple of 64 as 'Word Length' in TC-net100LAN, two or more continuation blocks can be registered as the same block ('block range'). Exceeding 64 words as the data type should be defined in Network Variable using the user data type (Array or Structure), please change this Value. In that case, the Talker block on TC-net100 is also fixed 64-words.

Specify the transmission speed (Low: Slow, Medium: Normal, High: Fast) in [Trans. Speed].

In [Talker Node], specify the transmission module for the control LAN.

In [Source], enter the controller to output the scan data.

To delete a variable, click the column to the left of the row to delete and press the [Del] key while a row is selected.

■ When TC-net10/20 is registered

It is necessary to register transmit block data of TC-net10/20 by both [Talker blocks] and [Module parameter].

[Product Tree] After the module is selected, the menu <File><Module parameter> is selected.

[Module parameter] screen opens.

It allocates to four high-speed blocks and four middle-speed blocks.

Enter the start word address of the block in [Top address].

Enter the word size used by the block in [Word size].

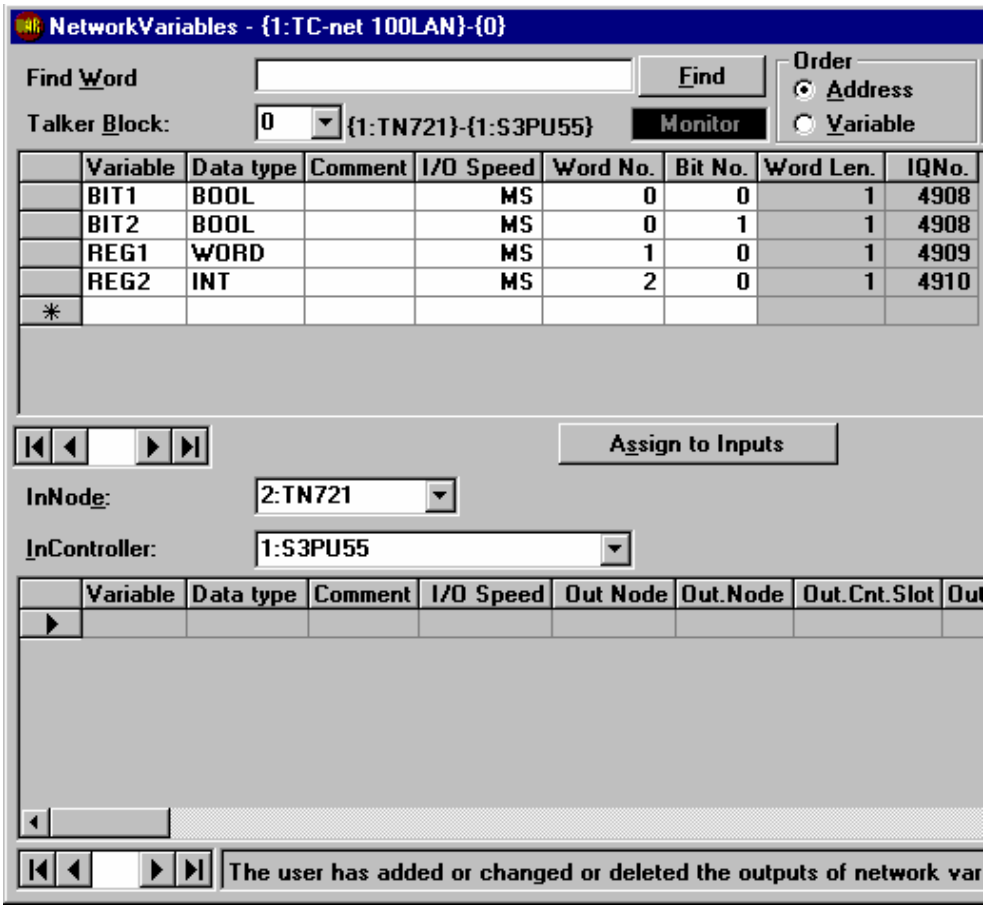
Top address, word size, and transmission speed (High speed or Middle speed) allocated here are set to [Talker blocks].

Note: It must agree to the content registered by the [Module parameter] though Top address, Word size, and the transmission speed are acceptable even if it allocates it to where in [Talker blocks].

3

Opening a network variable

Double-click the registered block No. or click [Open network] at top right of the window.



Edit lock

Editing is locked just after startup, so you cannot update and delete the variables.

Unlock the edit lock to perform input operation.
The line for adding which marked '*' is always available.

■ Registering the output variable

Click [Variable] in a blank row at the top of the window. Enter the variable name.

Enter the data type of the variable in [Data type].
Enter the comment of the variable in [Comment].

Specify a task (MS: Main task, HS: High-speed task) to synchronize I/O in [I/O Speed]. (S controller: MS fixed, L controller: MS, HS)

Enter the word address of the station global in [Word No]. If input is omitted, it is assigned automatically.
Enter the bit number in [Bit No] if the variable type is [BOOL].

To delete a variable, click the column to the left of the row to delete and press the [Del] key while a row is selected.

■ Assigning I/O variables under RIO to network variables

Click the [Open Undefined var.] button to assign I/O variables under RIO to TC-net100 LAN network variables. When the [Undefined network variables] dialog box opens, select one or more variables and drag and drop on output variables. The output variable assigned as output controller becomes an RIO controller in the case of device input and a non-RIO controller in the case of device output.

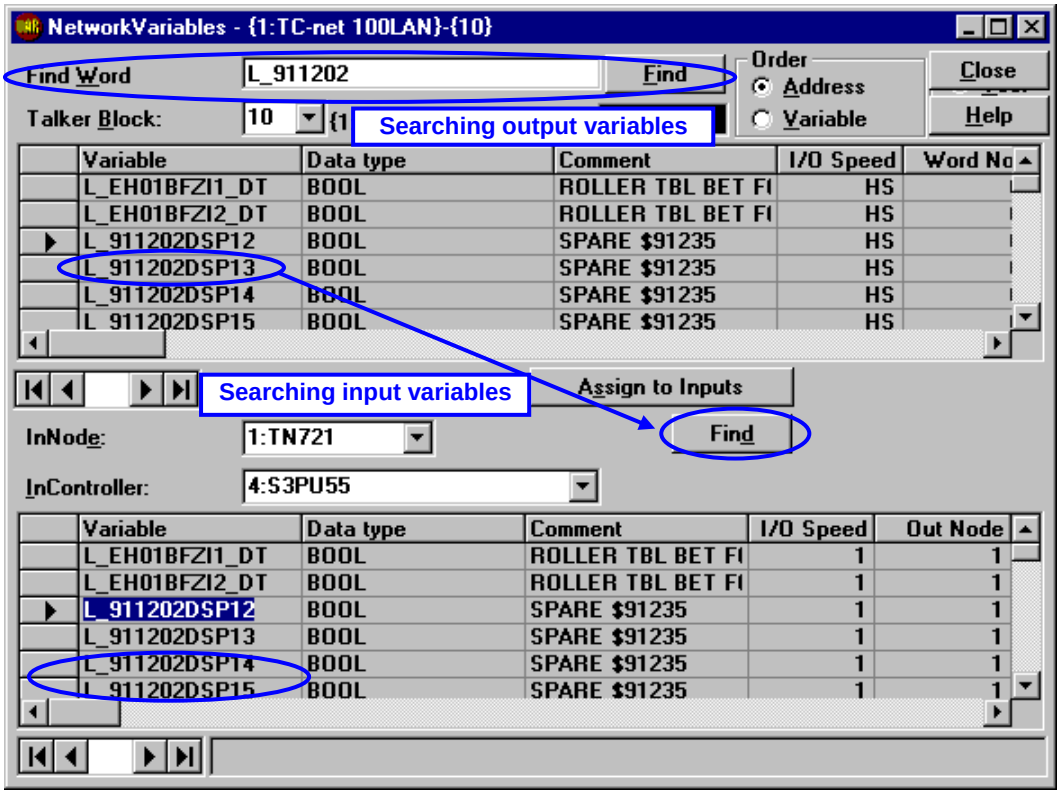
■ Searching variables

- Output Variables:
  Partial characters are searched from all network variables name of the selected system.
  Input the characters to search in [Find Word] and click the [Find] button. If they are found, displaying cursor is moved to the network variable. If [Find] button is pushed again, it is moved to next target.
  Special characters '*' and '?' can be used as follows:

Input characters	Found variables	Note
'ABC'	XABC, ABC345, XXXABC45	Characters included 'ABC'.
'A??C'	XAZZC, AXXC345, XYZA89C45	Characters included 2 characters between 'A' and 'B'.
'A*C'	XAZC, AXXXXXC345, XYZAB99C45	Characters included some characters between 'A' and 'B'.

3

- Input Variables:
  Variable name is searched from all network variables name of the selected system.
  Select an output variable to search and click the [Find] button.
  If it is found, displaying cursor is moved to the network variable. If [Find] button is pushed again, it is moved to next target.

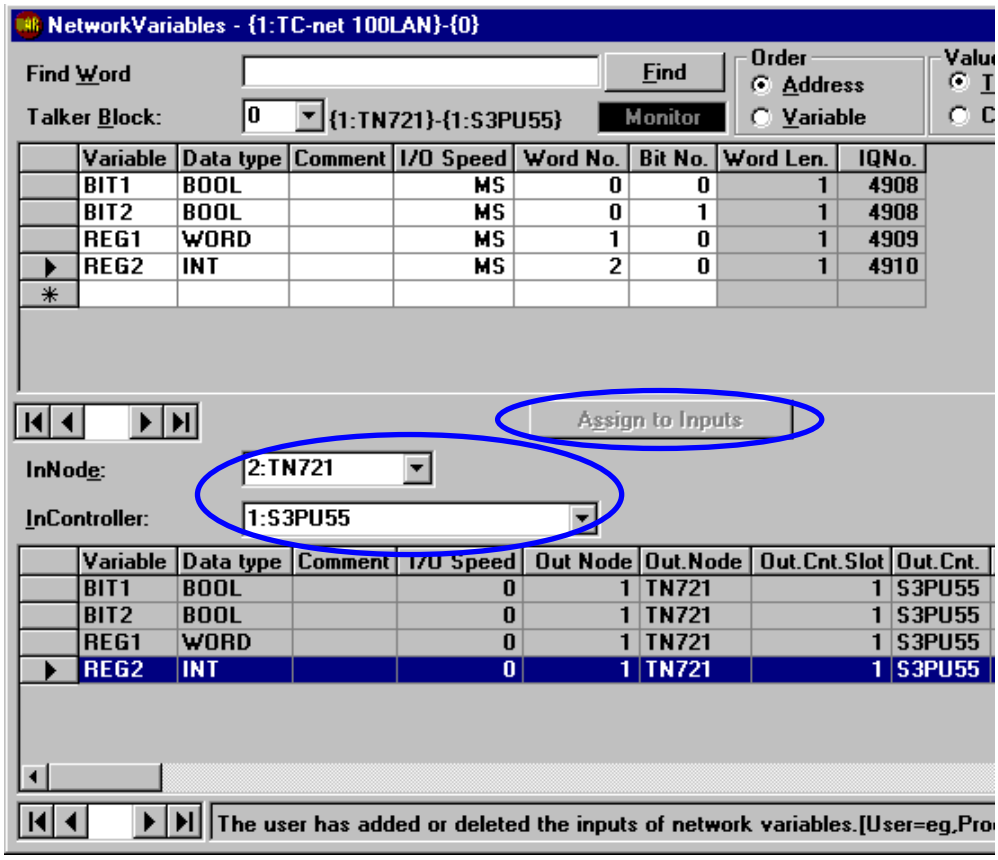


■ Changing variable display order

Change [Address] in [Order] to sort by Word No. Click [Variable] to sort by variable name.

■ Assigning to input variable

1) Select the controller to input the variable from the [InNode] and [InController] pull down list.
2) Click the left edge of the output variable row to select the row. Click while pressing the [Shift] key or [Ctrl] key to select multiple rows.
3) Click the [Assign to inputs] button. Then the variables selected as output variable appears as input controller variable (bottom of window).



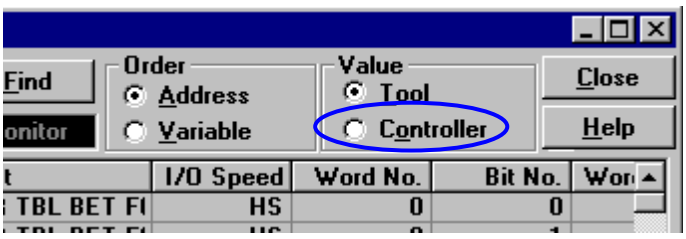
■ Drag & drop operation

Drag a variable name and drop in the [Data monitor], [Data view] window to register as monitor target.

Or drop in the [Program Editor] window to use it as variable name.

■ Online monitoring

To monitor data of registered variables, select <Controller> of [Values].



◆ Important

- When you want to monitor the following field network data of RIO station, you must assign variables on TC-net100 network.
  G3 I/O: TL-S20, Devicenet, Profibus
  5800 I/O: TL-S20, TL-30, TL-100, TL-1000

■ Assigning FL-net RAS Information variables under RIO to network variables

This registration is used in following case:

- RAS information for FL-net like 'Node status' and 'Node map' assigns as the Network Variables on Tc-net100.
- Using these variables, upper Controller can check them.

Please register as follows:

1) Register 'other station' of FL-net LAN
   The 'other station' is used to assign RAS Information as input variables.
2) Register talker block of 'other station'
   See following 'The RAS information on FL-net network'.
3) Register network variable
   Assign 'Node status' and 'Node map' as the Network Variables on FL-net LAN.
4) Register input variable of FL-net LAN
   Assign as input variable of RIO controller.
5) Register output variables of TC-net100 LAN
   Assign as output variable from undefined variables.
6) Register input variable of TC-net100 LAN
   Assign as input variable of S3 controller.

The RAS information on FL-net network is as follows:

1) Node status

   Top address = 3001h (Please register '12289' to 'Word no.' of 'Talker Block'.)
   Size = 1 word

   Format: See the manual of FL311/FL312 ('Chapter 11 RAS Function', 6F8C1067)

2) Cyclic node map

   Top address = 306Bh (Please register '12395' to 'Word no.' of 'Talker Block'.)
   Size = 16 words

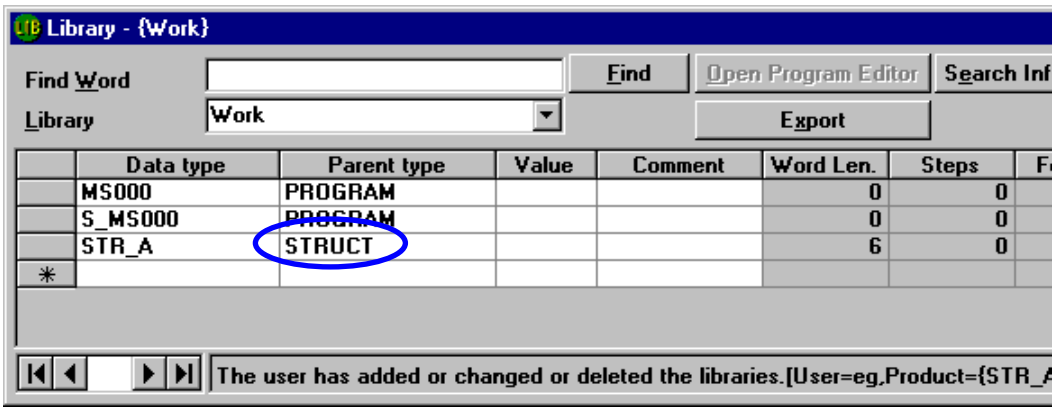
   Format: See the manual of FL311/FL312 ('Chapter 11 RAS Function', 6F8C1067)

3.5 Defining User Data Type (Structure)

This section describes how to define any data type that is not basic type or its array.

■ Opening a library

1) In the [Product Tree], click [Libraries].
2) Click 'Work' on the right side of the [Product Tree] and select <Library> from the <File> menu.



■ Registering user data type

Click [Data type] in a blank row. Enter the user data type name.

Enter 'STRUCT' in [Parent type].

Enter the comment of the user data type in [Comment].

To delete a user data type, click the column to the left of the row and press the [Del] key while a row is selected.

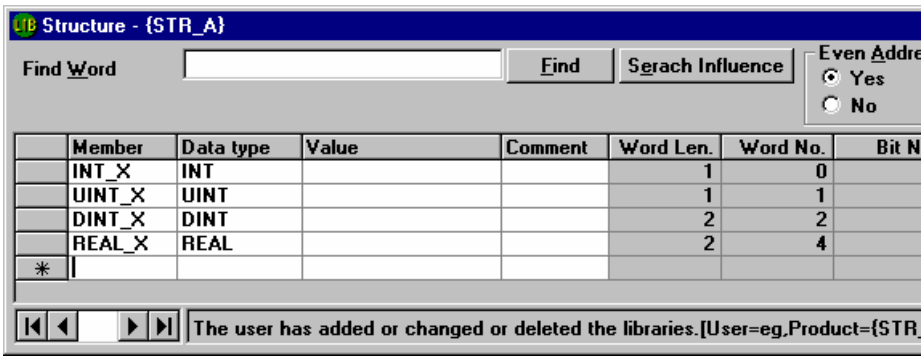
■ Searching a user data type

Enter the user data type name to search in [Find Word] and click the [Find] button.

3

Opening a user data type member

A user data type row is double-clicked, or a [Structure Member] button is clicked after choosing a row.



Registering a user data type member

Click [Member] in a blank row. Enter the user data type member name.

Enter the data type of the member in [Data type].

Enter the initial value of the member in [Value]. Input is enabled when the data type is basic type.

Enter the comment of the member in [Comment].

Drag & drop operation

Drag the data type and drop in the [Controller variable], [Station variable], [I/O variable], or [Network variable] window to use as data type.

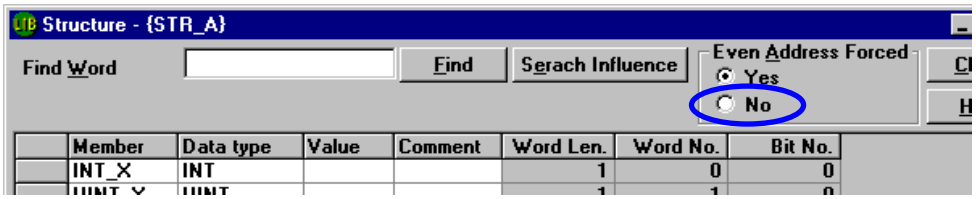
Change the allocation of a user data type member

On the User data type member window, the option 'Even Address Forced' means as follows:

- 'No': The user data type members are allocated tightly.
- 'Yes': They are aligned on the double-word address.

Note

- If Option 'Even Address Forced' is 'No', the Network or Station variables using this Structure which may has REAL,DINT,DWORD data types which length is over 2-word will have wrong values at run time.



Chapter 4
Registering Tag Variables

This topic describes how to register parameters to process signals exchanged with sensors and actuators connected to the L controller. This determines the standard processing of process signals and the display on instruments.

The following topics are described:

4.1 Registering Tags

This topic explains how to register Tag No. and Parameters using Tag Editor.

■ Start tag editor

Select the station to display in the [Product Tree] and select <File><Tag Editor> to start the Tag Editor.

■ Parameters

Each Controllers has the following Parameters.

[MCS type]

Parameters	L3PU11	L2PU1*	L1PU1* LC5**
PV : Indicator	OK	OK	OK
LP : Loop	OK	OK	OK
PB: Push button	OK	OK	OK
SQ: Sequence Panel	OK	OK	None
T: Timer	OK	OK	None
C: Counter	OK	OK	None
R: General Parameters (Real)	OK	OK	OK
W: General Parameters (Integer)	OK	OK	OK
P: Polynomial Line	OK	OK	OK
GD: Guidance	OK	OK	OK
F: Communication Data (Real)	OK	OK	OK
I: Communication Data (Integer)	OK	OK	OK
VB: Batch Control interface	OK	OK	None

[DS type]

Parameters	L3PU21	L2PU22	FN711 FN611	PU821
PV : Indicator	OK	OK	OK	OK
LP : Loop	OK	OK	OK	OK
PB: Push button	OK	OK	OK	OK
SQ: Sequence Panel	OK	OK	None	OK
TC:Timer Counter	OK	OK	None	OK
DB:Data Block	OK	OK	None	OK
T: Timer	OK	OK	None	OK
C: Counter	OK	OK	None	OK
R: General Parameters (Real)	OK	OK	None	OK
W: General Parameters (Integer)	OK	OK	None	OK
P: Polynomial Line	OK	OK	None	OK
RTT: DS Scan Parameter	None	None	OK	OK

■ Display parameters

Select item [Parameter] on the tool bar to open the parameter view.

There are five columns.

Item	Shows items that can be registered for the selected parameter.
Tool Value	Shows the value registered offline.
Controller Value	Shows the value read from the controller.
Data Type	Shows the data type of each item.
Initial Value	Shows the initial value used by the copy function.

The displayed fields are changed by the display mode option.

Tool	Item, Tool value, Data type, Initial value
Controller	Item, Controller value, Data type, Initial value
Tool and Controller	Item, Tool value, Controller value, Data type, Initial value

The [Record No.] button can be used to display the previous or next number. You can also enter the number directly.

Place the cursor on top of the number to display the range.

◆ Note

- Record No. starts from 1 because it follows the numbering rules for monitoring with OIS.
- However, note that the program internal Index No. starts from 0 because controller instruction does not allow array to start from any number other than 0.
- Tag Editor Record No. 1 = Program Editor [0].

■ Entering and saving values

A value input consists of tool value and controller value. Move the focus to the input item and double-click or press Enter.

Enter characters or numbers, or select from a list depending on the item.

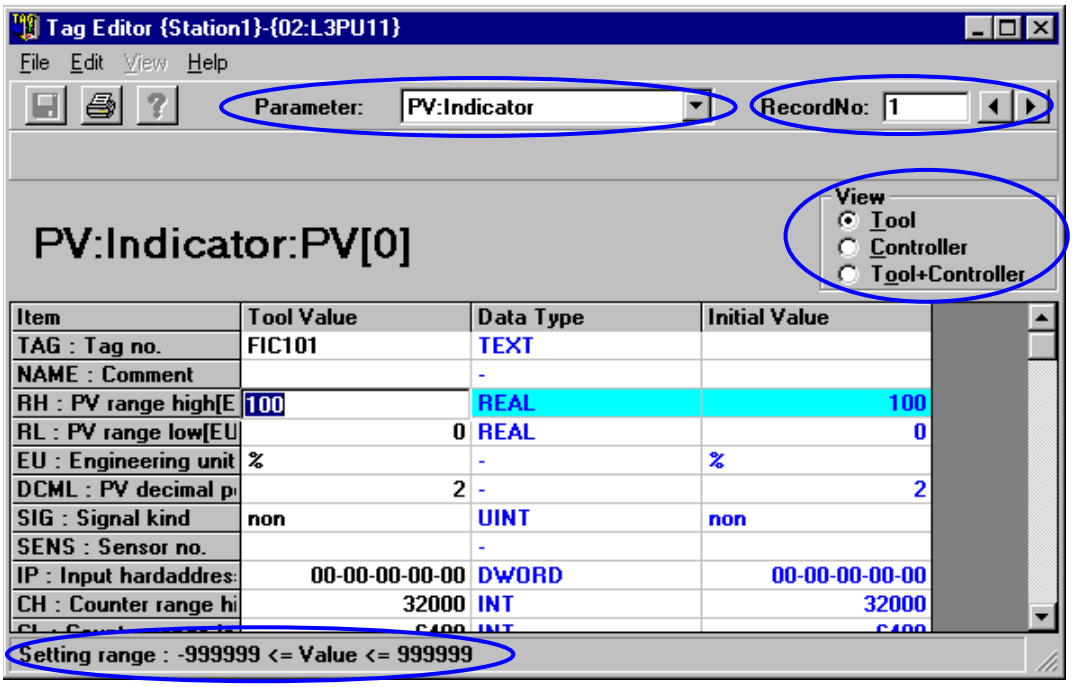
When entering characters and numbers, enter a value within the range displayed at the bottom of the window.

The following rules apply to TagNo.

Use only the following characters. (They must be unique within the system)

MCS type: Alphanumeric characters and underscore. The first character must be alphabet.

DS type: Alphanumeric characters and underscore. Characters not recognized as numeric value or reserved word cannot be used.



Select <File><Save> to save. The changed locations (red) are saved.

■ Copy values

The value (tool value, initial value) currently being displayed can be copied to another record.

Copy can be made in following units:

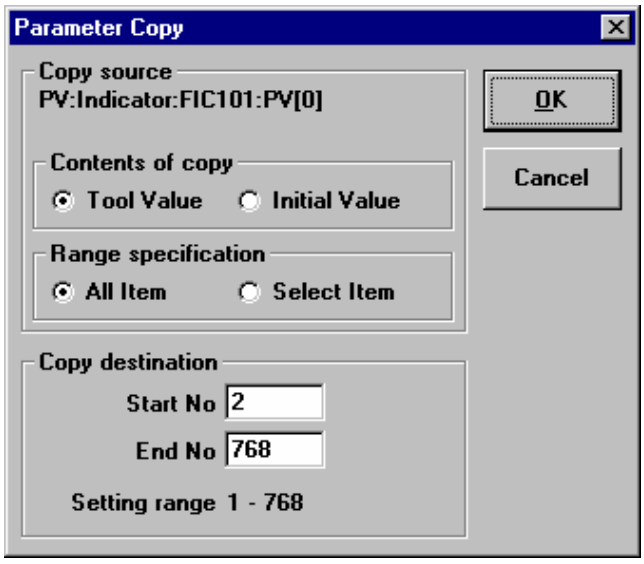
- Tool value (all items)
- Tool value (selected items)
- Initial value (all items)
- Initial value (selected items)

Selected item refers to any consecutive items that are in reverse video.

Selection is made by dragging the cursor over the target item while pressing the left button.

Or use the [Shift] + ↑ or [Shift] + ↓key combination.

Select <Edit><Copy parameter> to open the following window.



1) Setting source

   1-1) Select 'Tool Value' or 'Initial Value' for 'Contents of copy'.

   1-2) Select whether to copy 'All items' or 'Selected items'.

2) Setting destination

   2-1) Input the target 'Start No.'

   2-2) Input the target 'End No.'

3) Click [OK] to start copying.

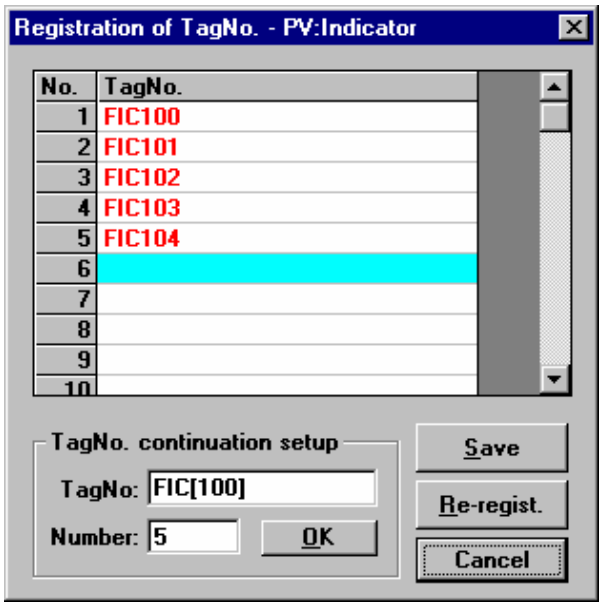
4

■ Generating sequential tag Nos.

This function is used to register only tag No. and to add the tag variables for 'New Instrument FB Library' to an existing tags.

It is useful when initially entering Tag no. only or when generating sequential Tag Nos.

Select <Edit><Registration of Tag No.>.



● How to register the continuousness tag Nos.

1) In 'TagNo. Continuation setup', the characters and numerical value bundled '[ ]' is set as Tag No.

2) Input the total number of registered tags.

3) Click button [OK]. Registered tag No. is displayed in the table in red-letter.

4) When [Save] is clicked, all the change parts (red-letter) are written in the file.

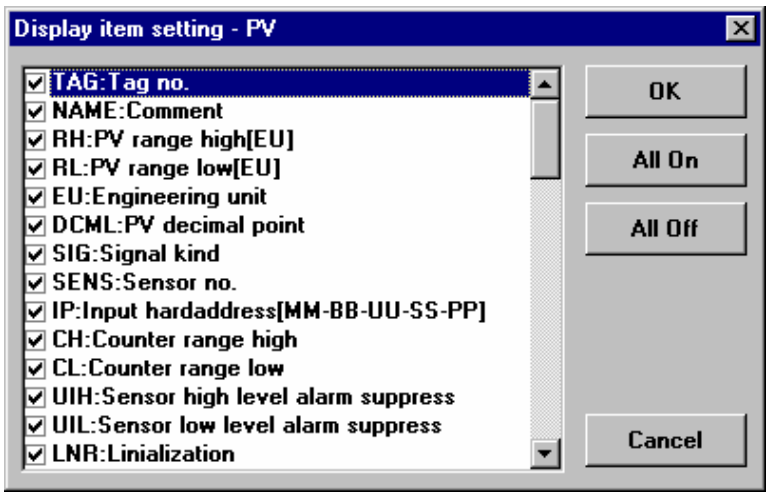
● How to add variable for 'New Instrument FB Library' to existing tag variable.

(Note) This function is used for tag Nos. which are registered on V-Tool V2.6.1 or more.
Click button [Re-regist.].

■ Display item setting

Item displayed on the screen is specified.

Select <View><Display item setting> to open the following window.



Only the item which puts the check is displayed on the screen.

[All On] button: The check is put on all items.
[All Off] button: The check on all items is removed.

■ Select I/O connection

I/O hard address (L-MCS) and I/O point variable identifier (L-DS,FN) can be specified with the alternative form.

When < View >< Select I/O connection > of the menu is checked, and the object item is double-clicked, the selection screen is displayed.

The object item is as follows.

- L Controller(MCS)

Tag kind	Item Name	Comment	I/O module kind
PV	IP	Input hard address	AI,PI
LP	OA	Output hard address	AO,PO
PB	IA1-IA3	Input hard address	DI,DO
	OA1-OA3	Output hard address	DO

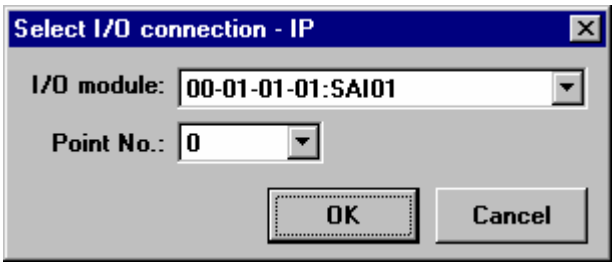
● L Controller (DS) / Unified controller type 2

Tag kind	Item Name	Comment	I/O module kind
PV	PVA	Input Point Variable Name	AI,PI
LP	MVA	Output Point Variable Name	AO,PO
PB	IA1-IA8	Input Point Variable Name	DI,DO
	OA1-OA8	Output Point Variable Name	DO

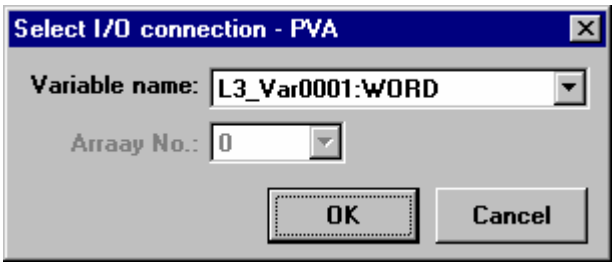
● FN Module

Tag kind	Item Name	Comment	Variable type
PV	PVA	Input Point Variable Name	INT,UINT,WORD
LP	MVA	Output Point Variable Name	INT,UINT,WORD
PB	IA1-IA8	Input Point Variable Name	BOOL
	OA1-OA8	Output Point Variable Name	BOOL

<L Controller>



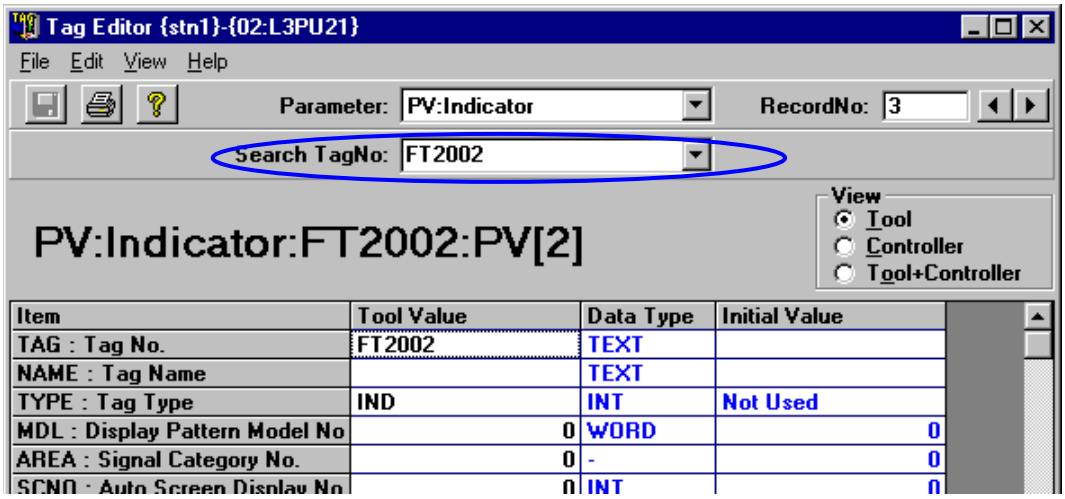
<FN Module>



Searching tag No.

Select or input the tag no. in 'Search TagNo:' list, the displayed tag parameter will be changed.

- All tag nos. are searched in a system.
- 'Search TagNo' is available, when one or more tag is registered.

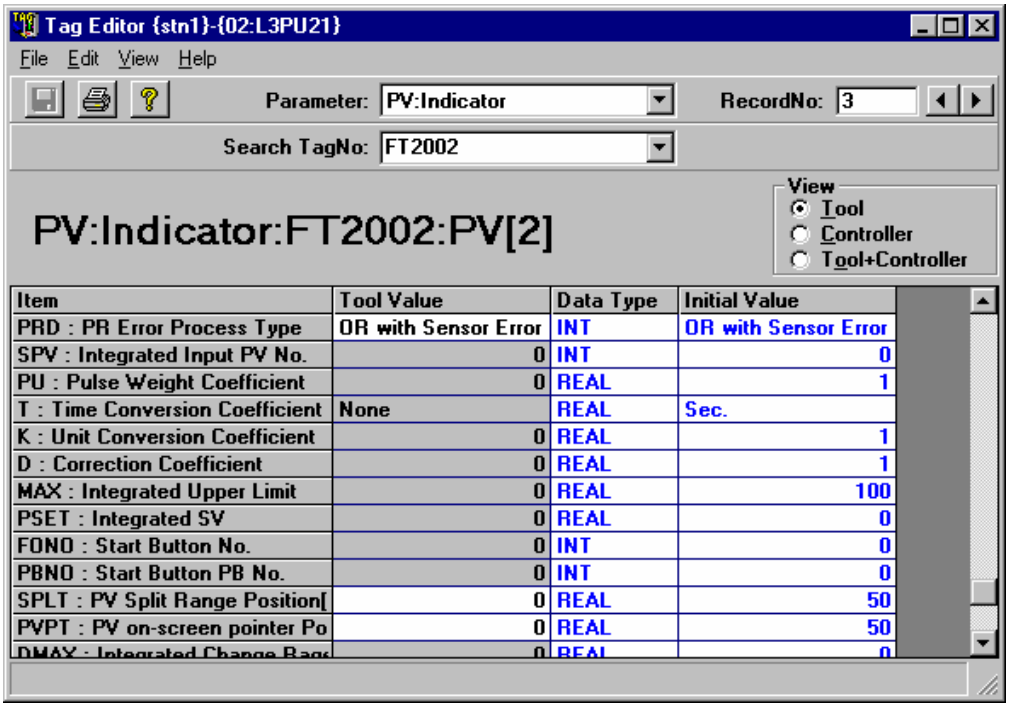


Masking unnecessary item

When the tag type is specified in the PV, LP, and PB tag of DS type, the unnecessary items are made a gray display and it comes not to be able to input the value.

The mask is done for PV by the combination of tag type (TYPE) and signal type (SIG).

For example, the IND tag and the signal type is the not pulse in the PV is displayed as follows.



■ Automatic setting of initial value

When the meter range RL and RH are input, the items which can be decided are set automatically.

The same values as RH and RL are set.(It is set that the alarm is not generated in an initial value.)

[MCS]

Input Item	Set Item
RH	PH
RL	PL

[DS]

Input Item	Set Item #1	Set Item #2
RH	PH	PHH
RL	PL	PLL

◇ Supplementary

- This function is not available, when the item value has already been input as non-zero. But in editing mode (displaying red-characters), it is available.

■ Selecting PV number

The item which inputs the PV number can be selected from a list.

In the list, tag no. and the table-variables are described in parallel.

Ex.) '1:FT_2000:PV[0]'

[MCS]

Tag kind	Item which selects PV number
Indicator (PV)	SPV,TM,PM
Loop Controller (LP)	PVP

[DS]

Tag kind	Item which selects PV number
Indicator (PV)	TM,PM,SVP,PVP
Loop Controller (LP)	PVP,VP
Push Button (PB)	PVP

4.2 Meaning of Tag Parameters

4.2.1 MCS type

■ Tag parameter type and count

The L controller has the following Tag parameters.

Tag Type	Meaning	L3-type1 L3PU11	L2-type1 L2PU11	L2-type2 L2PU12	L1PU11 L1PU12 L1LG11	LC511 LC512 CL521
PV	Indicator	1024	128	288	128	128
LP	Controller	256	32	96	8	8
PB	Push button	1024	128	288	32	32
SQ	Sequencer	128	16	48	—	—
T	Timer	512	192	192	—	—
C	Counter	256	96	96	—	—
R	Real parameter	2048	768	768	128	128
W	Integer parameter	2048	768	768	128	128
P	Polynomial line	128	48	48	16	16
GD	Guidance	8 (512GD)	3 (192GD)	3(192GD)	1 (64GD)	1 (64GD)
F	Transmission parameter real	128	48	48	32	32
I	Transmission parameter integer	128	48	48	32	32
VB	Batch interface	128	48	48	—	—

■ Meaning of PV

Item	Type	Meaning
TAG	P	Tag No. assigned as instrument ID. This is used as an ID No. to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • The leading character must be alphabet. • The length must not exceed 16 characters. • It must be unique within the system. • It must not be a reserved word.
NAME	O	Name of instrument. • It must not exceed 32 bytes.
RH	P	Indicator range upper limit. Real value. Engineering value. Unit is registered in the (engineering unit character) list. • It must be greater than instrument range lower limit (RL).
RL	P	Indicator range lower limit. Real value. Engineering value. Unit is registered in the (engineering unit character) list. • It must be less than instrument range upper limit (RH).

Item	Type	Meaning
EU	O	Set the engineering unit character of the process value PV. • It must not exceed 8 bytes.
DCML	O	Specify the number of decimal digits when displaying PV value and range on instrument. • It must be between 0 and 6.
SIG	P	Select the input signal type from the following: [Input Signal Type]: [Description] None: No standard processing of this instrument is performed. User calculated: Calculated value is assigned to PV value with script and used as internal instrument because no input counter conversion is performed. 4-20mA 2-wire: Select 4-20mA from 2-wire transmitter with real input signal. 4-20mA 4-wire: Select 4-20mA from 4-wire transmitter with real input signal. 1-5V: Select 1-5V from converter etc. with real input signal. Pt100new: Select resistance thermometer (new JIS support Pt100) with real input signal. Pt100old: Select resistance thermometer (old JIS support Pt100) with real input signal. K-THC: Select K type thermal couple with real input signal. T-THC: Select T type thermal couple with real input signal. J-THC: Select J type thermal couple with real input signal. E-THC: Select E type thermal couple with real input signal. B-THC: Select B type thermal couple with real input signal. R-THC: Select R type thermal couple with real input signal. S-THC: Select S type thermal couple with real input signal. Pulse contact: Select pulse contact input with real input signal. Pulse voltage: Select pulse voltage input with real input signal. mV: Select mV voltage input with real input signal.
SENS	O	Set the ID No. indicating the signal source of sensors and transmitters. This is for information only and not used for internal processing.
IP	P	Register the input points in the format MM_BB_UU_SS_PP. • MM is main slot No. • BB is bus No. • UU is unit No. • SS is slot No. • PP is point No.
CH	P	Set the input counter value equivalent to instrument range upper limit (RH). Integer. • It must be greater than input count lower limit (CL).
CL	P	Set the input counter value equivalent to instrument range lower limit (RL). Integer. • It must be less than input count upper limit (CH).

Item	Type	Meaning
UIH	P	Set whether to suppress sensor error (PVI) when input count exceeds input count upper limit (CH). • YES/NO
UIL	P	Set whether to suppress sensor error (PVI) when input count is less than input count lower limit (CL). • YES/NO
LNR	P	Select the type of linearlization performed by controller internal standard input processing. [Compensation operation code]: [Description] Linear: Select when the relationship between process value and input signal is already linear or when no linearlization is performed. DP/F: Convert from differential pressure to flow. DP/F-P: Convert from differential pressure to flow after pressure compensation. DP/F-T: Convert from differential pressure to flow after temperature compensation. DP/F-PT: Convert from differential pressure to flow after temperature and pressure compensation. RTD: Perform linear conversion of resistance thermometer (Pt100). THC: Perform linear conversion of thermocouple. Custom: Select when no linearlization is performed with standard input process and compensation is performed with script etc.
TTL	P	Select whether to treat PV value as instantaneous value or integrated value. Instantaneous value is displayed as bar graph and integrated value is displayed as counter.
SPV	P	When [Totalized Value] is selected in TTL, PV indicates integrated value. Other PV values can be selected as well as signal assigned to oneself as the instantaneous value that is the source of this integrated value. Register PVNo if other PV value is used for integration operation.
MAX	P	Set the maximum value when PV is integrated value. When PV exceeds this value, the excess becomes the PV value and integration is performed against this value starting from the next cycle. The maximum integrated value is used by journal calculation software that calculates the usage by periodically reading the rotary integrated value. Real. Same engineering value as PV. • It must be zero or greater.

Item	Type	Meaning
PRS	P	Controller can perform main scan or high-speed scan. Select the scan cycle to use for standard input processing.
LC	P	During instantaneous value processing, the controller treats instantaneous value less than this value as 0%. If low cut value is negative, no low cut is performed. Integer. To second decimal places. Unit %.
FT	P	During instantaneous value processing, the controller uses the primary low pass filter calculated by the following formula. Integer. To second decimal places. • Must be 0 or greater and less than 99.
TM	P	Register the PV No indicating the measured temperature when the process value is air flow and compensation by temperature is necessary.
PM	P	Register the PV No indicating the measured temperature when the process value is air flow and compensation by pressure is necessary.
TDG	P	Register the standard design temperature when the process value is air flow and compensation by pressure is necessary. Real. Unit °C.
PDG	P	Register the standard design pressure when the process value is air flow and compensation by pressure is necessary. Real. Unit kPa.
PRD	P	A PV process error bit (PRE) is set when there is an error in the signal source of the process value PV. Select the method of handling this signal source error from the following: [All sensors alarm detected]: Treat as PV process error if it is an error in signal from own sensor or if temperature/pressure compensation PV is in error. [Only main sensor alarm detected]: Even if there are temperature/pressure compensation points, monitor error in signal from own sensor only and treat it as PV process error (PRE). [No sensor alarm detected]: Do not treat as PV process error even if there is error in signal from own sensor or sensor error in one of the compensation points.
PU	P	For pulse input, register the process amount equivalent to one pulse. Real. Engineering value. • Must be zero or greater.
T	P	Select the unit of time for instantaneous value operation. Real. • SEC (=1), MIN (=60), or HOUR (=360).
K	P	Conversion factor between the unit indicated by the process signal and the unit of the displayed process value PV. Real. • Must be zero or greater.
D	P	Compensation factor that serves as conversion factor similar to unit conversion factor. Real. • Must be zero or greater.
PH	P	Alarm judgment upper limit for process value PV. Real. Same engineering value as PV. • Must be greater than PV lower limit alarm (PL).
PL	P	Alarm judgment lower limit for process value PV. Real. Same engineering value as PV. • Must be less than PV upper limit alarm.

Item	Type	Meaning
PVB	P	Dead band for upper/lower limit judgment. Real. Same engineering value as PV.
DPL	P	Process value PV change rate alarm judgment value. Real. Unit is engineering value/s. • It must be zero or greater.
DPB	P	Dead band for change rate alarm. Real. Unit is engineering value/s. • It must be zero or greater.
AGRD	O	Select the instrument warning level. • None, minor alarm, or major alarm.
AMON	O	Specify whether to monitor alarm with OIS. • ON or OFF
LOCK	O	Specify whether to disable instrument parameter change with OIS. • YES/NO
SIGN	O	Set the tagging character displayed on the instrument. • The length must not exceed 16 characters.
PVPT	O	When the PV value is instantaneous value, it is displayed as bar graph. In this case a pointer can be placed as a marker for process operation. Set its initial value. Real.
LOG	O	Specify whether to perform logging (record or print alarm etc.) with OIS. • YES/NO
PICT	O	Specify the window to expand when a tag is selected in the OIS alarm tag window. If unspecified, expanded to point window by default. • It must not exceed 8 bytes. Specify an ODF file name.
SIMM	P	Register the controller loopback simulation method when operating as indication value PV of the indicator registered in [LP]. [Simulation method]: [Description] Standard: Loopback automatically from controller output to PV when the simulation flag (SIM) is OFF. User: Do not perform automatic loopback when the simulation flag (SIM) is ON. Loopback is performed according to the user program.
DIC	P	Set whether to use the atom PVC which is used to compensate the PV value with application.
PVC	P	PV for application Attention: Data actually though it is in the parameter area.
PV	D	Engineering unit value May be set when scan is OFF (SCN=1).
SCN	D	Stop standard I/O processing when SCN=1 Perform standard I/O processing when SCN=0
SIM	D	When SIM=1, simulation is specified and MV -> PV simple loopback is performed.
SPR	D	Reset following alarms when SPR=1. PVH, PVL, PVD, PVI, PRE
RST	D	Initialize integrated value of TTL tag when RST=1.

Item	Type	Meaning
DEU	D	For future use
VIU	D	For future use
PRU	D	For future use
VHU	D	For future use
VLU	D	For future use
VDU	D	For future use
PDE	D	PDE=1 when input point (input module) is faulty.
PVI	D	PVI=1 when input count is less than input count lower limit (CL) or input count is greater than input count upper limit (CH).
PRE	D	PRE=1 when there is an error in the signal source of the process value PV.
PVH	D	PVH=1 when PV value>PV upper limit alarm (PH).
PVL	D	PVL=1 when PV value<PV lower limit alarm (PL).
PVD	D	If the change in PV per scan is expressed as dPV and the absolute value of PV is expressed as ABS(), PVD=1 when ABS(dPV)>=PV change rate alarm (DPL) x (scan cycle).

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of LP

Item	Type	Meaning
PVP	P	Set the number of the process value PV. Register the PV record No.
MSIG	P	Select the output signal type from the following: [Output Signal Type]: [Description] None: No standard processing of this instrument is performed. User calculated: No MV value real value processing performed. Select when no real output is performed such as cascade master loop. 4-20mA: Select 4-20mA with real output signal. Pulse width/slow: Select low speed pulse width output with real output signal. Pulse width/fast: Select high speed pulse width output with real output signal. Pulse train/slow: Select low speed pulse series output with real output signal. Pulse train/fast: Select high speed pulse series output with real output signal.
ACTS	O	Register the ID No. of the controller valve for connecting the output signal. This is unrelated to the program operation. • It must not exceed 16 bytes.

Item	Type	Meaning
OA	P	Register the input points in the format MM_BB_UU_SS_PP. • MM is main slot No. • BB is bus No. • UU is unit No. • SS is slot No. • PP is point No.
CTL	P	Select the instrument type from the following: [Control Operation Type]: [Description] none: No instrument operation performed. PID: Select PID controller. Sample PID Select sample PID controller. M/A: Select M/A controller. Ratio setter: Select ratio controller.
PRS	P	Select the cycle of the control operation. Select main scan or high-speed scan.
CDR	P	When PID controller or sample PI controller, select the operation direction of control amount MV with respect to deviation. MV increases or decreases when deviation (SV-PV) increases.
MDR	P	When analog output, select the direction of the analog output with respect to control amount MV. Select between [4-20mA output at 0-100%] or [20-4mA output at 0-100%].
KP	P	Ratio gain of PID operation. Real. Unit [times]. • It must be zero or greater.
TI	P	Integrated time of PID operation. Real. Unit [min]. • It must be zero or greater.
TD	P	Rate time of PID operation. Real. Unit [min]. • It must be zero or greater.
ETA	P	eta for imperfect differential gain (1/eta). Real. • It must be greater than 0 and 1 or less.
ALP	P	2-degree-of-freedom proportion coefficient (α). Real. • It must be between 0 and 1.
BET	P	2-degree-of-freedom integration coefficient (β). Real. • Must be 1 or greater and less than 2.
GAM	P	2-degree-of-freedom differential coefficient (γ). Real. • Must be 0 or greater and less than 2.
GP	P	During PID or SPI operation, the gain can be modified within a gap width near 0 of deviation (SV-PV). Set this gap width. Real. Unit %. • It must be between 0 and 100.
GG	P	During PID or SPI operation, the gain can be modified within a gap width near 0 of deviation (SV-PV). Set This gain. Real. Unit [times]. • It must be between 0 and 1.
DMV	P	MV change rate limit. Real. Unit [%/s]. • It must be zero or greater.
MH	P	MV upper limit. Real. Unit [%]. • It must be greater than MV lower limit (ML).

Item	Type	Meaning
ML	P	MV lower limit. Real. Unit [%]. • It must be less than MV upper limit (MH).
FP	P	When [Output Signal Type] is pulse, set the pulse count (pulse series) or pulse time (pulse width) necessary for the actuator to move full stroke. Real. • It must be zero or greater.
BL	P	When [Output Signal Type] is pulse, set the actuator backlash. • It must be between 0 and 255.
HT	P	When [Output Signal Type] is pulse, set the hold time when the output direction is reversed. Real. Unit [s]. • It must be between 0 and 10.
PLB	P	When [Output Signal Type] is pulse, set the dead band to stop unnecessary actuator movement for minute pulse count. Real. • It must be between 0 and 10.
DL	P	Set the alarm level for deviation (SV-PV). Real. Engineering value. • It must be zero or greater.
DVB	P	Set the dead band for deviation alarm. Real. Engineering value. • It must be zero or greater.
MHA	P	Set the MV upper limit alarm. Real. • It must be greater than MV lower limit alarm (MLA).
MLA	P	Set the MV lower limit alarm. Real. • It must be less than MV upper limit alarm (MHA).
MVB	P	Set the MV upper/lower limit alarm dead band. Real. • It must be zero or greater.
VP	P	When [Output Signal Type] is pulse, the feedback PV value can be displayed on the MV bar graph instead of MV in order to determine the actuator position and valve position. Set this PV No.
DT0	P	Set the cycle of the control operation. Integer. Unit [scan time]. • It must be zero or greater.
T0	P	Set the sampling time for sample PI controller. Integer. Unit [0.1s]. • Must be zero or greater.
T1	P	Set the control time for sample PI controller. Integer. Unit [0.1s]. • Must be zero or greater.
CLD	P	When PID controller or sample PI controller, select how to determine control stop (CLI) from the following: CLI by PRE: Set CLI=ON and automatically stop control operation when PV or SV value is abnormal (PRE). CLI depends on application: CLI is not automatically set to ON. The control stop condition depends on the user program.
POR	P	Pulse output request flag (= 1 is output request)
PMV	P	Pulse output request count
LDP	P	LDU decimal point position • It must be between 0 and 4.

Item	Type	Meaning
LDB	P	LDU display method Bar graph type Point display type
MVPT	O	Set the position of the operation pointer placed on the MV bar graph. • Above ML, below MH.
DCSV	O	When ratio controller, set the decimal point position of SV value. • It must be between 0 and 6.
EUSV	O	When ratio controller, set the engineering unit character of SV value. • It must not exceed 8 bytes.
DCMV	O	When ratio controller, set the decimal point position of MV value. • It must be between 0 and 6.
EUMV	O	When ratio controller, set the engineering unit character of MV value. • It must not exceed 8 bytes.
LDC	P	Register whether to connect loop display unit or not.
CMD	P	The control mode is set.
SVS	P	Select whether SV value can be set when the control mode of the controller is A mode.
FS0	P	The parameter for new instrumentation FB. The majors tracking of SV is done or it selects it.
FS1	P	The parameter for new instrumentation FB. The unit of the cascade value is selected.
MDT	P	The parameter for model drive PID FB library.
MKF	P	The parameter for model drive PID FB library.
MTF	P	The parameter for model drive PID FB library.
SV	D	For user application [For deviation alarm (DVE), absolute value of PV-SV is treated as the deviation.]
MV	D	When control mode (MOD)=C, A, RM, the value output to I/O specified with output point No(OA). However, when control operation type (CT)=[ratio controller], MV becomes engineering value and no output is performed.
MODE	D	C/A: MV changed by application is AO output. RM: Mode during OIS operation. M: Intelligent I/O readback data is overwritten for MV.
M	D	Mode M (for new instrumentation FB.)
A	D	Mode A (for new instrumentation FB.)
C	D	Mode C (for new instrumentation FB.)
RM	D	Mode RM (for new instrumentation FB.)
MVT	D	For user application
SIM	D	Simulation (SIM) of LP specified by control target PVNo (PVP) is set. When SIM=1, AO output of MV is stopped.
LSP	D	Reset following alarms when LSP=1. MVH, MVL, DVE

Item	Type	Meaning
MVE	D	Alarm indicating error in intelligent serial I/O specified with output point No(OA). MVE does not recover automatically. (Acknowledged recovery request from OIS is necessary.)
CLI	D	For user application
MVH	D	Alarm issued when MV exceeds MV upper limit alarm (MHA).
MVL	D	Alarm issued when MV is less than MV lower limit alarm (MLA).
DVE	D	Alarm issued when deviation (absolute value of PV-SV) exceeds the deviation alarm (DL). No alarm is issued if control operation type (CTL) is M/A controller or ratio controller. No alarm is issued if control mode is M or RM.
VPI	D	Alarm set when there is a sensor error in the AI specified with valve position PVNo (VP). Valid only when the output signal type (MSIG) is pulse.
SSV	D	For user application
CSV	D	For user application
SMV	D	For user application When SMV=ON, AO output of MV changed by application is performed regardless of the control mode.
CMV	D	For user application
CMP	D	For user application
SEQ	D	For user application
CC	D	For user application
MEU	D	For future use
CLU	D	For future use
MHU	D	For future use
MLU	D	For future use
DVU	D	For future use
VPU	D	For future use

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of PB

Item	Type	Meaning
TAG	P	Tag No. assigned as instrument ID. This is used as an ID No. to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • The leading character must be alphabet. • The length must not exceed 16 characters. • It must be unique within the system. • It must not be a reserved word.
NAME	O	Name of instrument. • It must not exceed 32 bytes.
NAM1 NAM2 NAM3	O	Name to be assigned to lamp status (FI1 to FI3).
USE	P	Register whether to use the corresponding instrument. • Use, not use.
IA1 IA2 IA3	P	Register the input points in the format MM_BB_UU_SS_PP. Register the digital input points or output points. The three points correspond to the three push button lamp signals. • MM is main slot No. • BB is bus No. • UU is unit No. • SS is slot No. • PP is point No.
OA1 OA2 OA3	P	Register the process signal output points in the format MM_BB_UU_SS_PP. Register the digital output points. The relationship between these outputs and the three push buttons is determined by the registration in the output table. • MM is main slot No. • BB is bus No. • UU is unit No. • SS is slot No. • PP is point No.
INV1	P	Specify whether to invert signal at input point to turn on lamp 1. • Non Invert/Invert
INV2	P	Specify whether to invert signal at input point to turn on lamp 2. • Non Invert/Invert
INV3	P	Specify whether to invert signal at input point to turn on lamp 3. • Non Invert/Invert
INA1	P	Specify whether to interpret turning on of lamp 1 as alarm. • YES/NO
INA2	P	Specify whether to interpret turning on of lamp 2 as alarm. • YES/NO
INA3	P	Specify whether to interpret turning on of lamp 3 as alarm. • YES/NO
UI1	P	Register whether to use lamp or not as function of push button lamp 1. • YES/NO

Item	Type	Meaning
UI2	P	Register whether to use lamp or not as function of push button lamp 2. • YES/NO
UI3	P	Register whether to use lamp or not as function of push button lamp 3. • YES/NO
AMON	O	Specify whether to monitor alarm with OIS. • YES/NO
AGRD	O	Select the instrument warning level. • None, minor alarm, or major alarm.
ONV1	P	Set whether to invert output of value after output table processing to output point 1. • Non Invert/Invert
ONV2	P	Set whether to invert output of value after output table processing to output point 2. • Non Invert/Invert
ONV3	P	Set whether to invert output of value after output table processing to output point 3. • Non Invert/Invert
UO1	P	Register whether to use button or not as function of push button lamp 1. • YES/NO
UO2	P	Register whether to use button or not as function of push button lamp 2. • YES/NO
UO3	P	Register whether to use button or not as function of push button lamp 3. • YES/NO
DA01 DA02 DA03	P	Select the action for output of each point when the button returns. • None (no action)/Set (set output)/Rest (reset output)/Toggle (invert output)
DA11 DA12 DA13	P	Select the action for output of each point when button 1 is pressed. • None (no action)/Set (set output)/Rest (reset output)/Toggle (invert output)
DA21 DA22 DA23	P	Select the action for output of each point when button 2 is pressed. • None (no action)/Set (set output)/Rest (reset output)/Toggle (invert output)
DA31 DA32 DA33	P	Select the action for output of each point when button 3 is pressed. • None (no action)/Set (set output)/Rest (reset output)/Toggle (invert output)
PRS	P	Set the standard processing cycle of the corresponding instrument within the controller. • HS(high-speed scan cycle), MS(main scan cycle)
LOCK	O	Specify whether to disable instrument parameter change with OIS. • YES/NO
SIGN	O	Set the tagging character displayed on the instrument. • The length must not exceed 16 characters.
LOG	O	Specify whether to perform logging (record or print alarm etc.) with OIS. • YES/NO

Item	Type	Meaning
PICT	O	Specify the window to expand when a tag is selected in the OIS alarm tag window. If unspecified, expanded to point window by default. • It must not exceed 8 bytes. Specify an ODF file name.
CM1	P	Used in OIS button operation and application button operation request. (There is no need to set CM1 as parameter.) none: Perform the set action when button returns (DO0). Button1: Perform the set action when button 1 is pressed (DA1). Button2: Perform the set action when button 2 is pressed (DA2). Button3: Perform the set action when button 3 is pressed (DA3).
SCN	D	Stop update of FI1 to FI3 when scan is OFF (=1).
SIM	D	For future use [Stop FO1 to FO3 output when simulation (=1)]
SPR	D	For future use [Reset alarm unacknowledged (IU1 to IU3) when alarm suppress (=1)]
LOC	D	For future use [Lock button status (FO1 to FO3) when requesting interlock (=1)]
IU1	D	For future use
IU2	D	For future use
IU3	D	For future use
UIO	D	For future use
FO1	D	When control mode (MOD) = A or RM, the status output to I/O specified with output point No (OA).
FO2	D	When control mode (MOD) = A or RM, the status output to I/O specified with output point No (OA).
FO3	D	When control mode (MOD) = A or RM, the status output to I/O specified with output point No (OA).
IOE	D	Alarm (alarm when 1) indicating error in intelligent serial I/O specified with input point No (IA) or output point No(OA).
FI1	D	Status input from I/O specified with input point No(IA).
FI2	D	Status input from I/O specified with input point No(IA).
FI3	D	Status input from I/O specified with input point No(IA).
MODE	D	A: FO changed by application is DO output. RM: OIS button operation mode. M: Intelligent I/O readback DO is overwritten for FO.
M	D	Mode M (for new instrumentation FB.)
A	D	Mode A (for new instrumentation FB.)
RM	D	Mode RM (for new instrumentation FB.)

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of SQ

Item	Type	Meaning
TAG	P	Tag No. assigned as instrument ID. This is used as an ID No. to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • The leading character must be alphabet. • The length must not exceed 16 characters. • It must be unique within the system. • It must not be a reserved word.
NAME	O	Name of instrument. • It must not exceed 32 bytes.
PNAM1-17	O	Name of step included in sequence operation. • It must not exceed 12 bytes.
AGRD	O	Select the instrument warning level. • None, minor alarm, or major alarm.
AMON	O	Specify whether to monitor alarm with OIS. • YES/NO
LOCK	O	Specify whether to disable instrument parameter change with OIS. • YES/NO
SIGN	O	Set the tagging character displayed on the instrument. • The length must not exceed 16 characters.
LOG	O	Specify whether to perform logging (record or print alarm etc.) with OIS. • YES/NO
PICT	O	Specify the window to expand when a tag is selected in the OIS alarm tag window. If unspecified, expanded to point window by default. • It must not exceed 8 bytes. Specify an ODF file name.
RUN	D	RUN mode RUN/HOLD=1/0
SSS	D	Single step mode ON/OFF=1/0
SPR	D	Alarm suppress ON/OFF=1/0
SSE	D	Single step execution ON/OFF=1/0
STU	D	[For future use]
ASU	D	[For future use]
ILA	D	[For future use]
STA	D	Congestion alarm ON/OFF=1/0
ASA	D	Answer alarm ON/OFF=1/0
ILA	D	Interlock alarm ON/OFF=1/0
PHNO0-31	D	Active Phase Map Indicates whether the phase is currently active (1) or not (0).

'P' indicates parameter.
'D' indicates data.
'O' indicates OIS data.

■ Meaning of T

Item	Type	Meaning
SET	P	Register the timer setting.
CMNT	O	Register the comment for the timer with up to 36 characters.
EU	O	Shows the unit for the second timer (0.1 [sec]) and minute timer (0.1 [min]).
VAL	D	Shows the current value when a timer is started or stopped.
START	D	Shows [ON] when the specified timer is started.
STOP	D	Shows [ON] when the specified timer is stopped.
RESET	D	Shows [ON] when the specified timer is reset.
UP	D	Shows [ON] when the value set in the timer exceeds the current value or is equal to the current value.

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of C

Item	Type	Meaning
SET	P	Register the counter setting.
CMNT	O	Register the comment for the counter with up to 36 characters.
EU	O	Shows the counter unit (count).
VAL	D	Shows the current value when the counter is manipulated.
INC	D	Shows [ON] when the specified counter is incremented.
DEC	D	Shows [ON] when the specified counter is decremented.
RESET	D	Shows [ON] when the specified counter is reset.
UP	D	Shows [ON] when the absolute value of the value set in counter exceeds the current value or is equal to the current value.
DOWN	D	Shows [ON] when the current value of the counter is less than the absolute value of the value set in counter prefixed with minus sign or the value set in counter is equal to the current value.

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of R

Item	Type	Meaning
VAL	P	Register the value of real parameter.
CMNT	O	Register the comment for the real parameter with up to 36 characters.
EU	O	Register the unit of the real parameter with up to 16 characters.

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of W

Item	Type	Meaning
VAL	P	Register the value of integer parameter.
B0-15	P	Register the integer value with bit parameter.
CMNT	O	Register the comment for the integer parameter with up to 36 characters.
EU	O	Register the unit of the integer parameter with up to 16 characters.
BCOM 0-15	O	Register the comment for the bit parameter with up to 36 characters.

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of P

Item	P/D/O	Meaning
VAL0X-11X	P	Register the X coordinates 0 to 11 as single precision floating point in increasing direction (X(i + 1)-Xi>=0).
VAL0Y-11Y	P	Register the Y coordinates 0 to 11 as single precision floating point.
CMNT	O	Register the comment with up to 36 characters.
XEU	O	Register the unit of X value with up to 16 characters.
YEU	O	Register the unit of Y value with up to 16 characters.

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of GD

Item	Type	Meaning
MSEG 0-63	O	Register guidance message with up to 40 characters.
PICT 0-63	O	For future use. Up to 8 characters.
B 0-63	D	Guidance bit 0/1=OFF/ON

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

■ Meaning of F

- To be supported in the future

■ Meaning of I

- To be supported in the future

■ Meaning of VB

Item	Type	Meaning
VC	D	VB command
EC	D	External command
VR	D	VB switch request
ER	D	External switch request
UN	D	Unit No.
ST	D	Status
RQ	D	Request
Q0-4	D	Request data 0-4
F	D	Fault No.
P	D	Owner
PD	D	Paused
W	D	Paused
S	D	Single step
WW0-8	D	Reserved integers 0-8
BB0-31	D	Reserved bits 0-31

'P' indicates parameter. 'D' indicates data. 'O' indicates OIS data.

4.2.2 DS type

■ Tag parameter type and count

The L controller (DS Type) and DS connection Ethernet card have the following Tag parameters.

Tag Type	Meaning	L3-type2 L3PU21	L2-type5 L2PU22	FN711	FN611	PU821
PV	Indicator	768	768	256	256	1024
LP	Controller	256	256	128	128	320
PB	Push button	1024	1024	512	512	1280
SQ	Sequencer	128	128	—	—	128
TC	Timer/Counter	128	128	—	—	128
DB	Data block	256	256	—	—	256
R	Real parameter	4096	4096	—	—	4096
W	Integer parameter	1280	1280	—	—	2560
T	Timer	512	512	—	—	512
C	Counter	128	128	—	—	128
P	Polynomial line	256	256	—	—	256
RTT	DS scan parameter	—	—	512	512	512

■ Meaning of PV

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. 0: Not used 10: IND 11: AMM 12: PFI 13: TTL 14: WND	See description	
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	0: Enabled 1: Disabled	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Tagging Character (SIGN)	Register the tagging character.	Up to 16 characters.	
Alarm Monitoring Method (ATYP)	Select the alarm issue and verification method. 0: A type 1: B type 2: B1 type 3: C type 4: C1 type 5: D type 6: B2 type	See description	0: Atype 1: B type are currently supported
Alarm Monitor Common Setting (AMON)	Select whether to monitor (ON) instrument alarm or not (OFF).	0: ON 1: OFF	

Item	Description	Set Value	Remark
Control Scan Setting (PRS)	Select the scan to perform instrument standard processing in controller. High-speed scan or main scan.	0: Main 1: High-speed	
Sub Schedule No. (SCH)	If main scan processing, the execution cycle of the instrument standard processing can be scheduled in order to distribute the load. When the sub schedule no. is 0, processing is performed for each main scan. When N (>0), processing is performed once every N + 1 main scans.	0 to 255	
Grouping No. (GPR)	Register the number of the main scan to perform the processing performed every N + 1 main scans described in "Sub Schedule No". Indicate with a number between 0 and (N-1). When the grouping number is greater than 1, set the number less than that number.	0 to 254	
Alarm Monitor Single Setting (MON)	When Alarm Monitoring Common Setting is ON, select whether to monitor (ON) each alarm point or not (OFF).	0: ON 1: OFF	
Alarm Grade Type (AGRD)	Select the alarm grade for each alarm point. 0: None 1: Warning 2: Minor alarm 3: Medium alarm 4: Major alarm	See description	0.1 sec unit
Monitoring Timer Setting (AMMT)	Set the interval in which no PV related alarm processing is performed in 01. second units. This is valid only when Tag type (TYPE) = 11: AMM is selected. Used as follows in combination with Start Button No. (FONO) and Start Button PB No. (PBNO). Example: When AMMT=100, FONO=8, and PBNO=1, no PV value related alarm processing [PVHH, PVH, PVL, PVLL, PVD, PVIH, PVIL, PDE, PRE] is performed for 10 seconds after #PB1.FO8 has changed.	0 to 32767	
Decimal Place (DCML)	Specify the number of decimal digits when displaying PV value and range on instrument.	0 to 5	
Engineering Unit (EU)	Set the engineering unit character of the process value PV.	Up to 16 characters.	
Input Point Bus No. / Node No. (BNO)	In the case of nv series, I/O node number is set. TC-net I/O: 3 to 26 Intelligent I/O: 31 to 34		For nv series
	In the case of V series, the bus number of the input point of the process signal is set. Please set input point bus/unit/slot/point number when you should detect PV I/O abnormality (PDE) by using intelligent cereal PI/O. (1) I/O module type when all the following conditions consist: IOM ="Intelligent serial" (2) PV I/O abnormality: PDE is necessary. PDE: Warning where intelligent I/O (AI module) is generated by DU (down of card). (3) The tag type: Excluding "Not Used". (4) The input signal type: Excluding " Calculated Value", "Not Used"		For V series

Item	Description	Set Value	Remark
Input Point Unit No. (UNO)	Set the unit no. of the process signal input point.		
Input Point Slot No. (SNO)	Set the slot no. of the process signal input point.		
Input Point Point No. (PNO)	Set the point no. of the process signal input point.		
Main Slot No. (CNO)	Set the slot no. of the main module.		Only nv series
Simulation Method (SIMM)	Select the controller loopback simulation method when operating as indication value PV of the indicator registered in AO/PO list. Simple loopback: Loopback automatically from controller output to PV when the simulation flag (SIM) is ON. Program loopback: Do not perform automatic loopback when the simulation flag (SIM) is ON. Loopback is performed according to the user program.	0: Program loopback 1: Simple loopback	
I/O Module Type (IOM)	Select the PI/O module type. 0: Parallel PI/O 1: Intelligent serial PI/O 2: Serial PI/O 3: SSIF 4: F series PI/O Please set input point bus/unit/slot/point number (BNO,UNO,SNO,PNO) when “Intelligent serial”, "SSIF", ”F series" is selected, and the PV I/O abnormality (PDE) detection is necessary.	See description	
Use Integrated Set Value (PSS)	Select whether to use integration setting or not. This is valid only when Tag type (TYP) = 13: TTL is selected. Use as follows in combination with integration setting (PSET). PSET setting is invalid when PSS = 0 (unused). Example: PSS = 1 (use), PSET = 500 Issue UP alarm when 500 < PV Recover UP alarm when PV< = 500	0: Not used 1: Used	
Cold Compensation Point PV No. (ZPT)	Set the PV number of signal used for cold contact compensation of thermocouple output.	0 to 1024	For future use
Inverse Poly Line No. (IPL)	Set the number of the inverse polynomial line table for inverse polynomial compensation of process signal.	0 to 256	For future use
Input Signal Type (SIG)	Select the input signal type. 0: Not used 1: Calculated value 2: 2-wire 3: 4-wire 4: 1-5V 5: Pt100 new 6: Pt100 old 7: K-THC 8: T-THC 9: J-THC 10: E-THC 11: B-THC 12: R-THC 13: S-THC 14: Pulse contact 15: Pulse voltage 16: mV	See description	

Item	Description	Set Value	Remark
Input Correction Operation Type (LNR)	Select the type of linearlization performed by PCS internal standard input processing. 0: No correction 1: DP/F 2: DP/F-P 3: DP/F-T 4: DP/F-PT 5: RTD 6: THC 7: Custom 8: Power factor 9: Phase angle	See description	
Input Point Variable Name (PVA)	Set the variable name of the of the process signal input point (analog input point) with direct notation variable. (Example: %MW11.0).		
Input Count Upper Limit (CH)	Set the input counter value (integer) equivalent to instrument range upper limit (RH). CL<CH< = 32767	See description	Only V series
Input Count Lower Limit (CL)	Set the input counter value (integer) equivalent to instrument range lower limit (RL). The relationship between input signal and input count is as follows: Input signal: Input count 4-20mA: 6400 to 32000 1-5V: 6400 to 32000 Resistance thermometer: 6400 to 32000 for the module measurement range Thermocouple: 6400 to 32000 for the module measurement range mV: –32000 to 32000 for the module measurement range Therefore, set CL and CH with the value in the table in order to match the module measurement range with the instrument range. However, set CH and CL obtained with the following formula in order to make the instrument range narrower than module measurement range. CH = CLO + (CHO-CLO) x RH/ (mRH-mRL) CL = CLO + (CHO-CLO) x RL/ (mRH-mRL) where CHO: Input count (32000) equivalent to the measurement range upper limit CLO: Input count (6400 or –32000) equivalent to the measurement range lower limit mRH: Input range upper limit mRL: Input range lower limit Note that measurement range is a parameter set in I/O module. –32768<=CL<CH	See description	Only V series

Item	Description	Set Value	Remark
Low Cut Setting (LC)	Set the low cut value used for instantaneous value process. During instantaneous value processing, instantaneous value less than this value is treated as 0%. Note: For "Compensation operation code", square root extraction is performed when performing differential pressure to flow conversion. Therefore, small change in signal near 0% is magnified and PV value may vary near 0. In such case, eliminate this variance by assigning a positive value for low cut value near 0.	–1 to 10	
Filter Coefficient (FT)	Set the filter constant for the primary filter used for instantaneous value processing. During instantaneous value processing, the primary low pass filter calculated by the following formula is used. Output value = Input value x (1 = FT/100) + Previous output x FT/100 (Note) With greater FT, the primary filter functions to eliminate more abrupt variation. 0< = FT<1	See description	
Instrument Range Upper Limit (RH)	Set the indicator range upper limit with real or engineering value. Unit is set in the (engineering unit character) item. RL<RH<=999999999	See description	
Instrument Range Lower Limit (RL)	Set the indicator range lower limit with real or engineering value. Unit is set in the (engineering unit character) item. –999999999< = RL<RH	See description	
Upper Limit Alarm Above PV (PHH)	PH<=PHH<=999999999	See description	
PV Upper Limit Alarm (PH)	Set the upper limit alarm of the process value PV. PL<PH<=PHH	See description	Real
PV Lower Limit Alarm (PL)	Set the lower limit alarm of the process value PV. PLL<=PL<PH	See description	Real
Lower Limit Alarm Below PV (PLL)	–999999999< = PLL< = PL	See description	
PV Upper/Lower Limit Alarm Dead Band (PVB)	Set the upper/lower limit alarm dead band. Note: How to issue PV value upper/lower limit alarm Issue upper limit alarm (PVH) when PV>=PH. Then recover when PV<=PH-PVB is satisfy. Issue lower limit alarm (PVL) when PV<=PL. Then recover when PV<=PL-PVB is satisfy.	0 to 999999999	
PV Change Rate Alarm (DPL)	Set the change rate alarm of the process value PV.	0 to 999999999	

Item	Description	Set Value	Remark
PV Change Rate Alarm Dead Band (DPB)	Set the PV change rate alarm dead band. Note: How to issue PV value change rate alarm When change in PV per scan is expressed as dPV and absolute value is expressed as ABS ( ), Change rate alarm (PVD) is issued when ABS (dPV) > = DPL x (scan cycle). Then, it recovers when ABS (dPV) < = (DPL-DPB)x(scan cycle).	0 to 999999999	
Temperature Correction PV No. (TM)	Set the number of the process value PV for which temperature compensation is performed. This is the PV No indicating the measured temperature when the process value is air flow and compensation by temperature is necessary.	0 to 1024	
Pressure Correction PV No. (PM)	Set the number of the process value PV for which pressure compensation is performed. This is the PV No indicating the measured temperature when the process value is air flow and compensation by pressure is necessary.	0 to 1024	
Temperature Correction Design Temperature (TDG)	Set the design temperature (°C) necessary for temperature compensation. This is the standard design temperature when the process value is air flow and compensation by temperature is performed.	0 to 999999999	Real
Pressure Correction Design Pressure (PDG)	Set the design pressure (kPa) necessary for pressure compensation. This is the standard design pressure when the process value is air flow and compensation by pressure is performed.	0 to 999999999	Real
PR Error Process Type (PRD)	Select how to detect error in the signal source of process value PV. A PV process error bit (PRE) is set when there is an error in the signal source of the process value PV. This is how the error in this signal source is detected. Sensor error OR: Treat as PV process error if it is an error in signal from own sensor or if temperature/pressure compensation PV is in error. Main sensor error only: Even if there are temperature/pressure compensation points, monitor error in signal from own sensor only and treat it as PV process error (PRE). No sensor error: Not treated as PV processing error even if there is error in own sensor or temperature compensation point. 0: OR with Sensor Error 1: Only Main Sensor's Error 2: No sensor error	See description	

Item	Description	Set Value	Remark
Integrated Input PV No. (SPV)	Set the number of the integrated input process value PV. When [Integration Type Code] is integrated value, PV indicates integrated value. Other PV values can be selected as well as signal assigned to oneself as the instantaneous value that is the source of this integrated value. Register PVNo if other PV value is used for integration operation. Note: In actual application, often instantaneous value and integrated value are required from one flow signal. In this case, integrated value can be obtained as PV by assigning this signal to real input of certain instrument, making PV the instantaneous value and "Integrated input PVNo." from other instrument as this PVNo.	0 to 1024	
Pulse Weight Coefficient (PU)	Set the pulse input signal weight coefficient. This is the process amount for a single pulse input pulse.	0 to 999999999	
Time Conversion Coefficient (T)	Select the unit of time for instantaneous value operation. 0: None 1: Second 60: Minute 3600: Hour	See description	
Unit Conversion Coefficient (K)	Set the conversion coefficient between the unit indicated by the process signal and the unit of the displayed process value PV.	0 to 999999999	
Compensation Coefficient (D)	Set the compensation coefficient that serves as conversion factor. Note: The values of PU, T, K, and D are used to obtain the following process value PV. Analog integrated value = (previous integrated value) + (current instantaneous value) x D x K x (scan cycle) /T Pulse integrated value=(previous count) + (current pulse value) x PU x D x K) Pulse instantaneous value = (current pulse count) x PU x D x K x T/(scan cycle)	0 to 999999999	
Integrated Upper Limit (MAX)	Set the maximum value when PV is integrated value. When PV exceeds this value, the excess becomes the PV value and integration is performed against this value starting from the next cycle. Maximum integrated value is used by journal calculation software that calculates the usage by periodically reading the rotary integrated value.	0 to 999999999	
Integration Setting (PSET)	Set the integration setting. This is valid only when Tag type (TYPE) =13: TTL is selected. Use as follows in combination with integration setting used (PSS). PSET setting is invalid when PSS = 0 (unused). Example: PSS=1 (use), PSET = 500 Issue UP alarm when 500<PV Recover UP alarm when PV< = 500	RL to RH	

Item	Description	Set Value	Remark
Start Button No (FONO)	Set the FO number of the start button to set the time where no PV related alarm process is performed. This is valid only when Tag type (TYPE) = 11: AMM is selected. Used as follows in combination with Start Button No. (FONO) and Start Button PB No. (PBNO). Example: When AMMT = 100, FONO = 8, and PBNO = 1, no PV value related alarm processing [PVHH, PVH, PVL, PVLL, PVD, PVIH, PVIL, PDE, PRE] is performed for 10 seconds after #PB1.FO8 has changed.	0 to 8	
Start Button PB No (PBNO)	Set the #PB number of the start button to set the time where no PV related alarm process is performed. This is valid only when Tag type (TYPE) = 11: AMM is selected. Used as follows in combination with Start Button No. (FONO) and Start Button PB No. (PBNO). Example: When AMMT = 100, FONO = 8, and PBNO = 1, no PV value related alarm processing [PVHH, PVH, PVL, PVLL, PVD, PVIH, PVIL, PDE, PRE] is performed for 10 seconds after #PB1.FO8 has changed.	0 to 1024	
PV Split Range Position (SPLT)	Set the position of the split range origin of the PV value bar graph of the split range displayed by OIS.	RL to RH	
PV on-screen Pointer Position (PVPT)	Set the initial value of the on-screen pointer that marks the PV value on the bar graph displayed when PV value is instantaneous value.	RL to RH	
Integrated Change Rate SV (DMAX)	Set the change rate setting of the PV integrated value. This is valid only when Tag type (TYPE) =13: TTL is selected. Unit is engineering value/hour. Example: Scan cycle=0.5 sec (500ms), DMAX = 3600 When A = change in PV (integrated value) for 1 scan cycle • Issue TTE alarm and stop PV integration when DMAX<A x (1/0.5) x 3600. • Issue TTE alarm and resume PV integration when A x (1/0.5) x 3600< = DMAX. When DMAX is set to 0, no TTE alarm is issued and PV integration is not stopped regardless of the change in PV (integrated value).	0 to 999999999	
Poly Line No. (PLN)	Set the number of the polynomial line table for polynomial compensation of process signal.	0 to 256	For future use
PF Signal Direction Setup (SGDR)	Select the direction of the power factor signal. This is valid only when Tag type (TYPE)=12: PFI is selected. When SDGR = 1 (negative direction), inversion is performed during power factor input conversion (such as convert as 0% if input count after normalization is 100%).	0: Direct 1: Reverse	

Item	Description	Set Value	Remark
Lead/Lag Display Setup (PDSP)	Select the display direction of the power factor bar graph displayed by OIS. This is valid only when Tag type (TYPE) = 12: PFI is selected.	0: Lead Lag 1: Log Lead	
Input Device Name (SENS)	Select the device name of the input signal source for displaying with OIS.	Up to 16 characters.	
Dragless Determination Value (V0)	Set the wind speed to be judged as windless. –3.402823E38 to 3.402823E38 This is valid only when Tag type (TYPE) = 14: WND is selected. Example: When #PV1.TYPE = 14(WND), #PV1.V0 = 10, If #PV1.PV<10, #PV1direction (wind direction) is windless.	See description	
Wind Direction PV No (PVP)	Specify the #PV to be converted as wind direction value. This is valid only when Tag type (TYPE) = 14: WND is selected. Example: When PV1.TYPE = 14(WND), #PV1.PVP = 2, #PV2.PV shall be wind direction input. For example, If #PV2.PV = 0, #PV1direction (wind direction) is North.	0 to 1024	
PV L-limit Sensor Error Suppress (UIL)	Set whether to suppress sensor error (PVI) when input count is less than input count lower limit (CL).	ON: Yes OFF: No	
PV H-limit Sensor Error Suppress (UIH)	Set whether to suppress sensor error (PVI) when input count exceeds input count upper limit (CH).	ON: Yes OFF: No	
PV/PVC Direct (DIC)	Set whether to use the atom PVC which is used to compensate the PV value with application.	PV<>PVC, PV=PVC	
Input Count Upper Limit (DCH)	Set the input counter value (double integer) equivalent to instrument range upper limit (RH). DCL<DCH< = 2147483647	See description	Only nv series
Input Count Lower Limit (DCL)	Set the input counter value (double integer) equivalent to instrument range lower limit (RL). –2147483648< = DCL<DCH	See description	Only nv series

■ Meaning of LP

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. 0: Not used 20: PID 21: SPI 22: M/A 23: RS 24: TPI 25: SET	See description	
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	0: Enabled 1: Disabled	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray		
Tagging Character (SIGN)	Register the tagging character.	Up to 16 characters.	
Alarm Monitoring Method (ATYP)	Select the alarm issue and verification method. 0: A type 1: B type 2: B1 type 3: C type 4: C1 type 5: D type 6: B2 type	See description	0: A type 1: B type currently supported

Item	Description	Set Value	Remark
Alarm Monitor Common Setting (AMON)	Select whether to monitor (ON) instrument alarm or not (OFF).	0: ON 1: OFF	
Control Scan Setting (PRS)	Select the scan to perform instrument standard processing in controller. High-speed scan or main scan.	0: Main 1: High-speed	
Sub Schedule No. (SCH)	If main scan processing, the execution cycle of the instrument standard processing can be scheduled in order to distribute the load. When the sub schedule no. is 0, processing is performed for each main scan. When N (>0), processing is performed once every N + 1 main scans.	0 to 255	
Grouping No. (GRP)	Register the number of the main scan to perform the processing performed every N + 1 main scans described in "Sub Schedule No". Indicate with a number between 0 and (N-1). When the grouping number is greater than 1, set the number less than that number.	0 to 254	
Interrupt Control Register Setup (SFRP)	Select whether to send (YES) interrupt to TIF station or not (NO) when control amount (MV) changes.	0: No 1: Yes	
Alarm Monitor Single Setting (MON)	When Alarm Monitoring Common Setting is ON, select whether to monitor (ON) each alarm point or not (OFF).	0: ON 1: OFF	
Alarm Grade Type (AGRD)	Select the alarm grade for each alarm point. 0: None 1: Warning 2: Minor alarm 3: Medium alarm 4: Major alarm	See description	
Indicator PV No. (PVP)	Set the number of the process signal PV for which valve position is displayed. When [Output Signal Type] is pulse, the feedback PV value can be displayed on the MV bar graph instead of MV in order to determine the actuator position and valve position.	0 to 1024	
Valve Position PV No. (VP)	Set the number of the process signal PV for which valve position is displayed. When [Output Signal Type] is pulse, the feedback PV value can be displayed on the MV bar graph instead of MV in order to determine the actuator position and valve position.	0 to 1024	
MV Output Direction Setting (MDR)	When analog output, select the direction of the analog output with respect to control amount MV. Either "4-20mA output at 0-100%" or "20-4mA output at 0-100%". Note: For pulse input, this output direction is as follows: When "4-20mA output at 0-100%", ΔMV is positive and it is Open pulse output. When "20-4mA output at 0-100%", ΔMV is negative and it is Close pulse output. 0: 4-20mA output at 0-100% 1: 20-4mA output at 0-100%	See description	

Item	Description	Set Value	Remark
Control Operation Direction Set (CDR)	Select the operation direction of control amount MV for the deviation of the PID controller or sample PI controller. Either "Increase MV when deviation (SV-PM) increase" or "decrease MV when deviation (SV-PV) increase". 0: Increase MV when SV-PM increase 1: decrease MV when SV-PV increase	See description	
MV Display Direction Setting (MDSP)	Select the origin for the display direction of the MV bar graph. 0 for origin on left side and 1 for origin on right side.	0: 0 to 100% 1: 100 to 0%	
MV Open/Close Char (VCHR)	Select the characters to display on 0-100 (100-0) origin in MV bar graph. 0: C-O 1: O-C 2: C-C 3: O-O 4: S-O 5: O-S 6: S-S	See description	
MV Split Range Position (MSPL)	Set the location of the origin when the MV bar graph is split range.	ML to MH	
MV On-screen Pointer Position (MVPT)	Set the position of the operation pointer placed on the MV bar graph.	ML to MH	
Output Signal Type (MSIG)	Select the output signal type. Not used: No standard processing of this instrument is performed. No real output: No MV value real output processing performed. Select when no real output is performed such as cascade master loop. 4-20mA: Real output signal is 4-20mA. Pulse width low-speed: Real output signal is low-speed pulse width output. Pulse width high-speed: Real output signal is high-speed pulse width output. Pulse column low-speed: Real output signal is low-speed pulse train output. Pulse column high-speed: Real output signal is high-speed pulse train output.	See description	—
I/O Module Type (MIOM)	Select the PI/O module type. 0: Parallel PI/O 1: Intelligent serial PI/O 2: Serial PI/O 3: SSIF 4: F series PI/O	See description	
Simulation Method (SIMM)	This item sets and is unnecessary. Please setting SIMM of PV:Indicator		

Item	Description	Set Value	Remark
Output Point Bus No. / Node No. (MBNO)	In the case of nv series, I/O node number is set. TC-net I/O: 3 to 26 Intelligent I/O: 31 to 34		For nv series
	In the case of V series, the bus number of the output point of the process signal is set. Please set output point bus/ unit/ slot/point number when all the following conditions consist. 1) I/O module type: MIOM = “Intelligent serial", “SSIF", "F series". 2) "MV abnormality: MVE" or "MV read backing processing when control mode is M" necessity. MVE: Warning where intelligent I/O (AO module) is generated by DU (down of card). MV read backing: Processing which sets I/O (AO module) intelligent read backing count in MV. 3) Tag type: TYPE = “PID",“SPI",“M/A",“TPI". 4) Output signal type:MSIG = “4-20mA".		For V series
Output point unit No. (MUNO)	Set the unit no. of the of the process signal output point.		
Output point slot No. (MSNO)	Set the slot no. of the of the process signal output point.		
Output point point No. (MPNO)	Set the point no. of the of the process signal output point.		
Main Slot No. (MCNO)	Set the slot no. of the main module.		Only nv series
Output Point Variable Name (MVA)	Set the variable name of the of the process signal output point (analog output point) with direct notation variable (Example: %MW11.0).	See description	
MV Change Rate Limit (DMV)	Set the MV change rate limit.	0 to 999999999	
MV Upper Limit (MH)	Set the MV upper limit. ML<MH< = 999999999	See description	
MV Lower Limit (ML)	Set the MV lower limit. –999999999< = ML<MH	See description	
MV Upper Limit Alarm Value (MHA)	Set the MV upper limit alarm. MLA<MHA< = 999999999	See description	
MV Lower Limit Alarm Value (MLA)	Set the MV lower limit alarm. –999999999< = MLA<MHA	See description	
MV Alarm Dead Band (MVB)	Set the MV upper/lower limit alarm dead band.	0 to 999999999	

Item	Description	Set Value	Remark
Control Stop Type (CLD)	Select how to judge the control stop (CLI) of the PID controller or sample PI controller. Demoted to CLI/M mode at SV/PV error: Set CLI = ON and automatically stop control operation when PV or SV value is abnormal (PRE). No error process setup: CLI is not automatically set ON. The control stop condition depends on the user program.	See description	
Control Mode Setting (CMD)	Select the operation disable condition for OIS-DS tag control mode change. Enable, C mode disabled, A mode disabled, M mode disabled, C/A mode disabled, C/M mode disabled, A/M mode disabled	See description	
SV Setting at A Mode (SVS)	Select whether SV value can be set when the control mode of the controller is A mode.	0: Enabled 1: Disabled	
Control Cycle (DT)	Set the cycle of the control operation in seconds.	0 to 32767	
Sample Time (T0)	Set the sample time of the sample PI controller in 0.1s units.	0 to 32767	
Control Time (T1)	Set the control time of the sample PI controller in 0.1s units.	0 to 32767	
Proportional Gain (KP)	Set the ratio gain of the PID operation.	0 to 1000	Unit is times
Integral Time (TI)	Set the integration time of the PID operation in minutes.	0 to 1000	
Rate Time (TD)	Set the rate time of the PID operation in minutes.	0 to 1000	
Derivative Coefficient (ETA)	Set the eta for imperfect differential gain (1/eta).	0 <= ETA <= 1	Real
2-degree-of-freedom Prop. Coefficient (ALP)	Set the 2-degree-of-freedom proportion coefficient (α).	0 to 1	Real
2-degree-of-freedom Integ. Coefficient (BET)	Set the 2-degree-of-freedom integration coefficient (β).	0 <= BET < 2	Real
2-degree-of-freedom Deriv. Coefficient (GAM)	Set the 2-degree-of-freedom differentiation coefficient (γ).	0 <= GAM < 2	Real
Deviation Gap Width (GP)	Set the gain of the deviation (SV-PV) of the PID and SPI operation. The gain can be modified within the gap width near 0.	0 to 100	Real Unit is %
Deviation Gap Gain (GG)	Set the gain of the deviation (SV-PV) of the PID and SPI operation. The gain can be modified within the gap width near 0.	0 to 1	Real Unit is times
Ratio Gain (GAIN)	Set the ratio station gain.	0 to 999999999	Real
Ratio Bias (BIAS)	Set the ratio station bias.	–999999999 to 999999999	Real

Item	Description	Set Value	Remark
Full Stroke Time/Pulse (FP)	When [Output Signal Type] is pulse, set the pulse count (pulse series) or pulse time (pulse width) necessary for the actuator to move full stroke.	0 to 999999999	
Back Lash (BL)	When [Output Signal Type] is pulse, set the actuator backlash.	0 to 255	
Hold Time (HT)	When [Output Signal Type] is pulse, set the hold time (S) when the output direction is reversed.	0 to 10	Real
Pulse Dead Band (PLB)	When [Output Signal Type] is pulse, set the dead band to stop unnecessary actuator movement for minute pulse count.	0 to 100	Real
Positive Deviation Alarm Value (PDL)	Set the alarm level for positive deviation with engineering value.	0 to 999999999	Real
Negative Deviation Alarm Value (NDL)	Set the alarm level for negative deviation with engineering value.	0 to 999999999	
Deviation Alarm Dead Band (DVB)	Set the dead band for deviation alarm with engineering value. Deviation alarm issuing and recovery method When absolute value is denoted as ABS ( ) Deviation alarm (DVE) is issued when ABS (SV-PV) > = DL is satisfied. Then, ABS (SV-PV) < = DL-DVB ABS (SV-PV) < = DL-DVB.	0 to 999999999	Real
Ratio Upper Limit (SH)	Set the instrument range upper limit of the ratio station. SL < SH < = 999999999	See description	
Ratio Lower Limit (SL)	Set the instrument range lower limit of the ratio station. –999999999 < = SL < SH	See description	
Ratio Engineering Unit Character (SVEU)	Set the engineering unit of the instrument range of the ratio station.	Up to 16 characters.	
Ratio Operation Value Engineering Unit (MVEU)	Set the engineering unit character of the MV value of the ratio station.	Up to 16 characters.	
Ratio Decimal Place (SVDM)	Set the decimal point position of the SV value of the ratio station.	0 to 5	
Ratio Operation Decimal Place (MVDM)	Set the decimal point position of the MV value of the ratio station.	0 to 5	

Item	Description	Set Value	Remark
Delta MV Gain (KF)	Set the compensation factor to compensate the MV change. This is valid only when Tag type (TYPE) = 20: PID, 21: SPI, or 24: TPI is selected. Combine with ΔMV bias (DFF) and use in instruction word (PID, SPI, TPI) as follows. • Add (A x KF) + DFF to MV where MV change operated with instruction word is A. If compensation is not necessary for calculated MV change of instruction word, set KF = 1 and DFF = 0.	0 to 100	
Delta MV Bias (DFF)	Set the bias value to compensate the MV change. This is valid only when Tag type (TYPE) = 20: PID, 21: SPI, or 24: TPI is selected. Combine with ΔMV gain (KF) and use in instruction word (PID, SPI, TPI) as follows. • Add (A x KF) + DFF to MV where MV change operated with instruction word is A. If compensation is not necessary for calculated MV change of instruction word, set KF = 1 and DFF = 0.	–100 to 100	
MV Lamp Target Value (MVP)	Set the target value for SMV instruction. Use as follows in combination with MV lamp increment (MVK) and MV lamp time coefficient (MVT). • Bring MV closer to target value MVP with slope (MVK/MVT).	–999999999 to 999999999	
MV Lamp Increment Value (MVK)	Set the slope of SMV instruction. Use as follows in combination with MV lamp target value (MVP) and MV lamp time coefficient (MVT). • Bring MV closer to target value MVP with slope (MVK/MVT).	0 to 999999999	
MV Lamp Time Coefficient (MVT)	Select the time unit for MV lamp. Use as follows in combination with MV lamp target value (MVP) and MV lamp increment (MVK). • Bring MV closer to target value MVP with slope (MVK/MVT). 0: None 1: Second 60: Minute 3600: Hour	See description	
SV Lamp Target Value (SVP)	Set the target value for SSV instruction. Use as follows in combination with SV lamp increment (SVK) and SV lamp time coefficient (SVT). • Bring SV closer to target value SVP with slope (SVK/SVT).	–999999999 to 999999999	
SV Lamp Increment Value (SVK)	Set the slope of SSV instruction. Use as follows in combination with SV lamp target value (SVP) and SV lamp time coefficient (SVT). • Bring SV closer to target value SVP with slope (SVK/SVT).	0 to 999999999	
SV Lamp Time Coefficient (SVT)	Select the time unit for SV lamp. Use as follows in combination with SV lamp target value (SVP) and SV lamp increment (SVK). • Bring SV closer to target value SVP with slope (SVK/SVT). 0: None 1: Second 60: Minute 3600: Hour	See description	
MV Tracking Value (TR)	Not used.	–999999999 to 999999999	

Item	Description	Set Value	Remark
Output Instrument Name (ACTS)	Select the device name of the output signal destination for displaying with OIS.	Up to 16 characters.	
Inching Pulse Width (POIP)	Set the inching width during pulse output. Note: Set the multiple of pulse width (9ms or 72ms). If a value that is not a multiple is specified, the excess is truncated. However, minimum pulse width is used if a value between 0 and minimum pulse width (9ms or 72ms) is specified.	0 to 1500	Unit is MS
SV major tracking (FS0)	The parameter for new instrumentation FB. The majors tracking of SV is done or it selects it.		
Cascade value kind (FS1)	The parameter for new instrumentation FB. The unit of the cascade value is selected.	0: % 1: Engineering Varue	
Dead time [min] (MDT)	The parameter for model drive PID FB library.		
PD comp. Gain (MKF)	The parameter for model drive PID FB library.		
PD comp. defferential time [min] (MTF)	The parameter for model drive PID FB library.		

■ Meaning of PB

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. If TIM (clock), CNT (counter) tag types are set to not used, the controller performs no standard processing. 0: Not used 30: SOV 31: MTR 32: MOV 33: PB4 34: PB8 35: PB2	See description	
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	

Item	Description	Set Value	Remark
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	0: Enabled 1: Disabled	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Tagging Character (SIGN)	Register the tagging character.	Up to 16 characters.	
Alarm Monitoring Method (ATYP)	Select the alarm issue and verification method. 0: A type 1: B type 2: B1 type 3: C type 4: C1 type 5: D type 6: B2 type	See description	0: A type 1: B type currently supported
Alarm Monitor Common Setting (AMON)	Select whether to monitor (ON) instrument alarm or not (OFF).	0: ON 1: OFF	
Control Scan Setting (PRS)	Select the scan to perform instrument standard processing in controller. High-speed scan or main scan.	0: Main 1: High-speed	
Sub Schedule No. (SCH)	If main scan processing, the execution cycle of the instrument standard processing can be scheduled in order to distribute the load. When the sub schedule no. is 0, processing is performed for each main scan. When N (>0), processing is performed once every N + 1 main scans.	0 to 255	
Grouping No. (GRP)	Register the number of the main scan to perform the processing performed every N + 1 main scans described in "Sub Schedule No". Indicate with a number between 0 and (N-1). When the grouping number is greater than 1, set the number less than that number.	0 to 254	
Interrupt Control Register Setup (SFRP)	Select whether to send (YES) interrupt to TIF station or not (NO) when button status (FO) changes.	0: No 1: Yes	
Alarm Monitor Single Setting (MON)	When Alarm Monitoring Common Setting is ON, select whether to monitor (ON) each alarm point or not (OFF).	0: ON 1: OFF	

Item	Description	Set Value	Remark
Alarm Grade Type (AGRD)	Select the alarm grade for each alarm point. 0: None 1: Warning 2: Minor alarm 3: Medium alarm 4: Major alarm	See description	
Input Signal Operation Record Setting (ARDI)	Select whether to set change in input signal in operation log item. 0: No 1: When ON 2: When OFF 3: When ONOFF	See description	
Output Signal Operation Record Setting (ARDO)	Select whether to set change in output signal in operation log item. 0: No 1: When ON 2: When OFF 3: When ONOFF	See description	
FI Signal Change Buzzer Setting (BZFG)	Select whether to sound the buzzer when there is a change in input signal. 0: No 1: When ON 2: When OFF 3: When ONOFF	See description	
Auto Detection Setting (ADT)	Select whether to detect (ON) alarm or not (OFF).	0: OFF 1: ON	
Answer Back Monitor Timer SV (FMT)	Set the monitor timer for monitoring answer back in 0.1 second units.	0 to 32767	
Display Lamp Character (SNAM)	Set the character displayed on the lamp.	Up to 16 characters.	
Signal ON Display Color (SCON)	Select the lamp color when the lamp signal becomes ON. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Signal OFF Display Color (SCOF)	Select the lamp color when the lamp signal becomes OFF. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Lamp Display Setting (LMP)	Select whether to display lamp on tag pattern in OIS.	0: Not Display 1: Display	
Button Display Setting (PB)	Select whether to display button on tag pattern in OIS.	0: Not Display 1: Display	

Item	Description	Set Value	Remark
Input Inversion Setting (INV)	Select whether to invert signal at input point to turn on lamp.	0: Not Inverted 1: Inverted	
Output Inversion Setting (ONV)	Select whether to invert the signal during output of value after output table processing to output point.	0: Not Inverted 1: Inverted	
Input Point Bus No. / Node No. (IBNO*)	In the case of nv series, I/O node number is set. TC-net I/O: 3 to 26 Intelligent I/O: 31 to 34		For nv series
	In the case of V series, the bus number of the input point of the process signal is set. Please set point number and input point bus/unit/slot/output point bus/unit/slot/point number when all the following conditions consist. (1) The I/O module type = “Intelligent serial”, “SSIF", "F series" (2) "I/O abnormality: IOE" or "Control mode: MOD = [M] of the DO read backing is necessary. IOE: Warning where intelligent I/O (DI and DO module) is generated by DU (down of card). DO read backing: Read backing DO of intelligent I/O (DO module) is set in FO.		For V series
Input Point Unit No. (IUNO*)	Set the unit no. of the of the process signal input point.		
Input Point Slot No. (ISNO*)	Set the slot no. of the of the process signal input point.		
Input Point Point No. (IPNO*)	Set the point no. of the of the process signal input put point.		
Input Point Main Slot No. (ICNO*)	Set the slot no. of the main module.		Only nv series
Output Point Bus No. (OBNO*)	Set the bus no. of the of the process signal output point.		
Output Point Unit No. (OUNO*)	Set the unit no. of the of the process signal output point.		
Output Point Slot No. (OSNO*)	Set the slot no. of the of the process signal output point.		
Output Point Point No. (OPNO*)	Set the point no. of the of the process signal output point.		
Output Point Main Slot No. (OCNO*)	Set the slot no. of the main module.		Only nv series
Input Point Variable Name (IA)	Set the variable name of the of the process signal input point (digital input point) with direct notation variable (Example: %MX11.0.0).		
Output Point Variable Name (OA)	Set the variable name of the of the process signal output point (digital output point) with direct notation variable (Example: %MX11.0.0).		

Item	Description	Set Value	Remark
Output points 1 to 8 (Button pressed) (DA*D) * is 1 to 8	Select the action for output of each point when button 1 to 8 is pressed. 0: None 1: Set output 2: Reset output 3: Toggle output	See description	
Output points 1 to 8 (Button released) (DA*V) * is 1 to 8	Select the action for output of each point when button 1 to 8 is released. 0: None 1: Set output 2: Reset output 3: Toggle output	See description	
Indicator PV Number (PVP)	Set the PV number of the process signal displayed on indicator.	0 to 768	For future use
Mode Usage Setting (MODS)	Select whether to display or not the control mode for the OIS,and select mode changing inhibit. 0: Not used 1: A/M Mode Enable 2: A Mode Disable 3:M Mode Disable	See description	
Multiple Button Simultaneous Set (MSEL)	Select whether to enable (1) or disable (0) pressing of multiple buttons simultaneous during remote operation from OIS.	0: Disabled 1: Enabled	
I/O Module Type (DIOM)	Select the PI/O module type. 0: Parallel PI/O 1: Intelligent serial PI/O 2: Serial PI/O 3: F series PI/O	See description	
Input Update Setting (FIUS)	Select whether to update input signal (FI) by standard process or not.	Standard User	
Answer Back Alarm Setting (ASA1)	Set whether to perform answer back alarm for MOT, SOV, and MOV tag.	No Yes	
Momentary Timer Setting (MTS)	Set the time till forced termination of momentary output for MOT, SOV, and MOV tag. in 100 ms units. After FO output request (RFO = 1) from OIS, if there is no termination request (RFO1 = 0) after this time has elapsed, RFO1 = 0 is forced by PCS.	0 to 32767 15 (1.5 second) or less is treated as 15.	
Momentary Timer Setting (MMS)	Set whether to perform momentary processing for each OIS button. Setting used for MOT, SOV, and MOV tag.	Unused Used	
Control Operation Direction Set (CDR)	Selects processing condition of 2PC tag. (For 2PC Tag) FO1 set with PV < SV, FO1 set with PV > SV		
2PC std. Processing (F2PC)	Selects whether to use standard processing or not. If OFF is selected, application program must be used for 2PC tag. (For 2PC Tag)	ON, OFF	
Hysteresis (H)	Set input characteristic of 2PC tag. (For 2PC Tag)	–99999999 to 999999999	
Set Value (SV)	Set SV of 2PC tag. (For 2PC Tag)	–99999999 to 999999999	
SV at C Mode (RSV)	Set SV of 2PC tag at C Mode. (For 2PC Tag)	–99999999 to 999999999	

Item	Description	Set Value	Remark
SV Setting at A Mode (SVS)	Selects whether it is possible to set the SV value when the control mode of the controller is A mode. (For 2PC Tag)	Enabled Disabled	
Control mode setting (CMD)	Selects whether it is possible to set the control mode or not. (For 2PC Tag) Enable, C Mode Disable, A Mode Disable, M Mode Disable, C/A Mode Disable, C/M Mode Disable, A/M Mode Disable		

■ Meaning of SQ

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. If the tag type is set to not used, the controller performs no standard processing.	Not used/SEQ	
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	Disable/Enable	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	

Item	Description	Set Value	Remark
Tagging Character (SIGN)	Register the tagging character.	Up to 32 characters.	
Alarm Monitoring Method (ATYP)	Select the alarm issue and verification method. 0: A Type 1: B Type 2: B1 Type 3: C Type 4: C1 Type 5: D Type 6: B2 Type	See description	0: A Type 1: B Type currently supported
Alarm Monitor Common Setting (AMON)	Select whether to monitor (ON) instrument alarm or not (OFF).	ON/OFF	
Alarm Monitor Single Setting (MON)	When Alarm Monitoring Common Setting is ON, select whether to monitor (ON) each alarm point or not (OFF).	0: ON 1: OFF	
Alarm Grade Type (AGRD)	Select the alarm grade for each alarm point. 0: None 1: Warning 2: Minor alarm 3: Medium alarm 4: Major alarm	See description	
Phase Name (PNAM)	Set the step name included in sequence operation.	Up to 24 characters.	
Interlock/Single Select (FA)	Set whether to stop sequence (single) at each phase.	Single/Interlock	
Conf Progress Setting (CNFM)	Set whether to confirm progress (not used).	OFF/ON	
Control Mode Setting (CMD)	Select the operation disable condition for OIS-DS tag control mode change. Enable, C mode disabled, A mode disabled, M mode disabled, C/A mode disabled, C/M mode disabled, A/M mode disabled	See description	

■ Meaning of TC

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. If TIM (clock), CNT (counter) tag types are set to not used, the controller performs no standard processing.	Not used/TIM/CNT	

Item	Description	Set Value	Remark
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	Disable / Enable	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Tagging Character (SIGN)	Register the tagging character.	Up to 16 characters.	
Alarm Monitoring Method (ATYP)	Select the alarm issue and verification method. 0: A Type 1: B Type 2: B1 Type 3: C Type 4: C1 Type 5: D Type 6: B2 Type	See description	0: A Type 1: B Type currently supported
Alarm Monitor Common Setting (AMON)	Select whether to monitor (ON) instrument alarm or not (OFF).	ON/OFF	
Control Scan Setting (PRS)	Select the scan to perform instrument standard processing in controller. High-speed scan or main scan.		
Sub Schedule No. (SCH)	If main scan processing, the execution cycle of the instrument standard processing can be scheduled in order to distribute the load. When the sub schedule no. is 0, processing is performed for each main scan. When N (>0), processing is performed once every N + 1 main scans.	0 to 255	
Grouping No. (GRP)	Register the number of the main scan to perform the processing performed every N + 1 main scans described in "Sub Schedule No". Indicate with a number between 0 and (N-1). When the grouping number is greater than 1, set the number less than that number.	0 to 255	
Alarm Monitor Single Setting (MON)	When Alarm Monitoring Common Setting is ON, select whether to monitor (ON) each alarm point or not (OFF).	0: ON 1: OFF	

Item	Description	Set Value	Remark
Alarm Grade Type (AGRD)	Select the alarm grade for each alarm point. 0: None 1: Warning 2: Minor alarm 3: Medium alarm 4: Major alarm	See description	
Engineering Unit (EU)	Set the engineering unit character of the process value PV.	Up to 16 characters.	
Time unit (TMEU)	When instrument type is clock, PV indicates elapsed time. Select this unit. The controller standard processing calculates the elapsed time from this code.	Sec / Min/ Hour / Day	
Decimal Place (DCML)	Specify the number of decimal digits when displaying PV value and range on instrument.	0 to 5	
Upper Limit (MAX)	This is the upper limit range. When the clock or counter PV value exceeds this value, peak crossing processing is performed automatically and rotary integration is repeated.	0 GT MAX GE 999999999	
Lower Limit (MIN)	This is the lower limit range. When the counter PV value is below this value, negative peak crossing processing is performed automatically and rotary integration is repeated.	–99999999 to 0	

■ Meaning of DB

Item	Description	Set Value	Remark
Tag No. (TAG)	Set the tag number to be assigned to the instrument. This is used to identify the instrument. • Allowed characters are alphabets, numbers, and underscore. • Must be unique within the system. • Must not be a reserved word. The case of the character is not recognized. All characters are converted to uppercase.	Up to 16 characters	
Tag Name (NAME)	Name of instrument. By inserting space in between, this can be centered or left/right justified in unit of 16 characters when displayed on OIS instrument.	Up to 32 characters.	
Tag Type (TYPE)	Select the instrument function type. Note that if the tag type is set to not used, the controller performs no standard processing. 0: Not used 60: DB1 61: DB8	See description	
Display Pattern Model No. (MDL)	This is the OIS tag pattern number. Standard tag pattern is used for 0. User created display pattern is used for 1 to 9.	0 to 9	
Signal Category No. (AREA)	Number used to group instrument signals throughout the system. Determine and register the number to which this instrument belongs.	0 to 63	

Item	Description	Set Value	Remark
Auto Screen Display No. (SCNO)	With OIS, a screen to be opened automatically when an instrument issues an alarm can be registered in advance. Set the number of such screen. Set 0 if no screen is to be opened automatically.	0 to 1024	
Operation Lock Setting (LOCK)	Specify whether to prohibit operator action when instrument tag pattern is tagged with the OIS.	Disable/ Enable	
Tagging Color (COLR)	Register the tagging color. Select a color from the list. 0: White 1: Red 2: Green 3: Yellow 4: Blue 5: Purple 6: Sky blue 7: Black 8: Light gray blue 9: Dark orange 10: Gray water 11: Flesh color 12: Very clear gray 13: Clear gray 14: Gray 15: Very dark gray 16: Dark gray 17: Gray blue 18: Gray purple 19: Light gray 20: Dark gray 21: Red earth 22: Tea green 23: Dry grass green 24: Indigo blue 25: Dark purple 26: Gray green 27: Faint gray 28: Pale green 29: Dark white 30: Faint yellow green 31: Faint dark gray	See description	
Tagging Character (SIGN)	Register the tagging character.	Up to 16 characters.	
Set value (Real)(R)	Set the initial value of REAL set value of 8 points.	RL to RH	
Set Value (Long Int) (D)	Set the initial value of LONG INT set value of 8 points.	DL to DH	
Set value (Int) (W)	Set the initial value of INT set value of 8 points.	WL to WH	
Set value Upper Limit (Real No.) (RH)	Set the upper limit of REAL set value of 8 points.	RL to 9999999	
Set Value Upper Limit (Long Int) (DH)	Set the upper limit of LONG INT set value of 8 points.	DL to 9999999	
Set Value Upper Limit (Int) (WH)	Set the upper limit of INT set value of 8 points.	WL to 32767	
Set Value Lower Limit (Real No.) (RL)	Set the lower limit of REAL set value of 8 points.	–999999 to RH	
Set Value Lower Limit (Long Int) (EL)	Set the lower limit of LONG INT set value of 8 points.	–999999 to DH	
Set Value Lower Limit (Int) (WL)	Set the lower limit of INT set value of 8 points.	–999999 to WH	
Set Value Type (DTYP)	Select the data type of set value for 8 points individually. 0: Not used 8: INT 12: LONG INT 16: REAL	See description	
Decimal Place (DCML)	Specify the number of decimal digits when value on instrument.	0 to 5	
Engineering Unit (EU)	Set the engineering unit character of the set value.	Up to 16 characters.	

■ Meaning of R

Item	Description	Set Value	Remark
Real Value	Set the numeric value of the real parameter.		
Comment	Set the comment for the real parameter.	Up to 36 characters.	
Engineering Unit	Set the numeric value of the real parameter.	Up to 16 characters.	

■ Meaning of W

Item	Description	Set Value	Remark
Real Value	Set the numeric value or bit string of integer parameter.		
Bit Comment	Set the comment for the bit string.	Up to 36 characters.	
Comment	Set the comment for the integer parameter.	Up to 36 characters.	
Engineering Unit	Set the unit of the integer parameter.	Up to 16 characters.	

■ Meaning of T

Item	Description	Set Value	Remark
Set Value	Set the timer setting.		
Comment	Set the comment for the timer.	Up to 36 characters.	
Engineering Unit	Timer engineering unit "0.1[sec]" or "0.1[min]" is displayed.	—	#T1 to #T256: 0.1 [sec] #T257 to #T512: 0.1 [min]
Input condition	Set the timer input condition equation.	Up to 18 characters	
Current Value	The timer current value is displayed.	—	Displayed when online
Start	[–1] is displayed when the timer starts.	—	Displayed when online
Stop	[–1] is displayed when the timer stops.	—	Displayed when online
Reset	[–1] is displayed when the timer current value is reset.	—	Displayed when online
Up	[–1] is displayed when the timer current value exceeds the set value.	—	Displayed when online

■ Meaning of C

Item	Description	Set Value	Remark
Set Value	Set the counter setting.		
Comment	Set the comment for the counter.	Up to 36 characters.	
Engineering Unit	The counter engineering unit [count] is displayed.	—	
Input condition	Set the counter input condition equation.	Up to 18 characters	
Current Value	The counter current value is displayed.	—	Displayed when online
Increment	[–1] is displayed when the counter current value increases.	—	Displayed when online
Decrement	[–1] is displayed when the counter current value decreases.	—	Displayed when online
Reset	[–1] is displayed when the counter current value is reset.	—	Displayed when online
Up	[–1] is displayed when the counter current value exceeds the set value.	—	Displayed when online
Down	[–1] is displayed when the counter current value is less than the absolute value of the set value prefixed with minus sign.	—	Displayed when online

■ Meaning of P

Item	Description	Set Value	Remark
X1 to X11	Set X coordinates 1 to 11 in increasing direction.	$0 <= Xi - 1 < Xi$	i = 2 to 11 single precision real
Y1 to Y11	Set Y coordinates 1 to 11.		Single precision real
Unit (X)	Set the X value unit.	Up to 16 characters.	
Unit (Y)	Set the Y value unit.	Up to 16 characters.	
Comment	Set the comment of the polynomial line table.	Up to 36 characters.	

■ Meaning of RTT

Item	Description	Set Value	Remark
ONS logical name (LOGN)	Register the logical name.	Up to 16 characters	
ONS atom name (ATMN)	Register the atom name.	Up to 4 characters	
Data type (DTYP)	Select the data type. D_NOTYPE, D_BIT,D_BITS, D_BYTE, D_BYTES, D_U_BYTE, D_U_BYTES, D_SHORT, D_SHORTS, D_U_SHORT, D_U_SHORTS, D_LONG, D_LONGS, D_U_LONG, D_U_LONGS, D_FLOAT, D_FLOATS	See description	
Atom array count (ATYP)	Register the total number of atom arrays.	0: No 1 or more: Total number of arrays	
Atom array position (ARYN)	Register the position of atom array.	0 to 65535	

4.3 Importing Tags

This section describes how to import tag parameter created as CSV format text file into the Tag Editor.

The following operations can be performed using the import and export functions.

- Display or edit tag parameters easily using spreadsheet application such as Excel or text editor such as Windows Notepad.
- Use already registered tag no. or parameter and register parameters to other controllers in parameter type units.

■ Used CSV text format

The input file format is as follows:

Type: Comma separated text file (CSV)

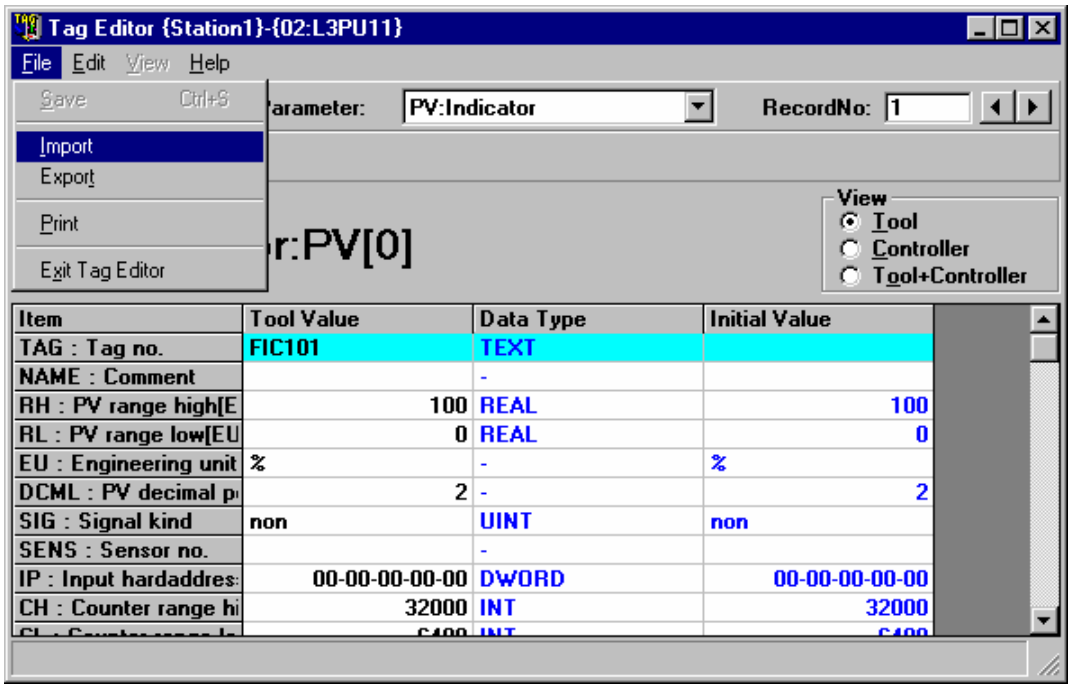
Format:

	Registered Content	Example
1st line	Name of item to import	IdNo,TAG,NAME,RH,RL
2nd and subsequent lines	Registration data of item to import	1,L1LOP1,,100,0

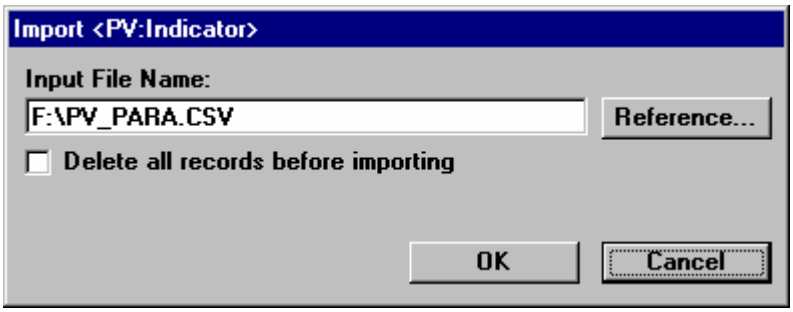
- IdNo (Record No.) is required. Specify a registration record No. starting from 1.
- Item name must be unique within the system. Create using the content of output file displayed on the tag editor window or created by exporting as reference.
- There is no need to register every item of the tag in the item name. Register only the items to import and match the number of data with number of items.
  Set a string with length 0 for blank. (Example: "",)
- The items may be in any order.
- Match the list of registration data with the list of the name of the items to be imported.

■ Importing

1) Select and display the parameter type to import in [Tag Editor] and click <File><Import>.



2) The following Import window appears.



Input file name: Specify the path and name of the CSV file.

[Reference…] button: Open a dialog box to select the path and file name.

Check box (Delete all records before importing):

Check to import after deleting the registered content corresponding to this tag type.

This prevents duplicate Tag No. error when replacing or moving records.

3) Set the above import conditions in the window as necessary and click the [OK] button to import.
Click the [Cancel] button to cancel execution and close the window.

4) The execution progress is indicated by the progress bar.
Click the [Cancel] button to abort execution. If execution is aborted, the result imported up that point are imported in record units.

■ Error log

If an error occurs, it is recorded in the error log.

- Format
[IdNo of the error], [Item name] ([Error code]), [Item name]([Error code]), …

Example: 1, TAG(12)
2, NAME(24), RH(21), …
0, IdNo(20)

- If IdNo cannot be determined, IdNo 0 will be output.
- Error Codes

Error Code	Description
10	IdNo is not specified.
11	Specified item (field) cannot be imported.
12	Tag No. is invalid or is duplicated.
20	Specified data is not a numeric value.
21	Specified numeric value cannot be set (out of range).
22	Specified numeric value cannot be set (not a selection option).
23	Specified character cannot be set (not a selection option).
24	Specified character cannot be set (invalid length).

4.4 Exporting Tags

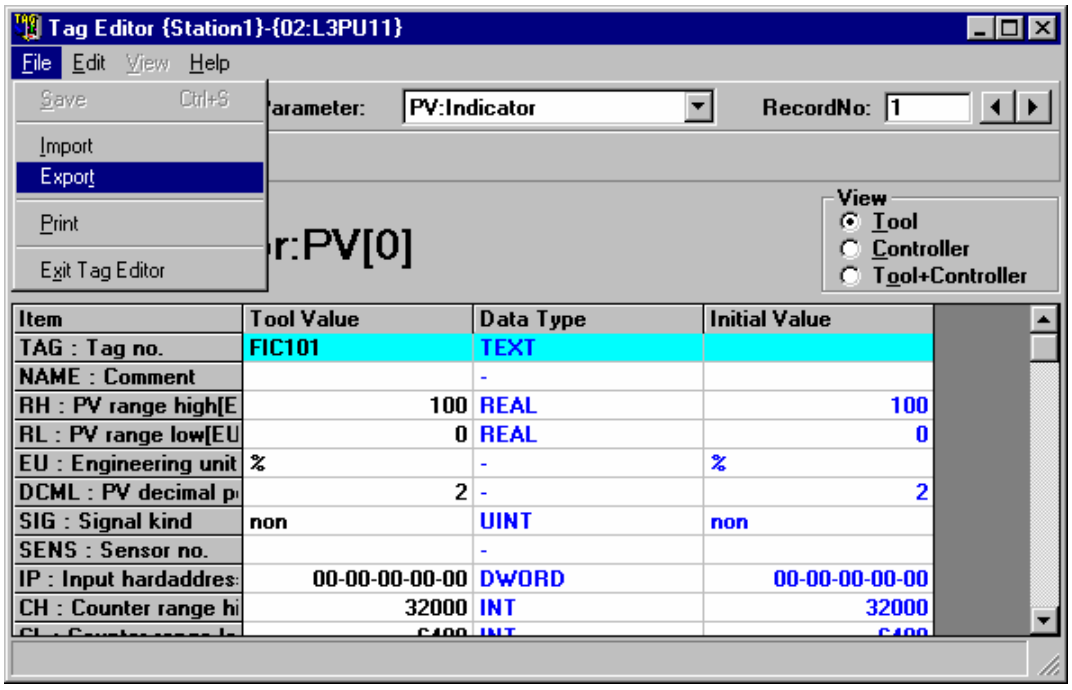
This section describes how to export tag No. and parameters registered with Tag Editor to CSV format text file.

The following operations can be performed using the import and export functions.

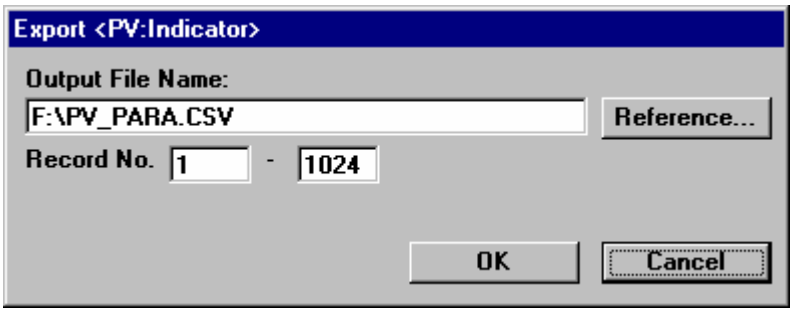
- Display or edit tag parameters easily using spreadsheet application such as Excel or text editor such as Windows Notepad.
- Use already registered tag no. or parameter and register parameters to other controllers in parameter type units.

■ Exporting

1) Select and display the parameter type to export in [Tag Editor] and click <File><Export>.



2) The following Export window appears.



Output file name: Specify the path and name of the output CSV file.

[Reference…] button: Open a dialog box to select the path and file name.

Record No.: Specify the range of records to output.

3) Set the above export conditions in the window as necessary and click the [OK] button to export.
Click the [Cancel] button to cancel execution and close the window.

4) The execution progress is indicated by the progress bar.
Click the [Cancel] button to abort execution. If execution is aborted, the result exported up to that point are exported in record units.

◆ Important

Restriction on the number of data columns (items)

The number of columns (items) for CSV format data is limited to 255 columns. Therefore, a tag with number of items greater than this is automatically divided into two files. ("(2)" is appended to the second file name.

- Affected tag: DS type PB tag
- Output file examples: PB_PARA.CSV and PB_PARA(2).CSV
  Note that if a file with the same name as the second file already exists, that file is deleted.
  Also, when editing the output of the affected tag and re-importing, the files must be merged before importing or they must be imported separately.
  There is no restriction on the number of rows (records) when exporting or the number of rows or columns when importing.

■ Output CSV text format

The output file format is as follows:

Type: Comma separated text file (CSV)

Format:

	Description	Example
1st line	Name of all items	IdNo,TAG,NAME,RH,RL,EU…LOG,PICT,SIMM
2nd and subsequent lines	Registration data of all items	1,L1LOP1,,100,0,%…1,,0

For DS type PB tag, IdNo (record No.) and TAG (tag No.) are automatically added to the first and second column of the second file of the divided files.

Chapter 5
Creating Control Programs

This chapter describes the procedure to create a control program with the Program Editor.
The following topics are described:

5.1 Kind of Program Editor

Kind of program editor

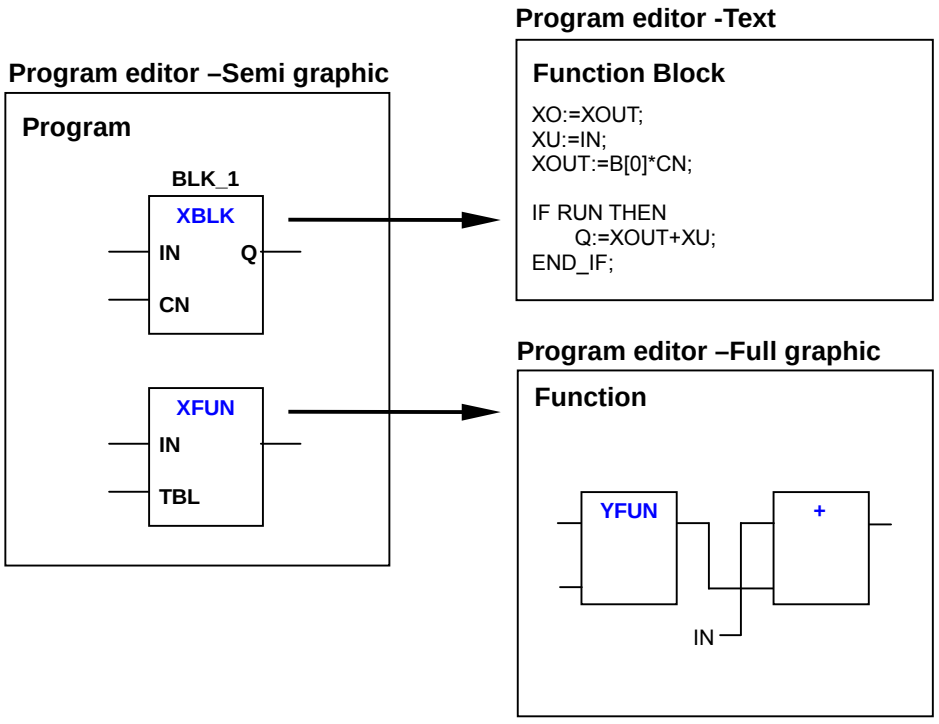
The following program editors are used to make the program, the function or the function block by using programming language (LD, FBD, SFC, ST) of V series.

Type of Program editor	Programming language
Semi graphic	LD,FBD,SFC
Full graphic	LD,FBD,SFC
Text	ST

Mutual call of program

The function and the function block can be called between programs of all kinds.

Example: When you call the block of the function of the text and Full-graphic function from the program of the semi-graphic

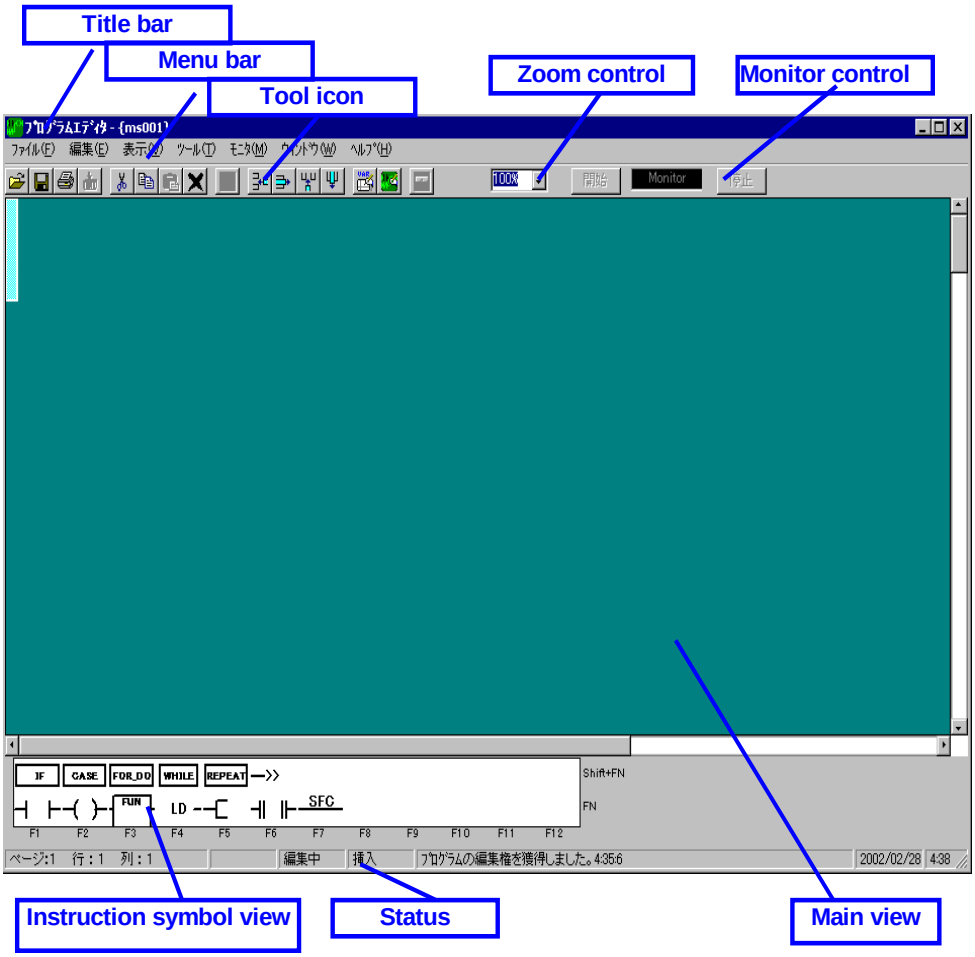


5.2 Semi Graphic

This chapter describes the procedure to create a control program with the Program Editor (Semi graphic).

5.2.1 Program editor organization

■ Name and role of each part



■ Title bar

Shows the name of the tool application and the target project file.

■ Menu bar

A menu of various operations. Each menu can be opened without using the mouse by pressing ALT + (Key).

■ Tool icon

Commonly used menu items appear as icons. Place the cursor on an icon to view its menu name.

■ Zoom control

A control to zoom in or out the graphic language displayed in menu view.

■ Monitor control

A control to start or stop online monitoring of the graphic language displayed in menu view.

■ Main view

View to draw or edit graphical language (LD/FBD/SFC). Used from program, function block, and function.

■ Instruction symbol view

A graphical language instruction symbol menu. Select with the function key and SHIFT key to draw the instruction symbol in the main view cell that has the focus.
The instruction symbol view appears only while editing.

■ Status

The following information appears in the status area:

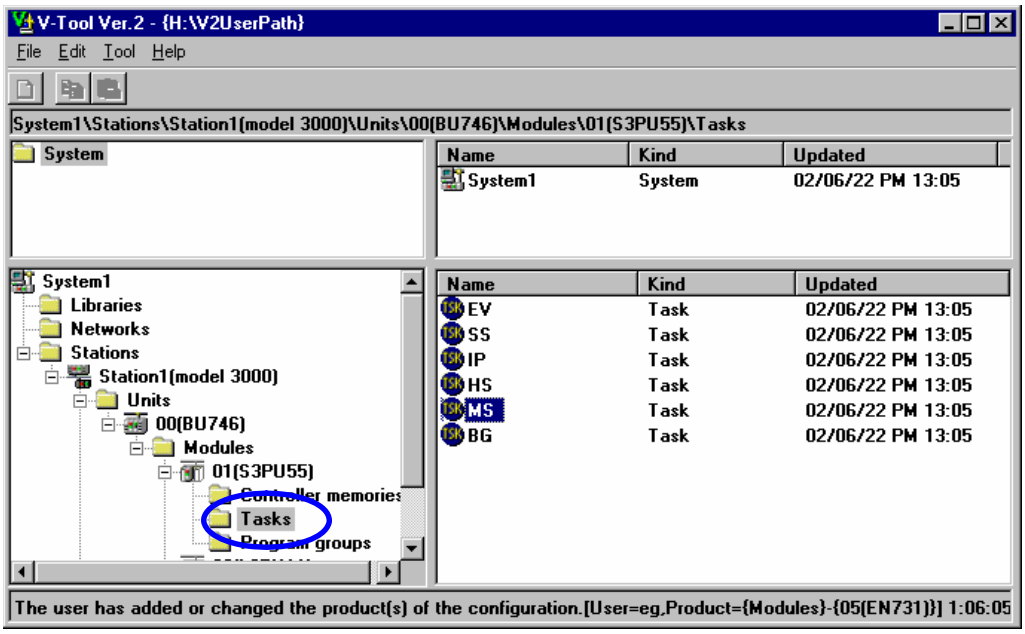
- Cursor position view ····· Shows the page, row, and column number.
- Controller operation mode view ····· When connected to a controller, shows the controller operation mode.
- Editing view ····· Displayed when editing with the Program Editor.
- Insert/Overwrite view ····· Indicates the cursor input mode (insert/overwrite) when editing with the Program Editor.
- Calendar view ····· Shows the current date and time.

5.2.2 Opening a task

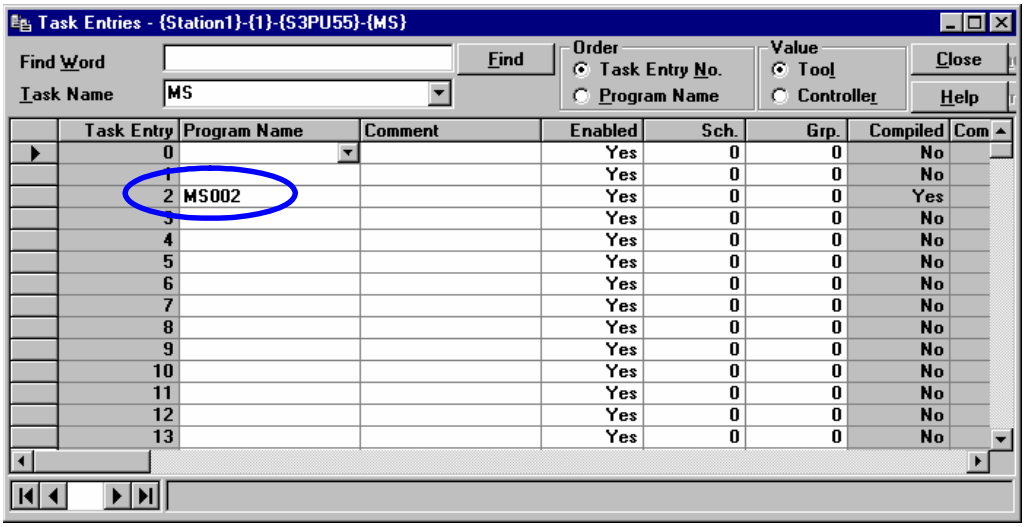
■ Starting

The Program Editor is started as follows:

1) From the [Product Tree], select the corresponding station, unit module and select a task in the module.



2) Execute <Task entry> from the <File> menu.
The following Task Entry window appears.



3) To create a new task, enter the [Program name], move the cursor to the corresponding Task Entry No. and click the [Open program editor] button. To open an existing task, move the cursor to the corresponding Task Entry No. and click the [Open Program Editor] button.
You can also double-click at the cursor location to start the Program Editor.

■ Task entry information

Program Information can be shown as follows:

- Compiled
  Status of program data and code binary is shown as follows:
  - Yes: All POU are already saved, and no error. All POU means a Program with User Function and User Function Block, is called from the program.
  - No: All POU are not saved yet, or they have compiling error.
- Modified
  Date and time, when program was modified, is shown. Modified program means the following operations: <Save Temporally>, <Save>, <Save and Download>, <Batch Compile>

  ◆ Important

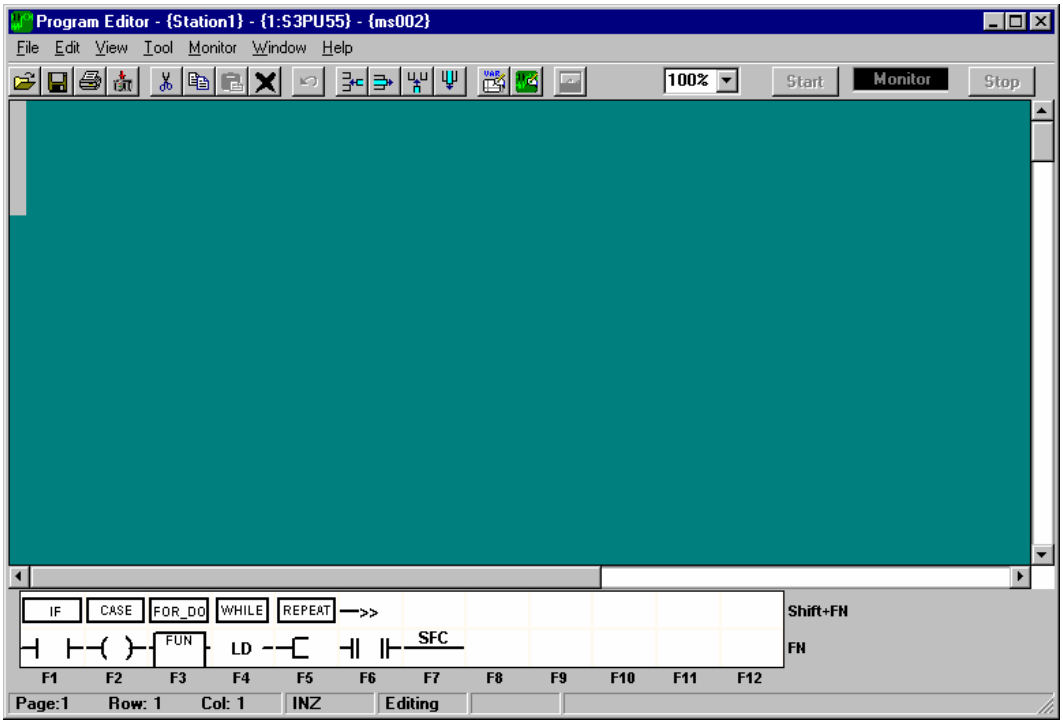
  - This Date and time means a program modified time only. Modifying User Function and User Function Block, which is called from the program, is not included.

- Steps
  Program code binary size is shown.
  - When <Modified> is 'Yes', step size is shown.
  - When <Modified> is 'No', size '0'(Zero) is shown.

■ Program editor window (new task entry)

When you create and open a new task from task entry, you can edit it.

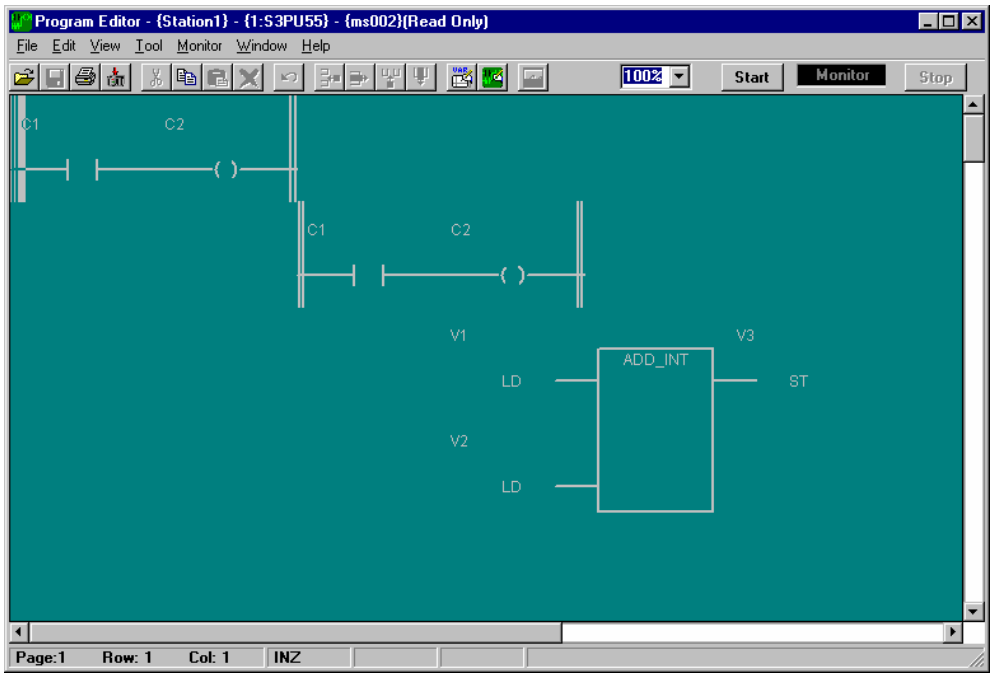
See [Drawing a Program] for information on how to edit a program.



■ Program editor window (existing task entry)

When you select and open an existing task, editing is disabled.

To edit, click <Edit> from the <Edit> menu. See [Drawing a Program] for information on how to edit a program.



To write to a controller, click <Write to controller> from the <File> menu. For information on how to write to a controller, see [Downloading Task Individually].

■ Ending

The Program Editor can be ended by any of the following methods:

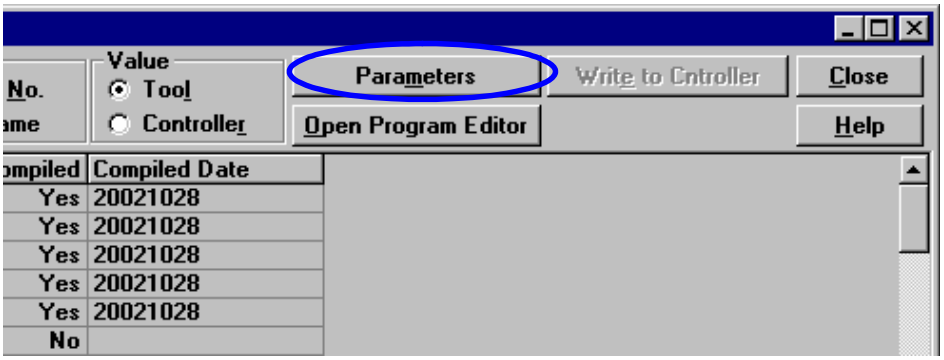
1) Execute <Exit> from the <File> menu.
2) Click [X] on the right end of the title bar.
3) Double-click the icon at the left end of the title bar.

■ Registration of actual argument

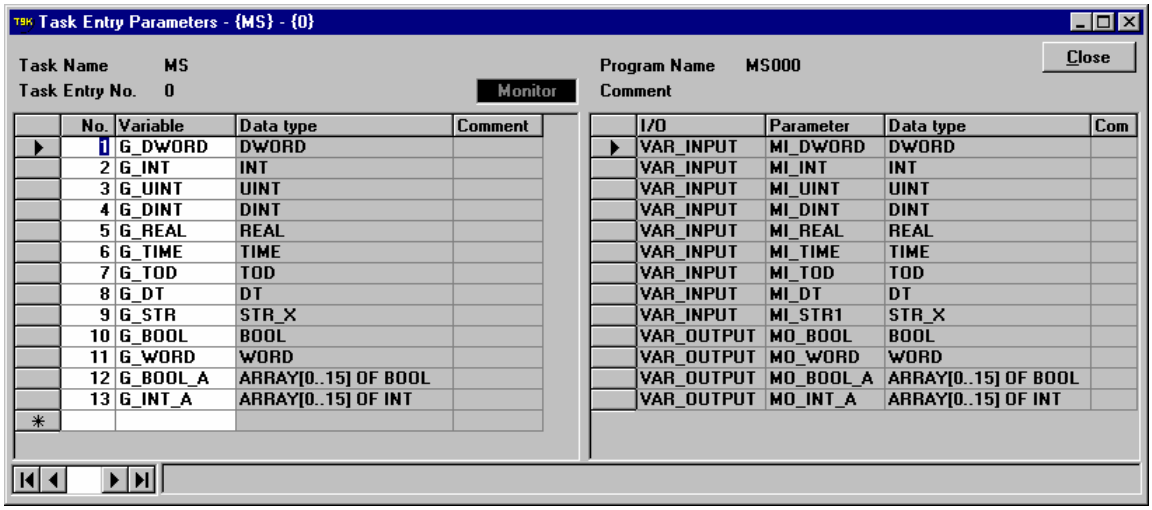
If a program has arguments 'VAR_INPUT, VAR_IN_OUT, VAR_OUTPUT', the global variables as actual arguments should be registered.

The operations are as follows:

1) Open Task Entry window, and click button [Registration of Actual Argument].



2) The following Task Entry Argument window appears.



3) Input global variables for program argument.

Order of input: Same order with program argument.

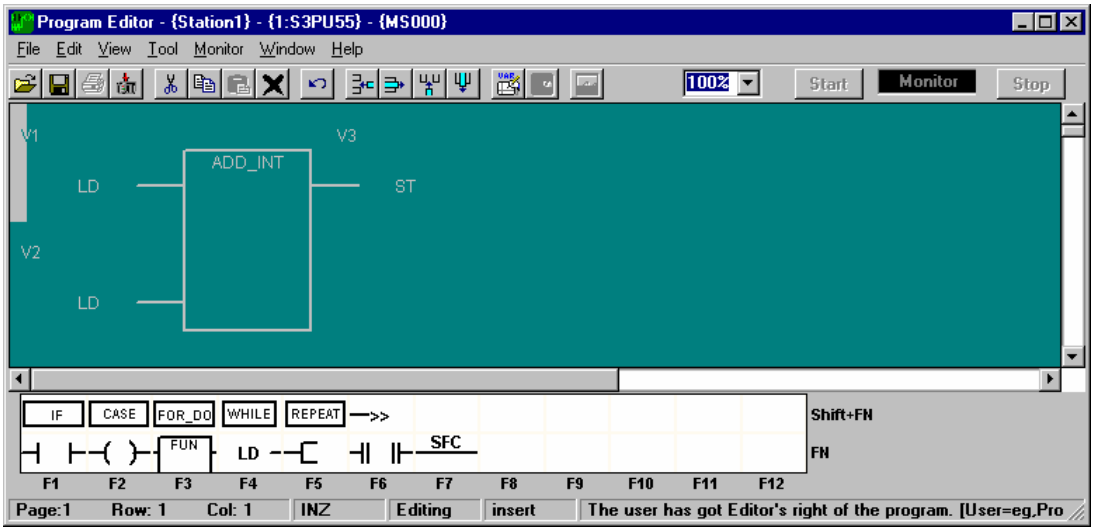
Change 'No.': Order of Actual Argument can be changed.

5.2.3 Drawing a program

This section describes how to input and edit an LD (ladder diagram)/FBD (function block diagram)/SFC (sequential function chart).

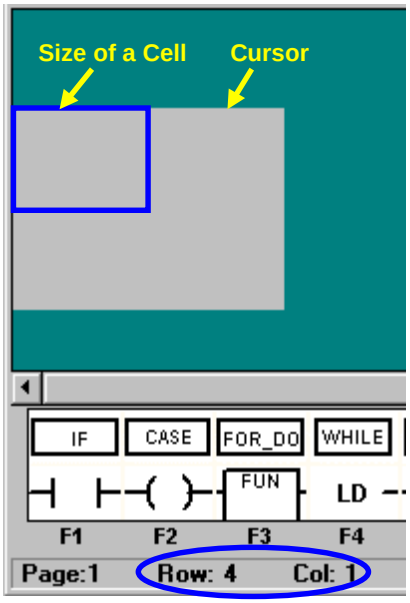
■ Adjusting form

The [Instruction symbol menu] can be toggled on/off from <Edit> of the <Edit> menu. This is useful when you need to increase the view while monitoring.



■ Cursor operation

- A cursor appears when you click the main view or sub view.
- The cursor can be moved with the [←], [→], [↑], or [↓] key.
- Insert mode is indicated by a narrow vertical cursor and overwrite mode is indicated by a wide cursor.
- The insert/overwrite mode can be toggled with the [Insert] key.
- In overwrite mode, the cursor is the size of a single cell.
- The current position of the cursor appears as row and column number in the position view.
- To select multiple cells, drag the cursor (move the cursor while pressing the left mouse button) around the desired cells.



■ Start editing

To start editing, select <Edit> from the <Edit> menu or click the following tool icon.

Select <Edit> from the <Edit> menu or click the following tool icon once more to exit the edit mode.

■ Entering instruction symbol

Place the cursor in the main view or sub view.

Press a function key No in the [Instruction symbol view]. The [Instruction symbol view] is divided in two. Press a function key [Fn] while holding down the [Shift] key to select the top half. The first layer simply shows the instruction symbol types. Select an instruction symbol in the second layer to draw it at the cursor position.

Use [Overwrite mode] when entering SFC instruction symbols.

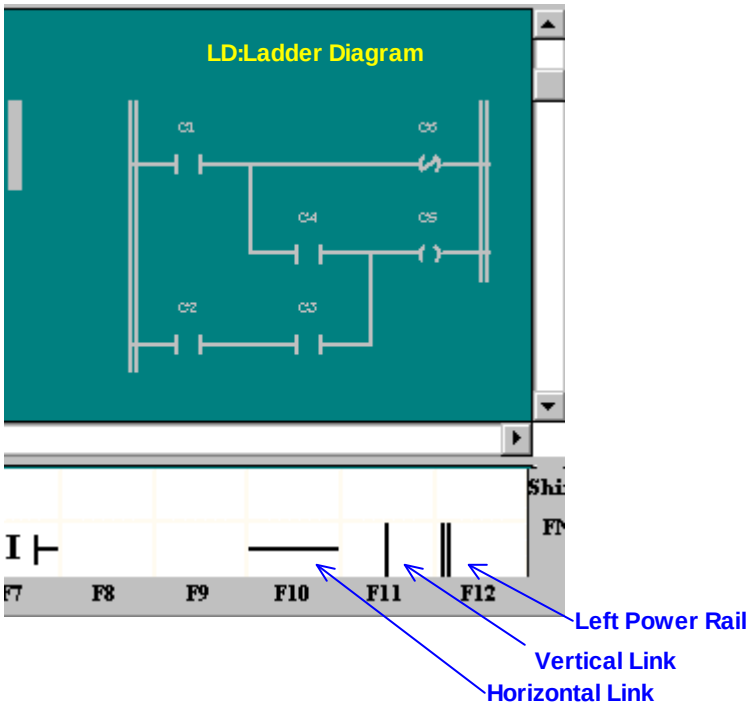
A default variable name is assigned automatically to instruction symbols that require variable name such as contact, coil, function block, LD, ST, SET, and STEP.

You can use the mouse to select instruction symbols, but using the keyboard is more efficient once you get used to it.

Use the [DEL] key to delete an instruction symbol.

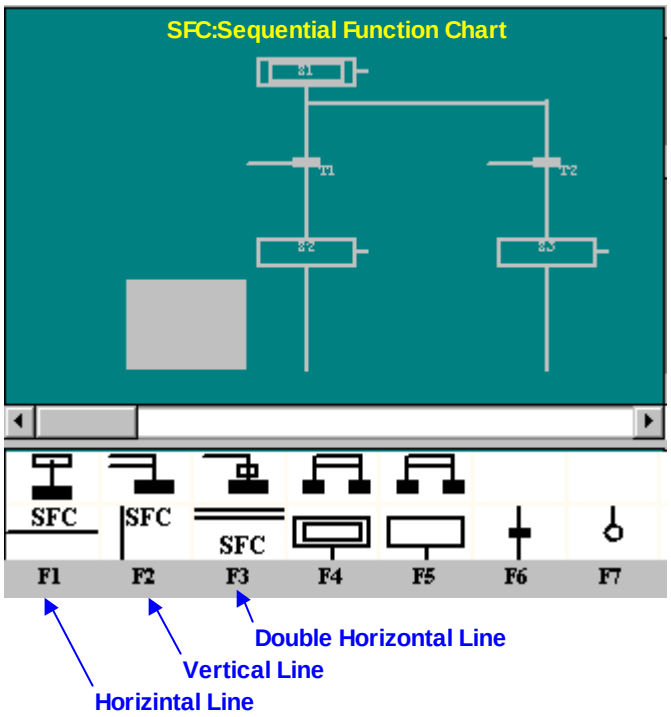
The left power rail, vertical connection line, and horizontal connection line of LD/FBD also have keyboard assignments.

Press the same key once more to erase the left power rail and vertical connection line. They cannot be erased with the [DEL] key.



The conditional branch line, parallel execution line, and step connection line of SFC also have keyboard assignments.

Press the same key once more to erase the conditional branch line and parallel execution line. They cannot be erased with the [DEL] key.



■ Program drawing editing operation

The following table shows the editing operations used during program drawing.

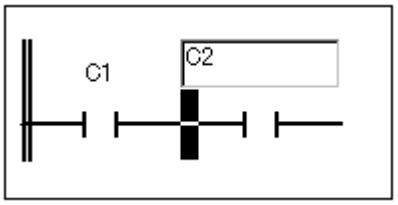
Operation	Key operation
Move cursor	[←], [→], [↑], [↓]
Move cursor to left or right edge	[Ctrl] + [←], [Ctrl] + [→]
Switch to insert mode	Press the [Insert] key to make the cursor narrow.
Switch to overwrite mode	Press the [Insert] key to make the cursor wide.
Draw an instruction symbol	Move the cursor to where you want to draw the instruction symbol and press [F1]-[F12] or [Shift] + [F1] - [Shift] + [F12] to move down the instruction word group hierarchy and press the key once more to select the desired instruction symbol and draw it at the cursor location. Press the [ESC] key to go back up the hierarchy. Horizontal line ([F11] + [F1]) is treated as a type of instruction symbol.
Drawing a function or function block	Move the cursor to where you want to draw the function or function block and press [Shift] + [F2], [F1] to display the function or function block selection dialog and then select to draw.

Operation	Key operation
Delete an instruction symbol	Move the cursor to the instruction symbol to delete and press the [Del] key. However, power rail and horizontal line cannot be deleted.
Delete a power rail and vertical line	Move the cursor to the power rail or vertical line to delete and press the function key indicating the same power rail or vertical line. The function keys for power rail are [F11] + [F3] and for vertical line are [F11] + [F2].
Copy a circuit	Move the cursor to the top left corner of the circuit to copy, move the cursor with [Shift] + [←], [→], [↑], or [↓] to select a rectangular area of the circuit to copy. Then press [Ctrl] + [C] to copy the circuit to an internal buffer. Or click the right mouse button and select <Copy> from the displayed menu.
Cut a circuit	Move the cursor to the top left corner of the circuit to copy, move the cursor with [Shift] + [←], [→], [↑], or [↓] to select a rectangular area of the circuit to cut. Then press [Ctrl] + [X] to cut the circuit to an internal buffer. Or click the right mouse button and select <Cut> from the displayed menu.
Paste a circuit	If there is a circuit in the internal buffer, move the cursor to an empty area and press [Ctrl] + [V] to paste it. The content of the internal buffer is available and the same circuit can be repeatedly again to an empty area. You can also click the right mouse button and select <Paste> from the displayed menu.
Delete a circuit	Move the cursor to the top left corner of the circuit to delete, move the cursor with [Shift] + [←], [→], [↑], or [↓] to select a rectangular area of the circuit to delete. Then press the [Del] key to delete. The content of the internal buffer is unchanged. You can also click the right mouse button and select <Delete> from the displayed menu.
Scroll a circuit	Keep pressing the [←], [→], [↑], or [↓] key to scroll a circuit that is tool large to display in the main graphic area.
Insert a line	Move the cursor to the row you want to insert and select <Self worksheet><Insert row> from the <Edit> menu.
Delete a line	Move the cursor to the row you want to delete and select <Self Worksheet><Delete Row> from the <Edit> menu.
Undo	Select Undo> from the <Edit> menu. If <Undo> is selected in the main view, the previous edit operation is undone. If it is selected in text view, the state before editing and the current state are displayed alternately. You can also click the right mouse button and select <Undo> from the displayed menu.

5.2.4 Entering variables

■ Keying variable names

Move the cursor to an instruction symbol and press [Enter]. When a text box appears as shown below, enter the variable name and press [Enter] to close the text box and draw on top of the instruction symbol.



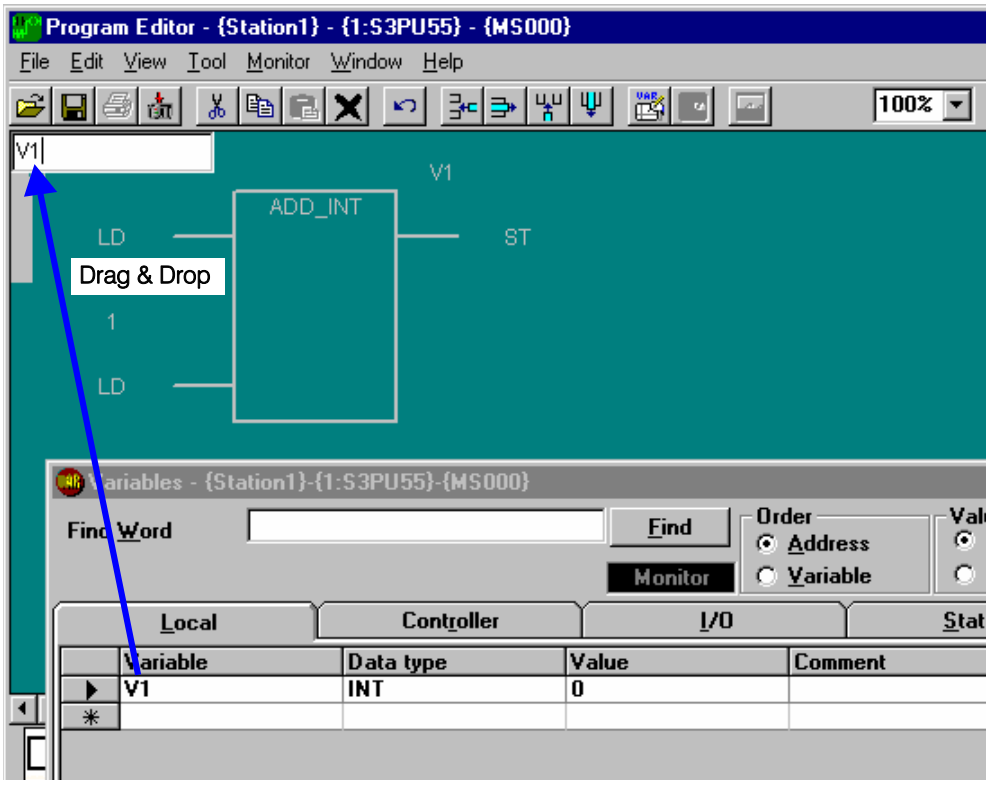
In general, it is more efficient to enter and draw all instruction symbols first and then enter the variable names.

■ Drag and drop a variable

If a variable is already declared, you can have it displayed and drag and drop it to the instruction word. The procedure is as follows:

1) Select <Available Variables> from the <Edit> menu to open the [Variable] window.

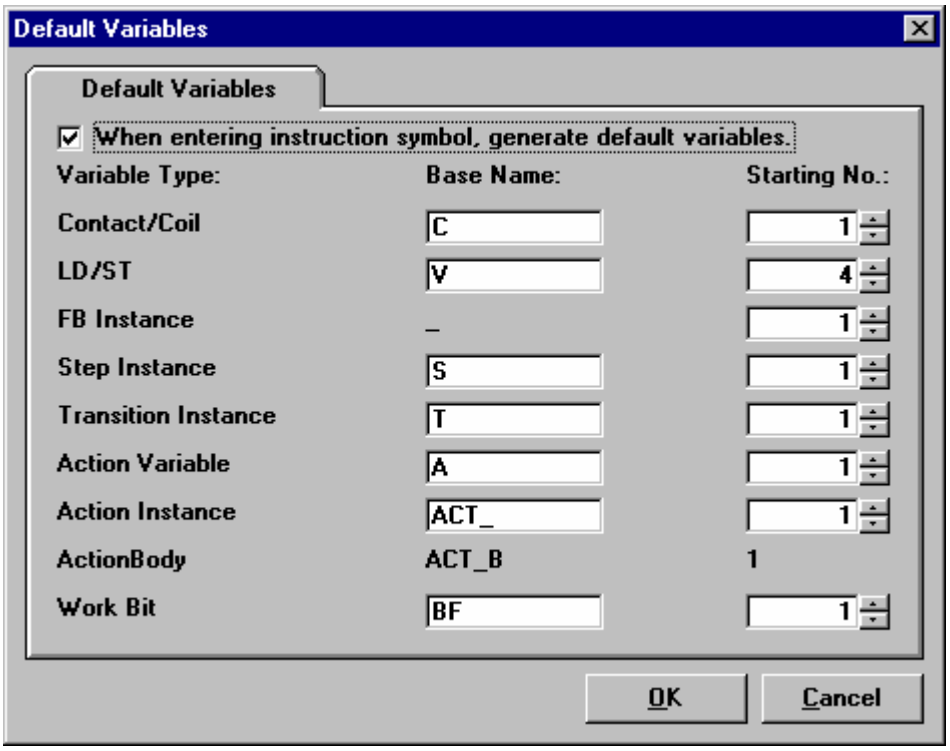
2) Place the cursor on the desired symbol name, hold down the left button, and move the cursor to the instruction word to enter the variable and release. The variable name is entered for the instruction word.



■ Changing the default function name

A default variable name is assigned automatically when drawing instruction symbols such as contact, coil, LD, ST, SET, function block, step, and transition.

This can be set in the following dialog box that appears <Default variable names> is selected from the <Tool> menu.



The base name is part of the variable name. Set it according to the variable name convention.

No variable name is generated if [When entering instruction symbol, generate default variables] is unchecked in the above dialog.

5.2.5 Declaring variables

■ Edit lock

Editing is locked just after startup, so you cannot update and delete the variables.

Unlock the edit lock to perform input operation.

The line for adding which marked '*' is always available.

◆ Important

Please be sure to execute the following operations, because these changes affected the invocation program processing.

- When the local variable is added or deleted, please delete and re-register the variable of this function block.
- When the argument of a function block is changed, please delete and re-draw the symbol of the function block.
- Changing or deleting variable declarations may bring some programs that refer the variables into unexpected action.

■ Entering a variable declaration

A variable declaration is entered as follows:

1) Select <Available variables> from the <Edit> menu to open the [Variables] dialog. If there are existing variable declarations, they appear as a table.

2) Move the focus to the row containing an asterisk (*) and set the [Variables], [Data type], [Comment], [Declaration type], [Read only], and [Declaration sequence].

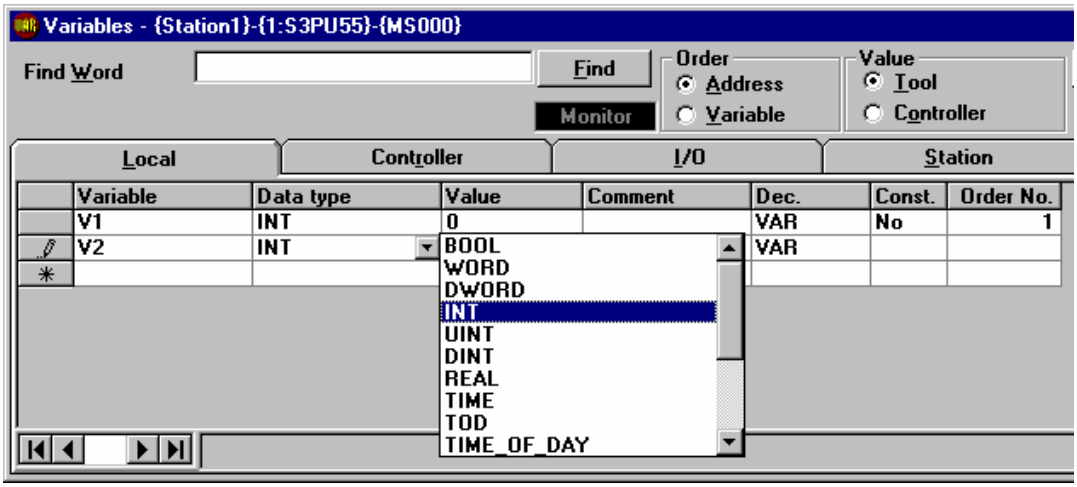
The declaration is made when the dialog box is closed.

◆ Important

- Registration of local variables:
  For safely executing programs continuously after downloading them, there are following restrictions after updating and deleting the variables.
  1) After deleting registrations, address packing does not work. After deleting, new registration is added last line.
  2) After updating data-type, delete it and added last line as new order number.
  3) Over and over again operated 1) or 2), variables can not be assigned automatically. In this case, please try batch compiling or change order number. Address packing works, and used address is available again.

- Registration of controller variables:
  For safety engineering, there are following restrictions after updating and deleting the variables.
  1) After deleting registrations, used address is not available for automatically assignment.
  2) After updating data-type, used address is not available for automatically assignment.
  3) After updating address, used address is not available for automatically assignment.
  4) Over and over again operated 1) to 3), variables can not be assigned automatically. In this case, please try batch compiling. Used address is available again.

To search a variable name, specify the [Find Word] and click the [Find] button. Wildcards can be used in the [Find Word]. For example, specifying 'HM*' will display all variables beginning with 'HM'. Specifying a null character will display all variables.



I/O, station, and network are read only.

■ Declaring function block variables and general variables

In addition to entering in the [Variables] dialog box, variables can also be declared as follows:

1) Open the desired program (PRG) or function block (FBK).
2) Click the icon (A) shown below to enter the [Editing] mode.
3) Draw the necessary instruction symbols that require a variable such as function block, contact, coil, LD, and ST in the [Main view]. At this point, default variable names (example: V1, V2, C1, C2, etc.) appear. You can change these if necessary.

4) If you change contact, coil, gate, LD, ST, or SET to an undefined variable name, the following dialog box opens after determining the data type automatically.

   Contact, coil, and gate are declared automatically as BOOL and LD, ST, SET are declared with the data type of the connection destination (line only, and gate are skipped). (They are declared as INT if the connection destination is undefined.)

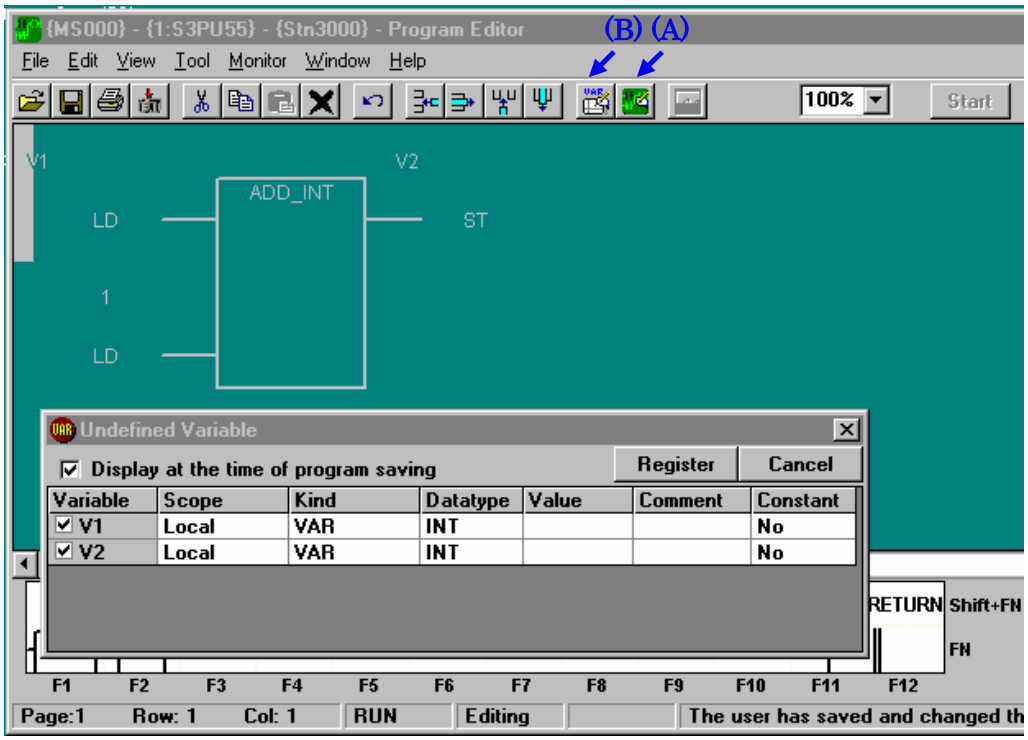
   The connection destination of LD, ST, and SET are searched in the order of right, bottom, left, and top.

   Function block, SFC, action, user action, transition, differential contact related variables and all local variables are determined automatically when saving.

5) Select the scope, type, and data type from the combo box. Enter the initial value and comment if they are necessary. Scope and type can only be selected from the combo box. To set the scope or type to other than the available selections such as making the type VAR-INPUT, set it in the [Variables] dialog box. The data type can be entered from the keyboard.

6) Click the [Register] button to complete the variable declaration.

7) The result of variable declaration can be viewed in the [Variables] dialog box by selecting <Available Variables> from the <Edit> menu or clicking the icon (B) shown below.



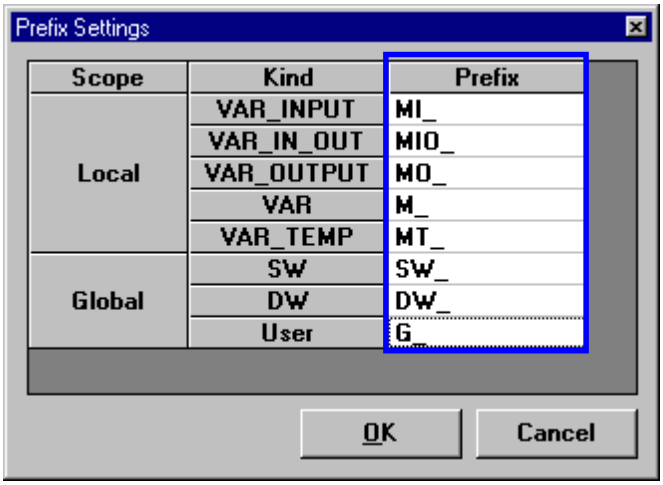
◆ **Important**

Please be sure to execute the following operations, because these changes affected the invocation program processing.

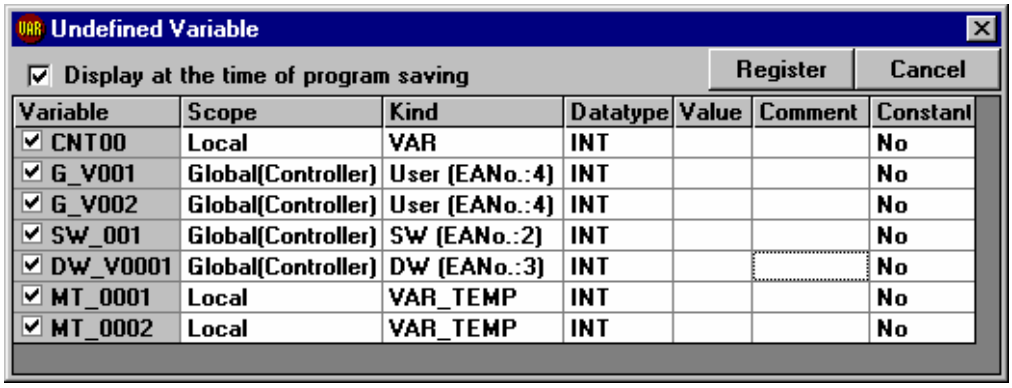
- When the local variable is added or deleted, please delete and re-register the variable of this function block.
- When the argument of a function block is changed, please delete and re-draw the symbol of the function block.

■ Automatic scope definition in undefined variables list

1) Select <Prefix Settings> from the <Tool> menu to register Initial letters of variables.



2) When registered letters are used, variables scope is set automatically.
Target instructions: Contact, Coil, Gate, LD, ST, SET, Derivative Contact, Derivative Coil



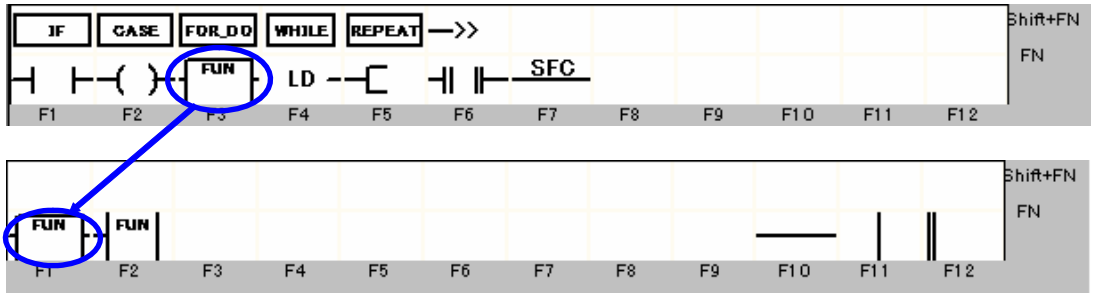
5.2.6 Using functions

Refer to [Drawing a Program] for information on how to draw basic graphics. This section describes how to draw functions.

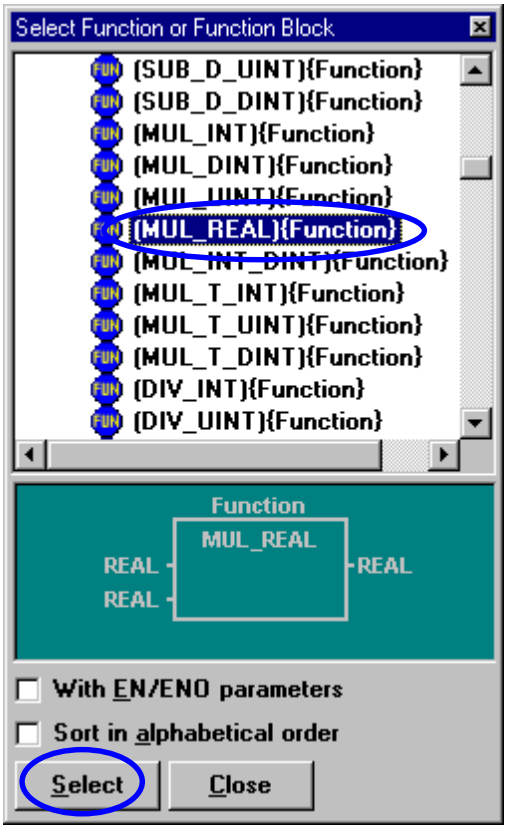
■ Drawing a function

Switch the focus to main view and display the cursor.

Select a function in the instruction symbol view.



- In the following diagram, select a function and click the [Select] button.



A function is drawn at the cursor position.

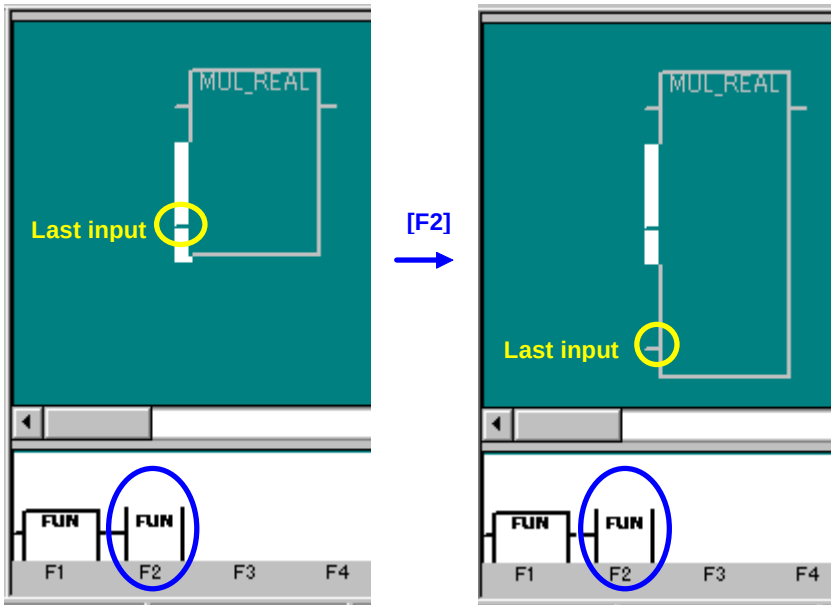
Changing the function input point

For some functions, the number of input points (number of input arguments) can be changed. Those are input arguments without names.

Example: MUL_REAL.

When a function is first drawn, the number of input points is minimum.

To increase the number of input points, move the cursor to the last input point as shown below and press the [F2] key. An input point is added and the shape of the function is extended vertically.

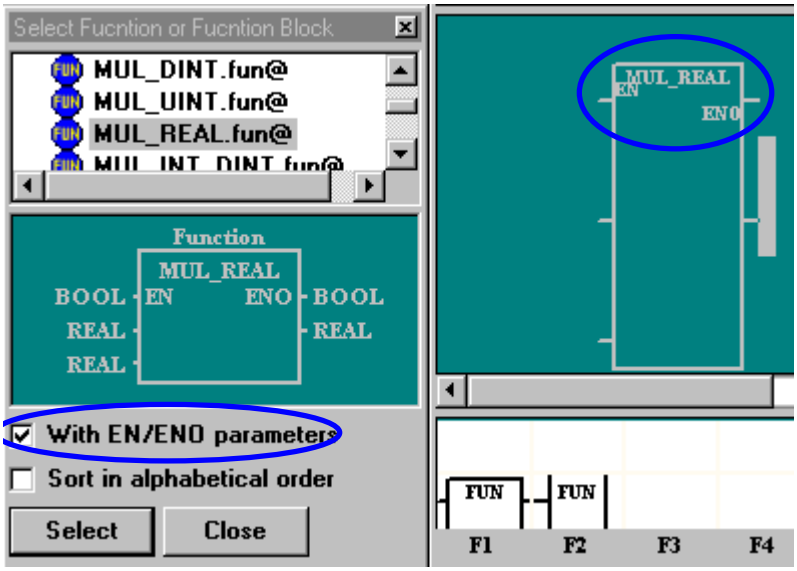


Drawing a function with execution control

A function with execution control is one with EN and ENO for input argument and output argument.

The functions with file name ending with @ in the [Select Function or Function Block] dialog correspond to this type.

When the focus is moved to such function, the [With EN/ENO parameters] checkbox is enabled. Check this and click the [Select] button to draw the function with execution control.



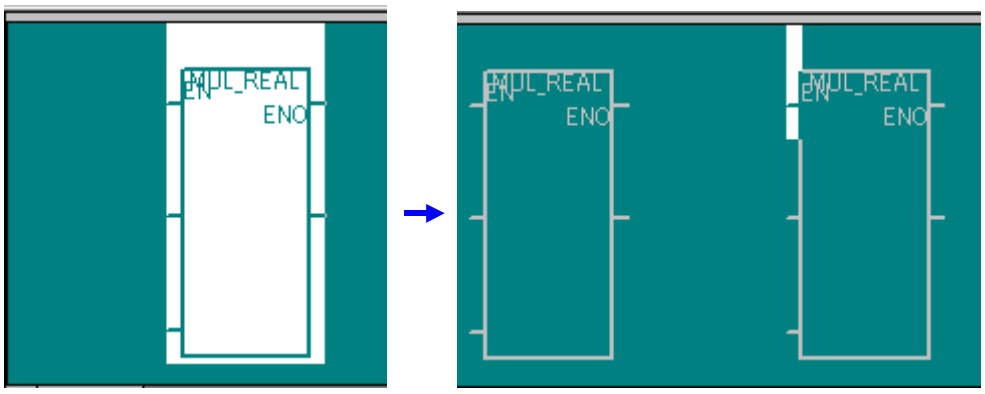
Copying a function

A function can be used repeatedly within the same program.

In such case, it is more efficient to copy and paste the graphic symbol rather than repeating the above procedure.

To copy a function, move the cursor at top left of the function, select the copy area with [Shift] + [←], [→], [↑], [↓] and press [Ctrl] + [C]. The selected area is copied to an internal buffer.

- To paste from the internal buffer, move the cursor to an empty area and press [Ctrl] + [V].



Copy Paste

5.2.7 Using function blocks

■ Drawing a function block

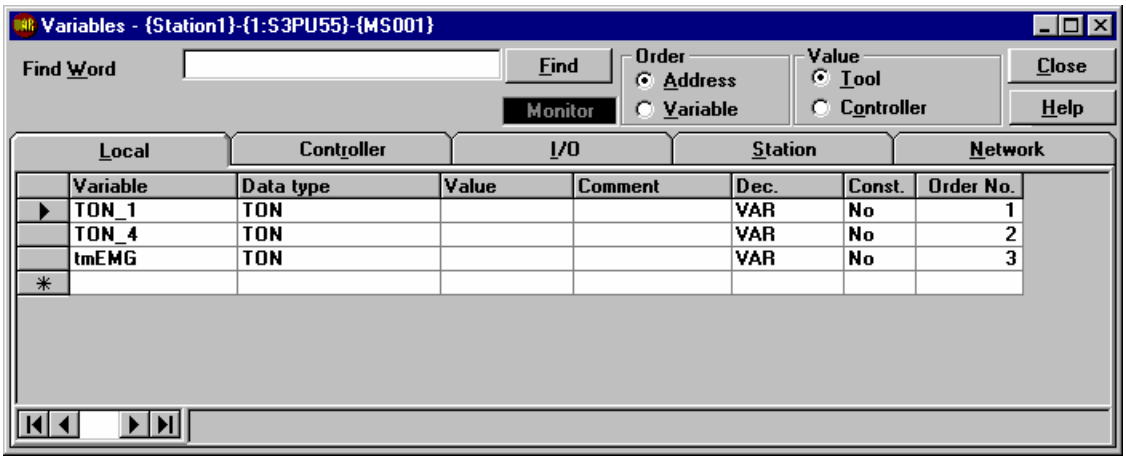
Function blocks are drawn in the same manner as functions. See the section [Using Functions].

■ Declaring a function block variable

A function block contains historical data. Therefore, the function block itself must be declared as a static variable.

A function block variable is declared as a local variable of a calling program or function block.

For example, assume there is a program that uses three on-delay timers (TON) as function blocks. Assume that their variable names are TON_1, TON_4, and tmEMG. Select <Available Variables> from the <Edit> menu and enter the local variable declarations as follows: The function block name (TON) is treated as a unique data type.



■ Copying a function block

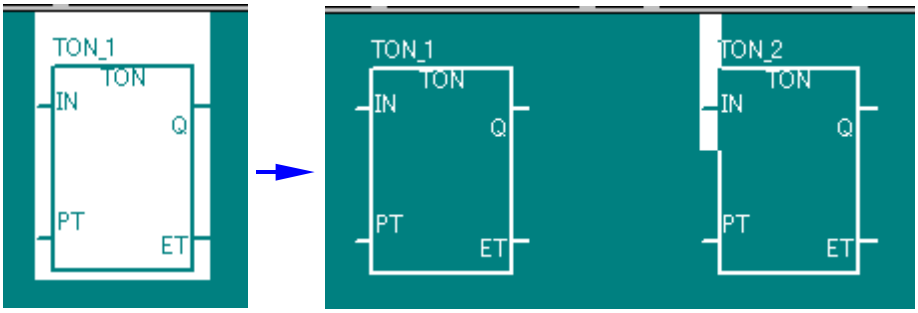
A function block can be used repeatedly within the same program.

In such case, it is more efficient to copy and paste the graphic symbol rather than repeating the above procedure to draw the function block.

To copy a function block, move the cursor to top left of the function, select the copy area with [Shift] + [←], [→], [↑], [↓] or by dragging the mouse and press [Ctrl] + [C]. The selected area is copied to the clipboard.

To paste from the clipboard, move the cursor to an empty area and press [Ctrl] + [V].

The variable name is included in the copy/paste operation. After pasting, change the variable name and add the variable declaration.



Copy **Paste**

◇ Supplementary

- When same FBK variable names are used in a program, compiling error occurs. Because FBK double-instance will become abnormal program processing.
- In the knowledge that it is rules of programming, you can avoid compiling error. But the following way is very risky, please edit the programs and test them carefully.

  <How to change setting>

  1) Edit the text file 'Compile2.ini' in the Windows directory, set the value as follows:

     [Compile]
     AllowDupFB = 1

     Default setting is 'AllowDupFB = 0'. It means that 'You can not use the FBK double-instance'.
     Please do not change other setting values.

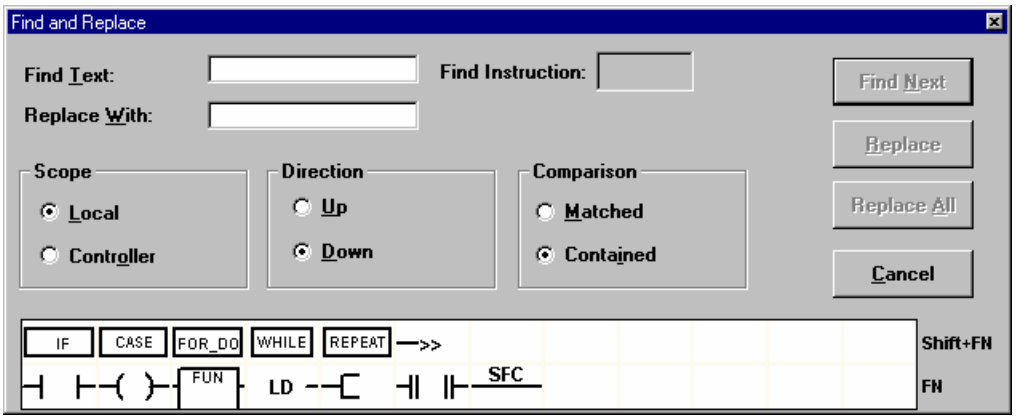
  2) Restart the V-Tool before editing the text file.
     When you are using C/S version V-Tool, please change this setting on each client PC, and if you use batch compiling, please change this setting on Server PC.

5.2.8 Search and replace instruction words

This section describes how to search and replace variable names and instruction words within a task (program) or controller from the Program Editor.

The following items can be searched and replaced.

Instruction word	Target
Contact/coil	Variable
F/FB	(FB) instance name, F/FB name (only when searching instruction word)
LD,ST,SET	Variable
Gate	Variable
BOOL type Action	Timer value, Action variable
User type Action	Timer value, Action name, indicator
Step	Step instance
Transition	Variable
IF/CASE/FOR/WHILE/REPEAT	Conditional equation, initial value, final value, increment
Jump/label	Label



■ Searching and replacing variables

From the Program Editor:

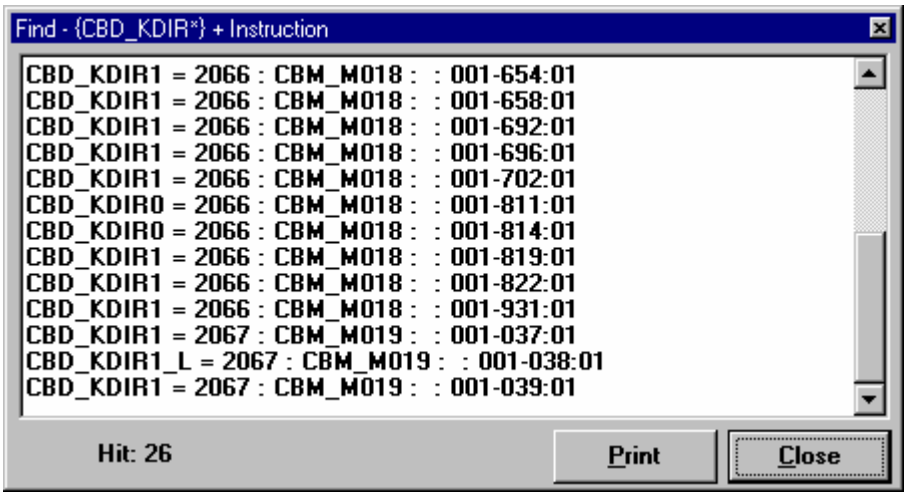
1) Click <Find/Replace> from the <Edit> menu.
2) Enter the variable to search in <Find Text>.
3) Select <Scope><Direction><Comparison> as necessary.

<Scope>	<Local>: Search within the task (program) containing the focus. <Controller>: Search within the current controller.
<Direction>	<Up>: Search upward. <Down>: Search downward.
<Comparison>	<Matched>: Search for string matching the search string. <Contained>: Search for string containing the search string.

4) Click the [Search next] button.

<Local>: If found, the cursor moves to the found result.

<Controller>: If found, Searching dialog is displayed.



5) <Local>: If there are two or more search results, the cursor is moved to the next location when the [Search next] button is pressed.

Search is performed in word units. Some examples are shown below.

Variable to search	“ ABCDE ”
Variables that are found	“ ABCDE ” , “ ABCDE[100] ” ,” D.ABCD ”,
Variable that are not found	“ ABCD_1 ”, “ AABCDEE ”, “ DATA_ABCDE “

Wildcard character may be used.

Character pattern	Matching character
-{ }-?	Any single character
*	Any number of characters
#	Any signal number

■ Searching instruction words

From the Program Editor:

1) Click <Find/Replace> from the <Edit> menu.
2) In the lower half of the dialog box, select the instruction word symbol to search from the instruction symbol view.
   In the case of function or function block, select the "FUN" instruction symbol to open the [Select Function/Function Block] dialog box and select the function or function block.
3) Select <Scope> and <Direction> as necessary.
   <Comparison> need not be set because it is for string search.
4) Click the [Find next] button. If found, the cursor moves to the searched result.
5) If there are two or more search results, the next item is searched when the [Search next] button is pressed.
6) To stop instruction word search, select a blank section in the instruction symbol view at the bottom half of the dialog box.

■ Searching variables and instruction words together

From the Program Editor:

1) Click <Find/Replace> from the <Edit> menu.
2) Select <Find Text>.
3) In the lower half of the dialog box, select the instruction word symbol to search from the instruction symbol view.
4) Select <Scope> <Direction> <Comparison> as necessary.
5) Click the [Search next] button. If found, the cursor moves to the searched result.
6) If there are two or more search results, the next item is searched when the [Search next] button is pressed.

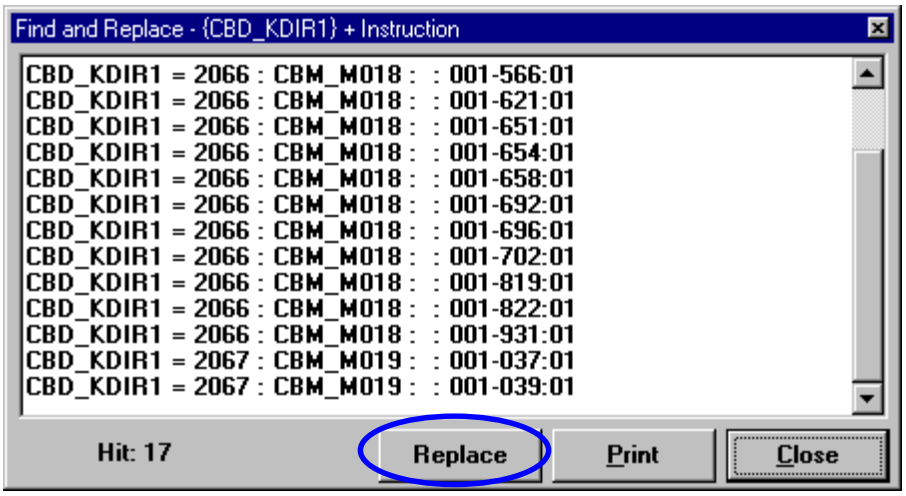
■ Replacing variables

<Local>:
Using Program Editor,

1) Change to Edit Mode, and Click the menu <Edit><Find/Replace>.
2) Select <Local> in <Scope>.
3) Input characters in 'Find Text'.
4) Input characters in 'Replace With'.
5) Click button [Replace], move the cursor to found characters, replace them.

<Controller>:
Using Program Editor,

1) Change to Display Mode, and Click the menu <Edit><Find/Replace>.
2) Select <Controller> in <Scope>.
3) Input characters in 'Find Text'.
4) Input characters in 'Replace With'.
5) Click button [Replace All], Result dialog is displayed.
6) Click button [Replace], replace them all.



◆ Important

- Replaced program should be saved.

5.2.9 Various edit and display functions

This section describes the edit and display functions of the Program Editor that have not been covered up to now.

■ Inserting and deleting rows and columns

Rows and columns can be inserted or deleted in the main view.

Select <Insert row> from the <Cell worksheet> menu to insert a row at the current cursor location.

A row cannot be inserted in the middle of a graphic circuit.

Select <Delete row> from the <Cell worksheet> menu to delete a row at the current cursor location.

A row cannot be deleted from the middle of a graphic circuit.

Select <Insert column> from the <Cell worksheet> menu to insert a column at the current cursor location.

The circuit is split to insert a column even in the middle of a graphic circuit.

Select <Delete column> from the <Cell worksheet> menu to delete a column at the current cursor location.

The circuit is deleted even if the column is in the middle of the graphic circuit.

When <Insert row> is selected from the <Cell worksheet> menu, a row is inserted if the circuit can be retained.

When <Delete row> is selected from the <Cell worksheet> menu, a row is deleted if the circuit can be retained.

■ Adding a page no.

When the graphic circuit in the main view is large, sometimes it is desirable to divide it into pages to indicate functional groups.

To divide into pages, first place the cursor where there is no circuit.

Select <Insert Page Separator> from the <Edit> menu, add a page No. and click [OK].

Page break is a symbol shown below. This indicates the end of the page.

To delete a page break, select <Delete Page Separator> from the <Edit> menu.

To repaginate, select <Re-number Page No> from the <Edit> menu.

Page breaks should be entered so that it is unnecessary to repaginate when the program is changed. Therefore, page numbers can be assigned in preset intervals.

If there are page breaks, pages are printed separately during printing described later.

If there are page breaks, jump can be made specifying a page number or to the previous or next page by selecting <Jump> from the <Edit> menu.

■ Entering comments

In the main view, comments can be entered. Comments help to improve the readability of a graphic circuit.

Place the cursor on a cell where there is no graphic symbol or page break.

Select <Edit comment> from the <Edit> menu.

When a text input dialog box appears, enter a comment and click the [OK] button to enter the comment at the cursor location.

Comments can be deleted, moved, or copied by cut and paste.

■ Zoom in zoom out

The graphic in the main view can be zoomed in or out from 60 to 140% in 20% interval.

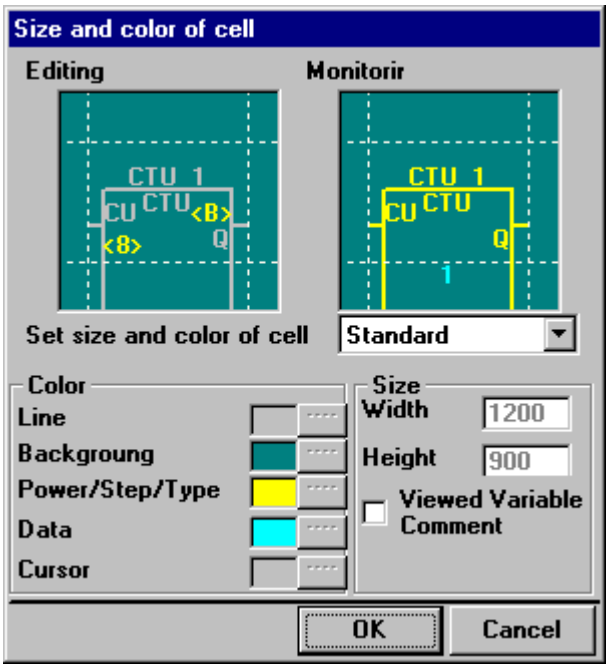
Select <Zoom> from the <View> menu or specify the zoom percentage in the zoom control.

■ Changing the color and size of the graphic

The background color, line color, monitor color, and cell size can be changed in the main view.

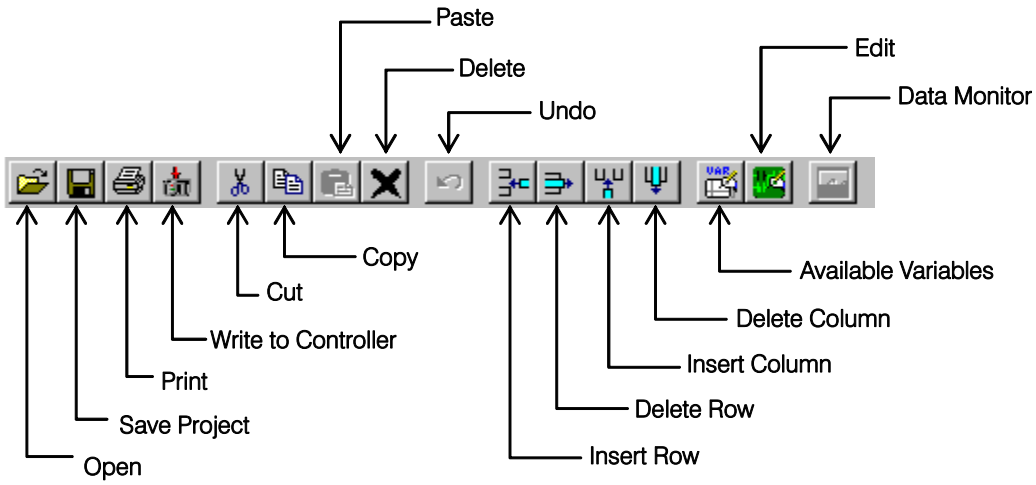
Select <Set Size and Color of Cell> from the <Tool> menu.

The default [Cell size and color of cell] is [Standard]. If you selected [User], you can change the color and size and store them to display with those values next time.



Tool icons

The meaning of the tool icons are as follows:



The meaning of a tool icon is displayed when the cursor is placed on an icon.

The function of each tool icon is also provided as menu.

5.2.10 Saving a task

■ Save

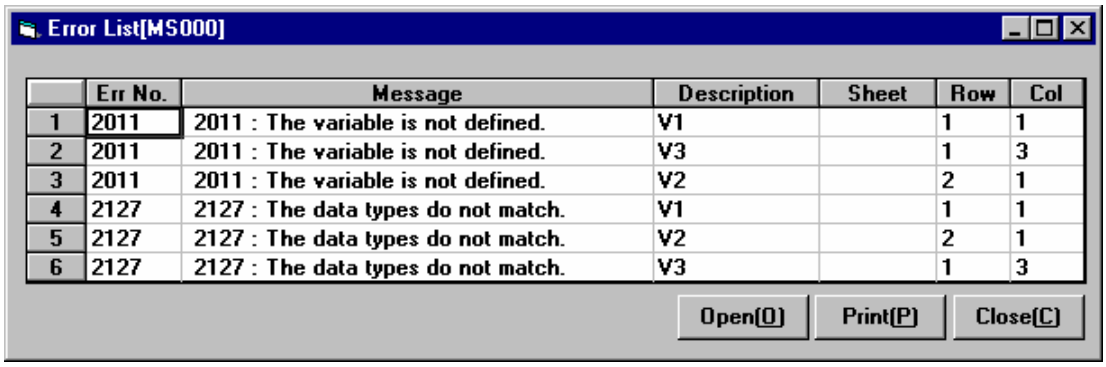
Select <Save Project> from the <File> menu to compile and save the edited program.

If there is no compile error, the program is saved after compiling.

If there is a compile error, an error list or a message appears.

If there is an error list, <Error List> becomes available in the <Edit> menu enabling the list to be opened from here also.

An example of an error list is shown below.



To find the location of an error, move the focus to a line in the error list and click the [Open] button to move the cursor to the corresponding location in the main view.

The error list can also be printed with the [Print] button.

The compiler detects more than one error so the same type of error may appear consecutively.

◇ Supplementary

- Since only the change part of a program is saved, the saving time of the 2nd is shortened as compared with the first time.

■ Saving temporarily

Select <Save temporarily> from the <File> menu to save the current program without compiling.

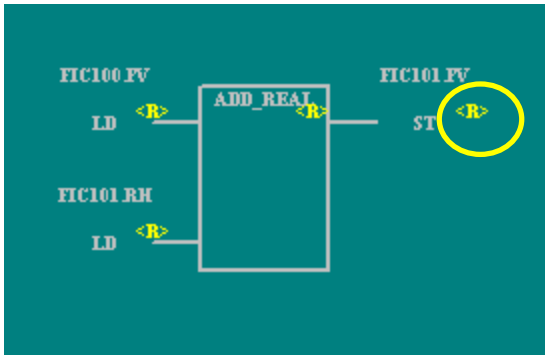
This is useful when saving a program that you are still editing or known to contain compile errors.

5.2.11 Displaying variable comment and instruction execution sequence

■ Displaying data types

In the [Program Editor], the data type of an instruction word or variable can be displayed for a compiled task (project).

1) Click <View data type> from the <View> menu.
The data types are displayed as follows:



The meaning of the abbreviations are as follows:

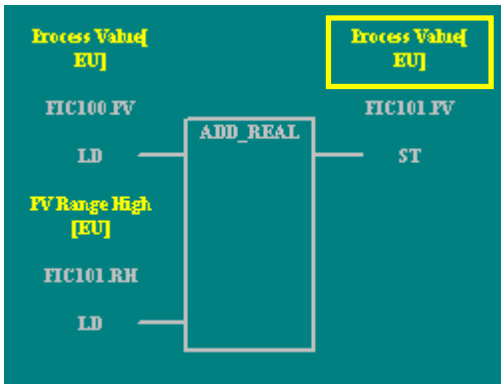
Abbreviation	Meaning
< B >	BOOL
< W >	WORD
< DW >	DWORD
< I >	INT
< UI >	UINT
< DI >	DINT
< R >	REAL
< T >	TIME
< D >	DATE
< TD >	TOD
< DT >	DT
< ST >	STRING

2) To stop displaying of data types, click <View data type> from the <View> menu once more.

■ Displaying variable comments

In the [Program Editor], the comment of a variable can be displayed for a compiled task (project).

1) Click <View Variable comments> from the <View> menu.
The variable comment appears above the variable name as shown below.

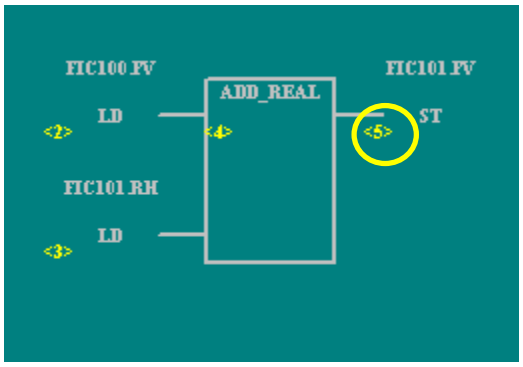


2) To stop displaying variable comments, click <View Variable comments> from the <View> menu once more.

■ Displaying instruction execution sequence

In the [Program Editor], the execution sequence (step number) of instruction words can be displayed for a compiled task (project).

1) Click <View Step No.> from the <View> menu.
The step number is displayed as follows:



2) To stop displaying step numbers, click <View Step No.> from the <View> menu once more.

5.2.12 Using the Cross Reference

The cross reference shows the task (program), controller, and station in which a variable is referenced or assigned.

This is useful in determining where data is originating or used when a program is not running as expected.

■ Displaying the cross reference

1) Open a task in the Program Editor.

2) If the task is compiled, move the cursor to the variable to search and select <Cross Reference> from the <Edit> menu. The cross reference can also be selected from the right click menu.

3) A window opens and search is started automatically.
If a variable is not selected in step 2), search as follows:

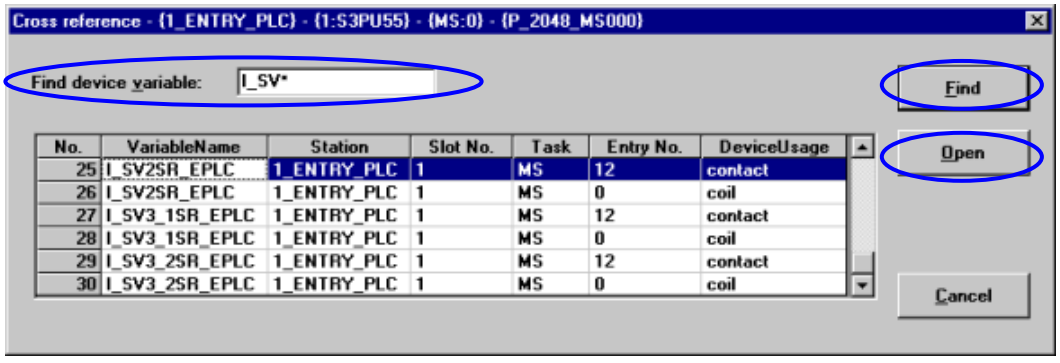
① Enter the device variable name to search.
In [Find device variable], you can specify a variable name such as "ABC" or use wildcards such as "ABC*" or "*ABC" to display a cross reference of variable names that match those criteria.

Ex-1) *_J5, CBM_*, CBM.*: '*' is used as any character(s).

Ex-2) CBM_?1, C?0, ABC[?]: '?' is used as a character.

The device variables that are fitting to these conditions can be found.

② Click the [Find] button.



The meaning of each item is as follows:

Item	Search result
Station	Station name
Slot No.	Main module slot no.
Task	Task in which the variable is referenced or assigned
Entry No.	Task entry No.
Reference	LD, ST, SET, contact, coil, set coil, reset coil

■ Opening a program

The procedure to open a program at the location (station/slot/task) indicated in the cross reference is as follows:

1) Click the target line in the cross reference list.
2) Click the [Open] button.
   The Program Editor opens and the cursor moves to the location specified by that line.
   The calling status is retained at the jump destination for online/offline status.

5.2.13 Using device variables property

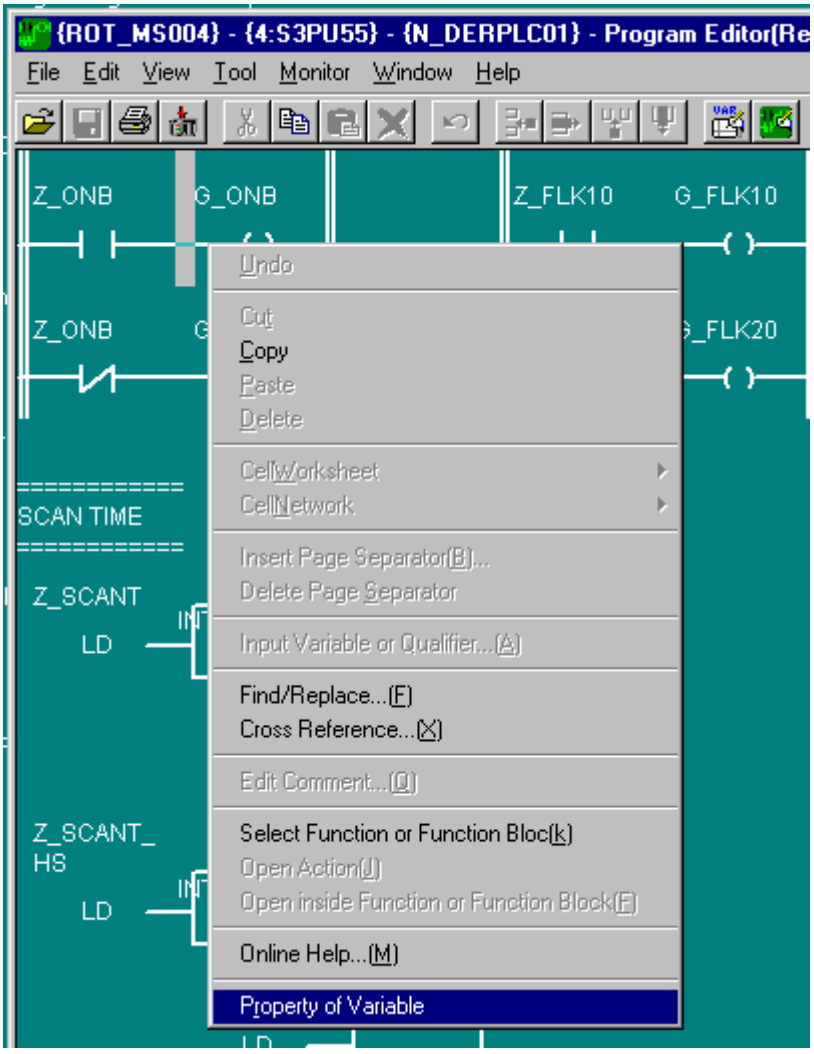
You can check the properties of device variables that are used on the programs.

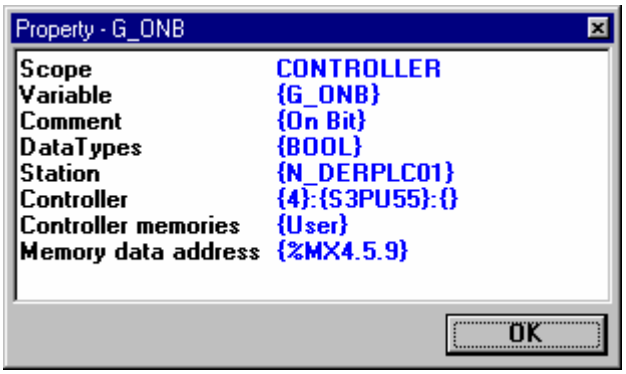
■ Restrictions

Device variables property window can not be refreshed displaying data. If you changed data, please re-open the windows manually.

■ Opening device variables property window

1) Select the device on the Program Editor, and click right button, select 'Device Variables Property' on Pop-up window.


{ROT_MS004} - {4:S3PU55} - {N_DERPLC01} - Program Editor(Re
File Edit View Tool Monitor Window Help
Z_ONB
G_ONB
Z_FLK10
G_FLK10
Z_ONB
_FLK20
SCAN TIME
Z_SCANT
LD
Z_SCANT_
HS
LD
Undo
Cut
Copy
Paste
Delete
CellWorksheet
CellNetwork
Insert Page Separator(B)...
Delete Page Separator
Input Variable or Qualifier...(A)
Find/Replace...(F)
Cross Reference...(X)
Edit Comment...(O)
Select Function or Function Bloc(k)
Open Action(J)
Open inside Function or Function Block(F)
Online Help...(M)
Property of Variable


Property - G_ONB
Scope CONTROLLER
Variable {G_ONB}
Comment {On Bit}
DataTypes {BOOL}
Station {N_DERPLC01}
Controller {4}:{S3PU55}:{}
Controller memories {User}
Memory data address {%MX4.5.9}
OK

- Display Items

Item/Scope	Network	Network I/O	Station	Station I/O	Controller	Controller I/O	Local
Device	○	○	○	○	○	○	○
Device comment	○	○	○	○	○	○	○
Data type	○	○	○	○	○	○	○
Network	○	○	—	—	—	—	—
Network module	○	○	—	—	—	—	—
Station	—	○	○	○	○	○	○
Controller	—	○	○	○	○	○	○
I/O module	—	○	-	○	-	○	-
Scan data address	○	○	-	-	-	-	-
Controller memory	○	○	○	○	○	○	○
Memory data address	○	○	○	○	○	○	-
Program name	—	—	—	—	—	—	○
Input / Output	○	○	○	○	—	○	○

Format is as follows:

- Scope: 'NETWORK' / 'STATON' / 'CONTROLLER' / 'LOCAL'
- Device variable: {Device Name}
- Data type: {Data type}
- Network: {NetNo}:{Network CatCode}:{Network Comment}
- Network module: {NodeNo}:{Node CatCode}
- Station: {Station name}
- Controller: {SlotNo}:{Controller Catcode}:{Contoller Comment}
- I/O module: {MM-BB-UU-SS.WordNo[.BitNo][,IO Area Name]}:{I/O Module Catcode}
- Scan data address: {Talker BlockNo}.{WordNo}[.{BitNo}]
- Controller memory: {Memory Block Name}
- Memory data address: {%MW*}(IQ*)
- Program name: {POU Name}
- Input / Output: 'INPUT' / 'OUTPUT' / 'IN_OUT'

5.3 Structured Text

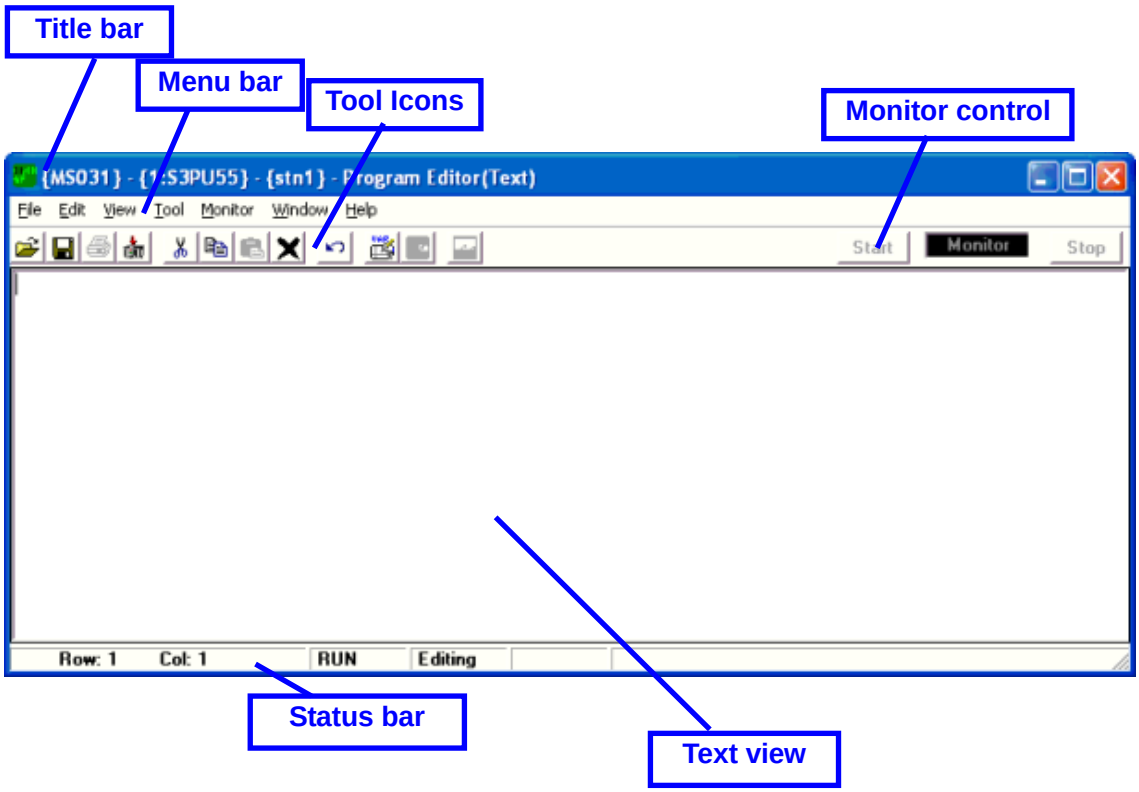
Explains how to make structured text program using program editor (Text).

◇ **Supplementary**

- This function is not supported in Engineering tool 2.

5.3.1 Organization of program editor (Text)

■ Control names of program editor (Text)



■ Title bar

Displays name and location of the program.

■ Menu bar

Displays top menu to open the detail by pressing ALT key and the displayed key without operating mouse.

■ Tool Icons

Frequently used menu items are also assigned to the tool icons. Put your mouse pointer on the icon to show the name of menu item.

■ Monitor control

Starts and stops the online monitor for the program in text view.

■ Text view

Displays program code of ST (Structured text).

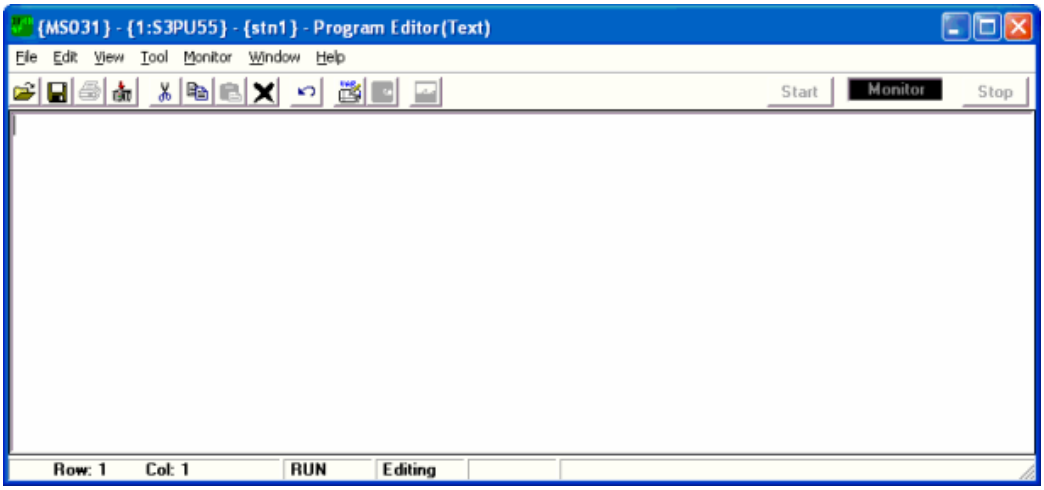
■ Status bar

Displays line and column number of the cursor position, status of the connected controller, status of the editor and current date.

5.3.2 Opening program

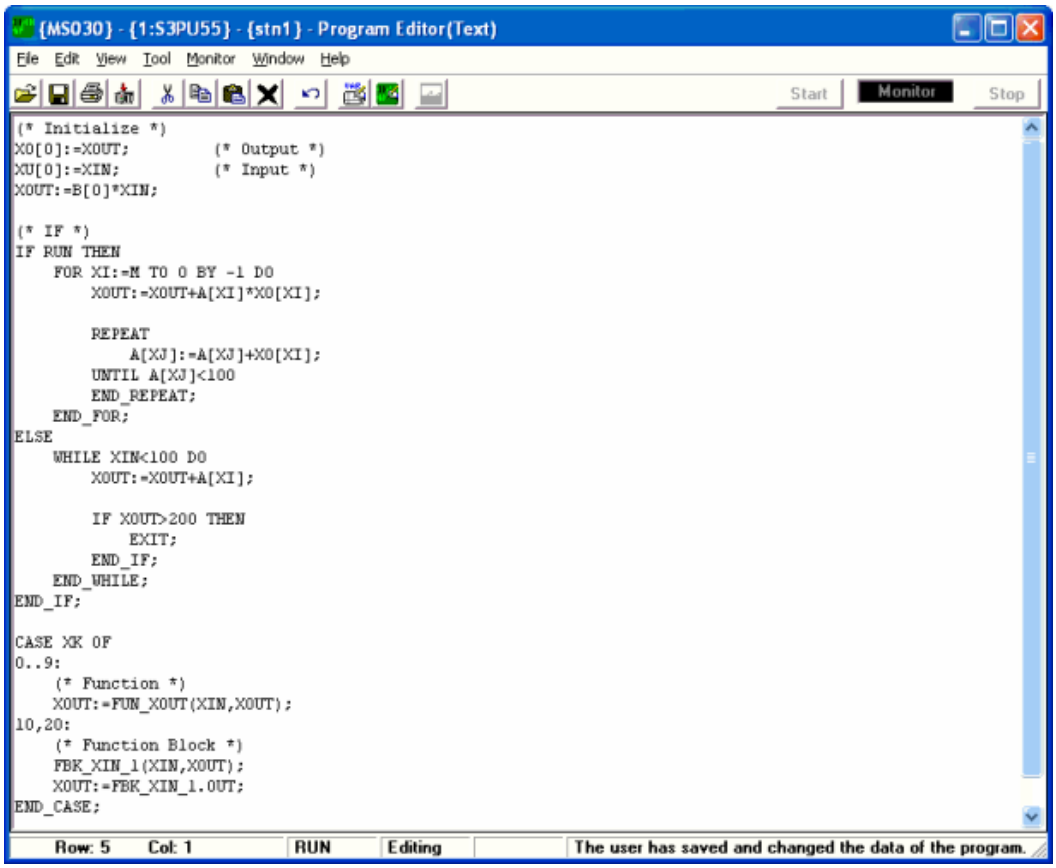
■ Open new program using ST

Enter new program name and select <Text> in [Task Entries] to open the program using Program Editor (Text) shown as follows.



■ Open existed program using ST

Click existed ST program in [Task Entries] to open the program using Program Editor (Text) shown as follows. After opening existing program, it ‘s read only. Click menu <Edit><Enable> to let the view enable to edit.



5.3.3 Editing program

Explains how to edit Structured Text using Program Editor (Text).

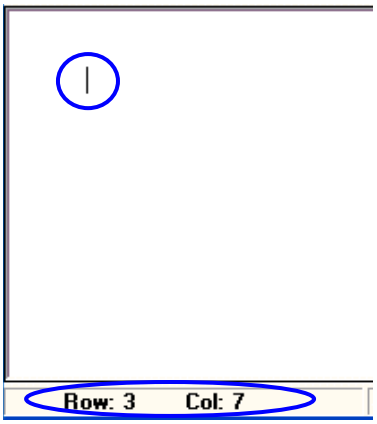
See [1.3.14 Structured Text (ST)] section to understand how to program ST.

■ Cursor operation

Click text view to display a cursor.

Press [←], [→], [↑], [↓] keys to navigate the cursor.

The status bar shows line and column number of the cursor position in Text view.



■ Enable and disable to edit

Click menu <Edit><Enable> to let the text view enable to edit.

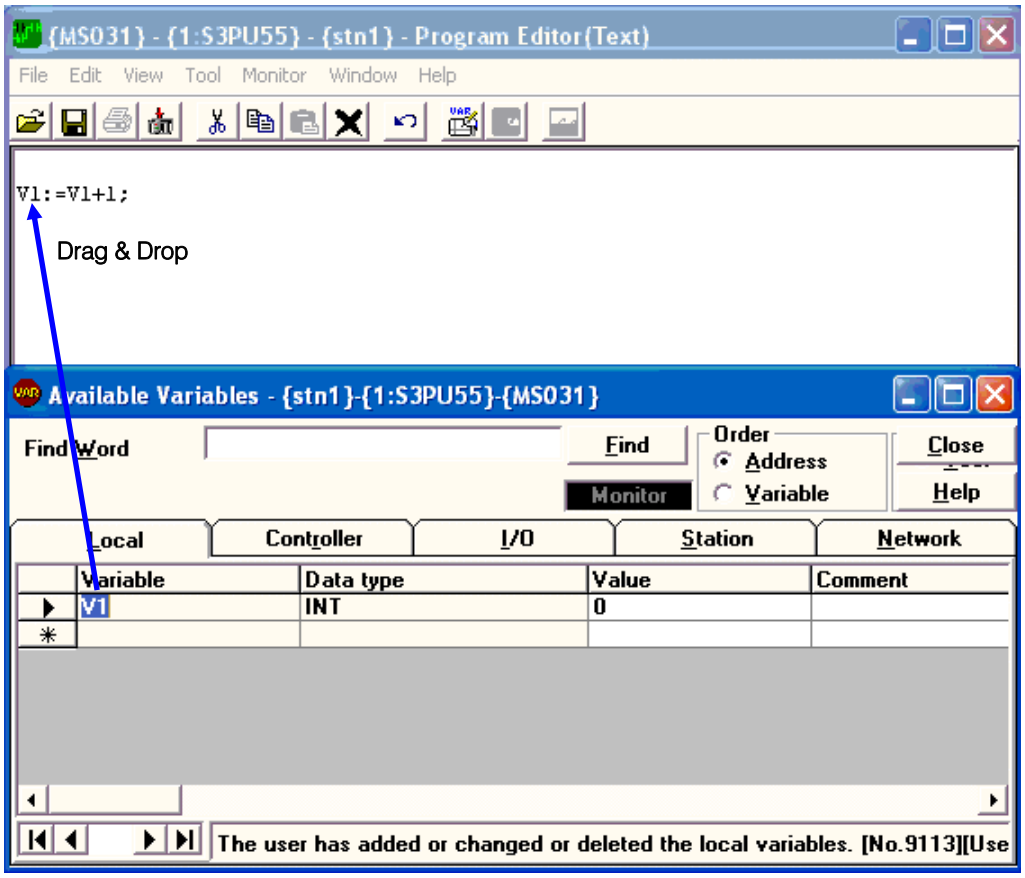
■ Operations for editing ST.

Operation	How to do
Move cursor to the left. Move cursor to the right. Move cursor to the up. Move cursor to the down.	Press [←] key. Press [→] key. Press [↑] key. Press [↓] key.
Move cursor to the left edge. Move cursor to the right edge.	Press [Home] key. Press [End] key.
Insert the type name of usable Function between the lines.	Move the cursor to the position you want to insert. Right-click and select menu <usable functions> to open it. Click one of the Functions to insert the name in the cursor position.
Copy text.	Move the cursor to the start position. Press [Shift] + one of [←], [→], [↑], [↓] keys to select the text. Press [Ctrl] + [C] to copy text to clipboard.
Cut text	Move the cursor to the start position. Press [Shift] + one of[←], [→], [↑], [↓] keys to select the text. Press [Ctrl] + [X] to cut and copy the text to clipboard.
Paste text	Move the cursor to the start position. Press [Ctrl] + [V] to paste the text in the position if the clipboard has some text.
Delete text	Move the cursor to the start position. Press [Shift] + one of [←], [→], [↑], [↓] keys to select the text. Press [Del] key to delete the text. This operation does not change clipboard contents.
Undo	Click menu <Edit> <Undo> to back your latest editing. It is single buffering undo but not multiple-buffering.

5.3.4 Entering variables

Instead of typing variable name in your program code, you can copy existing variable name in drag & drop manner shown as follows.

1) Move cursor to the inserting position in the Text View.
2) Click <Edit><Open Usable Variables> to open it.
3) Put mouse pointer on the variable name and drag and drop it on the Text View to insert the variable name in the cursor position.



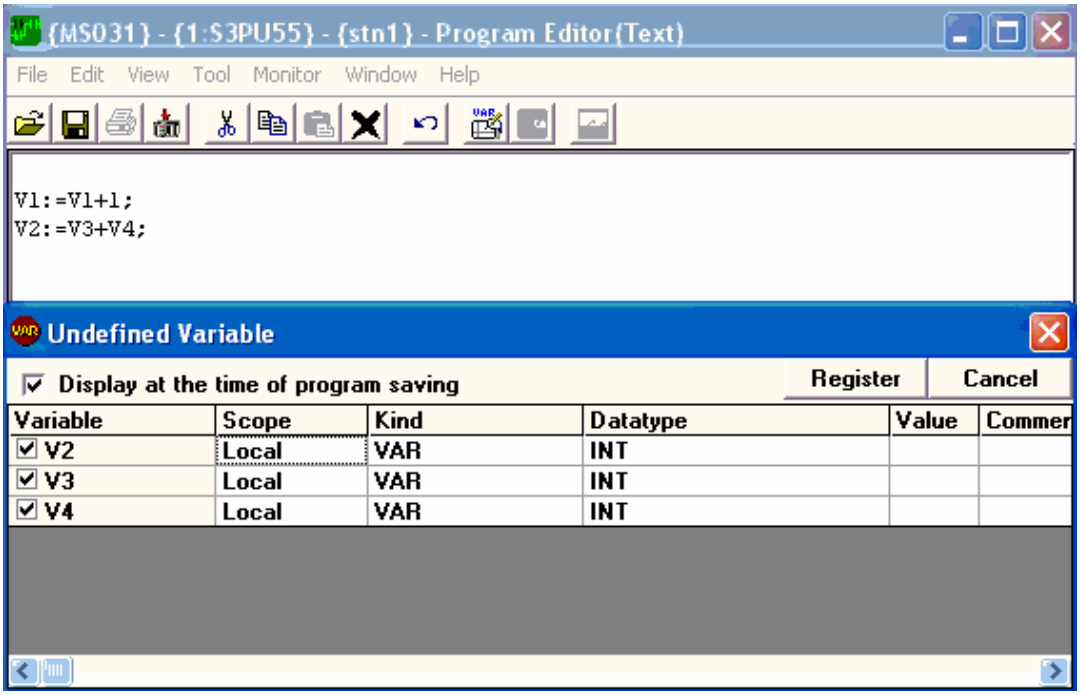
5.3.5 Declaring variables

■ Declaring variables manually

See [5.2.5 Declaring Variables] section to declare variables manually.

■ Declaring variables automatically

1) Write your program in Text View.
2) Click menu <Edit><Save> menu to compile and save your program.
3) If your program has some variables which do not exist, [Undefined Variables] form will appears.
   In the form, select the data of [Scope], [Kind] and [Data type] fields if necessarily.
   And also set the data of <Initial value> and <comment> if necessary.
   Note that the variable of Function Block needs the type name as data type.
4) Click [Register] button to declare variables automatically.
   Note that each of the declaring variables can be skipped if you clear the check-off in <Variable> field.
5) Open menu <Edit><Usable Variables> menu to see the declaration result.



◆ **Important**

- If you add, delete or change the local variables of existing Function Block, the size, contents or interface of the Function Block may be changed.
- If so, you should delete the instance variable declaration of Programs or Function Blocks which call the changed Function Block.

5.3.6 Using functions

Explains how to insert the name of usable Function between the lines of ST program code.

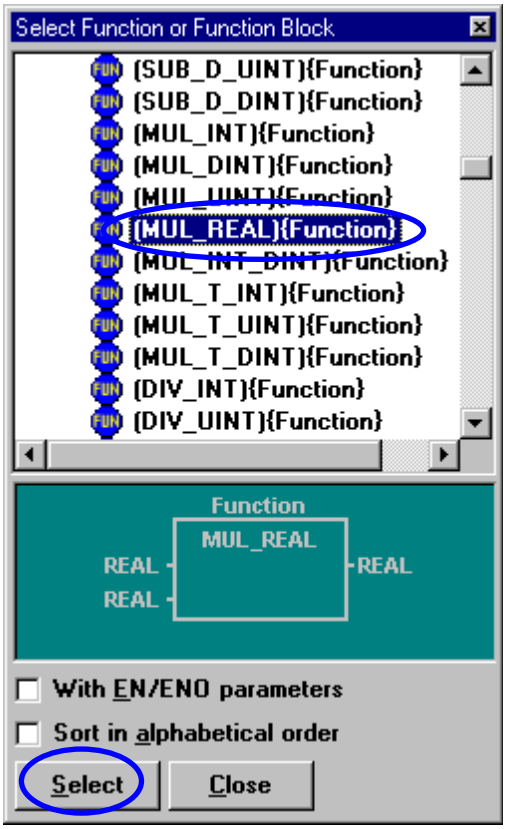
See <1.3.14 Structured Text(ST)> to understand how to program and call Function and Function Block using ST language.

■ Insert function name

In the Text View ,move cursor to the start position where you want to write the function name.

Right-click menu <Select Function/Function Block> to open the following form.

Click the function you need and click [Select] button to insert the name in the cursor position.



5.3.7 Using Function Blocks

Explains how to insert the name of usable Function or Function Block between the lines of ST program code.

See [1.3.14 Structured Text (ST)] section to understand how to program and call Function and Function Block using ST language.

■ Insert default variable name of Function Block

In the Text View ,move cursor to the start position where you want to write the variable name.

Right-click menu <Select Function/Function Block> to open it.

Click the Function Block you need and click [Select] button to insert the default variable name in the cursor position.

■ Declaring variable of Function Block

See [5.2.7 Using Function Blocks] section.

◆ Important

- In a POU, you can not multi-call the instance of Function Block because the multi-calling may cause unexpected results. Saving program that has the multi-calling, the compile error will be reported.
- If you will allow the multi-calling, you need to change the following settings in your responsibility.

<How to change the settings for multi-calling>

- Exit V-T ool3.
- Open 'Compile2.ini' file using general text editor, for instance, Note Pad that is attached in Windows.
  Find the following description, change the settings and save the data.

  ```
  ---
  [Compile]
  AllowDupFB =*
  ----
  ```

  'AllowDupFB =0' means that multi-calling of Function Block is not allowed by compiler.
  'AllowDupFB =1' means that multi-calling of Function Block is allowed by compiler.
- Start V-Tool3 to make the data available.
  In case of Client/Server version of V-Tool3, you need to set the data in all PCs.

5.3.8 Searching and replacing device variables

Explains how to search and replace device variables of Program Editor (Text).

■ Searching text

1) Click menu<Editor><Search & Replace> to open the form.
2) In <Search> field, enter text you search.
3) In <Scope>, <Direction>, <Comparison> fields, change data if necessary shown as follows.

<Scope>	<Local>: search text in the POU you open. <Controller>: Not supported in current version.
<Direction>	<Up>: search text upward. <Down>: search text downward.
<Comparison>	<Match>: search the same text. <Contain>:search text that contains the given text.

4) Click [Search Next] button. Hitting the text, the cursor will point it.
5) Hitting result has two or more, click [Search Next] button to make the cursor point the next text.
   If you select 'Contain' in <Comparison> field, you can search text using wildcards shown as follows.

Wild card	Meaning
?	a character
*	characters
#	a numeric character

Example of searching:

	<Match>	<Contain>	<Contain>
Given text	ABCDE	ABCDE*	*ABCDE
Hit text	ABCDE	ABCDE, ABCDE[100]	ABCDE, D.ABCDE
Not hit text	ABCDE_1	AABCDEE	DATA_ABCDEF

■ Replacing text

1) Click menu<Edit><Enable> to check off and menu<Edit><Search & Replace> to open the form.

2) In <Scope> filed, select <Local> option.

3) In <Search> field, enter text you search.

4) In <Replace> field, enter text with which you replace.

5) Click [Replace] button to search and replace if the given text is found.

5.3.9 Saving program

Explains how to save program written by Program Editor(Text).

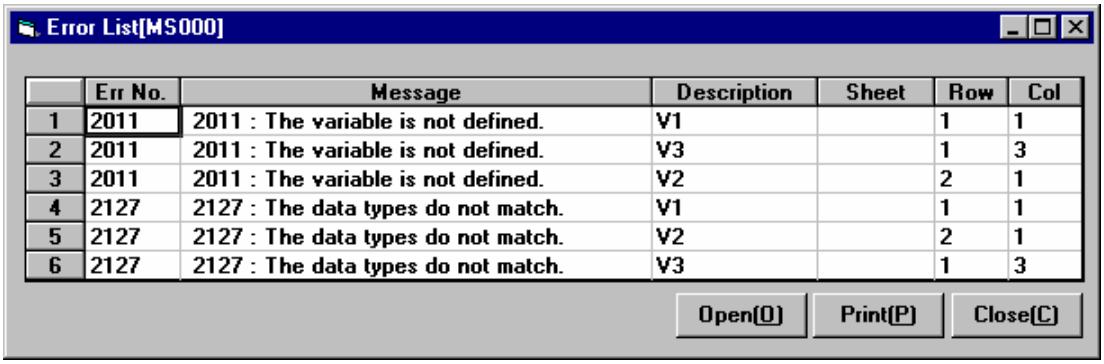
■ Saving program

Click menu<File><Save> to compile and save program you have made.

If the program has no errors, the saving will be finished normally.

If it has some errors, dialog box asks you if you need error list will appear.

In case of having errors, not only by confirming the dialog but also by clicking <Edit><Compile Error List> menu, the error list will be opened as follows.



Click a row of the list and <Open> button to let the cursor of TextView move to the location the error occurred.

Click <Print> to print error list.

Error list may display similar errors, because the compiler has multi error detection system.

■ Save temporarily

Click <File><Save temporarily> menu, If you need save program without compiling.

■ Error messages

Error messages Program Editor(Text) displays are shown as follows.

No.	Error Message	Explanation
300	End of comments '*)' is no found.	Comment should start from '(*' and end to '*)'.
301	The literal of 'Integer' is invalid.	The Integer has wrong expression as IEC61131-3 or the value is out of range.
302	The literal of 'Binary integer' is invalid.	The binary number has wrong expression as IEC61131-3 or the value is out of range.
303	The literal of 'Octal integer' is invalid.	The octal number has wrong expression as IEC61131-3 or the value is out of range.
304	The literal of 'Hex integer' is invalid.	The hexadecimal number has wrong expression as IEC61131-3 or the value is out of range.
305	The literal of 'Real' is invalid.	The floating point number has wrong expression as IEC61131-3 or the value is out of range.
306	The literal of 'Time' is invalid.	The time duration number has wrong expression as IEC61131-3 or the value is out of range.
307	The literal of 'Time of day' is invalid.	The time of day number has wrong expression as IEC61131-3 or the value is out of range.
308	The literal of 'Date' is invalid.	The date number has wrong expression as IEC61131-3 or the value is out of range.
309	The literal of 'Date and time' is invalid.	The date and time number has wrong expression or the value is out of range.
310	The <Integer selector value> of CASE is invalid.	The compared numbers with '..' is not integer number.
312	Identifier is invalid.	The identifier has wrong expression as IEC61131-3.
313	The directly represented variable is invalid.	The direct representative variable has wrong expression as IEC61131-3.
330	End of the statement must be semicolon. ';'	End of the statement should has a semicolon ' ; '.
332	Bracket ')' is not found after '('.	Left parenthesis '(' needs the right one ')'.
334	Bracket ']" is not found after '['.	Left parenthesis '[' needs the right one ']'.
335	Colon ':' is not found after the <Integer selector value> of CASE.	End of the number list needs a colon ' : '.
336	Variable member is not found.	The variable expression has no member.

No.	Error Message	Explanation
337	Assignment statement needs ': = '.	Assignment statement needs ‘: = ’ operator for setting data to a variable.
338	The keyword 'THEN' is not found in IF statement.	IF statement needs ‘THEN’ keyword after the condition expression.
339	End of IF statement must be 'END_IF'.	End of IF statement needs ‘END_IF’ key word.
340	The keyword 'OF' is not found in CASE statement.	CASE statement needs ‘OF’ key word after the index variable.
341	End of CASE statement must be 'END_CASE'.	End of CASE statement needs ‘END_CASE’ keyword.
342	The keyword 'TO' is not found in FOR statement.	FOR statement needs ‘TO’ keyword between min-value and max value.
343	The keyword 'DO' is not found in FOR or WHILE.	Both FOR statement and WHILE statement need ‘DO’ key word in the beginning statement.
344	End of FOR statement must be 'END_FOR'.	End of FOR statement needs ‘END_FOR’ keyword.
345	End of WHILE statement must be 'END_WHILE'.	End of WHILE needs ‘END_WHILE’ keyword.
346	The keyword 'UNTIL' is not found in REPEAT statement.	REPEAT statement needs ‘UNTIL’ keyword before the condition expression.
347	End of REPEAT statement must be 'END_REPEAT'.	End of REPEAT statement needs ‘END_REPEAT’ keyword.
348	Statement is invalid.	The top of statement needs a variable for Assignment, Function name ,Function block instance name or keyword of statement header.
349	The <Integer selector value> of CASE must be integer value.	Comparison data of CASE statement should be integer notation.
350	Expression is invalid.	Condition expression of statement or right expression of Assignment needs a variable, a constant, a function or correct expression.
351	Array element must be integer or index-variables.	Index of array variable needs integer number, or index variable.
352	Index-variables is not used in CASE/FOR statement.	In CASE statement or FOR statement, an index variable should be described after ‘CASE’ or ‘FOR’.
353	EXIT statement is available in FOR/WHILE/REPEAT statement.	EXIT statement should be described in the loop of FOR , WHILE or REPEAT statement.
354	Variables notation is invalid.	Pointer representative variable needs prefix data type and variable.
355	The directly represented variable must have even word number.	The word number of direct ‘%D’,’%F’ representative variable should be even number.
356	Invalid indexed description. Check index name, numeric subrange or usage of '[ ]'.	Index of array should be index variable or 0-65535 integer constant.

No.	Error Message	Explanation
357	Invalid description as pointer type variable. Please use basic data type. (ex. ABC {INT} [XI], MAP {BOOL} [7])	Data type of pointer representative variable should be elementary data type, that is described in parentheses '{ }'.
358	Declaration of pointer type variable must be used the data type 'PTR' or 'PTRB'.	Pointer representative variable needs declaration with 'PTR' or 'PTRB' data type.
359	Invalid description as pointer type variable, because it is unmatched with the declaration.	Pointer representative variable with BOOL type needs the declaration has 'PTRB' data type. And also pointer representative variable with none BOOL type needs the declaration has 'PTR' data type.
360	Variable is not defined.	The variable declaration is not found.
361	Word address of the directly represented variable is out of range.	The work number of direct representative variable should be below 4 M words.
362	This variable is prohibited processing batch I/O.	The I/O variable does not have batch I/O function.
363	Pointer type variable is invalid.	In pointer representative variable, left parenthesis '{' needs the right one '}'
364	FUN/FBK is not registered.	The Function or Function block does not registered in POU entry.
365	FUN/FBK is not compiled.	The Function or Function block is not compiled.
366	Return value of FUN is not defined.	In local variable declaration of user function, the return type ,that is 'FUNCTION' type, is not found.
367	Return value of FUN is not stored.	Assignment can not be performed to Function.
368	Return value of FUN can not be stored.	Function which return type is pointer can not described in the expression of statement.
369	Return value of FUN should be POU name.	In local variable declaration of user function, the function name should be declared as 'FUNTION' type.
370	Data type is mismatched, or it can not be used.	Each operators need matched data types of variables, functions or constants.
371	Argument number of FUN/FBK is mismatched.	The number of function parameters does not match the declaration.
372	Argument data type of FUN/FBK is mismatched.	Data types of function parameters do not match the declaration.
373	Data type of assignment statement is mismatched.	Assignment statement needs the match of data types.
374	Pointer type variable can not be stored.	Pointer representative variable cannot be assigned directly.
375	Data type of condition is invalid in IF/FOR/WHILE/REPEAT statement.	Each of IF, WHILE and REPEAT statements needs BOOL type expression. FOR statement needs INT or DINT type constant or variable as MIN, MAX, STEP.

No.	Error Message	Explanation
376	Data of MIN/MAX/STEP is invalid in FOR statement.	FOR statement needs INT or DINT type constant or variable as MIN, MAX, STEP.
377	The Function Block variable overlaps.	In a POU, you can not duplicate Function block calling.
378	Index-varilable can not be used, because bit-size of array element must be within 65535.	In BOOL type index access, the bit size of element should be below 65535.
379	Index-varilable can not be used, because word-size of array element must be within 65535.	In none-BOOL type index access, the word size of element should be below 65535.
380	The BOOL type variable has the over 1M word address that the instruction cannot access.	In BOOL type access, the word address should be below 1M words.
381	The variable has over 16M word address that the instruction cannot access.	In none-BOOL type access, the word address should be below 16M words.
382	Program step is too big.(Max.4KStep)	Program step size should be below 4 K steps.

5.3.10 Using cross reference

Cross-reference is a function to inspect in which station, in which controller, in which program and how the variables you look are used. It is useful for you to know data source and destination when inspecting programs that perform unexpectedly.

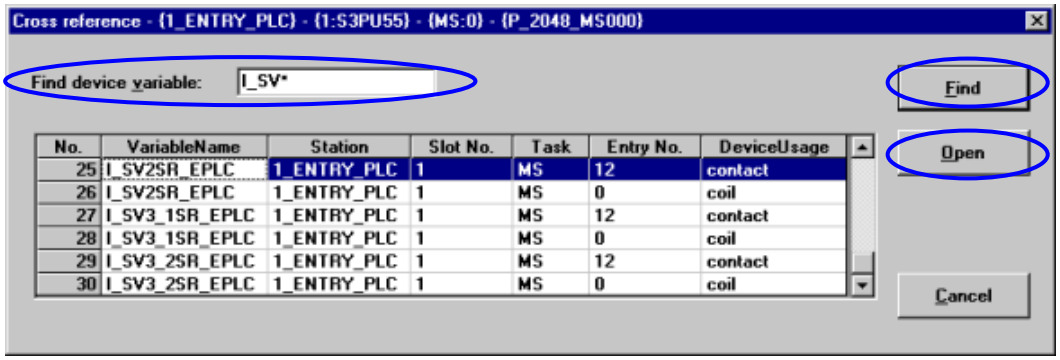
■ Starting cross-reference

1) Click a program you need in Task Entry to open Program Editor (Text).
2) You can click <Edit><Cross-reference> menu if the program is saved and compiled normally. In another way, it is available to right-click and select <Edit><Cross-reference> menu.
3) Opening the following form and searching will be started.

   If you do not select a device variable in program, you can set not only variable name but also variable pattern characters using some wild cards shown as follows.

   Example 1:
   _J5, CBM_*, CBM : <*> character means any characters

   Example 2:
   CBM_?1, C?0, ABC[?] :<?> character means any character.



Item	Means
Variable Name	Searched device variable name
Station	Station in which device variable is used.
Slot No.	Main Slot No. of Controller in which device variable is used.
Task	Task in which device variable is used.
Entry No.	Task Entry in which device variable is used.
Action/Phase	<No use>
Page/Sheet No.	Page 1 <fixed>
Row	Row No. of page in which device variable is used.
Column	Column No. of page in which device variable is used.
Reference	If used device variable is loaded (LD) or stored (ST).

■ Opening referred program

Click a item of cross-reference list you need.

Click [Open] button to open the referred program and let the cursor move to the location.

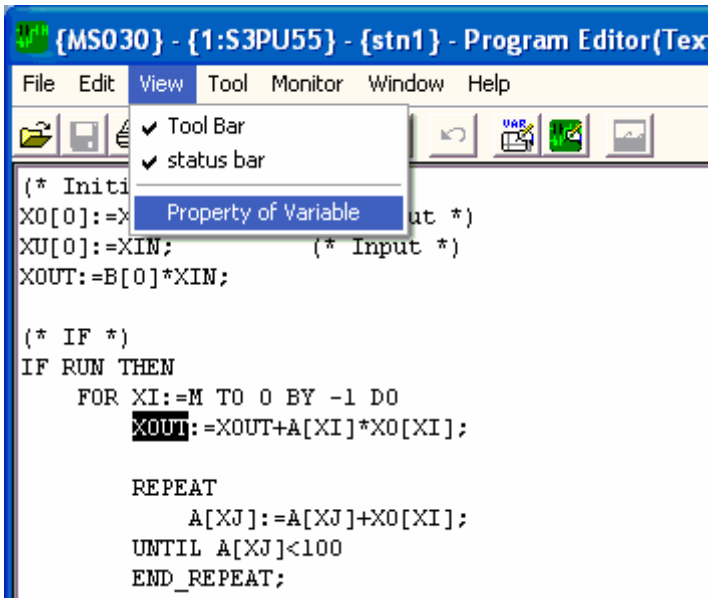
Not only in offline mode, but also in online mode, the mode will be inherited.

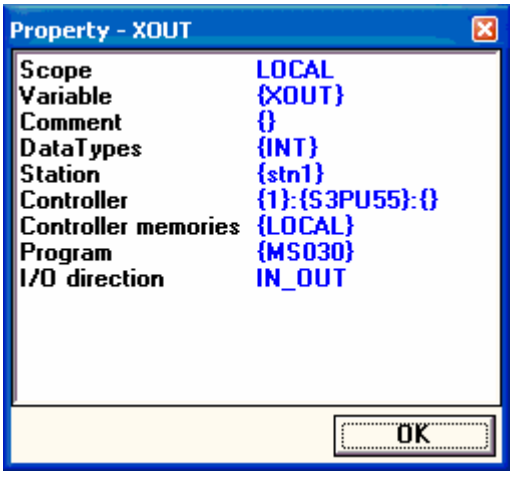
5.3.11 Using device variable property

Explains how to display the property of device variable used in program.

■ Opening device variable property

In Text View, select a variable you need to display the property and click <View>< Property of Variable > shown as follows. In another way it is available to right-click to select <View><Property of Variable> menu.





See [5.2.13 Device Variable Property] section about the meanings of displayed items.

◆ **Note**

- The view of device variable property is snapshot and not refreshed if the declaration of variable is changed by some other users during displaying view.

5.4 Full Graphic

Explains how to use Program Editor (Full Graphic) for programming LD, FBD and SFC.

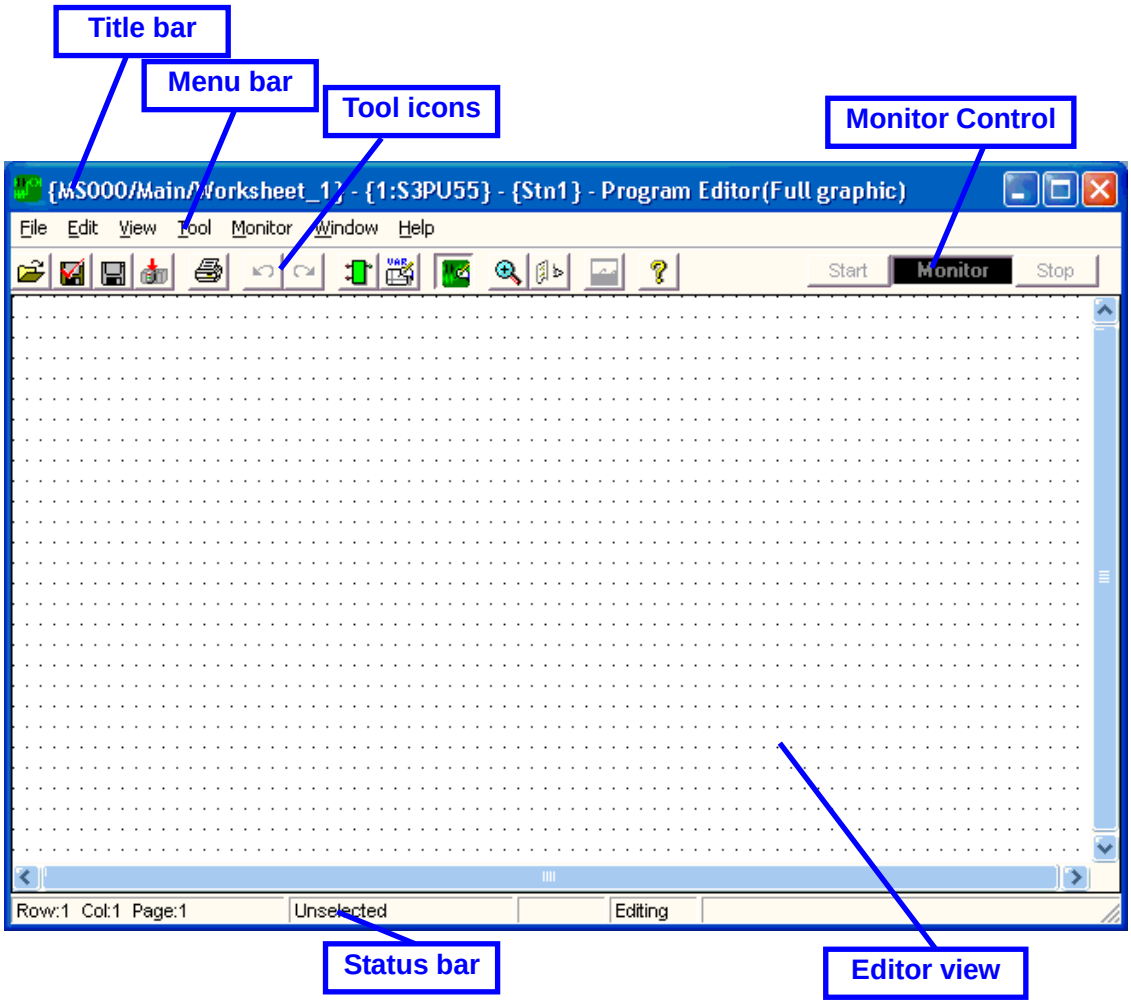
The following items are explained.

◇ **Supplementary**

- This function is not supported in Engineering tool 2.

5.4.1 Organization of program editor (Full graphic)

Control names of program editor (Full graphic)



Title bar

Displays the name and location of the program.

Menu bar

Displays the top menu to open the detail by pressing ALT key and the displayed key without operating mouse.

Tool icons

Frequently used menu items are also assigned to the tool icons. Put your mouse pointer on the icon to show the name of menu item.

Monitor control

Starts and stops the online monitor for the program in text view.

Editor view

Displays a worksheet in which full-graphical program is drawn by LD,FBD or SFC.

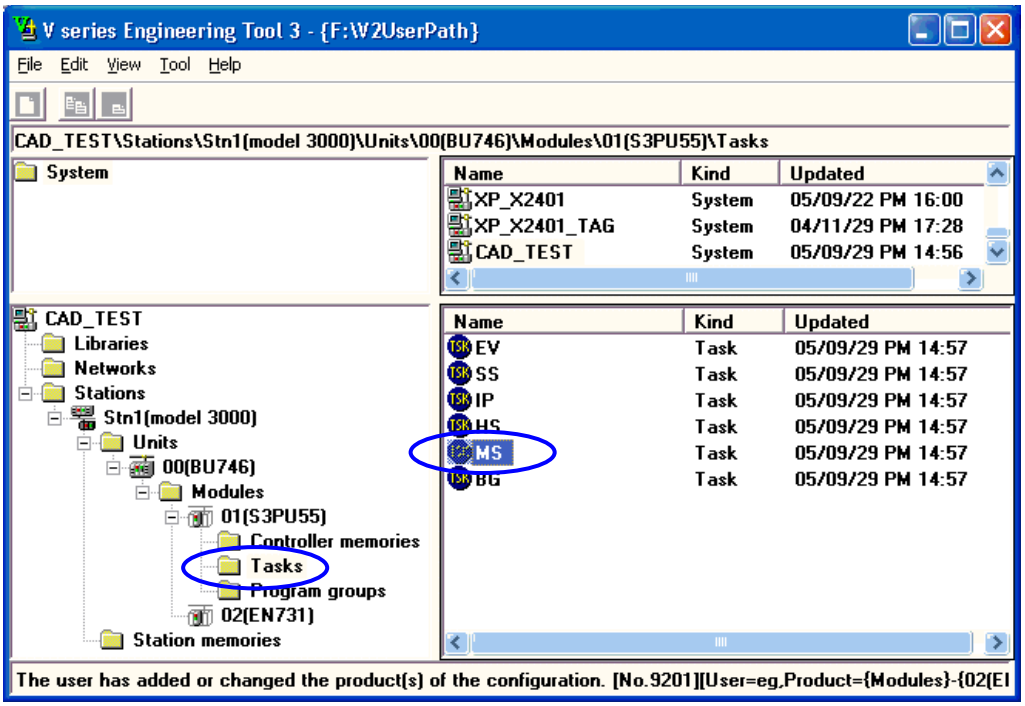
Status bar

Displays the row and column number of the cursor position ,status of the connected controller ,status of the editor and current date.

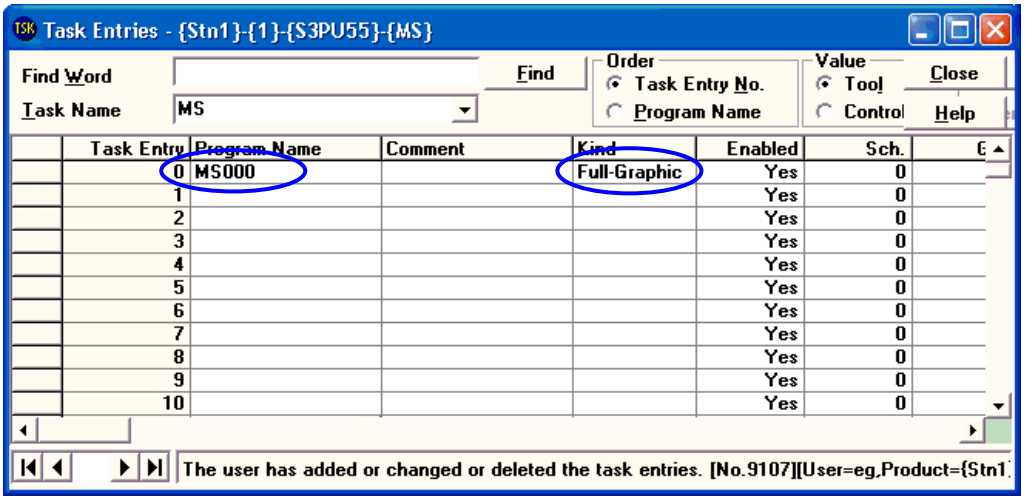
5.4.2 Opening program

■ Creating or opening full-graphic program

1) In Product Tree, select Station, Controller ,Task in which you need to make program as follow.



2) Click task name (ex. MS) to open [Task Entry] form shown as follows.



3) To create new program, enter <Program Name>, select 'Full-Graphic' as <Kind> and click <Open program editor> button.
To open existing program, select a row of existing task entries and click <Open program editor> button.

■ Task entry information

Program Information can be shown as follows:

<Compiled>
Status of program data and code binary is shown as follows:

- Yes: All POU are already saved, and no error. All POU means a Program with User Function and User Function Block, is called from the program.
- No: All POU are not saved yet, or they have compiling error.

<Modified>
Date and time, when program was modified, is shown. Modified program means the following operations: <Save Temporally>, <Save>, <Save and Download>, <Batch Compile>

◆ **Note**

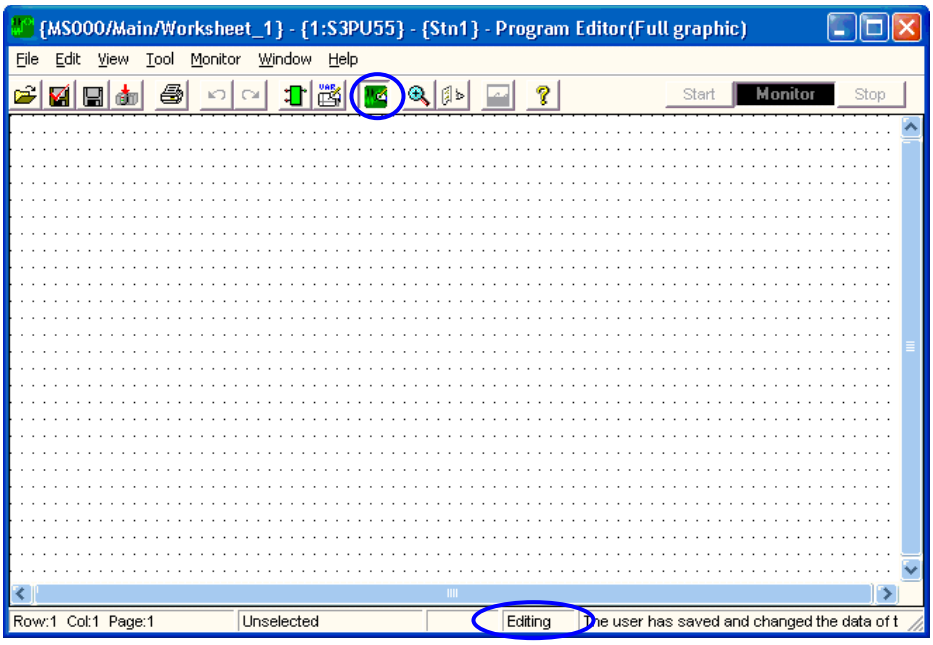
- This Date and time means a program modified time only. Modifying User Function and User Function Block, which is called from the program, is not included.

<Steps>
Program code binary size is shown.

- When <Modified> is 'Yes', step size is shown.
- When <Modified> is 'No', size '0'(Zero) is shown.

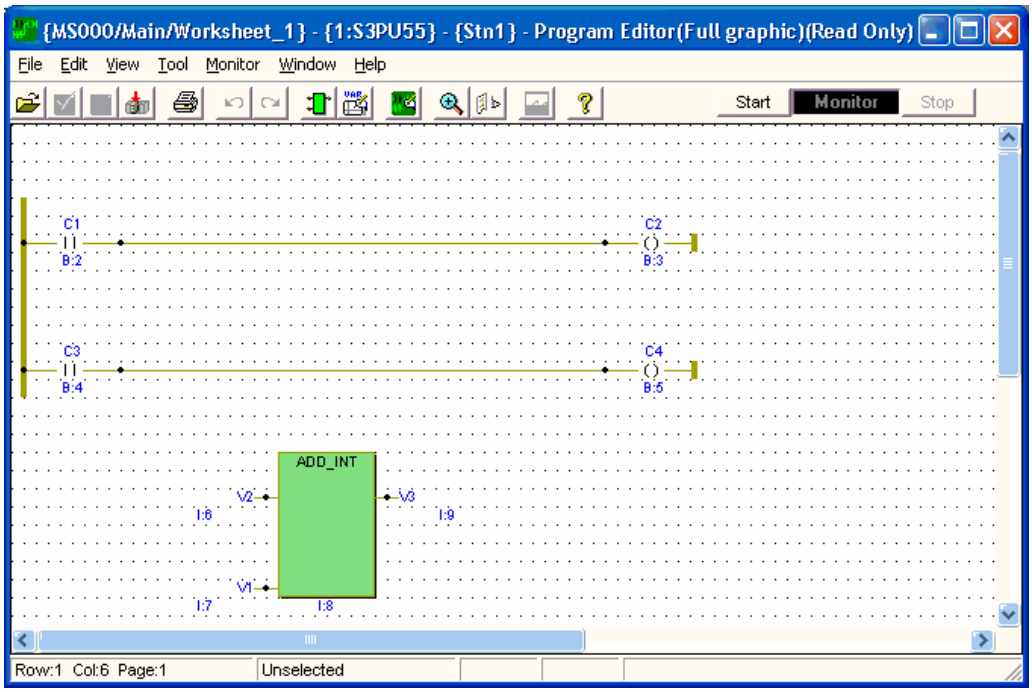
■ In case of new program

New program is opened 'enable to edit' initially.



■ In Case of existing program

Existing program is opened 'read only' initially. If you want to edit, click <Edit><Enable>.



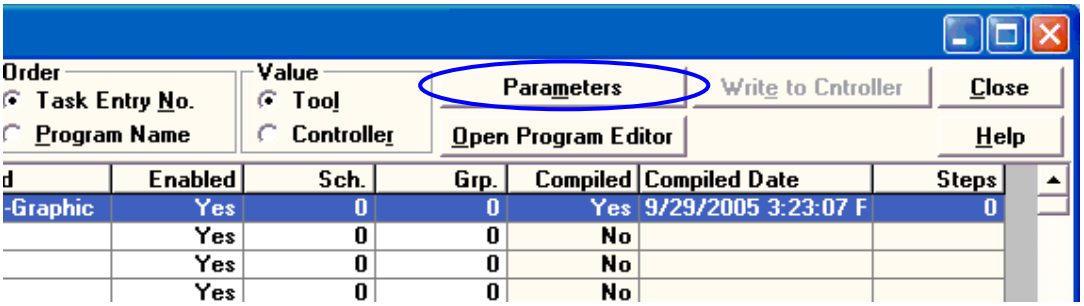
■ Exit program editor

To exit Program Editor, click <File><Exit>, click [X] button in the right edge of title bar or double-click app icon in the left edge of title bar.

■ Registering task parameters

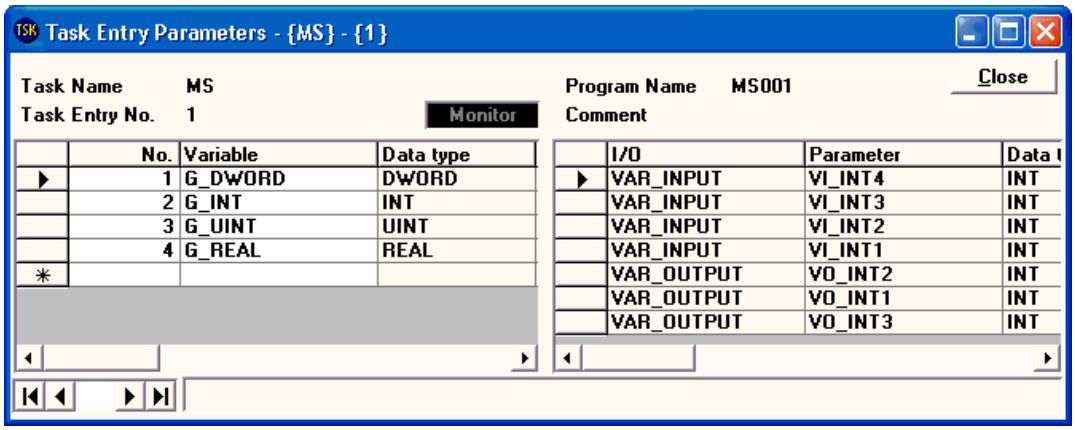
If you declare in/out parameters (VAR_INPUT, VAR_IN_OUT, VAR_OUTPUT) for Program ,you need to attach global variables to the parameters according to the following ways.

1) In [Task Entry] form, click [Parameters] button to open [Task Entry Parameters].



2) In [Task Entry Parameters], enter global variable name for each parameter shown as follows.

Global variables will be displayed according to <No.>
Not only variables count and parameters count but also the data types should be equal.



5.4.3 Drawing program

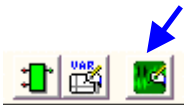
Explains how to draw full graphic program using Program Editor (Full Graphic).

■ Drawing cursor

Click space of Editor View to display drawing cursor.

■ Enable to edit

Click <Edit><Enable> or the following tool icon to let Editor View enable.



Click it once more to let Editor View disable.

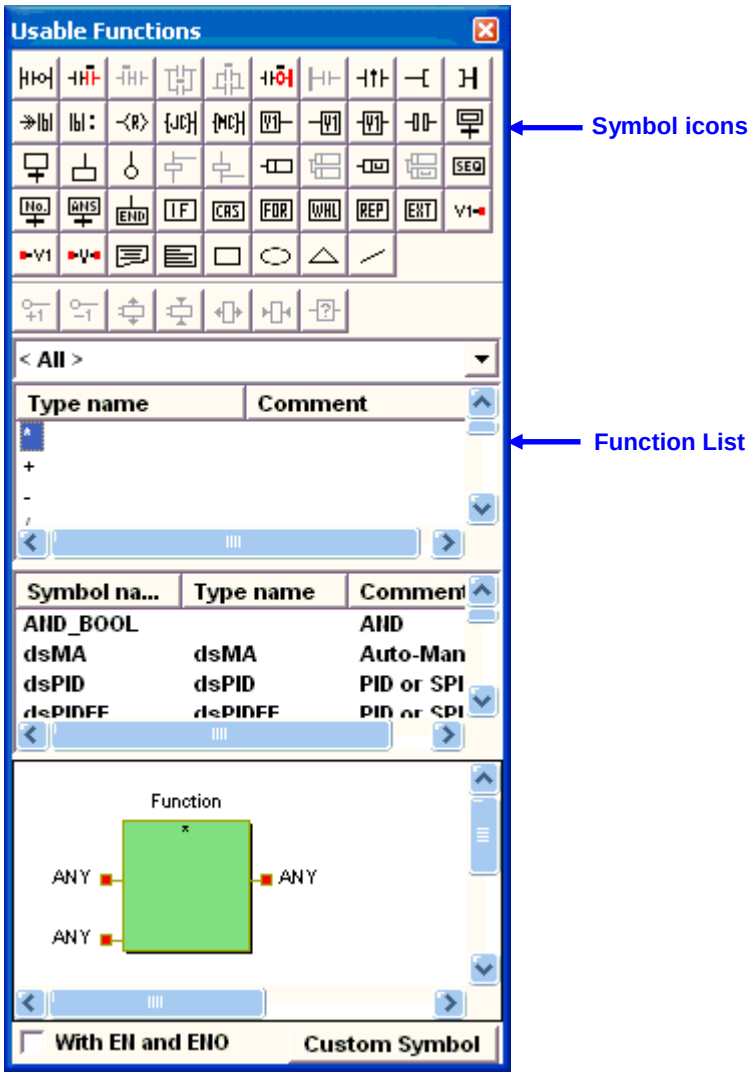
■ Drawing instruction symbol

Click space of Editor View to display drawing cursor.

Click <Edit> <Usable Function> to open [Usable Function] form shown as follows.

Click a symbol icon or a Function to draw the symbol at cursor position.

In case of Contact, Coil, Function Block ,Gate ,Input (output) variable ,Step or Transition, the default variable is displayed automatically. To delete symbols, select them and press [DEL] key.



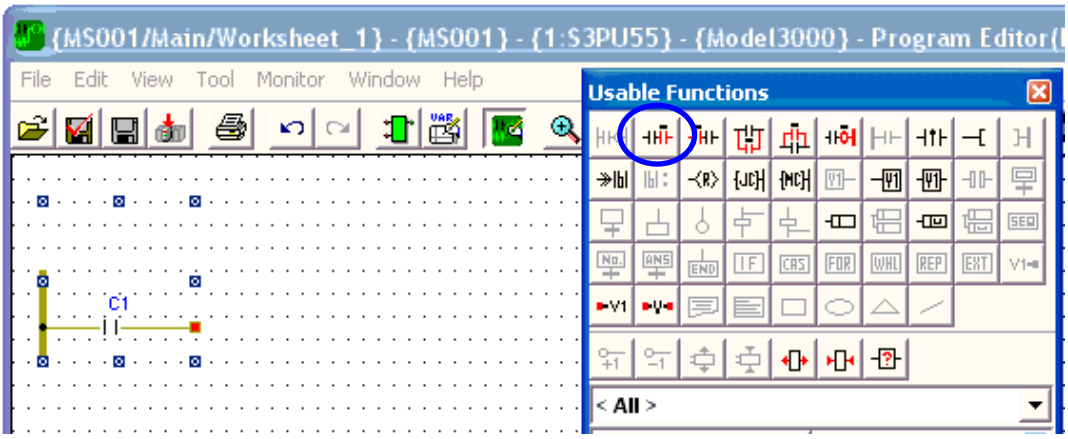
■ Drawing symbols in quick succession

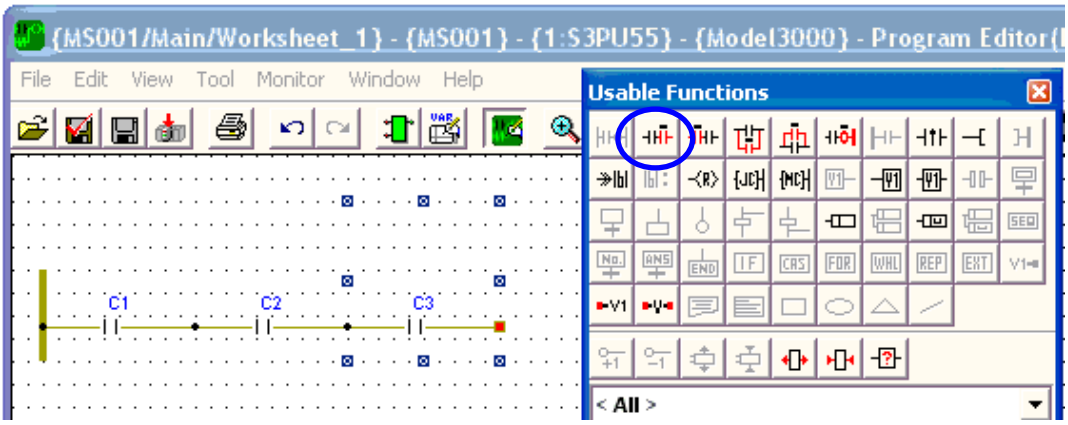
Click a symbol to select it ,for example Contact.

Click <Draw contact right > icon to draw a new contact automatically connected.

You will find that clicking in succession will make network of contacts shown as follows.

Not only <Draw contact right> icon but also <Draw contact down icon> would be useful to attach wired-or Contact.

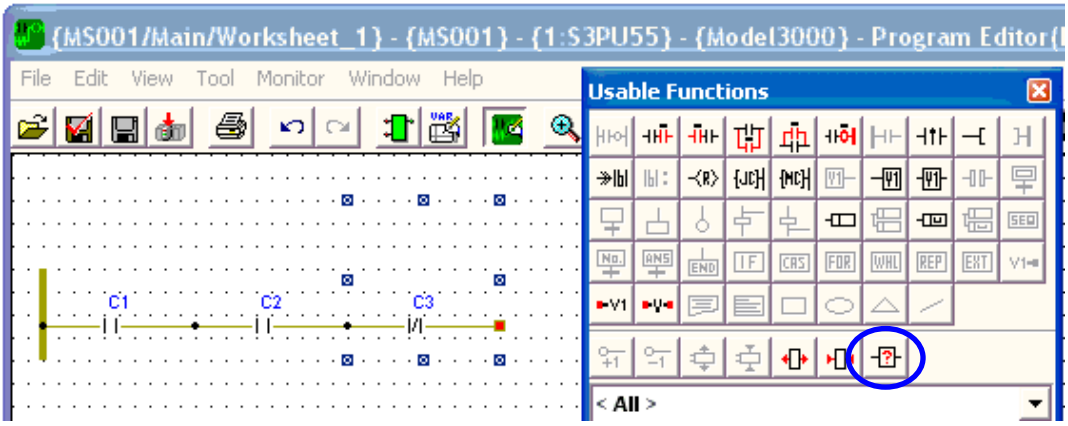




■ Changing device

Click a symbol to select it ,for example Contact.

Click  symbol icon to change the kind of device shown as follows.

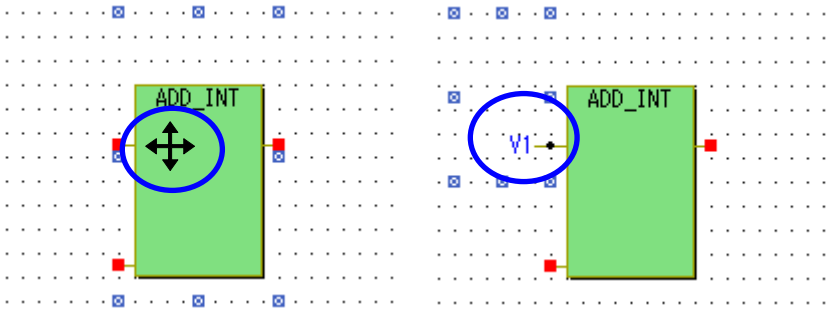


Clinking <change device> will show you the following devices.

Symbol	Initially	1st	2nd	3rd	4th	5th
–| |–	—| |— Normally open contact	—|/|— Normally closed contact	—|P|— Positive transition sensing contact	—|N|— Negative transition sensing contact	—	—
–|↑|–	—| ↑ |— Positive transition detector	—| I |— Inverter	—| ↓ |— Negative transition detector	—	—	—
—( )—‖	—( )—|| Coil	—(/)—|| Negated Coil	—(S)—|| SET Coil	—(R)—|| RESET Coil	—(P)—|| Positive transition sensing coil	—(N)—|| Negative transition sensing coil
–‖ ‖–	—|| ||— Normally open gate	—||/||— Normally closed gate	—	—	—	—
–V1	—V1 Output variable	—>V1 SET variable	—	—	—	—
–[MC]–|	–[MCS] Master control SET	–[MCR] Master control RESET	—	—	—	—
–[JC]–|	–[JCS] Jump control SET	–[JCR] Jump control RESET	—	—	—	—
IF	IF	THEN	ELSEIF	ELSE	END_IF	—
CAS	CASE INDEX	,	:	. . ,	. . :	END_CASE
FOR	FOR_DO INDEX MIN MAX STEP		END_FOR	—	—	—
REP	REPEAT	UNTIL	END_REPEAT	—	—	—
WHL	WHILE	DO	END_WHILE	—	—	—

Attaching a variable with function (FUN / FBK)

Double-click the edge of Function, near the input or output line, to attach a input variable or a output variable.

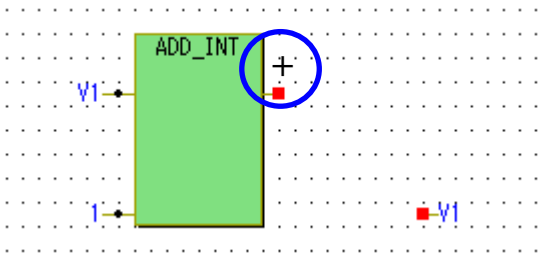


When you want to attach a new type symbol as the new input variable or the new output variable, please check to <Tool><Attaching New Variable Symbol>.

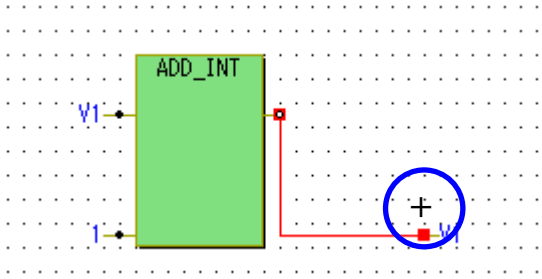
Connecting a line between connectors

Move mouse pointer to a input /output line or a connector and so the mouse pointer become <+> mark.

Click the location to start connection. You will find that the connected line appears and the end of line can be moved with your mouse pointer.

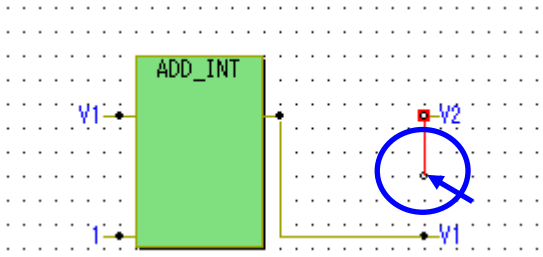


Move mouse pointer and click the other location your mouse pointer become <+> mark to finish to connect the line shown as follows.



■ Aborting line connection

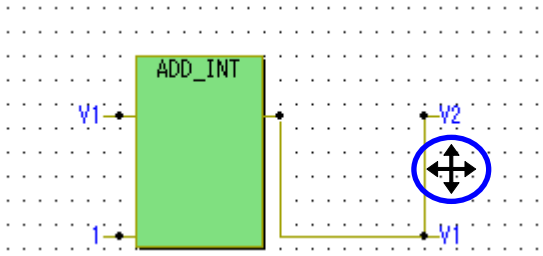
Before fishing connection ,double-click to abort connection and delete the line.



■ Deleting exiting line connection

Click existing line to select it.

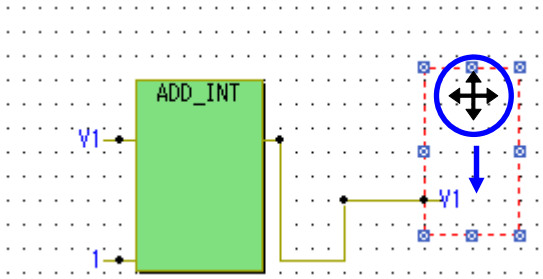
Press [Delete] key to delete the line connection.



■ Moving a symbol

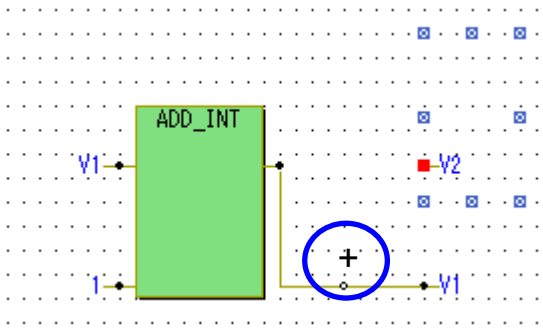
Click a symbol to select it.

Move a symbol in dragging manner and so each of the connected lines is automatically moved and changed keeping connections.



Connecting new line to the middle point of line

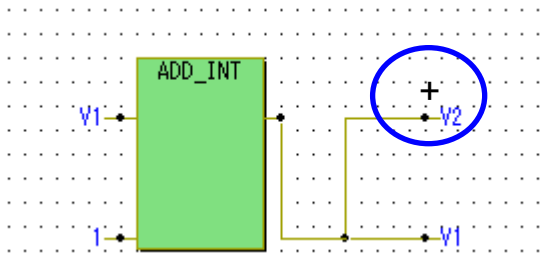
Pressing [Ctrl] key, move mouse pointer to near the middle point of line and so the mouse pointer become <+> mark that means 'connectable point'.



Click the connectable to start connection.

After starting connection, release [Ctrl] key and move mouse pointer to the other connectable point that shows <+> mark mouse pointer.

Click the other connectable point to finish connecting line shown as follows.



Selecting device symbol

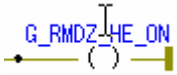
◇ Supplementary

- This operation is available for Ver.4.2.0 and Ver.3.10.0 or upper version.

Using unavailable version, please try to select wide area or other area.

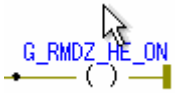
[Click a symbol]
When the mouse cursor is changed the following type, please click a symbol.

- Variable area:



- Symbol area:

[Select symbols]
When the mouse cursor is changed the following type, please select symbols.



5

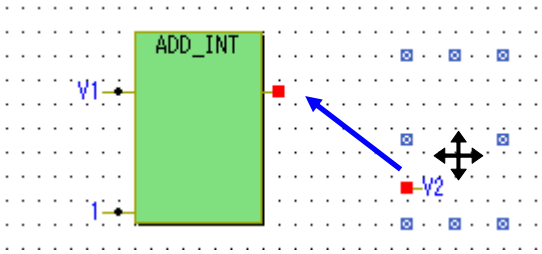
Exception: This operation can not be used for the following symbols:

- Line symbols for SFC and LD
- Symbols for comment and diagrams
- Custom symbols

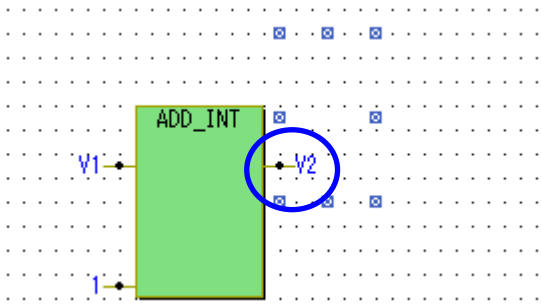
■ Moving and connecting symbol

Click a symbol you want to move to select it.

In dragging manner, move the symbol until the position of connector is equal to the other connector.

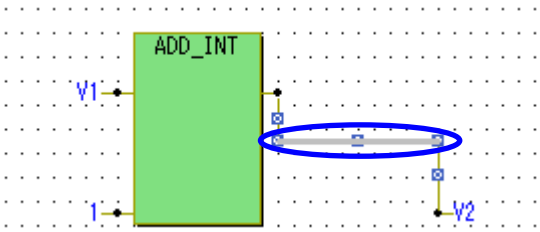


After moving, the two symbols will be connected each other.

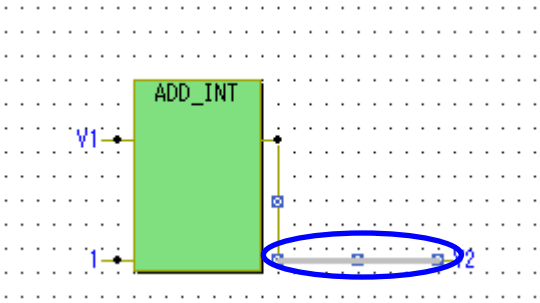


Moving a middle segment of line

Click a middle segment of line to display gray colored selector bar shown as follows.



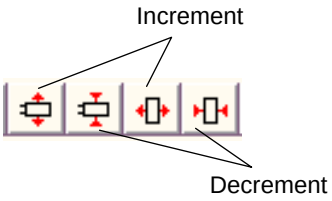
Pressing left-button of mouse, move the selector to the location you need and release the button.



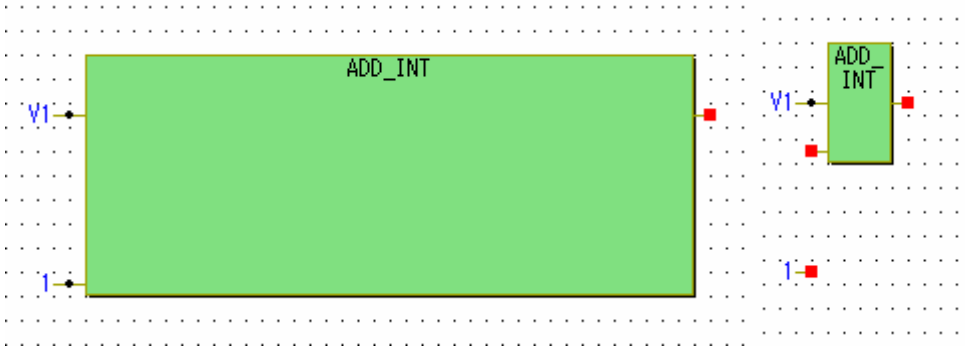
Changing height and width of function symbol

Click a function or function block symbol to select it.

Click <Increment height between connectors> , <decrement height between connectors>, <Increment width>, <Decrement width> to change size.



The following shows the highest and the lowest.



5

■ Editing operations

Item	Operation
Drawing a Instruction symbol	Click space of Editor View to display cursor. Click <Edit><Usable Functions>. Click a symbol icon you need to draw the symbol at cursor position.
Draw a Function or Function Block.	Click space of Editor View to display cursor. Click <Edit><Usable Functions>. Click one of Function List you need to draw the Function at cursor position.
Delete a symbol.	Click a symbol you delete to select it. Press [Delete] key.
Delete a line	Click a line you delete to select it. Press [Delete] key.
Copying networks	Pressing left-button of mouse, drag a rectangle to select symbols and lines the rectangle contains and release the button. Press [Ctrl] + [C] to copy the objects to clipboard.
Cutting networks	Pressing left-button of mouse, drag a rectangle to select symbols and lines the rectangle contains and release the button. Press [Ctrl] + [X] to cut and copy the objects to clipboard.
Pasting networks	Click space of Editor View. Press [Ctrl] + [V] to paste the objects from clipboard.
Deleting networks	Pressing left-button of mouse, drag a rectangle to select symbols and lines the rectangle contains and release the button. Press [Delete] to delete the objects. Note that content of clipboard is not changed.
Scroll a worksheet	Pressing each of [←], [→], [↑], [↓] keys will show you the other part of worksheet that can not be displayed in Editor View.
Inserting a row	Click space of Editor View you want to insert a row. Click <Edit><Insert space row> to move the below networks downward.
Deleting a row space	Click space of Editor View you want to delete a row. Click <Edit><Insert space row> to move the below networks upward.
Undoing	Click <Edit><Undo> to go back to the previous Editor View.

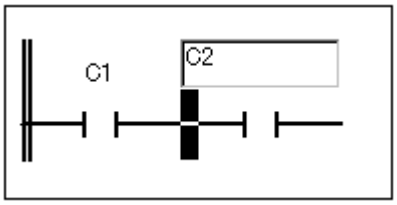
5.4.4 Entering variables

■ Entering a variable

Click a device variable to open a text box.

Drag the right-down edge of text box to resize the box.

Type variable name in the text box and press [Enter].



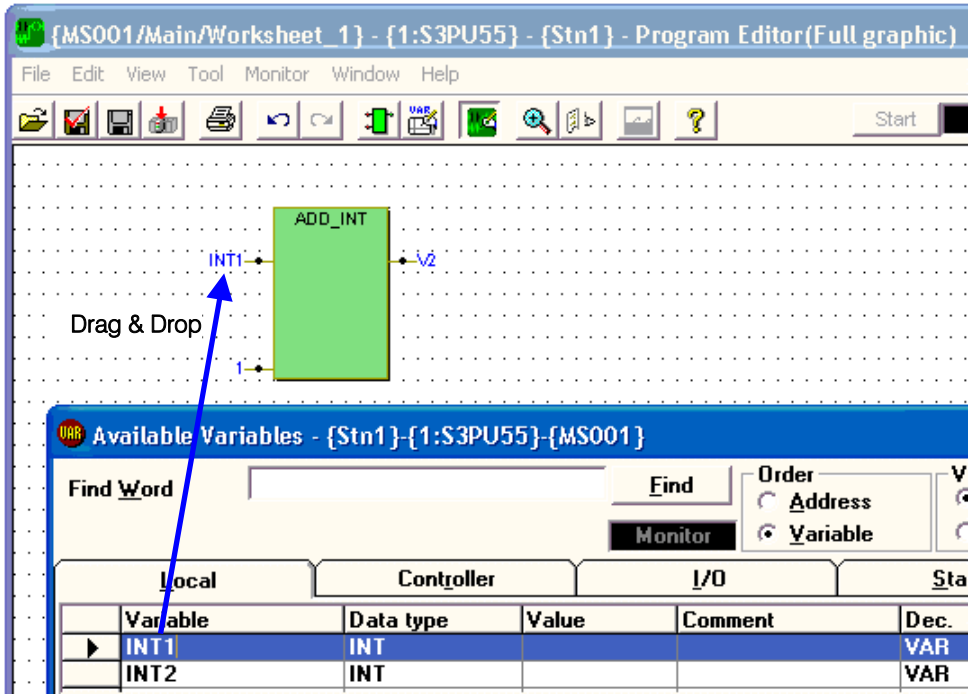
In general, it is more efficient to draw all instruction symbols first and then enter the variable names.

■ Dragging a existing variable

Click <Edit><Usable Variables> menu to open it shown as follows.

Pressing left-button of mouse, drag one of the usable variables on a device variable you want to change

Release left –button to replace the device variable.



■ Changing default variable name of symbol

Some kinds of symbol ,for example Contact ,Contact ,Input or Output Variable ,Function Block ,Step or Transition have a default variable initially. The name can be changed by the following steps.

- Click <Tool><Default Variable Name>.
- Change the base name according to the rule of variable name.

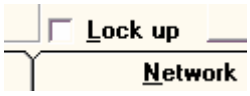
5.4.5 Declaring variables

■ Declaring variables manually

1) Click <Edit><Usable Variables> to open it.
2) Click a last row and enter [Variable], [Data type], [Comment], [Kind], [Constant] and [Order No.] items to add a new variable.

■ Locking up

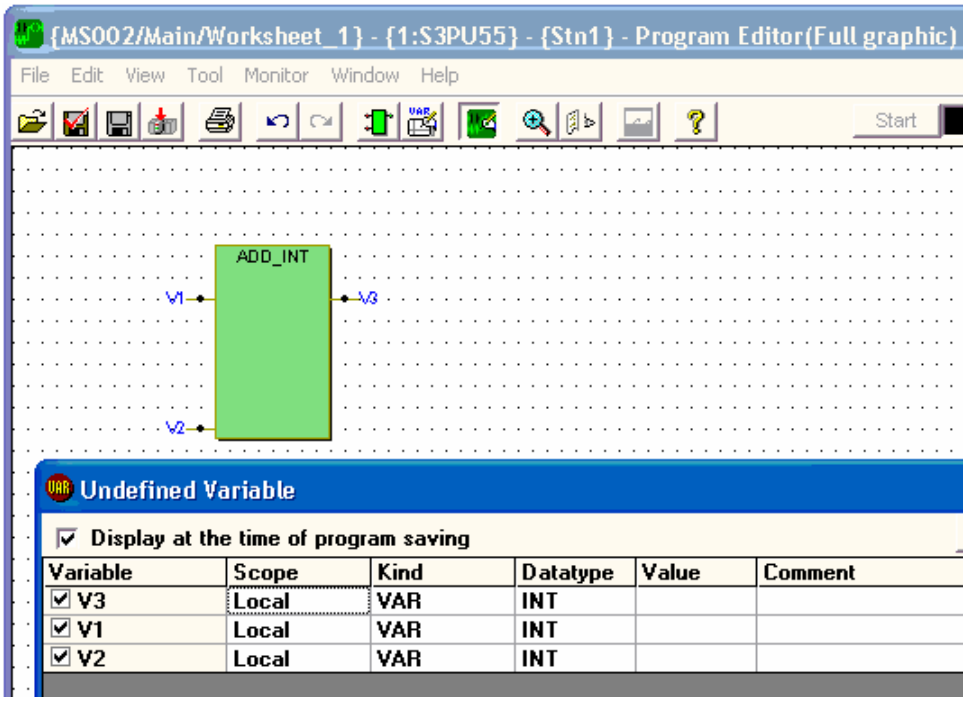
Initially, existing variables are locked up. In case of editing existing variables, clear checked mark of <Lock up> check box shown as follows.



■ Declaring variables automatically

In stead of entering variables manually you can register variables used in your program automatically.

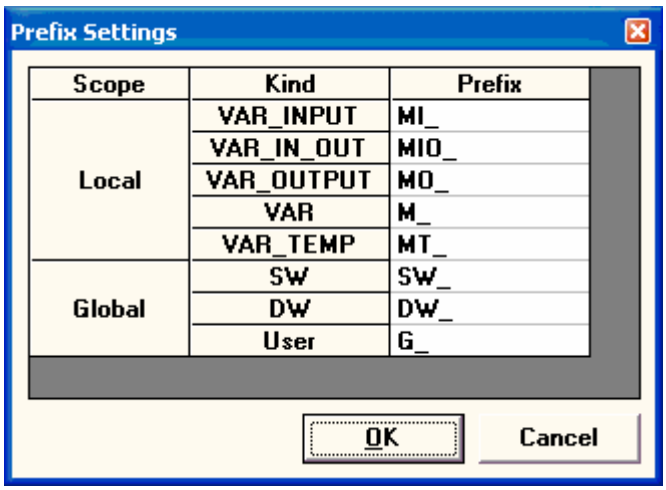
- After editing your program, click <File><Save>.
  If your program has some undefined variables, [Undefined Variables] form shown as follows will appear.
- Enter [Scope] ,[Kind] ,[Data type] ,[Value] and [Comment] fields if necessarily.
- Click [Register] button to declare variables in each scope automatically.
  If you open [Usable Variable] form again, you will find those variables assigned automatically.



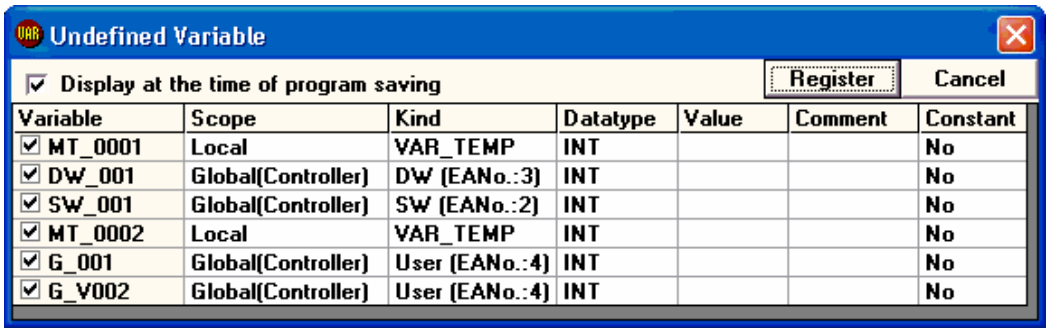
■ Changing initial 'scope' of undefined variables

You can control the initial value of <Scope> field in each undefined variable in the following manner.

- Click <Tool><Prefix settings> to open the following form.
- Enter some prefix string in each item and click [OK] button.
  When saving program, [Undefined Variable] will show you the scope of variable according to the relationship between prefix and scope.



- Following figure is an example displayed according to the above setting.



Variable	Scope	Kind	Datatype	Value	Comment	Constant
MT_0001	Local	VAR_TEMP	INT			No
DW_001	Global(Controller)	DW (EANo.:3)	INT			No
SW_001	Global(Controller)	SW (EANo.:2)	INT			No
MT_0002	Local	VAR_TEMP	INT			No
G_001	Global(Controller)	User (EANo.:4)	INT			No
G_V002	Global(Controller)	User (EANo.:4)	INT			No

◇ Supplementary

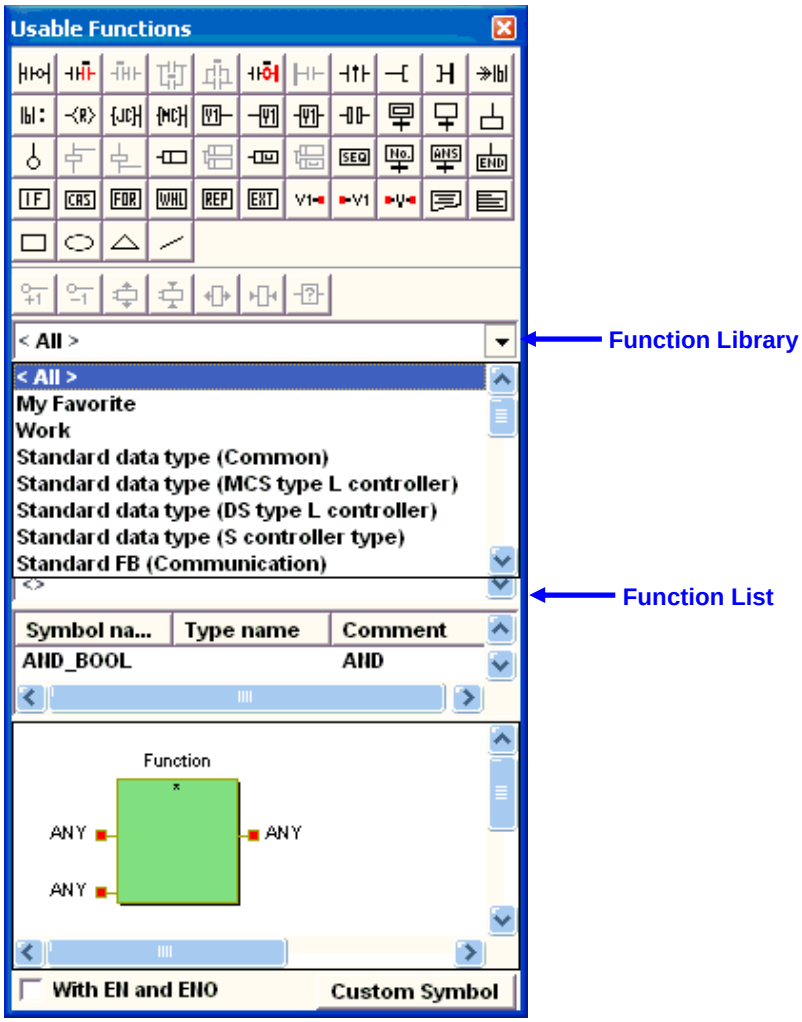
- If you add ,delete or change the local variables of existing Function Block, the Function Block instance size or interface may be changed. In that case you should delete all of the instance variable declarations and invocation drawings of Programs or Function Blocks.

5.4.6 Using functions

Explains how to draw and edit full-graphic program using Functions and Function Blocks.

■ Drawing functions

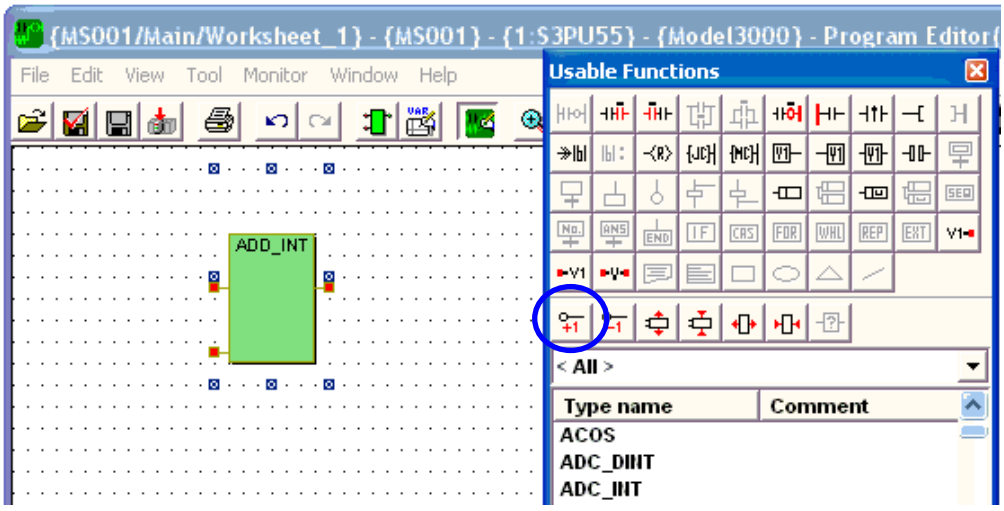
- Click space of Editor View to let drawing cursor appear.
- Click <Edit><Usable Functions> to show the following form.
- Select one of Function Libraries to show Function List.
- Double-click one of Function List to draw the symbol at the cursor position in Editor View.

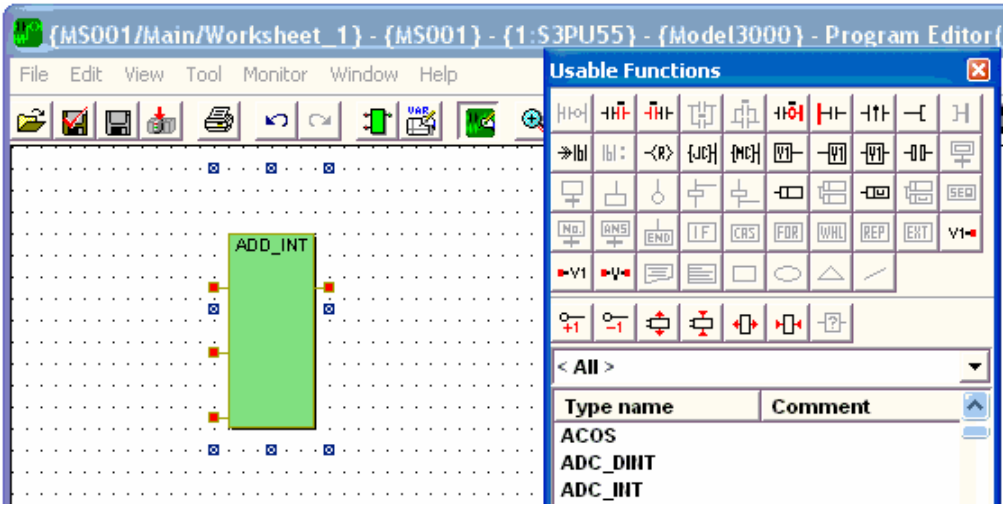


■ Increasing or decreasing input points of standard functions

Some standard Functions have variable input points, for example [+], [*], [ADD_INT], etc. The parameter names are empty. Initially the count of input points are drawn in minimum.

- Click a function to select it.
- Click <increase terminals> icon to increase the input points shown as follows.
- Click <decrease terminals> icon to decrease the input points.

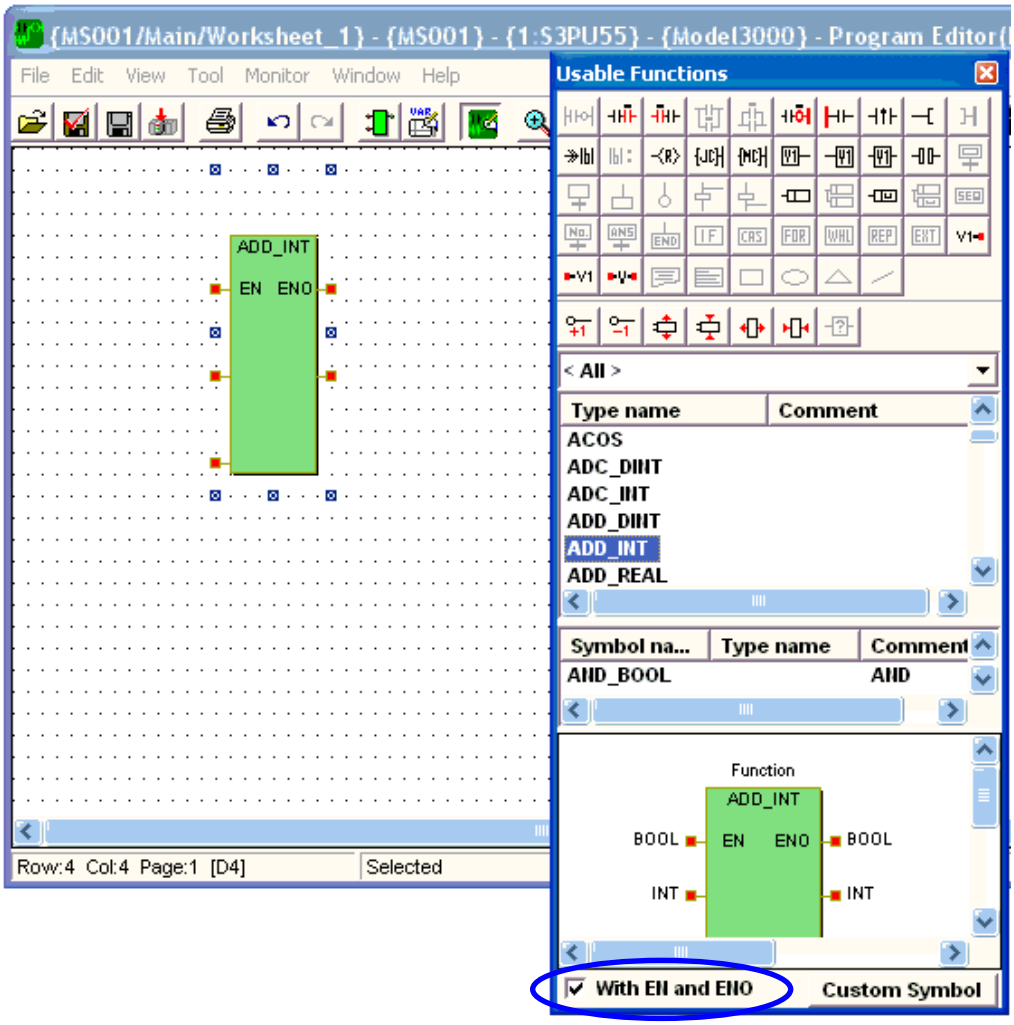




■ Drawing a function with EN/ENO parameters

EN/ENO parameters perform a role of execution control for standard Functions.

To draw the Function, check off <With EN and ENO parameters> check box and double click one of standard Functions to draw it, shown as follows.



5.4.7 Using function blocks

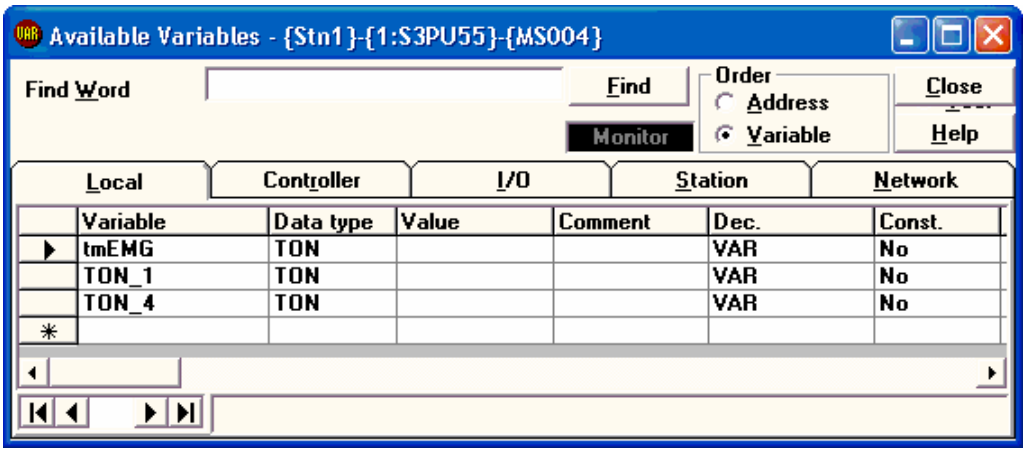
■ Drawing function blocks

See [5.4.6 Using Functions] section.

■ Declaring function block variables

A Function Block needs instance as a local static variable of program in which the Function Block is called. Because each Function Block needs to have it's own retained data.

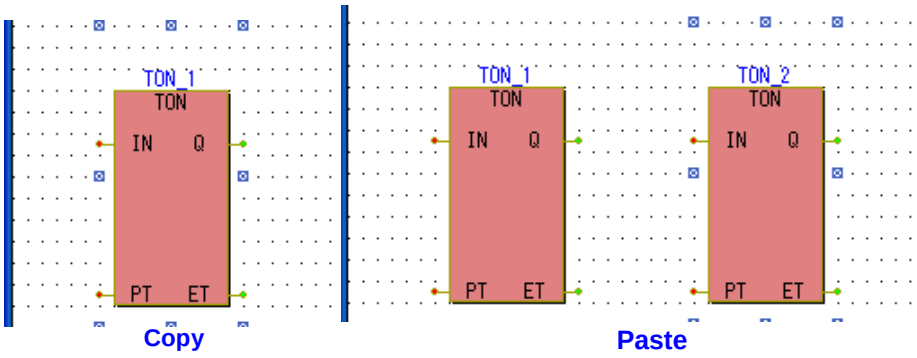
For example, some program calls three 'TON' Function Blocks. Those variables are TON_1, TON_4 and tmEMG. In this case, you should register the three variable as 'TON' data type in local scope of [Usable Variables] form shown as follows.



■ Copying function blocks

In copy & paste manner, you can copy Functions Blocks. See [5.4.3 Drawing Program-Editing Operations] section.

To avoid to multi-call a instance of Function Block, the copied variable name is automatically changed shown as follows.



5.4.8 Searching and replacing instructions or variables

Explains how to search and replace instruction symbols or device variables in a program or a controller.

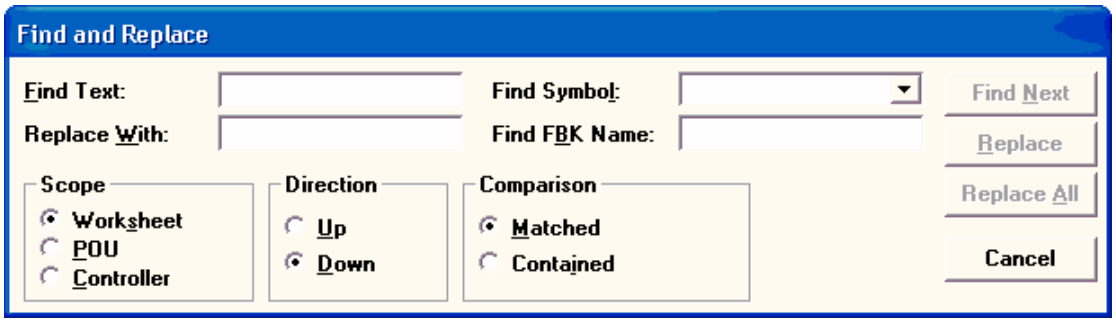
The searched and replaced targets are shown as follows.

Instruction symbol	targets
Contact, Coil	Device variable name
Function, Function Block	Function name, Function Block type name Function Block variable name
Input Variable Output Variable InOut Variable	Device variable name
Gate	Device variable name
Action	Timer setting, Action variable
User Action	Timer setting, Action name, Indicator variable name
Step	Step variable name
Transition	Device variable name
IF,CASE, FOR, WHILE, REPEAT	Index variable name, MIN, MAX, STEP
Jump, Label	Label name

■ Searching text

In Program Editor (Full Graphic),

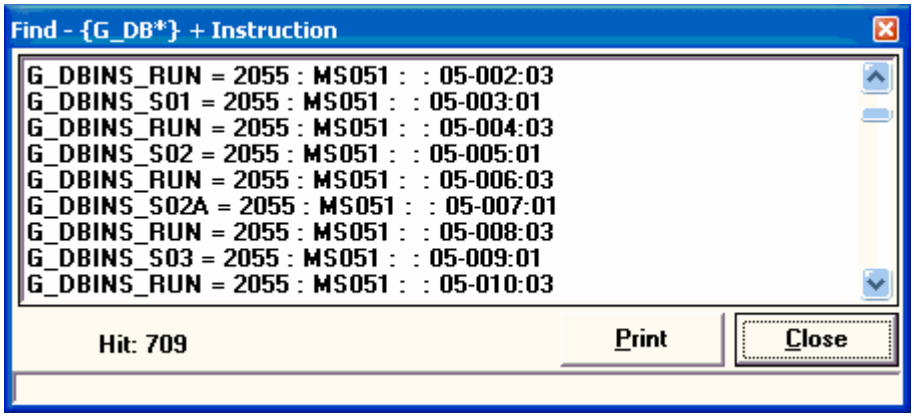
- Click <Edit><Search/Replace> to open the following form.
- Enter [Find Text] item you want to search.
- Select [Scope] ,[Direction] ,[Comparison] options if necessarily.
- Click [Find Next] to start searching.



Options of searching are shown as follows.

Scope	Worksheet: searching in current Worksheet. POU: searching in current POU. Controller: searching in current Controller.
Direction	Up: searching upward. Down: searching downward.
Comparison	Matched: searching text matches <Find Text> string. Contained: searching text contains <Find Text> string.

In case of Controller scope, the result of searching are shown as follows.



For example ,{G_DBINS_S02A = 2055 : MS051 : :05-002:30} means:

‘G_DBINS_S20A’: searched string

‘2055’: POU No.

‘MS051’: Task and Task Entry No.

’05-002:30’: Worksheet No. -Row No: Column No.

In case of Worksheet or POU scope, the program in which searched text is used is opened in succession by clicking [Find Next] button.

If you select <Contained> in comparison field, you can search text using wild cards shown as follows.

Wild card	meaning
?	any character
*	any characters
#	any numeric character

■ Example of searching

	<Matched>	<Contained>	<Contained>
Find Text	ABCDE	ABCDE*	*ABCDE
Hit Text	ABCDE	ABCDE, ABCDE[100]	ABCDE, D.ABCDE
Not hit Text	ABCDE_1	AABCDEE	DATA_ABCDEF

■ Searching text with symbol

You can search not only text but also text with symbol according to following operations.

- Click <Edit><Search/Replace>.
- Enter <Find Text>.
- Select <Find Symbol>.
- Select [Scope] ,[Direction] ,[Comparison] options if necessarily.
- Click [Find Next] to start searching.

■ Replacing text in worksheet or POU scope

You can not only search but also replace text according to following operations.

- In Program Editor (Full graphic), click <Edit><Enable> to enable Editor View to edit.
- Click <Edit><Search/Replace> to open the form.
- Select 'Worksheet' or 'POU' in [Scope] field.
- Enter <Find Text> and <Replaced With>
- Click [Replace] to jump to searched text and replace it.

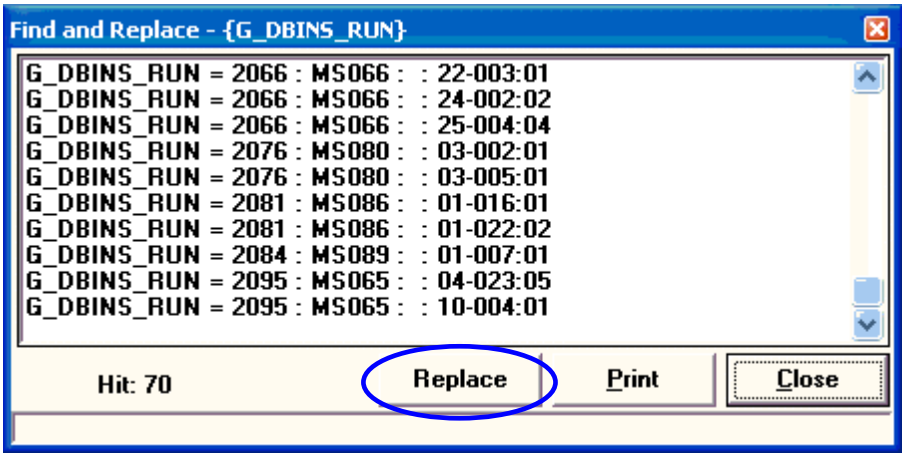
◆ Note

- In case of Worksheet or POU scope program replaced by text should be saved.

■ Replacing text in controller scope

You can not only search but also replace text according to following operations.

- In Program Editor (Full graphic), click <Edit><Enable> to enable Editor View to edit.
- Click <Edit><Search/Replace> to open the form.
- Select 'Controller' in [Scope] field.
- Enter <Find Text> and <Replaced With>
- Click [Replace All] to open the searched results shown as follows.
- Click [Replace] to replace all of the text in the controller scope.



5.4.9 Various edit and display functions

■ Inserting and deleting space

Click space of Editor View you want insert or delete a row (or column) space to display drawing cursor.

- Click <Edit><Insert space><row> to insert a row space at the cursor position.
- Click <Edit><Insert space><column> to insert a column space at the cursor position.
- Click <Edit><delete space><row> to delete a row space at the cursor position.
- Click <Edit><delete space><column> to delete a column space at the cursor position.

Clipping control logic diagram

You can clip a control flow diagram displayed in a worksheet as Enhanced Metafile and paste it on the other application like Excel sheet.

- Select some graphic objects by dragging a rectangle in a worksheet.
- Click <Edit><Clip Picture> to send the picture to clipboard.
- In the other application, like Excel sheet, click <Edit><Paste> or <Paste As> to paste the picture.

Saving control logic diagram

You can save a control flow diagram displayed in a worksheet as Enhanced Metafile.

- Select some graphic objects by dragging a rectangle in a worksheet.
- Click <Edit><Save Picture> to open the file dialog.
- Set a filename you want and click [Save] to make the file.

Displaying printed page boundary

Click <View><Page boundary> to display page boundary blue lines.

Those lines represent boundaries of physically printed pages according page settings of Program Editor.

Displaying overview

Click <View><Overview> to open [Overview] form represent a over view of the worksheet.

If you click some point of overview, Editor View will be panned to contain the point.

Attaching free comment

- Click <Edit><Enable> to open [Usable Functions].
- Click space of Editor View to display drawing cursor.
- Click  <Free comment> icon of [Usable Functions] to draw a free comment box.
- Double-click a free comment box to enable it to edit.
- Enter some comments you need.
  In this status drag the right (or down) side of box by mouse to change size of the box.
- Click out of the box to finish to edit.

■ Attaching text box, shape and line

- Click <Text Box> icon of [Usable Functions] to draw a text box.
- See [Attaching Free Comment] section to know how to enter a text.
- Click Shape (i.e. <Rectangle>, <Ellipse> and <Triangle>) and <Line> icon of [Usable Functions] to draw rectangle, ellipse, triangle and line.
- See [Attaching Free Comment] section to know how to edit the size of shape.
- Click and drag the end of Line to change the length and the direction.
- Click and drag the middle of Line to add a vertex. So the Line will become polynomial line.
- Change the property settings to change the appearance.
- Click right button on a graphic object, and click <Properties> menu to open property form.
- Change each property value and press [OK] to decide the value.

■ Zooming

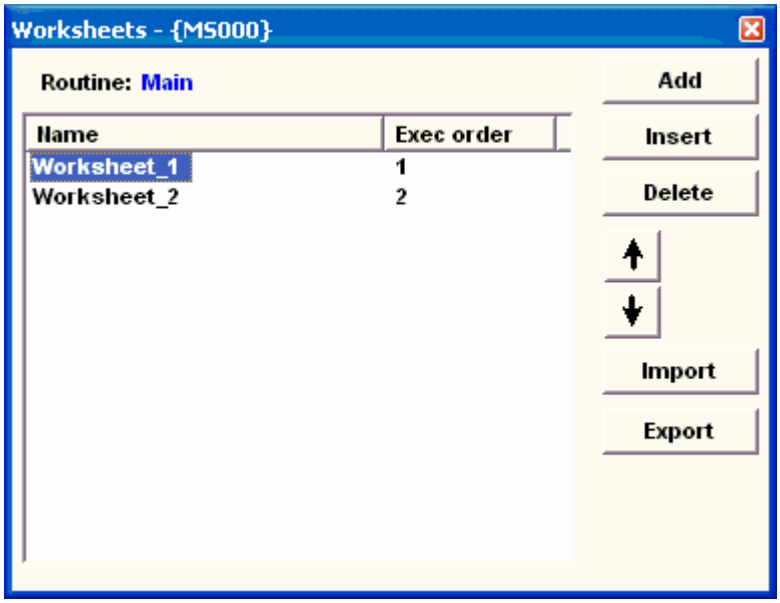
- Click <View><Zoom> to open the following form.
- Enter zooming data (%) or slide the bar to zoom Edit View from 40% to 200%.

■ Worksheet operations

An Editor View of Program Editor (Full graphic) represents a worksheet means drawing space.
A POU has one or more routines.

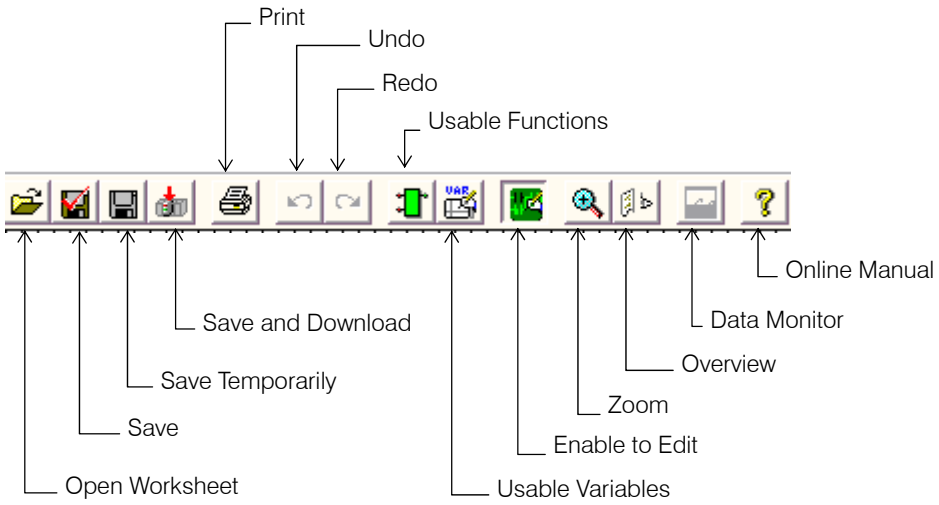
A routine has one or more worksheets up to 99.

- Click <File><Open><Worksheet> to open [Worksheets] form shown as follows.



- Click {Name} you want to edit and press [F2] key to edit the name if necessarily.
- Click [↑],[↓] key to change execution order of worksheets.
- Click [Add] button to add new worksheet after the existing worksheets.
- Click [Insert] button to add new worksheet before the selected worksheet.

■ Tool icons



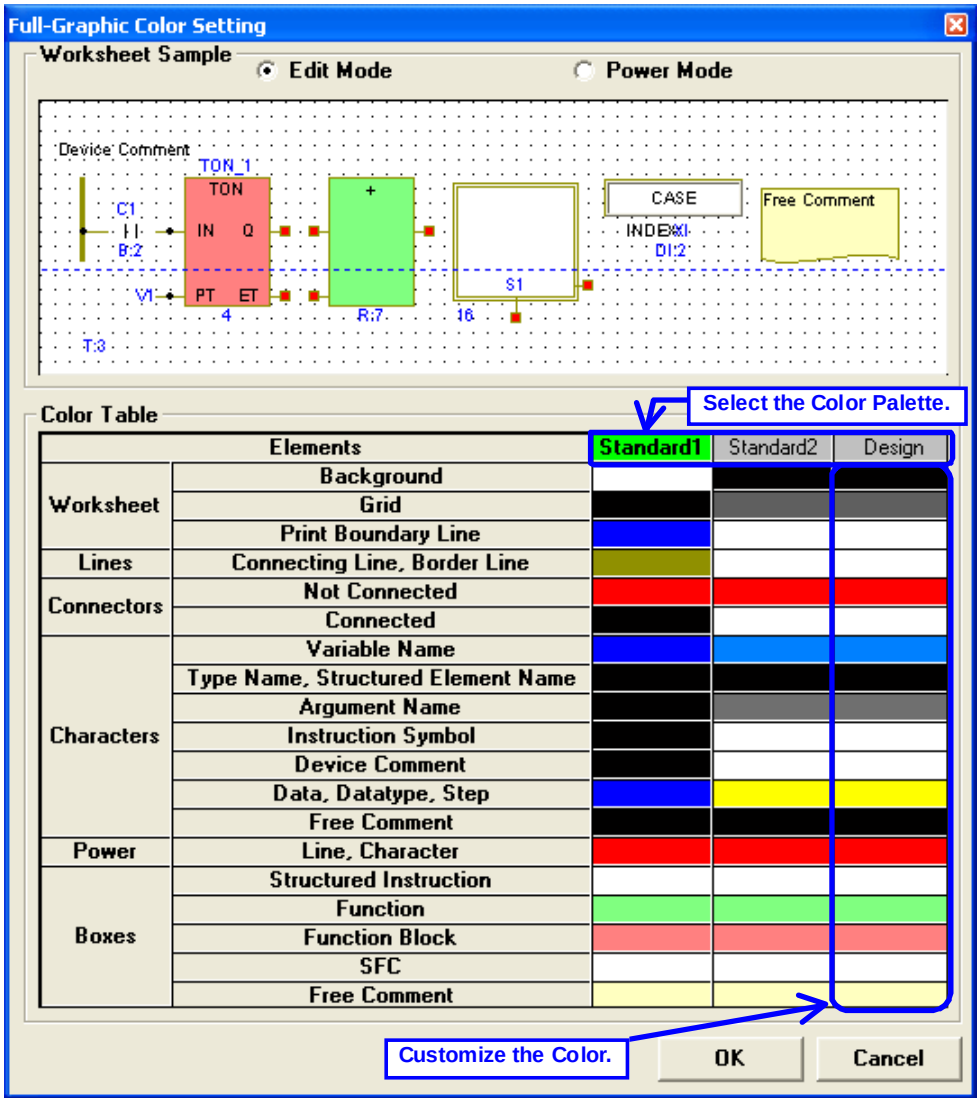
If you put mouse pointer on a tool icon the name will appear as tool tip.

The functions of Tool Icons are prepared as menu items.

■ Changing graphic colors

In Full-graphic Program Editor of V-Tool3, that is version3.3.0 or higher, colors of graphic objects can be changed as you like.

Click <Tool><Display Color Setting…> menu to open the setting form shown as follows.



Initially colors of graphic objects are defined by [Standard1] color pallet.

You can change the color pallet to [Stander2] or [Design] by clicking each header field.

You will find that colors of sample graphic objects are changed when the selected color pallet is changed.

Each color of the standard pallets is recommended and fixed but each one of [Design] can be changed as you like. To change each color of [Design] pallet, there are the following two ways.

- When you have selected the [Design] palette, click a color cell you want to change to open a color table and select a color you need.
- Drag a source color cell to a destination color cell you want to change and drop it.

◇ **Supplementary**

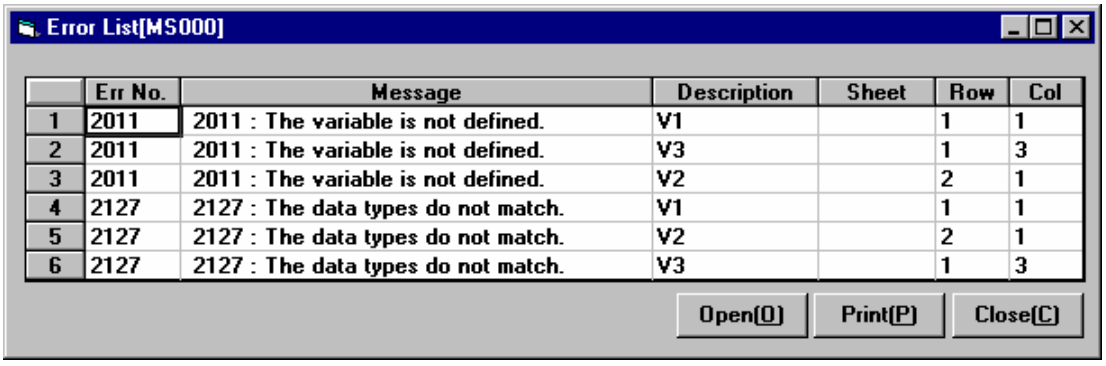
- Worksheets made by version 3.3.0 (or higher) of V-Tool3 will be displayed in their own color on the previous version of V-Tool3 and the colors cannot be changed.

5.4.10 Saving program

Explains how to save program written by Program Editor (Full graphic).

■ Saving a program

- Click <File><Save> to compile and save program you made.
  If program has no errors, saving will be finished normally.
  If it has some errors, message asks you if you need error list will appear.
  In case of having errors, not only confirming the message but also clicking <File><Compie Error List> open
  [Error List] form shown as follows.



- Click a row of list and click <Open> button to make drawing cursor jump to the error location.
- Click <Print> button to print displayed error list.

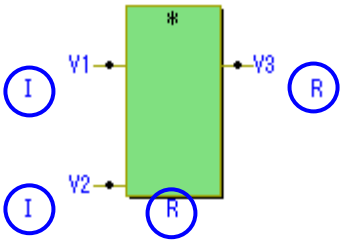
■ Save temporarily

Click <File><Save temporarily> if you need save program without compiling.

5.4.11 Displaying data type and execution order

■ Displaying data type

In Editor View of Program Editor <Full graphic>, click <View><Data type> menu to display each data type of device variables by characters.
If you click <View>< Data type> once more, the characters will be cleared.



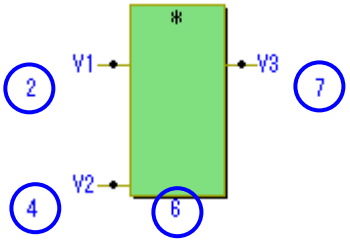
Characters	Data type
B	BOOL
W	WORD
DW	DWORD
I	INT
UI	UINT
DI	DINT
R	REAL
T	TIME
D	DATE
TD	TOD
DT	DT
ST	STRING

■ Display execution order of instructions

If the program will be finished to save and compile, execution order no. (step no.) of the instruction symbols will be displayed.

Click <View><Step No.> menu to display step numbers shown as follows.

If you click <View>< Step No.> once more, the step numbers will be cleared.



5.4.12 Using cross reference

Cross-reference is a function to inspect in which station, in which controller, in which program and how the variables you look are used. It is useful for you to know data source and destination when inspecting program that performs unexpectedly.
See [5.3.10 Using cross reference] about operations.

5.4.13 Using device variable property

See [5.3.11 Using device variable property] about operations.

5.4.14 Using any function

■ What is any function?

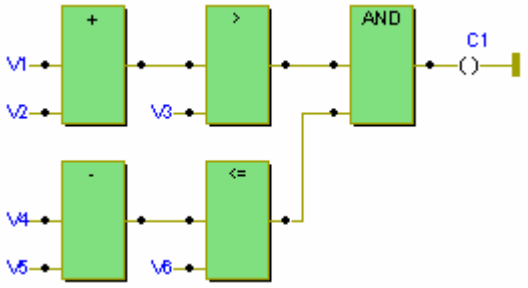
The Any Function is one of the standard-function for any data types. The user can use these symbols without selecting the data type.

The data types are determined automatically using variable's data types, when a program that contained these symbols is saved and complied in V-Tool.

Following instructions are available for full-graphic type program editor:

Kind	Type	Symbol
Arithmetic Operations	Add	+
	Subtract	–
	Multiply	*
	Divide	/
Logical Operations	Bitwise Boolean AND	AND
	Bitwise Boolean OR	OR
	Bitwise Boolean NOT	~
	Bitwise Boolean XOR	XOR
Comparison Functions	Greater Than	>
	Greater Than or Equal	>=
	Equal	=
	Less Than or Equal	<=
	Less Than	<
	Not Equal	<>

■ Sample program



These are useful in following case:

1) Efficient programming
   Basic functions such as arithmetic operations can be used without selecting the data type.

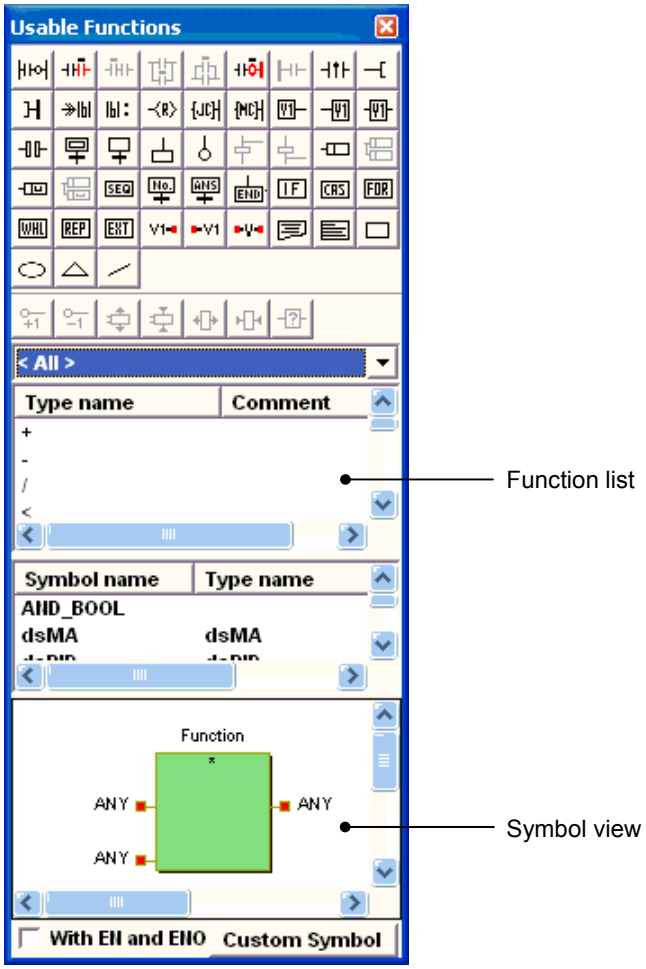
   The variable data types can be determined at the same time.

2) Compact symbols
   These are small symbols, so the user can draw the compact circuit that contains these.

   The type conversion instructions can be inserted automatically for internal processing, so several data types can be selected for the input variables.

■ Use any function

- Open [Program Editor (Full graphic)]
- Click menu <Edit><Enable> to open [Usable Functions] shown as follows.



- Click some space of worksheet to show drawing cursor.
- Click one name of [Function list] to show the image in [Symbol view].
- Double-click one name of [Function list] to draw the symbol in the worksheet.
- Variable inputs of some symbols can be increased and decreased like the other standard functions.

See also the manuals of 'Instruction Set' to know each Any Function Instructions.

■ Error messages

If there is a data types conflict of variables for Any Function, compiling error occurs.

The messages and measures are shown as follows:

No.	Message	Measure
465	Data type is mismatched, or it can not be used.	• Insert the INOUT function with data type declared variable.
490	Any type instruction is not allowed this data type or combination of data types. Please use INOUT Instruction to fix data type, or check data type of Inputs and Outputs.	• Check the data types of Input and/or Output Variables. • Check the variables, of which are unavailable data type for conversion functions.

■ Defining data type automatically (Default data types)

Default data types are as follows:

1) Data type of instructions
If there are not defined-variables for Any Function, data type of Any Function is defined as follows:

Kind	Default types
Arithmetic Operations	REAL
Logical Operations	BOOL
Comparison Functions	REAL

2) Data type of Constant value
If there are not defined-values (ex: “1”, “-10”) for Any Function, data type of Constant value is defined as follows:

Kind	Default types	Note
Arithmetic Operations	REAL	
Logical Operations	BOOL	Only for “0” or “1”. If other values are used, error occurs.
Comparison Functions	REAL	

■ Defining data type manually

If user defines data type for part of variables, data types of Any Function and other variables are defined automatically.

There are 3 concrete ways as follows:

1) Define data type of variable.
2) Connect the Any Function with data defined instructions (ex: “ADD_REAL”, “AND_BOOL”).
3) Define data type of constant value (ex: “REAL#1”, “1.0”).

◇ **Supplementary**

- If 2 or more data types are defined as variables and/or instructions, unexpected result or compiling error occurs.
- Please use the other standard instructions of which data type is defined.
  If 2 or more data types are used for Any Function, please refer to the next section ‘Know Any Function more in details’.
- Output data type of Comparison Functions is fixed as BOOL type. Connecting variable or instruction with its inputs is valid for data type definition.

■ Know any function more in details

Internal processing to fix the data types is as follows:

- Automatic determination of the undefined variables data type
  Data types of the undefined variables are determined automatically, which are connected to Any Function symbol, when a program that contained these symbols is saved and complied in V-Tool.
- Automatic determination of the instructions data type
  Data types of these instructions are determined automatically, when a program that contained these symbols is saved and complied in V-Tool.
- Automatic insertion of data conversion instructions
  If the determined data types of instructions are different from the input one, the type conversion Instruction is inserted automatically.

◇ **Supplementary**

- See also the manuals of ‘Instruction Set’ to know the details of ‘Any Function Instructions’.

5.5 Creating a User Function

■ Determining the specification

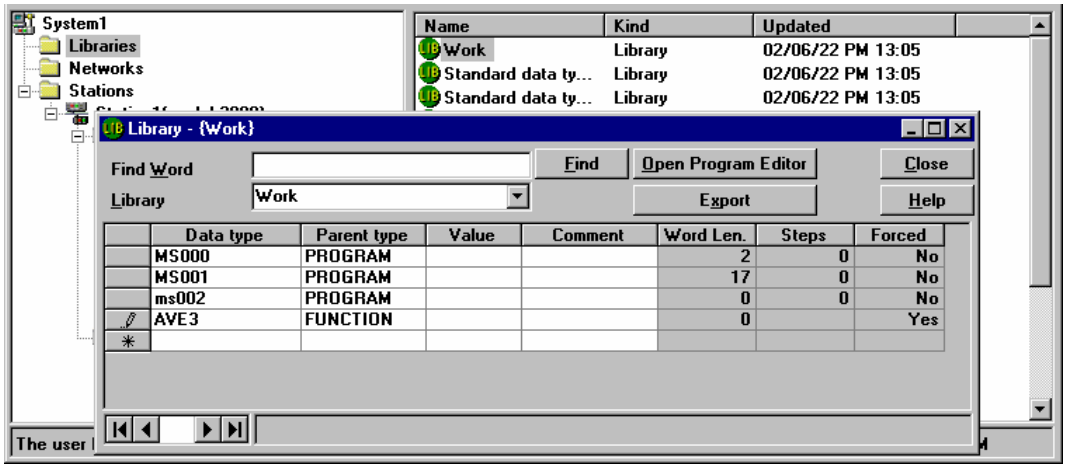
- The user can create a unique function.
- Refer to the section "V Series Software Model Functions" for information on functions.
- Here, the following specification is assumed:

> A function to calculate the weighted averge of process values at three points. The process values are real values. The function name is AVE3.
>
> Equation: y=(K1*x1+K2*x2+K3*x3)/3 where K1+K2+K3=3

■ Creating user function

Creating a function named AVE3.

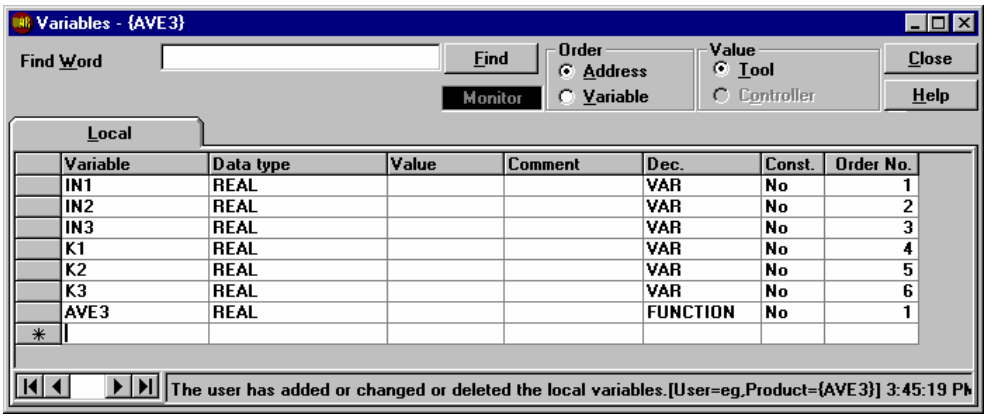
1) Start the Product Tree and double-click the system to use the function at the top right corner of the window. The editable sub folders in the selected system appear at the bottom left of the screen.
2) Select the sub folder [Library] to open a library list at the bottom right of the window.
3) Double-click [Work] in the library list to open the [Library] window.
4) In the [Library] window, enter the name of the function to be created (AVE3) in [Data type] and FUNCTION in [Parent type].Select program kind (Semi-Graphic, Text, Full-Graphic). Enter a comment if necessary.
5) Click [Open Program Editor] to create the inside of the function.



Determining arguments

There are three input arguments for process value. Input arguments for weighing coefficient are three points. The function value is the one point-weighted average.

- Select <Available Variables> from the <Edit> menu and declare the function variables as follows:

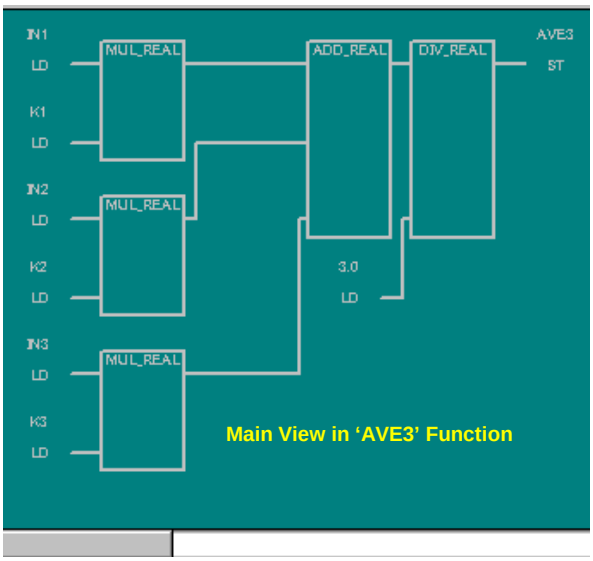


- If the declaration type is set to [FUNCTION], the output of the created user function can be used as input. If it is set to [VAR_OUTPUT], it is necessary to store the output of the user function in a variable with the ST instruction.

Creating the function internal

Once the arguments are determined, create the user function as follows:

1) In the main view of the edit form, draw the operation in the above specification using standard functions.



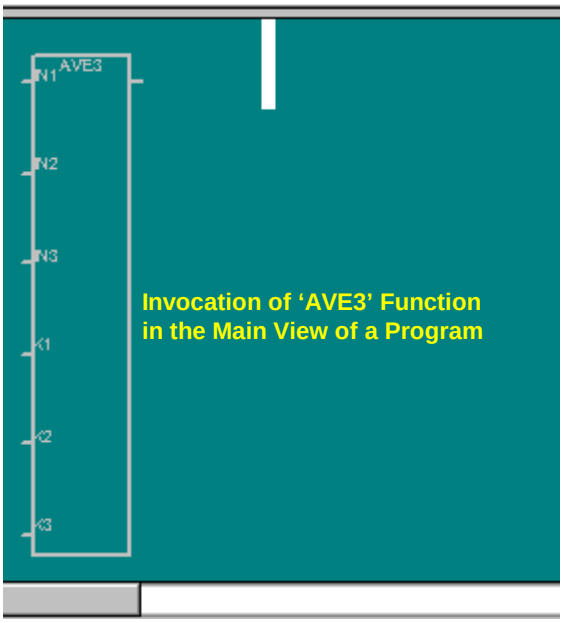
2) Select <Save Project> or <Temporarily Save> from the <File> menu to save.

   If undefined variables exist, undefined variables window is shown. If you do not want to define them, please click checked-box to be 'OFF'.

   The user function file is now created.

3) To view the user function instruction symbol, refer to the procedure described under [Using a Function]. In this example, the instruction symbol appears as follows.

4) As in the example, a function is created with the variable declared as VAR_INPUT type as input and variables declared as FUNCTION and VAR_OUTPUT type as output. Furthermore, input/output are created from top to bottom of the function box in the variable declaration sequence.



5.6 Creating a User Function Block

■ Determining the specification

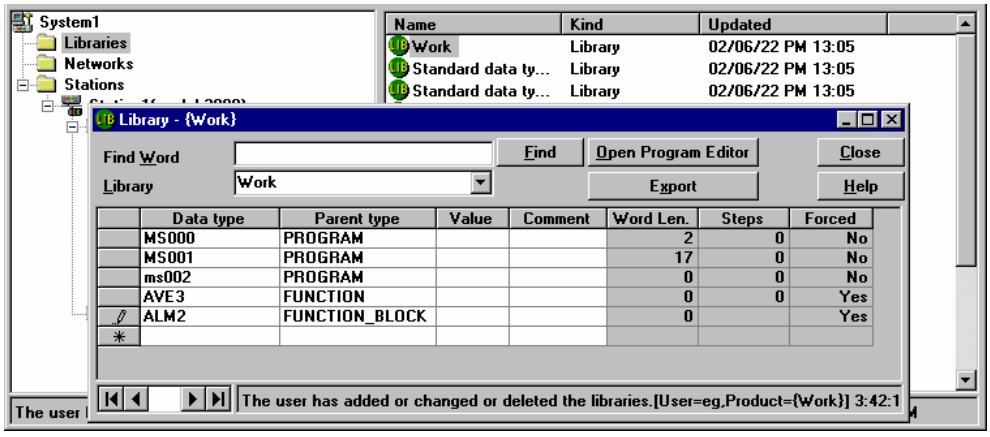
- The user can create a unique function block.
- Refer to the section [V Series Software Model Functions] for information on function blocks.
- Here, the following specification is assumed:

Output high/low limit level alarms (HH/LL) of process value IN. IN is a real value. Function block name is ALM2. Alarm output HH is latched ON when IN exceeds high limit H0. Latch is released when IN<H0-X0. Alarm output LL is latched ON when IN is less than low limit L0. Latch is released when IN>L0+X0.

■ Creating user function block

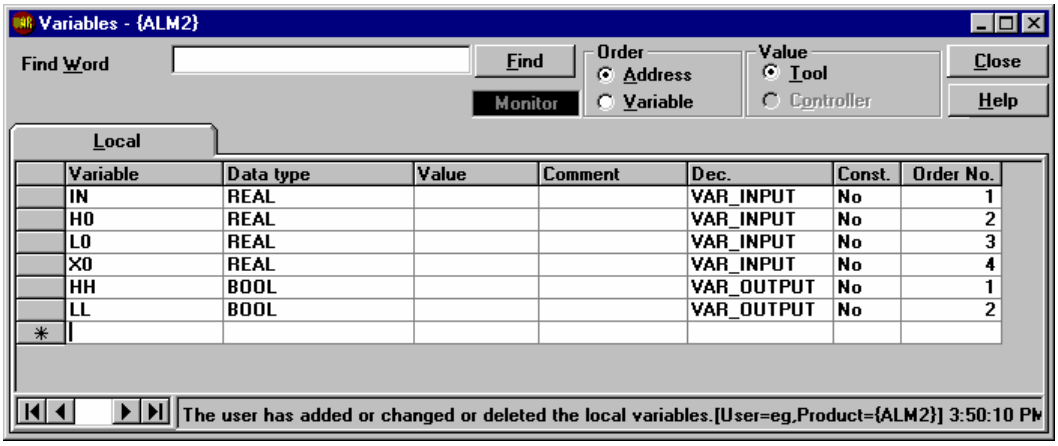
Creating a function block named ALM2.

1) Start the Product Tree and double-click the system to use the function block at the top right corner of the window. The editable sub folders in the selected system appear at the bottom left of the window.
2) Select the sub folder [Library] to open a library list at the bottom right of the window.
3) Double-click [Work] in the library list to open the [Library] window.
4) In the [Library] window, enter the name of the function to be created ALM2 in [Data type] and FUNCTION_BLOCK in [Parent type]. Select program kind (Semi-Graphic, Text, Full-Graphic). Enter an initial value and comment if necessary.
5) Click [Open Program Editor] to create the function block internal.



■ Determining arguments

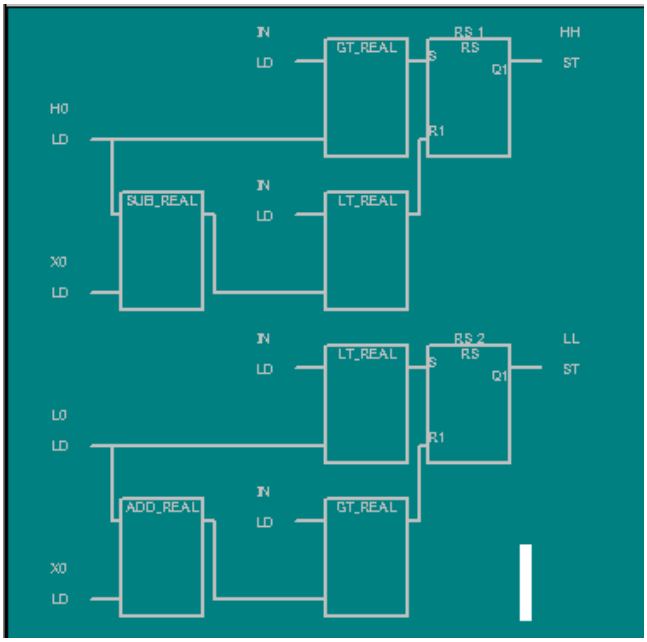
- Input arguments are process value IN, high limit H0, low limit L0, and dead band X0.
- Output arguments are high limit alarm output HH and low limit alarm output LL.
- Select <Available Variables> from the <Edit> menu and declare the function block arguments as follows:



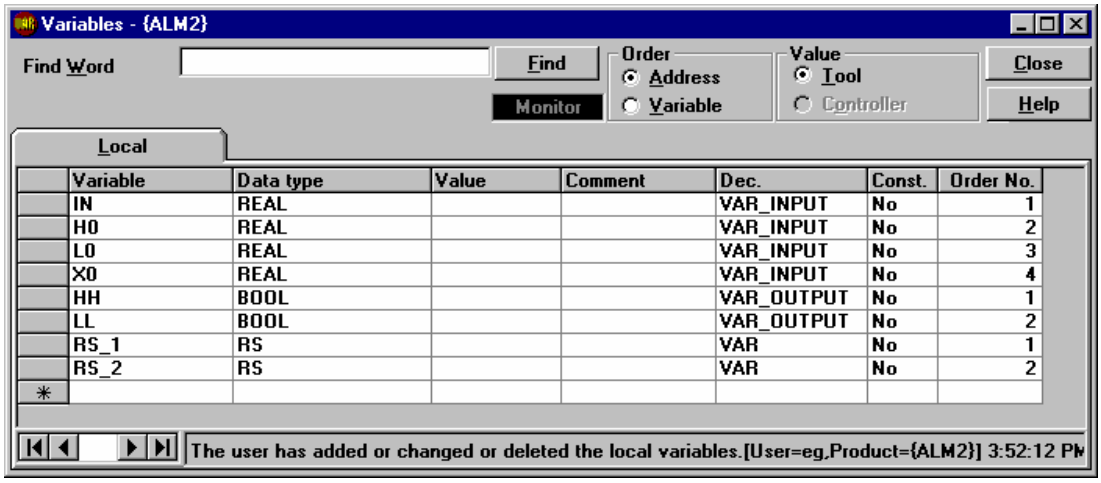
■ Creating the function block internal

Once the arguments are determined, create the user function block as follows:

1) In the main view of the edit form, draw the operation in the above specification using standard functions.

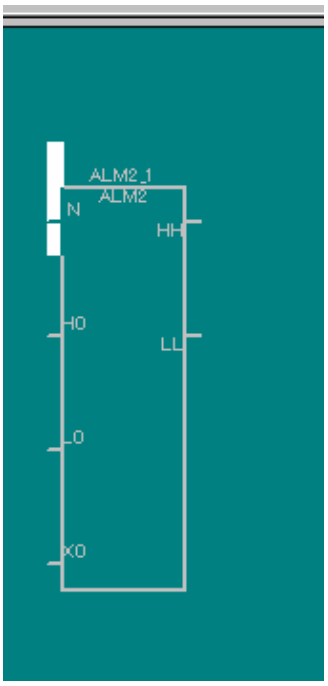


2) Add local variable declarations within the function block.
Here, declare variables as follows because the function block [RS] is used.



3) Select <Save Project> from the <File> menu to save.
If undefined variables exist, undefined variables window is shown. If you do not want to define them, please click checked-box to be 'OFF'.
The user function block file is now created.

4) To view the user function block instruction symbol, refer to the procedure described under [Using a Function]. In this example, the instruction symbol is as follows:



5.7 Using Tag Symbols

This section describes how to program using Tag No.

<Using Tag symbols>

Tag No registered with the Tag Editor is registered as controller variable as shown below:

!{TagNo}_# (#:0-3)

(Example) DS type PV: If indicator
!FI000_0: PV_PARA variable
!FI000_1: PV_DARA variable

When using a Tag symbol in Program Editor or Tag View, specify {TagNo} with the leading '!' and trailing '_#' removed.

(Example) DS type PV: If indicator
FI000.PV

How to describe Array type member

Some Tag No. and Variables have the array type members shown as follows.

Example:

XPB100.FI[0]: The first lump status of Push Button XPB100.
XPB100.FI[1]: The second lump status of Push Button XPB100.
XPB100.FO[0]: The first button status of Push Button XPB100.
XPB100.FO[1]: The second button status of Push Button XPB100.

The index value of array starts from zero.

In order to fit the bump/lump no. the following descriptions are available.

Example:

XPB100.FI1: The first lump status of Push Button XPB100. Equal to XPB100.FI[0].
XPB100.FI2: The second lump status of Push Button XPB100. Equal to XPB100.FI[1].
XPB100.FO1: The first button status of Push Button XPB100. Equal to XPB100.FO[0].
XPB100.FO2: The second button status of Push Button XPB100. Equal to XPB100.FO[1].

5.8 Reusing a Program

Sometimes, you would like to reuse part or all of a control program that you created. Properly reusing programs can significantly improve the design efficiency and controller usage.

This section describes various methods to reuse a program.

■ Copying a graphic

If graphics are similar, you can copy and modify it.

Refer to [Drawing a Program] for information on how to copy and paste graphics.

The Program Editor can be executed more than once.

Graphics can be copied to the same view, different view within a project, or a view of a different project.

■ Saving as text file

Program (PRG), function block (FBK), and function (FUN) can be saved and loaded as text files.

This is useful when exchanging files with other tools through FD or network.

The procedure to save as text file is as follows:

1) From the [Program Editor], open the file to save (copy source). The copy source must have been saved.
2) Execute <Save text file> from the <File> menu.
3) Specify the file name in the [Save as] dialog box and save.

■ Loading a text file

The procedure to load a text file is as follows:

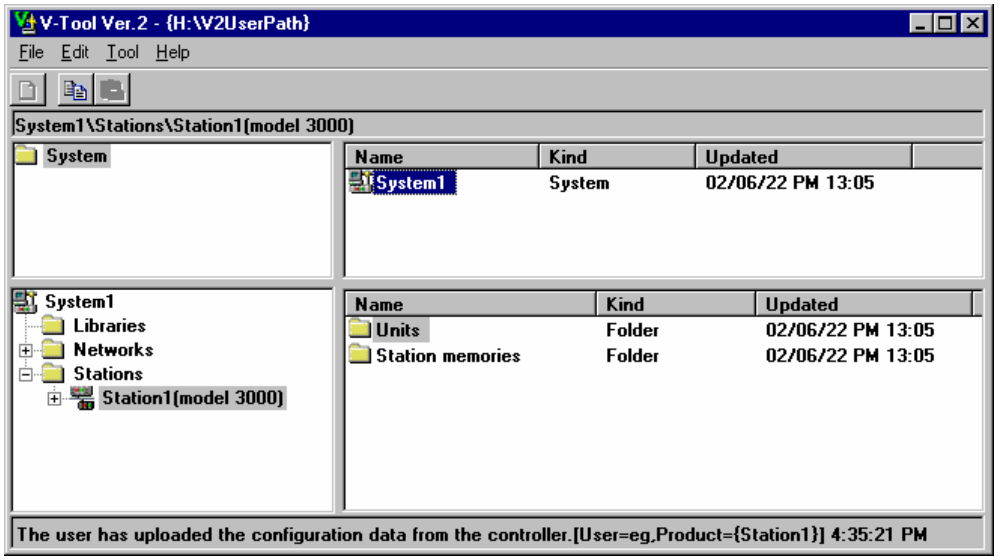
1) Open a new program from [Task entry].
2) Execute <Load text file> from the <File> menu.
3) Specify the file in the [Open file] dialog box to open the file saved in edit form.
4) This file can be reused by entering variable declarations.

■ Copying the entire system

An entire system can be copied under the same product path.

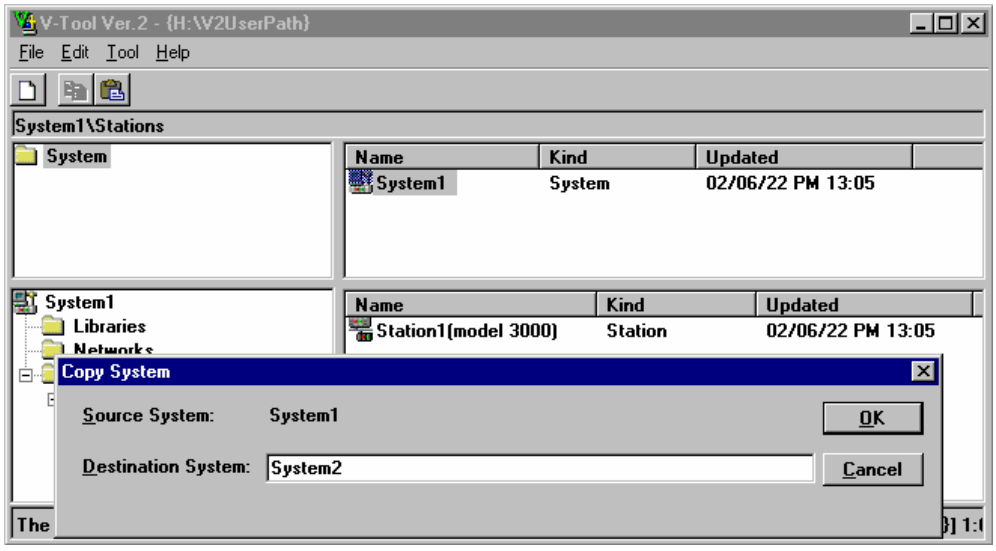
1) Open the [Product view].

2) Select the copy source system and select <Copy> from the <Edit> menu.



3) Select [System] at the top left corner of the window and select <Paste> from the <Edit> menu.

4) Enter the system name and click the [OK] button.



5) The name of the copied system is added to the system list at top right of the window. Double-click it to edit inside the system.

5.9 Compile a Batch of System

You can compile a batch of System that has the following items.

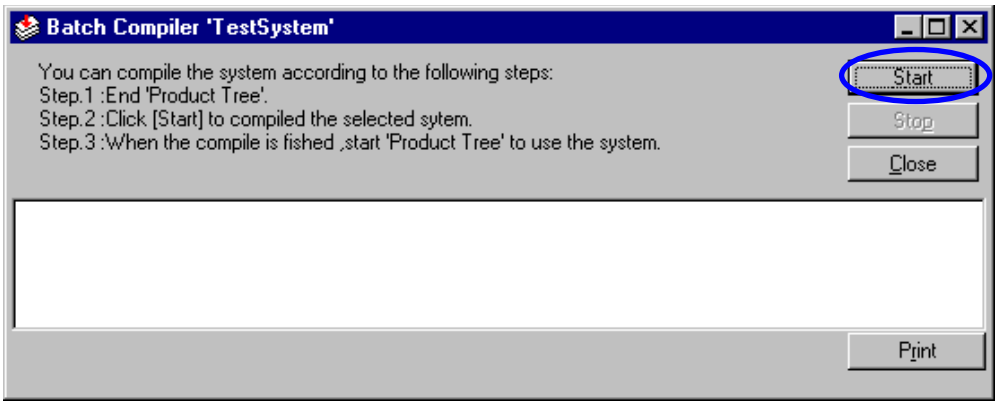
- User defined type
- Controller Variables
- Programs
- Task entry

■ Opening batch compiler

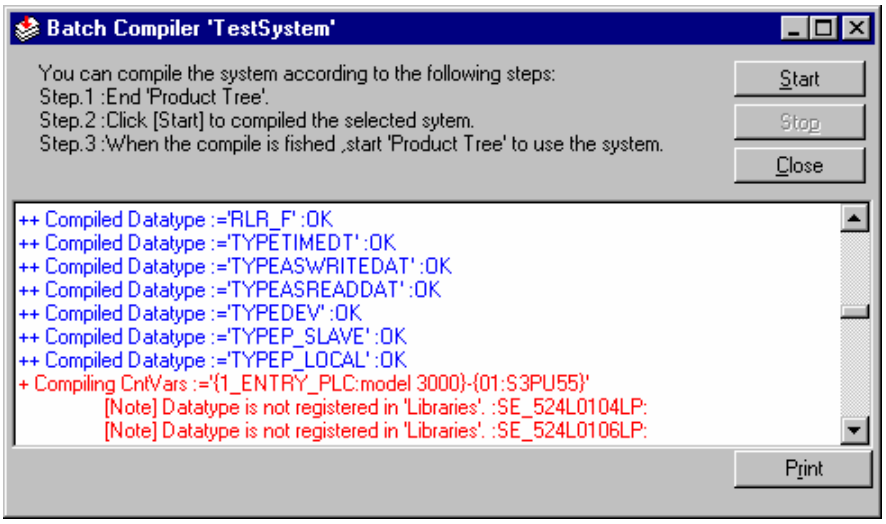
On [Product Tree], select the system to compile and click menu <File><Batch compile>.

■ Start batch compile

1) Close Product Tree, without close [Batch Compiler] window.
   In the case of C/S, all users should close [Product Tree].
2) Click [Start] to compile the selected system.



Please click [stop] button to stop the compile.
The logs will be displayed during compile.

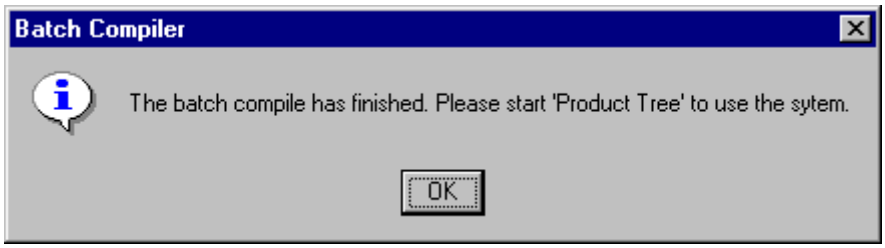


The color of logs as follows.

Color	Meaning
Blue	Compile finished
Red	Compile error detected

Click [Print] button to print out the logs.

3) When the compile is finished, start [Product Tree] to use the system.



Note

- Edit and monitoring operation is enabled during compile. But the change becomes invalid when compile is finished.

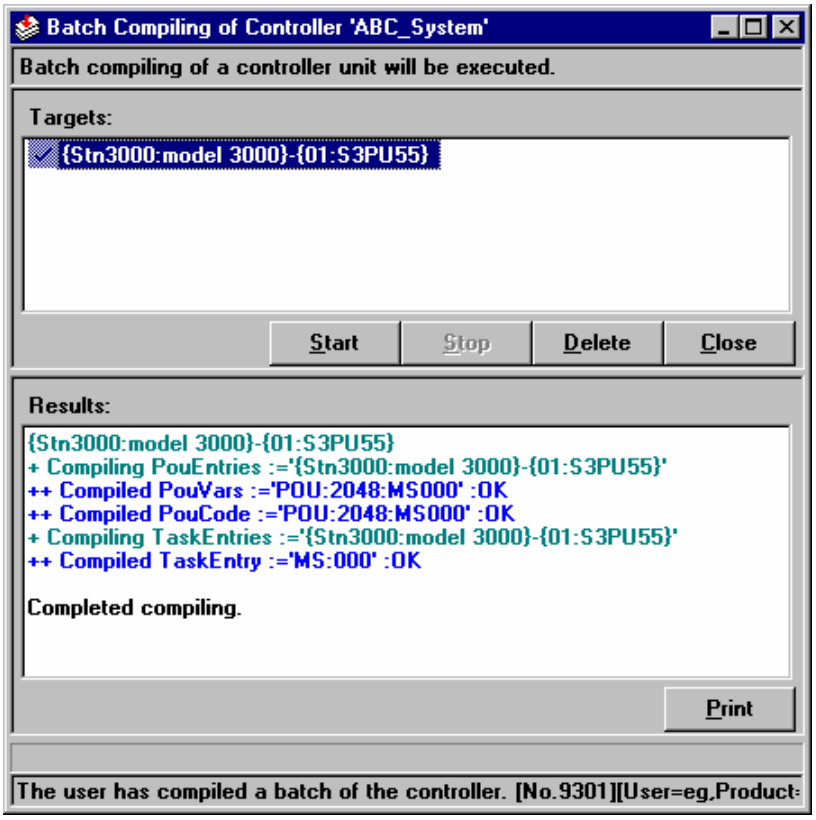
5.10 Batch Compiling of Controller

You can compile a batch of Controller that has the following items.

- Controller Variables
- Programs
- Task entry

■ Start batch compile

1) Select a controller in [Product Tree]. Select menu <File> <Batch compile>.
2) After displaying the window, you can select other controller.
3) Push [Start] button, Batch compiling starts order by [Request List].
4) While compiling, operation 2) can be used.



The logs will be displayed during compile.

The color of logs as follows.

Color	Meaning
Blue	Compile finished
Red	Compile error detected

- [Stop] button: Cancel compiling.
- [Delete] button: If you want to cancel request, select controller on [Request List], and push button [Delete].

■ Printing result of compiling

Push button [Printing].

◇ **Supplementary**

- When other user edits the controller, you can not start Batch compiling.

5.11 Searching Influence of Change

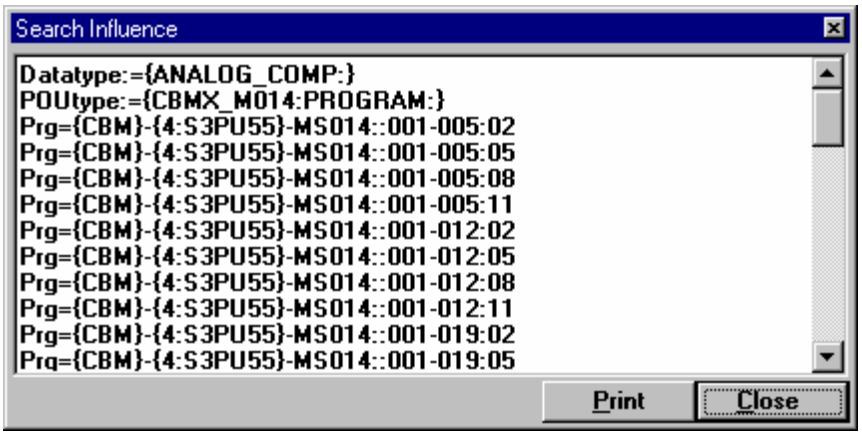
When the variables or the programs will be re-made, the Influence of the change can be searched.

■ Searching influence of change

The following items can be searched.

Function	Target
Library	Data types
Structure	Members
I/O Variables	I/O Variables
Controller Variables	Controller Variables (SW/DW/User)
Station Variables	Station Variables (Output/Input)
Network Variables	Network Variables (Output/Input)
Available Variables	Controller, I/O, Station, Network Variables
POU Entries	POUs

Click <Search Influence> button from above windows.



Form of display is as follows:

Part of Influence	Form
User Definition	Datatype = {Data type:Comment}
POU type	POUtype = {Data type:Base type:Comment}
Network Variables	NetVar = {Network no.:Network name}-{Send Block no.} -{Variable:Comment}
Station Variables	StnVar = {Station name}-{S:Controller name} -{Memory type}-{Variable:Comment}
Controller Variables	CntVar = {Station name}-{S:Controller name} -{Memory type}-{Variable:Comment}
Function Block	Fbk = {Station name}-{S:Controller name} -POU name: POU no.:Action name:PPP>RRR:CC
Function	Fun = {Station name}-{S:Controller name} -POU name: POU no.:Action name:PPP>RRR:CC
Program	Prg = {Station name}-{S:Controller name} -TTEEE:Action name:PPP>RRR:CC

Example) Prg = {Stn1}-{1:S3PU55}-MS000:ACT_1_B:001-0001:01

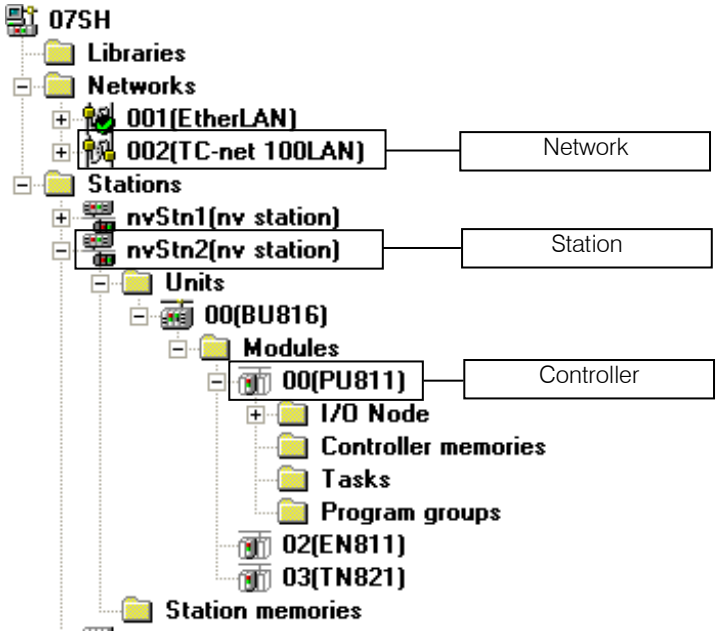
Symbol Description

Symbol	Description		Type
S	Slot No.		—
TT	Task type		EV, SS, IP, HS, MS, BG
EEE	Task entry No.		—
PPP	Page No.	Semi Graphic	Page No.
		Text	Page No.
		Full Graphic	Work Sheet No.
>	Action		–: Read >: Write S : Set R : Reset
RRR	Row No.		—
CC	Column No.		—

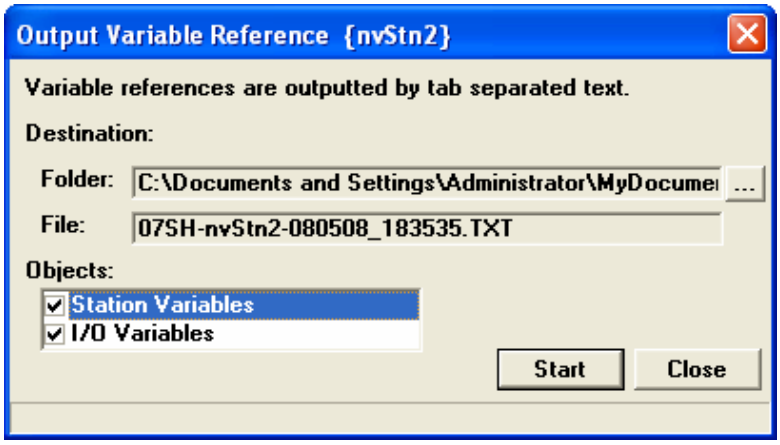
- Printing influence of change
  Click <Print> button from above <Search Influence> windows.
- Searching and outputting influence of change
  The following items can be searched.

Product	Target
Network	Network Variables
Station	Station Variables
Controller	Controller Variables

1) On product tree select product, and click <File>-<Output Variable Reference>menu.



2) "Output Variable Reference" form appears.



3) Confirm destination.
If you change the destination folder, click "…" button.
You cannot change the destination file name.

4) Confirm objects.
Clear the check box if it is not necessary to output.

5) Click Start button.
Variable reference list is made on the destination. And the result appears.

Output format

Output format is as follows. Each item is separated with Tab code.

[Module / Item]

Variable 1 <Tab> Reference1 <Tab> Reference2 <Tab> Reference3 <Tab>·····Reference N

Variable 2 <Tab> Reference1 <Tab> Reference2 <Tab> Reference3 <Tab>·····Reference N

⋮

Variable n <Tab> Reference1 <Tab> Reference2 <Tab> Reference3 <Tab>·····Reference N

5.12 Setting Program Security

◇ **Supplementary**

- The following explanation is applied to V-Tool version 2.6 or more.

■ Program security

You can set security, that is an access protection of your Library, against the users if you need.

The access levels are prepared as follows.

No Access: The user can not use, inspect, nor edit the library and its programs.

Usable: The user can use, but not inspect nor edit the library and its programs.

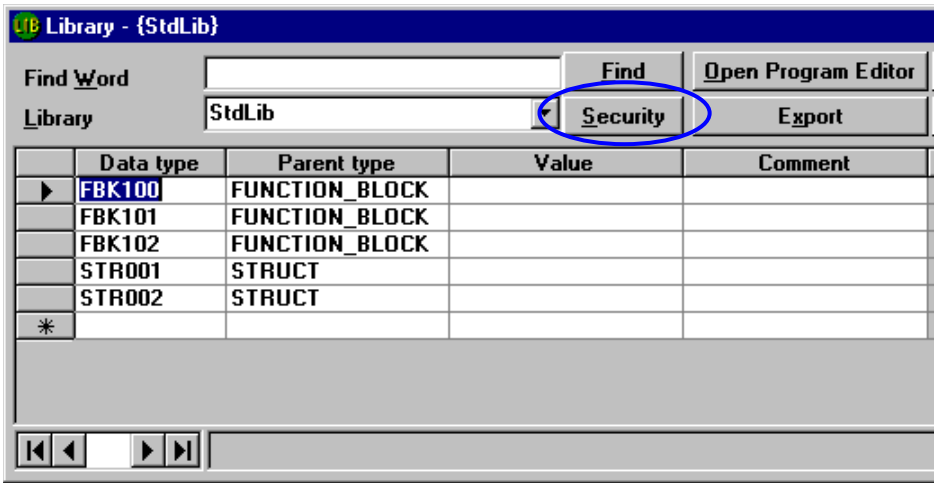
Visible: The user can use and inspect but not edit the library and its programs.

Editable: The user can use, inspect and edit the library and its programs.

You can attach any access level to each users. Users who are not registered in the library can not access the library and its programs. If a library has no user registration, everybody can use, inspect and edit the library and its programs.

■ Registering a manager of library

- Open view [Library] and select a library to which you attach security.
- Click button [Security] to open dialog [Program Security].



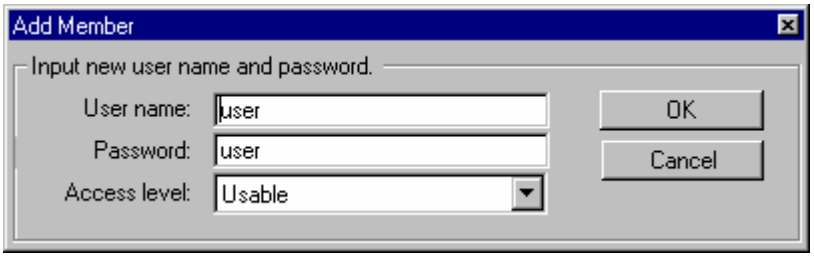
- In dialog [Update manager], input username and password of a manager of the library and click button [OK].

◇ **Supplementary**

- Access level of a manager is always ”Editable”.
  Username and password is available from 1 to 32 characters.
  Invalid characters are as follows.
  ? “ / \ <> * | : ; (space) (tab) (CR)

■ Registering members of a manger with an access level

Click menu<Member><Add>.



Input username and password of a member that should be one of Login users ,and access level to click button [OK].

■ Changing a manager

- In dialog [Program Security], input username and password of the manager and click button [OK].
- Click menu <Manager><Update> to open dialog [Update Manager].
- Input new username or password of the manager and click button [OK].

■ Changing a member

- In dialog [Program Security], input username and password of the manager and click button [OK].
- Click a username of member list who you want to change.
- Click menu <Member><Update> to open dialog [Update Member].
- Input new username or password of the member and click button [OK].

■ Deleting a member

- In dialog [Program Security], input username and password of the manager and click button [OK].
- Click a username of member list who you want to delete.
- Click menu <Member> <Delete>.

■ Deleting program security

- In dialog [Program Security], input username and password of the manager.
- Click menu <Manager> <Delete Security>.

◇ Supplementary

- Login security is case-sensitive for password and not for username.
- Do not forget username and password of manager.

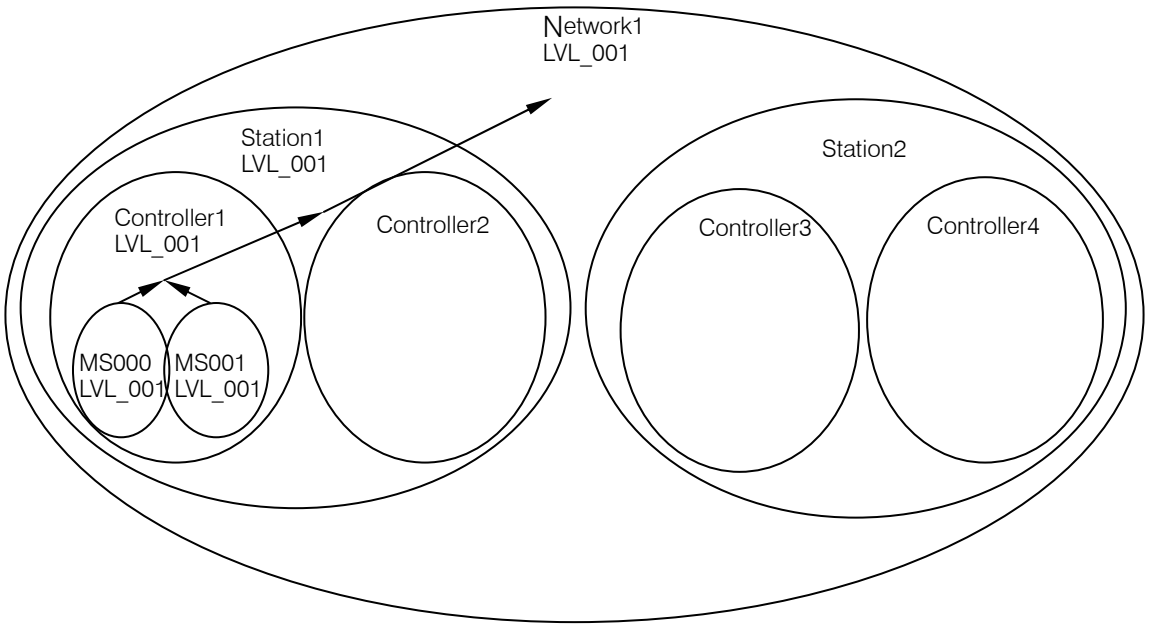
5.13 Searching Double Defined Variables

Using this function, you can find double-defined variables as local & global variables.

Device variable that is used in program is searched. The following variables are target.

Local variables, Controller variables, I/O variables, Station variables, Network variables.

The following figure shows examples. Local variable 'LVL_001' is also defined as controller, station, and network variable. These registrations can be found.



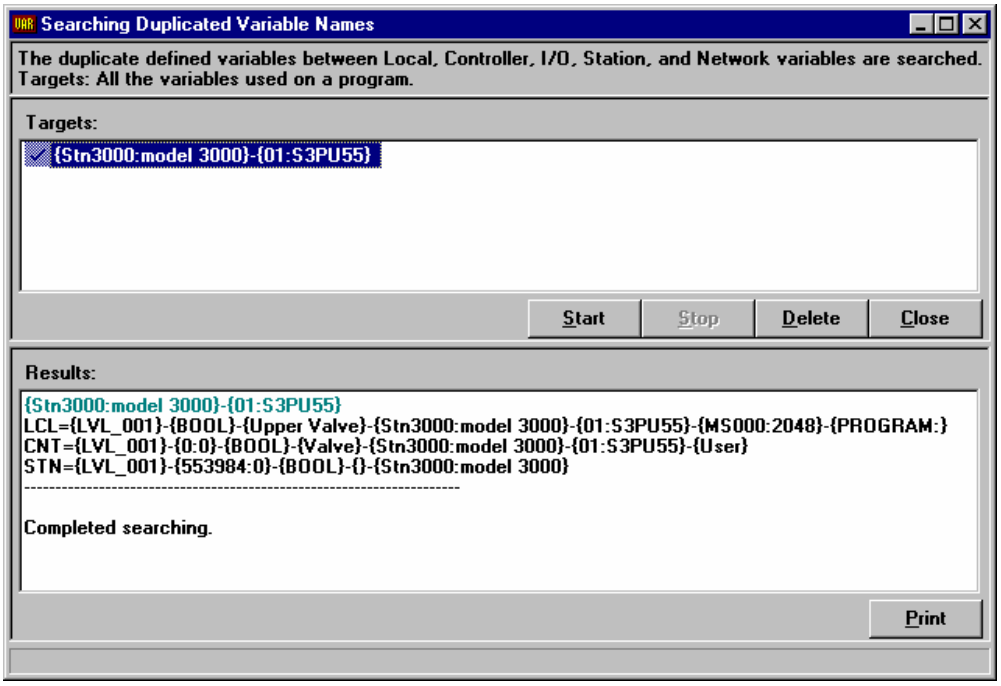
■ Restrictions

If you change the registration of variables while searching, the result may not be correct.

Please re-start searching manually.

■ Searching double defined variables

1) Select a controller in [Product Tree], Select menu <File> <Search Duplicated Variable Names>.
2) After displaying the window, you can select other controller.
3) Push [Start] button, Searching controllers starts order by [Request List].
4) While searching, operation 2) can be used.



- Display Items:

Local variable	LCL={Variable name}-{Data type}-{Comment} -{Station name:Model}-{Slot no.:Controller name} -{POU name:POU no.}-{Data type: Comment}
Controller variable	CNT={Variable name}-{Word no.:Bit no.}-{Data type}-{Comment} -{Station name:Model}-{Slot no.:Controller name}-{Memory type}
I/O variable	I/O={Variable name}-{I/O word no.:Bit no.}-{Data type}-{Comment} -{Module name:Hard address}
Station variable	STN={Variable name}-{Word no.:Bit no.}-{Data type}-{Comment} -{Station name:Model}
Network variable	NET={Variable name}-{Word no.:Bit no.}-{Data type}-{Comment} -{Network no.:Network name}-{Send Block no.}

- [Stop] button: Cancel searching.
- [Delete] button: If you want to cancel request, select controller on [Request List], and push button [Delete].

■ Printing result of searching

Push button [Printing].

5.14 Searching Overlap Addresses of Variables

Using this function, you can find double-defined addresses of variables.

Device variables are searched if same address is used for the registration of other variables or not.
The following variables are target:

- Controller variables, I/O variables, Station variables, Network variables.

The following patterns are searched:

- BOOL & BOOL: Bit address overlapping.
- BOOL & Others: Word address overlapping.
- Others & Others: Word address overlapping.

'Others' includes 'Basic data type', 'Array type' and 'User data type'.

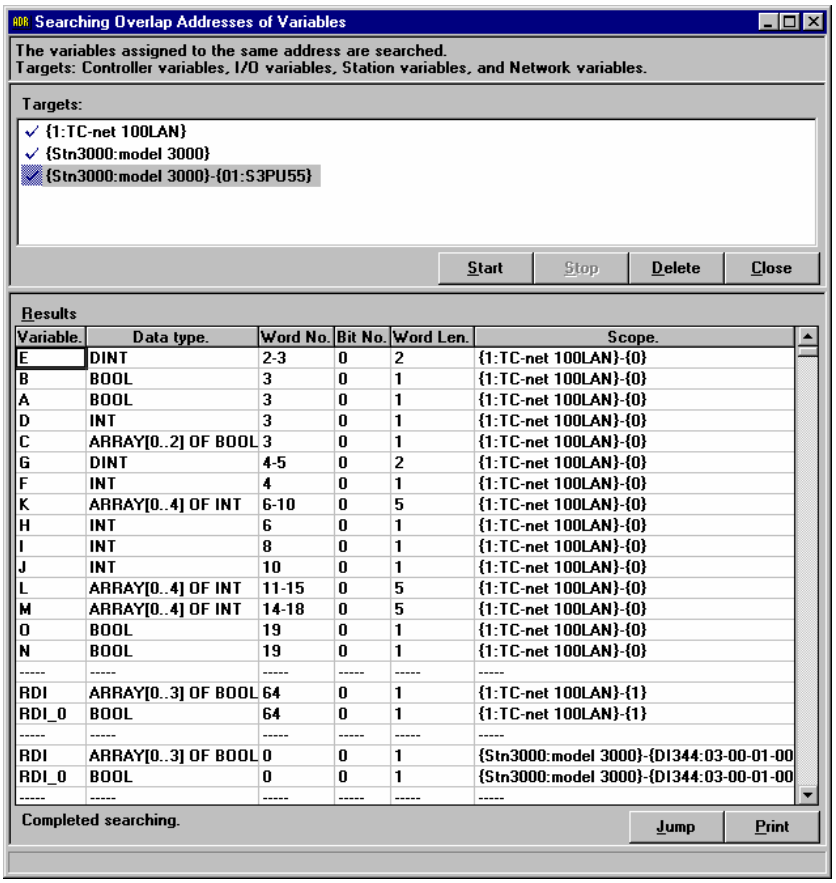
■ Restrictions

If you change the registration of variables while searching, the result may not be correct.

Please re-start searching manually.

■ Searching overlap addressed of variables

1) Select a network or a station or a controller in [Product Tree]. Select menu <File><Search Overlap Addresses>.
2) After displaying the window, you can select other controller.
3) Push [Start] button, Searching controllers starts order by [Request List].
4) While searching, operation 2) can be used.
   - Case of a network:
     Scan memory and I/O module addresses (Word No. & Bit No.) are searched.
   - Case of a station:
     Station memory and I/O module addresses (Word No. & Bit No.) are searched.
   - Case of a controller:
     Controller memory and I/O module addresses (Word No. & Bit No.) are searched.



Variable.	Data type.	Word No.	Bit No.	Word Len.	Scope.
E	DINT	2-3	0	2	{1:TC-net 100LAN}-{0}
B	BOOL	3	0	1	{1:TC-net 100LAN}-{0}
A	BOOL	3	0	1	{1:TC-net 100LAN}-{0}
D	INT	3	0	1	{1:TC-net 100LAN}-{0}
C	ARRAY[0..2] OF BOOL	3	0	1	{1:TC-net 100LAN}-{0}
G	DINT	4-5	0	2	{1:TC-net 100LAN}-{0}
F	INT	4	0	1	{1:TC-net 100LAN}-{0}
K	ARRAY[0..4] OF INT	6-10	0	5	{1:TC-net 100LAN}-{0}
H	INT	6	0	1	{1:TC-net 100LAN}-{0}
I	INT	8	0	1	{1:TC-net 100LAN}-{0}
J	INT	10	0	1	{1:TC-net 100LAN}-{0}
L	ARRAY[0..4] OF INT	11-15	0	5	{1:TC-net 100LAN}-{0}
M	ARRAY[0..4] OF INT	14-18	0	5	{1:TC-net 100LAN}-{0}
O	BOOL	19	0	1	{1:TC-net 100LAN}-{0}
N	BOOL	19	0	1	{1:TC-net 100LAN}-{0}
-----	-----	-----	-----	-----	-----
RDI	ARRAY[0..3] OF BOOL	64	0	1	{1:TC-net 100LAN}-{1}
RDI_0	BOOL	64	0	1	{1:TC-net 100LAN}-{1}
-----	-----	-----	-----	-----	-----
RDI	ARRAY[0..3] OF BOOL	0	0	1	{Stn3000:model 3000}-{DI344:03-00-01-00
RDI_0	BOOL	0	0	1	{Stn3000:model 3000}-{DI344:03-00-01-00
-----	-----	-----	-----	-----	-----

- Display Items:
  'Scope' format is as follows:

Network variable	{Network no.:Network name}-{Send Block no.}
Station variable	{Station name:Model}
Controller variable	{Station name:Model}-{Slot no.:Controller name} -{Memory type}
I/O variable (System Scope)	{Station name:Model}-{Module name:Hard address}
I/O variable (Station Scope)	{Station name:Model}-{Module name:Hard address}
I/O variable (Controller Scope)	{Station name:Model}-{Slot no.:Controller name} -{Module name:Hard address}

- [Stop] button: Cancel searching.
- [Delete] button: If you want to cancel request, select controller on [Request List], and push button [Delete].
- [Jump] button: Variables window is opened automatically. You can confirm the registration of a variable that is selected in this window.

■ Printing result of searching

Push button [Printing].

5.15 Checking Duplicated Output Variables

The program locations of the duplicated output to the same variable are detected.

Targets: Local variables, Controller variables, I/O variables, Station variables, and Network variables.

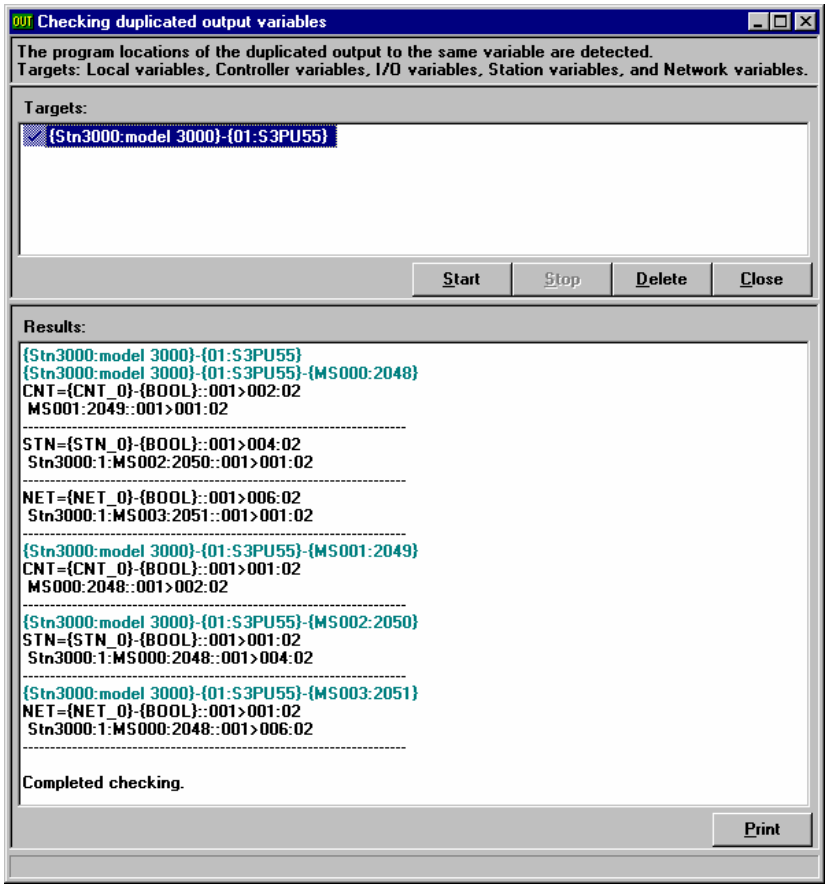
■ Restrictions

Please re-start checking manually after compiling program.

The alias name of variable can not be found as the duplicated output.

■ Checking duplicated output variables

1) Select a controller in [Product Tree], Select menu <File><Check Duplicated Output Variables>.
2) After displaying the window, you can select other controller.
3) Push [Start] button, checking controllers starts order by [Request List].
4) While checking, operation 2) can be used.



- Display Items:

Network variable	NET={Variable name}-{Data type}:Action name:PPP>RRR:CC Station name:S:POU name: POU no.:Action name:PPP>RRR:CC
Station variable	STN={Variable name}-{Data type}:Action name:PPP>RRR:CC Station name:S:POU name: POU no.:Action name:PPP>RRR:CC
Controller variable	CNT={Variable name}-{Data type}:Action name:PPP>RRR:CC POU name: POU no.:Action name:PPP>RRR:CC
Local variable	LCL={Variable name}-{Data type}:Action name:PPP>RRR:CC Action name:PPP>RRR:CC

Symbol Description

Symbol	Description		Type
S	Slot No.		—
PPP	Page No.	Semi Graphic	Page No.
		Text	Page No.
		Full Geaphic	Work Sheet No.
>	Action		–:Read >:Write S:Set R:Reset
RRR	Row No.		—
CC	Column No.		—

- [Stop] button: Cancel checking.
- [Delete] button: If you want to cancel request, select controller on [Request List], and push button [Delete].

■ Printing result of checking

Push button [Printing].

5.16 Checking Input and Output Variables

The program locations on which the following variables are used are detected.

- The variables of only an input without an output (Variables of Contact/Load instruction)
- The variables of only an output without an input (Variables of Coil/Store instruction)

Targets: Local variable and Controller variables.

Variables	Check
Local variable	○
Controller variable 'User','DW','SW')	○
Station variable	—
Network variable	—
I/O variable (Controller Scope)	—
I/O variable (Station Scope)	—
I/O variable (System Scope)	—

■ Restrictions

Please re-start checking manually after compiling program.

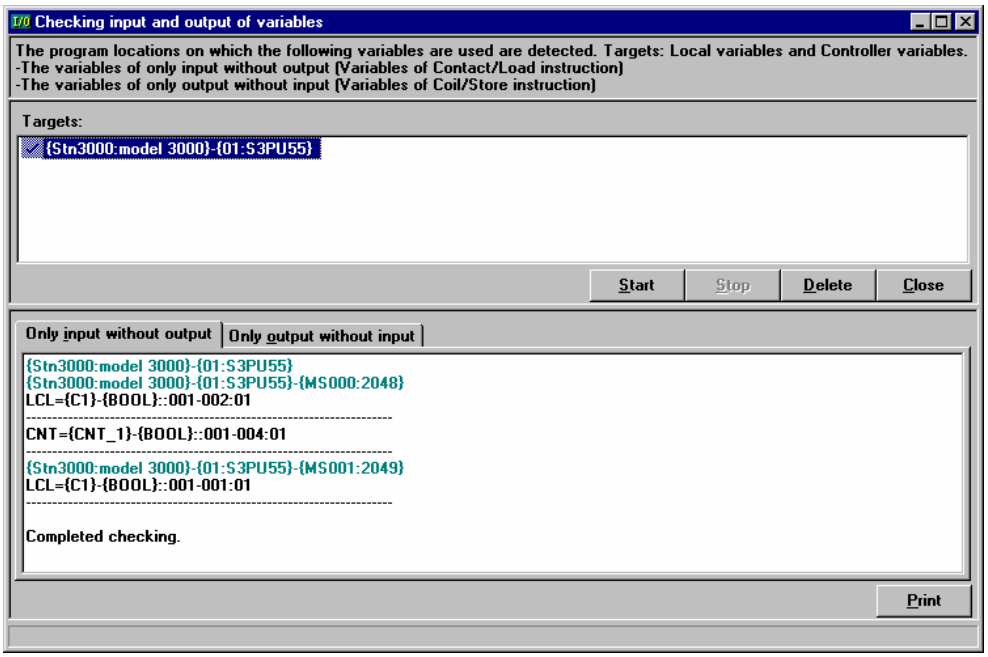
The variables can not be checked, which are used on the instructions like 'TMOV'.

The alias name of variable can not be found as the input/output variables.

When controller variables like 'DW' or 'SW' are read, these are always found as checking result.

■ Checking input and output variables

1) Select a controller in [Product Tree], Select menu <File><Check Input and Output of Variables>.
2) After displaying the window, you can select other controller.
3) Push [Start] button, checking controllers starts order by [Request List].
4) While checking, operation 2) can be used.



- Display Items:

Controller variable	CNT={Variable name}-{Data type}:Action name:PPP>RRR:CC POU name: POU no.:Action name:PPP>RRR:CC
Local variable	LCL={Variable name}-{Data type}:Action name:PPP>RRR:CC Action name:PPP>RRR:CC

Symbol Description

Symbol	Description		Type
S	Slot No.		—
PPP	Page No.	Semi Graphic	Page No.
		Text	Page No.
		Full Geaphic	Work Sheet No.
>	Action		–: Read >: Write S: Set R: Reset
RRR	Row No.		—
CC	Column No.		—

- [Stop] button: Cancel checking.
- [Delete] button: If you want to cancel request, select controller on [Request List], and push button [Delete].

■ Printing result of checking

Push button [Printing].

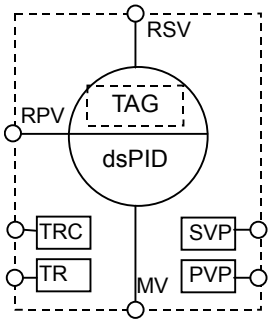
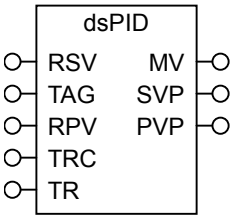
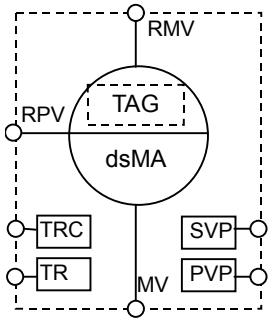
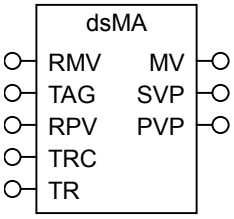
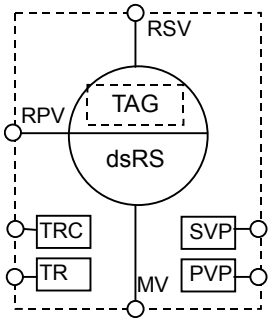
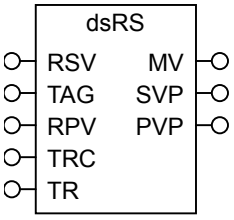
5.17 How to Use Custom Symbols

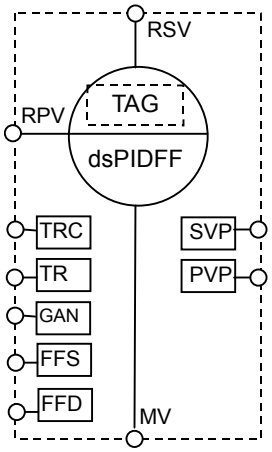
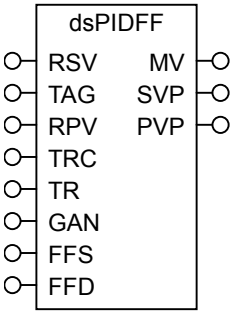
Custom symbol is a graphic symbol that realizes some specific figure IEC61131-3 does not have.
Each custom symbol is functional or none-functional one. At execution, functional symbol performs and none-functional does not perform.

Custom symbols can be used and created in V-Tool3 Ver3.1.0 or more.

■ Readymade custom symbols

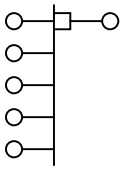
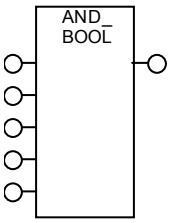
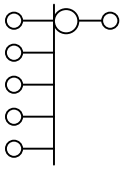
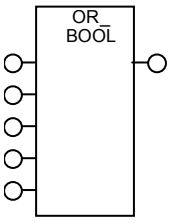
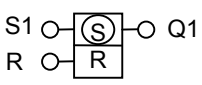
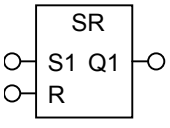
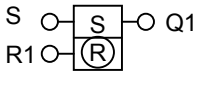
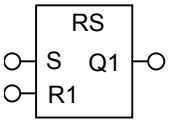
Readymade custom symbols of V-Tool3 are shown as follows.

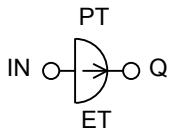
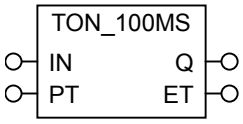
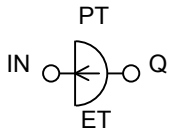
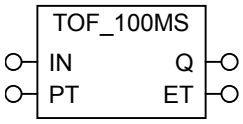
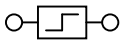
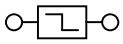
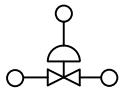
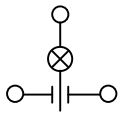
Custom symbol name	Custom symbol	Equivalent function block	Comment
dsPID			PID or SPI controller
dsMA			Auto/Manual setter
dsRS			Ratio setter

Custom symbol name	Custom symbol	Equivalent function block	Comment
dsPIDFF			PID or SPI controller with feed forward compensation

◇ **Supplementary**

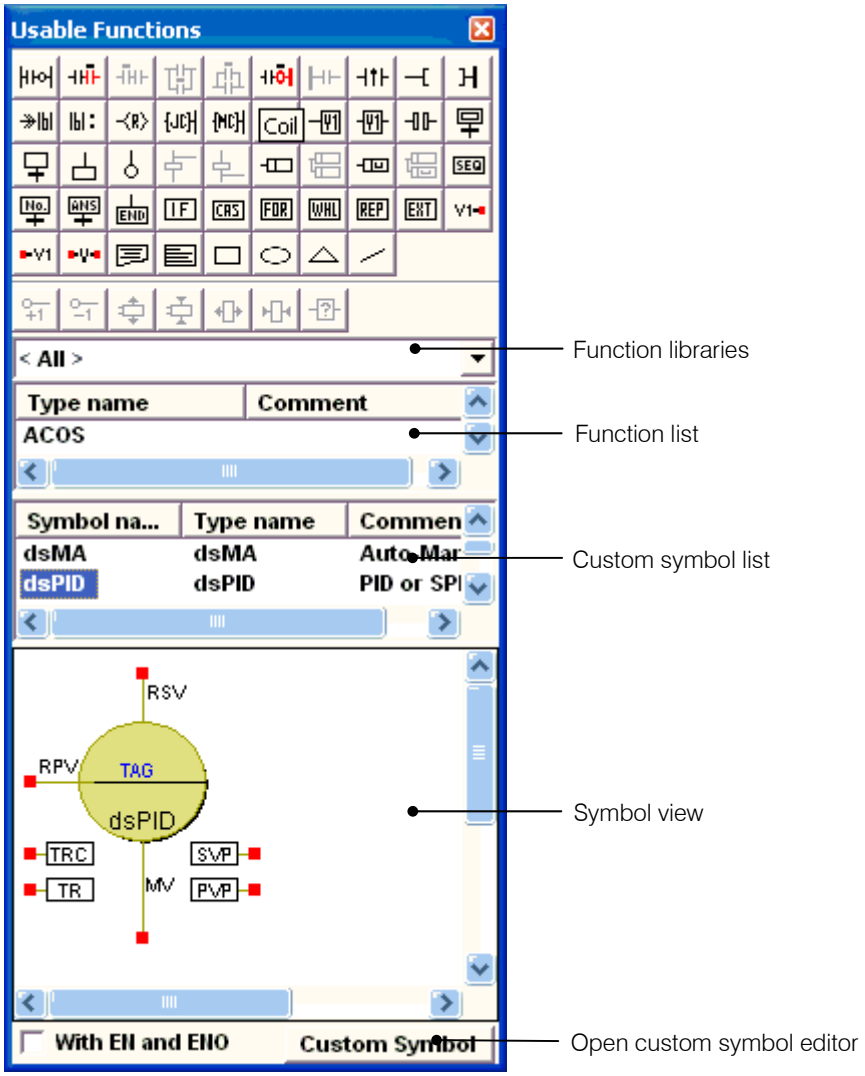
- Using dsPID,dsMA,dsRS and dsPIDFF needs the license of New Instrument FB Library that is an add-in package for V-Tool3.

Custom symbol name	Custom symbol	Equivalent function block	comment
AND_BOOL			Boolean AND Variable Inputs:2 to 15 points.
OR_BOOL			Boolean OR. Variable Inputs:2 to 15 points.
NOT_BOOL			Boolean NOT.
SR			Set-Flip-Flop
RS			Reset-Flip-Flop

Custom symbol name	Custom symbol	Equivalent function block	comment
TON_100MS			On-delay timer. 1 count is 100 ms.
TOF_100MS			Off-delay timer. 1 count is 100 ms.
Rising_Edge			Rising edge detector.
Falling_Edge			Falling edge detector.
Valve		None	Control value display. None-functional.
Sensor		None	Sensor and transmitter display. None-functional.

■ Drawing custom symbols

- Open [Program Editor (Full graphic)]
- Click menu <Edit><Enable> to open [Usable Functions] shown as follows.



- Click some space of worksheet to show drawing cursor.
- Click one name of custom symbol list to show the image in the symbol view.
- Double-click one name of custom symbol list to draw the custom symbol in the worksheet.
- Especially, variable inputs of some special symbols (AND_BOOL, OR_BOOL) can be increased and decreased like the functions.

5.18 How to Create Custom Symbols

Explains how to create specific custom symbols that user needs.

Custom symbols can be used and created in V-Tool version3.1.0 or more.

■ Specifications of custom symbols

Each custom symbol needs a custom symbol name.

Each custom symbol is functional type that is executed in controller or none-functional type that is not executed.

A functional type symbol needs a Function or a Function Block that is executed in controller.

One or more custom symbols can be defined for a Function or a Function Block.

You can make custom symbols using Custom Symbol Editor.

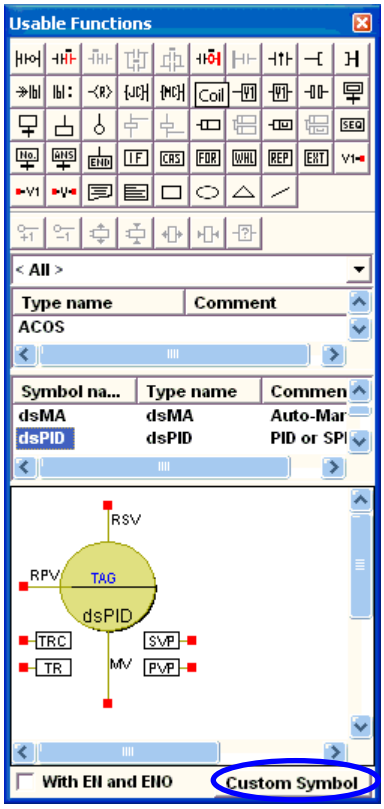
Custom Symbol Editor has some graphical objects, that are Frame, Body, Terminals, Shape, Line and etc, to make specific custom symbol.

To create your custom symbols, you can copy or export/import any readymade custom symbols.

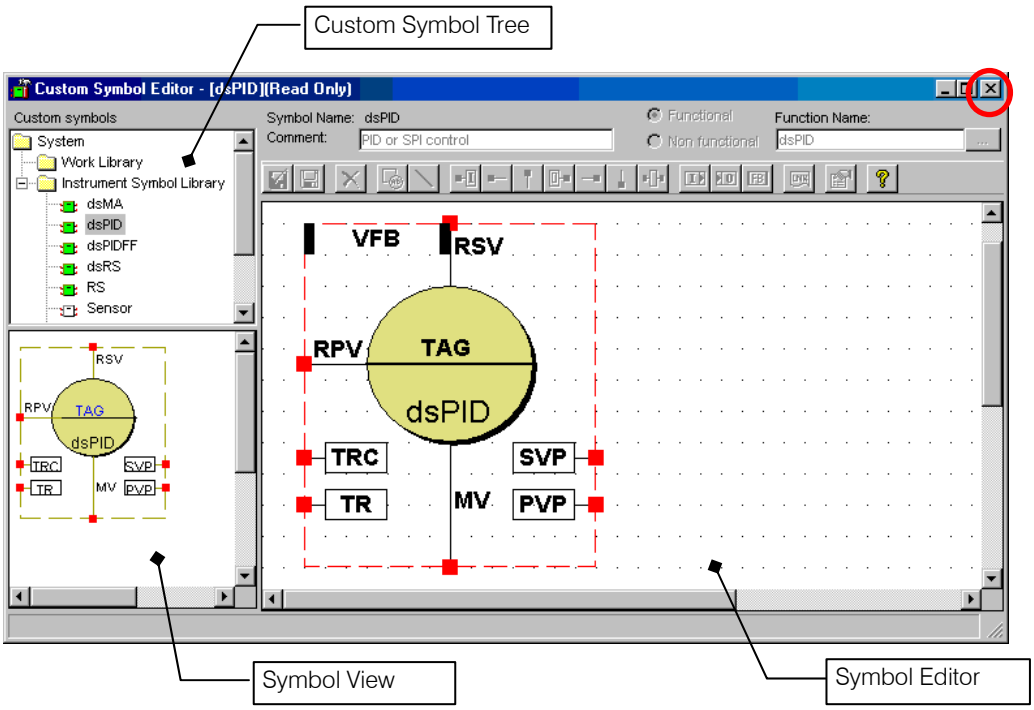
■ Opening and closing custom symbol editor

Open [Program Editor (Full graphic)] form.

Click <Edit><Enable> menu to open [Usable Function] form shown in the following figure.



Click [Custom Symbol] button to open the form shown in the following figure.



Click [X] button of the title bar to close the form.

■ Creating new custom symbol

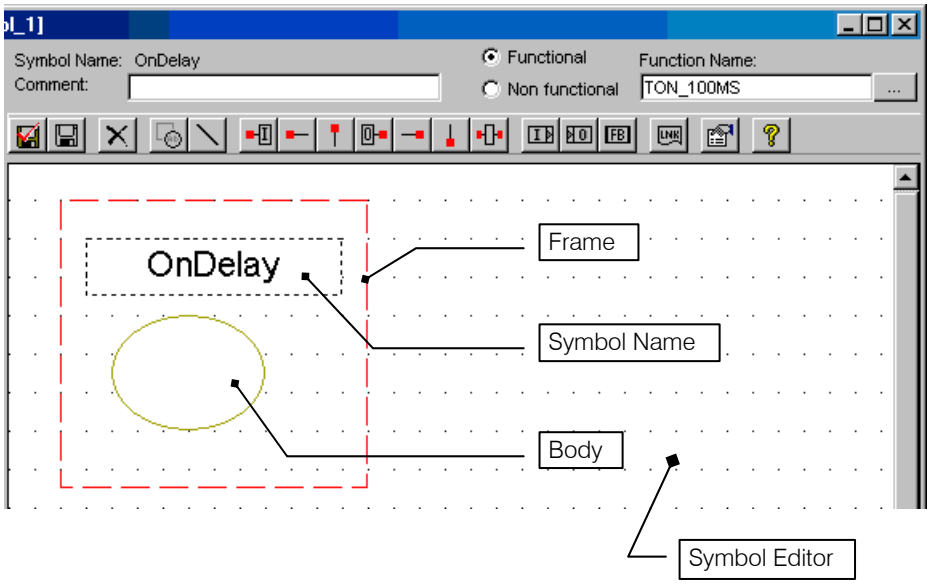
In Custom Symbol Tree, right button click <Work Library> icon and click <New> menu to add new custom symbol.

Click the new custom symbol to rename it and update the contents of Symbol Editor.

◇ Supplementary

Each custom symbol name should:

- Be unique in all custom symbol names of the System.
  (Uppercase letter and lowercase one are not distinguished.)
  (Left side and right side spaces are deleted automatically.)
- Be the length from 1 to 32 bytes.
  (ASCII character is counted as 1 byte and DBCS as 2 byte.)
- Have the characters except the following special ones.
  * , . / : ; < > ? \ | '



Type <Comment> field as you like.

◆ Note

- The byte length of Comment should be 128 bytes or less.

Click <Functional> or <Non functional> option button as you like.
In case of Functional, you needs to select readymade Function or Function Block by clicking [...] reference button.

Initially Symbol Editor displays Frame, Symbol Name and Body graphic objects.

Frame is a boundary rectangle of custom symbol and becomes the selecting frame on Program Editor.

◆ **Note**

- Any graphic objects except Link Comment should be located in Frame.
  Symbol Name is the object has the name.
  Body is the object expresses the main image of custom symbol.
  At online monitoring, this boundary is colored by the power.

■ Adding graphic objects

Some toolbar icons express the usable graphic objects for making custom symbol as follows.

Icon	Role
Shape	Expresses various readymade shape. Can hold text and picture in it.
Line	Expresses straight line, polyline or curve.
Input Terminal (Left, Box)	Expresses left-directed input terminal for input parameter with the box.
Input Terminal (Left)	Expresses left-directed input terminal for input parameter without the box.
Input Terminal (Up)	Expresses up-directed input terminal for input parameter without the box.
Output Terminal (Right, Box)	Expresses right-directed output terminal for output parameter with the box.
Output Terminal (Right)	Expresses right-directed output terminal for output parameter without the box.
Output Terminal (Down)	Expresses down-directed output terminal for output parameter without the box.
In-Out Terminal	Expresses left/right-directed inout terminal for inout parameter with the box.
Input Variable	Expresses input variable that is connected with input parameter. Each input variable uses a single step.
Output Variable	Expresses output variable that is connected with output parameter. Each output variable uses a single step.
Function Block Variable	Expresses instance of function block.
Linked Comment	Expresses comment of linked TAG or some parameter variables.

Click each icon to add the graphic object in Symbol editor.

■ Moving graphic objects

Click and drag a graphic object to move.

Each red connector of terminal should be located on the boundary of Frame.

Each graphic object except Linked Comment should be located inside of Frame.

■ Deleting graphic objects

Press [Delete] key or click [Delete] icon on the toolbar to delete the selected graphic objects.

Dragging mouse pointer from some point at space selects the inner graphic objects.

Frame, Symbol Name and Body can not be deleted because of the necessary elements for custom symbol.

■ Resizing graphic objects

Click and drag the rectangle boundary of graphic object to resize it.

The length of lead lines and the height of Input Terminal (Left,Box) and Output Terminal (Right,Box) can not be resized.

■ Connecting line between graphic objects

Click the center of graphic object and drag mouse pointer to another graphic object to make connected line between the objects.

Click the line and press [Delete] key to delete it.

■ Changing properties of graphic objects

Right button click a graphic object and click <Properties> menu to open the form.

Change each property value as you like.

(1) Shape properties

Each Shape can hold and display the text you need. The max length is 1024 bytes.

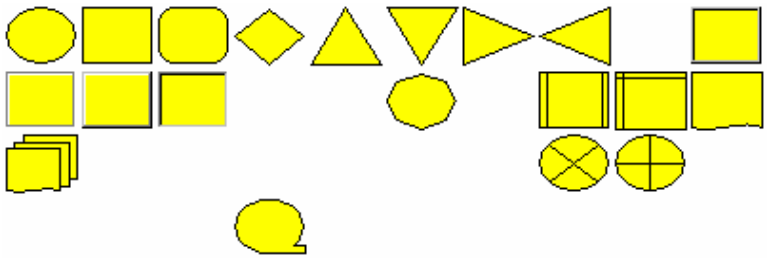
Press [Enter] key to change the text line.

Each Shape can hold and display the picture you need.
BMP,EMF,WMF,GIF and JPEG types are usable.

Select <Picture> and press [Delete] key to delete it.

Set ‘Adjust Picture Size to Node’ in <Auto Size> to resize the picture for the size of Shape.

To rotate the shape, select some angle in <Shape Orientation>. But the following marked shapes are invalid for the angle setting.



<Fill Color> is available only when <Transparent> is 'Opaque'.

(2) Line properties

<Draw Style> except solid and transparent is available only when <Draw Width> is 0.

<Draw Color> is available only when <Draw Style> is not 'Transparent'.

Click and drag the edge of Line to change the length and the direction.

Click and drag the middle of Line to add a vertex. So the Line will become polyline.

Select cubic spline or bezier of <Link Style> to make the polyline curved.

Maximum is 64 points per a curved line.

The line or curved line is too close to the frame, so it cannot be saved. In this case, please correct its position.

(3) Terminal properties

In case of functional custom symbol, <Text> needs parameter name of the executed Function or Function Block.

(4) Variable properties

In case of functional custom symbol, <Text> needs parameter name of the executed Function or Function Block.

Don’t overlay the other objects with Variable because monitoring value is displayed in the south side of Variable.

(5) Linked Comment properties

Linked Comment should be connected with Input Variable which has TAGNo or R/W/P/T/C variable.

<Tag Comment><Instrument Range><Lamp Status Character>is usable for TAGNo Input Variable.

<Comment>is usable for R/W/P/T/C Input Variable.

■ Zooming

Select pull-down <Zoom> and select the value to change Zooming.

■ Saving custom symbol

Click [Save] button of tool bar to start the validation check for custom symbol.

When the symbol has some problems, the error list will appear.

Click an item of the list to jump and select the graphic object which has the cause of error.

Error list icon	Meaning
	Error. The location or the property setting of graphic object makes the error. Saving custom symbol is canceled.
	Warning. Confirm the graphic object according to the message. If the other errors are not found, saving the custom symbol is finished normally.

Click [Save Temporarily] to save the custom symbol without the validation. So this custom symbol does not appear in [Usable Functions] form.

In Custom Symbol Tree, note that custom symbol icon shows one of the followings.

Error list icon	Usable in Program Editor	Not Usable in Program Editor
Functional		
None functional		

■ Coping and customizing readymade custom symbol

There are two way of the customization. The first way is in the same System and the second is from the other System.

(1) Copying from the Same System

In Custom Symbol Tree, right button click a custom symbol you copy and click <Copy> menu to create new symbol.

Right button click the target <Library> folder and click <Paste> menu to move the new symbol into the Library.

Right button click the new symbol and click <Rename> to rename it.

Double-click the copied custom symbol icon to update the contents of [Symbol Editor] form.

Edit and save the copied custom symbol contents as you like.

(2) Copying from the Other System

In Product View, open System which has some custom symbols you want to export.

Open [Custom Symbol Editor] in Program Editor of the System.

In Custom Symbol Tree, right button click some <Library> folder you export and click <Export> menu to open [Export] form.

In <Export> form, check the custom symbols you want to export.

In <Export> form, click <Export> button to export the files.

In Product View, open System which has some custom symbols you want to import.

Open [Custom Symbol Editor] in Program Editor of the System.

In Custom Symbol Tree, right button click some <Library> folder you import and click <Import> menu to open [Import] form.

In [Import] form, check the custom symbol files you exported.

In [Import] form, click <Import> button to import the files in the folder.

After importing, shown as “(1)Copying from the Same System”, edit and save the imported custom symbols.

■ Editing custom symbol library

(1) Adding and renaming custom symbol

See [Creating New Custom Symbol].

(2) Deleting custom symbol

In Custom Symbol Tree, right button click a custom symbol you want to delete and click <Delete> menu.

(3) Adding and renaming custom symbol library

In Custom Symbol Tree, right button click <System> and click <New> menu.

In Custom Symbol Tree, right button click <Library> and click <Rename> menu to change it.

(4) Deleting custom symbol library

In Custom Symbol Tree, right button click <Library> you want to delete and click <Delete> menu.

◆ **Note**

- Deleting Custom Symbol Library means all of the custom symbols are deleted.
- Readymade two libraries, <Work Library> and <Instrument Symbol Library>, can not be deleted for standard.

Chapter 6
Setting Control Parameters

■ What is control parameter?

Control parameters refer to the semi-fixed values such as operation target values and alarm judgment values which are referenced by the control program. These values are set and saved with the tool beforehand and downloaded to the controller. Normally, the values within the controller are changed by HMI and tool according to the adjustment and operation status. Therefore, control parameters must be stored in controller memory that retains its content when the power is turned off.

◇ **Supplementary**

- Memory that retains its content when the power is turned off depends on the controller model. Refer to your controller manual for more information.
- Whereas "Parameters" refer to semi-fixed values read mainly by the control program, values actively updated by the control program are sometimes referred to as "Data."

■ Data view and tag editor

[Data View] and [Tag Editor] are provided to display and set control parameters and data.

Both can be used to display and set the value of a tool file (offline).

Both can be used to refresh display and set the value of a controller memory (online).

[Data View] displays and sets all global variables and local variables as IEC61131-3 data type.

[Data View] can display and set value of variables for up to 32 points.

In [Data View], the displayed variable name can be saved to a data sheet and called when necessary.

The [Tag Editor] displays and sets Tag parameters/data that are provided beforehand by the L controller.

The Tag parameter/data viewed with the [Tag Editor] can be displayed and set regardless of whether the variable is compiled or not.

With [Tag Editor], you can easily set, select, and copy values within the effective range of the Tag parameter/data.

The [Tag Editor] can also display online and offline values simultaneously.

The [Data View] can be used from the L, S controller, but some Tag parameters may not be clear because their data format is not IEC61131-3. The [Tag Editor] is designed specifically for L controller Tag parameter/data. Use these two accordingly.

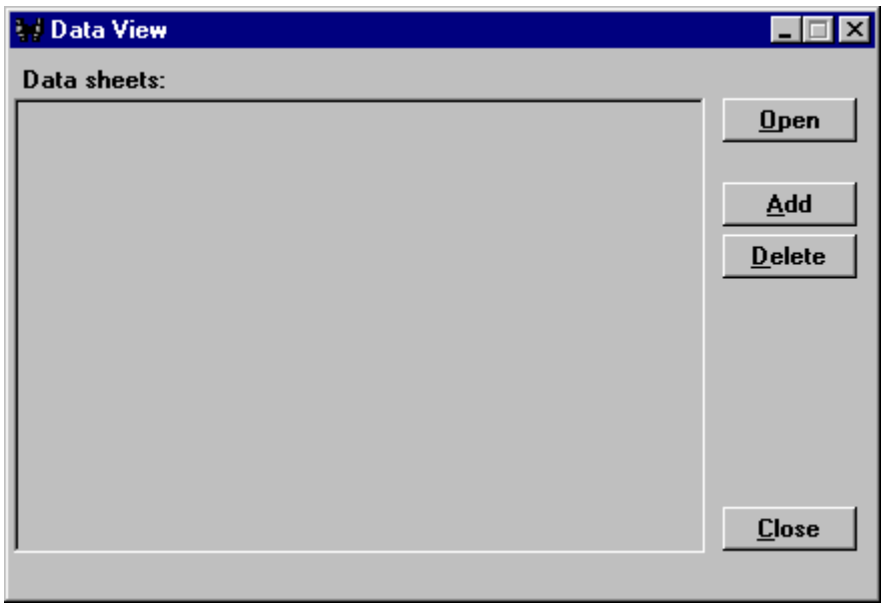
This section describes the operation to set control parameters. The following topics are described:

6.1 Setting Values in Data View

This section describes how to monitor the value of variables within the system and set new values.

■ Starting data view

After selecting a system from the [Product Tree], select <Data View> from the <File> menu to open the [Data View] window.

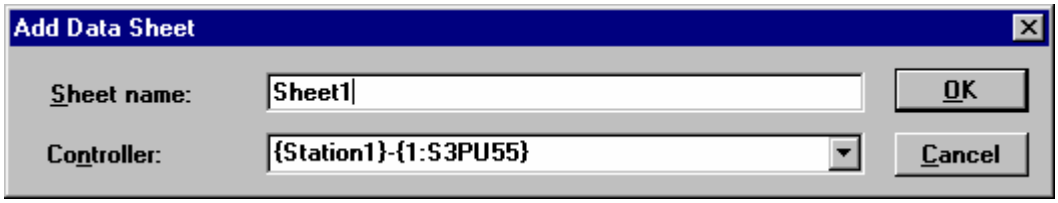


■ Adding a new data sheet

In the [Data View] window, click the [Add] button to open the [Add data sheet] window.

Select the target controller from the [Controller] pull down list, enter the [Sheet name] and click the [OK] button.

Click [Cancel] button to close the window.



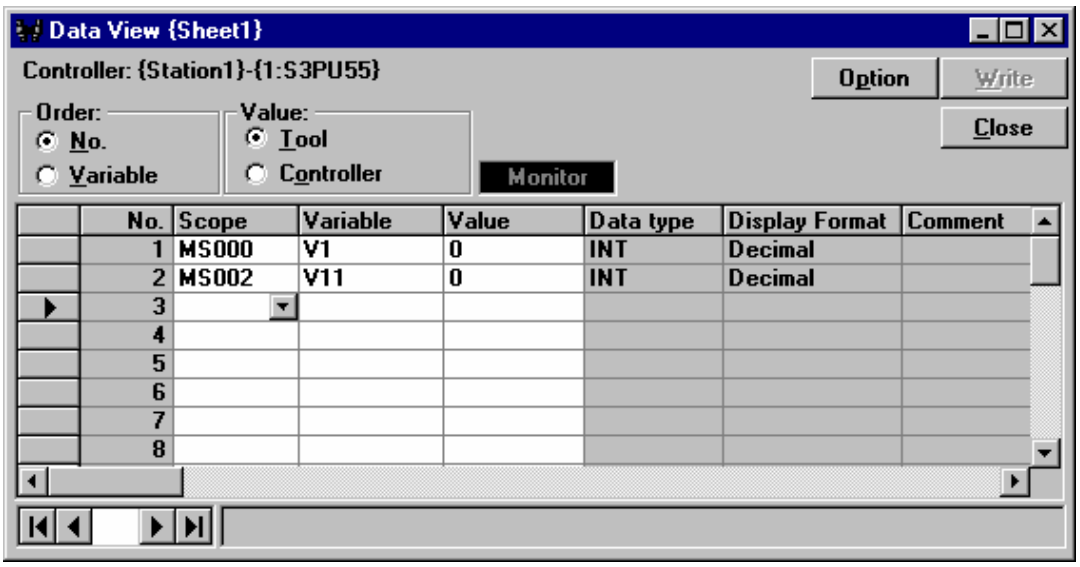
■ Adding variables to the data sheet

Select a data sheet in the [Data View] window and click the [Open] button.

When the data sheet opens, enter the variable for which you want to display the value.

You can also drag and drop from each variable window to add variables to the data sheet.

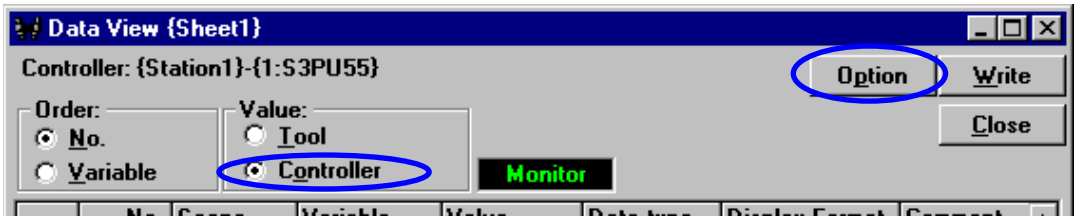
Adding and deleting the target variables is available even if online monitoring mode.



■ Start monitoring

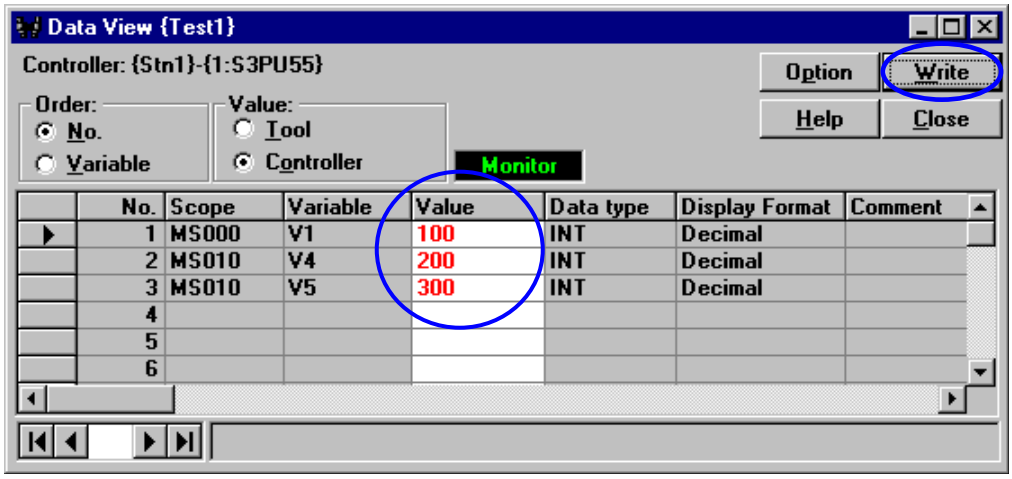
Select [Controller] in the [Value] frame of the data sheet window to monitor an online value.

The value display format can be switched in the [Option] window.



■ Changing the variable value

Enter a new value in the value column. Click the [Save] button to save to the controller.



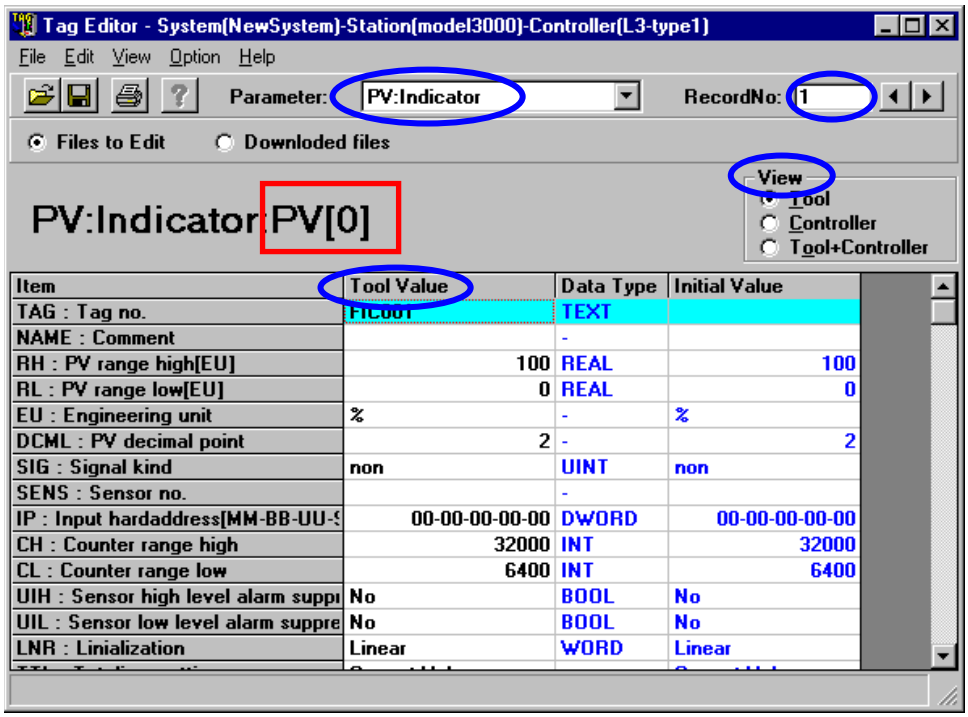
6.2 Setting Values Using Tag Editor

This topic describes setting values of using Tag Editor. Tag Editor treats only tag parameters and data of L Controllers.

■ Start tag editor

1) Tag Editor needs the L1, L2 or L3 type registration. If this controller is not yet registered, register it from [Product Tree].
2) Select the target station from the [Product Tree] and select <File><Open><Tag Editor> to start the [Tag Editor].
   Select one of the parameters to open the tag parameter list as follows.
3) Type, increment or decrement Record No. to change the record.
4) Selecting option [View] will change the data source of the values.

[Display]	Discription
Tool	Displays the values stored in the tool download file.
Controller	Refreshes and displays the values stored in controller memory when transmission with the controller is enabled.
Tool and Controller	Displays the download file and controller values side by side.

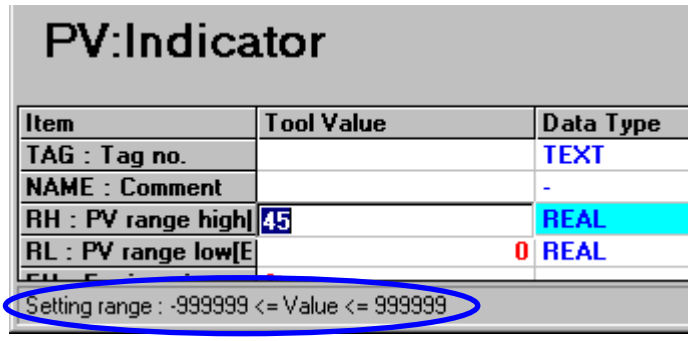


■ Set tag parameters

Click a field of [Tool Value] and push [Enter] to open the text or list box.

Type or select some value and push [Enter] to finish it.

In case of numerical input, the setting range is displayed in the status bar as follows.



Press the [Enter], [↑], or [↓] key to confirm entry.

Press the [ESC] key to cancel entry.

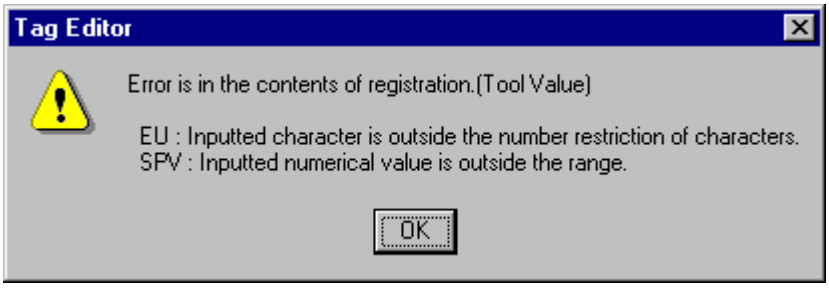
The portion in red in <Tool Value> or <Controller Value> indicates value not stored in file (changed value).

To save the value, select <Save> from the <File> menu.

If the change is valid, it is saved and changes from red to black.

If the change is not valid, the name of the items and their error description appear as follows.

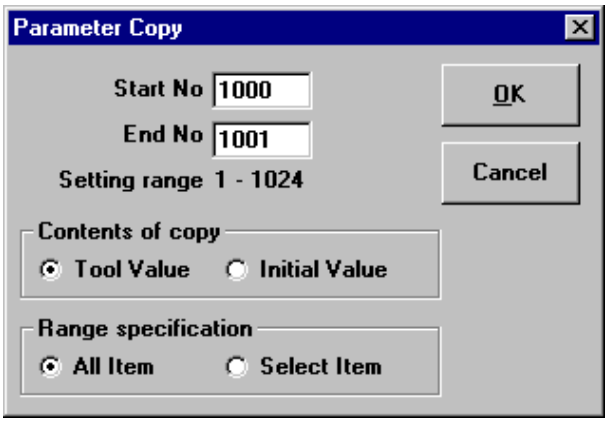
In this case, the change is not saved and remains red. Correct it as necessary.



■ Copying tag parameters

The displayed item <Tool Value> can be copied to another record at once.

1) Display the copy source and select <Parameter Copy> from the <Edit> menu.



2) Set the copy destination record numbers in [Start No.] and [End No.].

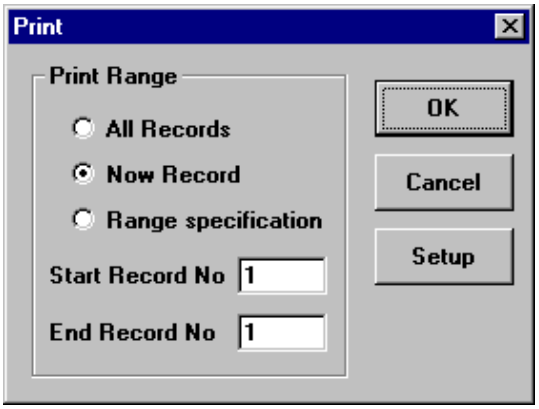
3) Also select whether the item to copy is the currently displayed <Tool Value> or the default <Initial Value>.

4) Select whether the range of items to copy is the currently displayed <All Items> or <Selected Items>. <Selected Items> is the range specified by selecting consecutive items in the [Tool Value] field in the currently displayed copy source items before this dialog.

5) Click the [OK] button to complete the specified copy.

■ Print tag parameters

1) Click menu<File> <Print> to open the following dialog.



2) Specify the pring range in the above dialog and print.

Chapter 7
Downloading / Uploading

Downloading refers to the transferring of [Configuration], [Program], and [Global variables] created with the Engineering Tool to the controller.
These objects are created by the following engineering actions.

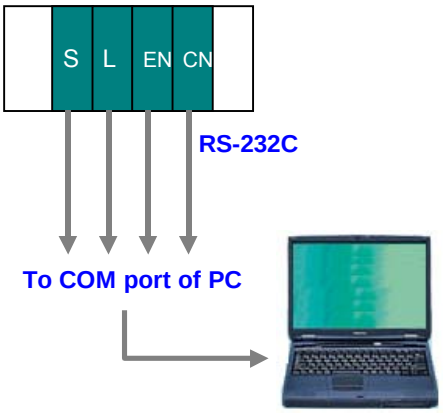
Engineering	Object
Hardware registration	Configuration
Control program creation	Program
Control parameter setup	Global variable

Uploading refers to the transferring of [Configuration], [Program], and [Global variables] from the controller to the Engineering Tool.

7.1 Connecting with the Controller

This section describes how to connect the PC (PC/AT compatible) running this tool with the controller prior to downloading.

■ Connecting with RS-232C (For V series)



The S, R, L, FN, EN, CN, or TN board and PC can be connected via RS-232C.

An RS-232C cable provided as V series standard product is used.

This cable has a 9-pin D-sub connector at both ends except for L1. For L1, the L1 side connector is an 8-pin modular jack.

The PC side is connected to serial port COM1 etc.

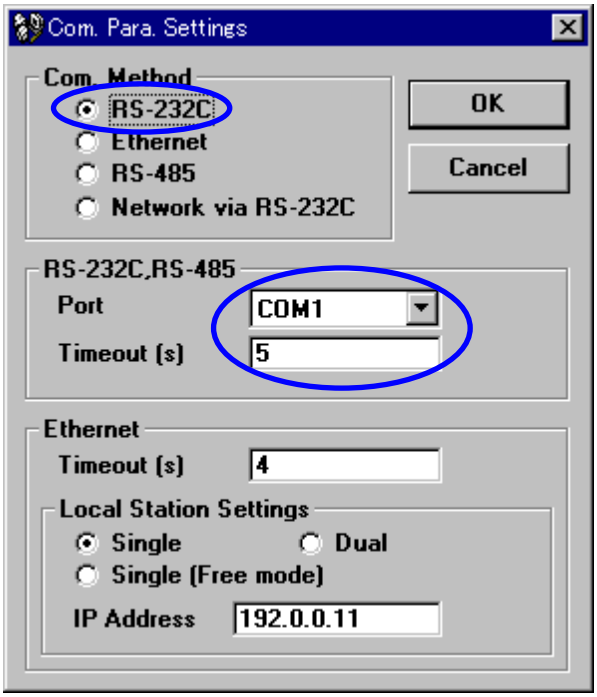
In the case of laptop PC that it is not equipped with a serial port, an expansion unit may be necessary.

The purpose of connecting to EN, CN board via RS-232C is to display and set board specific parameters.

When performing RS-232C transmission, select <Com. Para. Settings> from the [Tool] menu of the [Product Tree] and set as follows. These settings are available in each window requiring controller transmission and may be set anywhere.

When connecting to station via TC-net10/20, select “Network via RS-232C” setting. And set as follows.

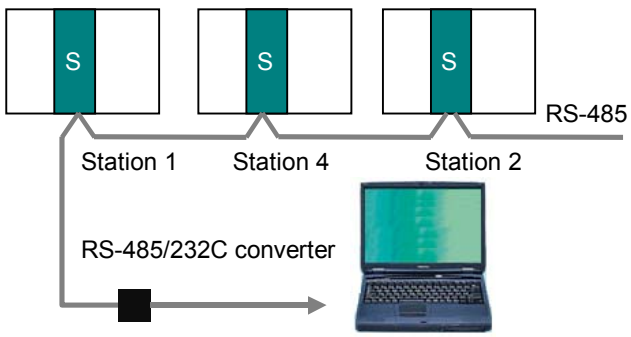
1) Set the IP address by Module Parameter of CN module.
2) Create a new TC-net10/20 LAN in [Networks] of the [Product Tree] and connect an CN module.
3) Select the TC-net10/20 LAN created in step 2) and select <Set as tool communication> from the <File> menu.



◆ **Important**

- A wrong connection to other station via RS-232C can not be found. System may be damaged in downloading. Please be sure and check connection.
- Data transmission rate of RS-232C is 9600bps. Downloading via RS-232C is needed more times than via Ethernet.

■ Connecting with RS-485 (For V series)



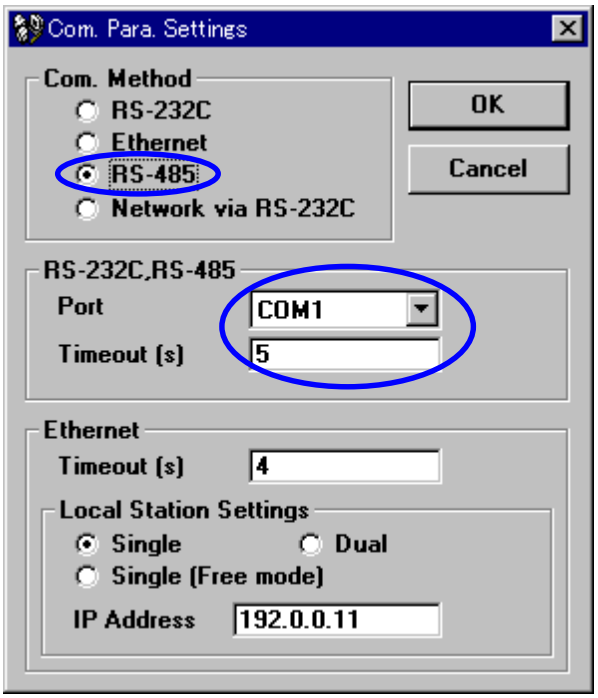
A single tool can connect to up to 31 controllers.

An RS-485 cable provided as V series standard product is used.

Only the S controller can be connected by RS-485.

An RS-485 connection requires an RS-232C to RS-485 interface converter.

When performing RS-485 transmission, select <Com. Para. Settings> from the [Tool] menu of the [Product Tree] and set as follows. These settings are available in each window requiring controller transmission and may be set anywhere.

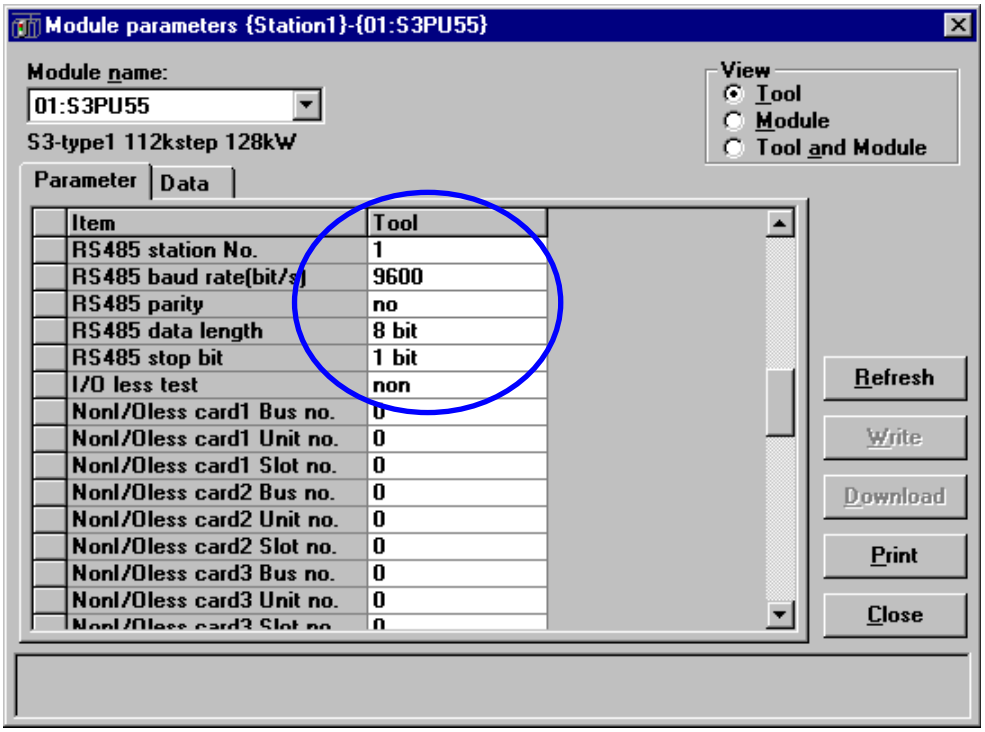


Furthermore, when performing RS-485 transmission, an ID no. which is an RS-485 communication station no. must be specified on the destination controller because the tool must identify the destination controller when communicating. Specify S controller in the [Product Tree], select <Module parameters> from the <File> menu, and specify the following parameters.

For [RS-485 Station No.], Specify a number from 1 to 32 to be assigned to the S controllers connected to a single tool.

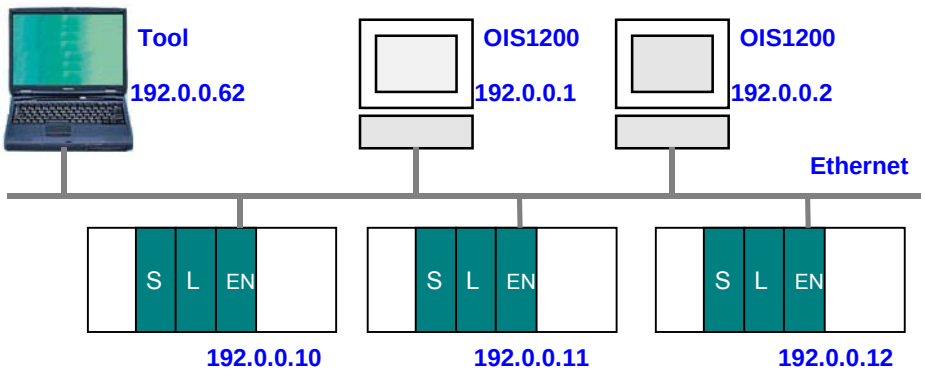
[Baud rate], [Parity], [Data length], and [Stop bit] are serial communication parameters and must be set as follows for transmission with the tool.

Note that RS-485 transmission cannot be performed until these parameters are downloaded by RS-232C or Ethernet because they must be written in S controller memory.



■ Connecting with Ethernet (For nv series and V series)

[OIS1200 system]



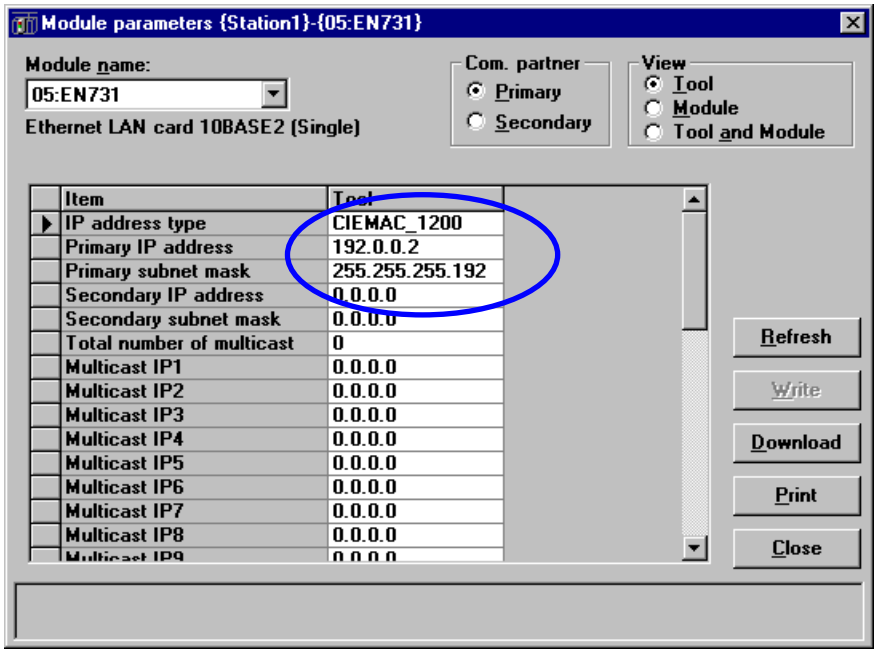
Set the IP address including the tool to '192.0.0.X' where X = 1 to 62.

Set the subnet mask to '255.255.255.192'.

Set the IP address of EN as follows with the tool:

1) n the [Product Tree], connect the EN module.

2) n the [Product Tree], select <Module parameters> from the <File> menu and set the EN module parameters as follows:
Only the primary settings are necessary when using EN board as single.

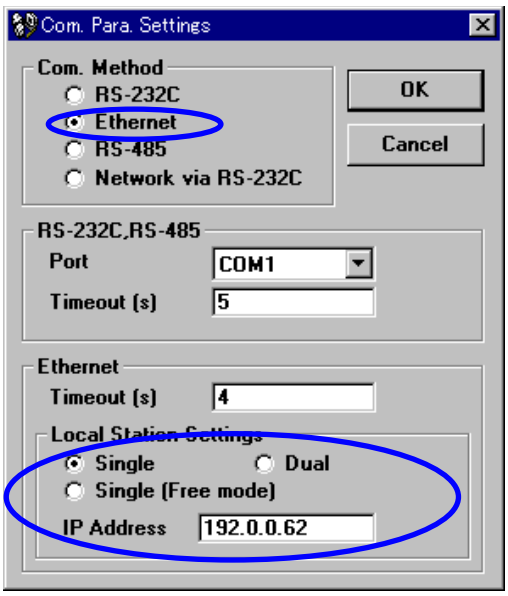


7

3) Create a new Ethernet LAN in [Networks] of the [Product Tree] and connect an EN module.

4) Select the Ethernet LAN created in step 3) and select <Set as tool communication> from the <File> menu.

5) Also select <Com. Para. Settings> from the [Tool] menu of the [Product Tree] and set as follows.
Set the IP address of the tool PC for <Local Station settings>.
Specify <Single> if the transmission path is single. Specify <Dual> if dual.
When starting the tool on the same PC as OIS1200, do not specify <Single (free mode)>.



For the X in the IP address of EN, set the upper (H) and lower (L) numbers of decimal X converted to hexadecimal with the EN board rotary switch. Refer to the EN board hardware manual for more information.

Set the IP address of the PC with the Windows standard function as follows:

Please refer to "3.1.1 Step1 Set up Windows platform" of the chapter of the setup for the setting method.

[Other Ethernet systems]

If OIS1200 is not present on the Ethernet LAN, the following two <IP address types> can be used.
Set the [IP address type] column to either one with the EN module parameter.

◆ **Note**

- When class is changed, V-tool must be restarted.

■ Class B type (V series standard)

Set the IP address including the tool to '172.16.64.X' where X=1 to 126.

Set the subnet mask to '255.255.192.0'.

For the X in the IP address of EN, set the upper (H) and lower (L) numbers of decimal X converted to hexadecimal with the EN board rotary switch. Refer to the EN board hardware manual for more information.

■ Any

From the tool, set any IP address (class B or class C) to EN.

If class B, set the subnet mask to '255.255.192.0'.

Set the IP address including the tool to '172.16.64.X' to '172.31.64.X' where X=1 to 126.

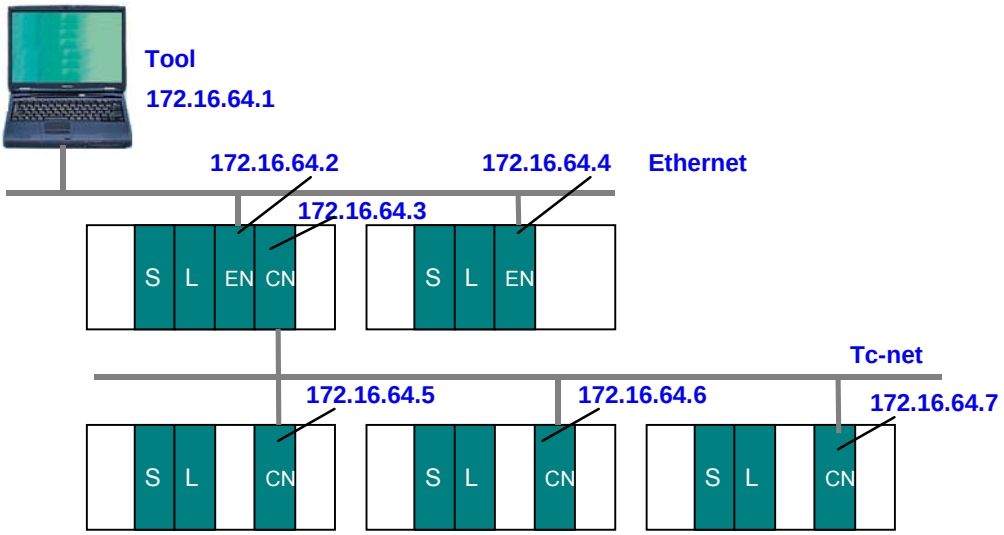
If class C, set the subnet mask to '255.255.255.192'.

Set the IP address including the tool to '192.168.0.X' to '192.168.255.X' where X=65 to 126.

Refer to the EN board hardware manual for more information.

When the EN module is free mode and the transmission path is single, any IP address other than above may also be specified. In this case, specify <Single (free mode)> for [Com. Para. Settings].

[Tc-net10 system]



A controller on the Tc-net10 can be accessed transparently from the tool PC on the Ethernet.

Therefore, set the IP address including the tool to '172.16.64.X' where X=1 to 64.

Set the subnet mask to '255.255.192.0'.

Set the IP address of EN and CN with EN, CN module parameters of [Product Tree].

For the X in the IP address of EN, set the upper (H) and lower (L) numbers of decimal X converted to hexadecimal with the EN board rotary switch. Refer to the EN board hardware manual for more information.

For the X in the IP address of CN, set the upper (H) and lower (L) numbers of decimal X with the CN board rotary switch. Refer to the CN board hardware manual for more information.

Set the IP address of the PC with the Windows standard function.

7.2 Batch Downloading to Controller

This section describes how to batch download [Configuration], [Program], [Global variables] to a controller.

7.2.1 Batch downloading to controller of nv series

This section describes how to batch download [Configuration], [Program], [Global variables] to a controller.

■ Over view of downloading

Batch downloading and division downloading without tool-source.

1) Halting the controller
2) Batch download to controller without tool-source
3) Changing the controller to RUN mode

■ Halting the controller

The controller must be halted in order to perform batch download.

When a controller is in process operation or adjustment phase, all control operations of the controller is stopped when the controller is halted. Whether the controller can be halted must be determined from the operational viewpoint. Obtain permission from the operation manager or adjustment manager who is authorized by the operation manager.

The controller can be halted locally with switches on the front panel or remotely with the tool.

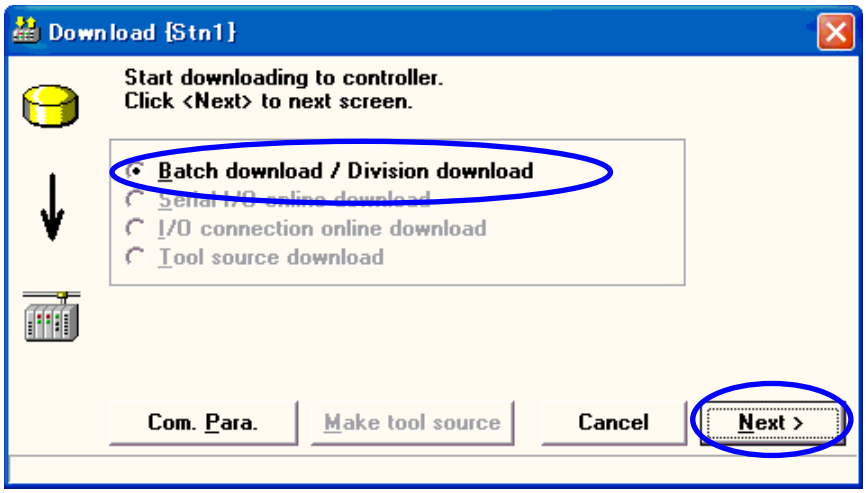
The procedure to locally halt the controller depends on the controller model. Refer to your hardware manual for more information.

There are two ways to remotely halt the controller.

1) Switch the operation mode to HALT in [Set RUN mode] of the [System View].
2) Switch the operation mode to HALT in the middle of the batch download procedure.

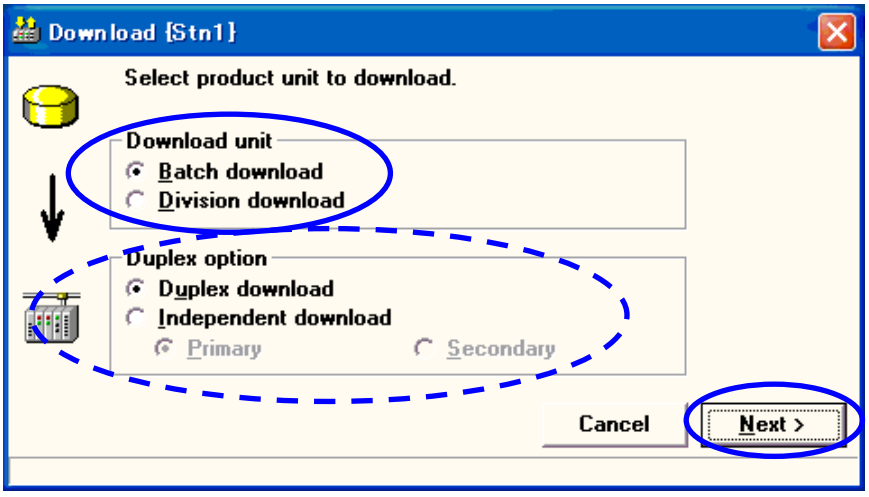
■ Batch download to controller without tool-source

1) Click the relevant station in the [Product Tree] and select <Download> from the <File> menu.



2) Click the [Next] button and select the download unit.

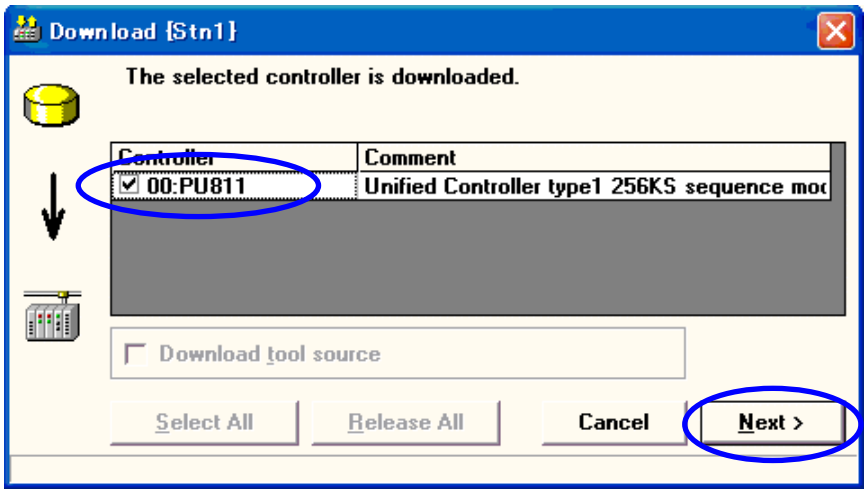
- Batch download: Clears the controller memory and downloads the entire [Configuration], [Program], and [Global variables].
- Split download: Downloads the specified [Configuration], [Program], and [Global variables] without clearing memory.
  Select the option only for duplex.
- Duplex download: Halts the controllers, which are the primary and the secondary side, and downloads to the primary side.
- Independent download: Halts the controller, which is the primary or the secondary side, and downloads to the selected side.



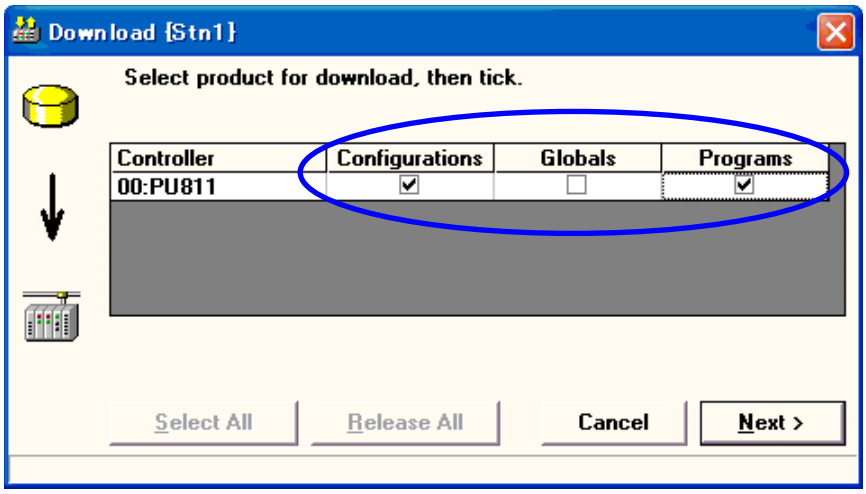
Note

- The function <Duplex download> needs equalizing of controller. After downloading, run the controller as the duplex system to equalize the data automatically. Please run the primary side first.

3) Click the [Next] button and check the download destination controller.

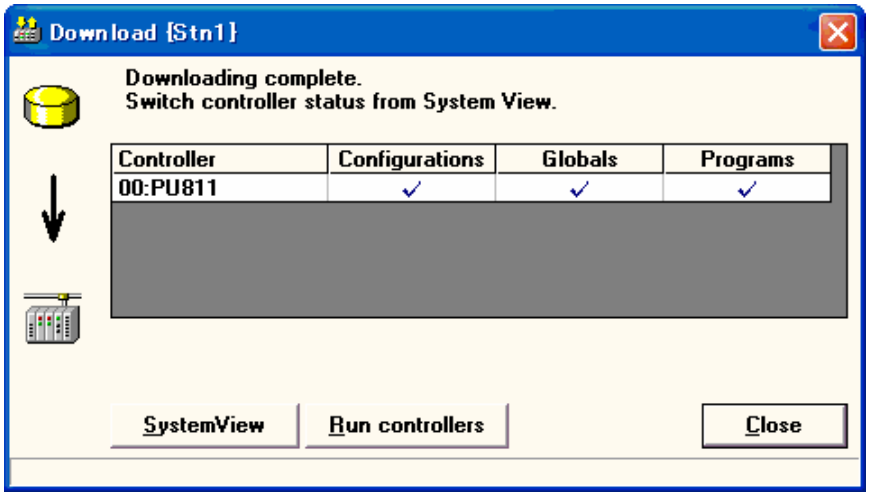


At this point, if split download is specified in step 2), check the necessary items in the download target confirmation dialog.



4) Click the [Next] button to open the download confirmation dialog box and execute as necessary. Downloading to the controller starts when [Yes] is selected. If [No] is selected, downloading is canceled.

5) Downloading starts and [Configuration], [Program], and [Global variables] are transferred successively to the controller. The following dialog box appears when downloading completes.



◇ **Supplementary**

- The controller operation mode remains at DL-WAIT when batch download completes. The only mode that can be entered from DL-WAIT is RUN. The procedure to change the operation mode to RUN is described below.

7

■ Changing the controller to RUN mode

When the controller is changed to RUN mode, the controller will perform all control operations.

When the controller is changed to RUN mode, depending on the process operation and adjustment status, actual I/O takes place and process equipment operates. Therefore, obtain permission from the process operation and adjustment manager when changing the controller to RUN mode.

The controller can be changed to RUN mode either locally or remotely as in the case of halting.

The procedure to locally halt the controller depends on the controller model. Refer to your hardware manual for more information.

The two procedures to remotely change to RUN mode is as follows:

[System view]

1) When batch download described above completes, click the [System View] button.

◇ **Supplementary**

- System view can also be started as follows:
  Click the relevant station in the [Product Tree] and select <System View> from the <File> menu.

2) Select [Open] in the monitor control of the [System View] and refresh the data.
3) Check the operating status of the corresponding controller and other controllers.
4) Use the [↑] and [↓] key to move the focus to the appropriate controller.
5) Execute <Set RUN mode> from the <Tool> menu.
6) Click the [RUN] button.
7) Select [Yes] to switch the operation mode to RUN. Select [No] to cancel.

[Run controllers]

1) When batch download described above completes, click the [Run controllers] button.

◇ **Supplementary**

- This function is not available for the dual station. In this case, please use [System View].

2) According to the dialogs, run controllers.
How to use the buttons on the dialog windows are as follows:

'Yes': Back up the downloaded data or run controllers.

'No': Skip to back up the downloaded data or run controllers.

'Cancel': Stop to back up the downloaded data and/or run controllers.

7.2.2 Batch downloading to controller of V series

This section describes how to batch download [Configuration], [Program], [Global variables] to a controller. Tool-source downloading for reverse-generation and I/O connections online downloading are also explained.

If there are more than one controller under a station, take note of the following when batch downloading because the controller may crash.

If the [Collaboration Control] parameter is changed, batch download to all controllers within the same station.

◆ **Note**

- Tool-source downloading and reverse-generation is supported in following controller types and versions.

Reverse-generation	Controller							
	L3	L2	L1, LC	S3	STC	S2	R3	FN
	○ (*1)	○ (*2)	○ (*3)	○ (*4)	—	○ (*5)	—	—

(*1): Basic software Version 3.10 or more. (L3PU21: V3.11 or more)
(*2): Basic software Version 3.10 or more.
(*3): Basic software Version 2.30 or more.
(*4): Basic software Version 02.61 or more. (in BU74A excepted)
(*5): Basic software Version 02.60 or more. (S2PU82: V02.00 or more)

■ Over view of downloading

Batch downloading and division downloading without tool-source.

1) Halting the controller
2) Batch download to controller without tool-source
3) Changing the controller to RUN mode

Batch downloading and division downloading with tool-source.

1) Halting the controller
2) Batch download to controller with tool-source
3) Changing the controller to RUN mode

Downloading only tool-source for reverse-generation.

1) Download to controller only tool-source

I/O connections online downloading.

1) Download to controller added I/O connections.

Serial I/O online downloading.

1) Download to controller added or deleted serial I/O unit information.

Halting the controller

The controller must be halted in order to perform batch download.

When a controller is in process operation or adjustment phase, all control operations of the controller is stopped when the controller is halted. Whether the controller can be halted must be determined from the operational viewpoint. Obtain permission from the operation manager or adjustment manager who is authorized by the operation manager.

The controller can be halted locally with switches on the front panel or remotely with the tool.

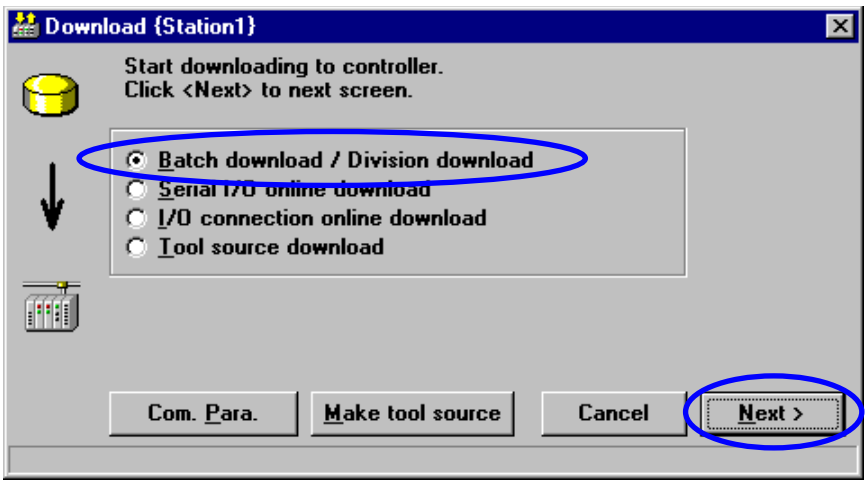
The procedure to locally halt the controller depends on the controller model. Refer to your hardware manual for more information.

There are two ways to remotely halt the controller.

1) Switch the operation mode to HALT in [Set RUN mode] of the [System View].
2) Switch the operation mode to HALT in the middle of the batch download procedure.

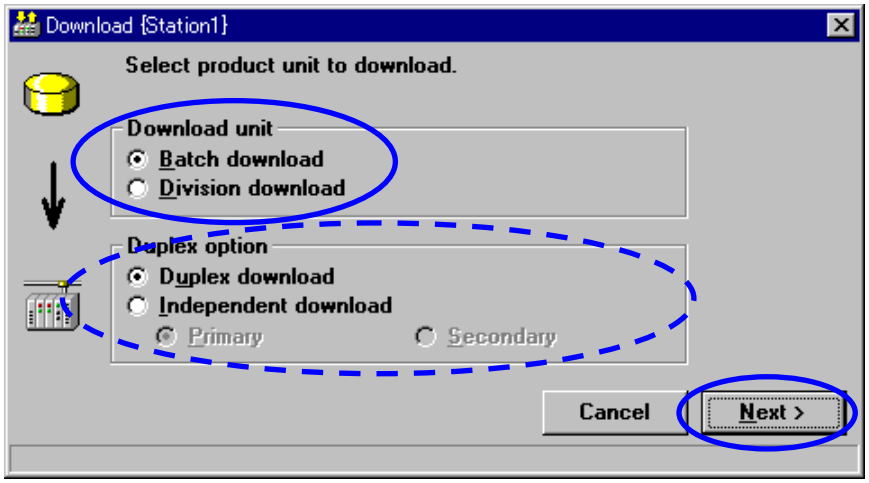
Batch download to controller without tool-source

1) Click the relevant station in the [Product Tree] and select <Download> from the <File> menu.



2) Click the [Next] button and select the download unit.

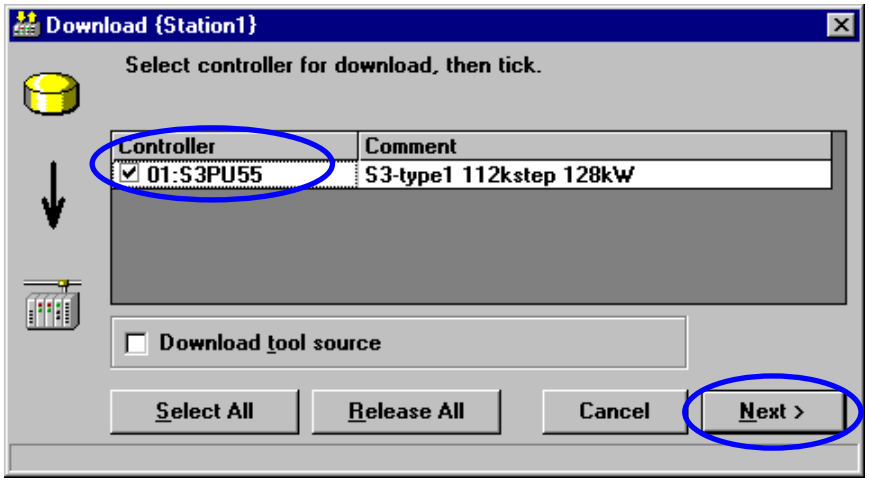
- Batch download: Clears the controller memory and downloads the entire [Configuration], [Program], and [Global variables].
- Split download: Downloads the specified [Configuration], [Program], and [Global variables] without clearing memory.
  Select the option only for duplex.
- Duplex download: Halts the controllers, which are the primary and the secondary side, and downloads to the primary side.
- Independent download: Halts the controller, which is the primary or the secondary side, and downloads to the selected side.



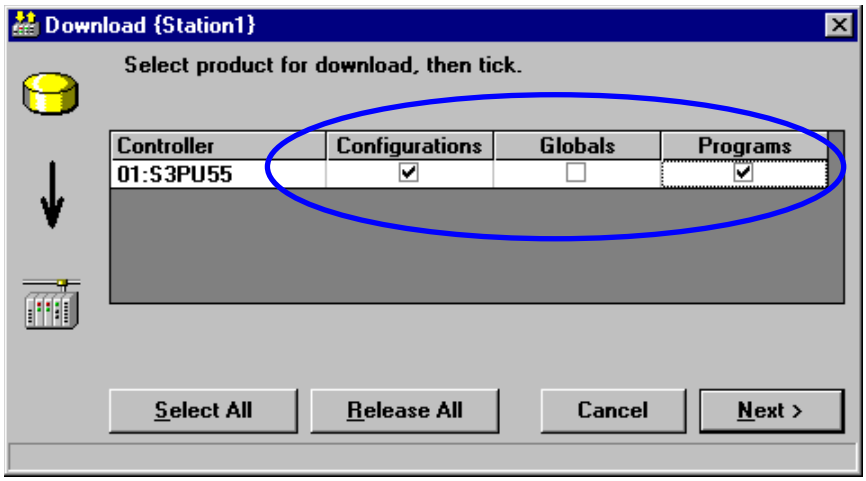
Note

- The function <Duplex download> needs equalizing of controller. After downloading, run the controller as the duplex system to equalize the data automatically. Please run the primary side first.

3) Click the [Next] button and check the download destination controller.



At this point, if split download is specified in step 2), check the necessary items in the download target confirmation dialog.

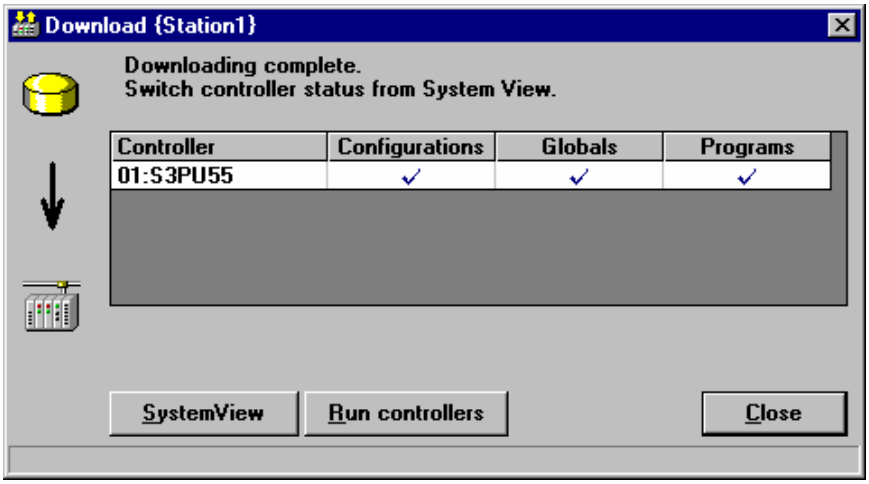


4) Click the [Next] button to open the download confirmation dialog box and execute as necessary. Downloading to the controller starts when [Yes] is selected. If [No] is selected, downloading is canceled.

◇ **Supplementary**

- In case of MELPLAC I/O, the Verify dialog is started automatically. See '2.4 Registering Module Parameters'.

5) Downloading starts and [Configuration], [Program], and [Global variables] are transferred successively to the controller. The following dialog box appears when downloading completes.



◇ **Supplementary**

- The controller operation mode remains at DL-WAIT when batch download completes. The only mode that can be entered from DL-WAIT is RUN. The procedure to change the operation mode to RUN is described below.
- When connecting by RS232C and performing batch download, do not pull out the RS232C cable.

■ Changing the controller to RUN mode

When the controller is changed to RUN mode, the controller will perform all control operations.

When the controller is changed to RUN mode, depending on the process operation and adjustment status, actual I/O takes place and process equipment operates. Therefore, obtain permission from the process operation and adjustment manager when changing the controller to RUN mode.

The controller can be changed to RUN mode either locally or remotely as in the case of halting.

The procedure to locally halt the controller depends on the controller model. Refer to your hardware manual for more information.

The two procedures to remotely change to RUN mode is as follows:

[System view]

1) When batch download described above completes, click the [System View] button.

◇ **Supplementary**

System view can also be started as follows:

- Click the relevant station in the [Product Tree] and select <System View> from the <File> menu.

2) Select [Open] in the monitor control of the [System View] and refresh the data.

3) Check the operating status of the corresponding controller and other controllers.

4) Use the [↑] and [↓] key to move the focus to the appropriate controller.

5) Execute <Set RUN mode> from the <Tool> menu.

6) Click the [RUN] button.

7) Select [Yes] to switch the operation mode to RUN. Select [No] to cancel.

[Run controllers]

1) When batch download described above completes, click the [Run controllers] button.

◇ **Supplementary**

- This function is not available for the dual station. In this case, please use [System View].

2) According to the dialogs, back up the downloaded data and run controllers.

◇ **Supplementary**

- Supporting the function 'Back up the downloaded data' depends on the controller model.

How to use the buttons on the dialog windows are as follows:

'Yes': Back up the downloaded data or run controllers.

'No': Skip to back up the downloaded data or run controllers.

'Cancel': Stop to back up the downloaded data and/or run controllers.

◇ **Supplementary**

- The function [Run controllers] is supported in following controller types and versions.

Run controllers	**Controller**							
	L3	L2	L1, LC	S3	STC	S2	R3	FN
	○ (*2)	○ (*2)	○ (*1)	○	○	○	○	○ (*2)

(*1): Basic software Version 2.51 or more.
(*2): The function 'Back up the downloaded data' is not available.

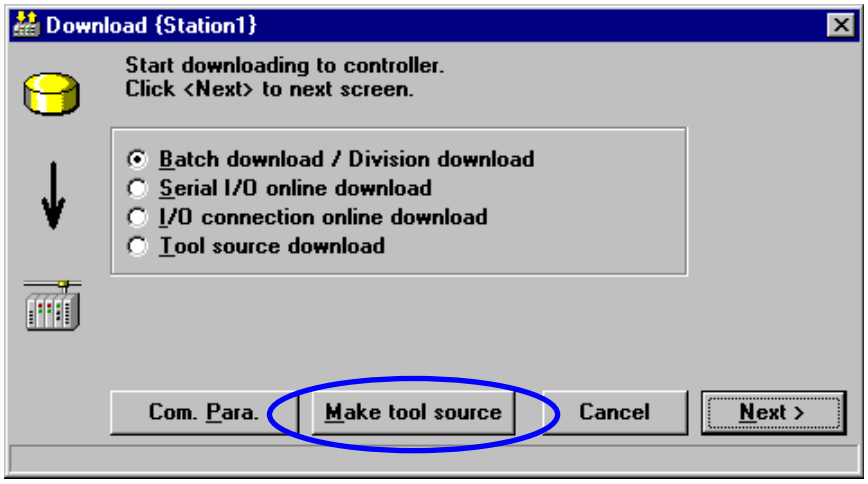
■ Batch download to controller with tool-source

Uploading is the restoration of tool registration. It is called “Reverse generation”.

Before uploading, the source information “Tool-source” should be downloaded.

This section describes how to download to a controller with tool-source.

1) Make tool-source
Click the relevant station in the [Product Tree] and select <Download> from the <File> menu. Select button <Make tool-source>.



Select a controller to allocate tool-source. Tool-source allocation unit is as follows:

Network configuration, Network variables, User definition type.	System units
Hardware configuration. Station variables.	Station units
Controller variables, Program.	Controller units

◇ Supplementary

- When you want to delete tool-source, please check off.

Checked: Select a controller to allocate tool-source.

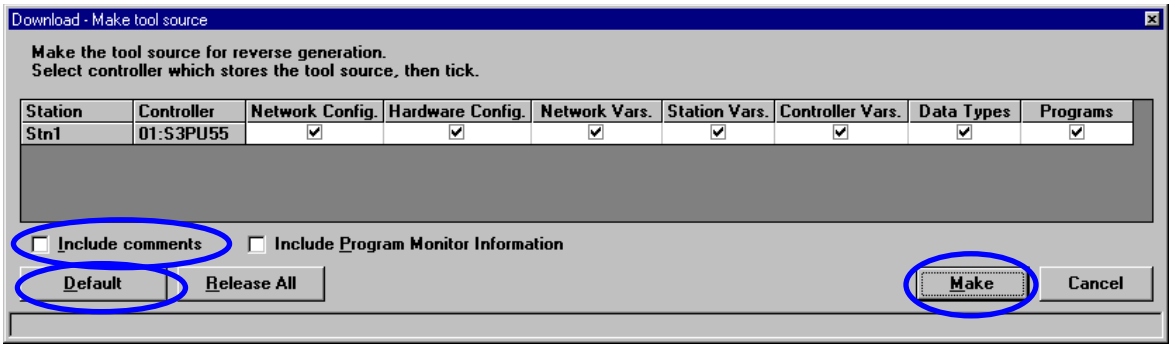
Non-checked: Delete allocated tool-source.

[Default allocation]: Checked to the controller which located on the lowest number slot.

[Include comment]: Making tool-source with comment.

[Include Program Monitor Information]:
Making tool-source with the monitoring information. If this option is not checked, after uploading please execute batch-compling to re-make the monitoring information.

[Make]: Start to make the tool-source. If you want to break making, please select [Cancel]

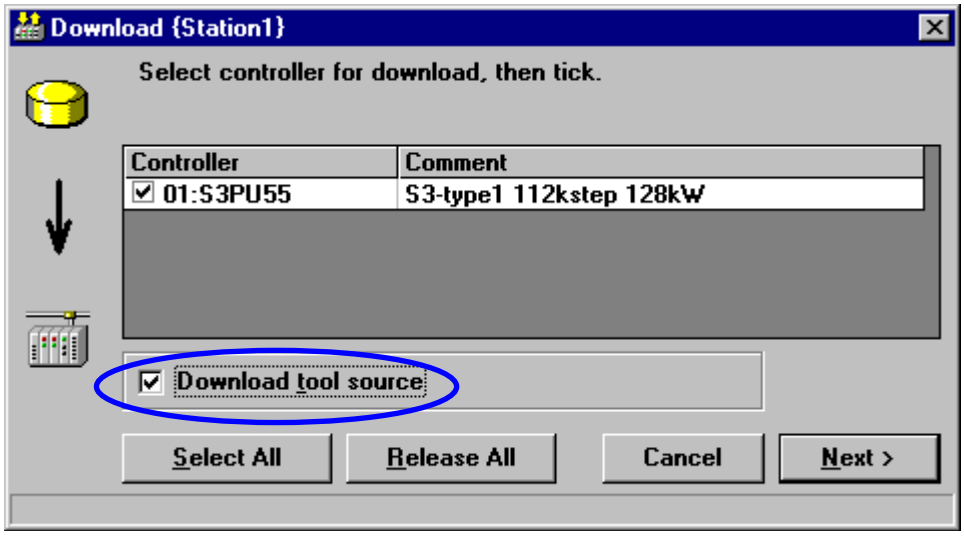


Tool-source is stored as POU in the controller. Please check available memory size using 'Resource Report'.

◇ Supplementary

- Creation of Tool-source consumes seven POU entries from the end of POU No.
- When tool-source is made, the controller memory size is needed about 2 or 3 times than the case in which the 'Reverse generation' is not used.
  Please check available memory size using 'Resource Report'. See '8.8 Determining Free Program Space'.
- If the option [Include Program Monitor Information] and [Include comment] are checked off, the controller memory using size can reduced.
  If this option [Include Program Monitor Information] is not checked, after uploading please execute batch-compiling to re-make the monitoring information.

2) Click the [Next] button and check the download destination controller, and check 'Download tool source'.



When 'Division download' is selected, Tool-source is download to each products.

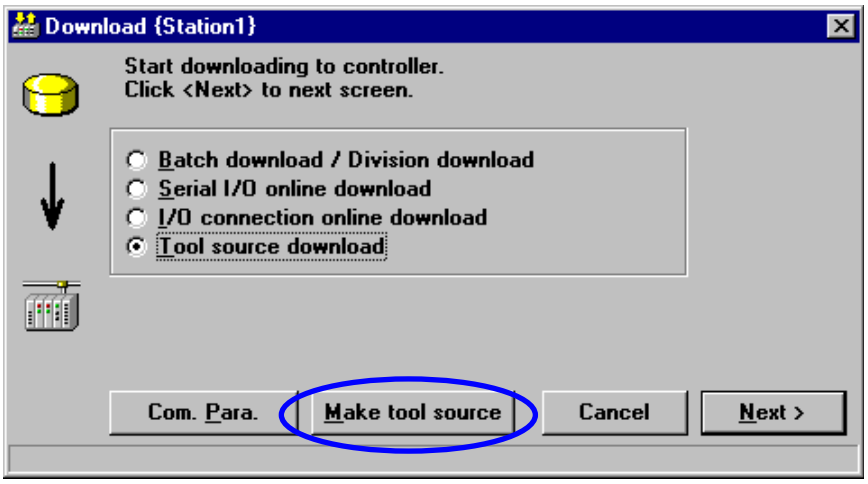
Configurations	Network configuration, Hardware configuration.
Global variables	Network variables, Station variables, Controller variables.
Programs	User definition type, Program.

◇ **Supplementary**

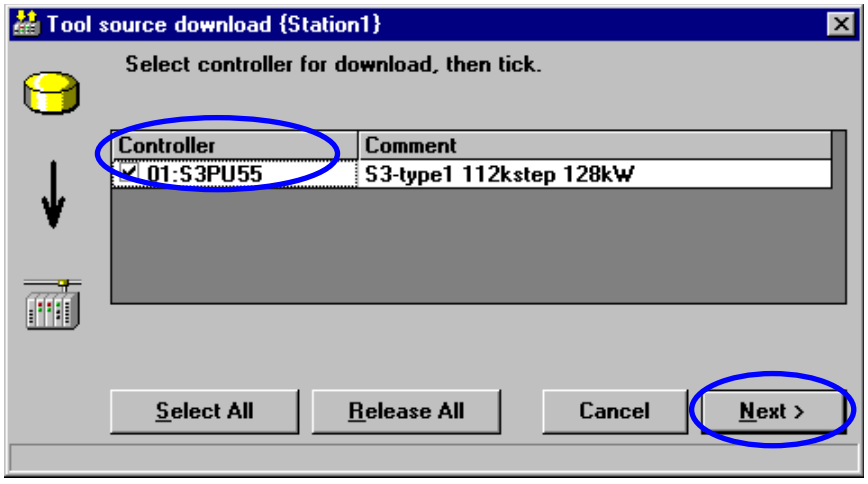
- When the option 'downloaded tool source' is selected, please check downloaded tool-source using [Check tool-source] of uploading window, because "Reverse generation" is not supported in the some controller's types and versions. See '10.2 Batch Uploading from Controller ' to know how to use [Check tool-source] function.

■ Download to controller only tool-source

1) Select 'Tool source download' in Download window, click the [Next] button.



2) Click the [Next] button and check the download destination controller, start downloading.



◇ **Supplementary**

- When downloading is finished, please check downloaded tool-source using [Check tool-source] of uploading window, because “Reverse generation” is not supported in the some controller’s types and versions. See ‘7.4 Batch Uploading from Controller ‘ to know how to use [Check tool-source] function.

■ Download to controller added I/O connections

I/O connections of network and station variables can be online-downloaded.

The controller doesn’t need to be halted, and batch I/O processing can not be executed after adding variables.

This section describes how to download to a controller that is added I/O connections.

◇ **Supplementary**

- I/O connections online downloading is supported in following controller types and versions.

I/O connections online downloading	Controller							
	L3	L2	L1, LC	S3	STC	S2	R3	FN
	—	—	—	○ (*1)	○ (*2)	○ (*3)	—	—

(*1): Basic software Version 02.7C or more.

(*2): Basic software Version 02.56 or more.
(*3): Basic software Version 02.00 or more. (S2PU82 Only)

- In following case, online-downloading is available:

  Configurations were downloaded to controller from tool that supported this function.

  Configurations are not changed from other tools.

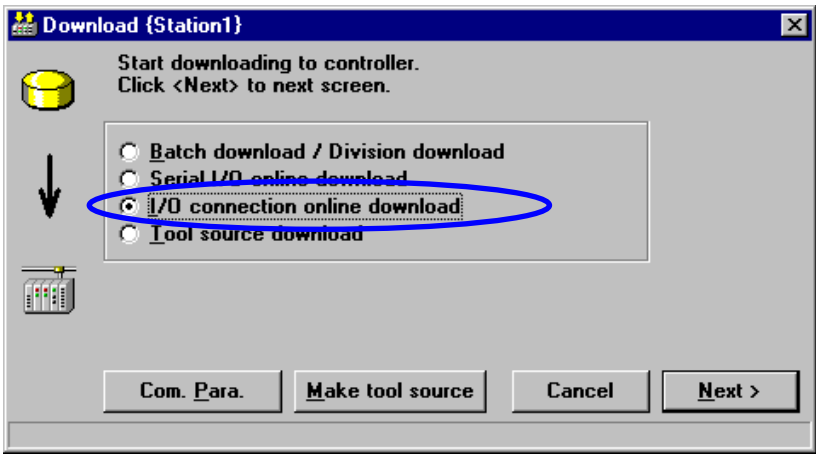
  I/O connections of each types are already registered, this is not first time to downloading.

  Only added I/O connections of network or station variables. Not changed or not deleted one.

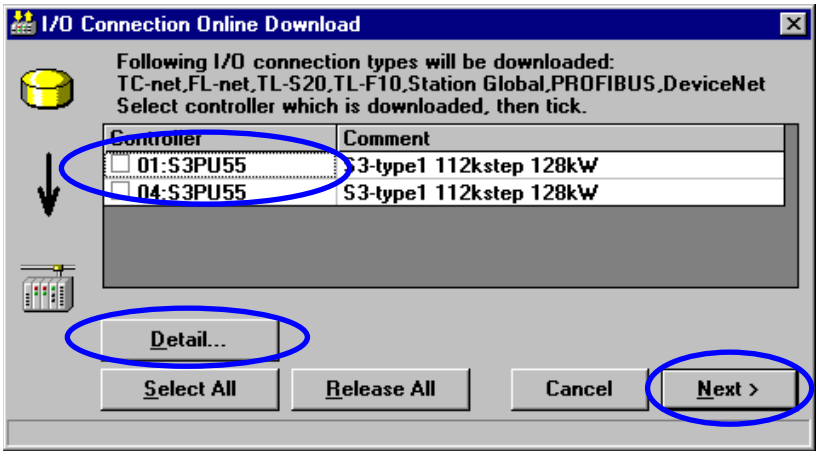
  'Changing I/O Connection Area' function is not used.

  New I/O modules that use I/O connections are not registered.
  If these conditions are not satisfied, please use batch or division downloading function.

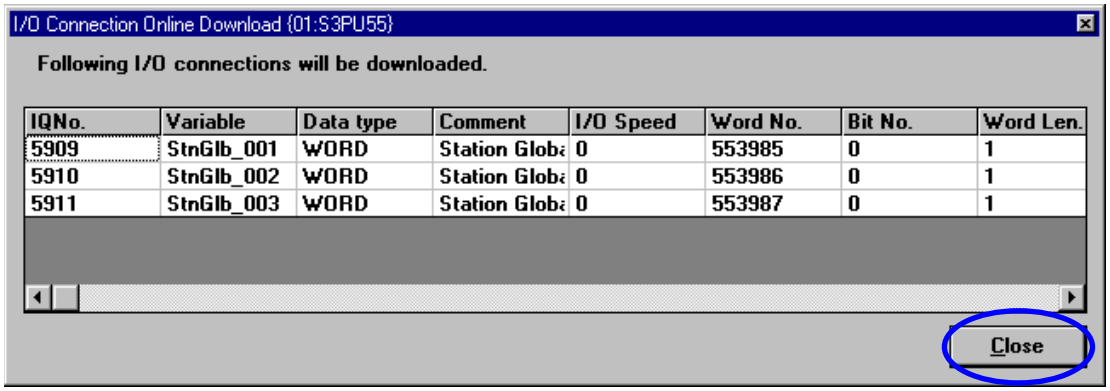
1) Click the relevant station in the [Product Tree] and select <Download> from the <File> menu.
   Select ‘I/O connection online download’ in Download window, and click the [Next] button.



2) Check the download destination controller.



3) Select [Detail] button, downloaded I/O connections are displayed.



4) Click the [Next] button, then start downloading.

■ Download to controller added or deleted serial I/O unit information

Serial I/O unit information can be online-downloaded.

The controller doesn't need to be halted, and I/O processing can not be executed after adding and downloading unit.

This section describes how to download to a controller added or deleted I/O unit.

◇ Supplementary

- Serial I/O online downloading is supported in following controller types.

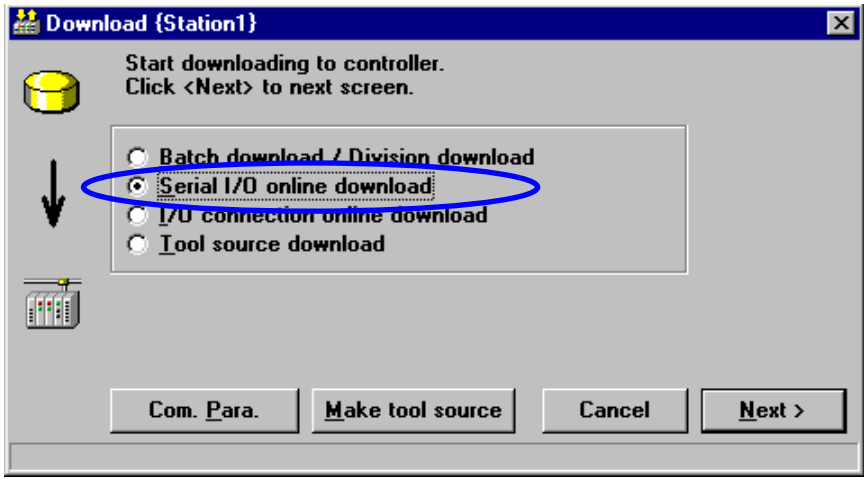
Serial I/O online downloading	Controller							
	L3	L2	L1, LC	S3	STC	S2	R3	FN
	○	○	○	—	—	—	—	—

- In following case, online-downloading is available.

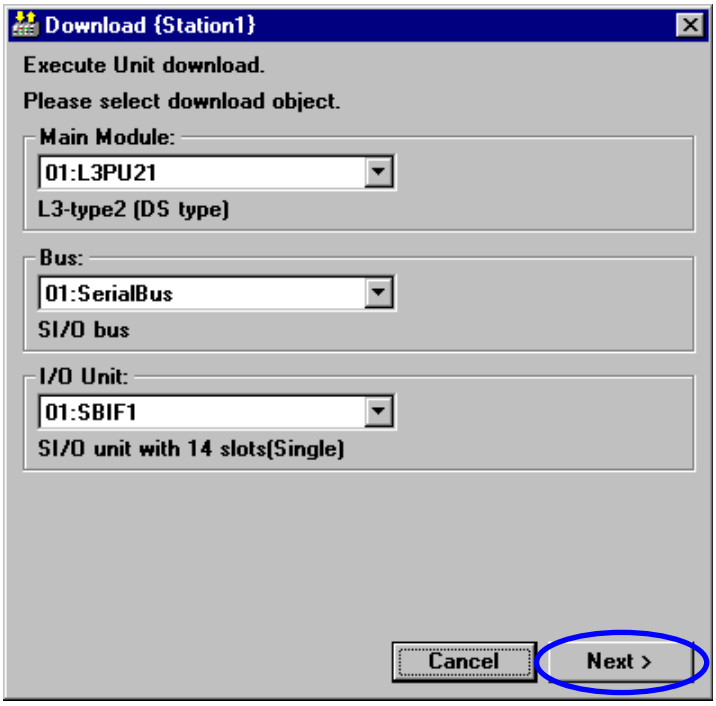
  In registration data of tool, main unit configurations and controller parameters are not changed.

  In downloaded data of controller, main unit configurations and controller parameters are not changed from other tools.
  If these conditions are not satisfied, please use batch or division downloading function.

1) Click the relevant station in the [Product Tree] and select <Download> from the <File> menu.
   Select 'Serial I/O online download' in Download window, and click the [Next] button.



2) Click the [Next] button, and select the download destination I/O unit.
To clear unit information, select non-registered Unit No..



3) Click the [Next] button, operate with guidance to start downloading.

7.3 Downloading Task Individually

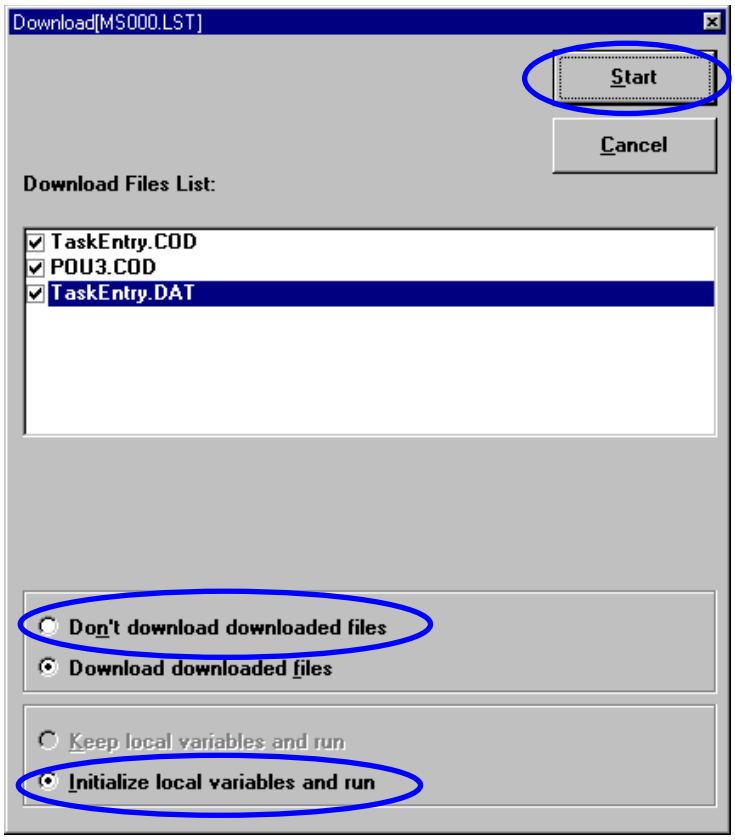
When batch downloading is performed to a controller, [Configuration], [Program], and [Global variables] are all transferred to the controller. Then when the control program is changed, it is possible to download that task individually. This task is actually a project unit assigned to a task entry. This individual downloading can be performed regardless of whether the controller operation mode is RUN or HALT. Individual downloading is performed from the [Program Editor].

■ Individual download procedure

Start the [Program Editor] from [Task Entries].

View, edit, or save the program as necessary according to the procedure described in [Creating Control Programs]. Here, the download procedure is described assuming the desired task is already saved.

1) Select <Write to the Controller> from the <File> menu.



The download file list contains all of the downloaded candidates among the files linked to the relevant project. And those that are different from the files in the controller, in other words, those that should be downloaded are checked.

The fist option is [Don't download downloaded files] checked by default. This minimizes the download time.

The second option is [Keep local variables and run] or [Initialize local variables and run]. If you delete some local variables of downloading program or change the order, this option may be fixed by [Initialize local variables and run]. If you do not, this option is selectable and selected by stored value you selected previously.

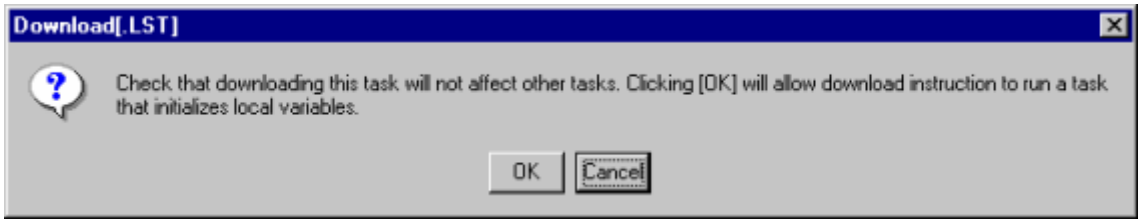
[Initialize local variables and run] means that after downloading the task is executed after zero clearing all of the local variables in the project.

[Keep local variables and run] means that after downloading the controller copies the values of the existing local variable area to the local variable area of the newly downloaded project in scan synchronization and executes continuously.

◇ **Supplementary**

- When the step of SFC was added in your program, [Keep local variables and run] option cannot be selected.

2) Click [Start] button.



3) Click [OK] if you agree with the above. Click [Cancel] to cancel individual download.

7.4 Batch Uploading from Controller

This section describes how to batch upload [Configuration], [Program], and [Global variables] from a controller.

Uploading is the restoration of tool registration. It is called “Reverse generation”.

Before uploading, the source information “Tool-source” should be downloaded. (See “7.2 Batch Downloading to Controller”.)

◇ **Supplementary**

- Batch uploading over-write the user registration of this tool. Please back up the user system registration. (See “11.1 Importing/Exporting User System”.)

■ Preparation

The registrations for “Reverse generation” are as follows:

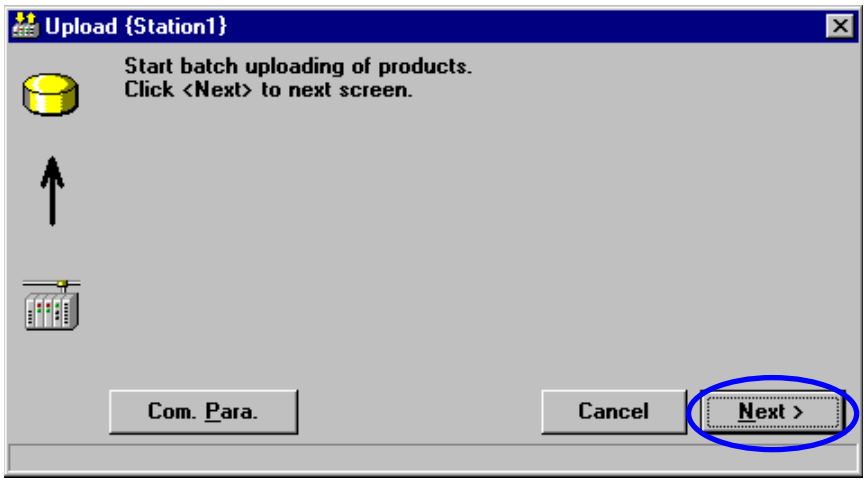
- RS-232C connection: The registration of Station.
- Ethernet connection: The registrations of Station, Main-unit, Trans.-module with IP-Address.
- RS-485 connection: The registrations of Station, Main-unit, S-module with RS485 station no.
- When the uploading of [Global variables] which “Reverse generation” is not executed.
- The main-unit configuration information of this tool is already downloaded to the controller.

◇ **Supplementary**

- Please check the controller’s types and versions which supported “Reverse generation”. (See “7.2 Batch Downloading to Controller”.)

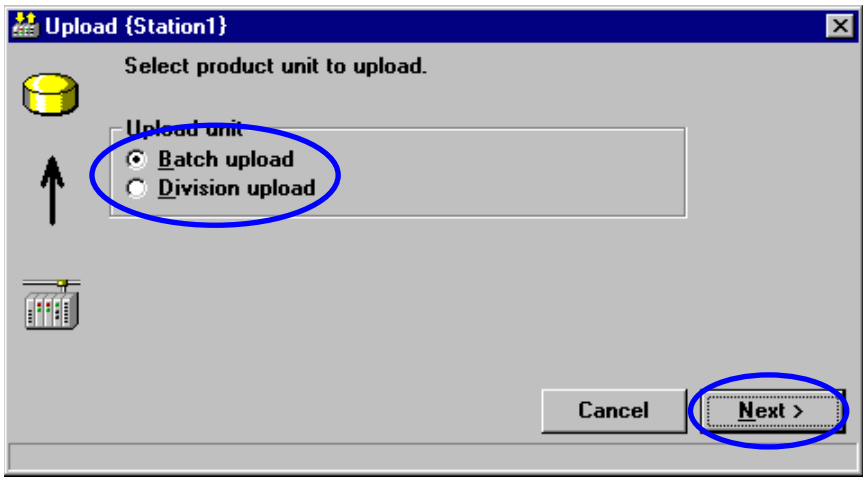
■ Batch uploading from controller

1) Click the relevant station in the [Product Tree] and select <Upload> from the <File> menu.



2) Click the [Next] button and select the upload unit.

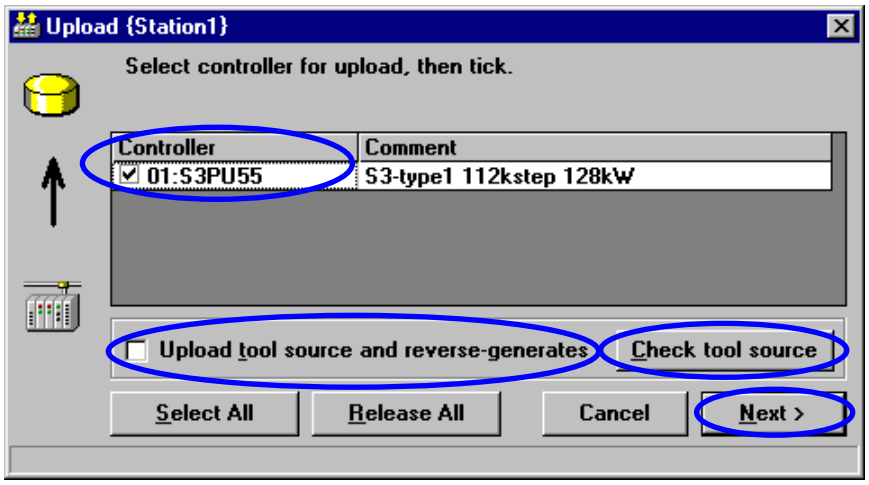
Batch upload uploads all [Configuration], [Program], and [Global variables].
Split upload uploads the specified [Configuration], [Program], and [Global variables].



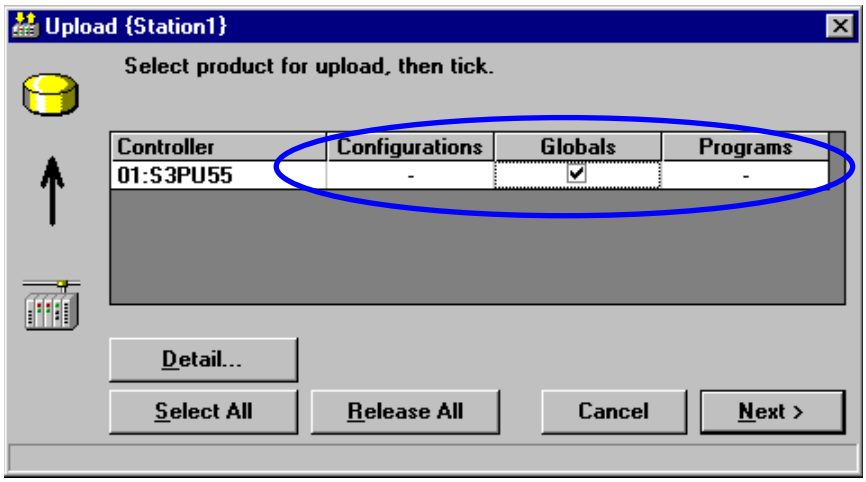
3) Click the [Next] button and check the upload destination controller.

"Uploading tool-source, and make reverse-generation" is checked: [Configuration], [Program], and [Global variables] are uploaded from a controller.
[Check Tool-source] button: Tool-source list is displayed.

"Uploading tool-source, and make reverse-generation" is not checked:
Only [Global variables] are uploaded from a controller.



Click the [Next] button.
At this point, if split upload is specified in step 2), check the necessary items in the upload target confirmation dialog.



<Target tool-source of split-uploading>

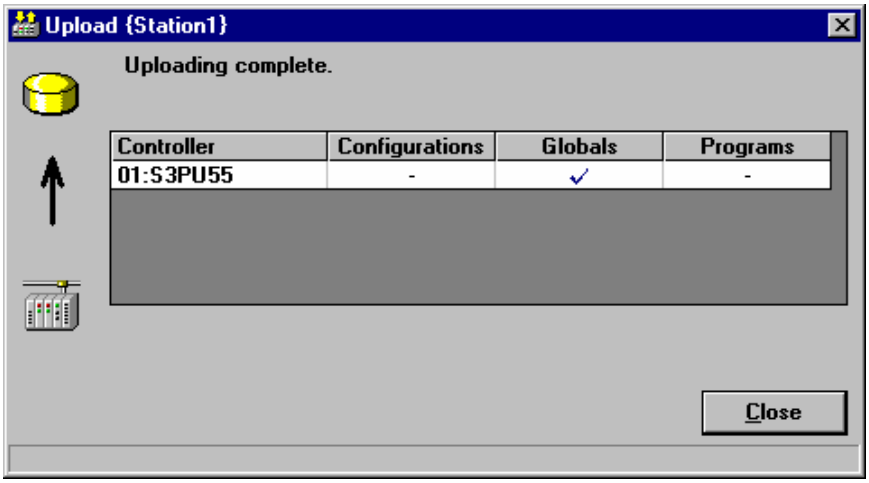
[Configuration]	Network configuration, Hardware configuration.
[Global variables]	Network variables, Station variables, Controller variables.
[Program]	User definition type, Program.

◇ Supplementary

- If tool-source is distributed to more than one controller, the order of uploading is as follows:
  (1) Network configuration, (2) Hardware configuration, (3) User definition type,
  (4) Network/Station/Controller variables (In random order).

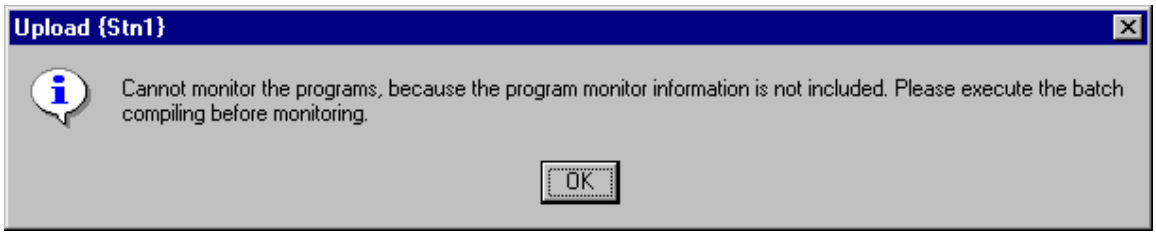
4) Click the [Next] button to open the upload confirmation dialog box and execute as necessary. Uploading to the controller starts when [Yes] is selected. If [No] is selected, uploading is canceled.

5) Uploading starts and [Configuration], [Program], and [Global variables] are transferred successively to the engineering tool. The following dialog box appears when uploading completes.



◆ Note

- When connecting by RS232C and performing batch upload, do not pull out the RS232C cable.
- When ‘Reverse genaration‘ is used, the following message may be shown after uploading. If this message is shown, please execute batch-compling to re-make the monitoring information.



Chapter 8
Monitoring Control Program

This chapter describes the procedure to monitor a control program with the Program Editor.

8.1 Semi Graphic

This section describes how to monitor a LD (ladder diagram), FBD (function block diagram), or SFC (sequential function chart) with the Program Editor (Semi graphic).

- Monitoring a program
- Monitoring inside a function
- Monitoring inside a function block
- Exerting force online
- Swapping online
- Sequence tag operation

8.1.1 Monitoring a program

This section describes how to monitor an LD (ladder diagram), FBD (function block diagram), or SFC (sequential function chart).

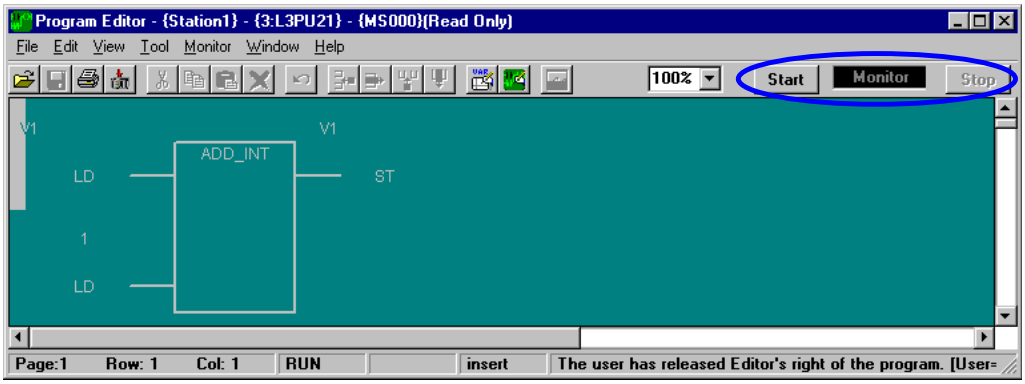
■ Start monitoring

To start monitoring a program, place the cursor in the main view and click the <Start> button or select <Start monitor> from the <Monitor> menu.

While monitoring, [Monitor] flashes at the top of the window.

■ Stop monitoring

To stop monitoring a program, click the <Stop> button or select <Stop monitor> from the <Monitor> menu.



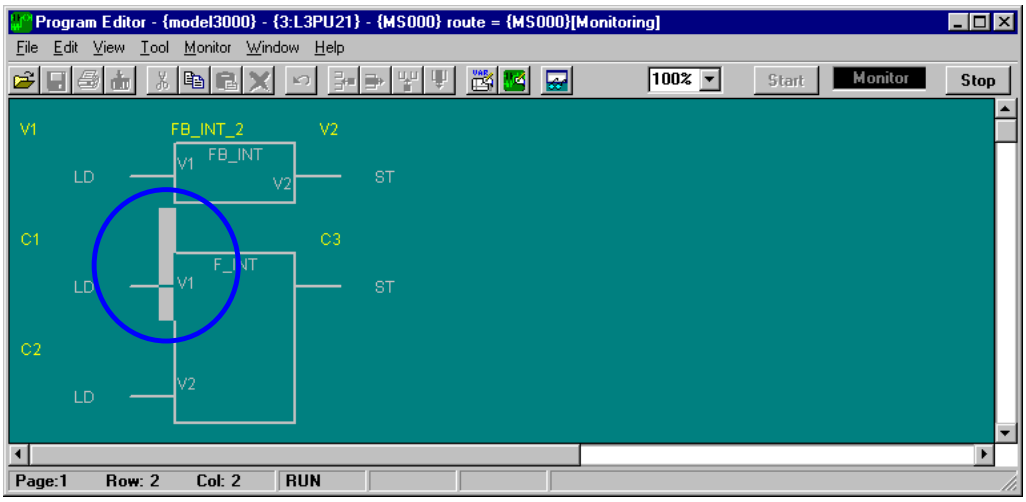
8.1.2 Monitoring inside a function

This section describes how to monitor inside a user created function.

■ Open specifying calling source

When program monitoring is started, place the cursor at the beginning of the function to monitor and select <Open inside function or function block> from the right click menu.

The inside of the specified function opens and monitoring starts.



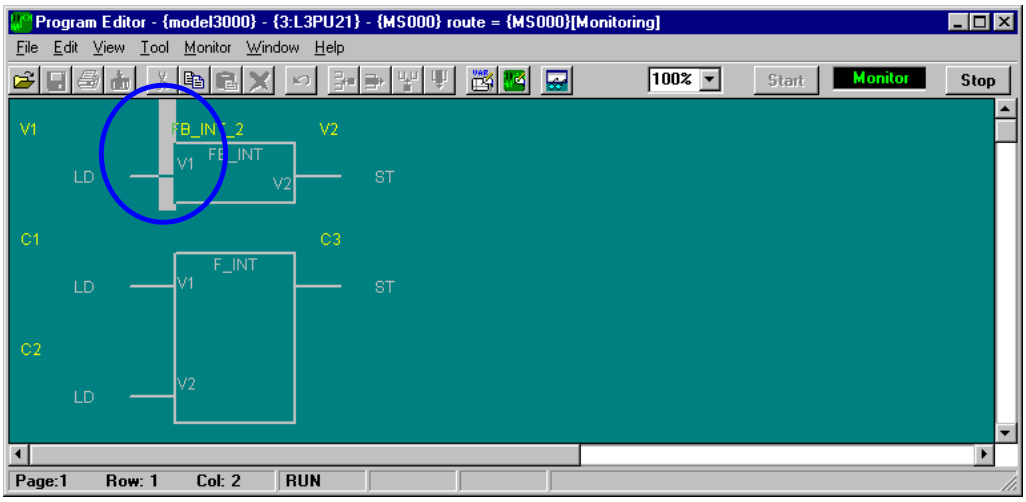
8.1.3 Monitoring inside a function block

This section describes how to monitor inside a user created function block.

■ Open specifying calling source

When program monitoring is started, place the cursor at the beginning of the function block to monitor and select <Open inside function or function block> from the right click menu.

The inside of the specified function block opens and monitoring starts.



8.1.4 Exerting force online

This section describes how to exert force (forced retention of output result) on a coil while monitoring the program with the [Program Editor]. Force (forced retention of setting) can also be exerted on contact with the same procedure.

■ Viewing [Force setup menu]

Click <Contact/coil force menu> from the <Monitor> menu.

■ Exerting force

1) The instruction symbol of the forced coil appears in [Force setup menu] when the cursor is moved to the coil to exert force.
2) Press the function key No. of the forced coil instruction symbol. Then the coil with the cursor is replaced with a forced coil and a border appears.

■ Releasing force

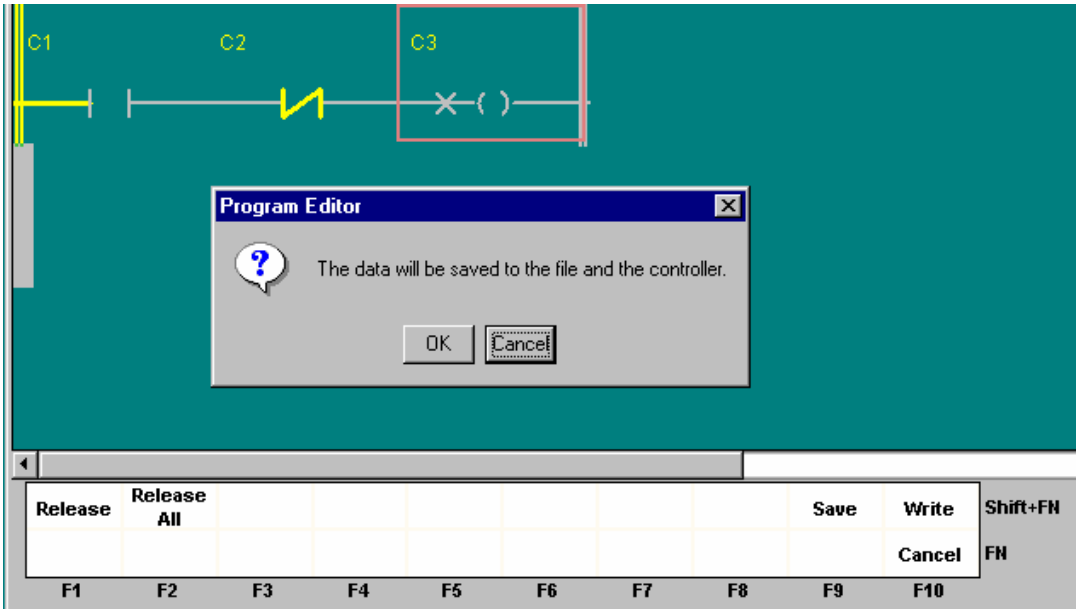
1) [Released] appears in the [Force setup menu] when the cursor is moved to the coil to release force.
2) Press the function key No of [Release]. Then the forced coil with the cursor is replaced with a coil and a border appears.
3) To release all force within a file, use [Release all].

■ Write to controller and tool/save to tool only

Select the function key No of [Write] from the [Force setup menu] to write to the controller and tool. The border disappears and monitoring is enabled with the forced instruction.

To write to tool only offline, select [Save].

[Write] or [Save] at one time is possible for force or release of up to 80 steps.



■ Viewing of the force state within a controller.

1) Click <Contact/coil force list> from the <Monitor> menu.

   Each force state of Semi graphic/Full graphic in a controller is displayed.

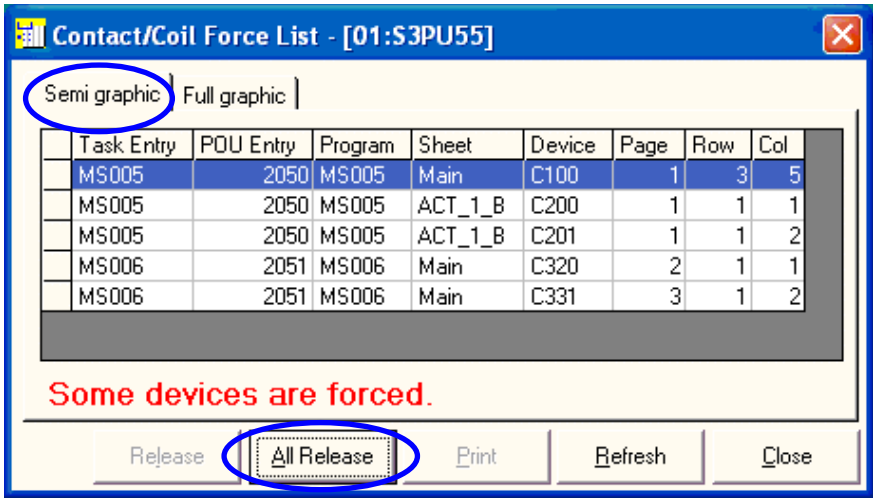
   The message of the existence of the force containing semi graphic/Full graphic is displayed on a screen.

   Some devices are forced.

   Forced device is not found.

■ Releasing all force within a controller

1) Click <Contact/coil force list> from the <Monitor> menu.



2) Click the [All Release] button. Then the [Release force] window appears.

3) Click [OK].

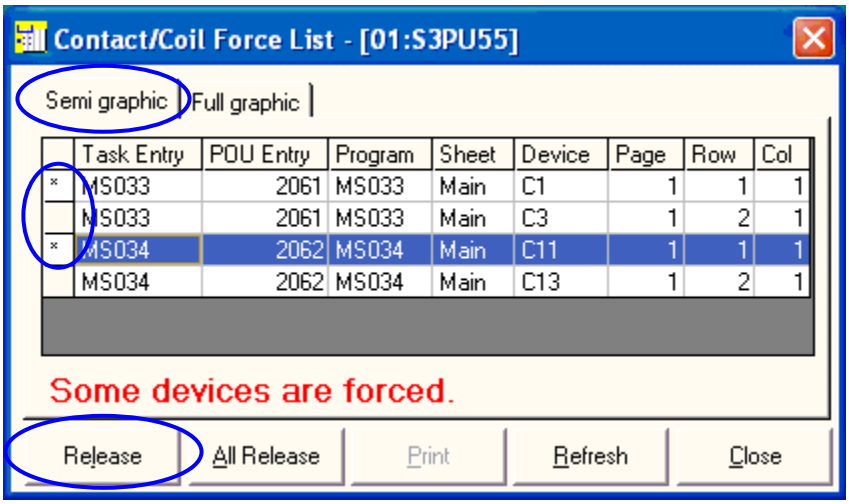
◆ **Note**

- When you cancel a force, please set operation mode of Controller to HALT.

■ Releasing force within a controller

1) Click <Contact/coil force list> from the <Monitor> menu.

2) Item to release is clicked with a mouse.
   * is displayed.



3) Click the [Release] button. Then the [Release force] window appears.

4) Click [OK].

◆ **Note**

- When you cancel a force, please set operation mode of Controller to HALT.

■ Closing the [Force setup menu]

Close the [Force setup menu] with one of the following methods:

1) Select [Cancel] in the [Force setup menu].

2) Click <Contact/coil force menu> from the <Tool> menu.

3) Click <Instruction swap menu> from the <Tool> menu.

8.1.5 Swapping online

This section describes how to swap (force exchange) instruction and immediate value while monitoring the program with the [Program Editor].

■ Viewing [Instruction swap menu]

Click <Instruction Swap Menu> from the <Tool> menu. This is possible only when monitoring.

■ Swapping instructions

1) Move the cursor to the instruction to swap. Then the swappable instruction symbol appears in the [Instruction Swap Menu].
2) Press the function key No. of the instruction symbol to swap. Then the instruction with the cursor is replaced with the selected instruction and a border appears.

   Specify a instruction in the same group for instruction to swap.

Group	Instruction that can be swapped
Contact	–| |–, –|/|–
Coil	–( )–, –(S)–, –(R)–, –(/)–
Gate	GATE, GATEN

■ Swapping immediate values and variables

1) When the cursor is moved to a load instruction, the currently set immediate value or variable appears in the [Instruction Swap Menu].
2) Press the [Shift] key and [F1] key together to make the immediate value or variable editable.
3) Edit the immediate value or variable and press the [Enter] key. Then the value of the load instruction at the cursor is changed and a border appears.

   Swapping to a different data type is not allowed.

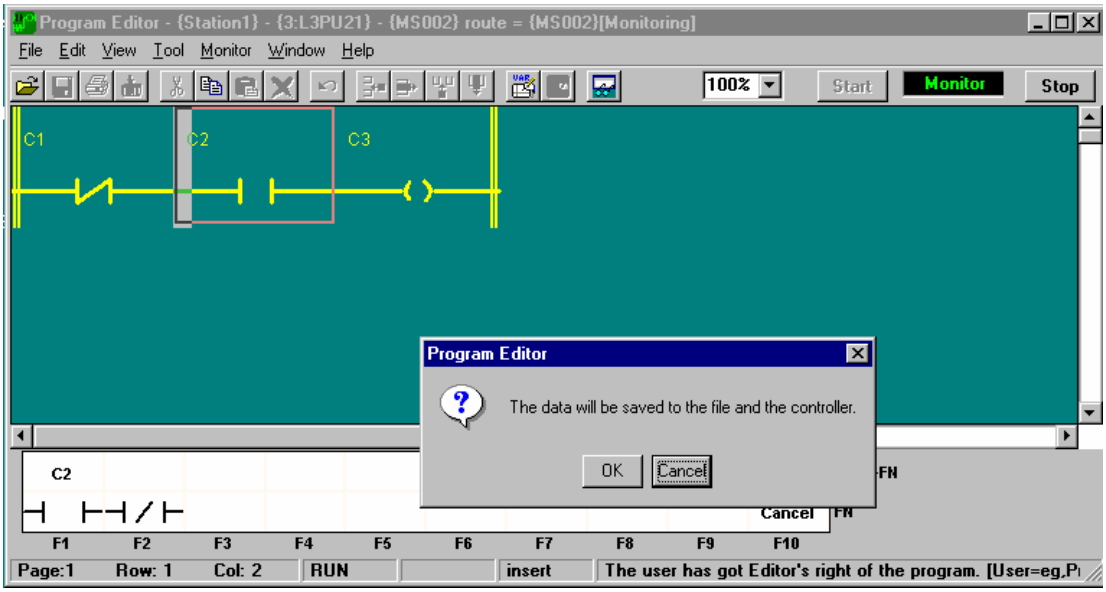
   Swapping from immediate value to variable or vice versa is not allowed.

   Immediate values and variables can be swapped at the following instructions.

Group	Instruction word	Immediate value swap	Variable swap
Contact	–| |–, –|/|–	—	Allowed
Coil	–( )–, –(S)– , –(R)-, –(/)–	—	Allowed
Gate	GATE, GATEN	—	Allowed
Load	LD	Allowed	Allowed
Store/set	ST, SET	—	Allowed

■ Writing to controller and tool

Press the function key No. of [Write] in the [Instruction Swap Menu]. The border disappears and monitoring is enabled with the swapped instruction.



■ Closing the [Instruction Swap Menu]

Close the [Instruction Swap Menu] with one of the following methods:

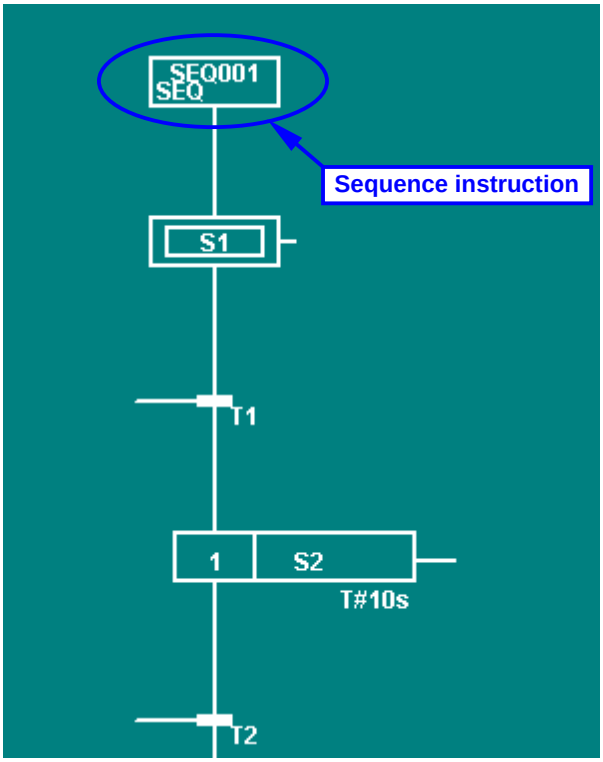
1) Select [Cancel] in the [Instruction Swap Menu].
2) Click <Contact/coil Force menu> from the <Tool> menu.
3) Click <Instruction Swap Menu> from the <Tool> menu.
4) Exit the monitor.

8.1.6 Sequence tag operation

This section describes how to operate the execution of SFC program related with the Sequence Tag.

■ Prerequisites

1) The Sequence instruction must be connected to the SFC circuit and it must be related with the Sequence Tag. (See Online manual: Instruction, 26.SFC Instructions)
2) Available controllers are L2PU22, L3PU21 or PU821.



■ Restrictions

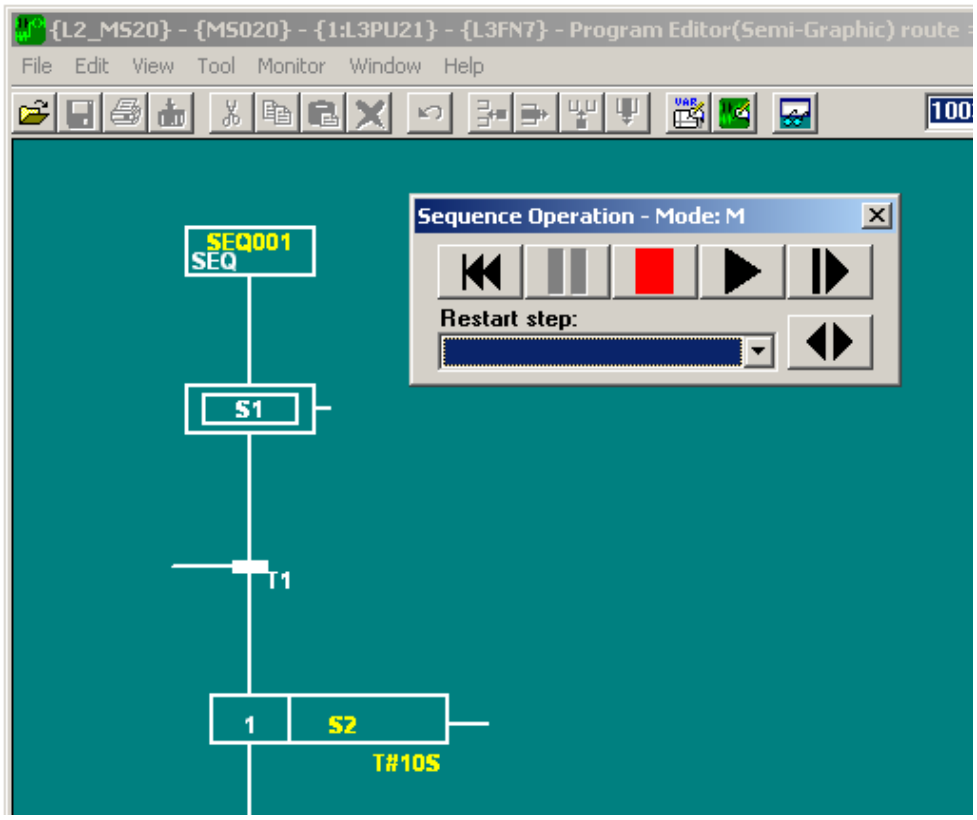
Do not assign one Sequence Tag to two or more Sequence instructions.

■ Displaying the operation panel

You can operate the execution of SFC program using the Operation Panel.

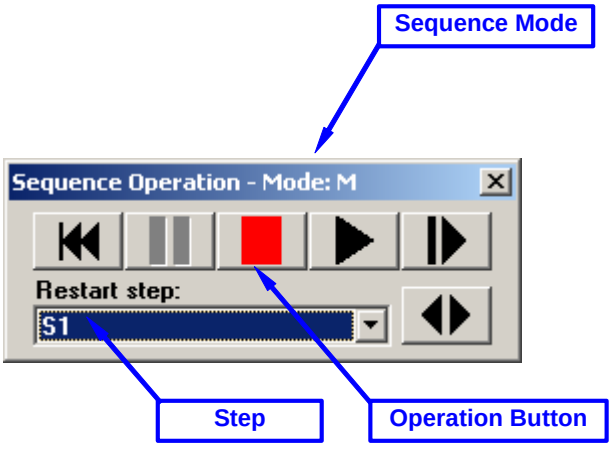
Open the program including Sequence instruction.

Starting monitor, the Operation Panel will be displayed automatically.



Click button [X] of the Operation Panel to close it.

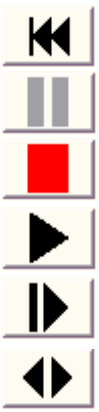
■ Name and role of each part



1) Sequence mode
Displays the current sequence mode.
(M:Stop, RM:Stop, A:Progress with confirmation, C:Continuous progress)

2) Step
Displays selectable steps as restart step.

3) Operation button
Execute each operation. Place the mouse pointer on the button to view its button name.



: Return to Top
: Progress with Confirm
: Stop
: Execute
: Single Step
: Change Restart Step

4) Message
Displays the error message at the time of operation.

■ Return to top

Click button [Return to Top] to activate the Initial Step in operation level.

It is effective when sequence mode is stop (M or RM).

■ Progress with confirm

When sequence mode is status of Progress with confirmation, [Progress with Confirm] is displayed in yellow blink.

Click button [Progress with Confirm] to resume execution.

■ Stop

Click button [Stop] to change the sequence mode into M or RM.

Sequence mode is changed into M when sequence mode is not M. [Stop] is displayed in red.

Sequence mode is changed into RM when sequence mode is M. [Stop] is displayed in red blink.

■ Execute

Click button [Execute] to change the sequence mode into A or C.

Sequence mode is changed into A when sequence mode is not A. [Execute] is displayed in green.

Sequence mode is changed into C when sequence mode is A. [Execute] is displayed in green blink.

■ Single step

Click button [Single Step] to execute a step only one scan.

It is effective when sequence mode is stop (M or RM).

■ Change restart step

Select the target step and Click button [Change Restart Step] to change the restart step.

In order to select target step, there is the following method.

1) Click the step instruction in program. The selected step is displayed on the step column.

2) Select target step from list of step column.

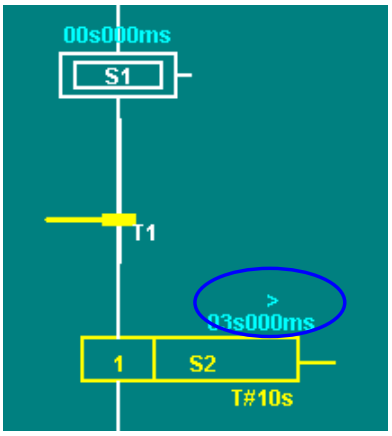
It is effective when sequence mode is stop (M or RM).

■ Displaying step status

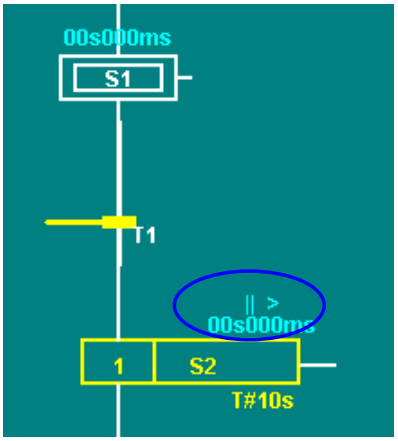
When the program including Sequence instruction is monitored, the following sign showing the state of step is displayed.

Sign	State of Step
>	Active Step
||	Status of Progress with Confirmation
!	Congestion alarm or Answer Back alarm

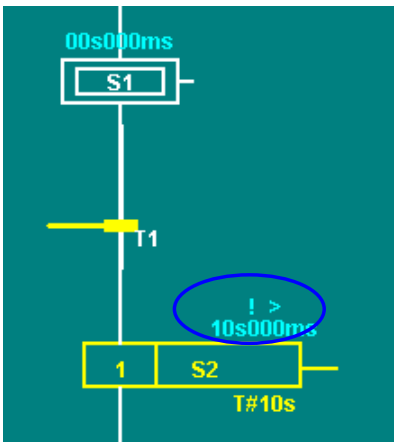
1) Active step



2) Status of progress with confirmation



3) Congestion alarm or answer back alarm



8.2 Structured Text

Explains how to monitor a Program, Function and Function Block using Program Editor (Text).

◇ **Supplementary**

- This function is not supported in Engineering tool 2.

- Monitoring a program
- Monitoring the inside of a function
- Monitoring the inside of a function block

8.2.1 Monitoring a program

Explains how to monitor a program written by ST.

■ Start monitoring

Click space of Editor View.

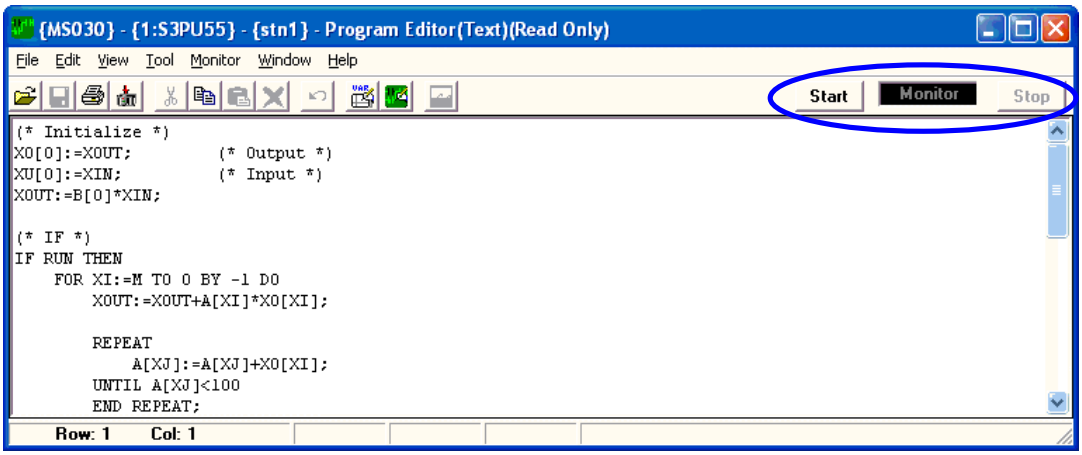
Click [Start] button to start monitoring if the controller (or simulator) is connected with V-Tool3.

While monitoring, [Monitor] indicator flashes at the top of the window.

And also monitor data of each line is refreshed in the left of Editor View.

■ Stop monitoring

Click [Stop] button.



8.2.2 Monitoring the inside of a function

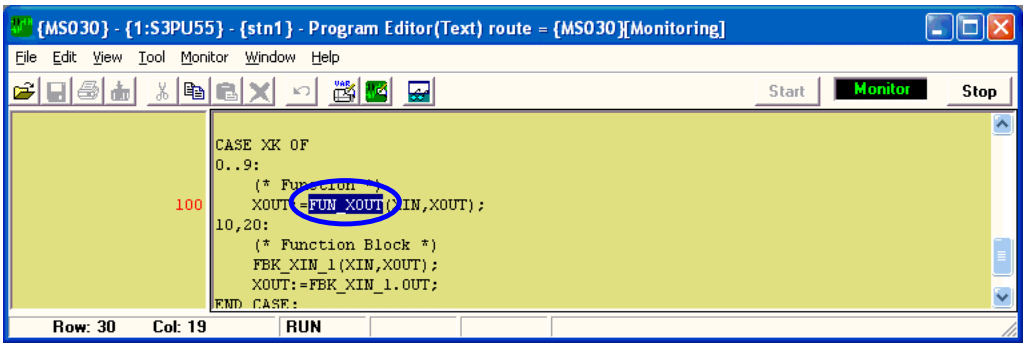
Explains how to monitor the inside of a User Function.

■ Monitoring the inside of a function

Open a Program calls User Functions and click [Start] Button to start monitoring.

Select a user's function name written in your program shown as follows.

Right-click and select <Open inside function or function block> menu to open another view which monitors the inside of the Function you need.



8.2.3 Monitoring the inside of a function block

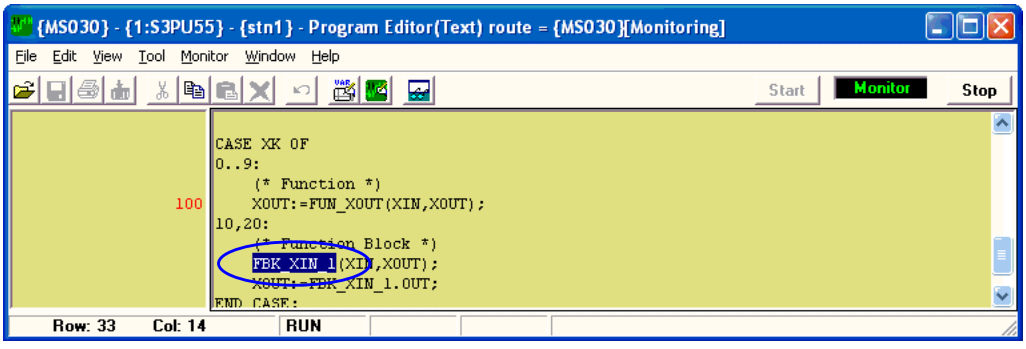
Explains how to monitor the inside of a User Function Block.

■ Monitoring the inside of a function block

Open a Program calls User Function Blocks and click [Start] Button to start monitoring.

Select a user's function block variable name written in your program shown as follows.

Right-click and select <Open inside function or function block> menu to open another view which monitors the inside of the Function Block you need.



8.3 Full Graphic

Explains how to monitor a Program, Function and Function Block using Program Editor (Full Graphic).

◇ **Supplementary**

- This function is not supported in Engineering tool 2.

- Monitoring a program
- Monitoring the inside of a function
- Monitoring the inside a function block
- Forcing online
- Swapping online
- Sequence tag operation

8.3.1 Monitoring a program

Explains how to monitor a Program drawn by Program Editor (Full Grapic).

■ Start monitoring

Click space of Editor View.

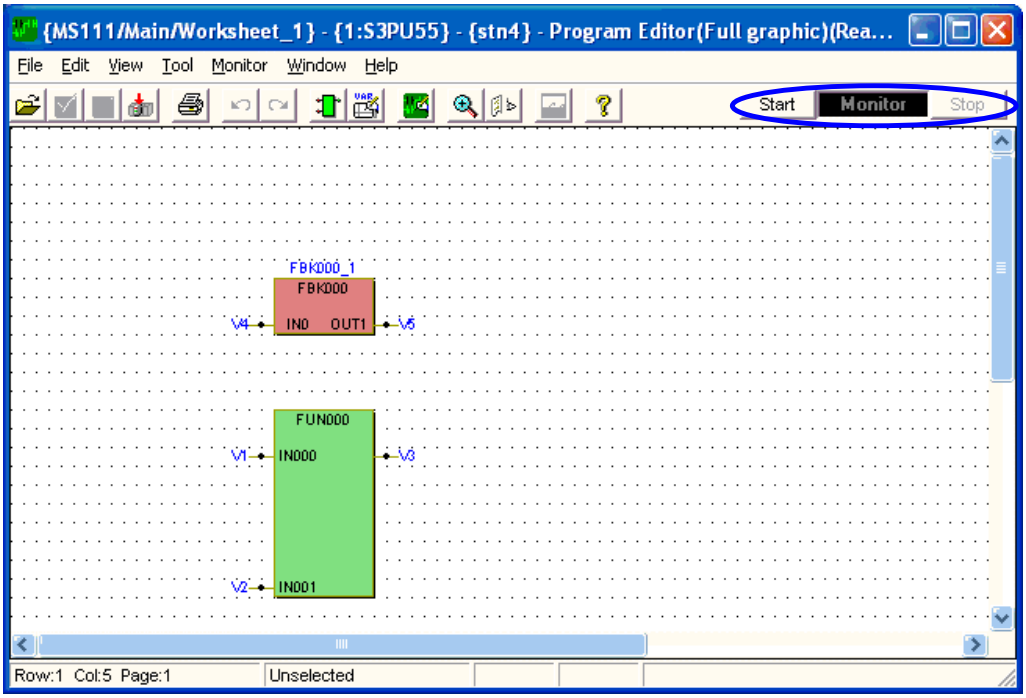
Click [Start] button to start monitoring if the controller (or simulator) is connected with V-Tool3.

While monitoring, [Monitor] indicator flashes at the top of the window.

And also monitor data of each device is refreshed.

■ Stop monitoring

Click [Stop] button.



◆ **Note**

- If the width of symbol is narrow, the monitor value and the device comment may overlap. In this case please stretch the symbol.

8.3.2 Monitoring the inside of a function

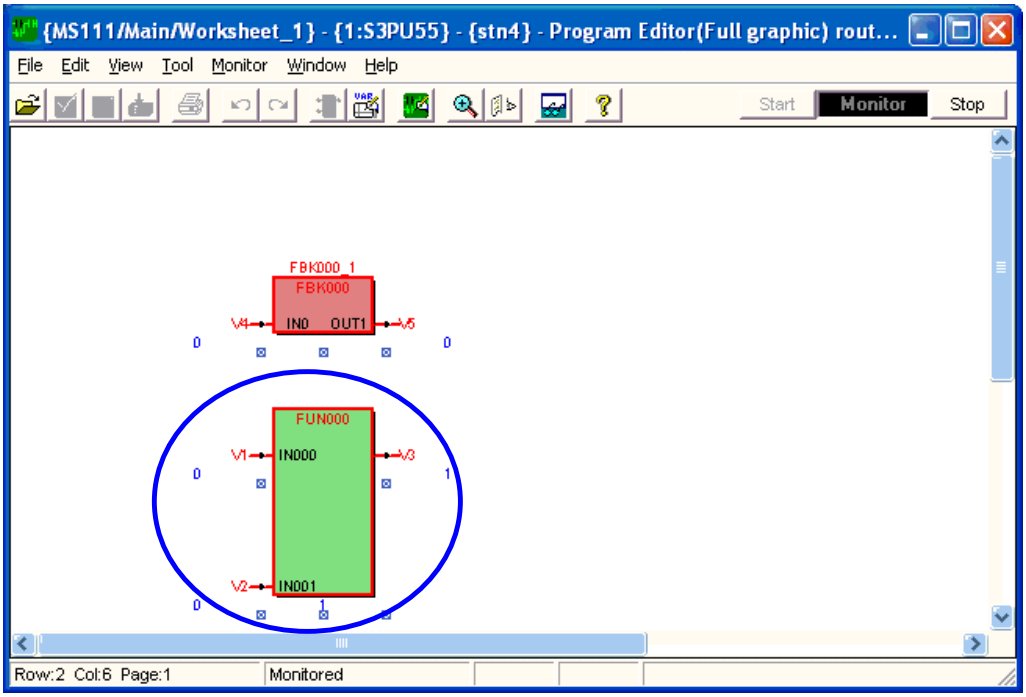
Explains how to monitor the inside of a User Function.

■ Monitoring the inside of a function

Open a Program calls User Functions and click [Start] Button to start monitoring.

Click a user's function symbol called in your program shown as follows.

Right-click and select <Internal Function> menu to open another view which monitors the inside of the Function you need.



8.3.3 Monitoring inside a function block

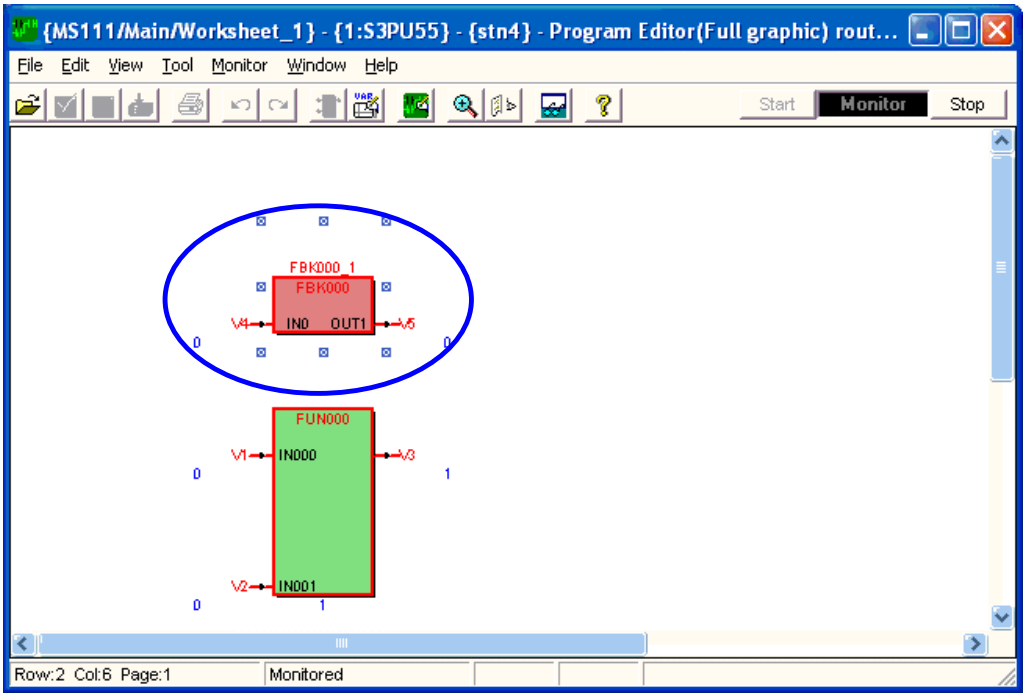
Explains how to monitor the inside of a User Function Block.

■ Monitoring the inside of a function block

Open a Program calls User Functions and click [Start] Button to start monitoring.

Click a user's function symbol called in your program shown as follows.

Right-click and select <Internal Function> menu to open another view which monitors the inside of the Function Block you need.



8.3.4 Forcing online

Explains how to force coil or contact using Program Editor (Full Graphic).

■ Opening [Contact/Coil Force] form

Click <Tool><Contact/coil force> menu.

■ Exerting force

Click a coil you want to force to select the coil and let [Forced Coil] icon be enabled.

Click [Forced Coil] icon to force the coil and a red frame will appear on the coil.

■ Releasing force

Click an existing forced coil to let [Release] button be enabled.

Click [Release] button to release the force and a red frame will appear on the coil.

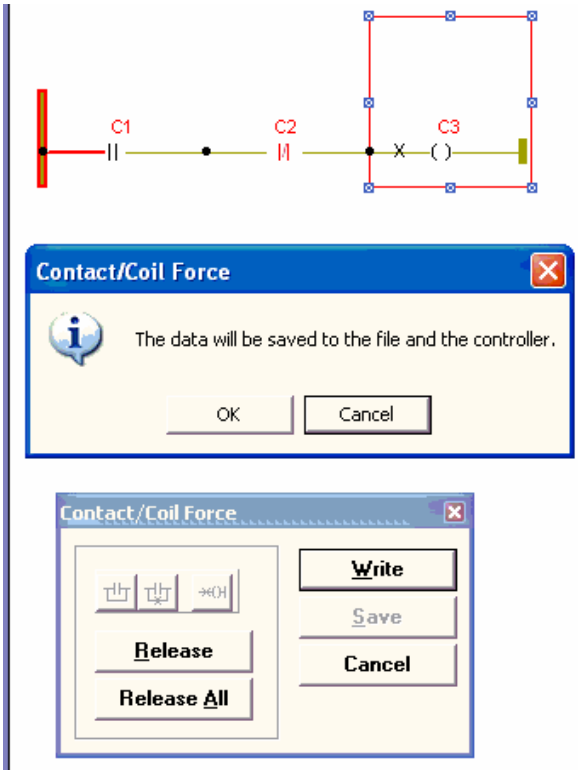
If you want to release all of the forced coils of the worksheet, click [Release All] button.

■ Writing/Saving forced or released status

Note that this red frame means 'on the way to force or release', not yet forced or released in Controller.

Click [Write] button to write the forced or released status into Controller and red frames will disappear.
If you want to save the forced or released status to V-Tool, click [Save] button.

A batch of coils and contacts, up to 80, can be forced or released at once.



■ Opening force list of controller

Click <Tool><Contact/Coil Force List> menu to open the following form.

Click <Semi Graphic> tab to open the force list of semi graphic programs.

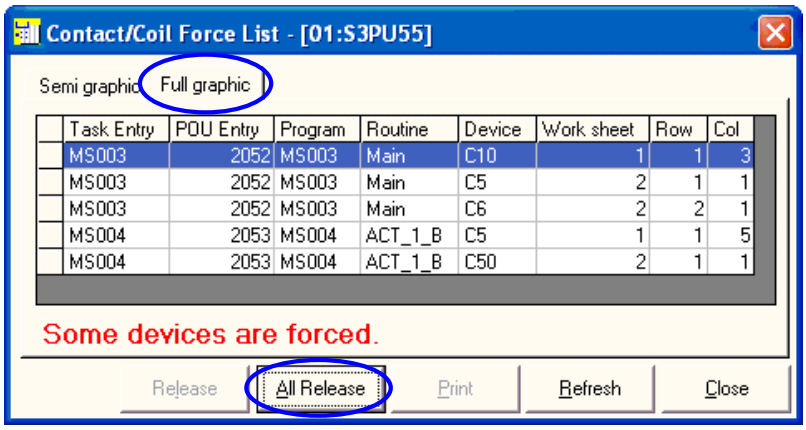
Click <Full Graphic> tab to open the force list of full graphic programs.

Following message will be displayed in big characters.

'Some devices are forced.' or 'Forced device is not found.' displays in each form.

■ Releasing all of the forced devices

The force of the device displayed in the tab that has been selected is released by the batch.

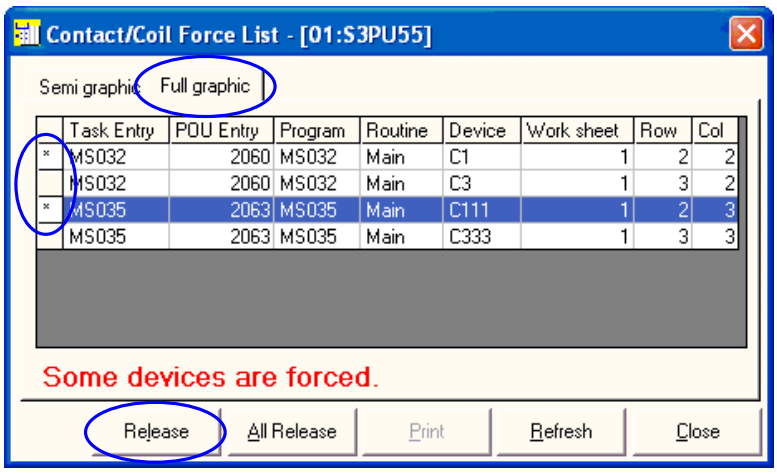


1) Click the [All Release] button to open [Release force] form.
2) Click [OK] to release all.

◆ **Note**

- Before releasing forced devices, you need to make the Controller HALT status.

■ Releasing selected devices in a controller



1) Click left columns you want to release to display <*> marks.
2) Click [Release] button to open [Release force] form.
3) Click [OK] to release the selected devices.

◆ **Note**

- Before releasing forced devices, you need to make the Controller HALT status.

■ Closing [Contact/coil force] form

You can take one of the following ways to close [Contact/Coil Force].

1) Select [Cancel] button in [Contact/Coil Force] form.
2) Click <Tool><Contact/coil Force>.
3) Click <Tool><Instruction Swap>.

8.3.5 Swapping online

Explains how to swap Instructions ,constant values or variables in a program while monitoring using Program Editor (Full Graphic).

■ Opening [Instruction swap menu] form

While monitoring Click <Tool> <Instruction Swap> menu to open [Instruction Swap] form.

■ Swapping instructions

Click an instruction symbol to display the swappable instruction symbols.

Click one of the swappable instruction symbols to replace the instruction symbol and a red frame will appear.

Swappable instruction symbols are shown as follows.

Group	Instruction that can be swapped
Contact	–| |–, –|/|–
Coil	–( )–, –(S)–, –(R)–, –(/)–
Gate	GATE, GATEN

■ Swapping constant values and variables

Click a constant or variable to display the constant or variable.

Edit and change the constant or variable and press [Enter] to replace the selected constant or variable and a red frame will appear.

◆ Note

- Cannot replace a constant or variable to one of the other data type.
- Cannot replace a constant with a variable and do a variable with a constant.

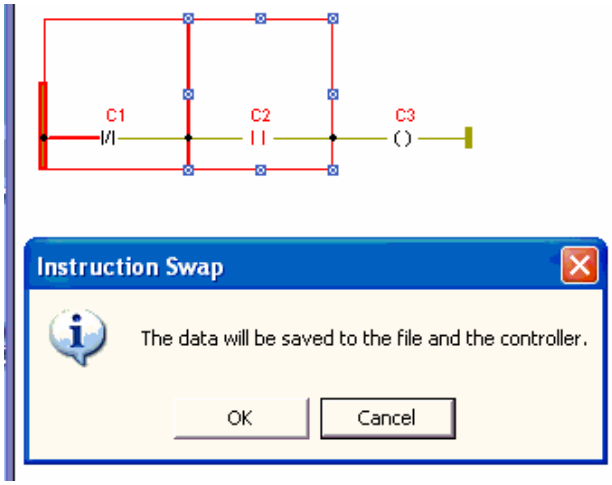
Constants and variables can be swapped in some instructions shown as follows.

Group	Instruction symbol	Constant value swapping	Variable swapping
Contact	–| |–, –|/|–	—	Allowed
Coil	–( )–, –(S)–, –(R)–, –(/)–	—	Allowed
Gate	GATE, GATEN	—	Allowed
Load	LD	Allowed	Allowed
Store	ST	—	Allowed
Set	SET	—	Allowed
Load/Store	–V1–	—	Allowed

■ Writing and saved swapped status

Note that this red frame means 'on the way to swap', not yet swapped in Controller.

Click [Write] to write the swapped status into controller and save to V-Tool and the red frame will disappear.



■ Closing the [Instruction Swap]

You can take one of the following ways to close [Instruction Swap].

1) Click [Cancel] in the [Instruction Swap] form.
2) Click <Tool> <Instruction Swap> menu.
3) Click <Tool> <Contact/coil Force> menu.
4) Exit the monitor.

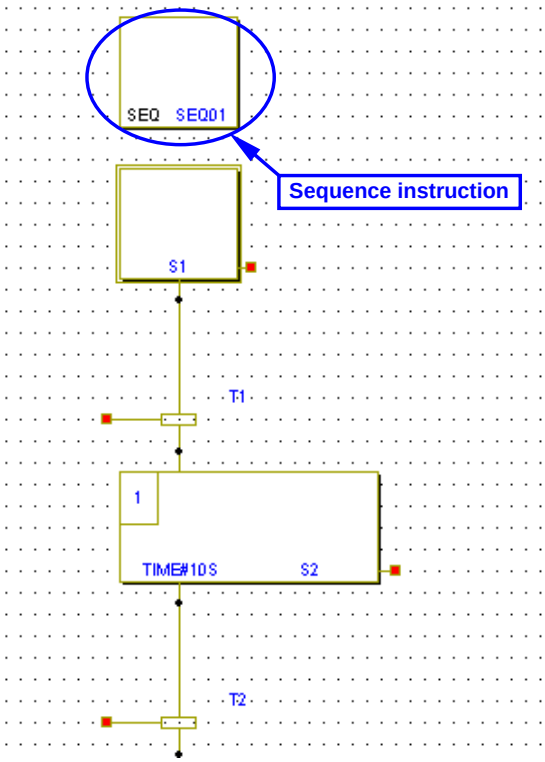
8.3.6 Sequence tag operation

This section describes how to operate the execution of SFC program related with the Sequence Tag.

■ Prerequisites

1) The Sequence instruction must be placed above the SFC circuit and it must be related with the Sequence Tag. (See Online manual: Instruction, 26.SFC Instructions)

2) Available controllers are L2PU22, L3PU21 or PU821.



■ Restrictions

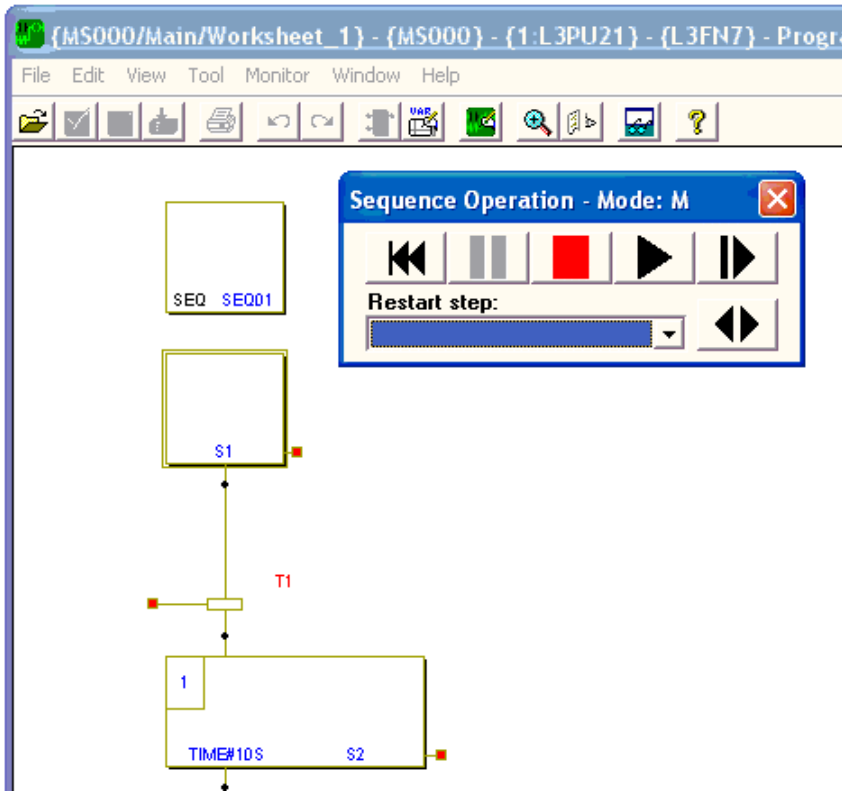
Do not assign one Sequence Tag to two or more Sequence instructions.

■ Displaying the operation panel

You can operate the execution of SFC program using the Operation Panel.

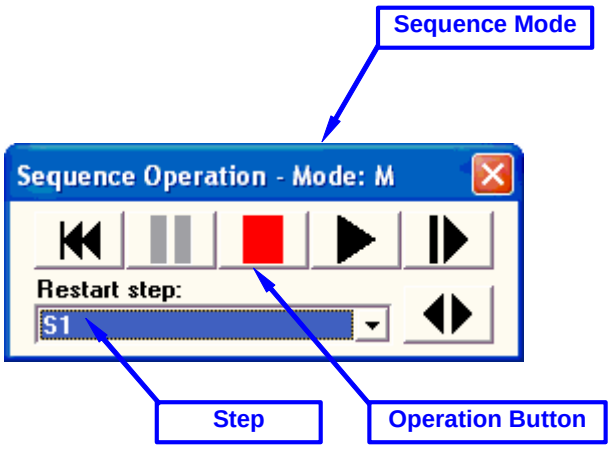
Open the program including Sequence instruction.

Starting monitor, the Operation Panel will be displayed automatically.



Click button [X] of the Operation Panel to close it.

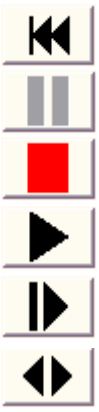
■ Name and role of each part



1) Sequence mode
   Displays the current sequence mode.
   (M:Stop, RM:Stop, A:Progress with confirmation, C:Continuous progress)

2) Step
   Displays selectable steps as restart step.

3) Operation button
Execute each operation. Place the mouse pointer on the button to view its button name.



4) Message
Displays the error message at the time of operation.

■ Return to top

Click button [Return to Top] to activate the Initial Step in operation level.

It is effective when sequence mode is stop (M or RM).

■ Progress with confirm

When sequence mode is status of Progress with confirmation, [Progress with Confirm] is displayed in yellow blink.

Click button [Progress with Confirm] to resume execution.

■ Stop

Click button [Stop] to change the sequence mode into M or RM.

Sequence mode is changed into M when sequence mode is not M. [Stop] is displayed in red.

Sequence mode is changed into RM when sequence mode is M. [Stop] is displayed in red blink.

■ Execute

Click button [Execute] to change the sequence mode into A or C.

Sequence mode is changed into A when sequence mode is not A. [Execute] is displayed in green.

Sequence mode is changed into C when sequence mode is A. [Execute] is displayed in green blink.

■ Single step

Click button [Single Step] to execute a step only one scan.

It is effective when sequence mode is stop (M or RM).

■ Change restart step

Select the target step and Click button [Change Restart Step] to change the restart step.

In order to select target step, there is the following method.

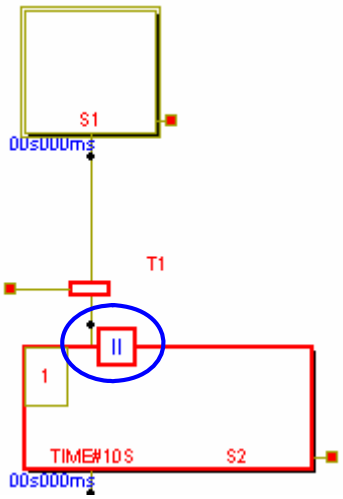
1) Click the step instruction in program. The selected step is displayed on the step column.
2) Select target step from list of step column.
   It is effective when sequence mode is stop (M or RM).

■ Displaying step status

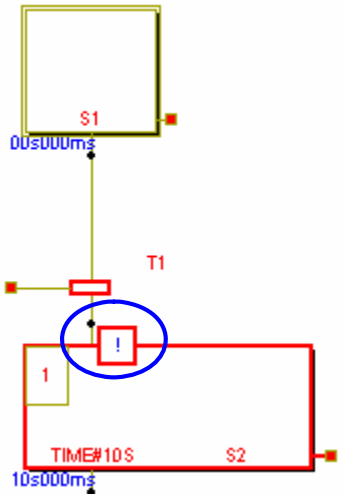
When the program including Sequence instruction is monitored, the following sign showing the state of step is displayed.

Sign	State of Step
||	Status of Progress with Confirmation
!	Congestion alarm or Answer Back alarm

1) Status of progress with confirmation



2) Congestion alarm or answer back alarm



8.4 Monitoring Data Together with Program

This section describes how to monitor the values of program variables and global variables while monitoring a program.

■ Viewing data value monitor

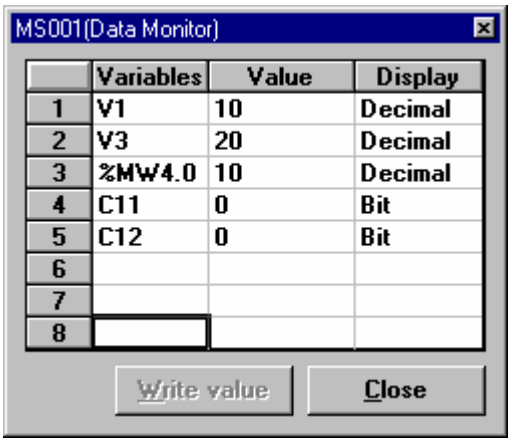
With program monitoring started, select <Data Monitor> from the <Monitor> menu to open the following dialog box.

Enter the variable name or direct notation variable in the Variable Name column to start monitoring.

The display format of the data value can be changed in the Display Format column.

The maximum number of the variables monitored at once is as follows.

nv series: 32 points
V series: 8 points



The displayed content can be saved when closing the Program Editor.

■ Writing variable value

Enter the new value in the data value field and click the [Write value] button.

■ Selecting monitoring target variable by drag and drop

Drag the monitor target variable to the data value monitor window to register as monitor target.

8.5 Monitoring Any Data

This section describes how to monitor any data of local variable or global variable.

The procedure to monitor any data of the L controller Tag variable is also described.

For information on how to start and use the [Data View], refer to [Setting Values in Data View].

For information on how to start and use the [Tag Editor], refer to [Setting Values with Tag Editor].

■ Starting the tag editor

Select the target station from the [Product Tree] and select <Open> <Tag editor> from the <File> menu to start the Tag Editor.

Select the desired [Parameter type].
Scroll [Record No.] or enter the desired Tag variable directly and display it.

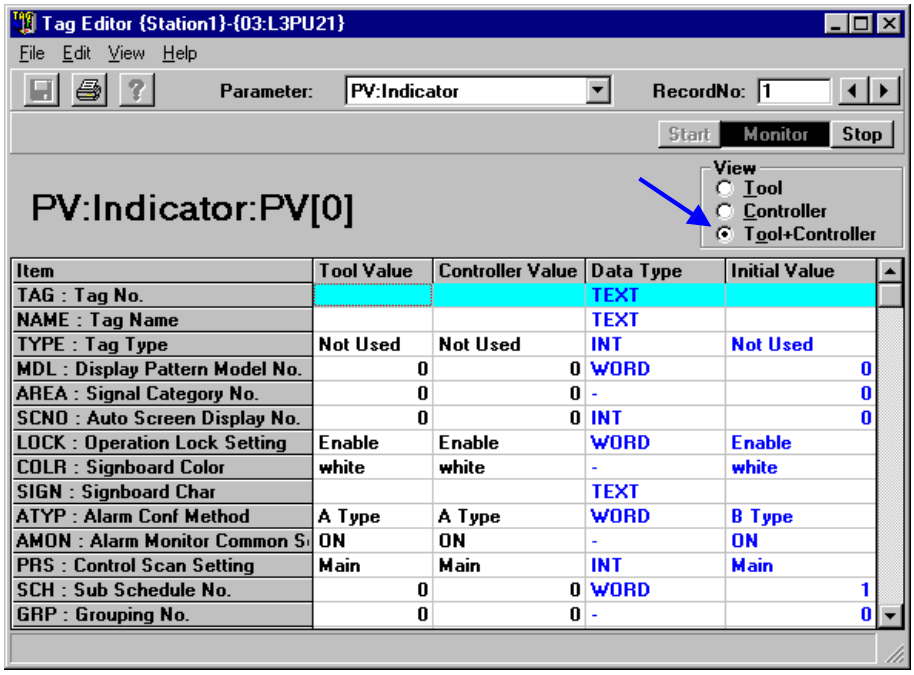
■ Start monitoring

Select <Controller> or <Tool + Controller> from the <View> option.

Click [Start] on the tool bar to start monitoring.

■ Stop monitoring

Click [Stop] on the tool bar to stop monitoring.



Item	Tool Value	Controller Value	Data Type	Initial Value
TAG : Tag No.			TEXT	
NAME : Tag Name			TEXT	
TYPE : Tag Type	Not Used	Not Used	INT	Not Used
MDL : Display Pattern Model No.	0	0	WORD	0
AREA : Signal Category No.	0	0	-	0
SCNO : Auto Screen Display No.	0	0	INT	0
LOCK : Operation Lock Setting	Enable	Enable	WORD	Enable
COLR : Signboard Color	white	white	-	white
SIGN : Signboard Char			TEXT	
ATYP : Alarm Conf Method	A Type	A Type	WORD	B Type
AMON : Alarm Monitor Common S	ON	ON	-	ON
PRS : Control Scan Setting	Main	Main	INT	Main
SCH : Sub Schedule No.	0	0	WORD	1
GRP : Grouping No.	0	0	-	0

8.6 Monitoring Multiple Tasks Concurrently

The Program Editor can be invoked more than once. Each Program Editor can monitor a separate task to monitor more than one task at the same time.

■ Restrictions for concurrent monitoring

- Monitoring the same controller

  You cannot monitor two or more controllers at the same time from a single PC.

  Maximum number that can be monitored

  A Program Editor can be invoked up to four times on a single PC with each monitoring independently.

  Depending on the amount of memory installed on the PC and the number of concurrently invoked applications, the maximum number of monitor may be less than 4.

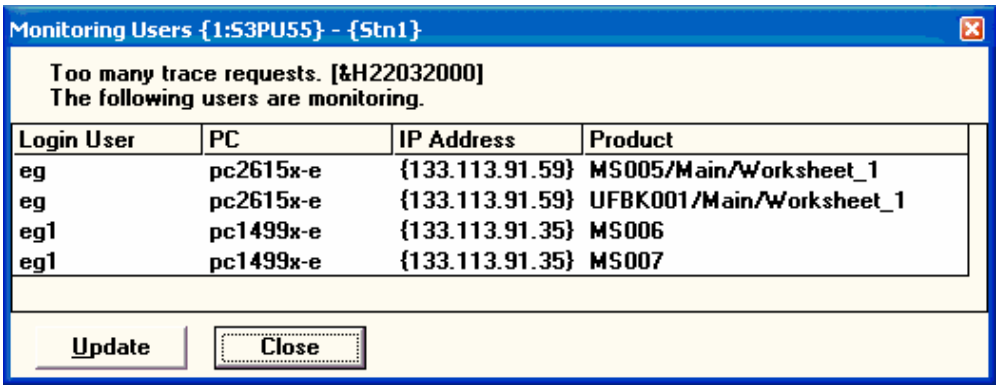
■ Monitoring user list

◆ Note

- This function is available for Ver.4.2.0, Ver.3.10.0, and Ver.2.14.0 or upper version.

This function is useful for the user, who wants to avoid the restrictions for concurrent monitoring.

Automatically V-Tool shows the following window, when the users request to start too many monitoring-program:



◆ Note

- The users can not open this window manually.

[Login User]: Users who use the program-monitoring function.

[PC]: User's PC name

[IP Address]: IP addresses of the PC

[Product]: Program name which is monitoring.

The item [Product] can show the POU, Routine, and worksheet name. (Routine and worksheet are only for Full-graphic type program editor.)

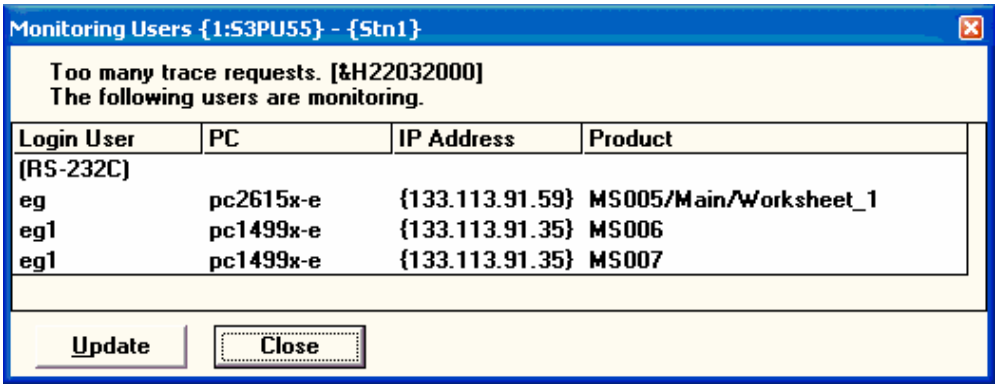
The button [Update]: For refreshing the data.

Note

- Do not remove LAN cable or shutdown PC, when displaying this window, not to become the refreshing lately.

The button [Close]: For closing the window.

The following window shows user is monitoring program via RS-232C cable:



Note

- Please close window to refresh displaying '(RS-232C)'.

This '(RS-232C)' is also displayed, when program editor is closed before stop monitoring, and opened again.

8.7 Externally Starting the Program Monitor

This section describes how to start the program monitor from user application other than V-Tool.

With this method, you can click on a device displayed with HMI or SCADA system process graphics and display the interlock sequence program related to that device in online monitor status.

■ Prerequisite and method

1) The user application is assumed to reside on the same PC and platform as V-Tool.
2) That PC must have sufficient resources (CPU, memory, disk space) to run the user application and V-Tool concurrently.
3) V-Tool and user application are started using the Windows Shell because they are configured independently.

■ Start with Process equipment I/O variable name

1) Start parameter
   The following three parameters are specified when starting the Program Editor with Process equipment I/O variable name.

Parameter	Meaning	Example
DeviceName	Process equipment I/O variable name	M100_RUN, XV100_Open
ScopeData	Scope below system that is performing I/O with process equipment	If [SysID]=System name= System1 [StnName]=Station name= Station1 [UnitNo]=Unit No.= 00 [ModulesNo]=Module No.= 01 then When displaying with controller variable ScopeData=[SysID]\[StnName]\[UnitNo]\[ModulesNo] When displaying with station variable ScopeData=[SysID]\[StnName]\[UnitNo]\[ModulesNo] When displaying with network variable ScopeData=[SysID]\[StnName]\[UnitNo]\[ModulesNo]
PrgPathName	Program Editor install path	PrgPathName=“C:\Program Files\VEngTool\vHMI”

2) Start command

The Shell command string to start the Program Editor is as follows using the above start parameters:

Start command
{PrgPathName} /T /M {DeviceName} /C {ScopeData}
Start command example [Stand alone version]
“C:\Program Files\VEngTool\vHMI” /T /M M100_RUN /C System1\Station1\00\00
Start command example [Client-server version]
“C:\Program Files\VEngTool\vHMI” /T /M M100_RUN /C System1\Station1\00\00

◇ **Supplementary**

- If you want to use space in PrgPathName, enclose the entire PrgPathName in double quotation marks to avoid it being interpreted as DOS command delimiter (example "Program Files").

● Start command options

Options	Meaning
/T	Display Program Editor window on top. Optional.
/V or /M	Required options. Must be specified. /V: Monitor is not started. /M: Monitor is started.
/C	Specify DeviceName as output variable name to process equipment. Optional.

Use a single space as delimiter for parameters and options.

■ Start with tag no. of sequence tag

1) Start parameter

The following three parameters are specified when starting the Program Editor with Tag No. of Sequence tag.

Parameter	Meaning	Example
Sequence TAG	Sequence TAG No.	[Sequence TAG] = SEQ_0100
System name	System name	[System name] = System1
PrgPathName	Program Editor install path	PrgPathName = “C:\Program Files\VEngTool\VHMISEQ”

2) Start command

The Shell command string to start the Program Editor is as follows using the above start parameters:

Start command
{PrgPathName} [/T] {/M or /V} {Sequence TAG} {System name}
Start command example
“C:\Program Files\VEngTool\VHMISEQ” /M SEQ_0100 System1

◇ **Supplementary**

- If you want to use space in PrgPathName, enclose the entire PrgPathName in double quotation marks to avoid it being interpreted as DOS command delimiter (example "Program Files").

● Start command options

Options	Meaning
/T	Display Program Editor window on top. Optional.
/V or /M	Required options. Must be specified. /V: Monitor is not started. /M: Monitor is started.

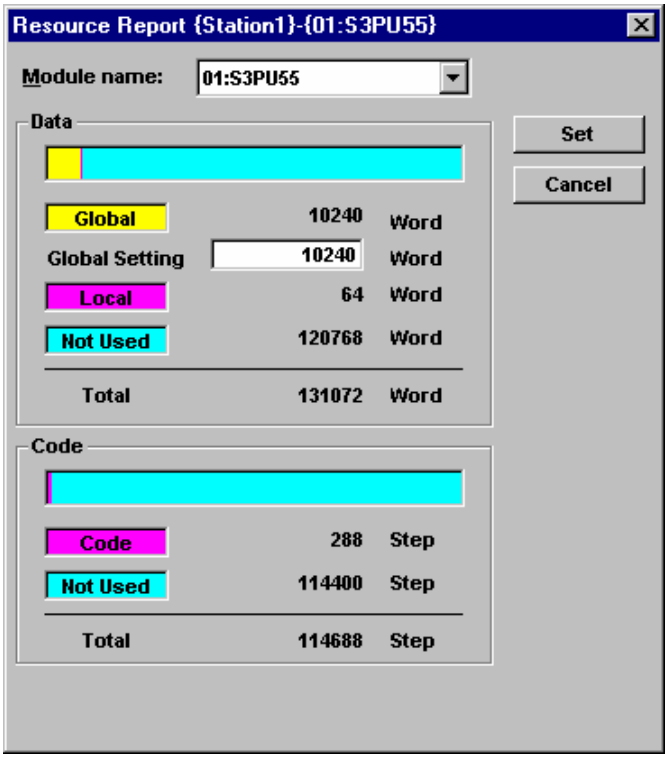
Use a single space as delimiter for parameters and options.

8.8 Determining Free Program Space

This section describes how to determine the space used by compile programs and data files and to determine the actual free space in the controller.

■ Determining the space used by compiled programs and data

1) In the [Product Tree], select a station.
2) Select <Resource report> from the <File> menu to open the following dialog box.
3) Select the target module from <Module name>.



- [Data]: Indicates the amount of compiled data as number of words converted to controller memory.

  [Global]: Global area usage.

  [Local]: Local area usage.

  [Unused]: Unused data area.

  [Total]: Total data area. Fixed according to controller type.

- [Code]: Indicates the amount of compiled program codes as number of steps converted to controller memory.

[Code]: Code area usage.

[Unused]: Unused code area.

[Total]: Total code area. Fixed according to controller type.

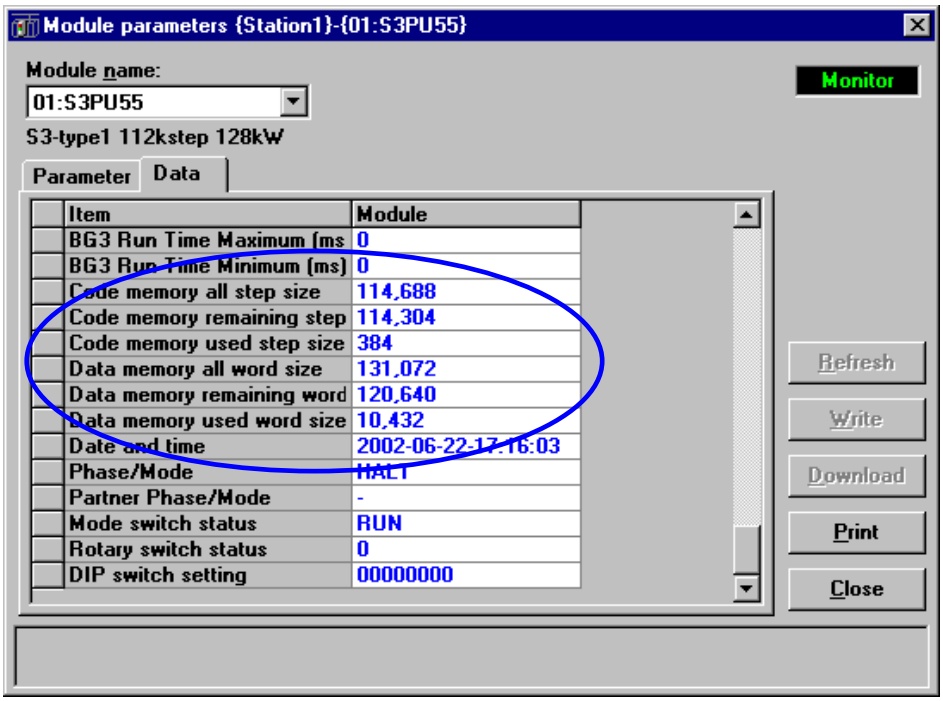
This information can be used to determine the amount currently used by data or program or amount still available to data or program. If data or program exceeds the respective total, the [Unused] value becomes negative and the warning "Unable to download" appears.

The S controller enables the boundary between the global area and local area to be changed. Set the desired number of words for the global area in [Global setting] and click the [Set] button. Obviously, the available local area will decrease when the global area is increased because the total amount of controller data area is fixed.

■ Viewing free controller program space

1) At the left bottom of the [Product Tree], select the controller module to view the free space and select <Module parameter> from the <File> menu.

2) Select the [Data] tab to view the actual controller operating status.



The free program space appear as [Code memory all step size], [Code memory remaining step], and [Code memory used step size].

The free controller variable space appear as [Data memory all word size], [Data memory remaining word], and [Data memory used word size].

■ Defrag

When you repeatedly download and delete programs in the controller, you may not be able to download programs smaller than the total remaining free space.

This is because programs are placed in various areas of the program memory and a contiguous memory necessary to contain the download program cannot be obtained.

In this case, you can perform a <Defrag> operation to reorganize the program allocation. Refer to <System monitor and maintenance><Various maintenance functions><Defrag> for more information.

8.9 Comparing Programs and Data Files

Programs and data files created with V-Tool are downloaded to the controller to be executed, but in some cases, you need to compare various download files in the tool with actual files downloaded to the controller to find discrepancies. This section describes how to compare and interpret the comparison result.

■ Targets

The following items can be compared:

- Ver.2 tool data & Ver.2 tool data
- Ver.2 tool data & Controller data
- Ver.2 tool data & Ver.1 tool data
- Ver.3 tool data & Ver.3 tool data
- Ver.3 tool data & Controller data

■ Procedure

1) In the [Product Tree], select the station containing the data to compare and then select <Compare> from the <File> menu.
2) When the [Compare products] dialog box appears, select the controller to be the comparison source or destination from the pull down list.
3) Select the location of the comparison data with the radio button. Location of files can be selected from [Tool data] or [Controller data]. However, comparison cannot be performed between controllers.
4) Click the [Compare] button to start the comparison. Comparison may take some time and can be stopped by clicking the [Cancel] button. Even when comparison is canceled, the compare result up to that point can be viewed.
5) Click the [Close] button to end. If you want to change controller and repeat comparison, you can click the [Back] button to return to the previous dialog box and change the specification.
6) Click [Ver. 1 Compare] to compare with Ver. 1.
7) When the [Compare products] dialog box appears, select the comparison source Ver. 2 controller from the pull down list.
8) Click the [File Select] button to select the Ver. 1 comparison target file.
9) Click the [Compare] button to start the comparison. Comparison may take some time and can be stopped by clicking the [Cancel] button. Even when comparison is canceled, the compare result up to that point can be viewed.
10) Click the [Close] button to end. If you want to change controller and repeat comparison, you can click the [Back] button to return to the previous dialog box and change the specification.

■ Viewing the result

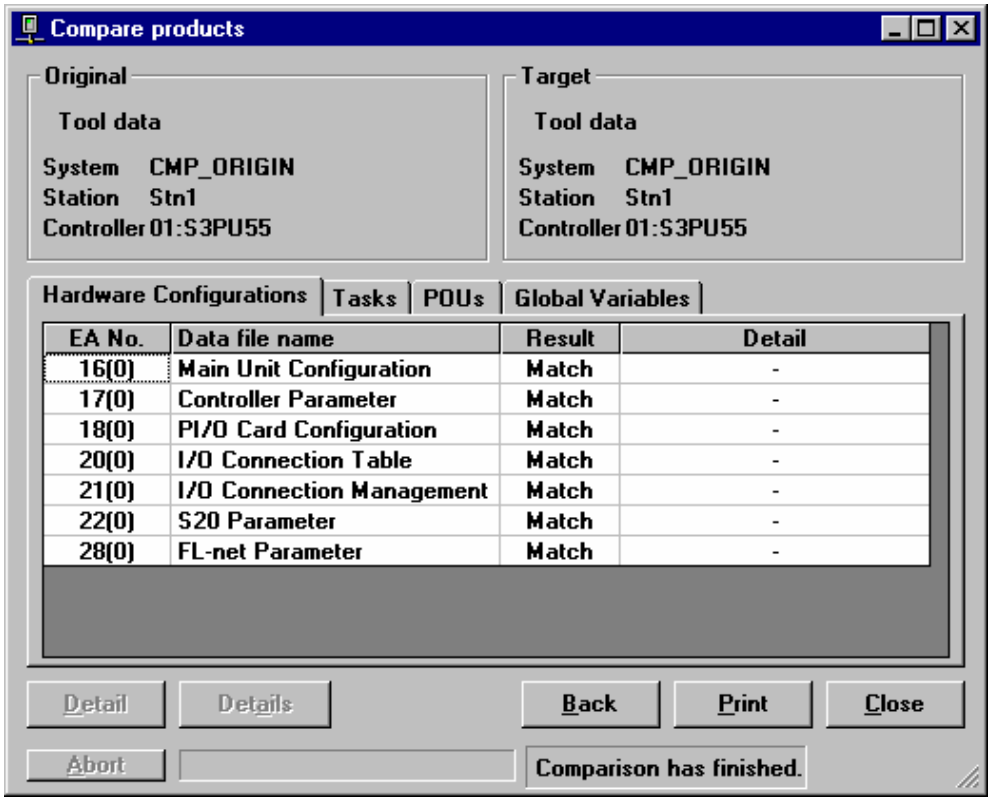
The result shows the status of the compare destination file with respect to the source file as follows.

Compare source	Compare destination	Result display	Detail display	
No data	Data present	Add	—	—
Data present	No data	Delete	—	—
Data present	Same data present	Match	—	—
Data present	Different data present	Changed	Data unmatched	—
Data present	Although data is in agreement, creation time differs	Changed	UUID unmatched (data matched)	—
Data present	Data may differ	Changed	UUID unmatched	This result displays only at the time of comparison of tool data and controller data.

UUID: Data creation information

The result display can be sorted by ID, file name, or result. Click on the title of the respective column. The sorted result is reflected in the printout.

The result can be printed. Click the [Print] button.



■ File contents

The contents of the file are as follows:

- Hardware setting

Data file name	Contents
Main unit configuration	Station configuration
Controller parameter	Controller parameter
PI/O card configuration	Parallel I/O card configuration
SI/O card configuration	Serial I/O card configuration
I/O connection table	I/O connection table
I/O connection control	I/O connection control, I/O interrupt information
S20 parameter	S20 parameter information
SI/O parameter	Serial I/O parameter information
SIF parameter	SIF parameter information
Tracking table	Redundant tracking information
FL-net parameter	FL-net setup information
Serial I/O connection control	Serial I/O connection control
Serial I/O connection table	Serial I/O connection table
Serial I/O connection table (Memory reference type)	Serial I/O connection table (Memory reference type)
PIO interrupt table	I/O interrupt information (for DS connection)

- Task

Data file name	Contents
{Task entry name}(COD)	Task entry program name
{Task entry name}(DAT)	{Task entry name} local variable

- Program configuration unit

Data file name	Contents
[Program configuration unit name]	Program, function block or function of {Program configuration unit name}

- Global variable

Data file name	Reference data
{Global variable name}	Global variable

■ Program code comparing

The details of program comparing can be shown.

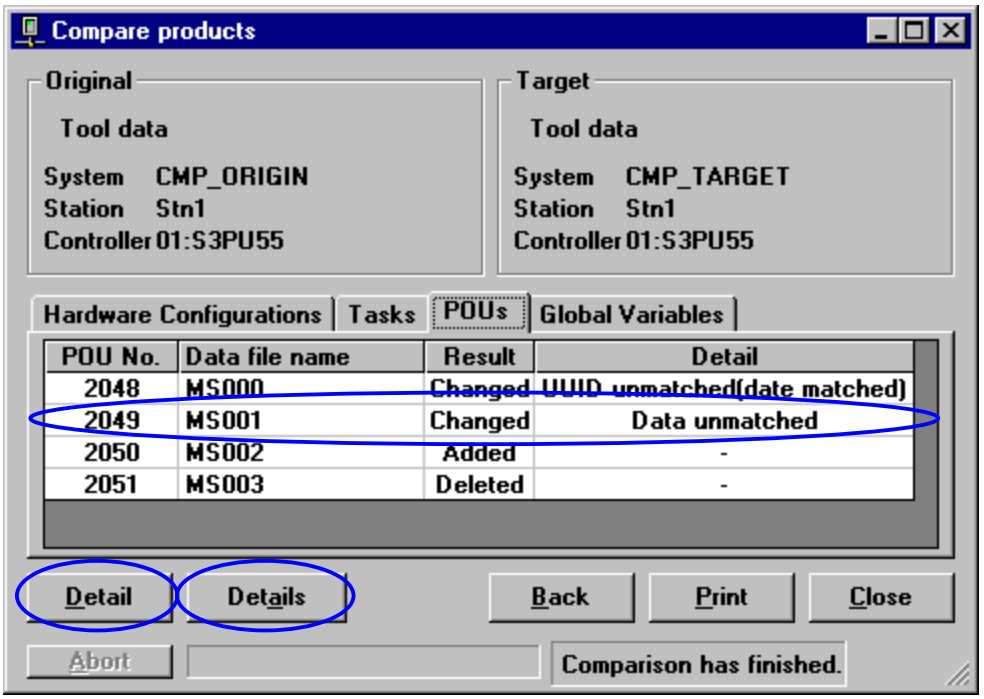
◇ Supplementary

- Program code comparing is supported in following controller types and versions.

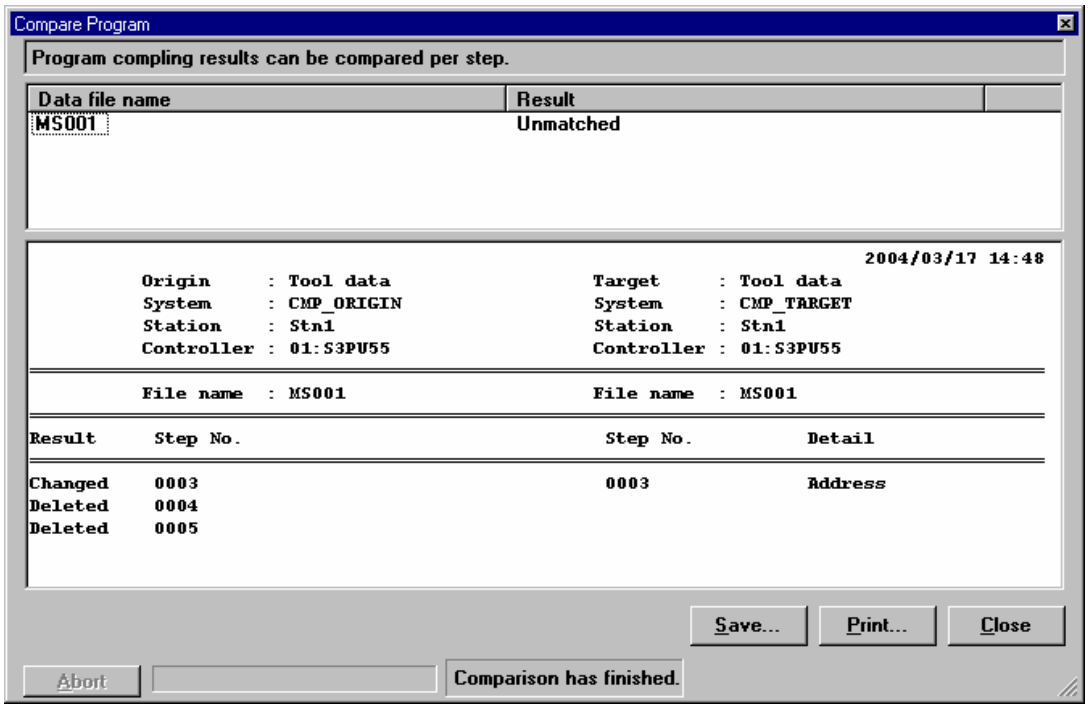
Program code comparing	Controller						
	L3	L2	L1, LC	S3	S2	R3	FN
	— (*1)	— (*1)	— (*1)	○ (*2)	○ (*3)	—	—

(*1): For future support
(*2): Basic software Version 02.61 or more.
(*3): Basic software Version 02.60 or more. (S2PU82: V02.00 or more)

1) Select POU which you want to check details of comparing result(s), click [Detail] or [Details] button.



2) Details of comparing result(s) is/are shown in [Compare Program] dialog as text.



The result can be printed. Click the [Print] button.

The result can be saved. Click the [Save] button.

8.10 Tracing Data

Data trace is a function to periodically collect data synchronized with the specified task in the controller and display it as a graph.

■ Restrictions

If the task scan cycle is 50ms or less, data may be lost depending on the transmission load.

Task scan cycle should be set as follows: (when performing data trace only)

1) Ethernet: 10ms

2) RS232C: 25ms

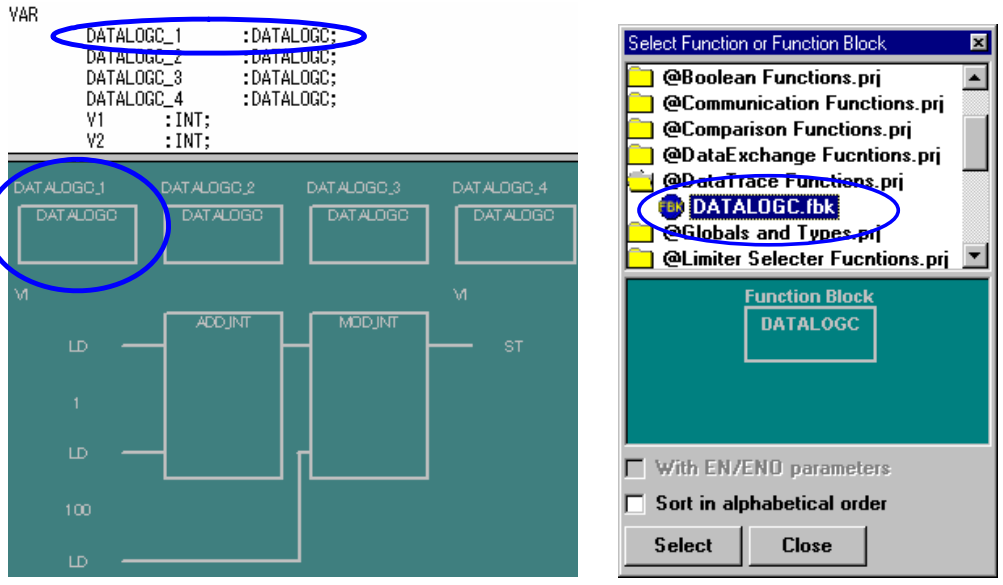
Up to four data may be collected.

A function block must be assigned to each collected data.

■ Preparation

A function block for data collection must be included in the task beforehand.

A function block must be assigned to each data to be collected.



Refer to "Chapter 5. Creating Control Programs" in the Basic Edition for more information.

■ Starting and quitting

Specify the station in the [Product Tree] and select <File><Data Trace>.

Data trace can be terminated by any of the following methods:

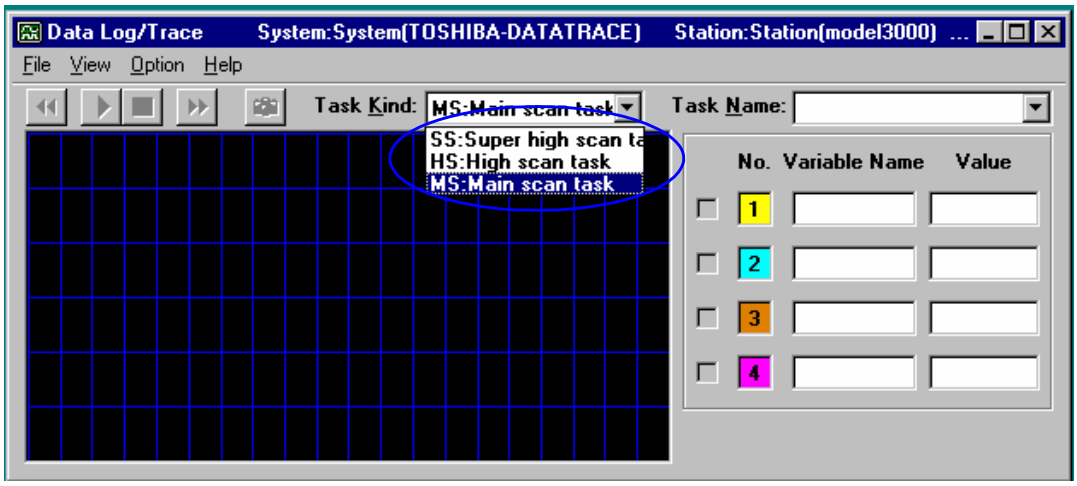
1) Select <File> <Exit>.
2) Click [x] at the right end of the title bar.
3) Double-click the icon at the left end of the title bar.

■ Preparing to trace

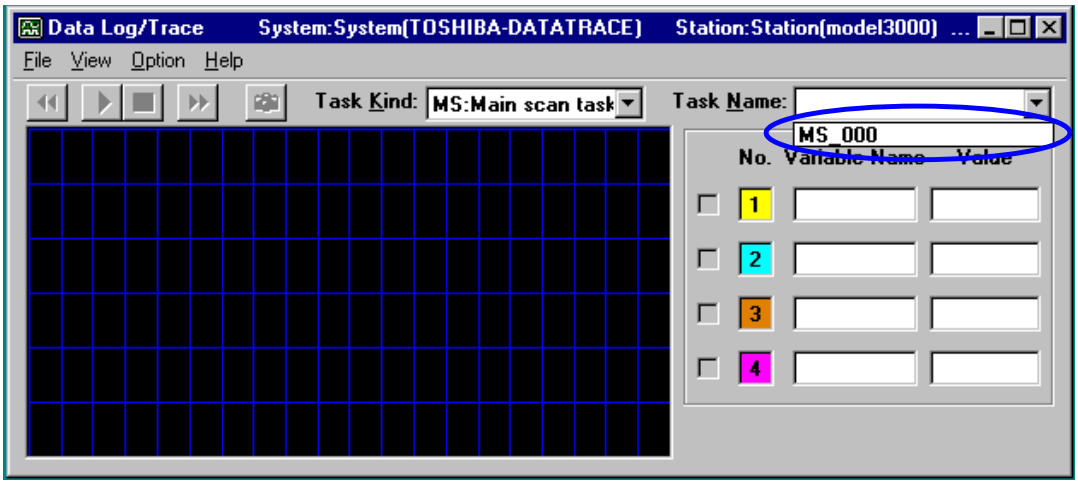
Select a module name. The default is the module with the smallest slot no.

Figure

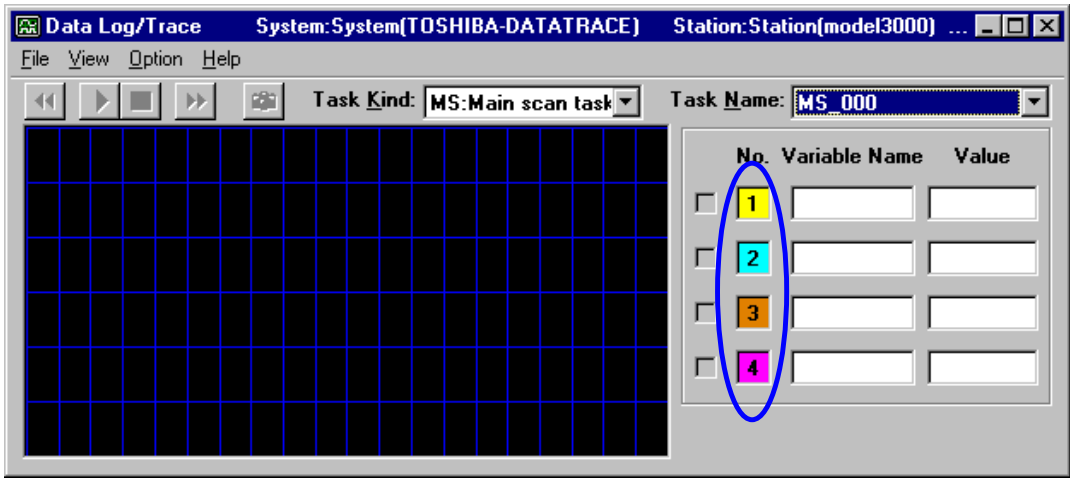
Select the task type. The default is MS main scan task.



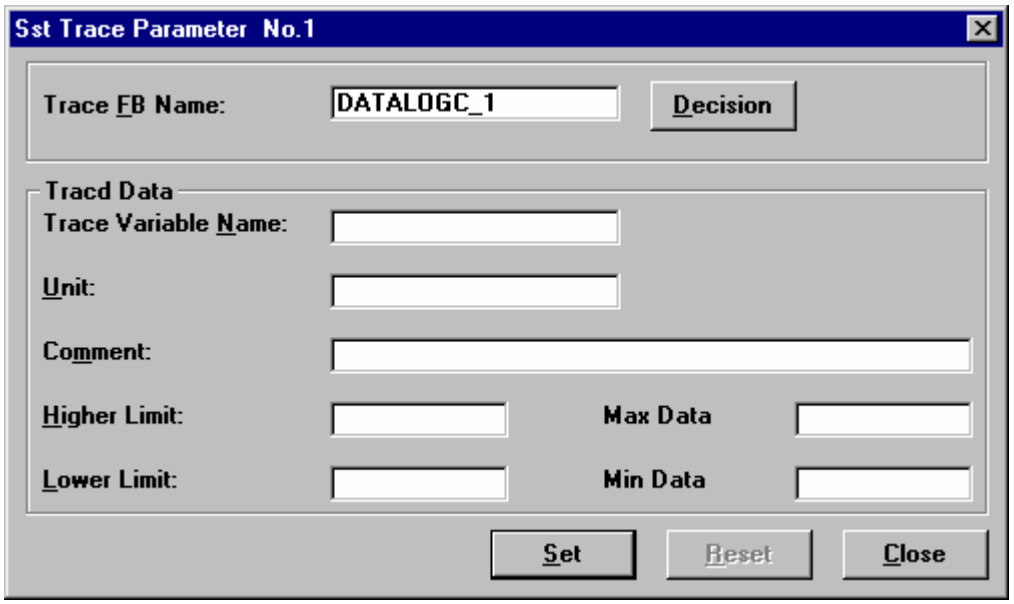
Select the task name.



Select a pen (click the number) to open the Trace Parameter Setup window.



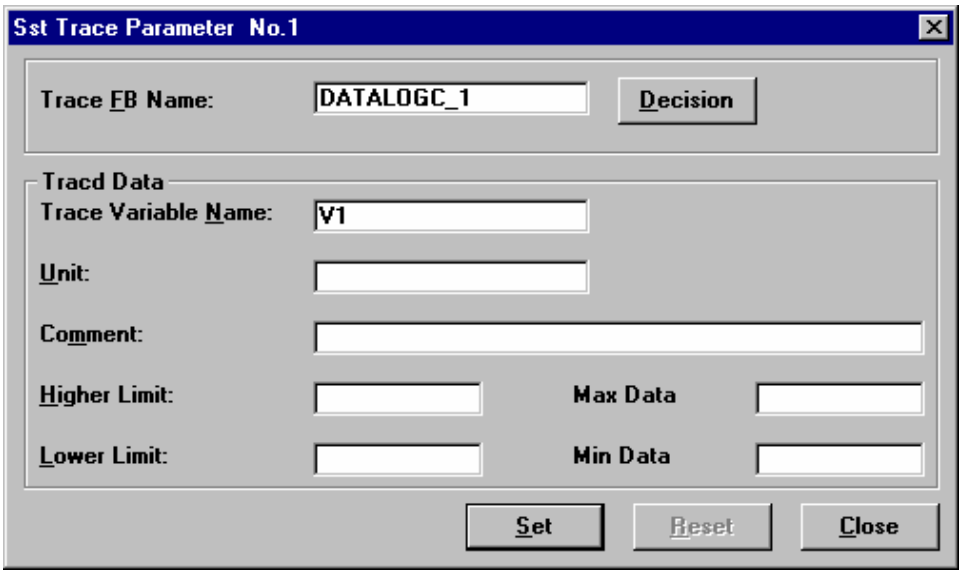
Enter the trace FB name and click the [Done] button.



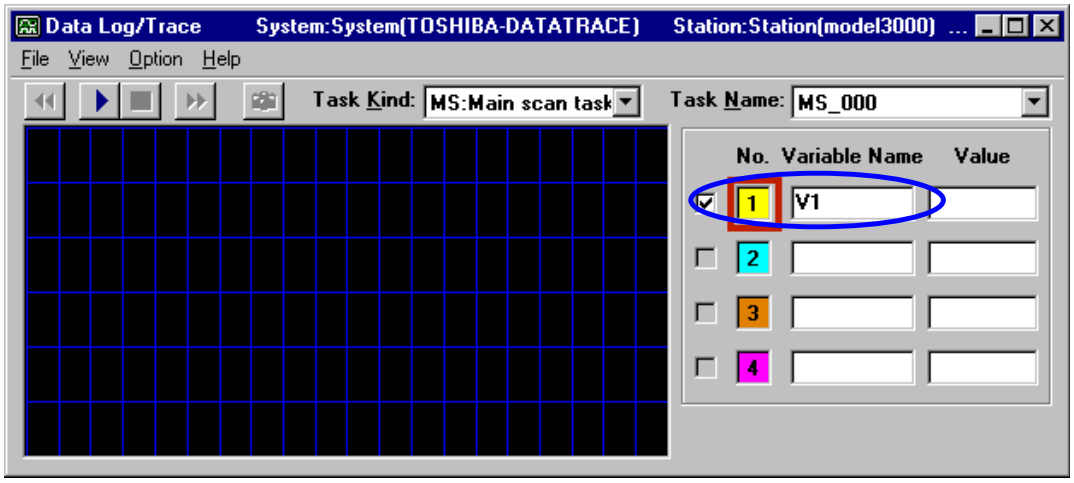
Enter the trace variable name (enter the unit, comment, upper/lower limits as necessary) and click the [Set] button.

Unit and comment are user comments. Upper/lower limits are set to 100 and 0 respectively if not entered.

Data maximum value and Data minimum value are trace start and trace end values.



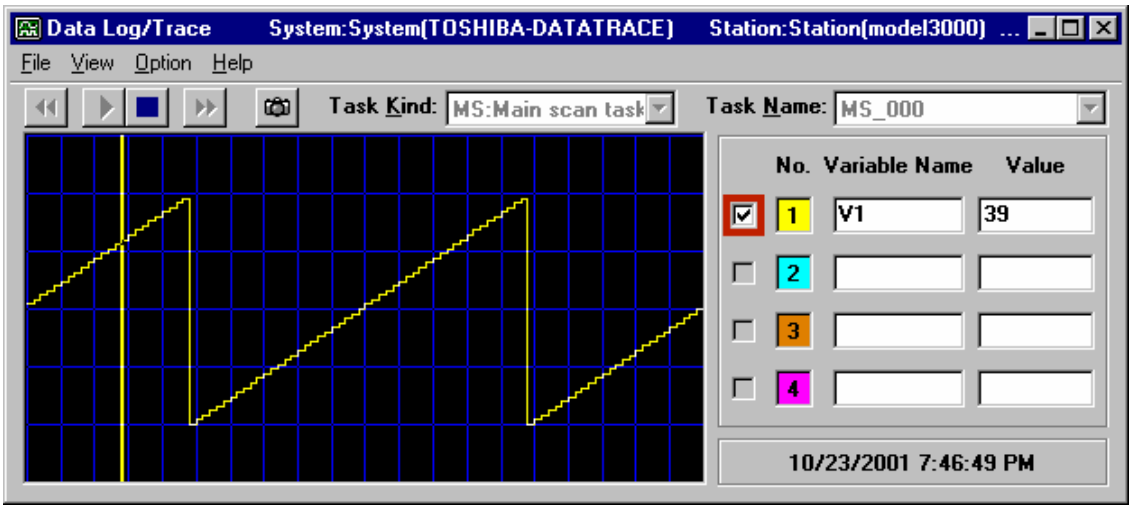
When the trace parameters are set properly, the variable name is displayed, pen no. is outlined in red, Display/Hide check box is set to Display. This completes the trace preparation.



Starting trace

Start data trace by either of the following methods:

1) Select <View><Start Trace>.
2) Click  in the toolbar.



Stopping trace

Stop trace by either of the following methods:

1) Select <View><Stop Trace>.
2) Click  in the toolbar.

Display/hide graph

Check the check box to display. 

Uncheck the check box to hide. 

Capturing the screen

Capture the displayed screen with one of the following methods. This is allowed only during trace.

1) Select <View><Data Capture>.
2) Click  in the toolbar.

Up to 100 screens can be captured between trace start and end.

Backward display

The captured screens are displayed while moving backward.

Display while moving backward by one of the following methods. This is allowed only after capturing and when trace is stopped.

1) Select <View> <Backward>.
2) Click  in the toolbar.

Forward display

The captured screens are displayed while moving forward.

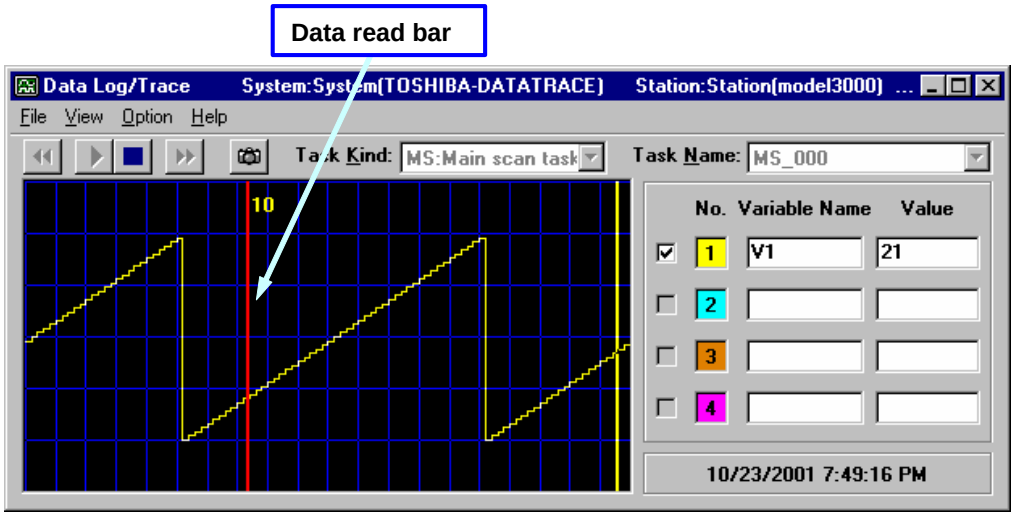
Display while moving forward by one of the following methods. This is allowed only after capturing and when trace is stopped.

1) Select <View><Forward>.
2) Click  in the toolbar.

Data read bar

The data read bar can be displayed by one of the following methods:

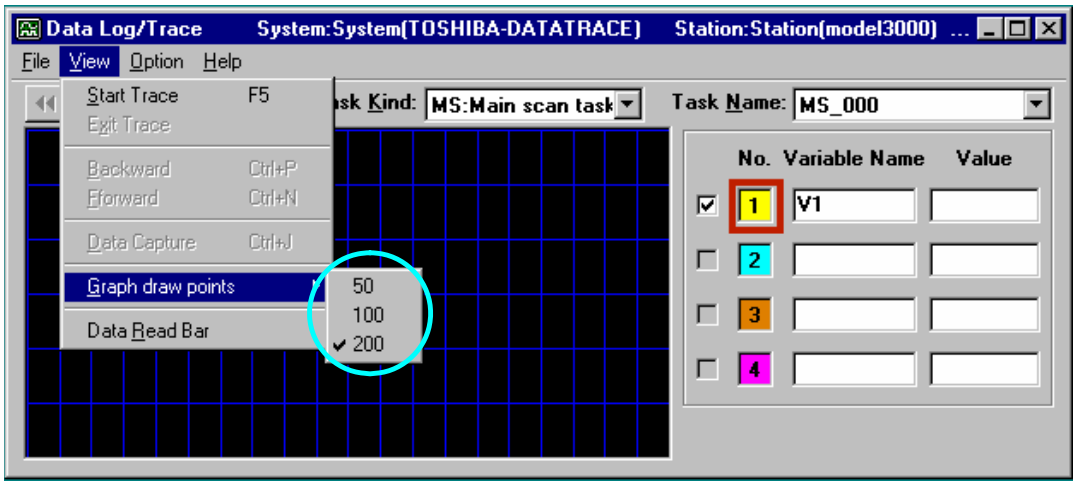
1) Select <View><Data Read Bar>.
2) Click the graph display area.



■ Number of graph draw points

This is the number of draw points on the horizontal axis of the graph display area.

To change the number of draw points, select <View><Graph Draw Points>. This is allows only when trace is stopped.



8

8.11 Exerting Force on I/O Input Points

This section describes how to exert force (force retention of input result) on I/O input points when online.

■ Viewing the I/O variable window

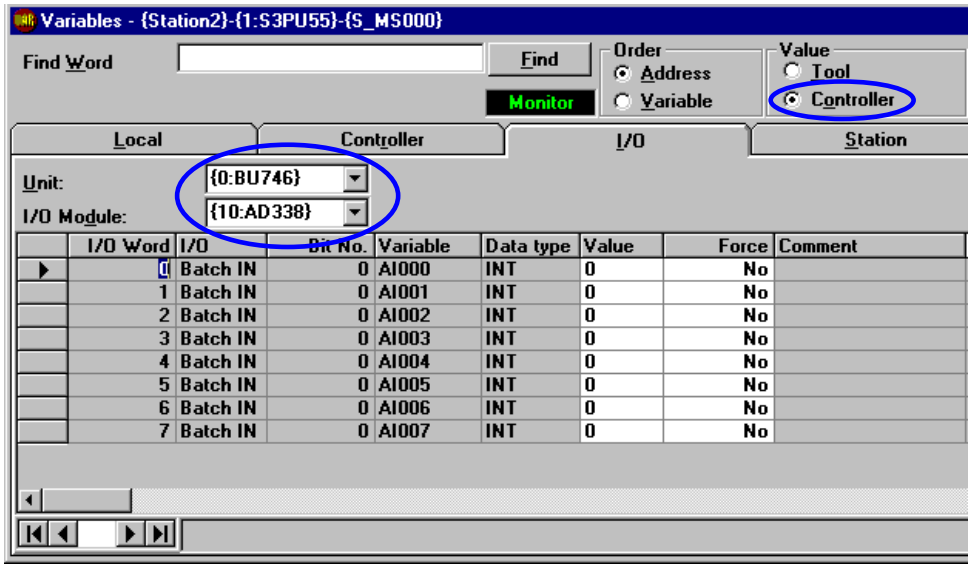
1) Open [Available variables] in the [Program Editor].
2) Select [I/O] and open the I/O variable.
3) Select the I/O module to exert force (module with [Batch input] for [Input/output]) with [Unit] and [Module].
4) The force status appears in [Force] when the [Value] is set to [Controller].

   The meaning of each force status is as follows:

   Yes: All bits of the corresponding word are forced

   No: All bits of the corresponding word are not forced

   Some: One of the bits of the corresponding word is forced



The procedure is the same for [Station] and [Network].

■ Exerting force

1) Set [Force] of the input point to exert force to [Yes].
2) Press the [Enter] key to confirm. The result is written to the controller.

Releasing force

1) Set [Force] of the input point to release force to [No].
2) Press the [Enter] key to confirm. The result is written to the controller.

Setting value to I/O input point

1) Click the [Value] of the input point to exert force.
2) Enter the [Value] and press the [Enter] key. The result is written to the controller.

Viewing a list of input focus

Execute [Input force list] at [I/O], [Station], or [Network] of the available variable.

Batch releasing input force

Select [Batch release]. When the confirmation dialog appears, select [Yes].

Chapter 9
Monitoring System and Maintenance of nv series

This chapter describes the controller software and hardware monitoring and maintenance procedure.

9.1 Monitoring Program Registration

This section describes how to monitor the status of programs registered in the controller.

■ Restrictions

Currently, there are cases where deleting of program is not accepted with [POU entry].

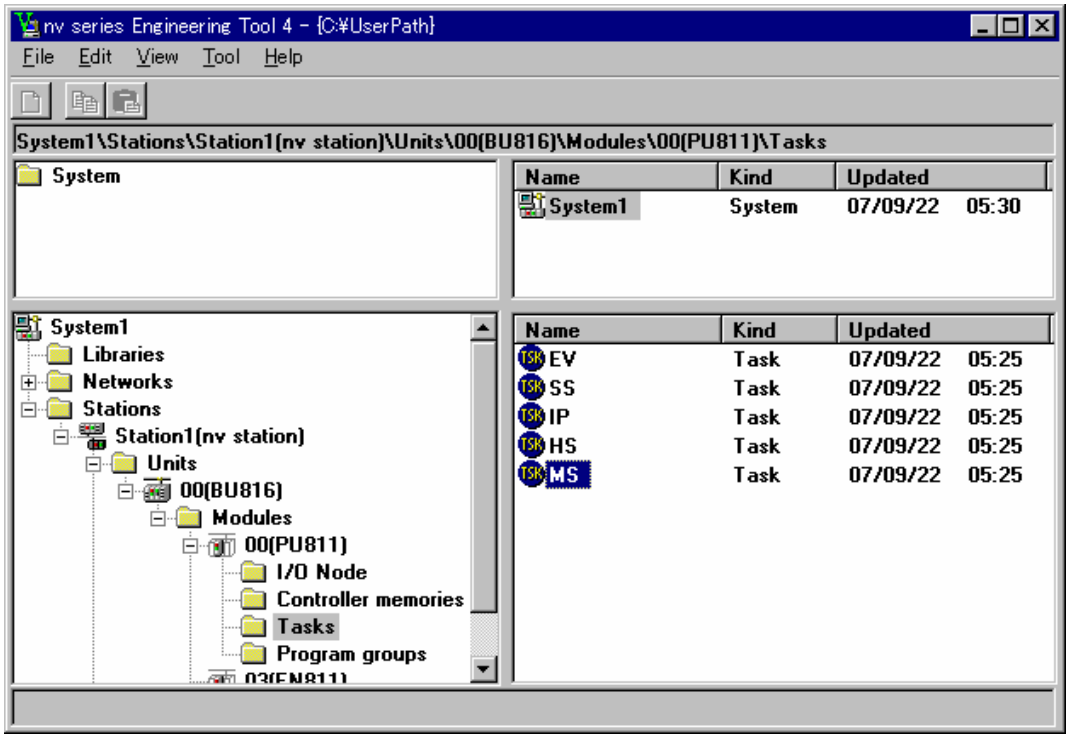
In such case, place the cursor on the program name column and retry.

Furthermore, deleting of multiple lines is not allowed.

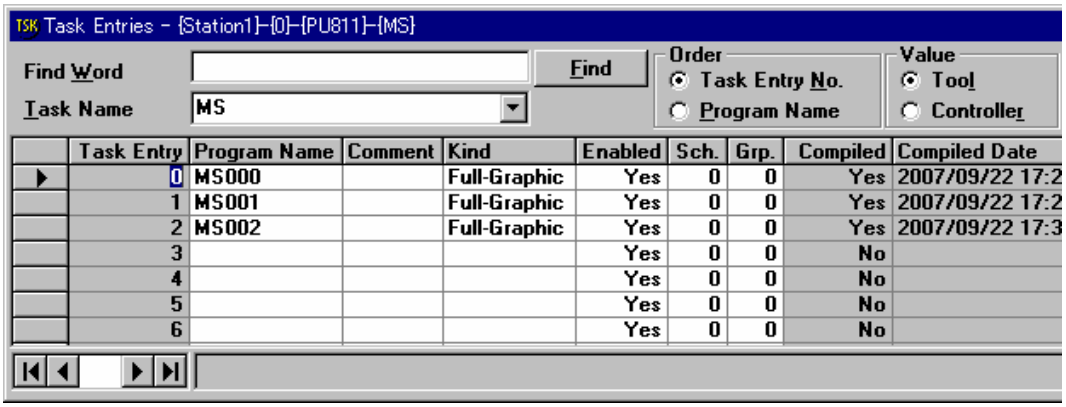
When deleting a POU entry, also delete the corresponding task entry.

■ Monitoring program registration

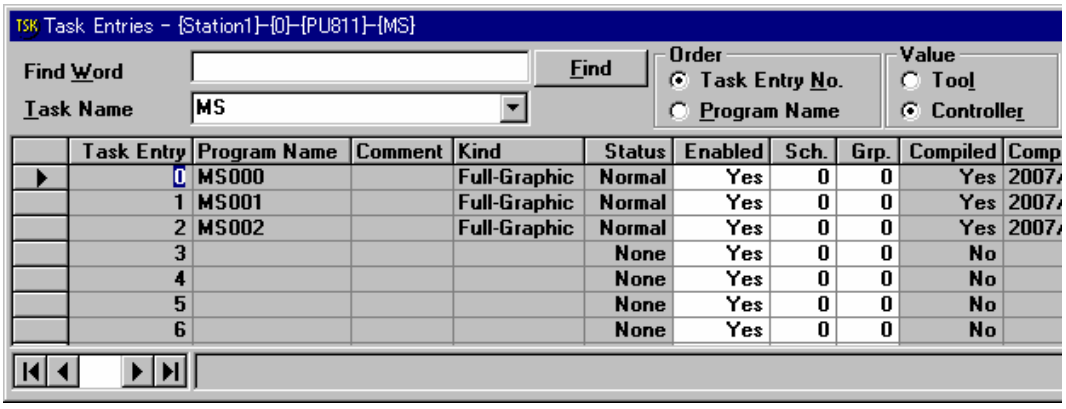
Select a controller from the [Product Tree] and double click a task type on the right side.



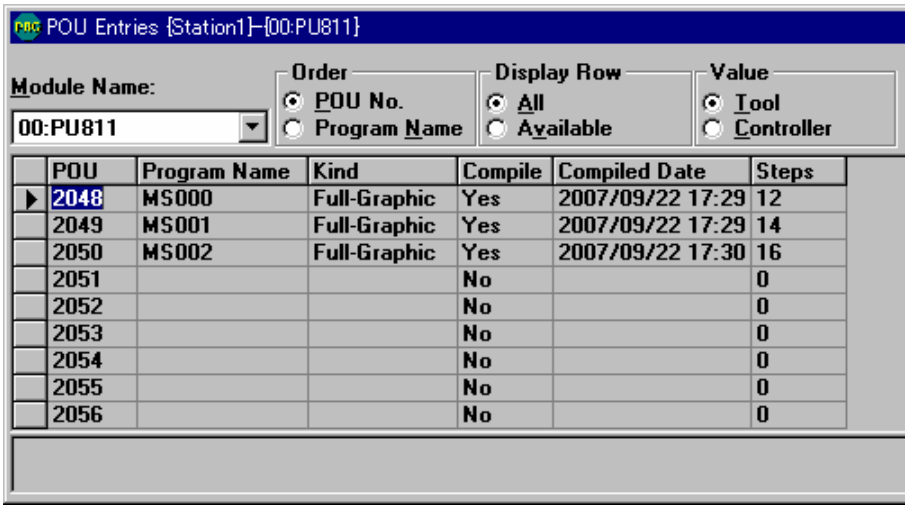
The [Task Entries] of the corresponding task type opens.



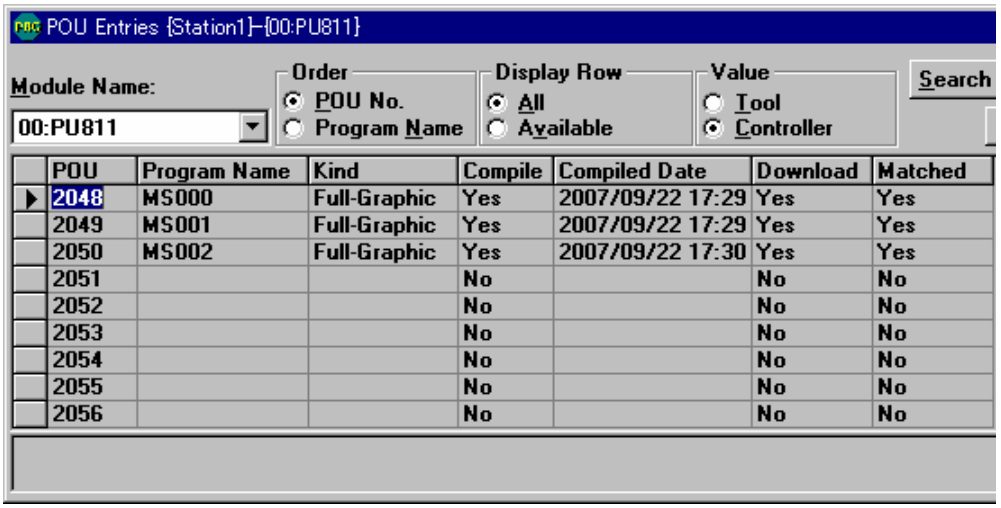
Select <Controller> for the "Value" option to load the task registration information from the controller.



After selecting a controller from the [Product Tree], select <POU entries> from the <File> menu to view the [POU Entries].



Select <Controller> for the "Value" option to load the program registration information from the controller.



POU	Program Name	Kind	Compile	Compiled Date	Download	Matched
2048	MS000	Full-Graphic	Yes	2007/09/22 17:29	Yes	Yes
2049	MS001	Full-Graphic	Yes	2007/09/22 17:29	Yes	Yes
2050	MS002	Full-Graphic	Yes	2007/09/22 17:30	Yes	Yes
2051			No		No	No
2052			No		No	No
2053			No		No	No
2054			No		No	No
2055			No		No	No
2056			No		No	No

The content of the "Matched" column is either Yes: Match, No: No match, or -: Controller only.

■ Deleting program registration

Place the cursor on the program row to delete (turns to blue reverse video) and press the [Delete] key.

When the confirmation dialog appears, select [Yes] unit.

Tool registration is deleted if tool is selected for the "Value" option and controller registration is deleted if controller is selected.

9.2 Monitoring Controller Parameters

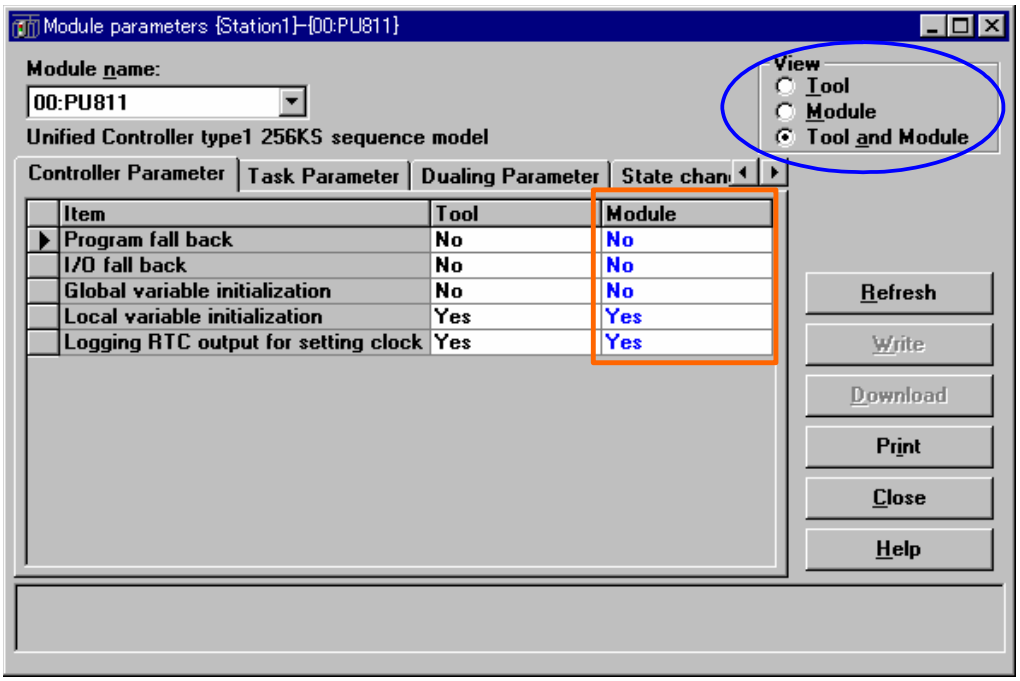
This section describes how to monitor the operation parameters in the controller.

■ Viewing controller parameters

Select a controller module in the Product Tree and select <Module parameters> from the <File> menu.

Select "Tool and module" for [View] to view the online information.

With this, you can check whether the set value is donwloaded correctly.

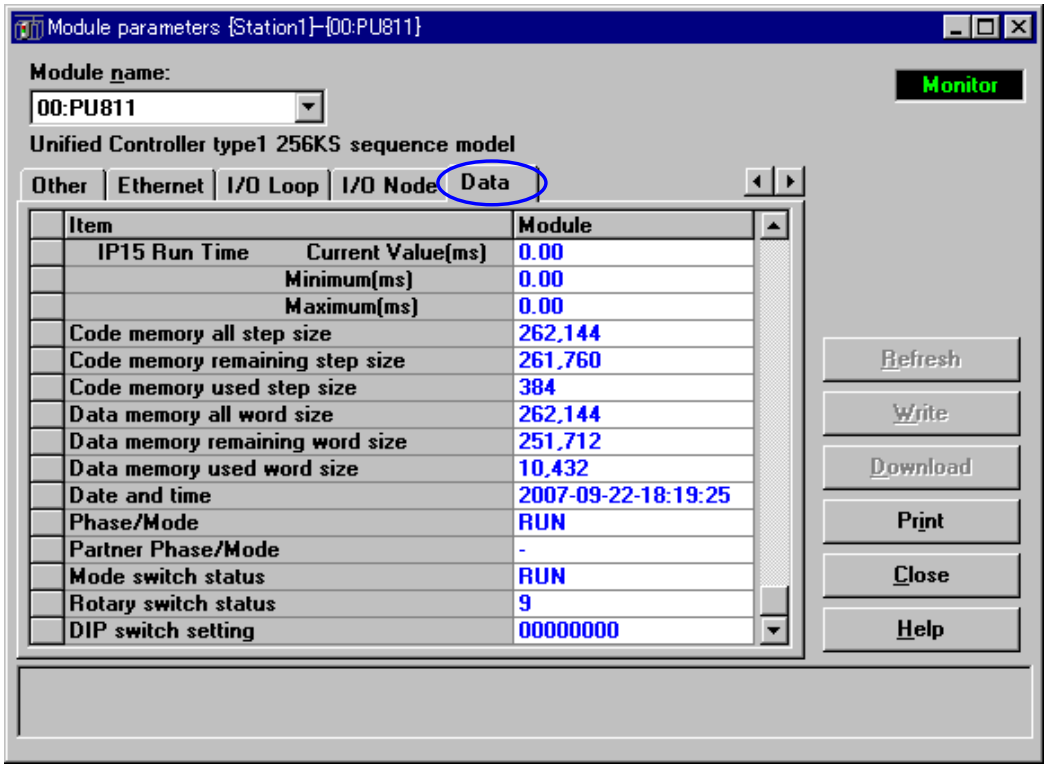


■ Monitoring the controller operation status

Select the [Data] tab to view the actual controller operating status.

The task scan time, program step size, and mode switch status appear.

The values are monitored to display the latest status.



■ Changing the controller scan cycle online

The value of the following parameters can be changed online even when the controller operating mode is RUN.

- Priority 2 scan time
- Priority 3 scan time
- Priority 4 scan time

Specify a value within the following range when changing the cycle online.

- (Maximum control cycle) >= Value to be set > (Current control cycle setting x 0.8)
- The value cannot be changed online if floating is specified for control cycle.

9.3 Monitoring Controller Operation Status

The monitoring of the alarm status and operating status in a controller is explained.

Restrictions

In System View, download the hardware configuration to the controller before viewing the station status because the System View reads online the hardware configuration downloaded to the controller and displays it on the screen.
When using System View with Ethernet connection, register the network card from Product Tree in advance and register the IP address.

Monitor the status of a controller

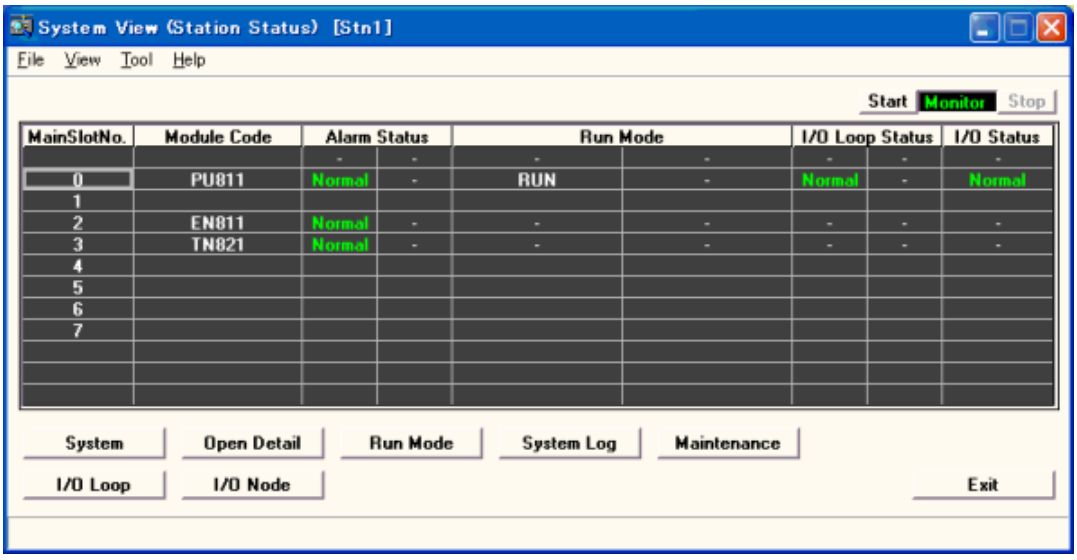
Select the station to display from the [Product Tree] and select <File><System View> to display the [Station Status] window of System View.

The following status appear in the [Station Status] window.

- Controller alarm status, operation mode, I/O loop status, I/O status
- Network module alarm status

When station is duplex composition, both of status are displayed in the order of Primary and Secondary.

To operate the controller or to display the information about the controller, select the controller (Click the line as which the controller is displayed).



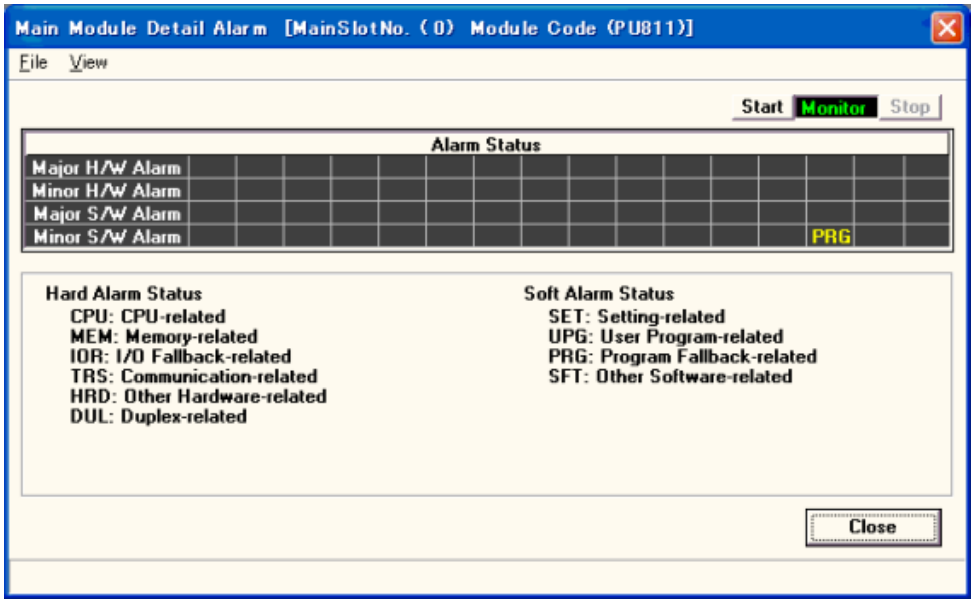
The monitor is stopped at the starting of [Station Status]. Push on button [Start] In monitor-control of tool-bar to start the refreshment display. Push on button [Stop] to suspend the refreshment display.

◇ **Supplementary**

- If you accidentally disconnected the Ethernet cable when connecting via Ethernet, quit System View before reconnecting the cable.
- When in DL-WAIT status, [Normal] appears in the [Alarm Status] and [Program Fallback] field.

■ Know the detailed contents of alarm

When alarm is occurred in the controller, select the line of the controller and select menu <Tool> <Main Module Detail Alarm> to know the detailed contents.



Classification of an alarm status is as follows.
Major or minor failure, Hardware or software.

If there are two or more abnormal conditions, they all will be displayed side by side.

Alarm	Name	Contents
Hardware	CPU	Standard software etc.
	MEM	Memory failure, Parity error etc.
	IOR	I/O fallback error
	TRS	Failure of transmission relation
	HRD	Hardware self-diagnostic failure
	DUL	Failure of duplex relation
Software	SET	The abnormalities of the registration contents
	UPG	A user program, the abnormalities about a user task
	PRG	Program fallback error
	SFT	The abnormalities of the other software relation

To know the detailed contents of alarm, check the [System Log].

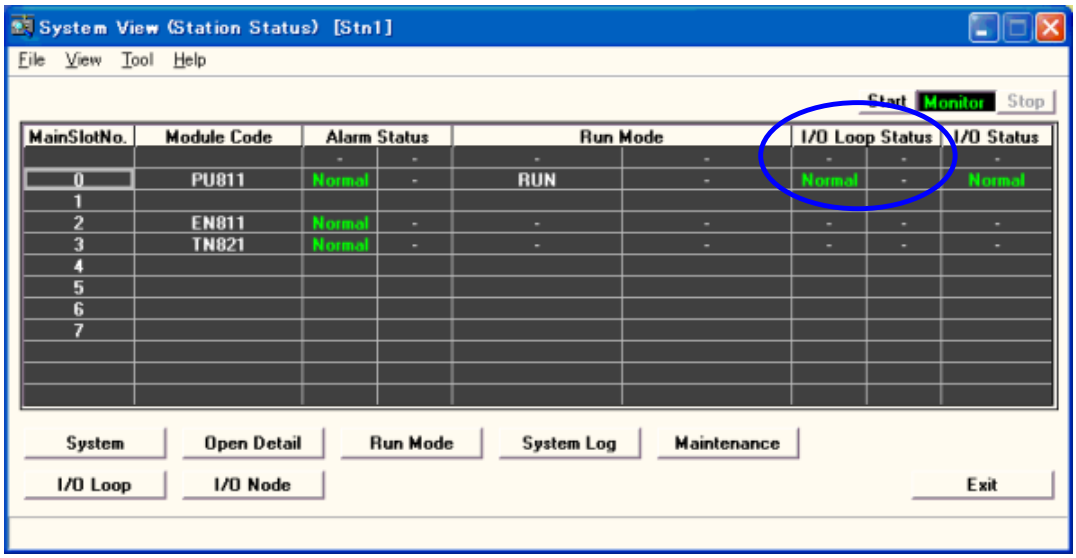
Please see "Monitoring System Logs" about [System Log].

9.4 Monitor I/O Loop Status

The monitoring of the I/O loop alarm status is explained.

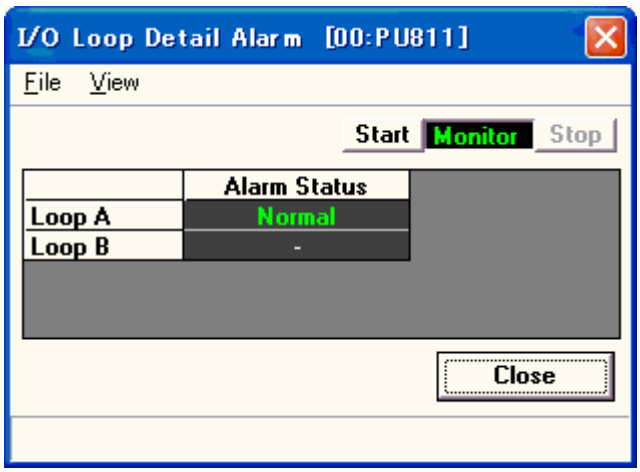
■ Monitor the I/O loop status

The [Station Status] window of the System View shows the representative alarm status of I/O loop in the [I/O Loop Status] display area.



■ Know the detailed contents of alarm

Select the line of the controller and select button <I/O Loop> to know the detailed contents of I/O loop alarm. Or double-click the [I/O Loop Status] area.

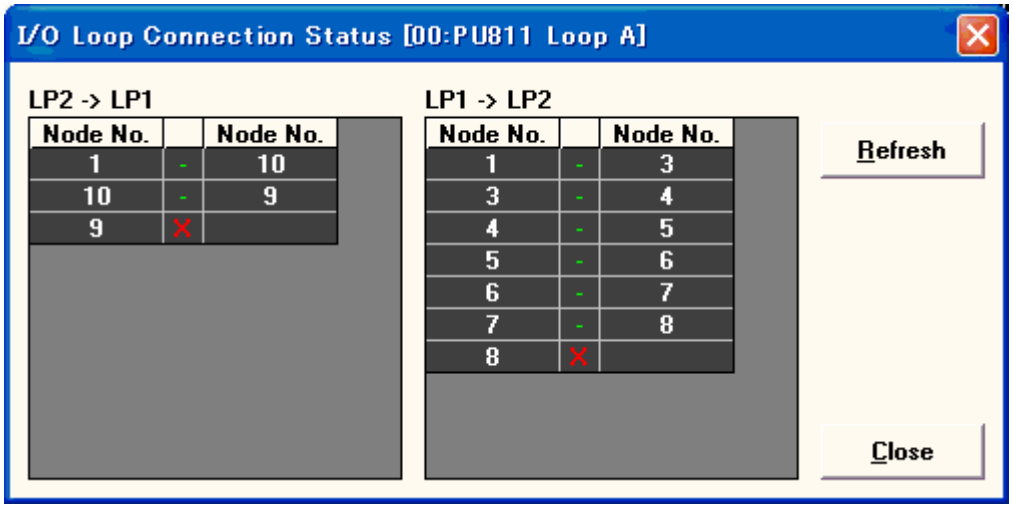


The following alarm status is displayed.

Alarm	Contents
Normal	Loop status is normal.
Bus Connection	Loop was disconnected. It is the bus state now.
Non-connection	There is not the I/O node of the connection partner.

■ Know the connection status of I/O node

Double-click the [Alarm Status] area in the [I/O Loop Detail Alarm] to know the connection status of I/O node.



The connection status of the I/O node to lead from LP2 to LP1, and to lead from LP1 to LP2 is displayed. When there is not the I/O node of the connection partner, 'X' is displayed.

■ Monitor the operation status of I/O loop

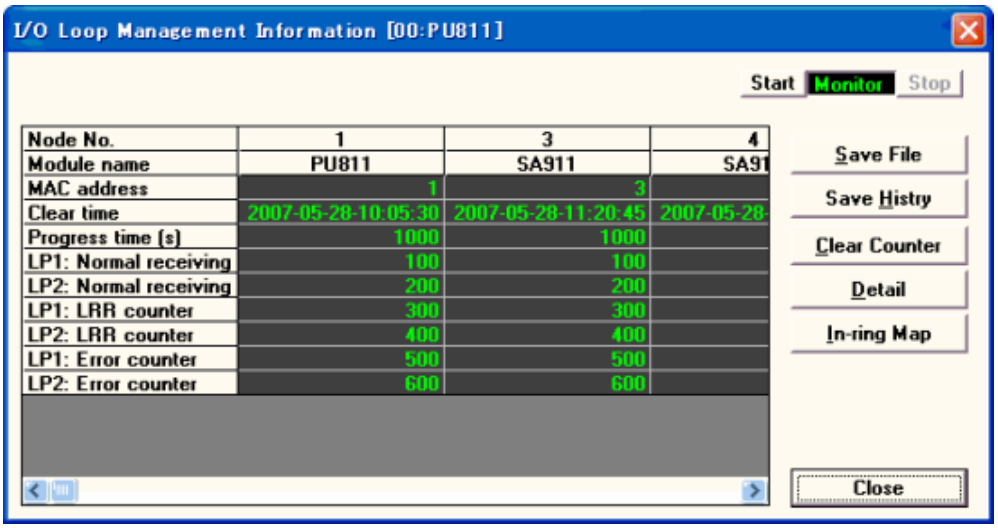
In the [Station Status] of System View, select controller and select menu <Tool> <I/O Loop Management Information>. [I/O Loop Management Information] will be displayed.

The following information is displayed on [I/O Loop Management Information].

- Node ID (Node No., Module name, MAC address)
- The measurement term of a node (Cleared time stamp, Lapsed time)
- Error counter

The following can be used as maintenance operation.

- Clearing counter
- Display of detailed information according to node
- Display of In-ring map



■ Display the scan healthy map of I/O loop

In the [Station Status] of System View, select controller and select menu <Tool> <I/O Loop Scan Healthy>.

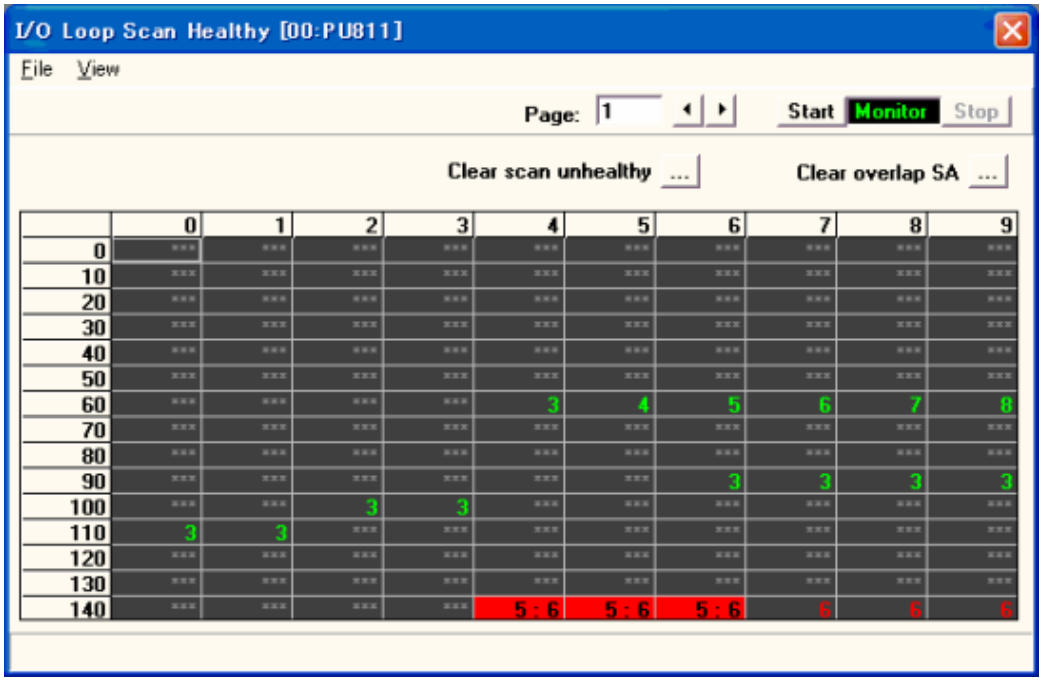
The number of a node is displayed on a block.

Healthy is meant if a numeric value is green.

Unhealthy is meant if a numeric value is red.

The following can be used as maintenance operation.

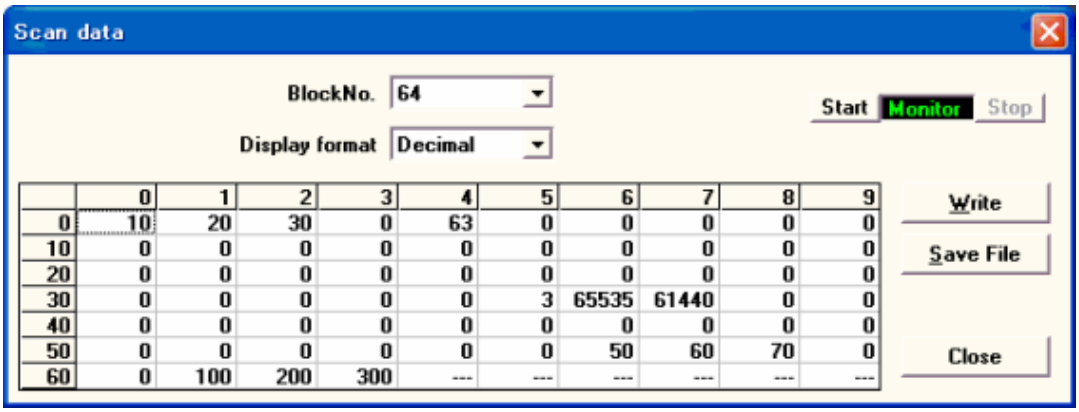
- Clear Scan unhealthy
- Clear overlap SA



■ Display the scan data of I/O loop

In the [I/O Loop Scan Healthy], select menu <Display> <Scan data>.

A value can be changed per word.



9.5 Monitor I/O Module Status

The monitoring of the I/O module alarm status is explained.

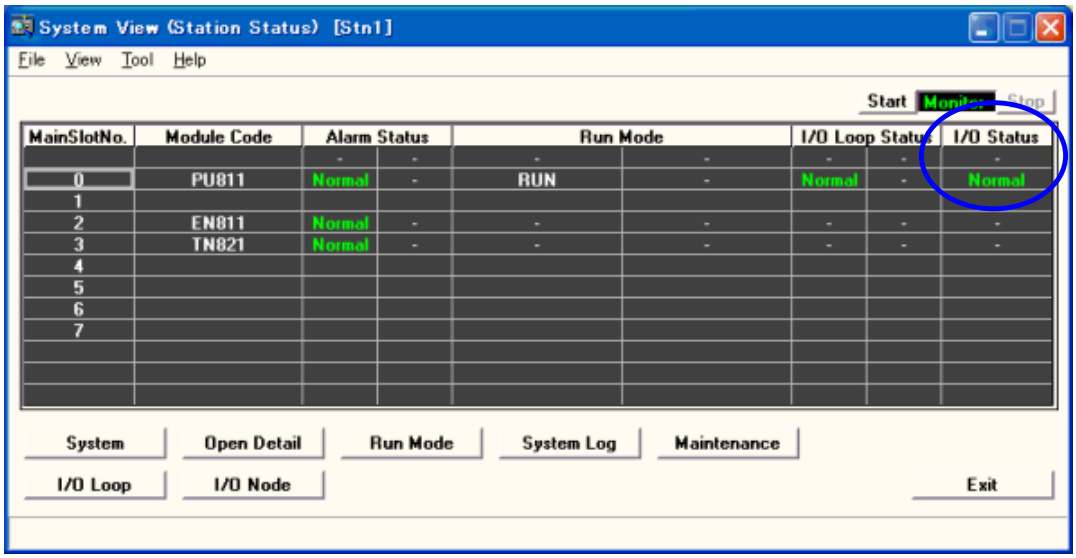
The status of I/O module is divided into three hierarchies as I/O node, I/O unit, and I/O module.

The representation status are displayed respectively as [I/O Node Status], [I/O Unit Status], and [I/O Module Status].

In the case of TC-net I/O, the status of I/O module is divided into two hierarchies as I/O node and I/O module.

■ Monitor the I/O status

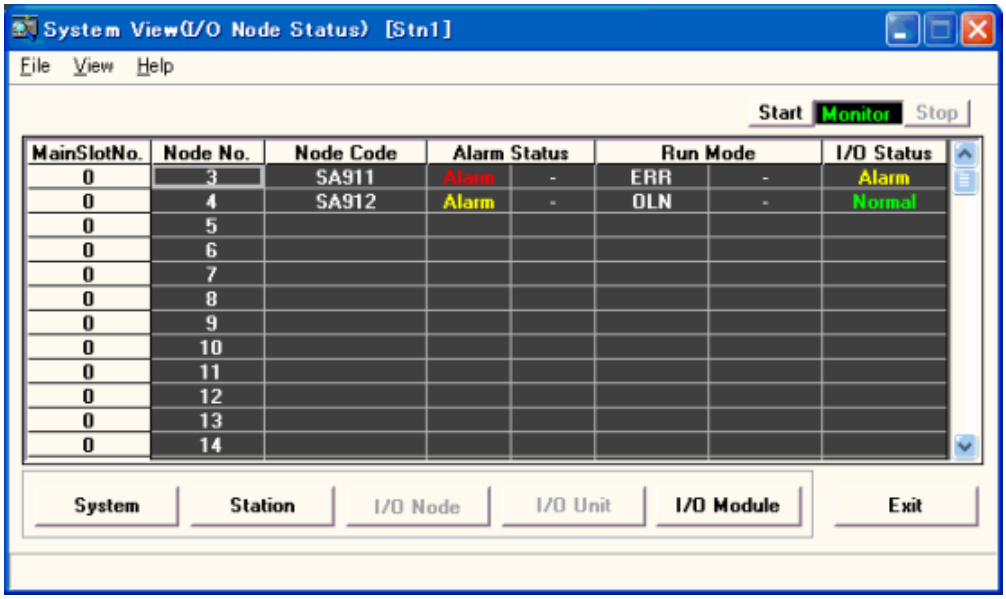
The [Station Status] window of the System View shows the representative alarm status of I/O node and I/O module in the [I/O Status] display area.



■ Monitor the I/O node status

To display the status of the I/O node, select the line of the controller and push button [I/O Node]. Or double-click the [I/O Status] area.

The representative alarm status of I/O node and I/O module is displayed per I/O node.



To display the detail alarm of I/O node, select menu <View> <I/O Node Detail Alarm>. Or double-click the [Alarm Status] area.

To display the System Log of I/O node, select menu <View> <System Log>.

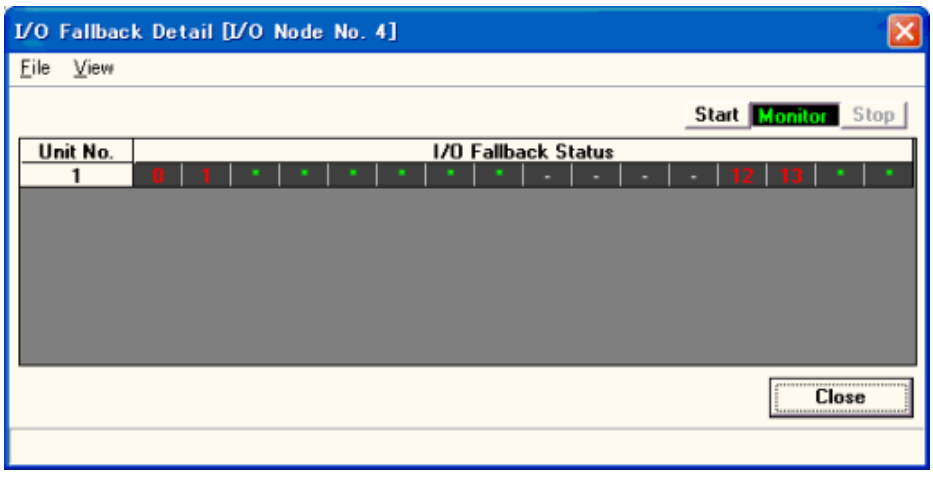
To display the Version information of I/O node and I/O module, select menu <View> <Version>.

■ Monitoring I/O module fallback detail

To display the status of the I/O Fallback Detail, select the line of the I/O node and select menu <Tool> <I/O Fallback Detail> in [I/O Node Status].

One line corresponds to one unit. The meaning of a sign is as follows.

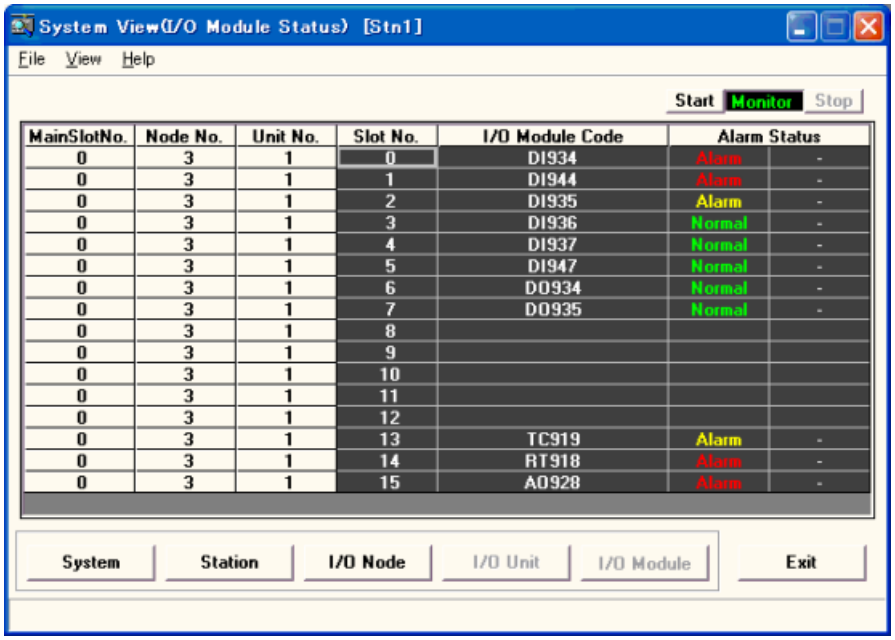
-: I/O non-registration
*: Normal
Number: The slot number of Fallback.



■ Monitor the I/O module status

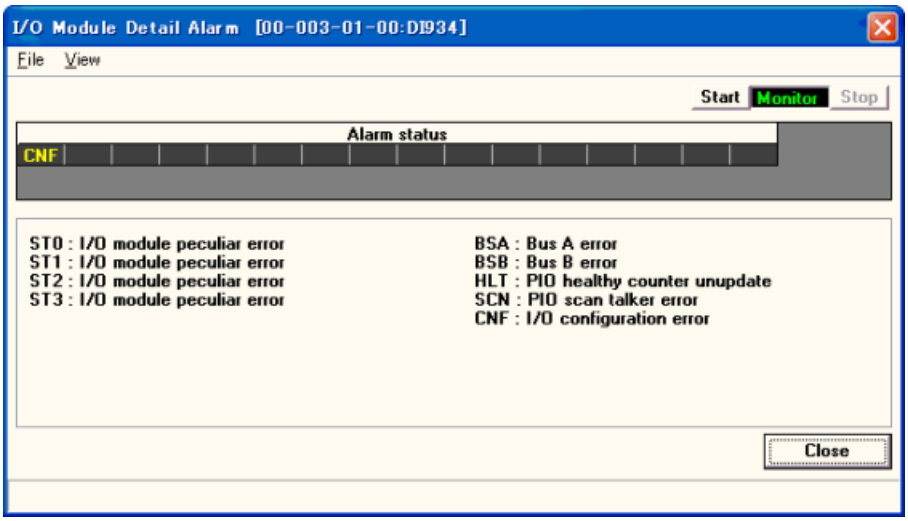
To display the status of I/O module, select node number and push button [I/O Module]. Or double-click the [I/O Status] area.

The alarm status of the I/O module mounted in the unit is displayed.



■ Know the detailed contents of alarm

When alarm is occurred in the I/O module, select the line of the I/O module and select menu <View> <I/O Module Detail Alarm> to know the detailed contents.



About the individual alarm contents every I/O module, please refer to the instruction manual of the I/O module.

9.6 Monitoring System Logs

The system log is explained.

A system log is the history of operation, and it is saved in a controller.

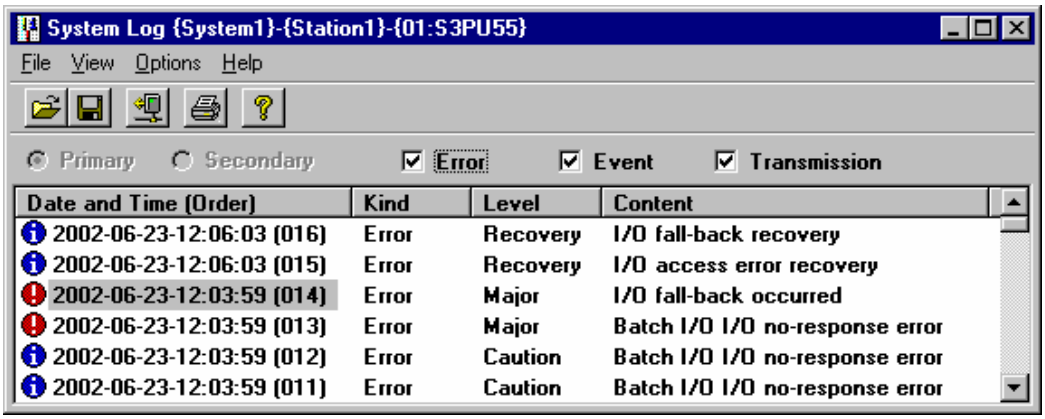
The contents saved according to the kind of controller differ.

Log name	Contents of log	Controller			
		PU811	PU821	EN	TN
Error log	Record which detected the abnormalities of hardware and software. System basic program and an application program are contained in software.	OK	OK	OK	OK
Event log	Record about module operating status, such as starting and switching.	OK	OK	OK	OK
Transmission log	Record which detected the abnormalities in transmission. Such as Ethernet etc., the information on network-related is included.	OK	OK	OK	OK
Operation log	Record of the operation from OIS about process-control.	—	OK	—	—

■ Obtaining system log

When [System View] is opened, the module to acquire the log is selected, and the menu <Tool> <System log> is executed, [System log] is displayed. Moreover, it is started from [System log] button.

The system log information on a specification controller is displayed on a [System Log] in the order of a date. In default setting, all the information on Error, Event, Transmission, and Operation Log is displayed.
Only a part can also be selected and displayed from these.



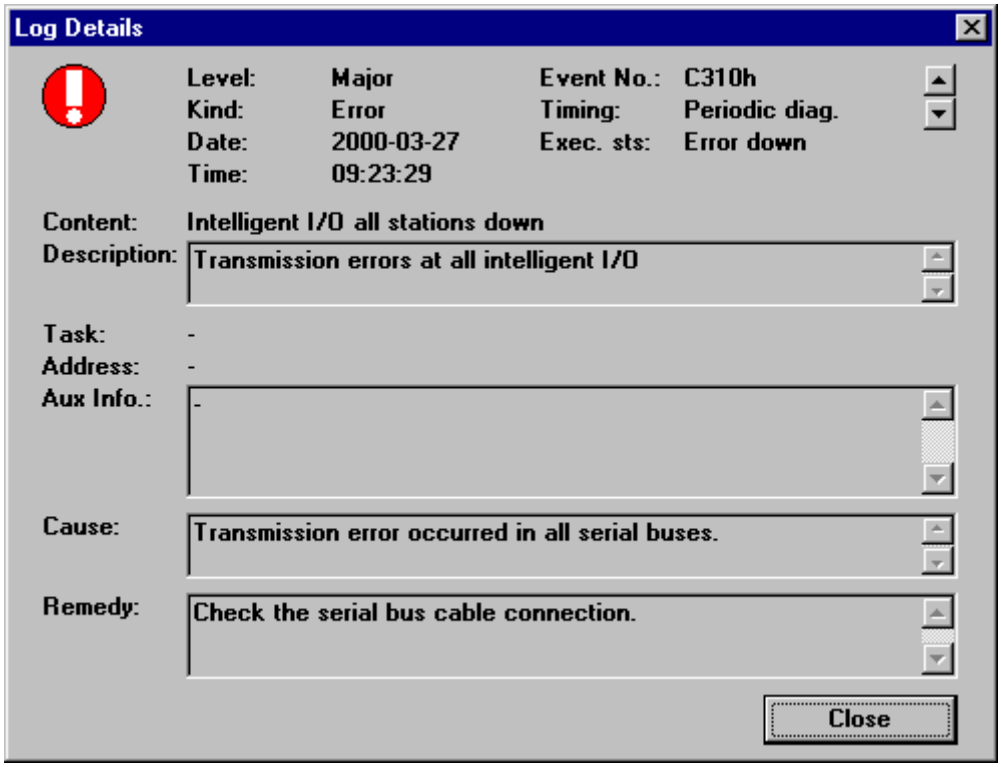
Know the detailed contents

To know the detailed contents of a log, It can check according to [Log Details].

Double-clicked the line, or select the log and select menu <View> <Details> to see [Log Details].

Cause and measure are also displayed in a detailed display.

Moreover, in order to see the contents of other logs, with [Log Details] displayed, please push an upper right vertical button and move to the log before and behind it.



Save system log information to file

The system log information currently displayed in the screen can be saved in CSV form at a file.

Select menu <File> <Save File>.

Display system log information from file

When the menu < file >< system log > is executed after the station is selected with the product tree, the system log is displayed.

Selecting menu <File> <Open File>, the system log saved at the file can be read, and it can also display on a screen.

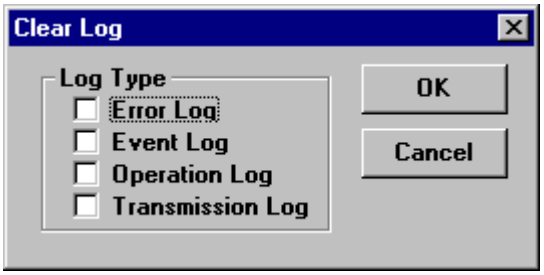
■ Clear the log

The log in a controller is clearable.

Select menu <View> <Clear Log> to show [Clear Log] dialog box.

It can be selected whether it clears about each of Error, Event, Operation, and Transmission log.

If all boxes are checked and [OK] button is pushed, all the logs in a controller can eliminate at once.



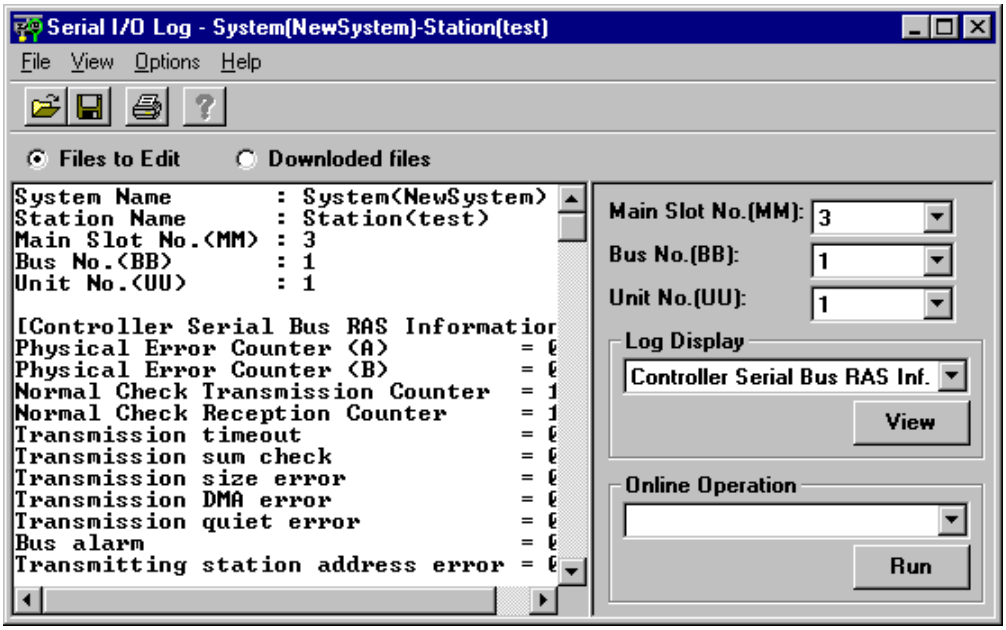
9.7 Monitoring Serial I/O Logs

The serial I/O log is explained. (For the future)

■ Read the serial I/O log

[Serial I/O Log] is started by displaying [I/O Module Status] window from [System View] and selecting <View><Serial I/O Log>.

In [Serial I/O Log], maintenance operation peculiar to a serial I/O module is possible in addition to showing log.

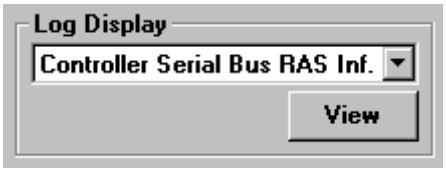


The log is not displayed after starting. Select the following log classification from menu <View> <Log> to read and display log.

Log type	Contents
All information	All the following information is read. It is effective only when selecting a station.
Controller side serial bus RAS information	The information managed and saved by L controller side among serial bus RAS information is read.
SBIF serial bus RAS information	The information managed and saved by SBIF side among serial bus RAS information is read.
SBIF I/O-bus error counter	The error counter of an I/O bus saved by SBIF is read.
I/O-bus error counter	The error counter of an I/O bus is read.
SBIF switching information change information	The duplex switching history of SBIF is read.

Log type	Contents
I/O-module log	The error counter inside an intelligent I/O module is read.
I/O-module failure information	The self-diagnostic result inside an intelligent I/O module is read.
I/O version & serial number	The hardware and software version and the serial number of an intelligent I/O module are read.
Tag information	The tag information on an intelligent IO module is read.

A display demand of a log can be carried out also from the drop-down list of the <View><Log Display> on the right-hand side of a screen.

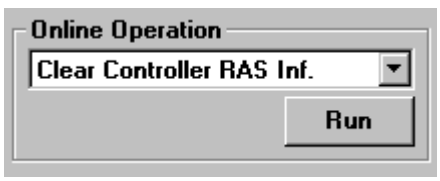


■ Execute online operation

The operation to a serial I/O module can choose and carry out the following operation item in menu <View> <Online Operation>.

Operation item	L2 L3	L1 LC	Contents of operation
Controller RAS information clearance	○		The zero clear of the RAS information currently recorded in a controller is carried out.
SBIF, I/O RAS information clearance	○	○	The zero clear of the RAS information currently recorded in SBIF is carried out.
Tag information write	○	○	Tag information is written in an intelligent I/O module.
AO output adjustment	○	○	Analog-output adjustment is performed by SAO (Analog Output) of an intelligent I/O module.

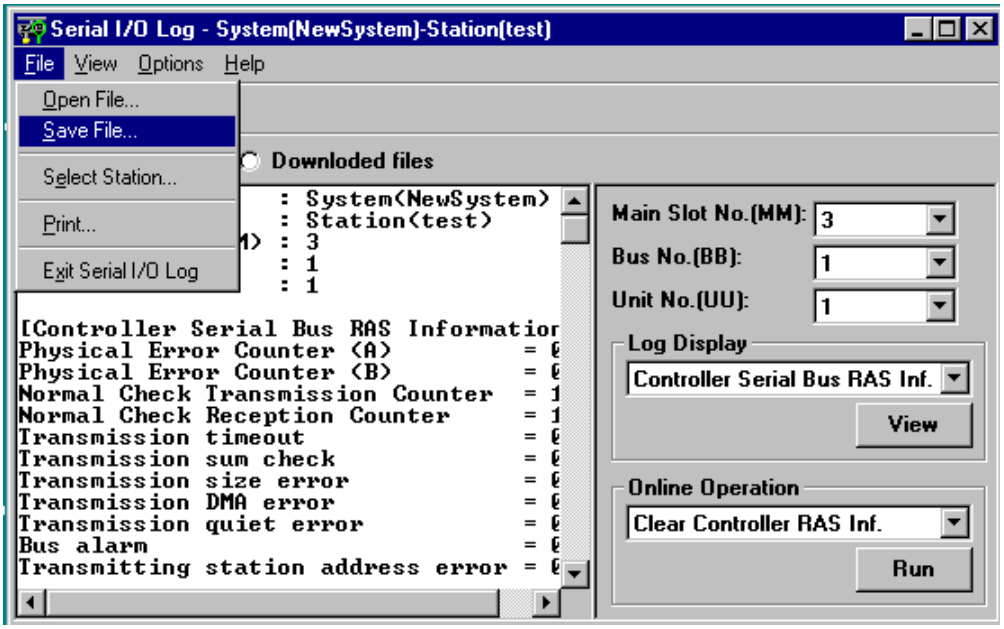
An online operation demand can be chosen also from the drop-down list in <Online Operation> of the screen right, and can be carried out.



■ Save serial I/O log information to file

The serial I/O log information currently displayed in the screen can be saved in CSV form at a file.
Select menu <File> <Save File>.

Moreover, selecting menu <File> <Open>, the serial I/O log saved at the file can be read, and it can also display on a screen.



9

9.8 Monitoring LAN Management Information

LAN management information is explained.

■ Monitor the operation status of LAN (TC-net100, Ethernet)

In the [Station Status] of System View, select TN module or EN module, and select menu <Tool> <LAN manager information>. [LAN Management Information] will be displayed.

The following information is displayed on [LAN Management Information].

Display contents	TN	EN (*1)
Node ID (Name, H/W address, IP address, MAC address)	OK	OK
The measurement term of a node (Cleared time stamp, Lapsed time)	OK	—
The status of a receiving line	OK	—
Error counter (Carrier crack, CRC error)	OK	—

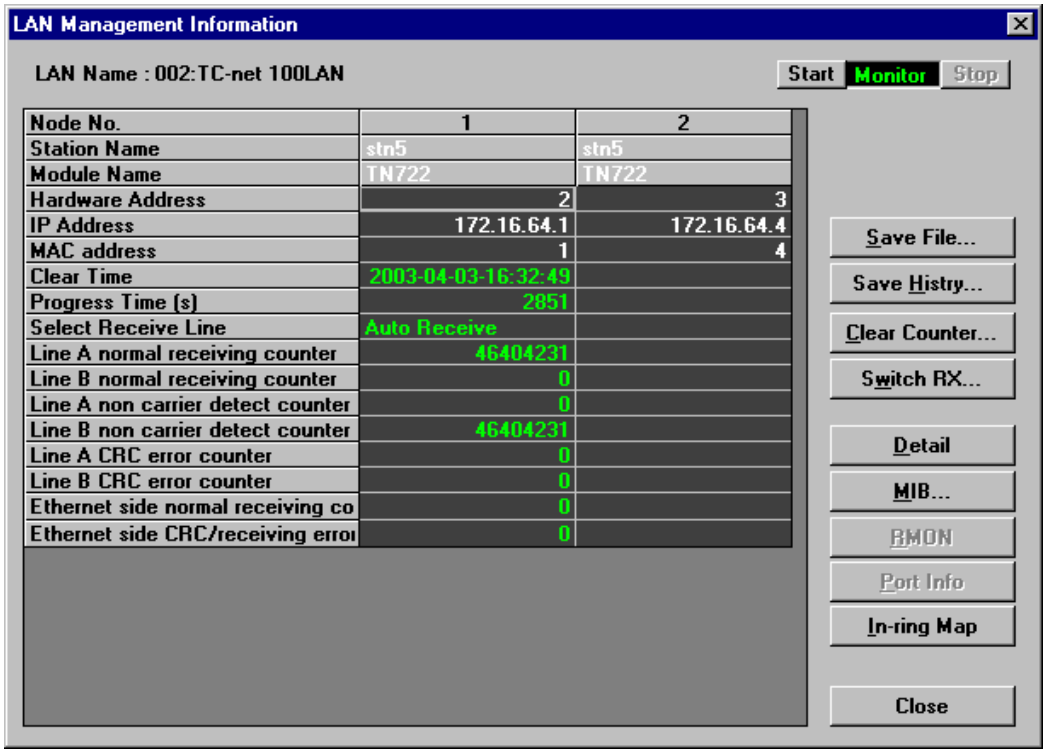
(*1): Only nv series.

The following can be used as maintenance operation.

The node is selected, and each button is pushed.

Maintenance operation	TN	EN (*1)
Switching the receiving line	OK	—
Clearing counter	OK	OK
Display of detailed information according to node	OK	—
Display of MIB information	OK	OK
Display of In-ring map	OK	—
Display of RMON information (Only a shared hub)	OK	—
The display of port information (Only a shared hub)	OK	—

(*1): Only nv series.



■ Display the scan healthy map (TC-net100)

In the [Station Status] of System View, select TN module, and select menu <Tool> <Scan Healthy Map >.

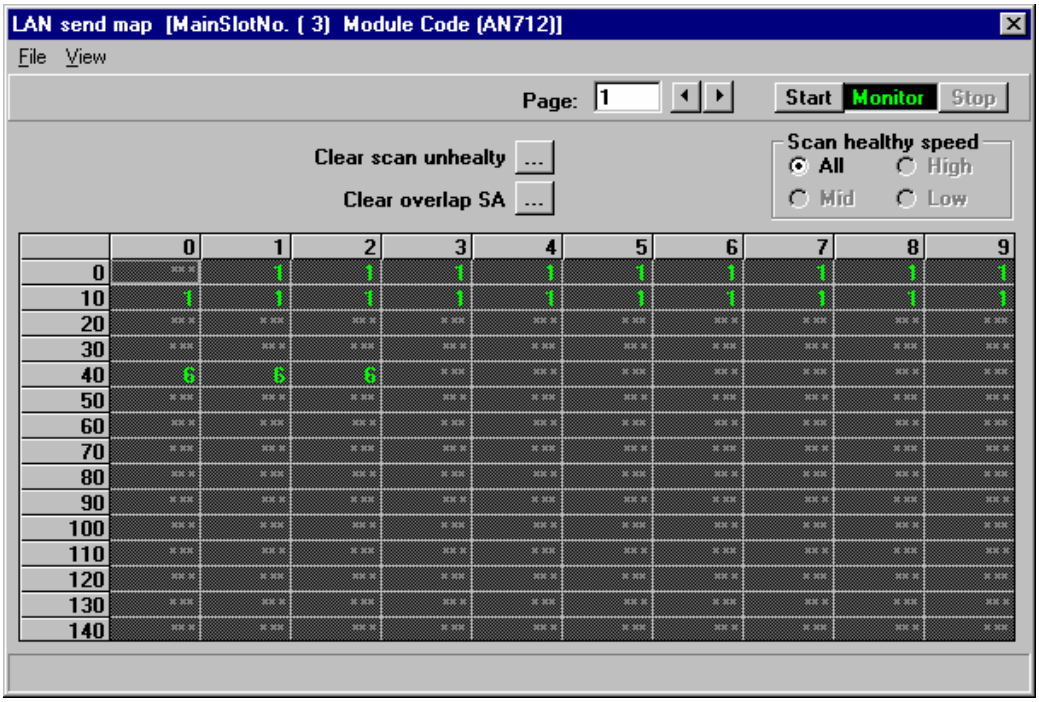
The number of a node is displayed on a block.

Healthy is meant if a numeric value is green.

Unhealthy is meant if a numeric value is red.

The following can be used as maintenance operation.

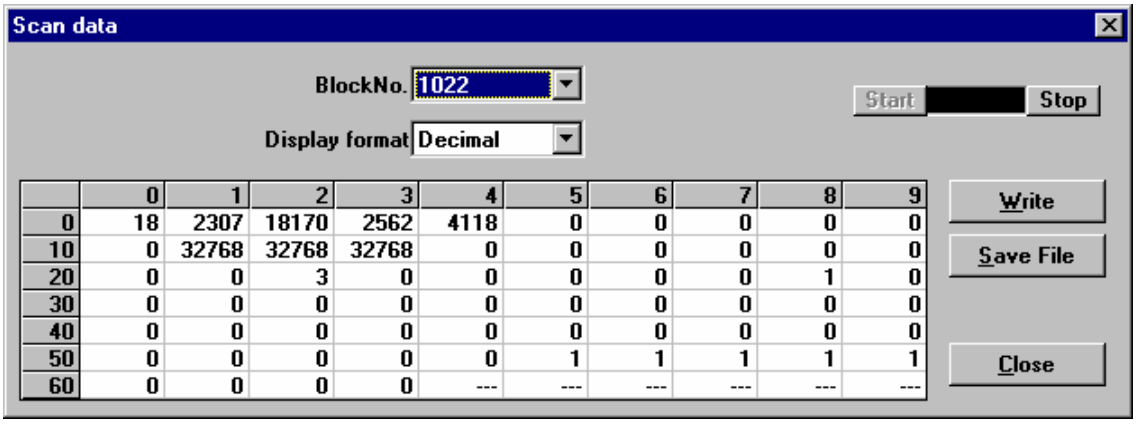
- Clear Scan unhealthy
- Clear overlap SA



■ Display the scan data (TC-net100)

In the [Scan Healthy Map], select menu <Display> <Scan data>.

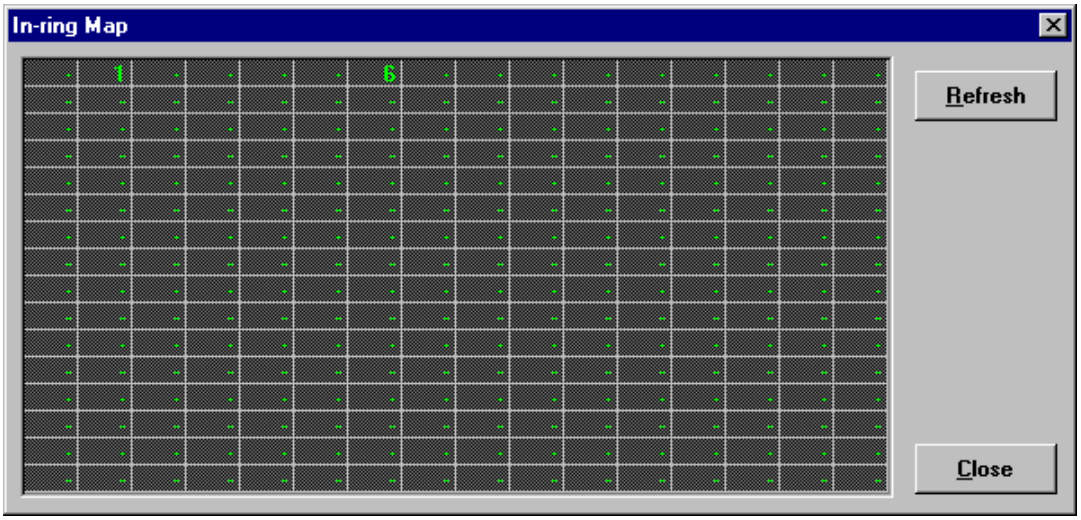
A value can be changed per word.



■ Display the node number which has entered into LAN (TC-net100)

In the [LAN Management Information], click button [In-ring Map].

The node number which has entered into LAN is displayed.



9

9.9 Various Maintenance Functions

Switching operation status of a controller, a memory-maintenance of a controller, switching the receive-line status of TC-net, and releasing alarm status of a serial I/O module are explained.

- Setting time
- Switching controller operation status
- Switching duplex status
- Switching receiver
- Clearing memory
- Defrag
- Backup and restore

9.9.1 Setting time

Displaying and setting time is explained.

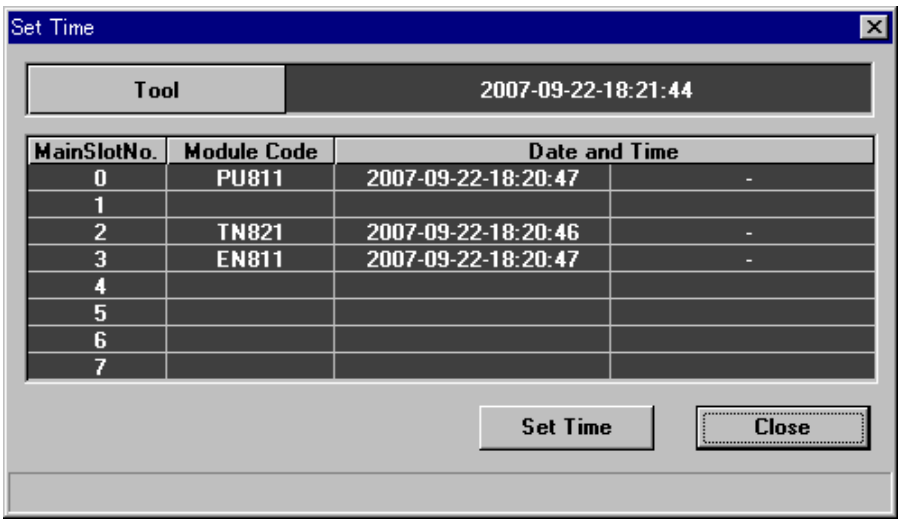
■ Set up time

To display and set up time of a controller, select menu <Tool><Set Time> in [Station Status] of System View. [Set Time] is displayed.

Time of each controller mounted in the main unit is displayed.

When a station is duplex system, both of time is displayed in the order of Primary and Secondary.

Time of the personal computer with which an engineering tool is operating is also displayed.



Push button [Set Time], controller time is changed to time of the personal computer with which an engineering tool is operating as a controller.

When tool is connected via Ethernet LAN, time of all the stations and the controllers on a network are changed.

◇ **Supplementary**

When you can not change the time of all the stations via Ethernet LAN, please make sure of the following settings.

- EN module parameters
- <Com. Parameter Settings> of this tool
- IP address of the PC

Refer to "7.1 Connecting with the Controller" in "Chapter 7 Downloading" for detail information on connecting with the controller.

Especially note the following points when the EN module is free mode.

- Select 'Single (Free mode)' in <Local Station Settings> of <Com. Parameter Settings>.
- Set the same sub-net mask to IP address setting of the PC and EN module parameter.

9.9.2 Switching controller operation status

The switching operation of a controller is explained.

Controller type	Operation mode		
	RUN	HALT	Error reset
PU811 PU821	OK	OK	OK

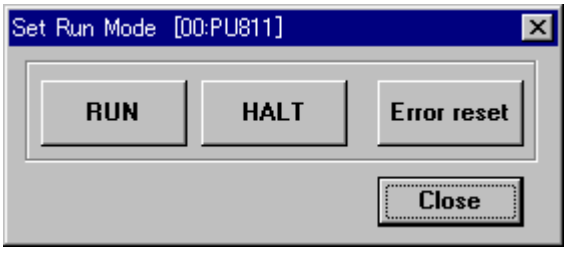
◆ **Important**

- Please see the operation manual of each controller about the contents of operation status, such as RUN and HALT.
- There is the status where a controller stops performing control, according to the kind of operation status. Moreover, a control system may be affected by changing an operation state. When switching an operation status, please perform influence on a control system.
- In the system which used duplex controller, duplex-switching may occur by switching an operation status. Please see the operation manual of each controller about the relation of mode operating status and the duplex operating status.

■ Switch operation mode

A duplex status can be checked in [Station Status] of System View.

To switch operation mode status, select controller and select menu <Tool><Set RUN Mode>. [Set Run Mode] dialog box is displayed.



When switching an operation state, Push button in [Set Run Mode] dialog box.

Please check having switched to the target operation status after execution.

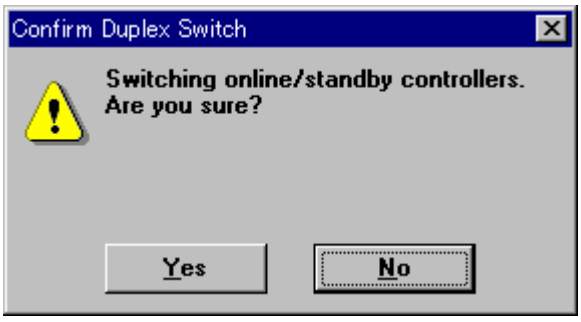
9.9.3 Switching duplex status

The online / standby switching of a duplex station, and equalizing are explained.

■ Switch the online / standby of a duplex station

The duplex status can be checked in [Station Status] of System View.

To switch online / standby status, select controller and select menu <Tool><Set Duplex>.



When select button [Yes], an online station is replaced by standby, and a standby station is replaced by online.

◇ **Supplementary**

- Please see the operation manual of each controller about the detailed contents of online / standby status switching.

9.9.4 Switching receiver

The receiving-line status of TC-net is explained.

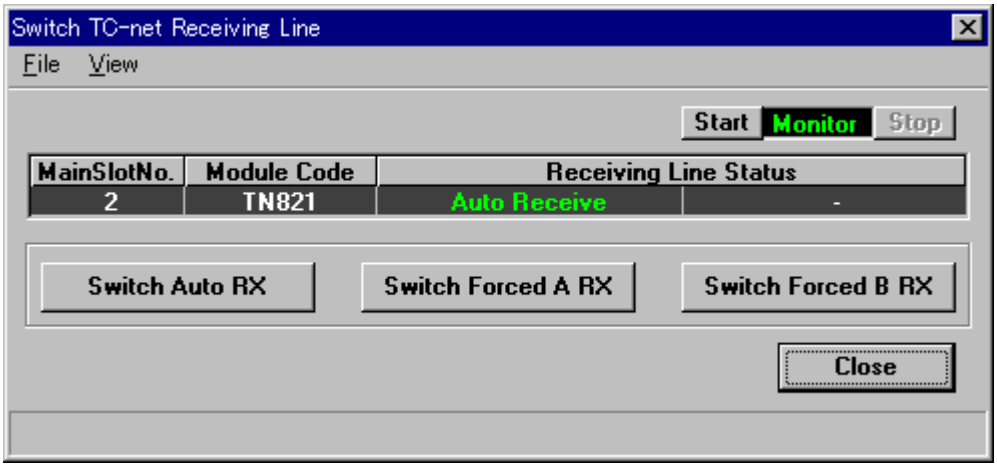
The following three status exist in the receiving-line status.

- Automatic receiving.
- A-line compulsion receiving.
- B-line compulsion receiving.

■ Switch the receiving line status of TC-net

Select TN module in [Station Status] of System View, and select menu <Tool><Switch TC-net Receiving Line>. [Switch TC-net Receiving Line] dialog box is displayed.

When the station is duplex composition, both of receiving line status are displayed in the order of Primary and Secondary.



The monitor is stopped at the time of starting. Push button [Start] in monitoring control of tool-bar to refresh screen. Push button [Stop] to suspend refreshment.

When switching the receiving line status, push the switching button.

Please check after execution having switched to the target receiving line status.

9.9.5 Clearing memory

Memory clearance: All the user memory of the controller is cleared to “0”.

When exchanging controllers, it initializes completely, and it is used when re-starting.

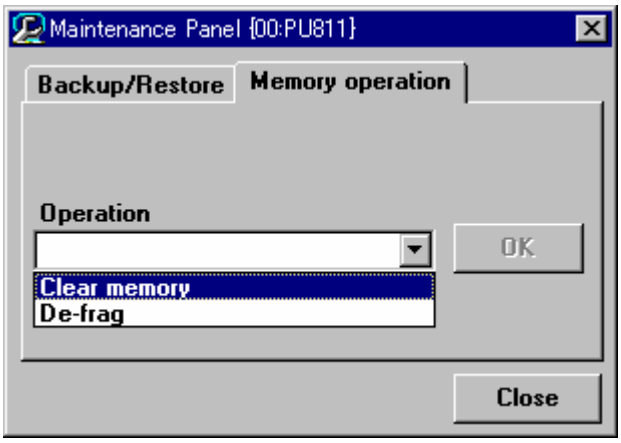
■ Clear memory of a controller

Select the controller in [Station Status] of System view, and select menu <Tool><Maintenance>.

[Maintenance Panel] is the dialog for maintaining memory of the controller.

Select tab <Memory operation>, and select "Clear memory" from pull-down menu <Operation>. Push button [OK] to start memory clearance execution.

Operation of memory clearance is available in HALT mode.



◇ Supplementary

- It is restricted that the memory clearance can be performed from the [Maintenance Panel] when the basic program of the controller is operating normally.
  When the abnormal condition of memory, such as the parity error, does not restore, the memory clearance by the switch of the controller may be needed.
  In this case, please perform the memory clearance compulsorily according to the operation manual of the controller.

9.9.6 Defrag

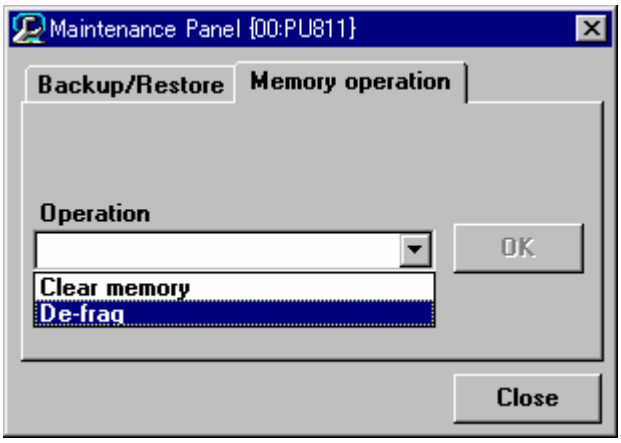
Defrag: An application program and the local variable area are rearranged among the memory for users of the controller, and an empty area is secured.

■ Execute defragmentation for fragmented memory of a controller

Select the controller in [Station Status] of System view, and select menu <Tool><Maintenance>.

[Maintenance Panel] is the dialog for maintaining memory of the controller.

Select tab <Memory operation>, and select "De-frag" from pull-down menu <Operation>. Push button [OK] to start de-fragmentation execution.



9.9.7 Backup and restore

Backup / restoration is explained.

Backup refers to the saving of controller memory content to the Tool hard disk.

Restore refers to the writing of memory content saved in Tool hard disk to the controller.

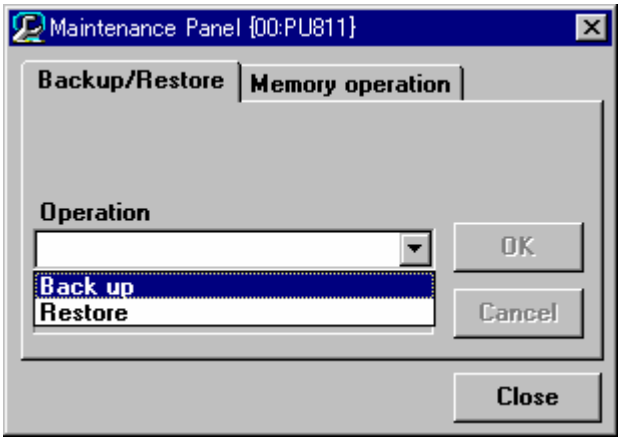
■ Backup

First, switch the target controller to HALT mode.

Select the target controller in [Station Status] of System View and click <Maintenance>. Then select [Backup] from the <Operation> pull down menu. Click the [OK] button to start backup.

During backup, the progress is displayed as bar graph. When backup completes, the save file dialog box appears.

Click the [Cancel] button to cancel the backup operation.



Restore

Select the target controller in [Station Status] of System View and click <Maintenance>.

Have the target controller switched to DL-WAIT mode beforehand.

Select [Restore] from the <Operation> pull down menu of [Maintenance Panel]. Click the [OK] button to open the Select file dialog box and select the file to restore.

During restore, the progress is displayed as bar graph.

Click the [Cancel] button to cancel the restore operation.

Note

- If restore is canceled, the controller data will be incomplete and the controller will not operate normally.

9.10 Externally Starting the RAS Window

This topic describes how to execute system view and system log screen externally from user application other than V-Tool.

■ Assumptions

1) The user application is on the same PC and platform as V-Tool.
2) The PC has sufficient resources (CPU, memory, disk) to run both the user application and V-Tool at the same time.
3) V-Tool and user application are organized independently and executes the invocation command using the Windows Shell.

■ Displaying station view in system view

● Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysView
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName

● Start command
The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}
Start command example [Standalone version]/[Client/Server version]
“C:\Program Files\VEngTool\SysView” /T /M SystemName,StationName

◇ Supplementary

- If the path name of the program file contains space as in "Program Files", enclose the entire path name within double quotation marks to distinguish it from DOS command separator.
- In System View started by the command, [System Log] button is enabled. Selecting a main module and opening the System Log can be available.

■ Displaying TC-net100 status in system view

- Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysView
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName
Slot No.	Slot No. of main unit connected to TC-net100	2
Bus No.	Fixed to 0 (Unused)	0
Unit No.	Fixed to 0 (Unused)	0
Screen No.	Specify the type of screen to display with number 0: LAN transmission map 1: LAN control information	1

- Start command
  The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}, {slot No.}, {bus No.}, {unit No.}, {screen No.}
Start command example [Standalone version] /[Client/Server version]
“C:\Program Files\VEngTool\SysView” /T /M SystemName,StationName, 2, 0, 0, 1

■ Displaying main module log in system view

- Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysLog
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName
Slot No.	No of module to display	1

- Start command
  The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}, {slot No.}
Start command example [Standalone version] /[Client/Server version]
“C:\Program Files\VEngTool\SysLog” /T /M SystemName,StationName,1

Chapter 10
Monitoring System and Maintenance of V series

This chapter describes the controller software and hardware monitoring and maintenance procedure.

10.1 Monitoring Program Registration

This section describes how to monitor the status of programs registered in the controller.

■ Restrictions

Currently, there are cases where deleting of program is not accepted with [POU entry].

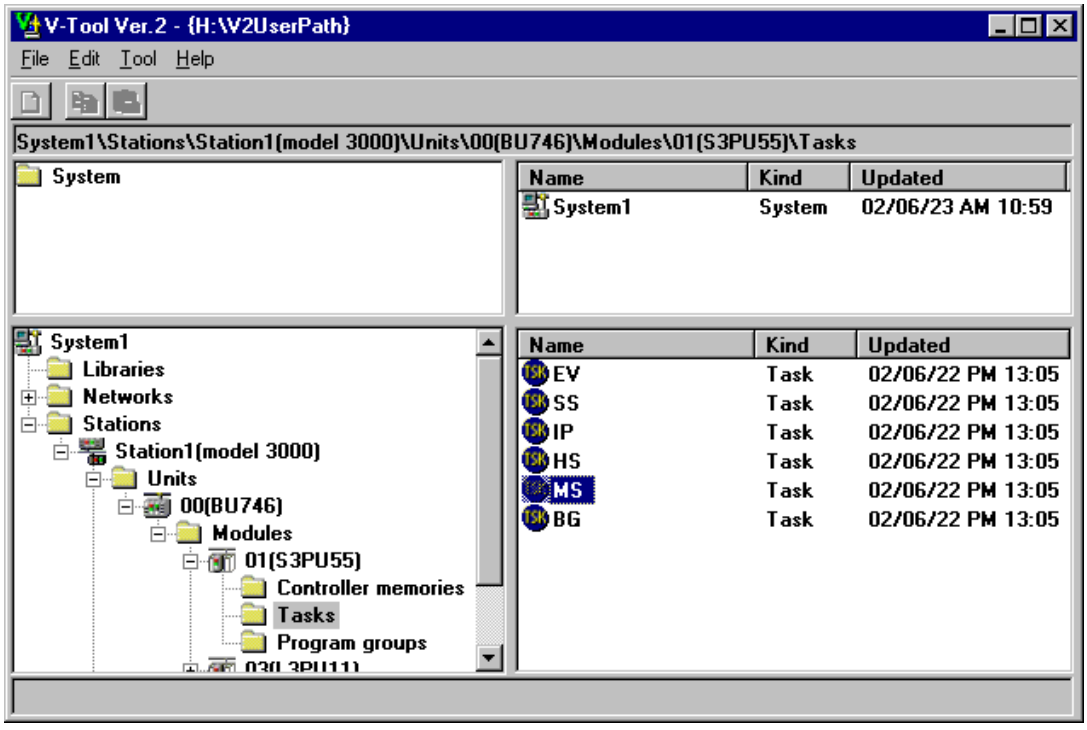
In such case, place the cursor on the program name column and retry.

Furthermore, deleting of multiple lines is not allowed.

When deleting a POU entry, also delete the corresponding task entry.

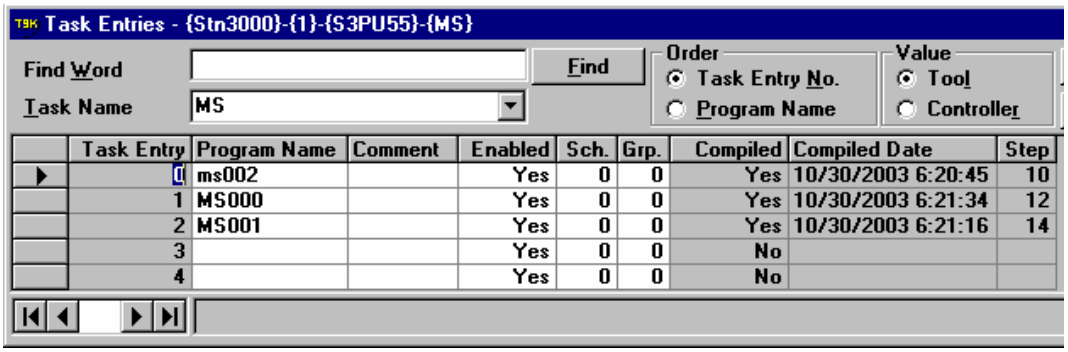
■ Monitoring program registration

Select a controller from the [Product Tree] and double click a task type on the right side.

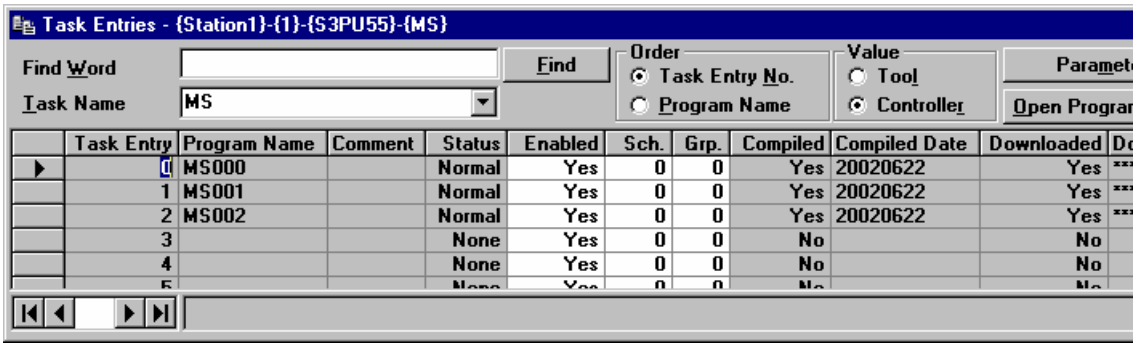


10

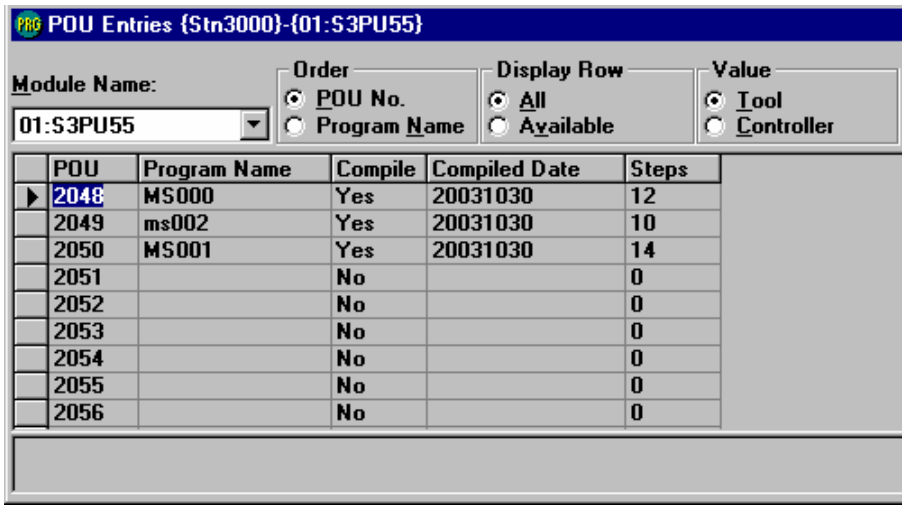
The [Task Entries] of the corresponding task type opens.



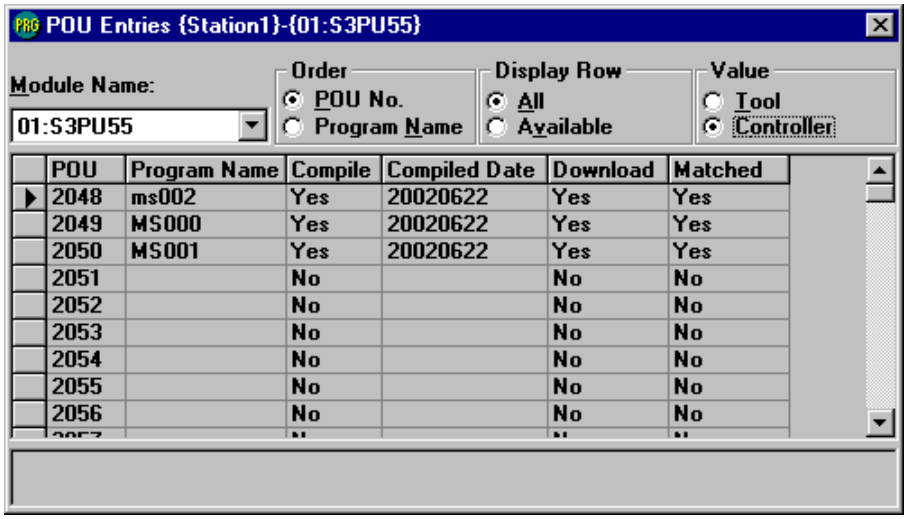
Select <Controller> for the "Value" option to load the task registration information from the controller.



After selecting a controller from the [Product Tree], select <POU entries> from the <File> menu to view the [POU Entries].



Select <Controller> for the "Value" option to load the program registration information from the controller.



The content of the "Matched" column is either Yes: Match, No: No match, or -: Controller only.

■ Deleting program registration

Place the cursor on the program row to delete (turns to blue reverse video) and press the [Delete] key.

When the confirmation dialog appears, select [Yes] unit.

Tool registration is deleted if tool is selected for the "Value" option and controller registration is deleted if controller is selected.

10.2 Monitoring Controller Parameters

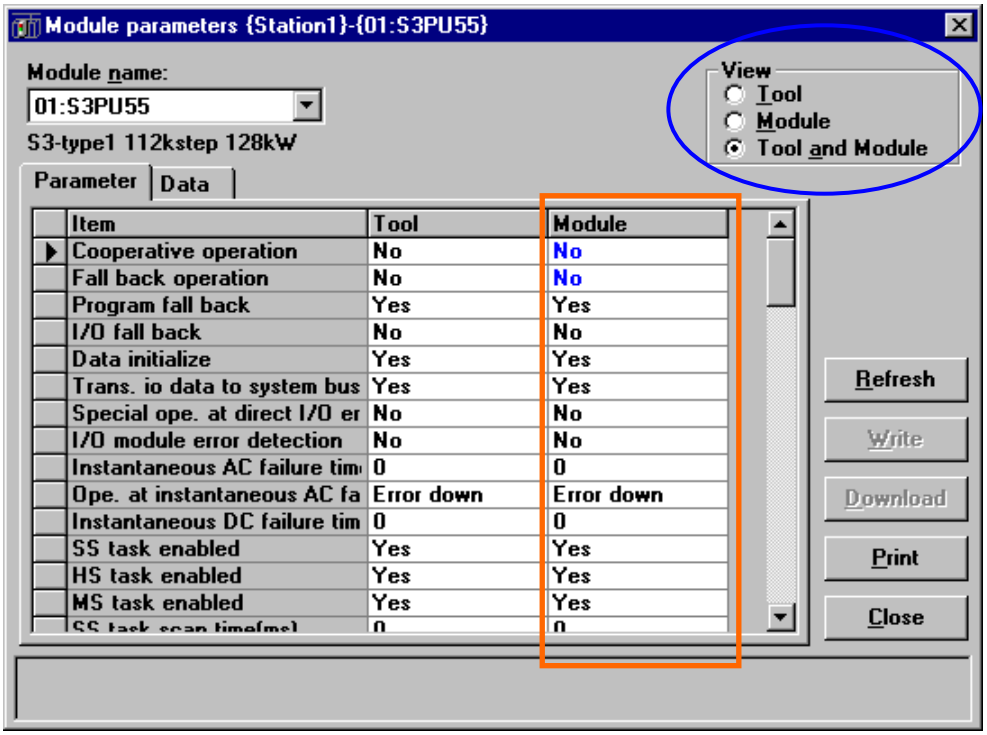
This section describes how to monitor the operation parameters in the S, L, FN, and RIO controller.

■ Viewing controller parameters

Select a controller module in the Product Tree and select <Module parameters> from the <File> menu.

Select "Tool and module" for [View] to view the online information.

With this, you can check whether the set value is donwloaded correctly.

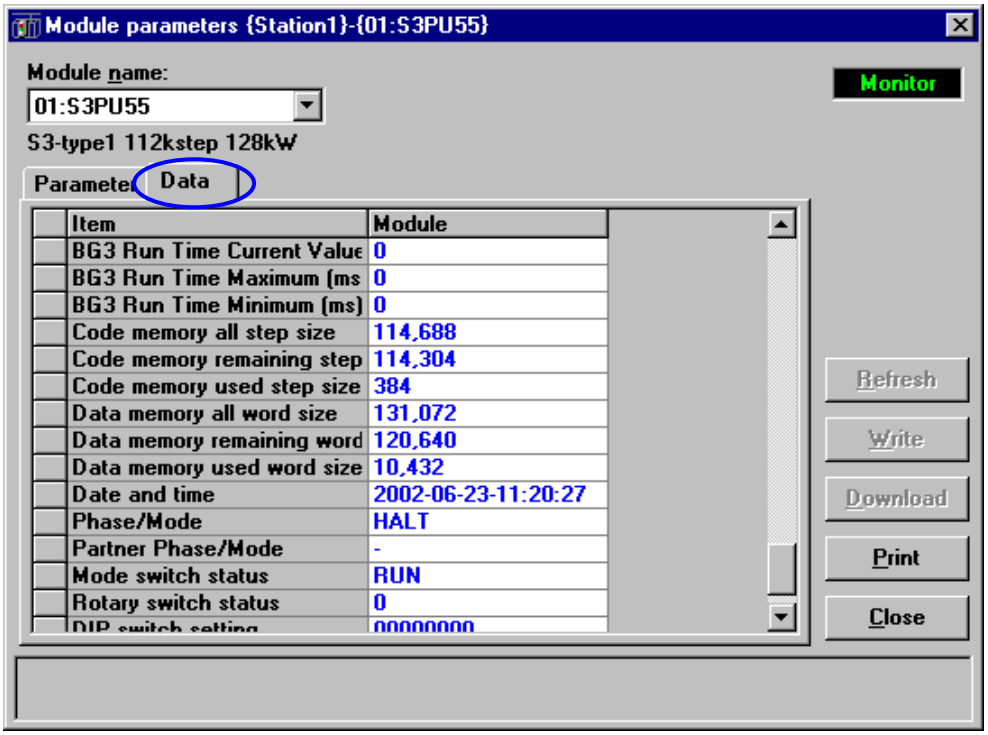


■ Monitoring the controller operation status

Select the [Data] tab to view the actual controller operating status.

The task scan time, program step size, and mode switch status appear.

The values are monitored to display the latest status.



■ Changing the controller scan cycle online

The value of the following parameters can be changed online even when the controller (*1) operating mode is RUN.

- SS task scan cycle
- HH task scan cycle
- MS task scan cycle

Specify a value within the following range when changing the cycle online.

- (Maximum control cycle) >= Value to be set > (Current control cycle setting × 0.8)
- The value cannot be changed online if floating is specified for control cycle.

(*1) S3Controller (Basic Software Version 02.60 or more)

10.3 Monitoring Controller Operation Status

The monitoring of the alarm status and operating status in a controller is explained.

Restrictions

In System View, download the hardware configuration to the controller before viewing the station status because the System View reads online the hardware configuration downloaded to the controller and displays it on the screen.

The following hardware modules cannot be distinguished in the System View.

Module	System View Display
BU356, BU35B	BU356/35B
CHS-5807, CHS-5839	CHS-5807/5839
CN611, CN612	CN611/612
CN711, CN712	CN711/712
EN611, EN631	EN611/631
EN621, EN641	EN621/641
EN711, EN731	EN711/731
EN721, EN741	EN721/741
SDI01, SDI01A	SDI01/01A
TN711, TN721	TN711/721
TN712, TN722	TN712/722
S3PU45 + IF721, S3PU45 + IF741, S3PU45	S3PU45 + IF721/741
S3ST45A + IF721, S3ST45A	S3ST45A + IF721

When using System View with Ethernet connection, register the EN or FN card from Product Tree in advance and register the IP address.

For Ethernet connection using FN, register the controller at the left edge of the Product Tree.

L3PU11 serial IO status cannot be displayed for Ethernet connection. Use RS-232C.

The Ethernet card registered on the main unit "BU74A" is displayed as "EN7**."

When some windows are already displaying as monitoring-mode, and other window is started monitoring, following message will be displayed.

'Temporarily unable to access (not ready to respond).'

In this case, please stop monitoring which is already running, before starting a new one.

■ Monitor the status of a controller

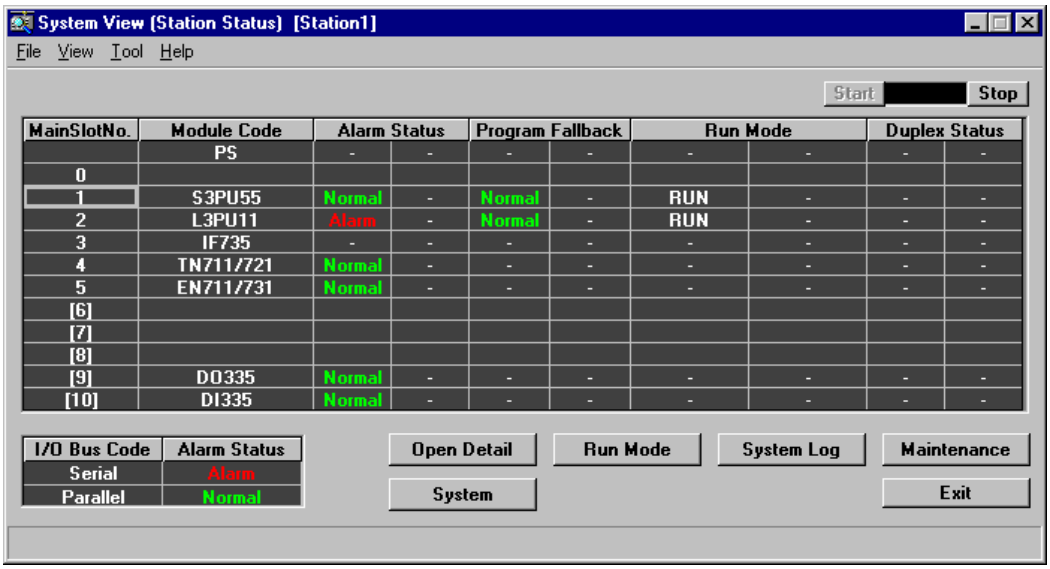
Select the station to display from the [Product Tree] and select <File><System View> to display the [Station Status] window of System View.

The following status appear in the [Station Status] window.

- Controller alarm status, program fallback status, operation mode, duplex status.
- Network module alarm status.
- I/O module alarm status.
- Serial I/O, parallel I/O representative alarm status.

When station is duplex composition, both of status are displayed in the order of Primary and Secondary.

To operate the controller or to display the information about the controller, select the controller (Click the line as which the controller is displayed).



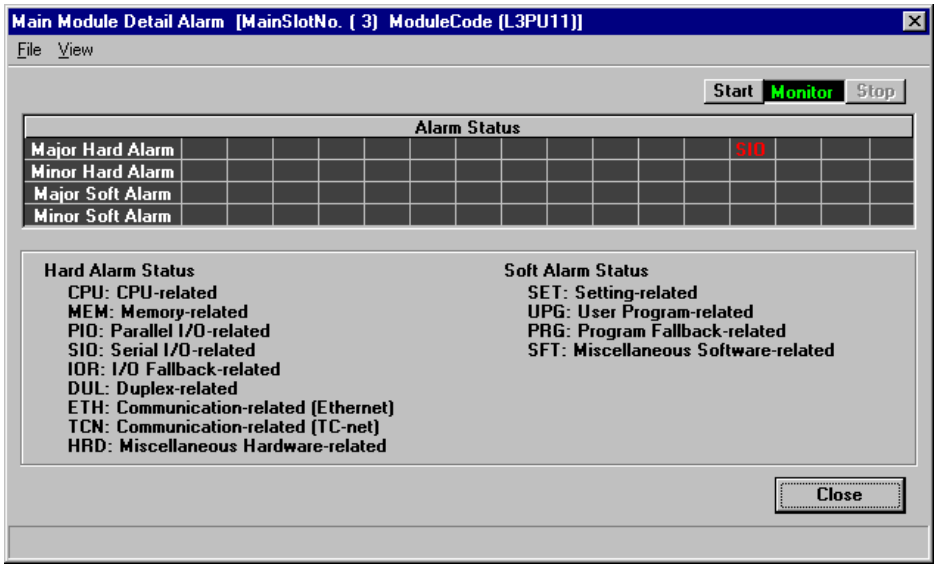
The monitor is stopped at the starting of [Station Status]. Push on button [Start] In monitor-control of tool-bar to start the refreshment display. Push on button [Stop] to suspend the refreshment display.

◇ Supplementary

- If you accidentally disconnected the Ethernet cable when connecting via Ethernet, quit System View before reconnecting the cable.
- When in DL-WAIT status, [Normal] appears in the [Alarm Status] and [Program Fallback] field.

■ Know the detailed contents of alarm

When alarm is occurred in the controller, select the line of the controller and select menu <Tool> <Main Module Detail Alarm> to know the detailed contents.



Classification of an alarm status is as follows.
Major or minor failure, Hardware or software.

If there are two or more abnormal conditions, they all will be displayed side by side.

Alarm	Name	Contents
Hardware	CPU	Standard software etc.
	MEM	Memory failure, Parity error etc.
	PIIO	Failure of parallel I/O relation
	SIO	Failure of serial I/O relation
	IOR	I/O fallback error
	DUL	Failure of duplex relation
	ETH	Failure of Ethernet relation
	TCN	Failure of TC-net relation
	HRD	Hardware self-diagnostic failure
Software	SET	The abnormalities of the registration contents
	UPG	A user program, the abnormalities about a user task
	PRG	Program fallback error
	SFT	The abnormalities of the other software relation

To know the detailed contents of alarm, check the [System Log].
Please see "Monitoring System Logs" about [System Log].

10.4 Monitor Parallel I/O Status

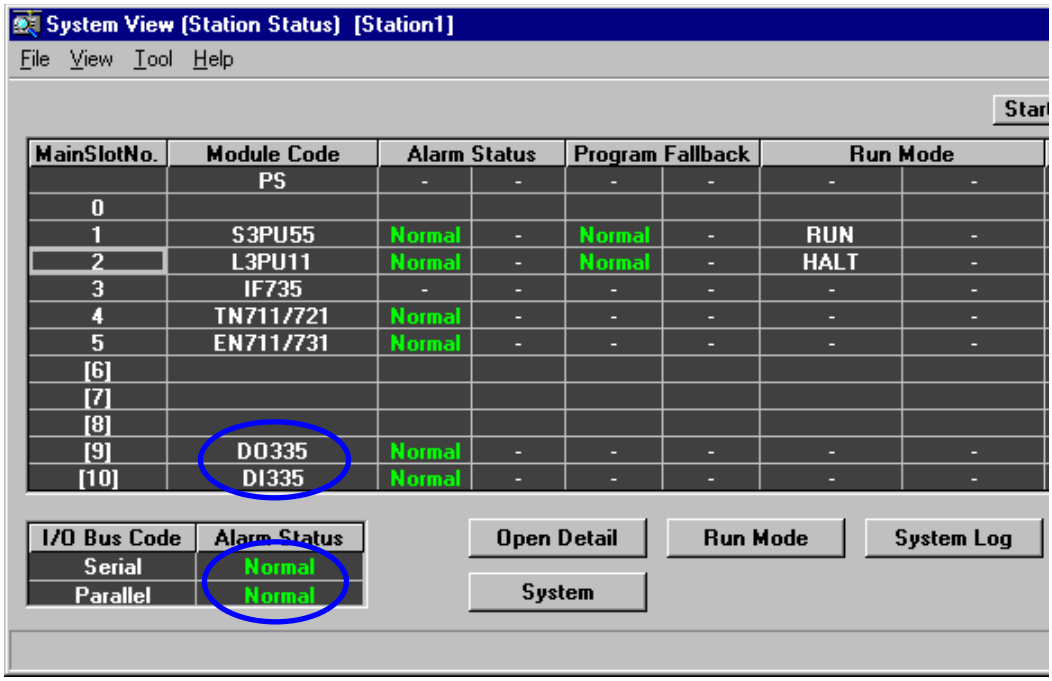
The monitoring of the parallel I/O alarm status is explained.

The status of parallel I/O is divided into three hierarchies as Bus, Unit, and Module.

The representation status are displayed respectively as [I/O Bus Status], [I/O Unit Status], and [I/O Module Status].

■ Monitor the main unit status

The [Station Status] window of the System View shows the representative alarm status of parallel I/O in the [Alarm Status] display area. The alarm status is displayed in the corresponding slot position for parallel I/O modules installed in the main unit.



The monitor is stopped at the starting of [Station Status]. Push on button [Start] in monitor-control of tool-bar to start the refreshment display. Push on button [Stop] to suspend the refreshment display.

The [I/O Bus Status], [I/O Unit Status], and a [I/O Module Status] where of it will explain from now on are the same.

◇ Supplementary

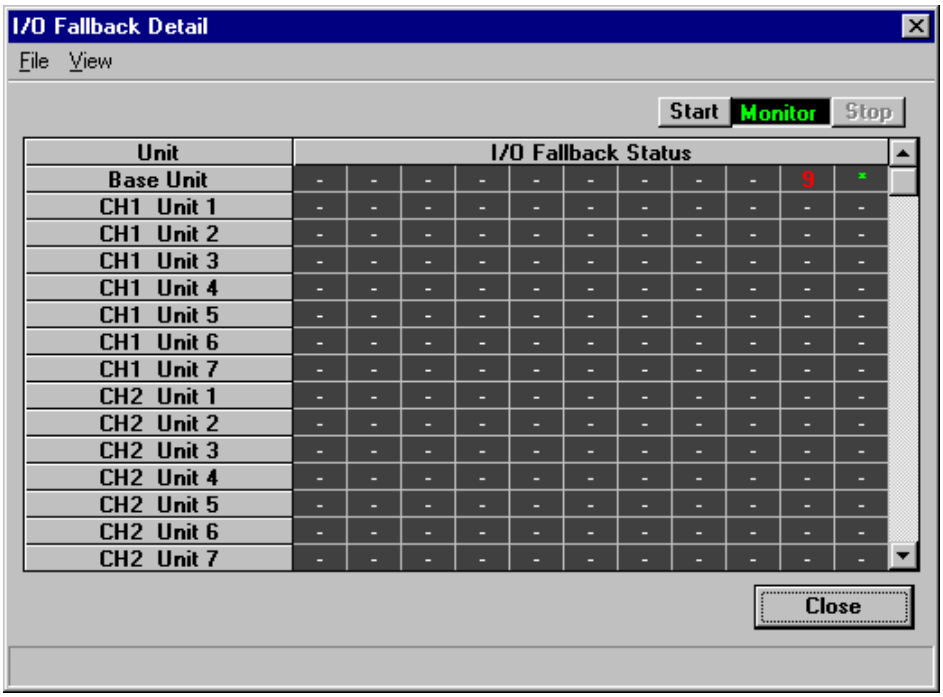
- If parallel I/O is not registered, [Normal] or [-] appears in the [Alarm Status] field.

■ Monitoring parallel I/O fallback detail

To display the status of a I/O Fallback Detail, Select menu <Tool><I/O Fallback Detail> in [Station Status] of SystemView.

One line corresponds to one unit. The meaning of a sign is as follows.

-: No registering of I/O
*: Normal
Number: The slot number of Fallback.



◇ Supplementary

- The menu of Fallback cannot be chosen if there is no registration of parallel I/O.

■ Release I/O fallback status. (MELPLAC I/O)

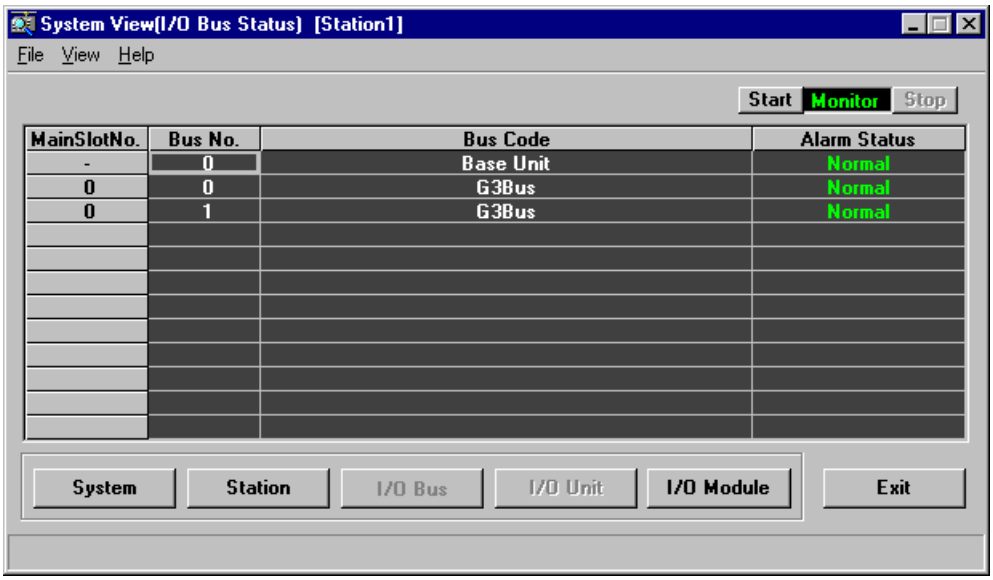
In the [Station Status] of System View, select the module [R3PU45+IF72C]. Select <I/O Fallback Detail> in the <Tool> menu.

Click button [Fallback Return] to release I/O fallback status.

■ Monitor the parallel I/O bus status

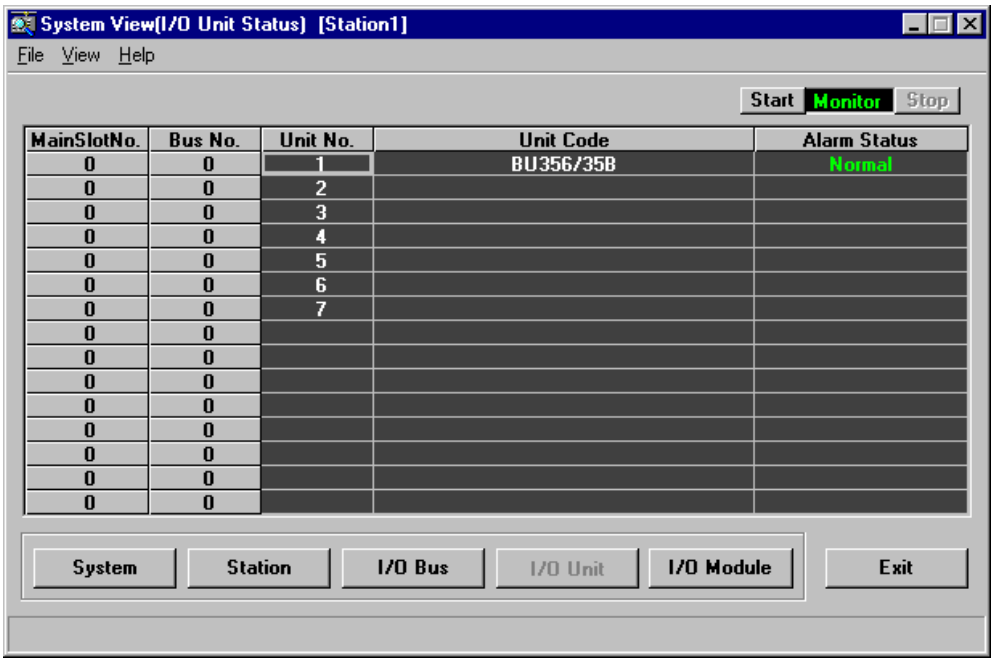
Double-click <I/O Bus Code> <Parallel> in the [Station Status] window to view the [I/O Bus Status] window.

This window shows the representative alarm status in parallel bus units.



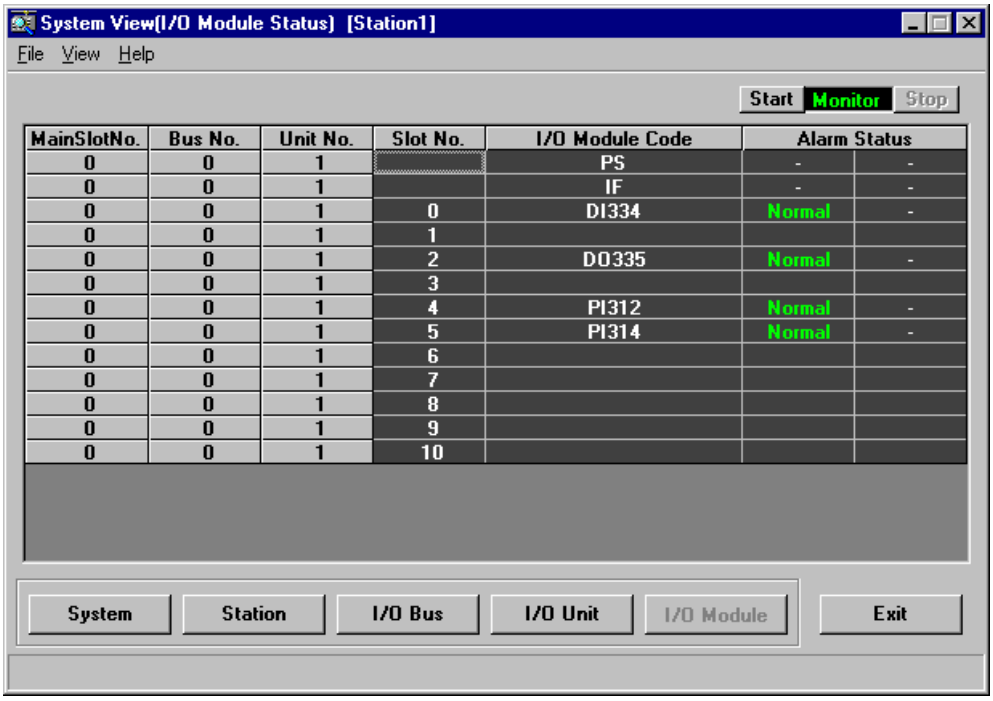
■ Monitor the parallel I/O unit status

To display the status of a parallel I/O unit, select bus number (select the line which the bus number is displayed) and push button [I/O Unit].
A representation alarm status is displayed per unit.



■ Monitor the parallel I/O module status

To display the status of a parallel I/O module, select unit number (click the line which the unit number is displayed) and push button [I/O Module]. The alarm status of the I/O module mounted in the unit is displayed.



10.5 Monitor Serial I/O Status

The monitoring of the serial I/O alarm status is explained.

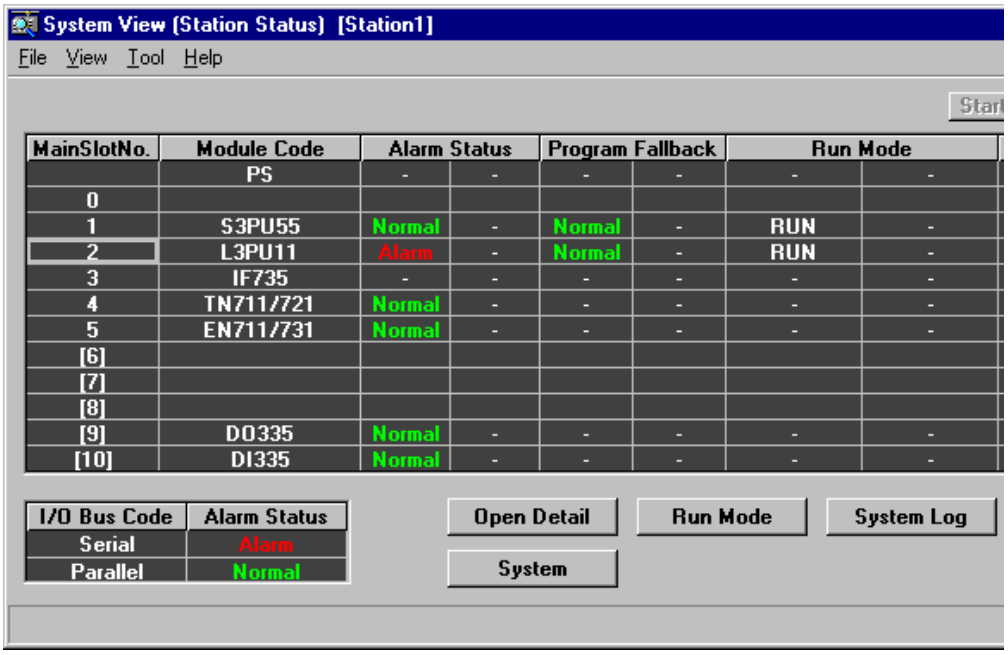
The status of serial I/O is divided into three hierarchies as Bus, Unit, and Module.

The representation status are displayed respectively as [I/O Bus Status], [I/O Unit Status], and [I/O Module Status].

Cautions: There are no menus "I/O Bus Status" and "I/O Unit Status" in Model1000.

■ Monitor the main unit status

The representation alarm status of serial I/O is displayed in the Serial field of the <I/O Bus Code> display area in [Station Status] of System View.



The monitor is stopped at the starting of [Station Status]. Push on button [Start] In monitor-control of tool-bar to start the refreshment display. Push on button [Stop] to suspend the refreshment display.

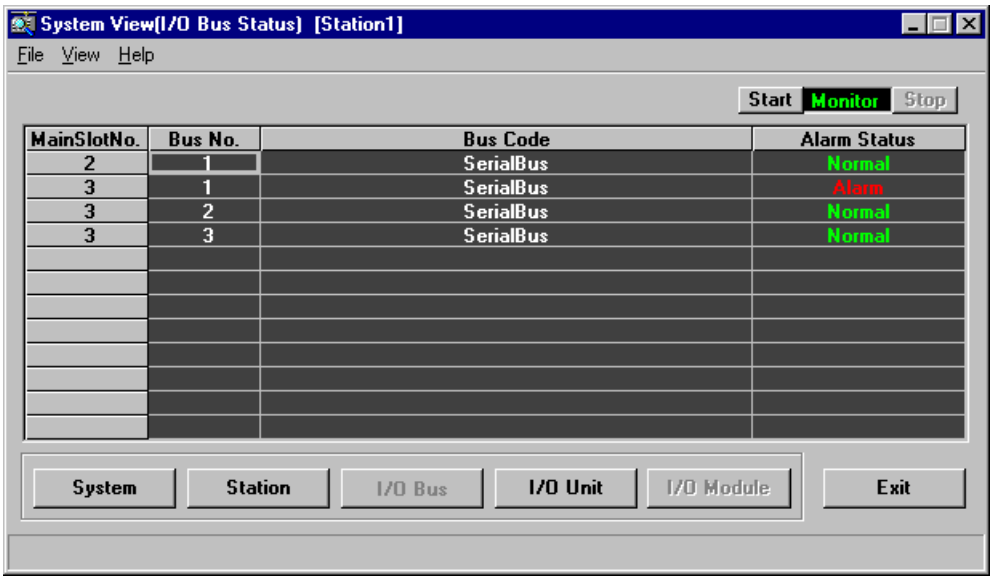
The [I/O Bus Status], [I/O Unit Status], and a[I/O Module Status] where of it will explain from now on are the same.

◇ Supplementary

- When no serial I/O is registered, [Normal] or [-] appears in the [Alarm Status] field.

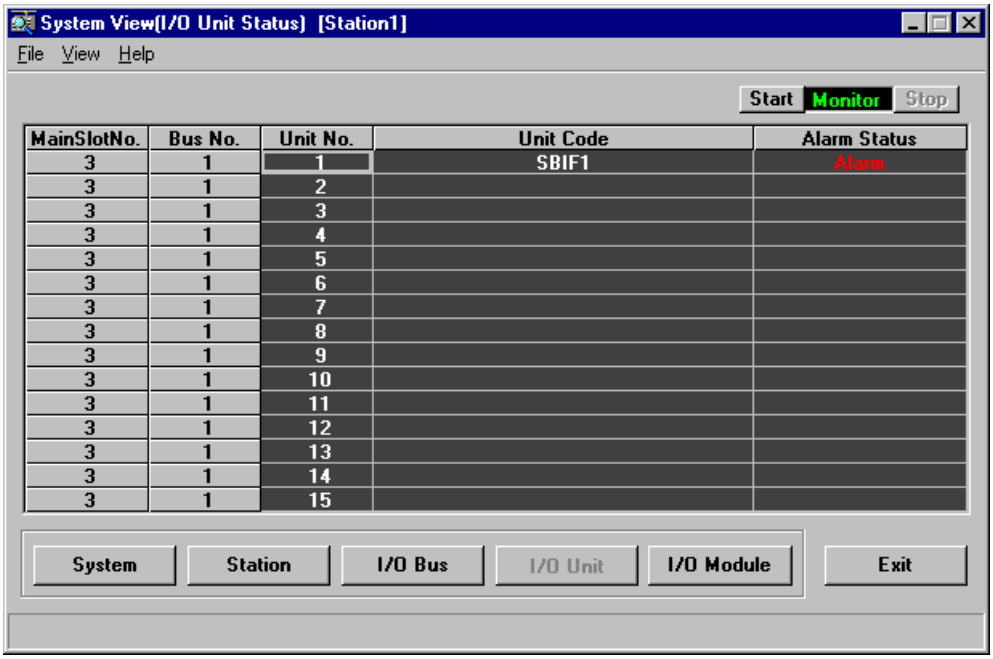
■ Monitor the serial I/O bus status

To display the status of a serial I/O bus, double-click <Serial> in the [I/O Bus Code] field. A representation alarm status is displayed per bus.



■ Monitor the serial I/O unit status

To display the status of a serial I/O unit, select bus number (select the line which the bus number is displayed) and push button [I/O Unit].
A representation alarm status is displayed per unit.

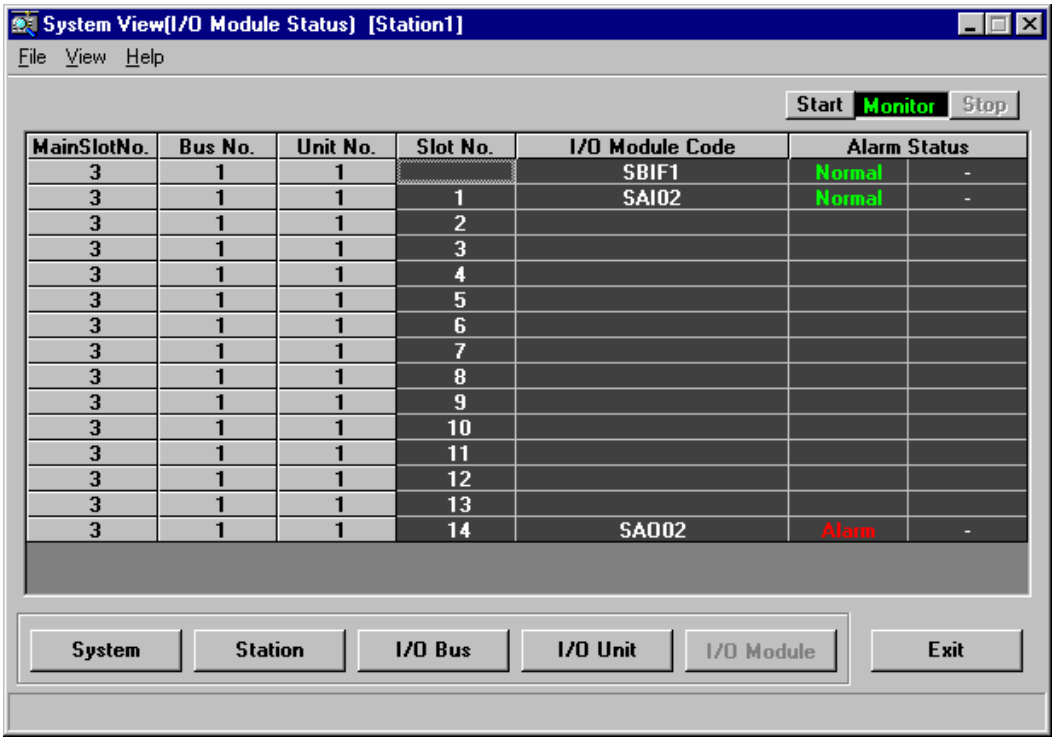


■ Monitor the serial I/O module status

To display the status of a serial I/O module, select unit number (click the line which the unit number is displayed) and push button [I/O Module].

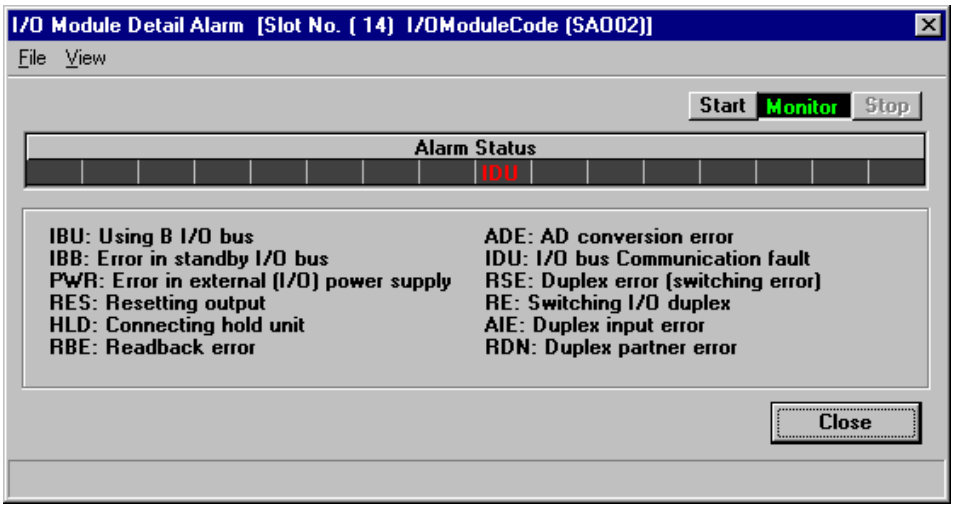
When an I/O module is duplex composition, both of status are displayed in the order of Primary and Secondary.

To operate the I/O module or to display the information about the I/O module, select the [I/O module] (Click the line as which the module is displayed).



■ Know the detailed contents of alarm

When alarm is occurred in the I/O module, select the line of the I/O module and select menu <View> <I/O Module Detail Alarm> to know the detailed contents.



To know the detailed contents of alarm, check the [Serial I/O Log].

Please see "Monitoring Serial I/O Logs" about [Serial I/O Log].

10.6 Monitoring System Logs

The system log is explained.

A system log is the history of operation, and it is saved in a controller.
The contents saved according to the kind of controller differ.

Log name	Contents of a log	Controller					
		S	L	EN	CN	TN	FN
Error log	Record which detected the abnormalities of hardware and software. System basic program and an application program are contained in software.	OK	OK	OK	OK	OK	OK
Event log	Record about module operating status, such as starting and switching.	OK	OK	OK	OK	OK	OK
Transmission log	Record which detected the abnormalities in transmission. Such as Ethernet etc., the information on network-related is included.	OK	OK	OK	OK	OK	OK
Operation log	Record of the operation from OIS about process-control.	—	OK	—	—	—	OK

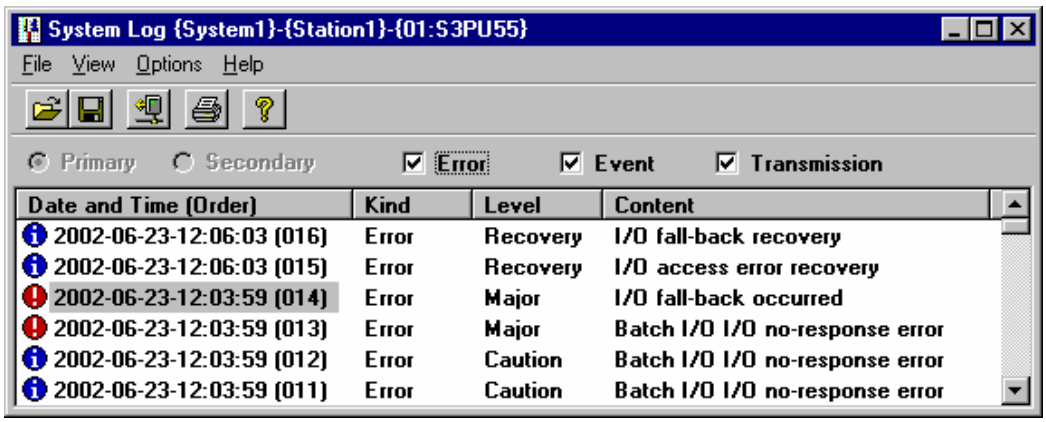
■ Obtaining system log

When [System View] is opened, the module to acquire the log is selected, and the menu <Tool> <System log> is executed, [System log] is displayed.

Moreover, it is started from [System log] button.

The system log information on a specification controller is displayed on a [System Log] in the order of a date. In default setting, all the information on Error, Event, Transmission, and Operation Log is displayed.

Only a part can also be selected and displayed from these.



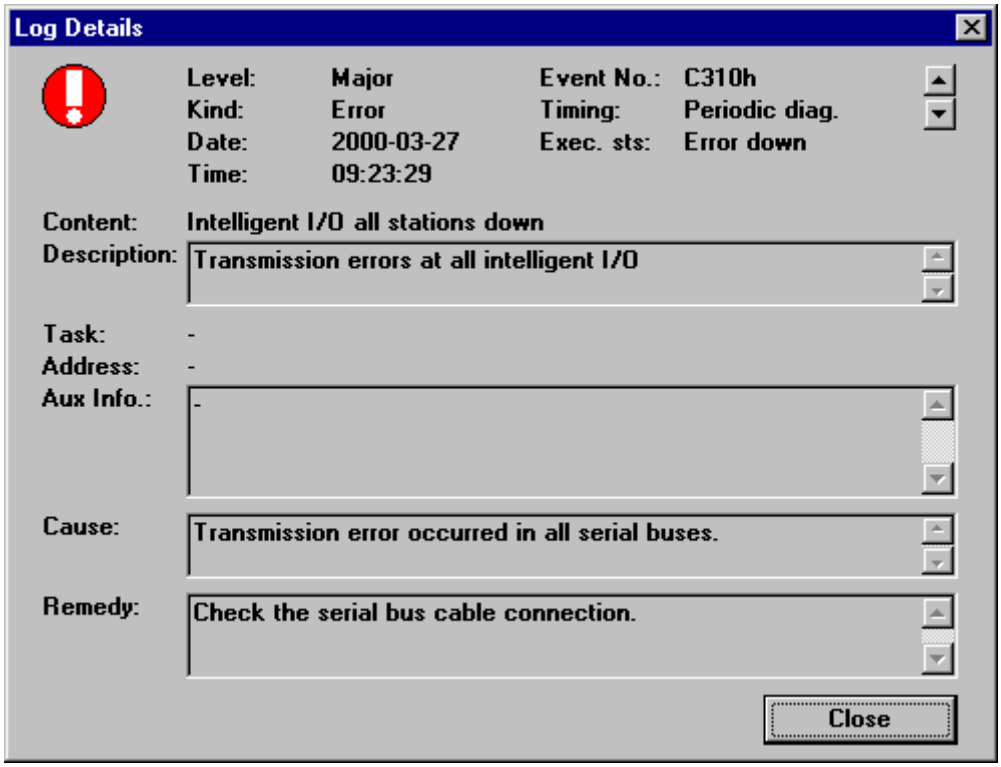
■ Know the detailed contents

To know the detailed contents of a log, It can check according to [Log Details].

Double-clicked the line, or select the log and select menu <View> <Details> to see [Log Details].

Cause and measure are also displayed in a detailed display.

Moreover, in order to see the contents of other logs, with [Log Details] displayed, please push an upper right vertical button and move to the log before and behind it.



◇ Supplementary

- Time stamp of AN777
  The date and time of AN777 in System Log is red and logged from EARI1 which is ADMAP-100F network node.

■ Save system log information to file

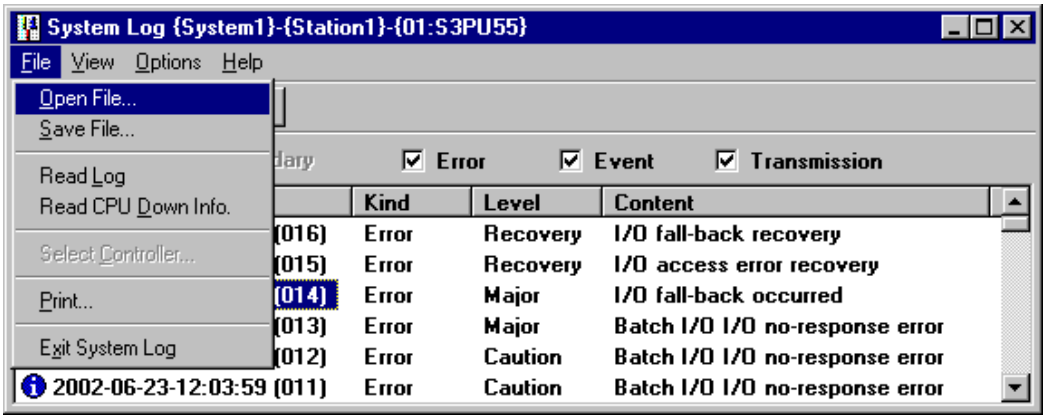
The system log information currently displayed in the screen can be saved in CSV form at a file.

Select menu <File> <Save File>.

■ Display system log information from file.

When the menu < file >< system log > is executed after the station is selected with the product tree, the system log is displayed.

Selecting menu <File> <Open File>, the system log saved at the file can be read, and it can also display on a screen.



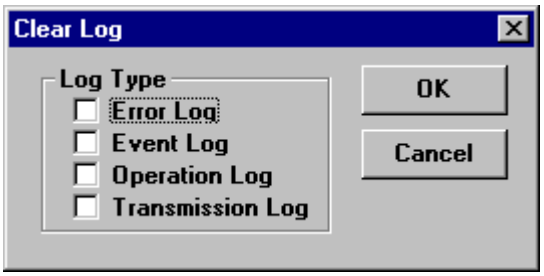
■ Clear the log

The log in a controller is clearable.

Select menu <View> <Clear Log> to show [Clear Log] dialog box.

It can be selected whether it clears about each of Error, Event, Operation, and Transmission log.

If all boxes are checked and [OK] button is pushed, all the logs in a controller can eliminate at once.



Obtaining CPU down information

In addition to the system log, the S controller internally maintains a detail CPU down information. If a CPU down occurs, obtain this information and send it to your service representative. This section describes how to obtain this information.

Note: This function is not supported on controllers other than Scontroller and DS type L controller.

To obtain the CPU down information, select <File><Read CPU Down Info>. The information can be stored in any file.

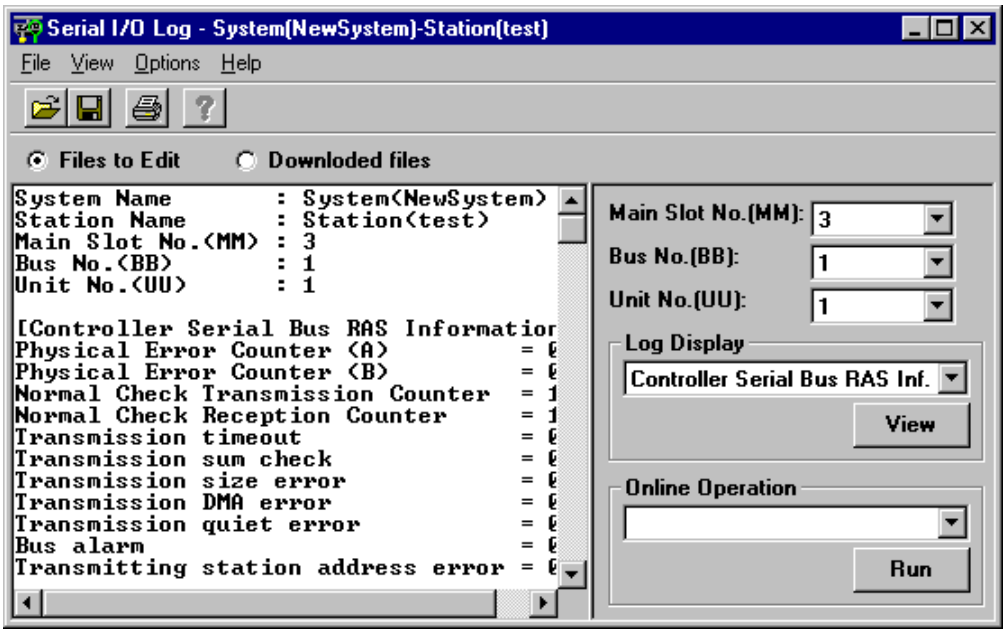
10.7 Monitoring Serial I/O Logs

The serial I/O log is explained.

■ Read the serial I/O log

[Serial I/O Log] is started by displaying [I/O Module Status] window from [System View] and selecting <View><Serial I/O Log>.

In [Serial I/O Log], maintenance operation peculiar to a serial I/O module is possible in addition to showing log.

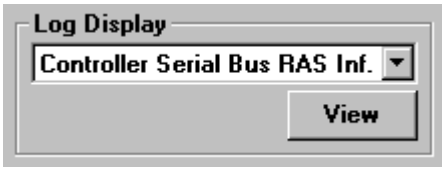


The log is not displayed after starting. Select the following log classification from menu <View> <Log> to read and display log.

Log type	Contents
All information	All the following information is read. It is effective only when selecting a station.
Controller side serial bus RAS information	The information managed and saved by L controller side among serial bus RAS information is read.
SBIF serial bus RAS information	The information managed and saved by SBIF side among serial bus RAS information is read.
SBIF I/O-bus error counter	The error counter of an I/O bus saved by SBIF is read.
I/O-bus error counter	The error counter of an I/O bus is read.
SBIF switching information change information	The duplex switching history of SBIF is read.

Log type	Contents
I/O-module log	The error counter inside an intelligent I/O module is read.
I/O-module failure information	The self-diagnostic result inside an intelligent I/O module is read.
I/O version & serial number	The hardware and software version and the serial number of an intelligent I/O module are read.
Tag information	The tag information on an intelligent IO module is read.

A display demand of a log can be carried out also from the drop-down list of the <View><Log Display> on the right-hand side of a screen.

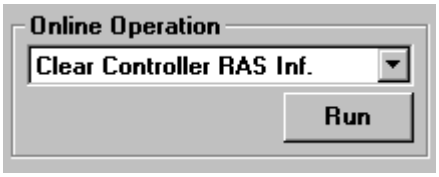


■ Execute online operation

The operation to a serial I/O module can choose and carry out the following operation item in menu <View> <Online Operation>.

Operation item	L2 L3	L1 LC	Contents of operation
Controller RAS information clearance	○		The zero clear of the RAS information currently recorded in a controller is carried out.
SBIF, I/O RAS information clearance	○	○	The zero clear of the RAS information currently recorded in SBIF is carried out.
Tag information write	○	○	Tag information is written in an intelligent I/O module.
AO output adjustment	○	○	Analog-output adjustment is performed by SAO (Analog Output) of an intelligent I/O module.

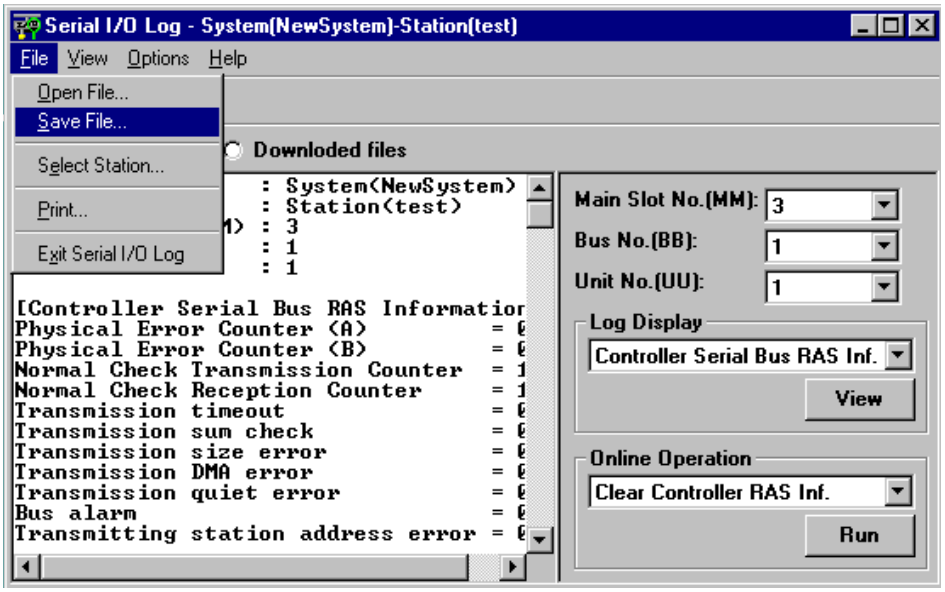
An online operation demand can be chosen also from the drop-down list in <Online Operation> of the screen right, and can be carried out.



■ Save serial I/O log information to file

The serial I/O log information currently displayed in the screen can be saved in CSV form at a file.
Select menu <File> <Save File>.

Moreover, selecting menu <File> <Open>, the serial I/O log saved at the file can be read, and it can also display on a screen.



10

10.8 Monitoring LAN Management Information

LAN management information is explained.

■ Monitor the operation status of LAN (TC-net10)

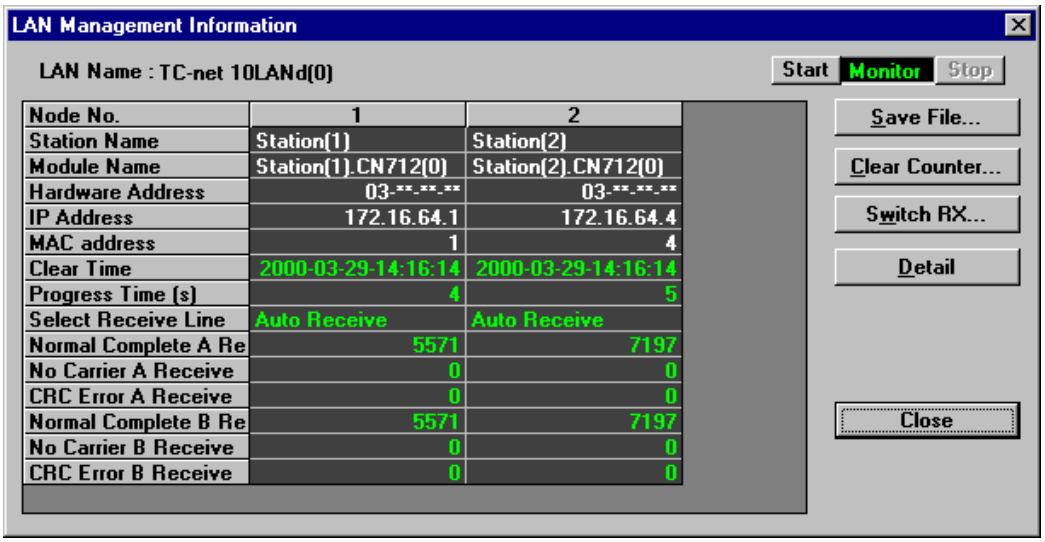
In the [Station Status] of System View, select CN module and select menu <Tool> <LAN manager information>. [LAN Management Information] will be displayed.

The following information is displayed on [LAN Management Information].

- Node ID (Name, H/W address, IP address, MAC address)
- The measurement term of a node (Cleared time stamp, Lapsed time)
- The status of a receiving line
- Error counter (Carrier crack, CRC error)

The following can be used as maintenance operation.

- Switching the receiving line
- Clearing counter

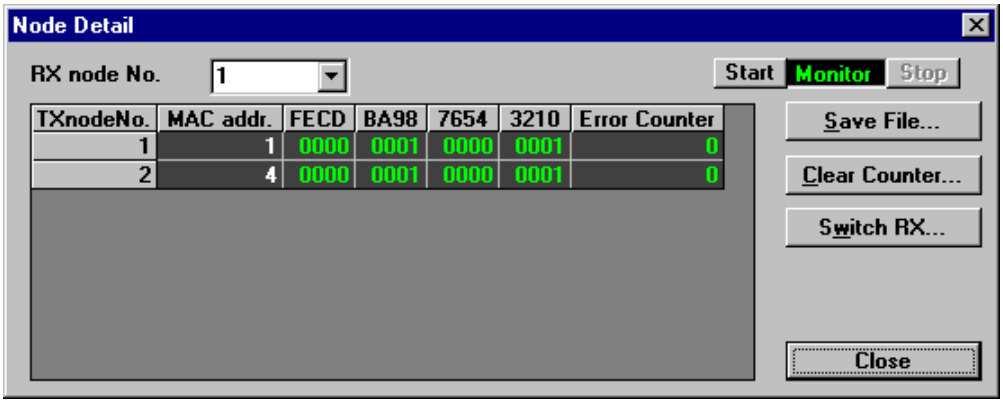


■ Know the detailed contents of error

When the error counter has risen, select the column of node and click button [Detail], or double-click the column of node. [Node Detail] are displayed.

The following information is displayed on [Node Detail].

- Error bit status
- Error counter



The node detail which has transmitted the unusual frame, and an error can be known.

The meanings of an error bit are as follows.

Error bit	Contents
0	A-line receiving normal completion
1	A-line no receiving carrier
2	A-line receiving carrier crack
3	A-line no receiving frame start delimiter
4	A-line receiving frame error
5	A-line receiving CRC error
6	A-line receiving size error
7	A-line receiving collision
8	B-line receiving normal completion
9	B-line no receiving carrier
A	B-line receiving carrier crack
B	B-line no receiving frame start delimiter
C	B-line receiving frame error
D	B-line receiving CRC error
E	B-line receiving size error
F	B-line receiving collision

■ Monitor the operation status of LAN (TC-net100)

In the [Station Status] of System View, select TN module and select menu <Tool> <LAN manager information>. [LAN Management Information] will be displayed.

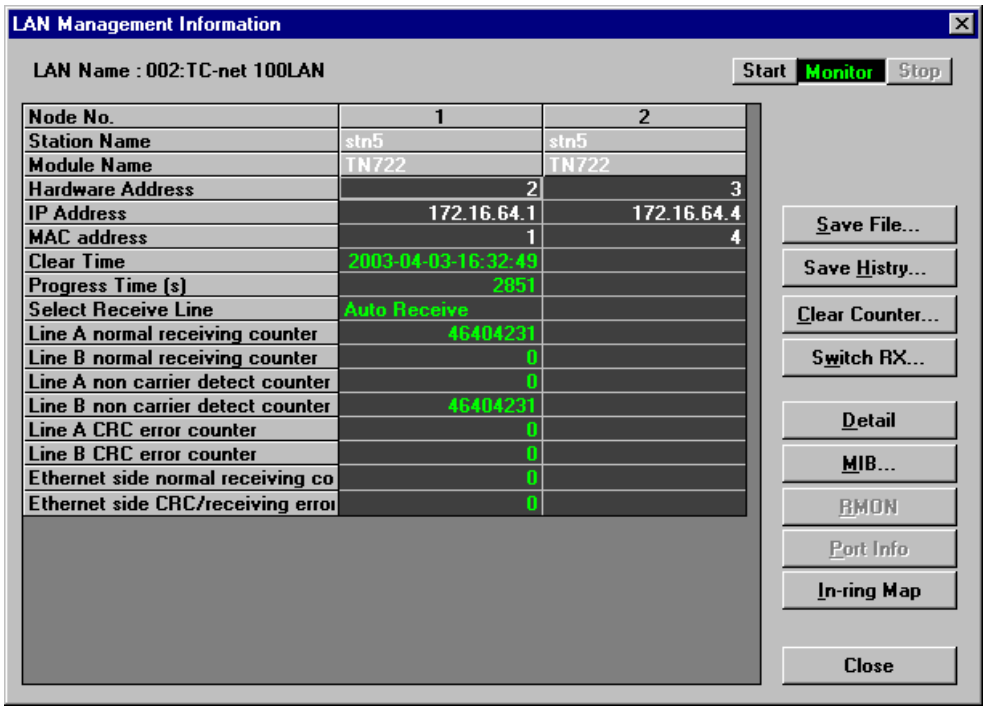
The following information is displayed on [LAN Management Information].

- Node ID (Name, H/W address, IP address, MAC address)
- The measurement term of a node (Cleared time stamp, Lapsed time)
- The status of a receiving line
- Error counter (Carrier crack, CRC error)

The following can be used as maintenance operation.

The node is selected, and each button is pushed.

- Switching the receiving line
- Clearing counter
- Display of detailed information according to node
- Display of MIB information
- Display of In-ring map
- Display of RMON information (Only a shared hub)
- The display of port information (Only a shared hub)



■ Monitor the operation status of LAN (ADMAP-5M)

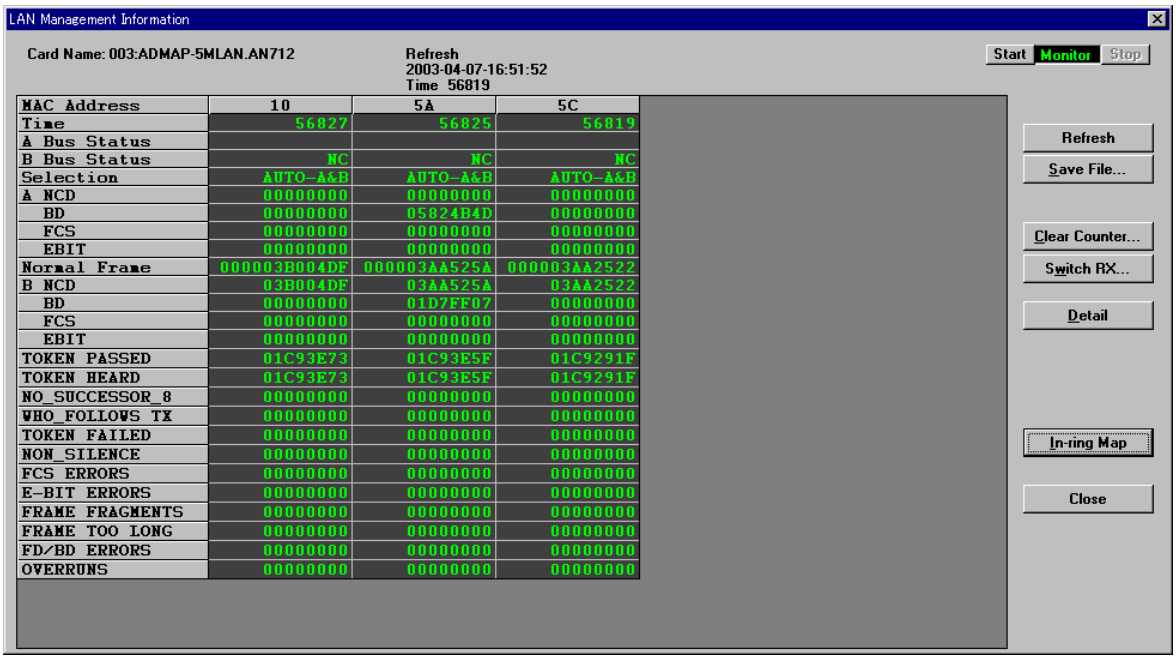
In the [Station Status] of System View, select AN module and select menu <Tool> <LAN manager information>. [LAN Management Information] will be displayed.

The following information is displayed on [LAN Management Information].

- Node ID (MAC address)
- The measurement term of a node (Cleared time stamp, Lapsed time)
- The status of a receiving line
- Error counter

The following can be used as maintenance operation.

- Refresh
- Save File
- Clearing counter
- Switching the receiving line
- Detail
- In-ring Map



Know the detailed contents of error

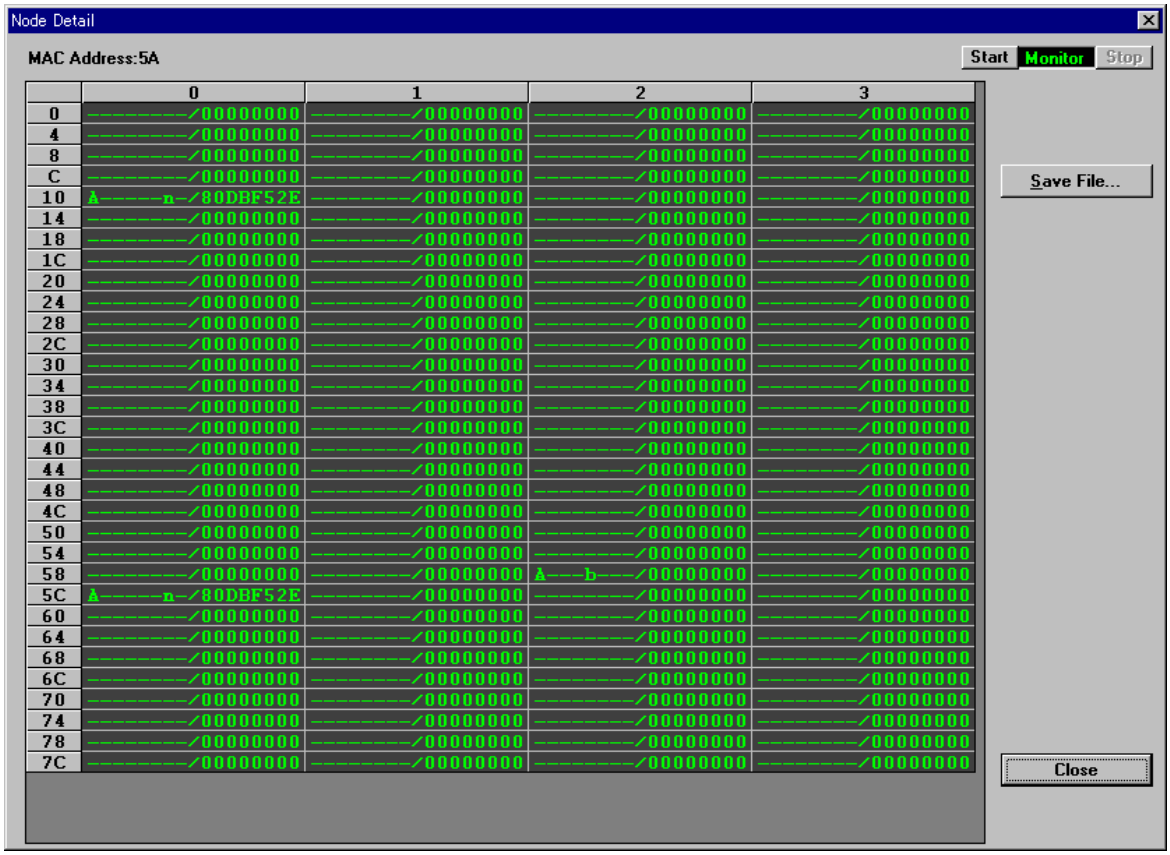
When the error counter has risen, select the column of node and click button [Detail], or double-click the column of node. [Node Detail] are displayed.

The following information is displayed on [Node Detail].

- Error bit status
- Error counter

The following can be used as maintenance operation.

- Save File



The node detail which has transmitted the unusual frame, and an error can be known.

Monitor the operation status of LAN (FL-net Control LAN)

In the [Station Status] of System View, select FL module and select menu <Tool> <LAN manager information>. [LAN Management Information] will be displayed. (Window format is same as TC-net10.)

The following information is displayed on [LAN Management Information].

- Node ID (Name, H/W address, IP address, MAC address)
- The status of a receiving line
- Error counter

The following can be used as maintenance operation.

- Clearing counter
- Scan healthy map

■ Display the scan healthy map (TC-net100, ADMAP-5M)

In the [Station Status] of System View, select TN, AN module and select menu <Tool> <Scan Healthy Map >.

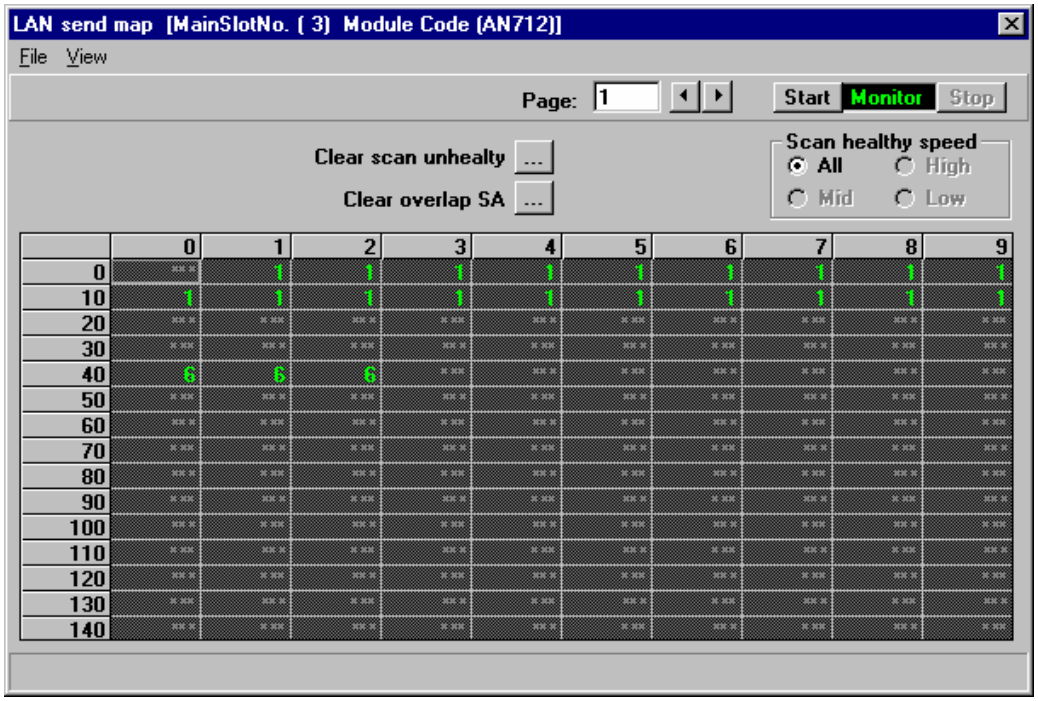
The number of a node is displayed on a block.

Healthy is meant if a numeric value is green.

Unhealthy is meant if a numeric value is red.

The following can be used as maintenance operation.

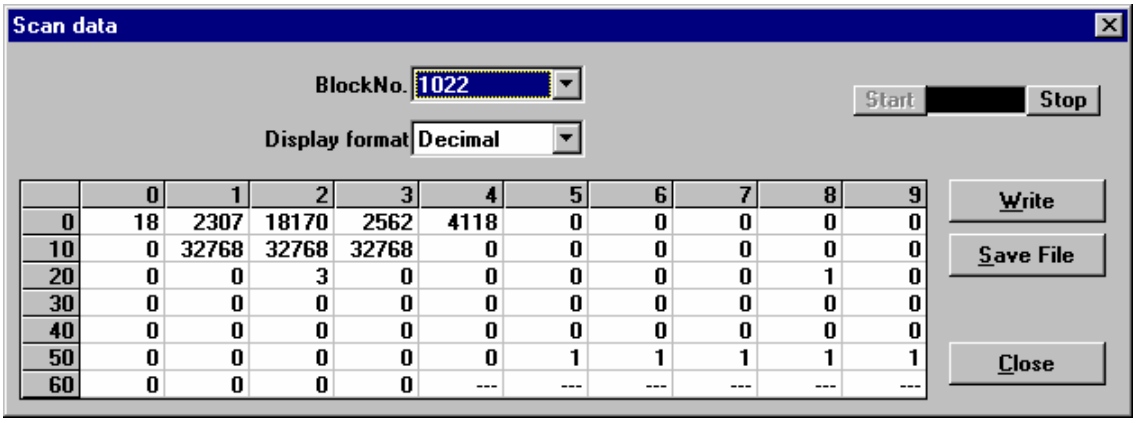
- Clear Scan unhealthy
- Clear overlap SA



■ Display the scan data (TC-net100, ADMAP-5M)

In the [Scan Healthy Map], select menu <Display> <Scan data>.

A value can be changed per word.

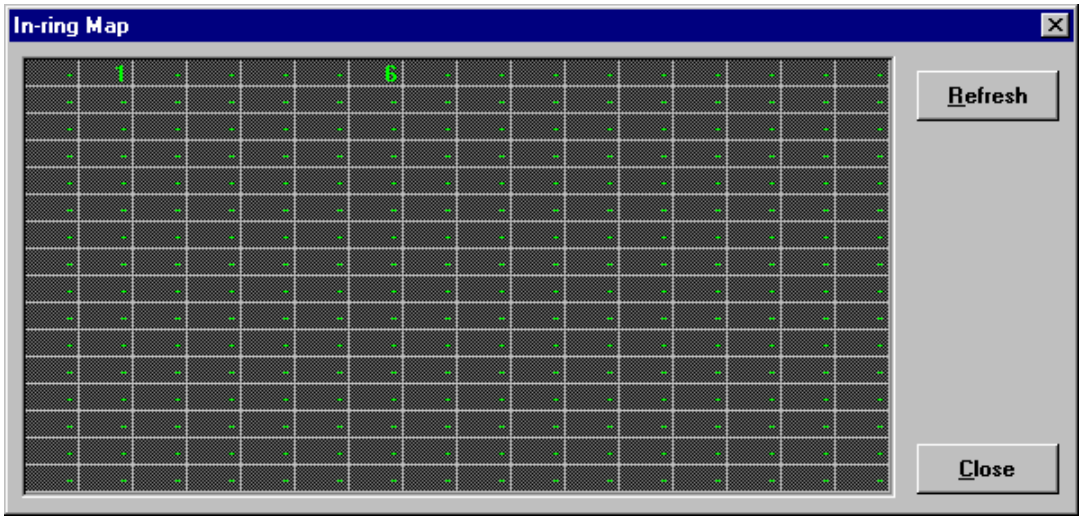


	0	1	2	3	4	5	6	7	8	9
0	18	2307	18170	2562	4118	0	0	0	0	0
10	0	32768	32768	32768	0	0	0	0	0	0
20	0	0	3	0	0	0	0	0	1	0
30	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	1	1	1	1	1
60	0	0	0	0	---	---	---	---	---	---

■ Display the node number which has entered into LAN (TC-net100, ADMAP-5M)

In the [LAN Management Information], click button [In-ring Map].

The node number which has entered into LAN is displayed.



■ Display the scan healthy map (FL-net Control LAN)

In the [LAN Management Information], select a node, and click button [Scan Healthy Map].

(Window format is same as 'In-ring Map'.)

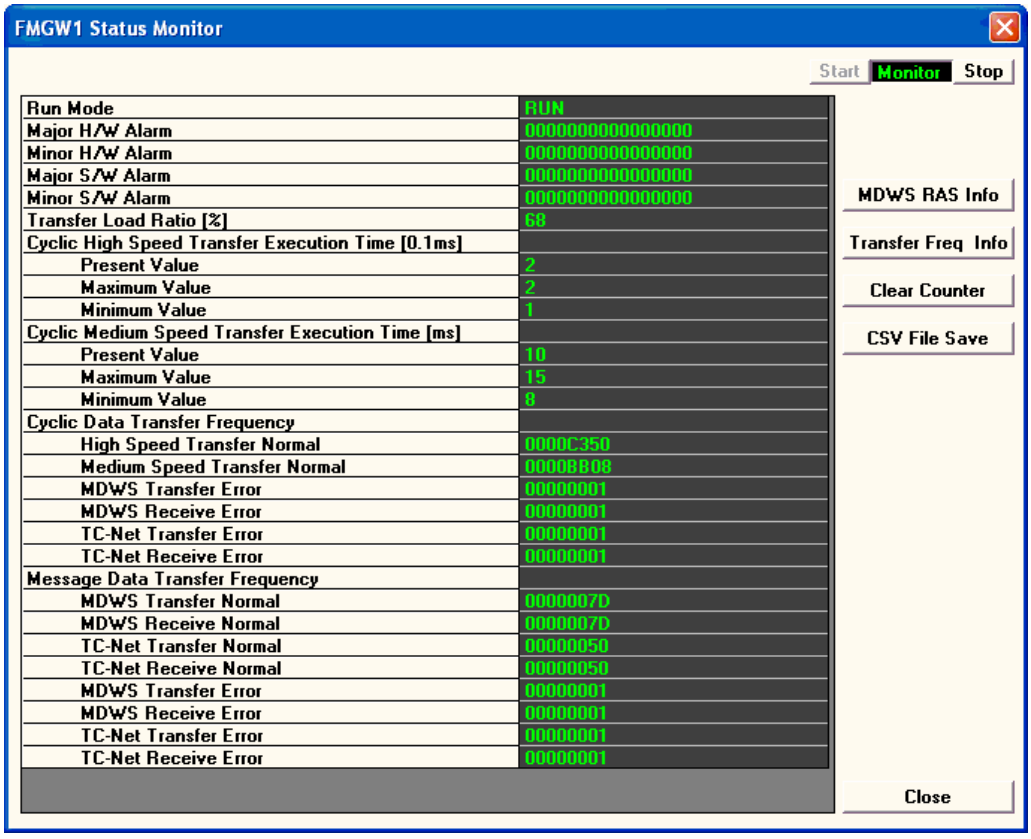
The healthy node number is displayed.

■ Display the status of FMGW1 (FMGW1)

In the [Station Status] of System View, select FMGW1 module and select menu <Tool> <FMGW1 Status Monitor>. [FMGW1 Status Monitor] will be displayed.

The following can be used as maintenance operation.

- Clearing counter



If [CSV File Save] button is clicked, the data on display can be saved at the CSV file.

The meaning of the alarm bit is as follows.

● Major H/W Alarm

Bit No.	Alarm kind	Timing
0-F	Not used	—

● Minor H/W Alarm

Bit No.	Alarm kind	Timing
0	DUM2 ALM	Abnormal interruption (DUM2 Minor alarm)
1	Parity error between DUM2 and FPGA-Fenix	Abnormal interruption (DUM2 Parity error)
2	Bus stall between DUM2 and FPGA-Fenix	Abnormal interruption (DUM2 Bus stall)
3	DUM2 FIFO overrun	Abnormal interruption (FPGA-FIFO overrun)
4	FPGA DMA Transmission size error	Abnormal interruption (DMA Transmission size error)
5	CPU Bus stall	Abnormal interruption (CPU Bus stall)
6-9	Not used	—
A	FROM BCC error	Periodic diagnosis (Flash ROM BCC error)
B-F	Not used	—

● Major S/W Alarm

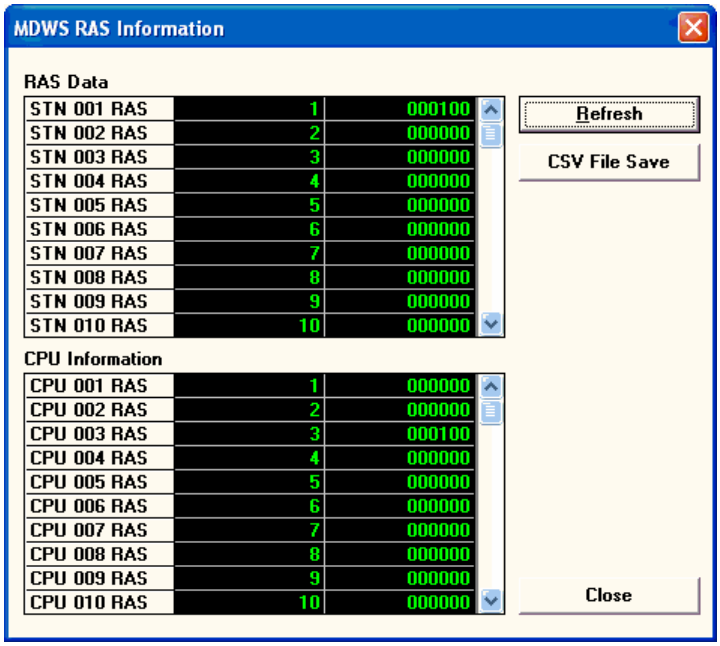
Bit No.	Alarm kind	Timing
0-F	Not used	—

● Minor S/W Alarm

Bit No.	Alarm kind	Timing
0	STN-SW is 0 or FF	Initial diagnosis
1-3	Not used	—
4	Scan talker block duplication	Periodic diagnosis
5	Scan node duplication	Periodic diagnosis
6	Scan parameter disagreement	Periodic diagnosis
7	Status transmission registration error	Download
8-F	Not used	—

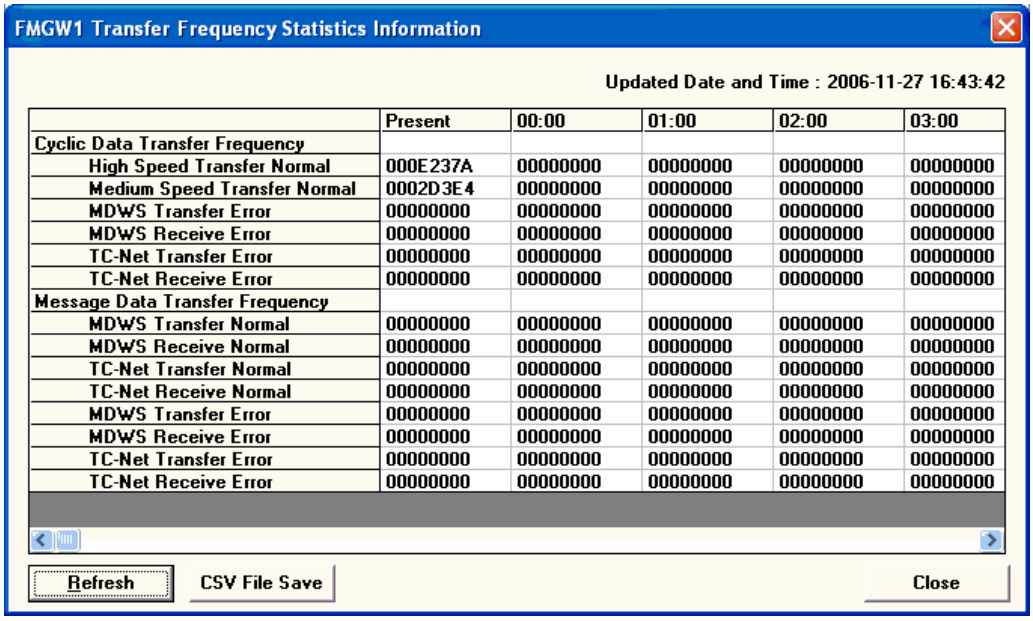
In the [FMGW1 Status Monitor], click [MDWS RAS Info] button. The “RAS data” and “CPU Information” of MDWS will be displayed.

If [Refresh] button is clicked, it will read again.



If [CSV File Save] button is clicked, the data on display can be saved at the CSV file.

In the [FMGW1 Status Monitor], click [Transfer Freq Statistics Info] button. The statistics information on the “Cyclic Data Transfer Frequency" and the "Message Data Transfer Frequency" is displayed.
If [Refresh] button is clicked, it will read again.



If [CSV File Save] button is clicked, the data on display can be saved at the CSV file.

10.9 Various Maintenance Functions

Switching operation status of a controller, a memory-maintenance of a controller, switching the receive-line status of TC-net, and releasing alarm status of a serial I/O module are explained.

10.9.1 Setting time

Displaying and setting time is explained.

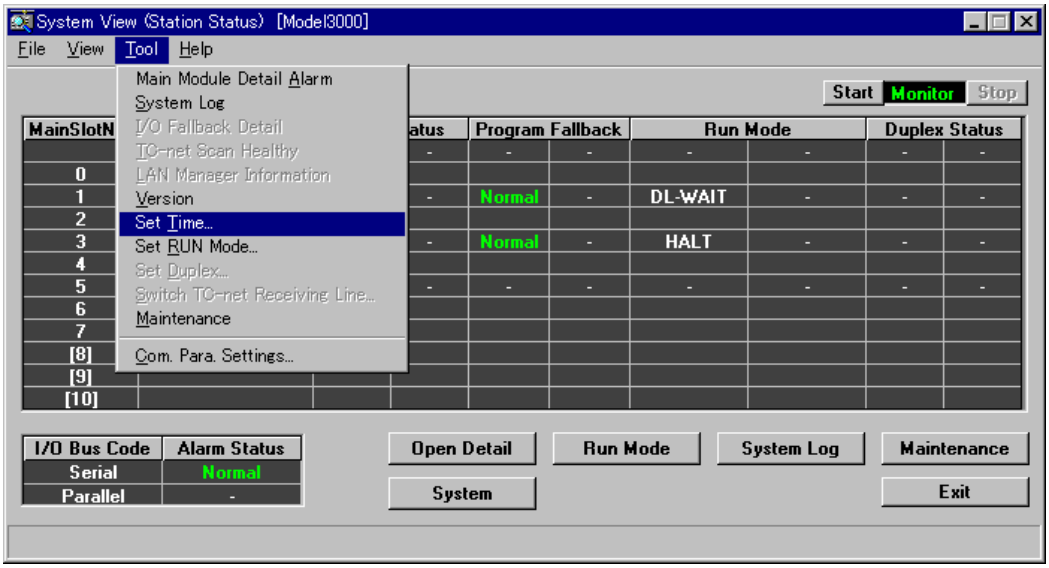
■ Set up time

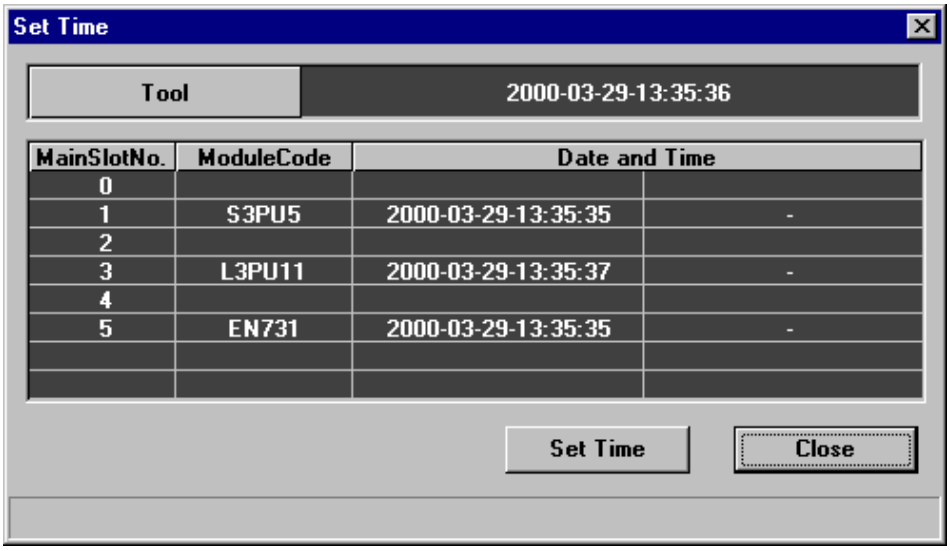
To display and set up time of a controller, select menu <Tool><Set Time> in [Station Status] of System View. [Set Time] is displayed.

Time of each controller mounted in the main unit is displayed.

When a station is duplex system, both of time is displayed in the order of Primary and Secondary.

Time of the personal computer with which an engineering tool is operating is also displayed.





Push button [Set Time], controller time is changed to time of the personal computer with which an engineering tool is operating as a controller.

When tool is connected via Ethernet LAN, time of all the stations and the controllers on a network are changed. When tool is connected via RS-232C COM port, time of a controller is changed.

◆ Note

- When you can not change the time of all the stations via Ethernet LAN, please make sure of the following settings.
- EN module parameters
- <Com. Parameter Settings> of this tool
- IP address of the PC
  Refer to "7.1 Connecting with the Controller" in "Chapter 7 Downloading" for detail information on connecting with the controller.
  Especially note the following points when the EN module is free mode.
- Select 'Single (Free mode)' in <Local Station Settings> of <Com. Parameter Settings>.
- Set the same sub-net mask to IP address setting of the PC and EN module parameter.

◇ Supplementary

Time setting To AN777

- Time setting of System View does not work with AN777.
- The time of AN777 in System View is red and displayed from one of EARI1 that is ADMAP-100F network node.

10.9.2 Switching controller operation status

The switching operation of a controller is explained.

Controller type	Operation mode					
	RUN	HALT	HOLD	RUNF	HOLD reset	Error reset
S3, S2	OK	OK	OK	OK	OK	OK
L3, L2, L1, LC, R3, R2, FN, CN614, FL654, FL754	OK	OK	—	—	—	OK

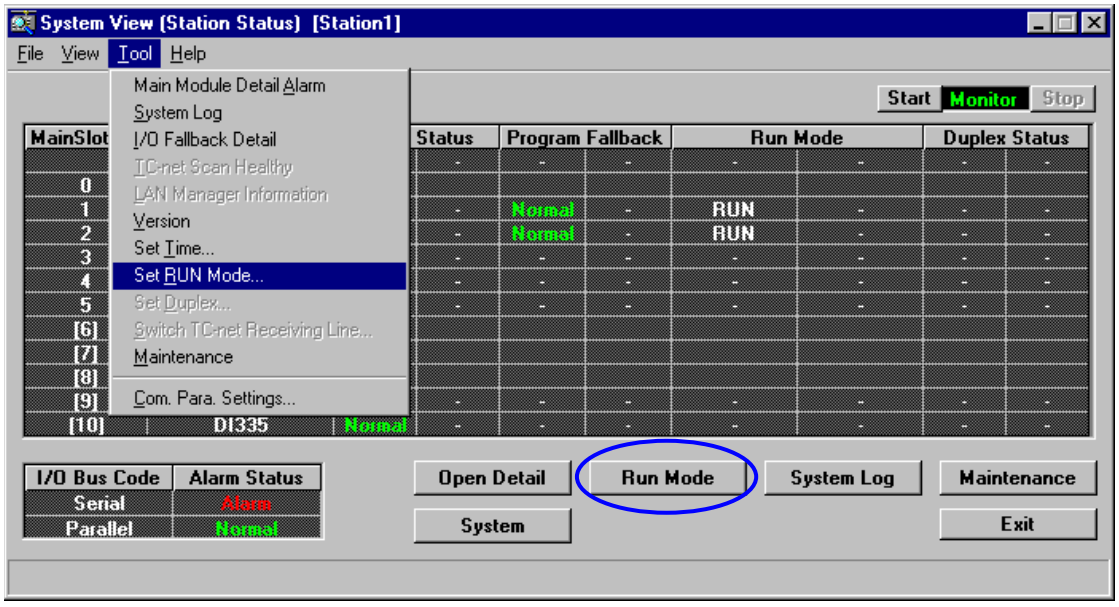
Note

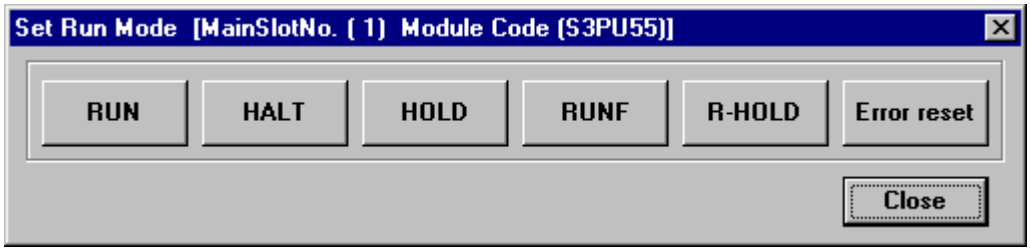
- Please see the operation manual of each controller about the contents of operation status, such as RUN and HALT.
- There is the status where a controller stops performing control, according to the kind of operation status. Moreover, a control system may be affected by changing an operation state. When switching an operation status, please perform influence on a control system.
- In the system which used duplex controller, duplex-switching may occur by switching an operation status. Please see the operation manual of each controller about the relation of mode operating status and the duplex operating status.

Switch operation mode

A duplex status can be checked in [Station Status] of System View.

To switch operation mode status, select controller and select menu <Tool><Set RUN Mode>. [Set Run Mode] dialog box is displayed.





When switching an operation state, Push button in [Set Run Mode] dialog box.

Please check having switched to the target operation status after execution.

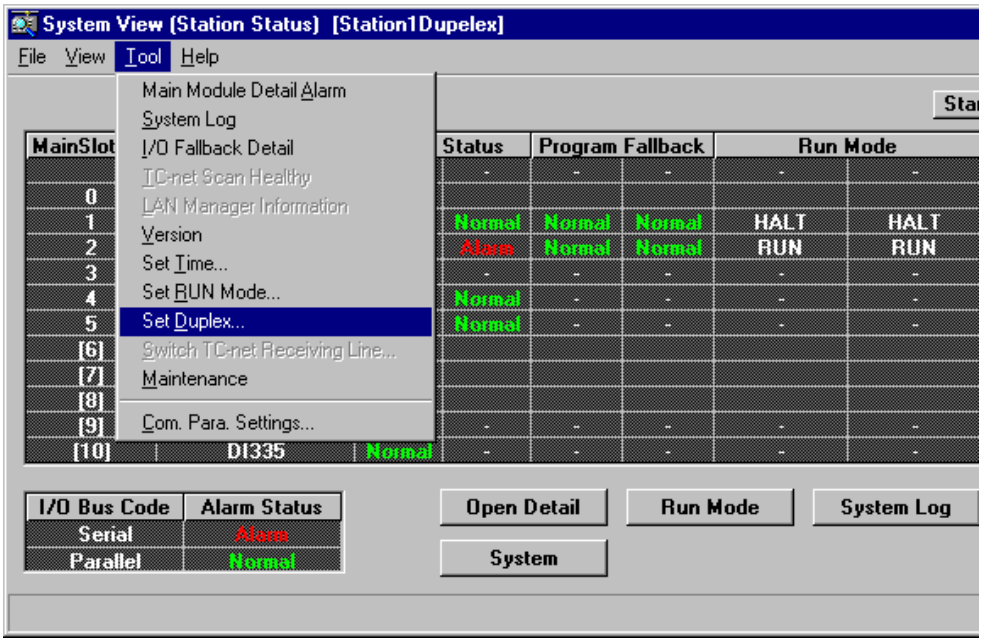
10.9.3 Switching duplex status

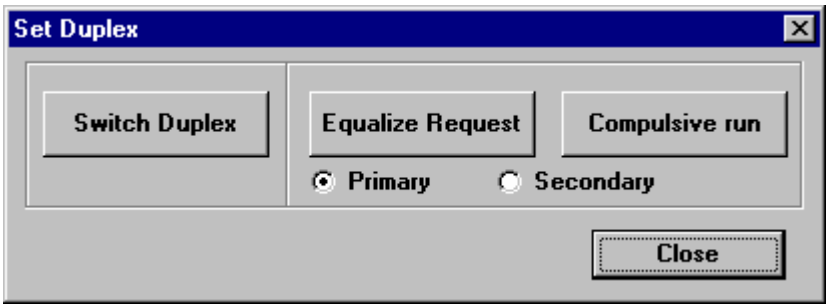
The online / standby switching of a duplex station, and equalizing are explained.

■ Switch the online / standby of a duplex station

A duplex status can be checked in [Station Status] of System View.

To switch online / standby status, select controller and select menu <Tool><Set Duplex>. [Set Duplex] dialog box is displayed.





When switching online / standby status, push button [Switch Duplex].
An online station switches to standby and a standby station switches to online.

When equalizing manually, select the destination (Primary or Secondary) and push button [Equalize Request]. Then the information of the online station will be equal to that of the standby station.

When running manually, select the destination (Primary or Secondary) and push button [Compulsive run]. Then the controller will be running alone without connecting tracking cable between Primary and Secondary.

◇ **Supplementary**

- Please see the operation manual of each controller about the detailed contents of online / standby status switching, and Equalizing.

10.9.4 Switching receiver

The receiving-line status of TC-net is explained.

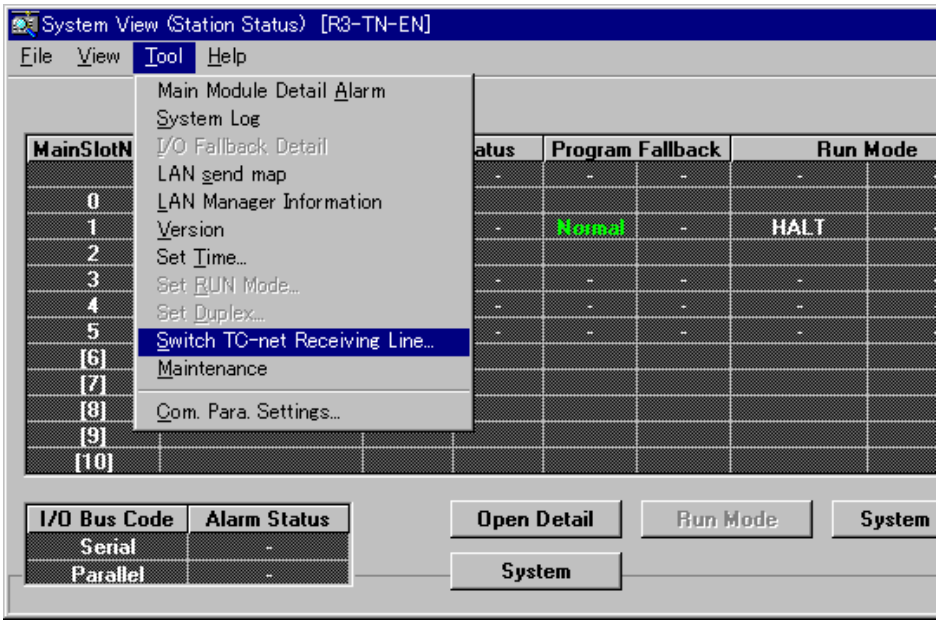
The following three status exist in the receiving-line status.

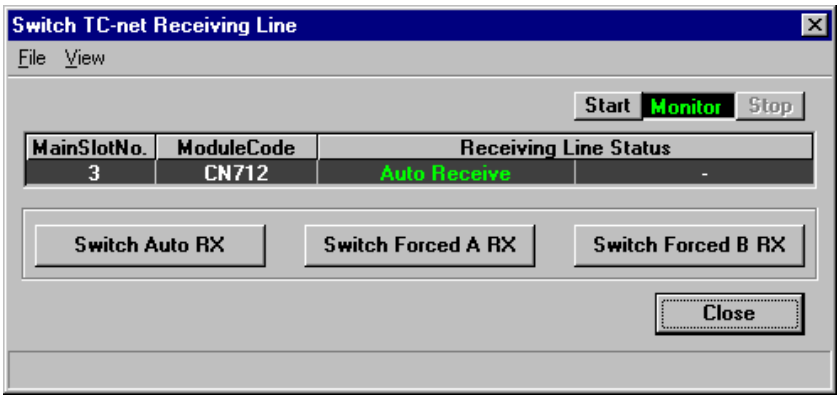
- Automatic receiving.
- A-line compulsion receiving.
- B-line compulsion receiving.

■ Switch the receiving line status of TC-net

Select CN module in [Station Status] of System View, and select menu <Tool><Switch TC-net Receiving Line>. [Switch TC-net Receiving Line] dialog box is displayed.

When a station is duplex composition, both of receiving line status are displayed in the order of Primary and Secondary.





The monitor is stopped at the time of starting. Push button [Start] in monitoring control of tool-bar to refresh screen. Push button [Stop] to suspend refreshment.

When switching the receiving line status, push a target switching button. Please check after execution having switched to the target receiving line status.

10.9.5 Clearing memory

Memory clearance: All the user memory of a controller is cleared to “0”.

When exchanging controllers, it initializes completely, and it is used when re-starting.

Clear Memory	Controller								
	L3	L2	L1, LC	S3	S2	R3	FN	CN614	FL654/754
	OK	OK	OK	OK	OK	OK	OK	OK	OK

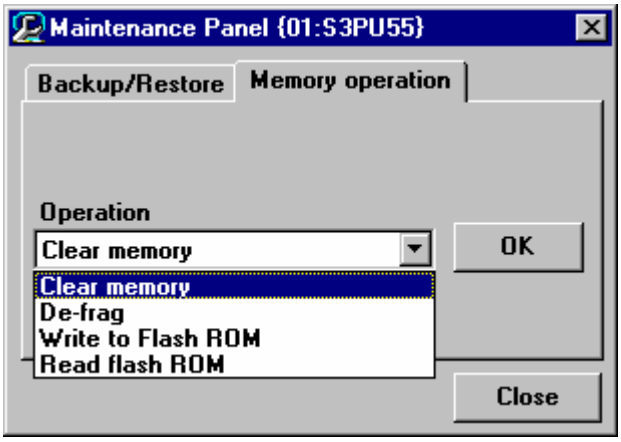
■ Clear memory of a controller

Select a controller in [Station Status] of System view, and select menu <Tool> <Maintenance>.

[Maintenance Panel] is a screen for maintaining memory of a controller.

Select tab <Memory operation>, and select "Clear memory" from pull-down menu <Operation>. Push button [OK] to start memory clearance execution.

Operation of memory clearance is available in HALT mode.



◆ Note

- It is restricted that a memory clearance can be performed from a [Maintenance Panel] when the basic program of a controller is operating normally.
  When the abnormal condition of memory, such as a parity error, does not restore, the memory clearance by the switch of a controller may be needed.
  In this case, please perform a memory clearance compulsorily according to the operation manual of a controller.

10.9.6 Defrag

Defrag: An application program and a local variable area are rearranged among the memory for users of a controller, and an empty area is secured.

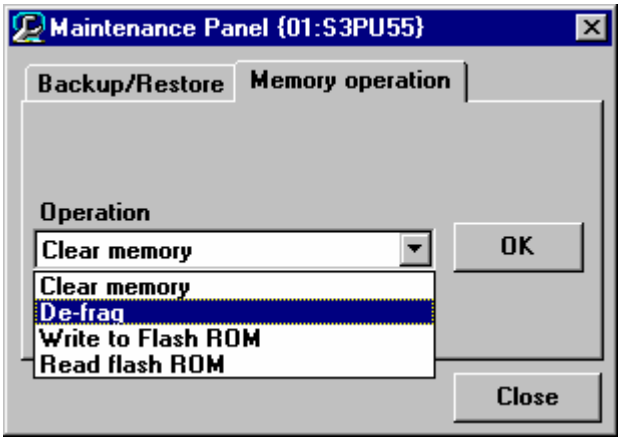
Defrag	Controller								
	L3	L2	L1, LC	S3	S2	R3	R2	STC	FN
	OK	OK	OK	OK	OK	OK	—	—	—

■ Execute defragmentation for fragmented memory of a controller

Select a controller in [Station Status] of System view, and select menu <Tool><Maintenance>.

[Maintenance Panel] is a screen for maintaining memory of a controller.

Select tab <Memory operation>, and select "De-frag" from pull-down menu <Operation>. Push button [OK] to start de-fragmentation execution.



10.9.7 Backup and restore

Backup/restoration is explained.

Backup refers to the saving of controller memory content to the Tool hard disk.

Restore refers to the writing of memory content saved in Tool hard disk to the controller.

Backup/Restore	Controller								
	L3	L2	L1, LC	S3	S2	R3	R2	STC	FN
	OK	OK	OK	OK	OK	OK	OK	OK	OK

Backup

First, switch the target controller to HALT mode.

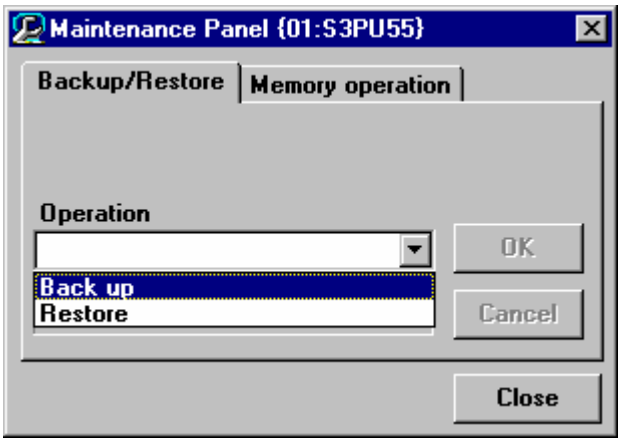
Select the target controller in [Station Status] of System View and click <Maintenance>. Then select [Backup] from the <Operation> pull down menu. Click the [OK] button to start backup.

During backup, the progress is displayed as bar graph. When backup completes, The save file dialog box appears.

Click the [Cancel] button to cancel the backup operation.

Note

- When resuming backup after canceling backup of L controller, wait at least 20 seconds before resuming.



Restore

Select the target controller in [Station Status] of System View and click <Maintenance>.

Have the target controller switched to DL-WAIT mode beforehand.

Select [Restore] from the <Operation> pull down menu of [Maintenance Panel]. Click the [OK] button to open the Select file dialog box and select the file to restore.

During restore, the progress is displayed as bar graph.

Click the [Cancel] button to cancel the restore operation.

Note

- If restore is canceled, the controller data will be incomplete and the controller will not operate normally.
- When resuming restore after canceling restore of L controller, wait at least 20 seconds before resuming.

10.9.8 Writing to FROM

FROM Write: The data downloaded to the module is backed up to ROM inside a module.

Operation	Module										
	L3 type1	L3 type2	L2	L1 LC	S3	S2	R3	STC	FN	CN	TN TL8000
Write to Flash ROM	—	—	—	OK	OK	OK	OK	OK	—	—	—
Save tag parameter	—	OK	—	—	—	—	—	—	OK	—	—
Write to EEPROM.	—	—	—	—	—	—	—	—	—	OK	OK

■ Write to ROM

Open the [Station Status] of a system view, and select a module.

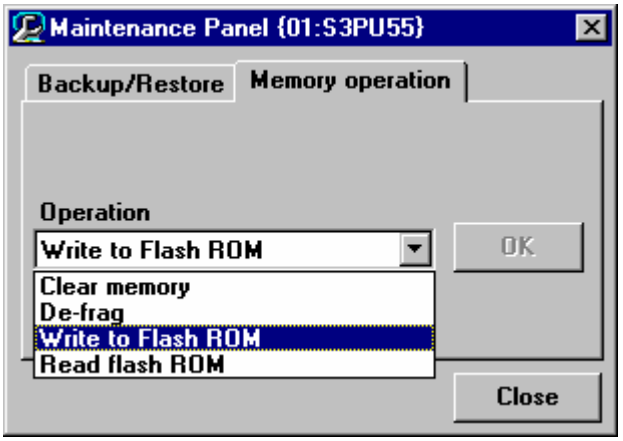
Click menu <Tool><Maintenance> in System View.

A [Maintenance Panel] is a screen for maintaining memory of a module.

Select tab <Memory operation> and select [Write to Flash ROM] from the pull-down menu <Operation>.

Push button [OK] to start ROM write.

Operation of flash ROM write is available in HALT mode.



10.9.9 Reading from FROM

FROM read-out: The data backed up by ROM in a module is read and it stores in RAM.

Operation	Module										
	L3 type1	L3 type2	L2	L1 LC	S3	S2	R3	STC	FN	CN	TN
Read flash ROM	—	—	—	—	OK	OK	OK	OK	—	—	—
Restore tag parameter	—	OK	—	—	—	—	—		OK	—	—

■ Read-out from ROM

Open the [Station Status] of a system view, and select a controller.

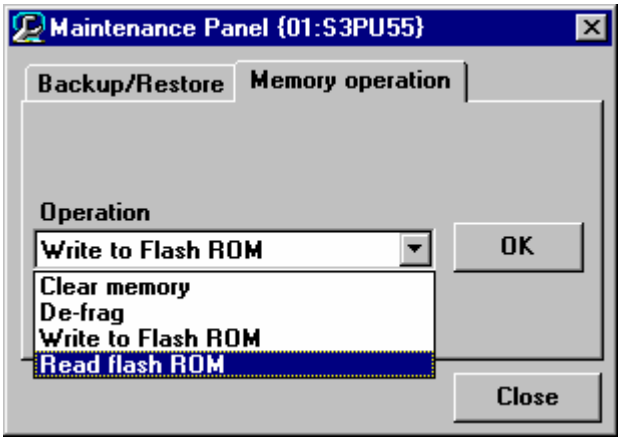
Click menu <Tool> <Maintenance> in System View.

A [Maintenance Panel] is a screen for maintaining memory of a controller.

Select tab <Memory Oparation> and select [Read Flash ROM] from the pull-down menu <Operation>.

Push button [OK] to start ROM read-out.

Operation of flash ROM read-out is available in HALT mode.



10.9.10 Clearing output reset

Releasing output reset status of a serial analog and digital output module is explained.

Release output reset status: The status which is outputting "0" compulsorily.

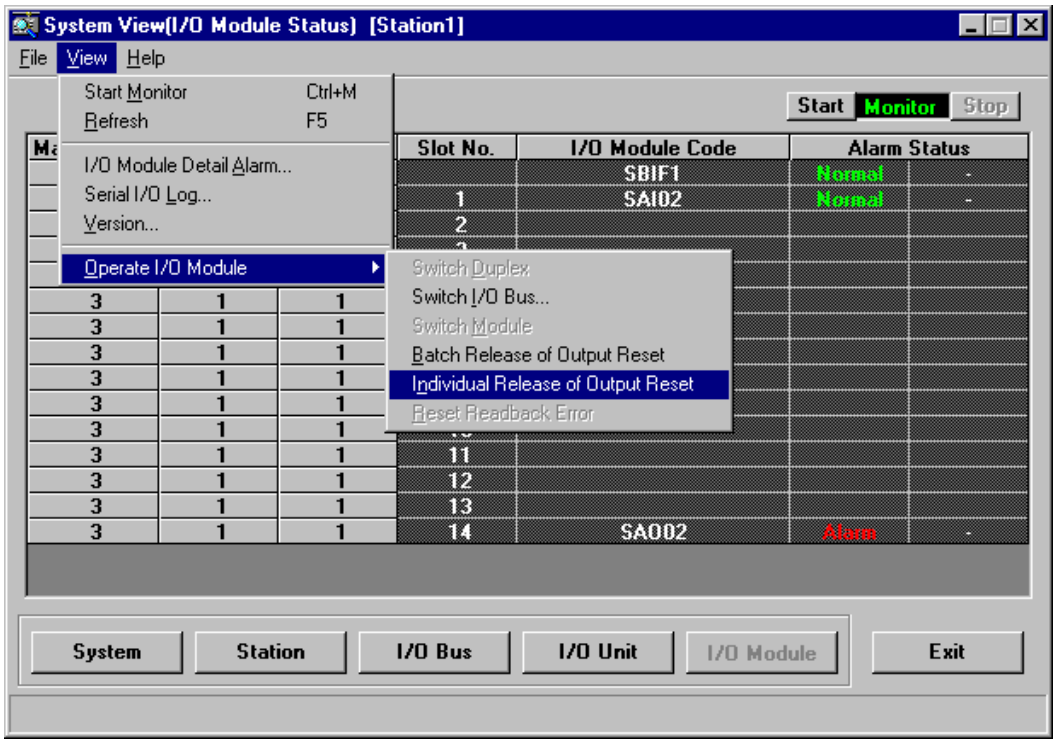
It becomes this status when the abnormalities in transmission occur in a serial bus and an I/O bus.

■ Release the output reset status of I/O module

In the [I/O Module Status] of System view, it can be checked whether the output reset status has occurred.

In order to cancel an output reset status, there are 2 kinds of following methods.

- Batch Release of Output Reset
  Select menu <View> <Operate I/O Module><Batch Release of Output Reset>.
  The output reset status is released per unit.
- Individual Release of Output Reset
  Select the analog or digital output module which the output reset status has occurred, and select menu <View> <Operate I/O Module> <Individual Release of Output Reset>.
  The output reset status of selected module is released.



10.9.11 Clearing read-back error

Resetting read back error of a serial I/O analog-output duplex module is explained.

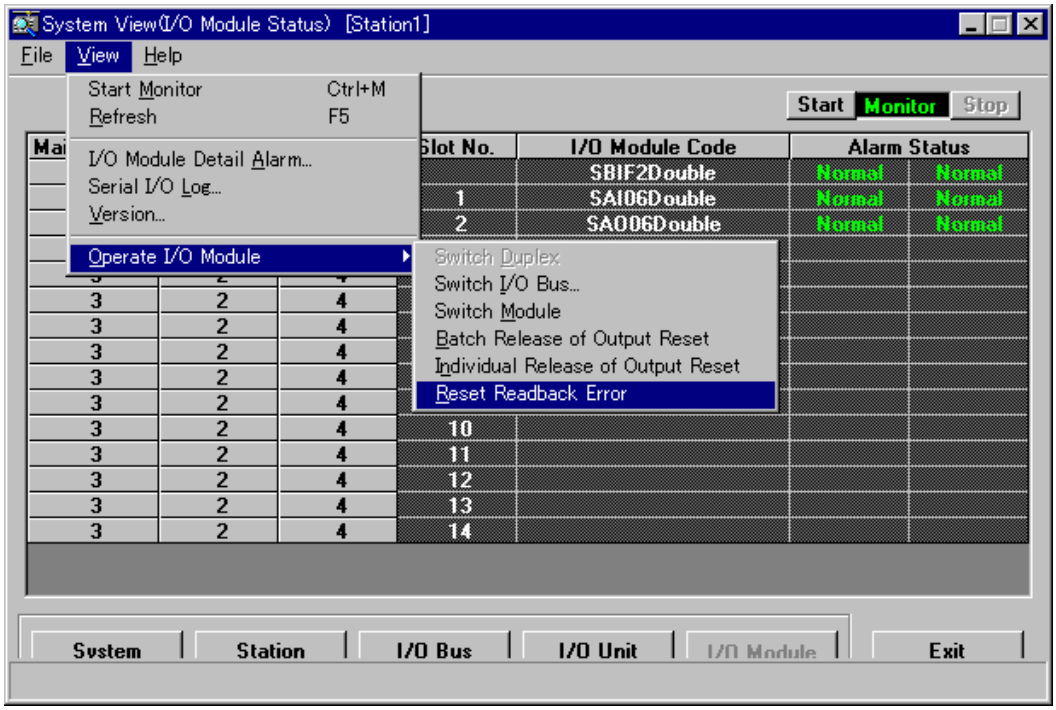
This operation is a function for resetting “Read-back Error” of a standby side module which disconnected the output-line.

■ Reset the read back error of I/O module

In the [I/O Module Status] of System View, it can be checked whether "Read-back Error" alarm occurred.

Select the analog-output duplex module which “Read-back Error” has occurred, and select menu <View> <Operate I/O Module><Reset Readback Error>.

“Read-back Error” which occurred in the standby side module is reset.



10.9.12 I/O Module online replacement

Setting online replacement of I/O module is explained.

This function separates the specified I/O card from the batch I/O process, direct I/O process and diagnosis of a controller, and enables online replacement of I/O modules.

Controller type		Operation mode			
		RUN	HALT	HOLD	RUNF
S	Model3000 (*1)	○	None	None	○
	Model2000	None	None	None	None
L, LC, R3, FN		None	None	None	None

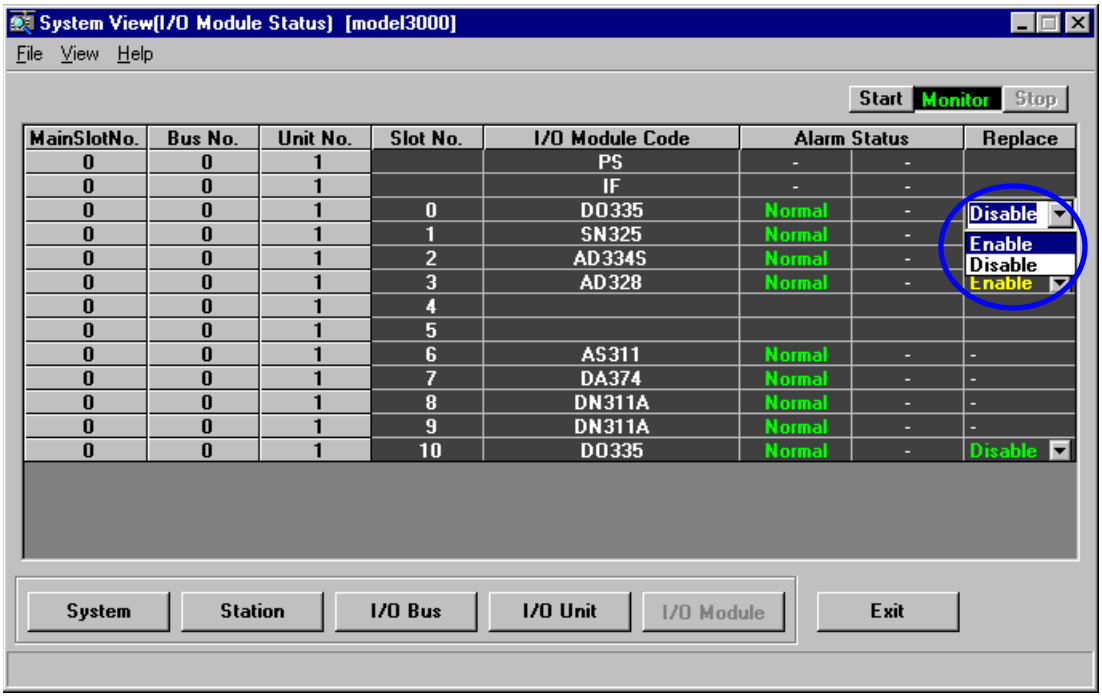
(*1) Basic software Version 02.61 or more.

■ Setting online replacement

Open the [I/O module status] window of a system view. In detail about open the window; please refer to the manual of the 9.4 Monitor I/O Loop Status.

Click the column of “Replace” and select “Enable”. Then confirm dialog is shown. Press <OK>.

After setting of Online replacement is completed, the column of “Replace” is update.

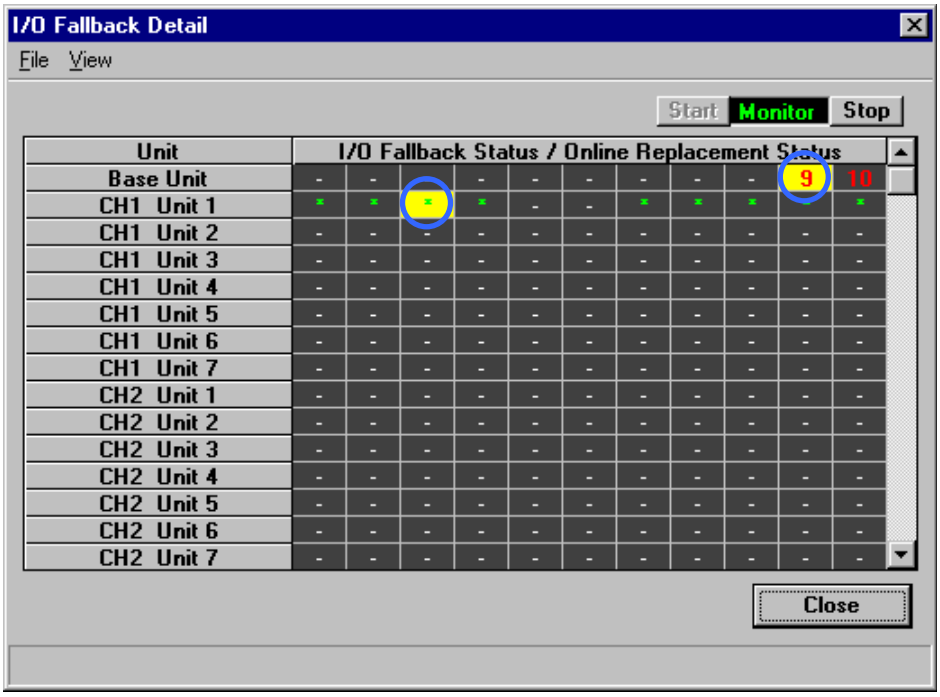


■ Confirm the status of online replacement in the station

Open the [Station Status] window of a system view.

Select the S controller which is registered left end, and select menu <Tool><I/O Fallback Detail> in [Station Status] of SystemView. Then “I/O Fallback Detail” window is displayed.

The module that is displayed in yellow means enable Online replacement.



The meaning of the back color and character as follows.

Back color	Character	
	Number	‘*’
Black	The slot number of Fallback. Disable Online replacement.	Normal Disable Online replacement.
Yellow	The slot number of Fallback. Enable Online replacement.	Normal Enable Online replacement.

–: No registering of I/O

■ Releasing online replacement

Click the column of “Replace” and select “Disable”.

If the operation mode of the controller is changed from ‘HALT’ to ‘RUN’, all online-replacement settings are released at once.

10.10 Externally Starting the RAS Window

This topic describes how to execute system view and system log screen externally from user application other than V-Tool.

■ Assumptions

1) The user application is on the same PC and platform as V-Tool.
2) The PC has sufficient resources (CPU, memory, disk) to run both the user application and V-Tool at the same time.
3) V-Tool and user application are organized independently and executes the invocation command using the Windows Shell.

■ Displaying station view in system view

● Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysView
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName

● Start command
The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}
Start command example [Standalone version]/[Client/Server version]
“C:\Program Files\VEngTool\SysView” /T /M SystemName,StationName

◇ Supplementary

- If the path name of the program file contains space as in "Program Files", enclose the entire path name within double quotation marks to distinguish it from DOS command separator.
- In System View started by the command, [System Log] button is enabled. Selecting a main module and opening the System Log can be available.

■ Displaying TC-net100 status in system view

- Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysView
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName
Slot No.	Slot No. of main unit connected to TC-net100	2
Bus No.	Fixed to 0 (Unused)	0
Unit No.	Fixed to 0 (Unused)	0
Screen No.	Specify the type of screen to display with number 0: LAN transmission map 1: LAN control information	1

- Start command

  The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}, {slot No.}, {bus No.}, {unit No.}, {screen No.}
Start command example [Standalone version] /[Client/Server version]
“C:\Program Files\VEngTool\SysView” /T /M SystemName,StationName, 2, 0, 0, 1

■ Displaying main module log in system view

- Start parameters

Parameter	Description	Example
Program file name	Program file name in system view (full path)	C:\Program Files \VEngTool\SysLog
/T	Display the window in system view in front. Optional. Note: /T must be followed by /M.	/T /M
/M	Enable display function menu only. Optional.	/M
System name	Name of system to display	SystemName
Station name	Name of station to display	StationName
Slot No.	No of module to display	1

- Start command
  The following shell command is used together with the above parameters to start the system view.

Start command
{program file name} /T /M {system name}, {station name}, {slot No.}
Start command example [Standalone version] /[Client/Server version]
“C:\Program Files\VEngTool\SysLog” /T /M SystemName,StationName,1

Chapter 11
V-Tool Maintenance

This chapter is intended mainly for system administrators and describes the engineering tool maintenance method.
The following tool maintenance topics are covered. Perform these as necessary in any order.

11.1 Importing/Exporting User System

This section describes how to import/export user system in system folder units.

Using the import and export functions enables exchange between different PCs in system units.

■ Supported media

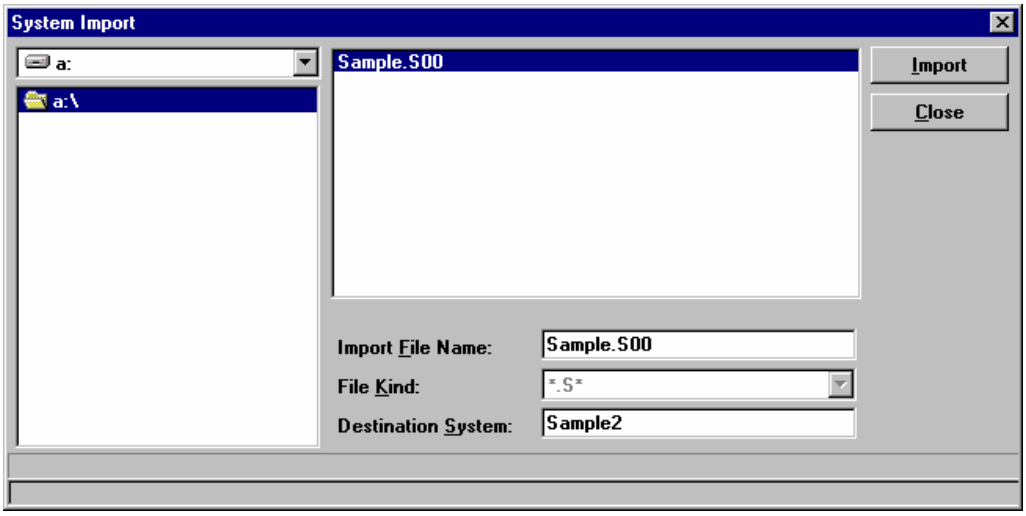
Any writeable media may be used as long has it has sufficient capacity.

■ Starting import

Select a system at left top of the [Product Tree] and select <Import> from the <File> menu.

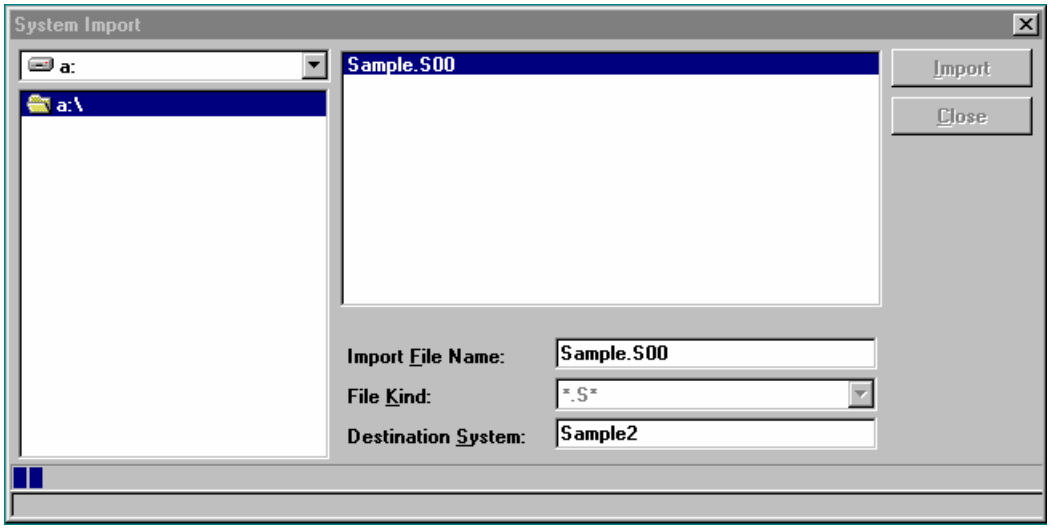
■ Importing

1) Select the file to import and the destination system in the [System Import] window.



- Drive, folder, file: Select the drive, folder, and file name of the file created during system export.
- Import destination system name: Enter the import destination system name.

2) Set the above import conditions in the window as necessary and click the [Import] button to import.



3) The execution progress is indicated by the progress bar.

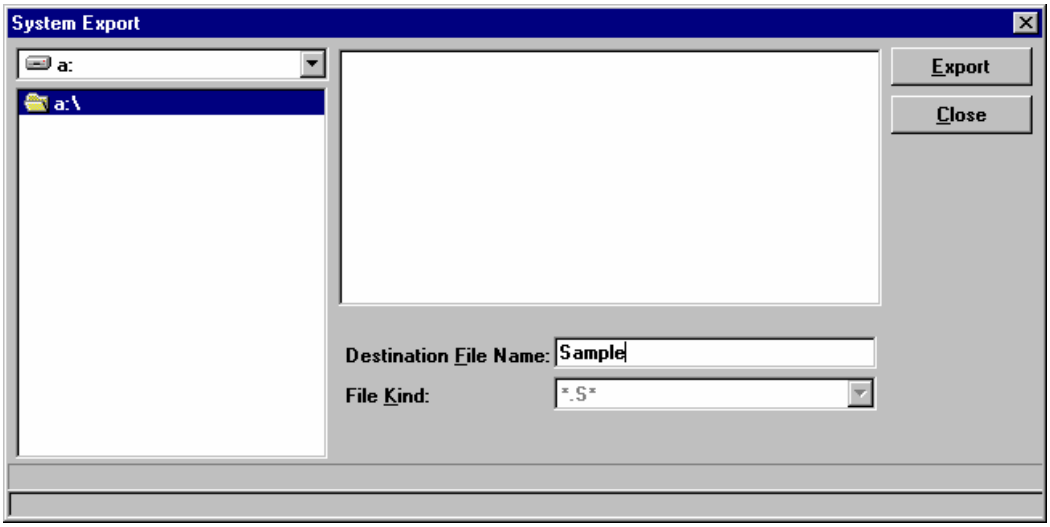
4) Hereafter, follow the displayed instructions.

■ Starting export

Select the system to export at left bottom of the [Product Tree] and select <Export> from the <File> menu.

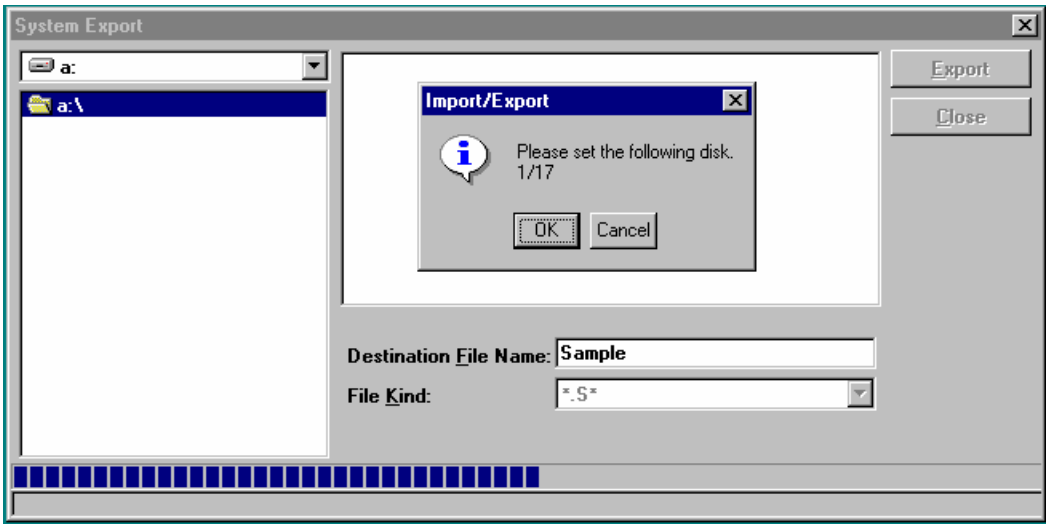
■ Exporting

1) Specify the export destination in the [System Export] window.



- Drive, folder: Select the export destination drive and folder.
- File name: Enter the export destination file name.

2) Set the above export conditions in the window as necessary and click the [Export] button to export.



3) The execution progress is indicated by the progress bar.

4) Hereafter, follow the displayed instructions.

11.2 Importing/Exporting Library

This section describes how to import/export user libraries.

<Library> import/export is performed for the following items:

- Import/export of user defined type unit or units
- Import/export of user program unit or units

Using the import and export functions enables exchange between different PCs or systems in user defined type, user program, or user library units.

Supported media

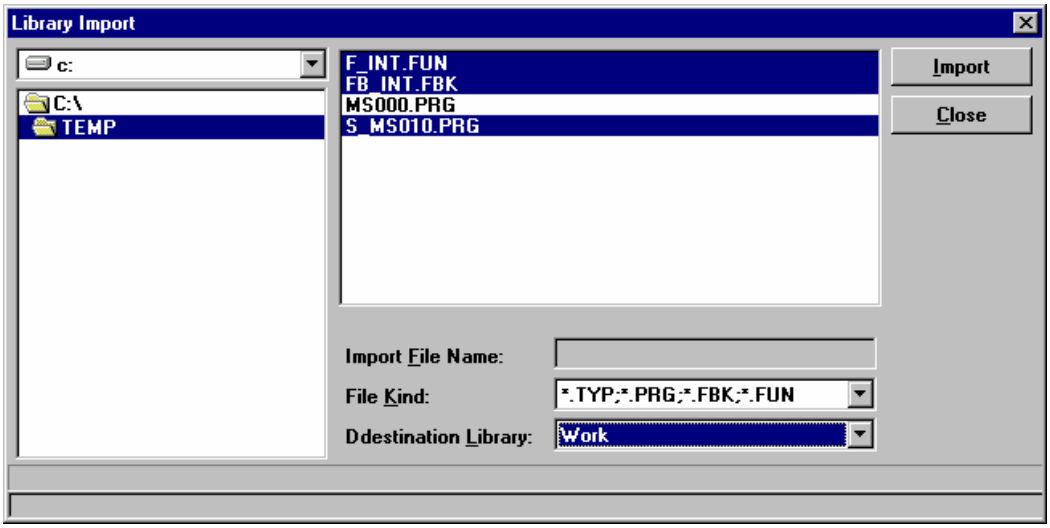
Any writeable media may be used as long has it has sufficient capacity.

Starting import

Select a library at bottom left of the [Product Tree] and select <Import> from the <File> menu.

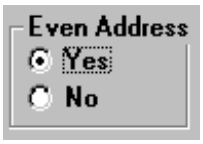
Importing

1) Select the file to import and the import destination system in the [Library import] window.



- Drive, folder, file:
  Select the drive, folder, and file name containing the file created during library export.
- Import destination library name:
  Enter the import destination library name.

- Even address forced:
  This option is used for the user data type member.

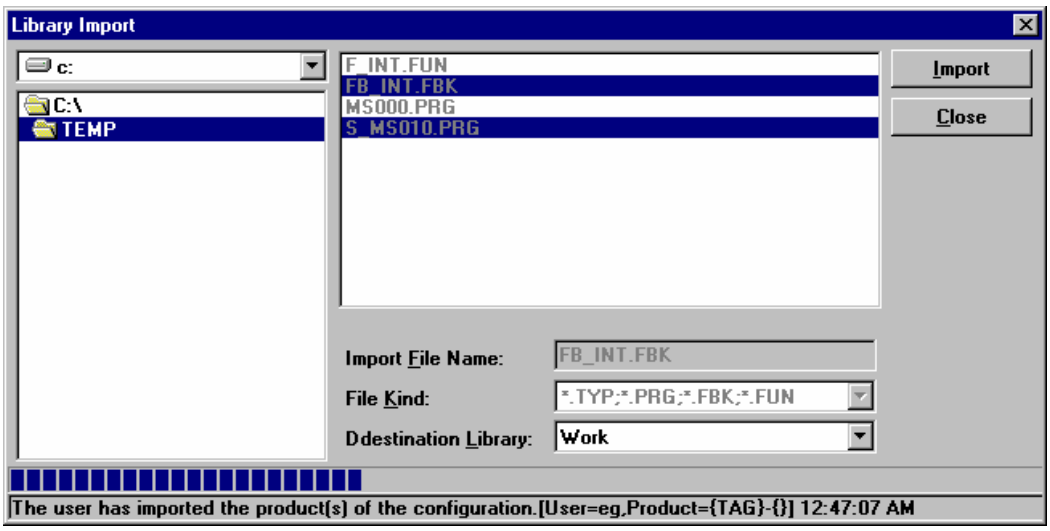


'No': The user data type members are allocated tightly.
'Yes': They are aligned on the double-word address.

◆ Note

- If Option 'Even Address Forced' is 'No', the Network or Station variables using this Structure which may has REAL,DINT,DWORD data types which length is over 2-word will have wrong values at run time.

2) Set the above import conditions in the window as necessary and click the [Import] button to import.



3) The execution progress is indicated by the progress bar.

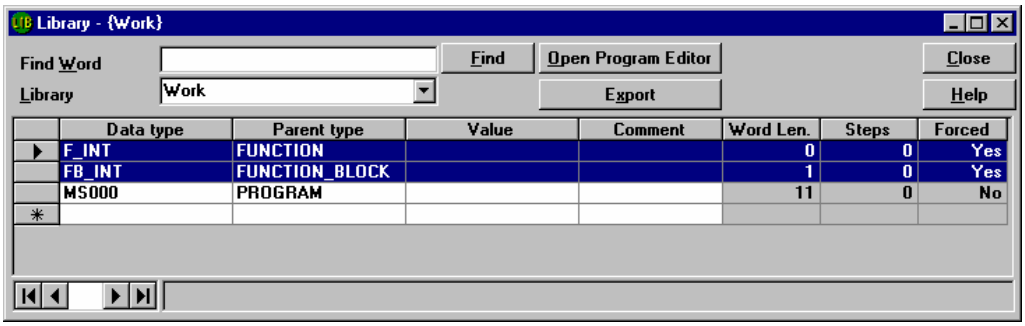
4) Hereafter, follow the displayed instructions.

◇ Supplementary

- Import destination library name
  Specify an existing library name (other than Standard…) as the import destination library name.
- Import sequence
  If the import target type (TYP-A) uses a different type (TYP-B), import TYP-B first and then import TYP-A.
  Furthermore, if the import target POU (POU-A) uses a different POU (POU-B), import POU-B first and then import POU-A.

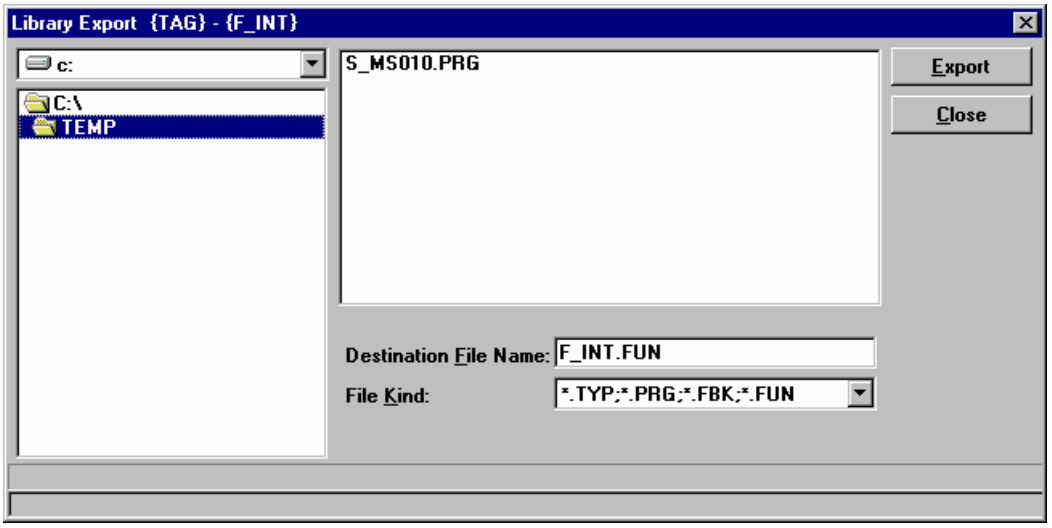
■ Starting export

Select the export type name in the [Library] window and click the <Export> button.



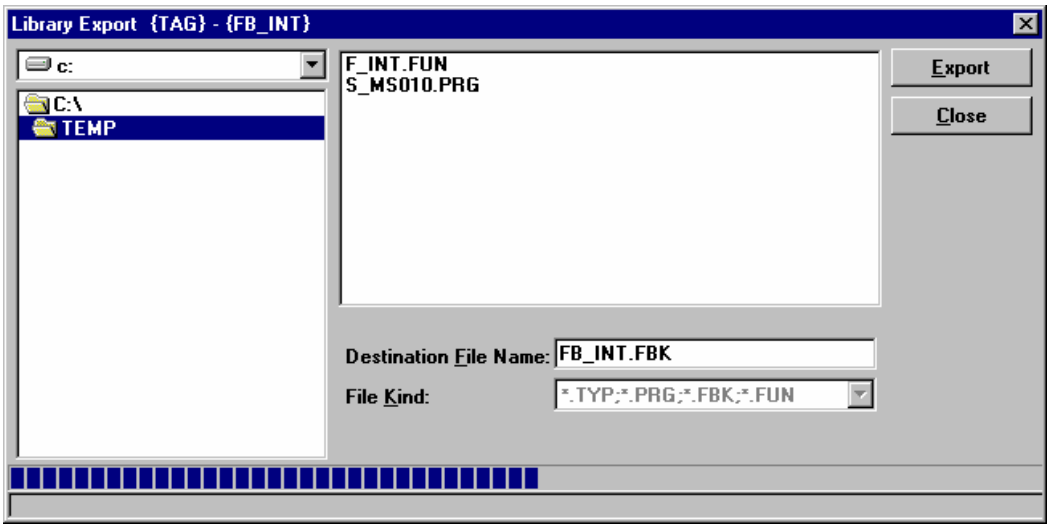
■ Exporting

1) Specify the export destination in the [Library export] window.



- Drive, folder: Select the drive and folder to store the export result.
- Export destination file name: Enter the file name to save the export result.

2) Set the above export conditions in the window as necessary and click the [Export] button to export.



3) The execution progress is indicated by the progress bar.

4) Hereafter, follow the displayed instructions.

◇ **Supplementary**

- Export destination file name
  Do not change the extension (TYP, PRG, FBK, FUN) when changing the export destination file name, such as when the file name is duplicated. If changed, the data type cannot be determined and import will fail.

■ Exporting format of user data type

Address information of the structure members ('Word No.', 'Bit No.', and 'Word Length') are exported as comment.

```
TYPE
    SPC:STRUCT
        WRDIA:REAL;   (*Work Roll Diameter. (m)*)(*0,0,2*)
        PAI:REAL;     (*Circular Constant*)(*2,0,2*)
        GEAR:REAL;    (*Gear Ratio*)(*4,0,2*)
        RT:REAL;       (*SPC Rate (m/s2)*)(*6,0,2*)
        K:REAL;       (*SPC APC Gain K*)(*8,0,2*)
        ACR:REAL;     (*SPC Accuray*)(*10,0,2*)
        SEL:BOOL;     (*Striker One Select Flag*)(*12,0,1*)
    END_STRUCT;
END_TYPE
```

◇ **Supplementary**

- Bold type characters are 2nd comment as address information.
- From left to right in 2nd comment, 'Word No.', 'Bit No.', and 'Word Length'.

11.3 Importing/Exporting In Text Format

This section describes how to import/export user products in text format in network unit or station unit.

Using the function to import and export in text format enables collaboration with user's higher level Case tools that can handle text format data and efficient data editing using commercial software.

■ Target products

- User I/O variables (including scan data)
- User global variables
- User task entry, POU entry
- User hardware configuration
- User hardware parameters

The following are not included in the target for this product. Use the user library import/export function.

- User POU
- User data type

■ Supported media

Any writable media may be used as long has it has sufficient capacity.

Compressed/split file format (*.P00) can be used to exchange data using floppy disks (FD).

■ How to use importing

Using the function to import, the difference of importing result should be known.

- Add products
  When a product is not registered yet, it is added.
- Change products
  When a product is already registered, it is changed.
- Update products
  When a product has a initial state, it is updated. Initialization also means ‘Deleting’.

Added products can not be deleted. If they should be deleted, please delete them from registration before importing.

■ Differences among the products are as follows

● Network information

1) LAN node configuration

- Add: When a node is not registered yet, it can be added.
- Change: Not available. When a node is already registered, it can not be changed.

2) Send block

- Update: Using specified block number, registration can be updated. Initialization is also available.

3) Network variable

- Add: When a variable is not registered yet, it can be added.
- Change: When a variable is already registered, the data type of variable can be changed.
- Update: When a variable is already registered, the comment of variable can be updated. Initialization is also available.

● Station information

1) Hardware configuration

- Add: When a hardware is not registered yet, it can be added.
- Change: When a hardware is already registered, convertible 'Catcode' can not be changed.
  Available 'Catcode' can be checked in other section; See 'Changing Name' of 'Product tree'

2) Hardware parameter / point parameter

- Update: Using specified item number, registration can be updated. Initialization is also available.

3) Station variable

- Add: When a variable is not registered yet, it can be added.
- Change: When a variable is already registered, the data type of variable can be changed.
- Update: When a variable is already registered, the comment of variable can be updated. Initialization is also available.

4) Controller variable

- Add: When a variable is not registered yet, it can be added.

- Change: When a variable is already registered, the data type of variable can be changed.
- Update: When a variable is already registered, the comment and value of variable can be updated. Initialization is also available.

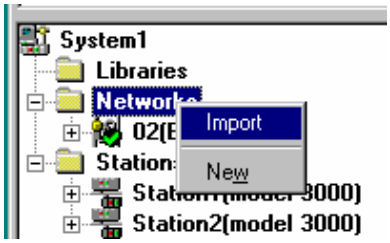
5) Task entry

- Update: Using specified entry number, registration can be updated. Initialization is also available.

6) POU entry

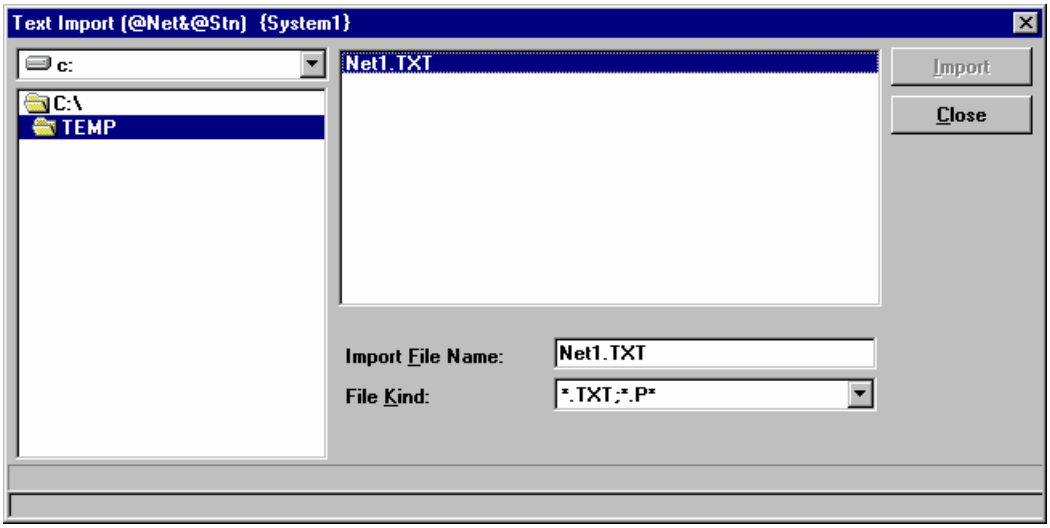
- Update: Using specified entry number, registration can be updated. Initialization is also available.

■ Starting import



Select a <Network> or <Station> and select <Import> from the <File> menu.

■ Importing



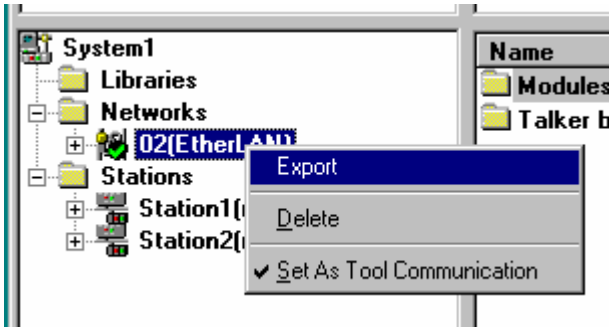
1) Select the file to import in the [Text import] window.
   Drive, folder, file: Select the drive, folder, and file name containing the created text file.
2) Set the above import conditions in the window as necessary and click the [Import] button to import.
3) The execution progress is indicated by the progress bar.
4) Hereafter, follow the displayed instructions.

◇ **Supplementary**

- Text contents are pre-checked before importing. When errors are found in the text using pre-checking, logged them and importing is canceled. When importing is completed abnormally, please see the logged file and correct text and re-try importing. (The pre-checking function is supported V2.8.0 or later.)

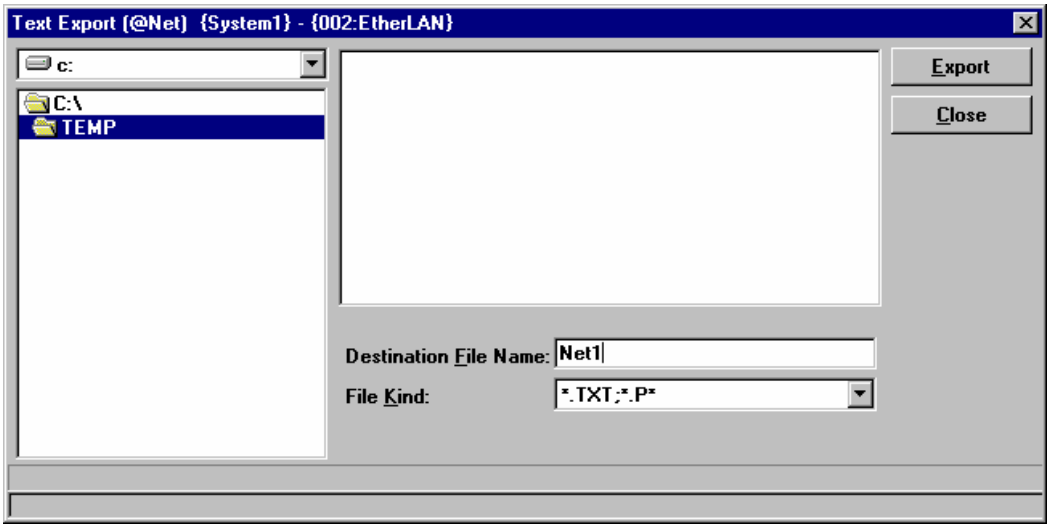
■ Starting export

Select a target network or station at bottom left of the Product Tree and select <Export> from the <File> menu.



■ Exporting

1) Specify the export destination file in the [Text export] window.



- Drive, folder: Select the drive and folder to store the export result.
- Export destination file name: Enter the file name to save the export result.

2) Set the above export conditions in the window as necessary and click the [Export] button to export.

3) The execution progress is indicated by the progress bar.

4) Hereafter, follow the displayed instructions.

■ Text format (sample)

Keywords such as @Net, @End_Net are used to store multiple CSV format tables in a single file.

● In the case of network

```
@Net
    (* NetNo,Catcode *)
    "1","TC-net 100LAN"
    @LanConfig
            (* NodeNo,StationName,HAddress,Catcode *)
            "1","Station1","03-**-**-**","TN721"
            "2","Station1","04-**-**-**","TN721"
    @End_LanConfig
    @SysBlocks
            (* BlockNo,TopWordNo,BlockWSize,Speed,OutNodeNo,OutCntSlot *)
            "0","0","64","1","1","1"
            "1","0","64","1","2","1"
            "2","0","64","1","",""
            "2046","0","64","1","",""
            "2047","0","64","1","",""
    @End_SysBlocks
    @SysVarsOut
            (* BlockNo,IOW,Variable,Datatype,Comment,Speed,WordNo,BitNo,
            StationName,HAddress *)
            "0","","BIT1","BOOL","","0","0","0","",""
            "0","","BIT2","BOOL","","0","0","1","",""
            "0","","REG1","WORD","","0","1","0","",""
            "0","","REG2","INT","","0","2","0","",""
    @End_SysVarsOut
    @SysVarsIn
            (* Variable,InNodeNo,InCntSlot *)
    @End_SysVarsIn
    @End_Net
```

- In the case of station

```
@Stn
    (* Name,Catcode *)
    "Station1","model 3000"
    @HardsConfig
            (* HAddress,Catcode *)
            "**-**-**-**","BU746"
            "01-**-**-**","S3PU55"
            "03-**-**-**","TN721"
            "04-**-**-**","TN721"
            "10-**-**-**","AD338"
    @End_HardsConfig
    @ModulesPara
            (* HAddress,OrderNo,cItemID,Value *)
            "01-**-**-**","1","3225","0"
            "01-**-**-**","2","3233","1"
            "04-**-**-**","38","3080","0"
    @End_ModulesPara
    @PointsPara
            (* HAddress,OrderNo,cItemID,Value,PointNo *)
            "03-**-**-**","1","3504","0","0"
            "03-**-**-**","2","3501","0","0"
            "04-**-**-**","7","3506","0","127"
    @End_PointsPara
    @StnVarsOut
            (* HAddress,IOW,Variable,Datatype,Comment,Speed,OutCntSlot,WordNo,
            BitNo,IQNo *)
            "01-**-**-**","","S_000","INT","","0","1","553984","0",""
            "01-**-**-**","","S_001","UINT","","0","1","553985","0",""
            "01-**-**-**","","S_002","DINT","","0","1","553986","0",""
            "01-**-**-**","","S_003","REAL","","0","1","553988","0",""
            "10-**-**-**","0","AID000","INT","","0","1","546548","0",""
            "10-**-**-**","1","AID001","INT","","0","1","546549","0",""
            "10-**-**-**","7","AID007","INT","","0","1","546555","0",""
    @End_StnVarsOut
    @StnVarsIn
            (* Variables,InCntSlot *)
    @End_StnVarsIn
    @CntBlocks
            (* HAddress,Name *)
            "01-**-**-**","SW"
            "01-**-**-**","DW"
            "01-**-**-**","User"
```

```
@CntVars
        (* HAddress,Name,IOW,Variable,Datatype,Value,Comment,Speed,Const,
        WordNo,BitNo *)
        "01-**-**-**","User","","G000","INT","0","","0","0","0","0"
        "01-**-**-**","User","","G001","UINT","0","","0","0","1","0"
        "01-**-**-**","User","","G006","STR_A","","","0","0","7","0"
        "01-**-**-**","User","","G009","ARRAY[0..3] OF WORD","","","0","0","20","0"
@End_CntVars
@CntValues
        (* HAddress,VarMember,Datatype,Value *)
        "01-**-**-**","G009[0]","WORD","1111"
        "01-**-**-**","G009[1]","WORD","2222"
        "01-**-**-**","G009[2]","WORD","3333"
        "01-**-**-**","G009[3]","WORD","4444"
@End_CntValues
@End_CntBlocks
@PouEntries
        (* HAddress,PouNo,Datatype *)
        "01-**-**-**","2048","MS000"
        "01-**-**-**","2049",""
        "01-**-**-**","2964",""
@End_PouEntries
@TaskEntries
        (* HAddress,TaskName,TaskEntryNo,Datatype,Comment,Enabled,Sch,
        Grp *)
        "01-**-**-**","EV","0","","","0","0","0"
        "01-**-**-**","EV","7","","","0","0","0"
        "01-**-**-**","SS","0","","","0","0","0"
        "01-**-**-**","IP","0","","","0","0","0"
        "01-**-**-**","IP","7","","","0","0","0"
        "01-**-**-**","HS","0","","","0","0","0"
        "01-**-**-**","HS","127","","","0","0","0"
        "01-**-**-**","MS","0","MS000","","0","0","0"
        "01-**-**-**","MS","255","","","0","0","0"
        "01-**-**-**","BG","0","","","0","0","0"
        "01-**-**-**","BG","3","","","0","0","0"
@TaskParams
        (* HAddress,TaskName,TaskEntryNo,No,Variable,dDatatype,
        dComment *)
@End_TaskParams
@End_TaskEntries
@End_Stn
```

■ Text format (additional information)

● Network information

1) I/O Variable of RIO(Remote I/O Station) is set as Network Variable '@SysVarsOut'.

   Output Variables of RIO can be imported, when '@SysVarsIn' is not registered. They are assigned automatically. Targets: Outputs of I/O variables and field network variables on 'TC-net 100 LAN'.

2) Importing data for address information 'WordNo/BitNo' of Network Variable '@SysVarsOut' are used as follows:

   - New location: Not set data. Length zero string is used. (Ex.: "")
   - User setting: Set data. Numeric data is used. (Ex.: "10000")

   If 'New location' and 'User setting' are used in a same text, 'User setting' is set more upper line than 'New location'. If they are set upside-down, the located address may be duplicated.

3) I/O connection 'IQNo' of Network Variable '@SysVarsOut/@SysvarsIn' are automatically assigned. It is not set in importing.

4) Importing data for target controller 'StationName' and 'Haddress' of Network Variable '@SysVarsOut' are only used for RIO controller. Please not set value using length zero string. (Ex.: "")

5) Importing data 'I/O Area(IOA)' and 'I/O Type(IOP)' of Network Variable '@SysVarsOut' are only used for RIO controller of MELPLAC I/O. Please refer to "'MELPLAC I/O Information" about IOA and IOP. For other controller, please not set value using length zero string. (Ex.: "")

● Station information

1) I/O Variable is set as Station Variable '@SysVarsOut' of Controller Variable '@CntVars'.

   If the main unit has system-bus, I/O Variable is used as Station Variable.

2) Importing data for address information 'WordNo/BitNo' of Station Variable '@StnVarsOut' and Controller Variable '@CntVars' are used as follows:

   - New location: Not set data. Length zero string is used. (Ex.: "")
   - User setting: Set data. Numeric data is used. (Ex.: "10000")

   If 'New location' and 'User setting' are used in a same text, 'User setting' is set more upper line than 'New location'. If they are set upside-down, the located address may be duplicated.

3) Importing data for I/O Connection 'IQNo' of Station Variable '@StnVarsOut/@StnVarsIn' are used as follows:

   - New assignment: Numeric data is set, or length zero string is used. (Ex.: "")
   - User setting: Set reserved string '(None)'. (Ex.: "(None)")

   If the reserved string '(None)' is used, 'IQNo' is registered as 'Null'. '(None)' is also used in exporting.

- MELPLAC I/O information
  Select from the following value.

- I/O area (IOA)
  1:Input area, 2:Output area, 3:Counter, 4:System area, 5:CH1 Input / Output area, 6:CH2 Input / Output area, 7:CH3 Input / Output area, 8:CH4 Input / Output area, 9:Command area, 10:Local error flag, 11:Input area 1, 12:Input area 2, 13:Output area 1, 14:Output area 2, 15:CH0 area, 16:CH1 area, 17:Remote STN error, 18:Reference data, 19:Feedback data, 20:Control area, 21:Special link relay, 22:Special link register, 23:LX Former, 24:LY Former, 25:LB Former, 26:LW Former, 27:LX Latter, 28:LY Latter, 29:LB Latter, 30:LW Latter, 31:X, 32:Y, 33:B Former, 34:W Former, 35:B Latter, 36:W Latter, 37:Status/Command area, 38:Cyclic Input area, 39:Cyclic Output area, 40:Cyclic area, 41:Status area, 42:CYC com. IN area, 43:CYS com. OUT area, 44:Position detect, 45:SW area

- I/O type (IOP)
  2:Batch IN, 3:Batch OUT

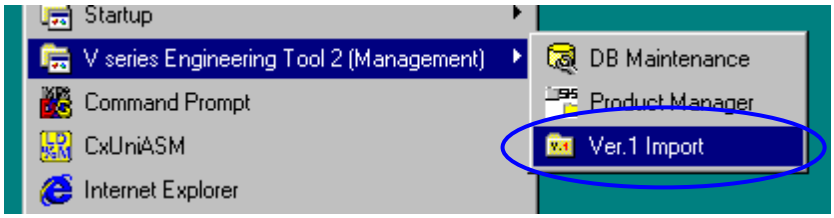
11.4 Importing Products from Ver. 1

Data conversion is necessary in order to use Engineering tool Ver. 1 products in after Ver. 2.

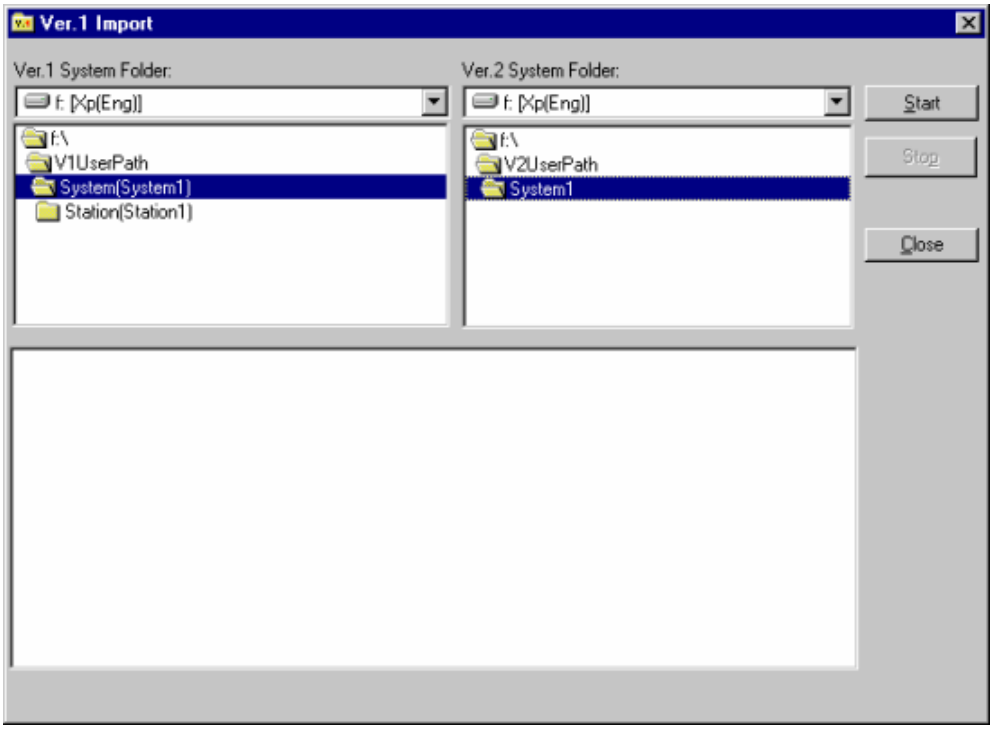
This section is intended for system administrators and describes how to import Engineering tool Ver.1 products.

■ Starting import (In the case of Ver.2)

From the Start menu, select <Program><V series Engineering Tool 2 (Management)><Ver.1 Import>.



■ Importing



1) Selecting version 1 system
   Select the version 1 import target system in [Ver.1 System Folder].
2) Selecting import destination
   Select the import destination system in [Ver.2 System Folder]. To import to a new system, create the new system beforehand in [Product Tree].
3) Importing
   Select the [Start] button. Import starts.

■ Restrictions

When 'PB_P' of 'Tag Operation Functions' is being used in the program of Ver.1 system, re-draw after deleting the target function by the [Program Editor] of Ver.2 after import.

11.5 Convert Semi Graphics to Full Graphics

Explains how to convert semi graphic type programs to full graphic type programs of a System.

Semi graphic program is made by Program Editor (Semi graphic).

Full graphic program is edited by Program Editor (Full graphic).

This function is not supported in Engineering tool 2.

■ Checking each access level of libraries

This conversion is executed for libraries have 'Editable' access level.

So this operator may be Tool manager or administrator in your System.

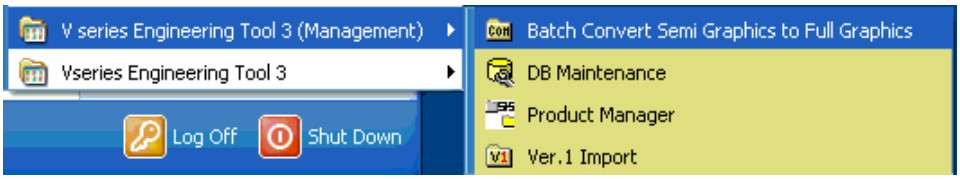
Libraries have out of 'Editable' level are skipped automatically.

So you had better confirm if each library has available access level before converting.

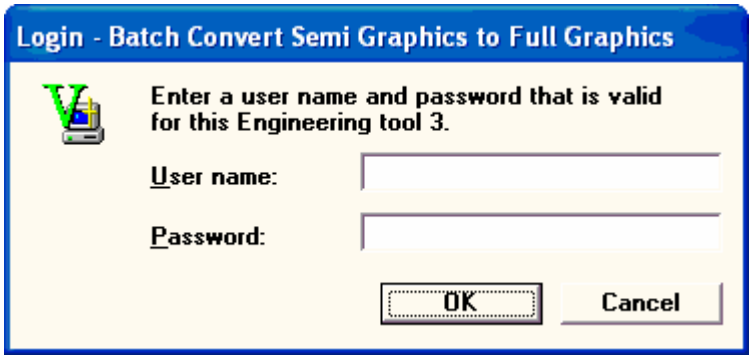
See [5.12 Setting Program Security] section to inspect or change access level.

■ Starting converter

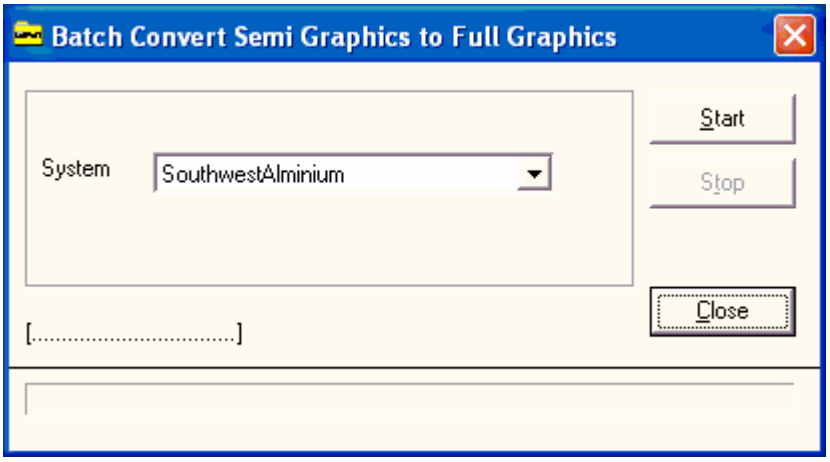
In start menu, click < V series Engineering Tool 3 (Management) >< Batch Convert Semi Graphics to Full Graphics > to start this converter shown as follows.



Enter user name and password to login.



■ Executing conversion



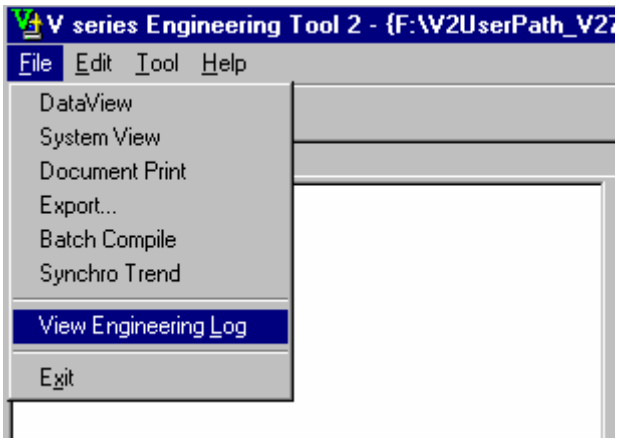
1) Select <System> you want to convert and click [Start].
2) During conversion you can stop the conversion by click [Stop] button.

11.6 Engineering Log

This function outputs and displays a log file, that is a record of change in a tool or a controller.

■ Output engineering log

On Product Tree, click menu <File> <View Engineering Log>.



The log file is created on Windows system folder. File name is as follows.
V2EngLog.txt

This file is displayed using [Notepad].

■ Customize record counts

1) Open System Folder (\Winnt) using [Explore], and Open 'V2Tool.INI' file using [Notepad].
   In the case of C/S, this must be performed by the tool administrator on the server PC.

2) Change value of 'OpeLogSize' Item.
   Standard of setting value is as follows.

Setting value	Records count
100(Default value)	about 900
300	about 2800

◆ **Note**

- Do not set large value over 1000.
- Do not change another values. If these values are changed, engineering tool becomes not work normally.
  Example) Set records count about 2800.
  OpeLogSize = 300

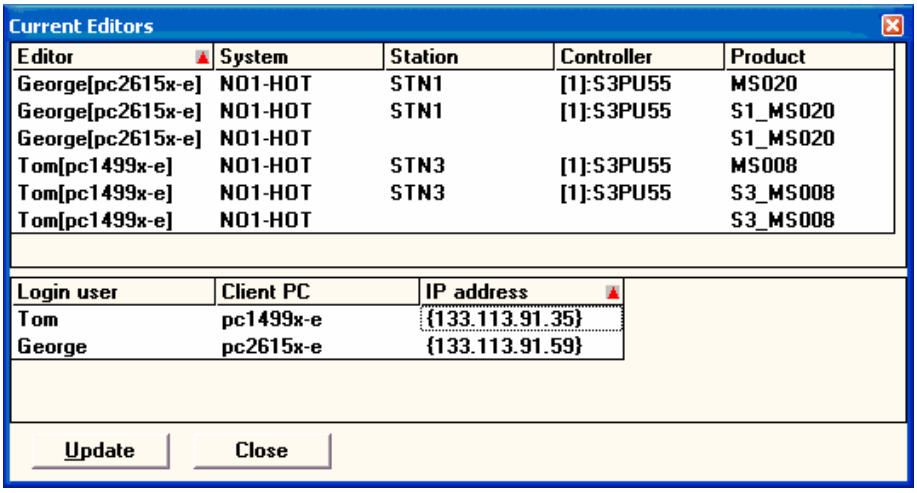
3) Save V2Tool.INI file.
   Setting value becomes valid after re-start Engineering tool.
   After re-installation of engineering tool, this setting is cleared. Please perform this setting again.

11.7 Displaying Login Users and Current Editors

In client server version, you may need to know: “Who are login users, now?” or “Who or which PCs are editing some products?” Especially it is needed in case of shutting down the server PC. In this section, how to display the information and the contents will be explained.

■ Opening current editors

Click menu <File><Current Editors> of Product Tree to open the following form.



The meanings of the fields are:

- Editor: Displays current editor name of V-Tool login users. [ ] shows the PC name.
- System: Displays System name of product edited currently.
- Station: Displays Station name of product edited currently.
- -Controller: Displays Controller name of product edited currently. [ ] shows the main slot no.
- Product: Displays Product name edited currently, which shows in the following table.

Displayed string in [Product] filed
Network
Station
Unit
Module
Bus
{POU name} : Note1
{Task name} : Note2
{Task entry name} : Note3
Network variable
Station variable
Controller variable
{Type name} :Note4
Library
Variable declaration
Permissive Fault Diagnosis
Synchro Trend

Note1: {POU name} displays the name of POU named by user.

Note2: {Task name} displays the name of Task, for example, “HS” or ”MS”.

Note3: {Task entry name} displays the name of Task entry, for example, “HS007” or ”MS125”.

Note4: {Type name} displays the name of data type defined by user.

Login user: Displays the name of V-Tool login user.

Client PC: Displays the PC name of V-Tool login .

IP address: Displays the IP address of the client PC.

Click each header column to sort the list by the field. Each clicking changes the sort order. Click [Update] to update the all of the tables. Click [Close] to close the form.

12

Chapter 12
Printing Documents

This chapter describes how to print Documents or Shot Print in the following topics.

12.1 Documents and Shot Prints

In V-Tool, Documents means the document products for the client. And Shot Print means the printout report for program debugging or maintenance.

■ Contents of documents

- System
  - Station list
  - LAN configuration
  - Send Blocks
  - Network variable list
- Station
  - Hardware configuration
  - Module parameters
  - Station global variable list
  - I/O connection list
  - I/O variable list
- Controller
  - Tag No list
  - Tag parameter list
  - Task List
  - Program organization unit list
  - Program organization unit
  - Variable and parameter list

■ How to make shot print

Select <File><Print> in each window.

- Module parameter
  The content displayed on the screen is printed.
- System log
  Error/event/intervention/transmission/log are printed
- Serial I/O log
  Serial I/O log is printed
- Tag editor
  Value of tool in specified range is printed
- Program editor
  The following information is printed
  - Program
  - Function block
  - Function
  - Compile error list

12.2 Setting Page Format

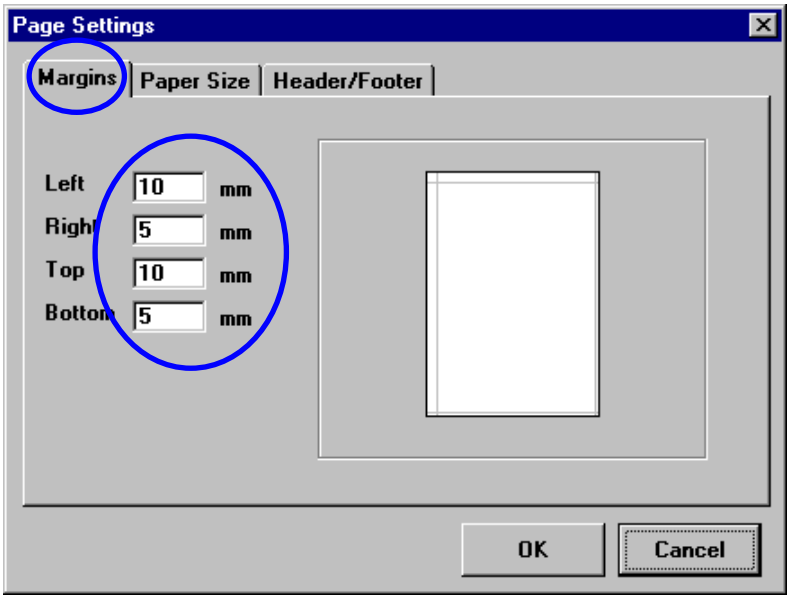
Explains how to set Page Settings for semi graphic programs or full graphic programs.

In [Document Printing] or [Program Editor], click <File><Page Settings> to open the following form.

■ Setting margins (for Semi graphic program)

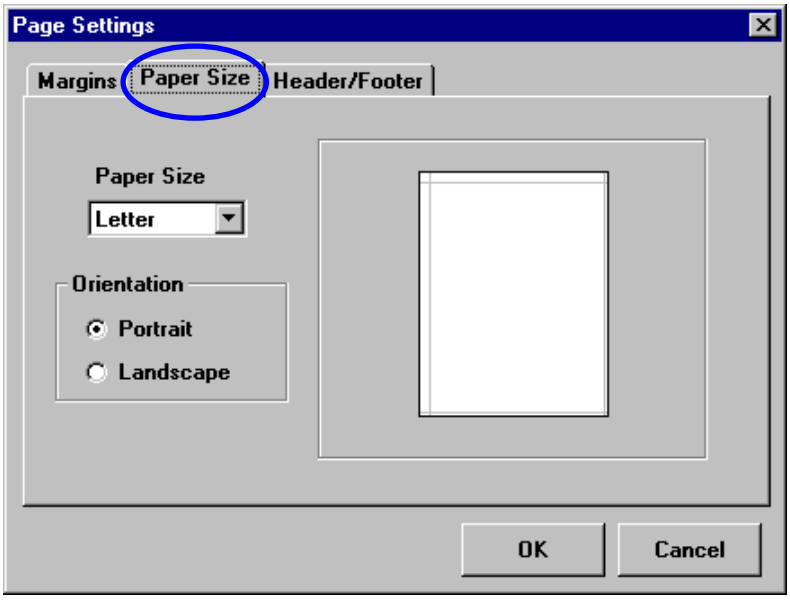
1) Click [Margins] tab.

2) Enter <Left>, <Right>,<Top>,<Bottom> size to update paper overview.



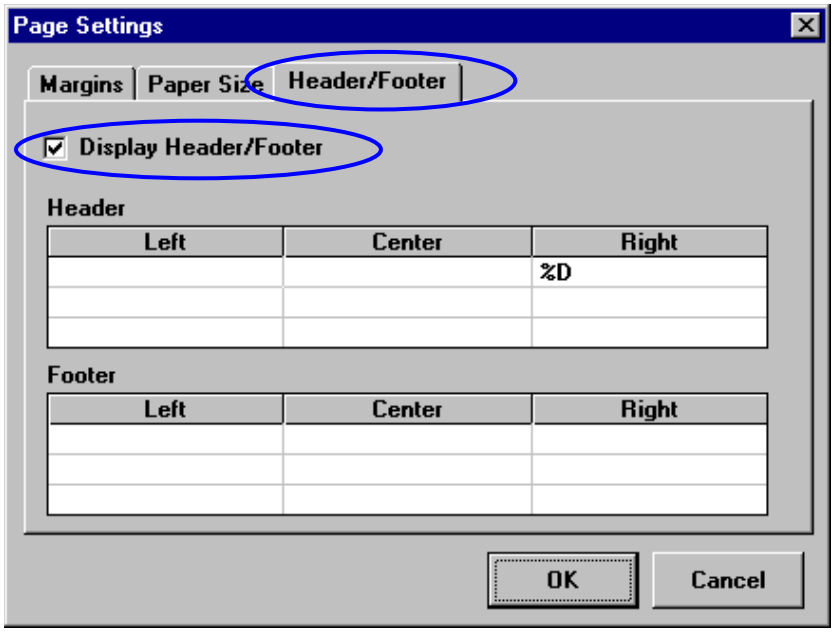
■ Setting paper size (for Semi graphic program)

1) Click [Page Size] tab and select <Paper Size> you need.
2) Click <Orientation> option you need.



■ Setting header and footer (for Semi graphic program)

1) Click [Header/Footer] tab.
2) Tick off <Display Header/Footer> if necessarily.
3) Enter text or keyword in each location you need.

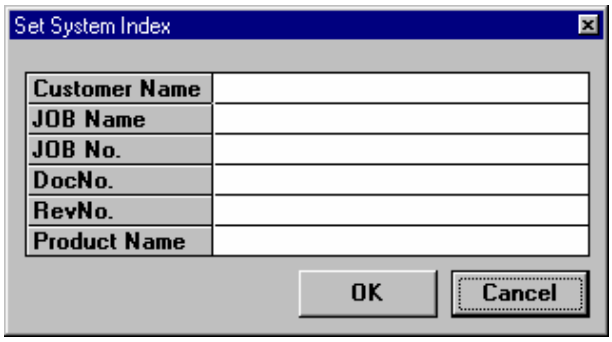


Keyword	Printed Content
%F	File Name
%D	Printed Date
%T	Printed Time
%P	Page Number
%A	Total pages
%PA	Page No./Total pages
%C	Customer name
%J	JOB name
%JNo	JOBNo
%JJNo	JOB name [JOBNo]
%DNo	DocNo
%RNo	RevNo
%PN	Manufacturer name
%CN	Print item name
%XRef	Cross reference header

Printing two or more items in a field is available, using a semicolon as separator shown as follows.

%D; %F Printed Data and Time

■ System common item setup



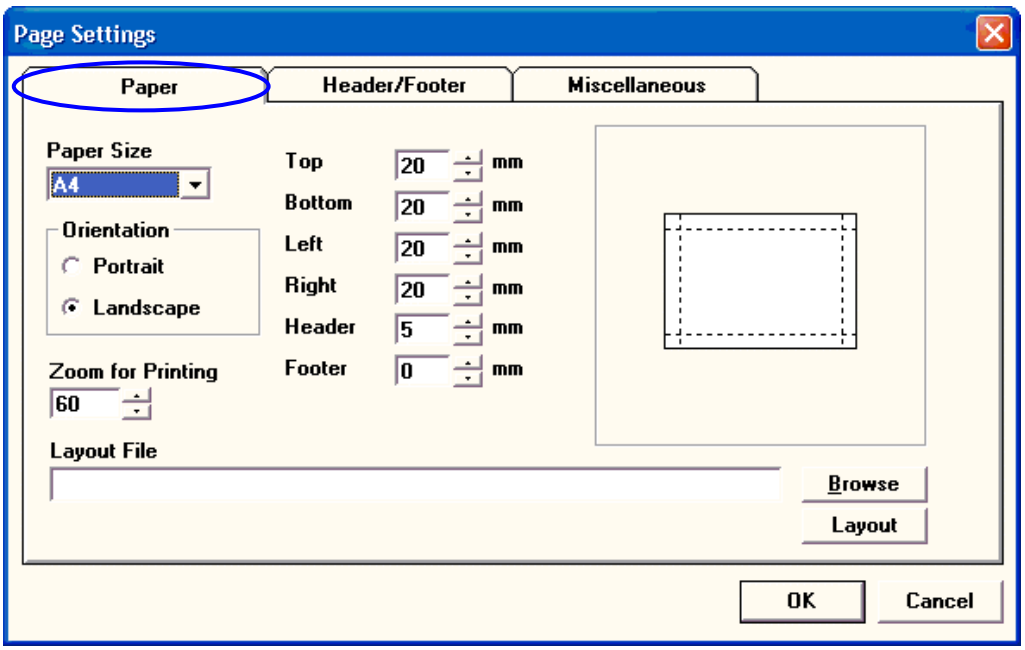
Here you can set system common items to be displayed on the cover or header/footer.

Select <File><System Common Setup Item>.

Enter the desired text.

■ Setting paper (for Full graphic program)

Click [Paper] tab to open the following form.



- Size of paper (A4, A3, and letter)
- Orientation
- Size of blank of form (top and bottom and right and left)
- Position of header/Footer
  If <Footer> is zero, Footer text is printed at the appropriate position.
  Change <Footer> when you want to tune the position.

◇ **Supplementary**

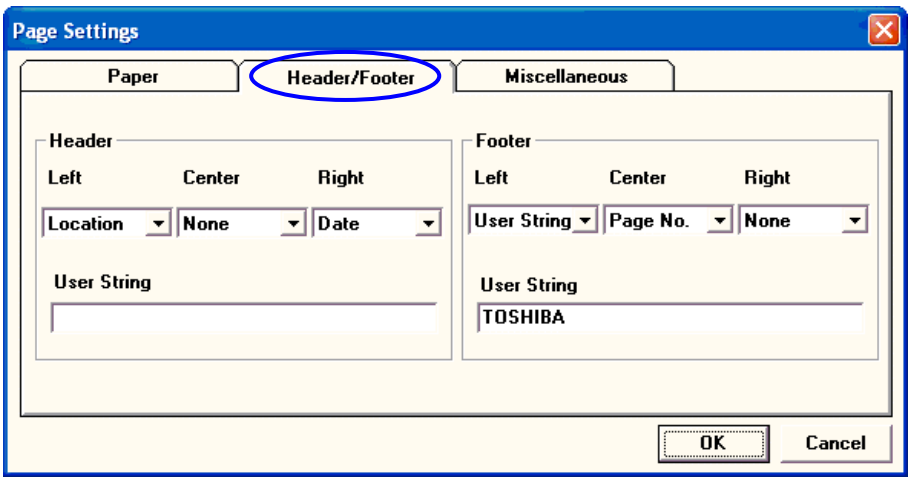
- If setting value is out of range, characters of Header/Footer might be cut and can not be printed.

- Zoom rate of work-sheet when printing

Using 'Layout File', see the section 'Document Layout'.

■ Setting header and footer (for Full graphic program)

Click [Header/Footer] tab to open the following form.



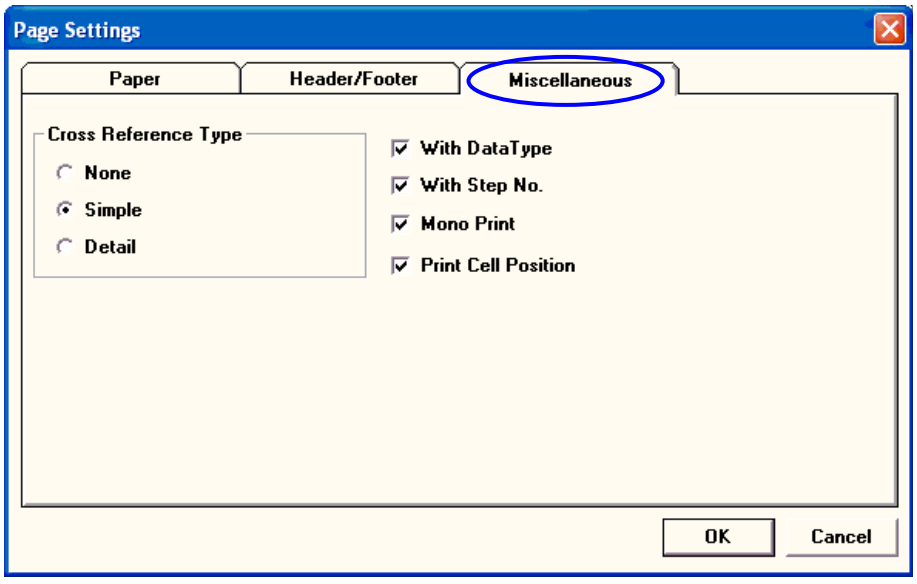
For each position <Left>, <Center> and <Right>, you can select printed contents shown as follows.

- Place (position of POU
- Date
- Page number

And also <User String> ,that is arbitrary character string, as Header or Footer can be printed.

■ Setting cross reference (for Full graphic program)

Click [Miscelaneous] tab to open the following form.



Click <Cross Reference Type> option to print full graphic program with it's cross reference list shown as follows.

- None
- Simple
- Detail

◇ **Supplementary**

- When paper orientation is 'Portrait', cross reference can be printed.

Tick off <With Data Type> to attach data type to each variable in program if necessarily.

Tick off <With Data Type> to attach step no. to each symbol drawn in program if necessarily.

Tick off <Mono Print> to print full graphic program in monotone if necessarily.

- Mono Print
  For monochrome printing.
- Print Cell Position
  For printing with cell position.

■ Document layout (for Full graphic program)

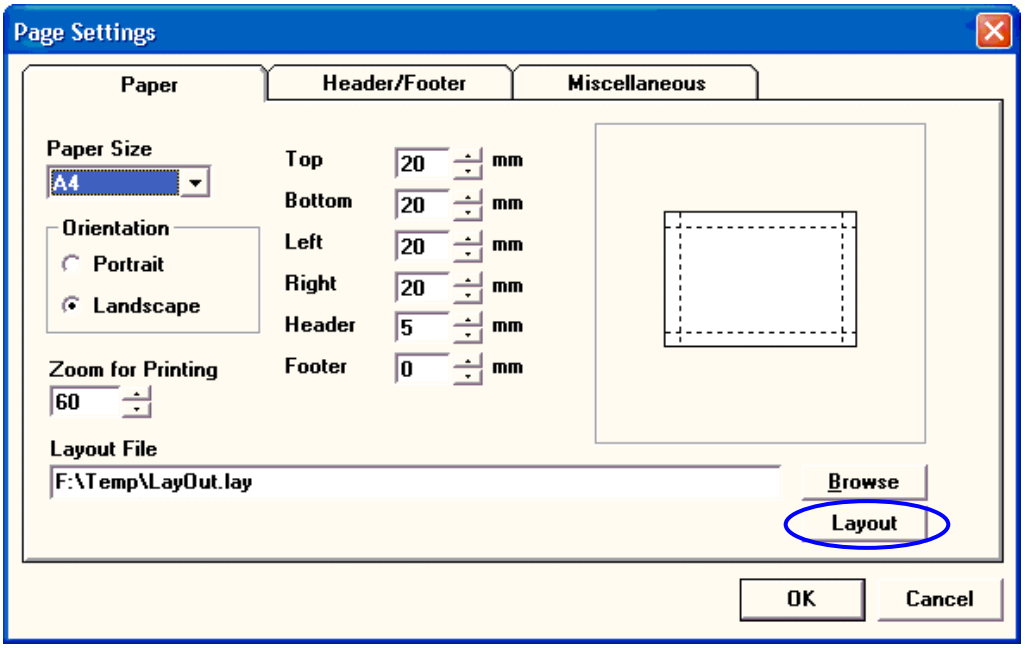
This function is used for free-layout of Strings and/or Pictures.

Formatted strings and bitmaps like Company's Logo are available for the document header/footer.

If you are already using the Settings of the section 'Setting Header and Footer', you can also use this function.

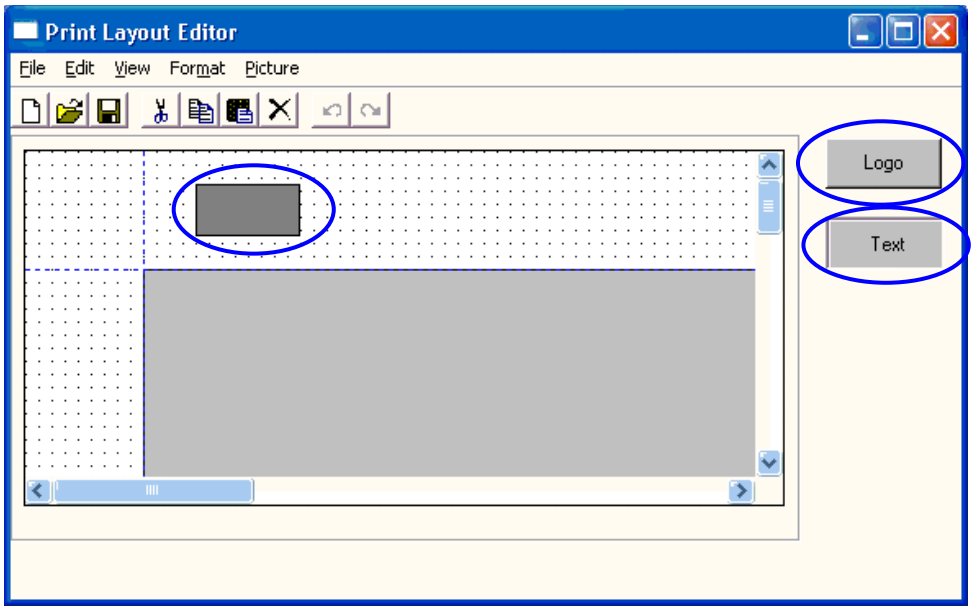
1) Make a Layout File, using 'Print Layout Editor'.
   See the section 'Editing Layout'.
2) Use the Layout File, setting to the form 'Page Settings'.
   See the section 'Setting Layout'.

■ Editing layout (for Full graphic program)



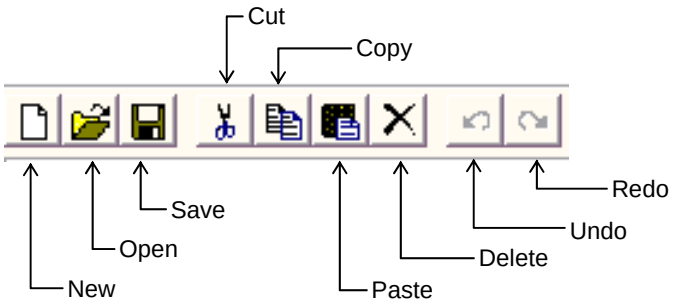
Click [Layout] button, to open the form [Print Layout Editor].

If you want to use a prepared file, set the file path using text box or [Browse] button.



If you already set the Header or Footer, the mark '■'is displayed on the screen.

1) Tool Icons are as follows



If you put the mouse-pointer on these icons, the name is appeared as tool tip.
These functions are also prepared as the menu items.

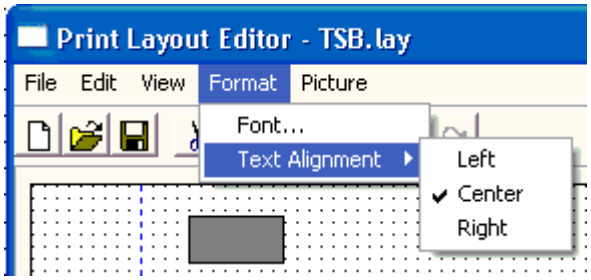
2) Setting Logo.
Click [Logo] button, and click editing area, to place a picture like bitmap.
Select file from the [Open] dialog.
Available files: Bitmap (.bmp), Icon (.ico), JPEG (.jpg), and GIF (.gif)

3) Changing Logo.
To resize the picture as logo, mouse dragging is available.
To move the position, mouse drag & drop is available.
To update the contents, Select <Picture> <Browse> to open dialog.

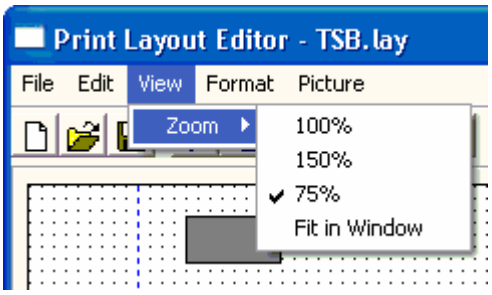
4) Setting Text.
Click [Text] button, and click editing area, to place text box.
Double-click the text box to edit it.
Enter some characters you need.

5) Changing Text.
To resize the text box, mouse dragging is available.
To move the position, mouse drag & drop is available.
To edit it, double-click it again.
To change the text font, click <Format><Font> to open [Font] dialog.

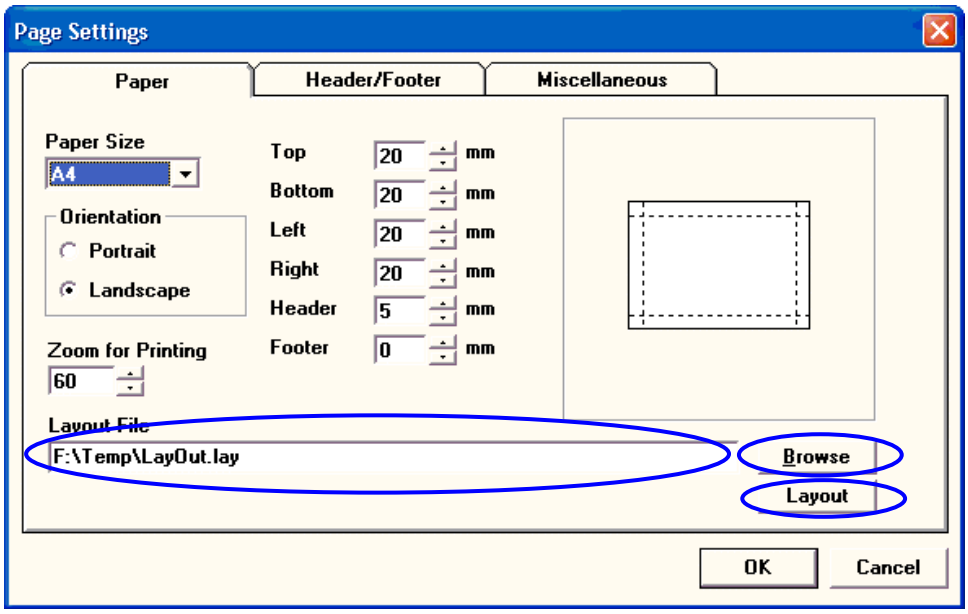
6) Setting Text Alignment.
Default of Text alignment is center.
Click <Format><Text Alignment> you need.



7) Setting Zoom.
Click <View> <Zoom> you need.



■ Setting layout (for Full graphic program)

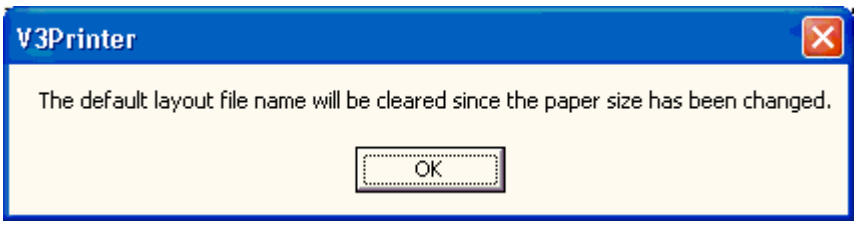


To use a prepared file, set the file path using text box or [Browse] button.

If you are already using the Settings of the section 'Setting Header and Footer', you can also use this function.

◇ Supplementary

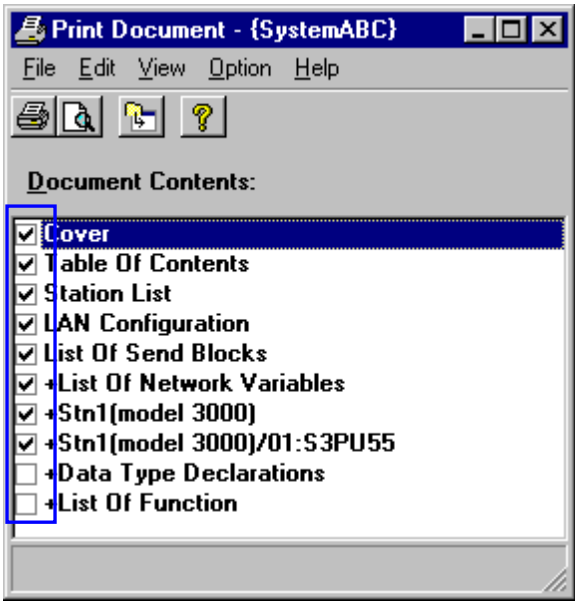
- If you change <Paper Size> or <Orientation> after setting 'Layout File', following dialog is appeared, and setting of 'Layout File' is canceled.



12.3 Printing Documents

■ Set print item

<Main window>



Normally, the check box in the window is used to specify whether to print a product or not.

If an item has sub levels("+" mark has adhered), select <View><Details> and specify with the check box in the detail dialog box. To select/deselect all sub levels of an item, check/uncheck the check box of the item.

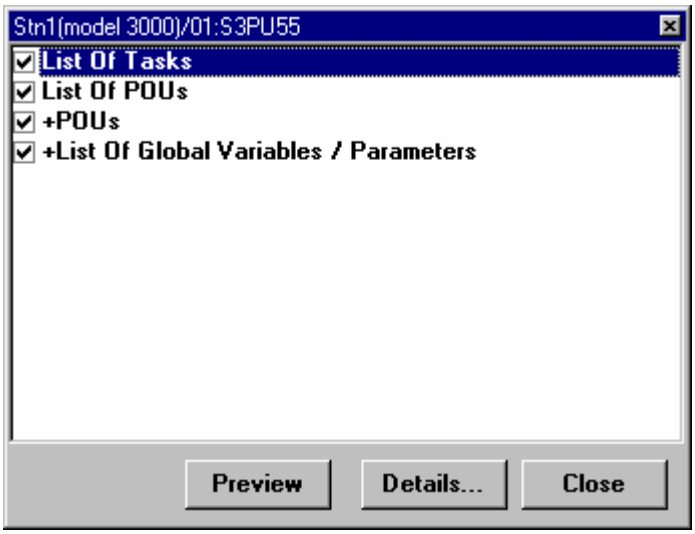
The following sub levels can be opened from the main window (see detail window 1).

- List of Network Variables
- Station
- Controller
- Data type declarations
- List of Function

◆ **Note**

- When printing completes, the window does not return automatically to the original window. Select the original window from the task bar.
- Do not print another document while print is in progress.

<Detail window 1>



Example) When Details is clicked after selecting Controller in the main window

The following items can be opened from the Detail window 1 (see detail window 2).
From the station detail

- Module parameters
- List of Station global variables
- List of I/O Connection

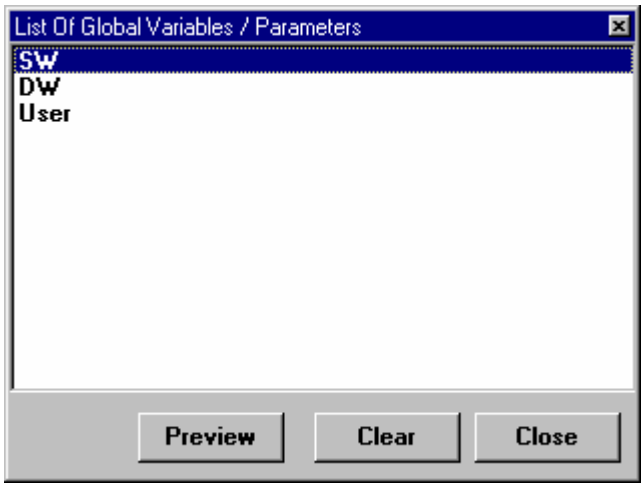
From the controller detail

- Program organization units
- List of Global Variable / Parameters
- Tag parameters

In the following cases, details of the tag parameter are displayed on the screen.

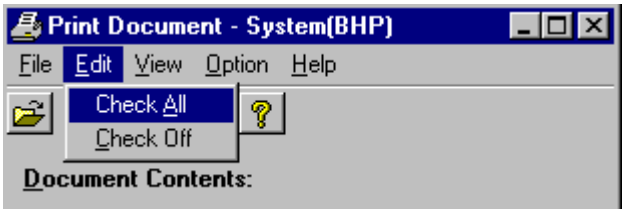
1) Parameter with Tag No.: When Tag No. is registered.
   In the MCS type tag, PVPNo should be registered in LP, and Tag No. should be registered in PV.
2) Parameter without Tag No.: When the comment is registered.
   Non-downloaded information like the comment should be registered.

<Detail window 2>

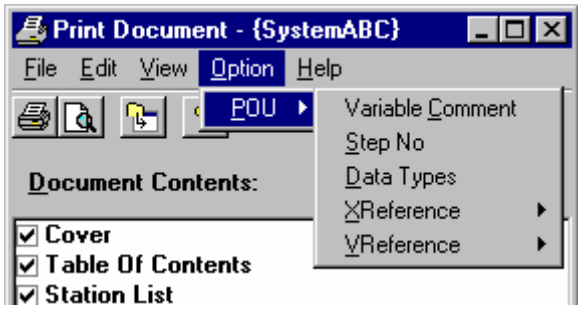


Example) When Details is clicked after selecting List of Global Variables / Parameters

To check all items for printing, select <Edit> <Check All>. To uncheck all items, select <Edit> <Uncheck All>.



Select the program organization unit file print and display options from <Option><Program Organization Unit>.



◇ Supplementary

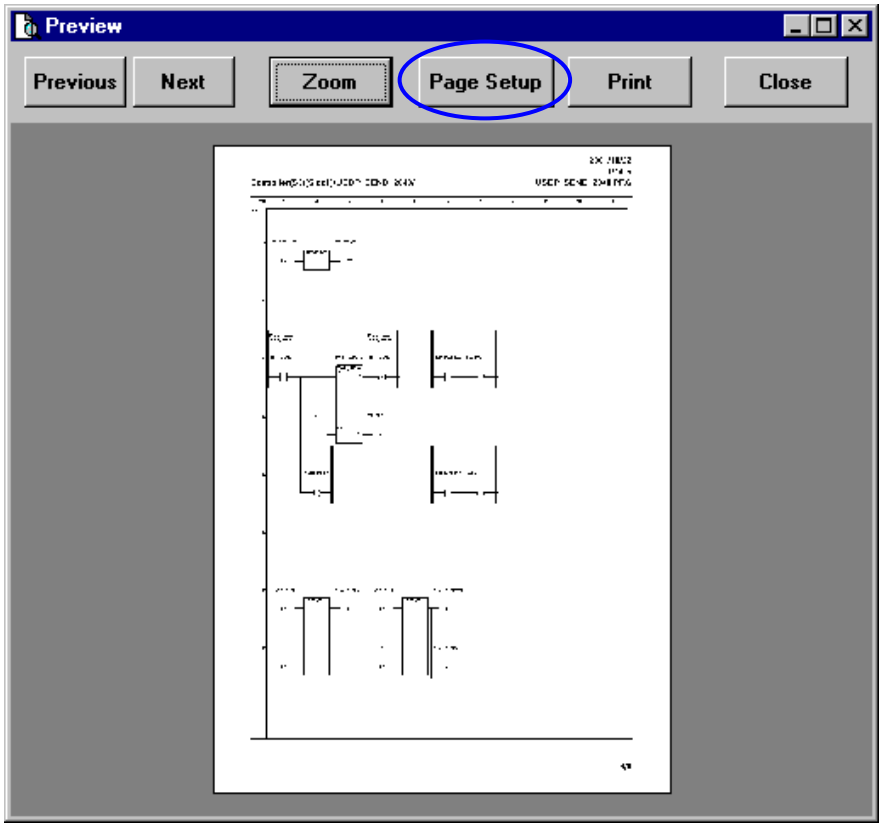
- Cross reference printing of program organization unit file is performed only for files with circuit created with 12 or less columns and when the paper orientation is set to landscape.

Preview

The print image can be checked on screen before actually printing.

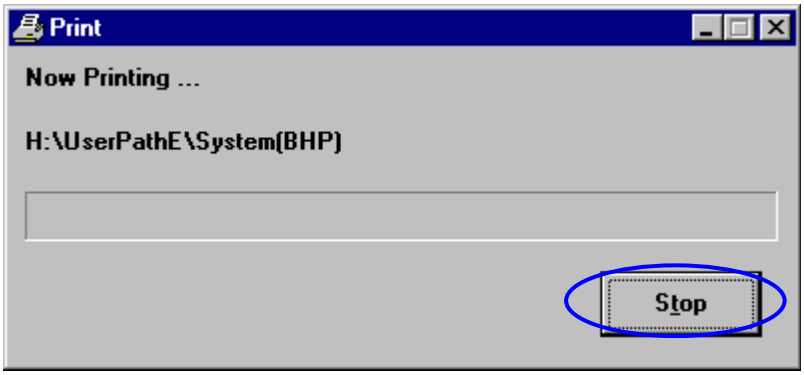
Select <File><Preview> from document print or <File><Preview> from the Program Editor.

You can print directly or go to the Page Setup window from the preview window.



Printing

Select <File> <Print> from document print to print all of the checked items.



A printing in progress dialog box appears while printing. Click [Cancel] to cancel printing.

Whether the local variable is printed before the print is executed is confirmed for Pflug Rafic's POU, and the dialog that specifies the print page is displayed afterwards.

Note

- A blank page might be printed by Pflug Rafic's print according to the writing of the circuit. In this case, please specify the page printed by print page specification dialog. A consecutive page is specified by "-". It is possible to delimit it by ",".
  Example) 1-4, 8, 10-12
- The preview/print cannot be likely to be done normally when there are extremely a lot of numbers of pages(page or more 1000) in Full graphic program print. In this case, please divide the circuit into two or more work-sheets.

12.4 Printing the Cross Reference

A cross reference list is a list that shows

1) the location (row, column) and

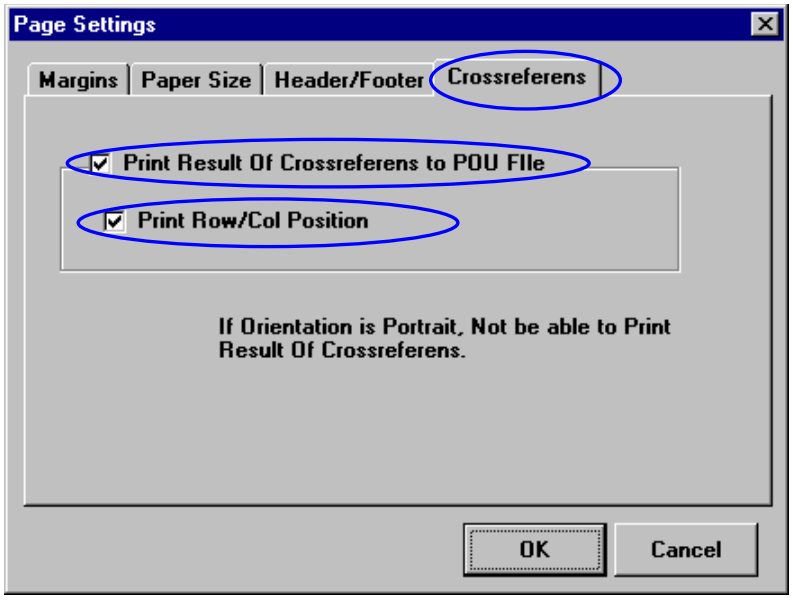
2) manner of use (assignment, reference, Set, Reset)

of variables in a program.

The cross reference list can be printed together with the program. This topic describes how to interpret the cross reference list.

Printing the cross reference list together with the program

Select <File> <Page Setup> from the Program Editor.

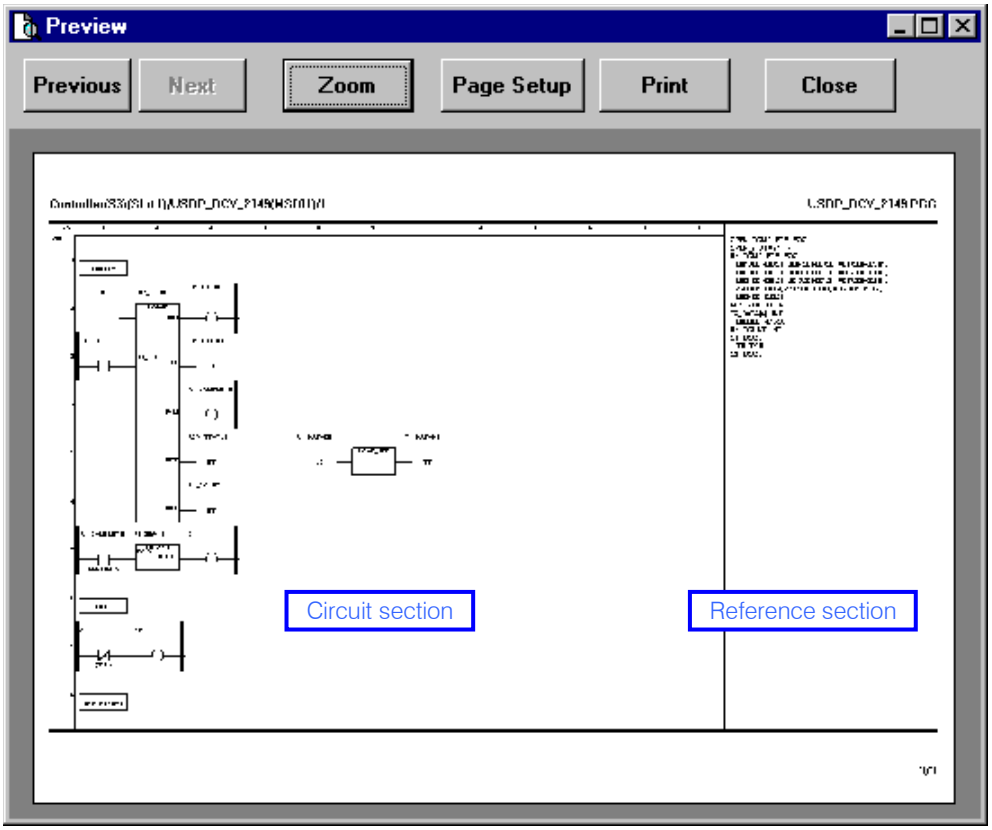


If [Print Cross Reference Result] is selected during page setup, print the cross reference list by selecting <File><Print>.

Preview

If [Print Cross Reference Result] is selected during page setup, the cross reference print image can be checked on screen. Select <File><Preview> from the Program Editor.

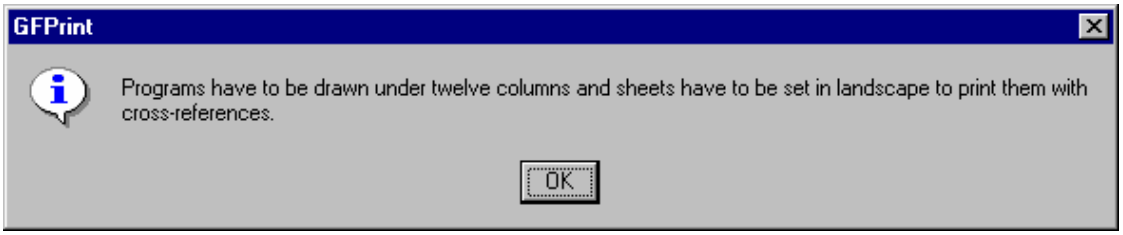
You can go to the Page Setup window from the following Preview window.



Circuit section: Shows the origin of the variables referenced in the circuit section.

Reference section: Shows the reference location of the variables used as output in the circuit section.
If [Print Detail Location (Row, Column)] is specified during page setup, the row and column also appear.

If the paper orientation is set to portrait or an instruction word exists in a column of a circuit that exceeds 12 columns, the following message appears and the cross reference cannot be printed.



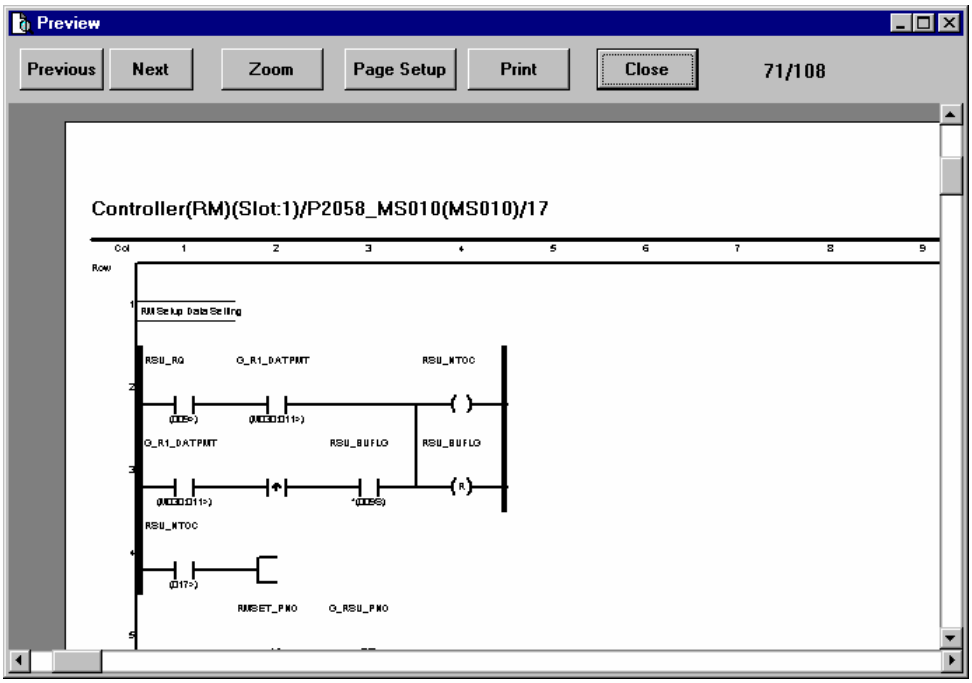
■ Interpreting the cross reference

Variable	Circuit section	Reference section	
	Reference	Reference	Detail reference
Station global	(S:TEEE:PPP>)	S:TEEE:PPP>	S:TEEE:PPP>RRRRR:CC
Controller global	(TEEE:PPP>)	TEEE:PPP>	TEEE:PPP> RRRRR:CC
Local	(PPP>)	PPP>	PPP> RRRRR:CC

● Symbol Description

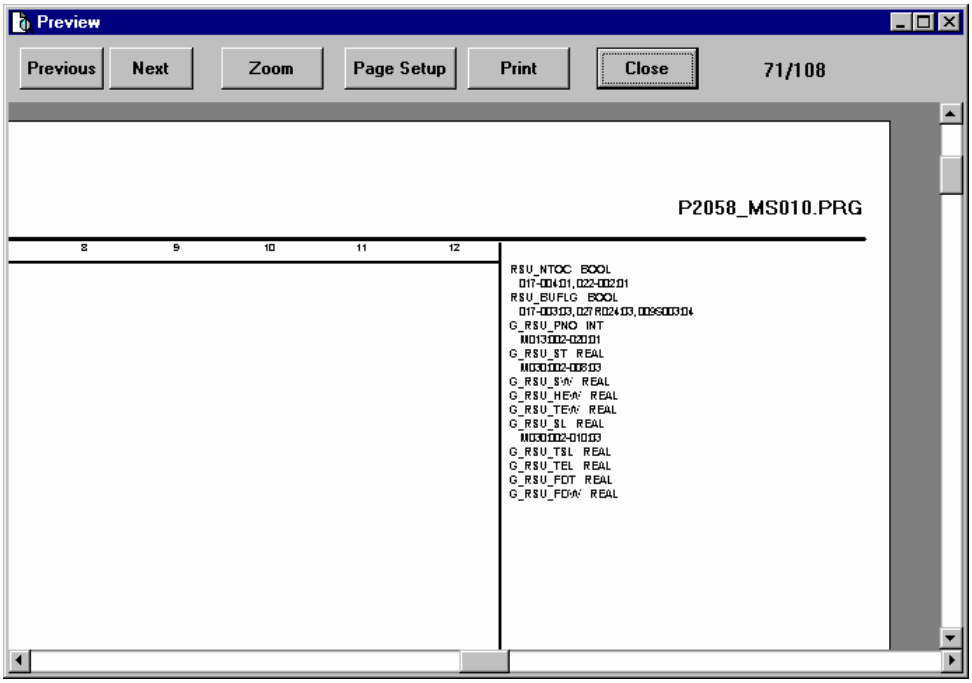
Symbol	Description	Type
S	Slot No.	—
T	Task type	E: Event task S: Super high-speed task I: Interrupt task H: High-speed scan task M: Main scan task B: Background task
EEE	Task No.	—
PPP	Page No.	—
>	Action	–: Read >: Write S: Set R: Reset
RRRRR	Row No.	—
CCC	Column No.	—

■ Interpreting the cross reference result of circuit section



Shows the reference list of user global output destination.

■ Interpreting the cross reference result of the reference section



Shows the station global SGC1 reference list.

12.5 Printing the Variable Reference and the Function Reference

This topic describes how to print the variable reference list and the function reference list.

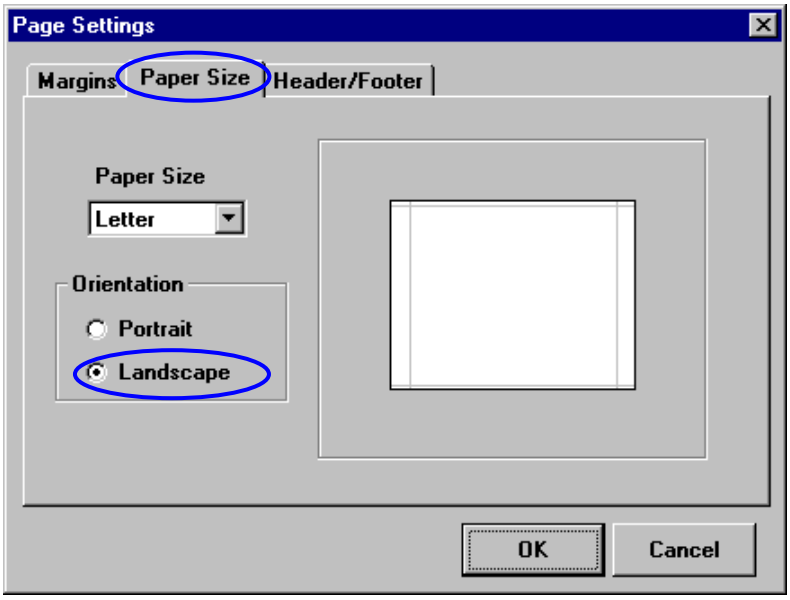
■ Printing the variable reference list

This reference list can be printed where variables are used

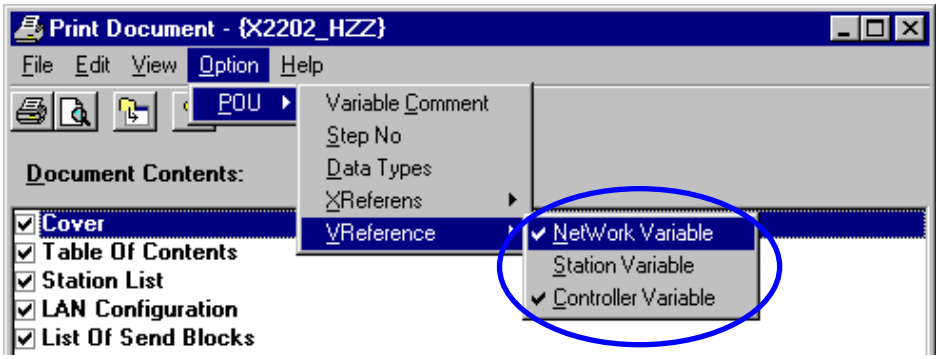
Target variables: Network, Station, Controller scope variables

Printed locations: Station, Controller, Program, Line

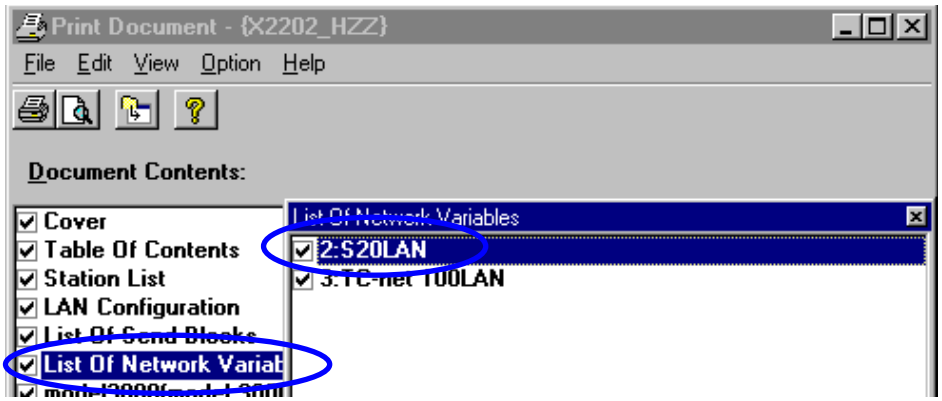
1) Select <File><Page Setup> from the Document Printing, Select 'Landscape'.



2) Select <Option><POU><Variable Reference>, and check scope



Select the target variables (‘Network variables’, ‘Station variables’, ‘Variables/Parameter List’), and start printing.



- Form of display is as follows:

Variables	Reference
Network Variables	Used in FBK: {Station name}-{S:Controller name} -POU name:POU no.:Action name:PPP>RRR:CC
Station Variables	Used in Function: {Station name}-{S:Controller name} -POU name:POU no.:Action name:PPP>RRR:CC
Controller Variables	Used in Program: { Station name }-{S:Controller name} -TTEEE:Action name:PPP>RRR:CC

- Symbol Description

Symbol	Description	Type
S	Slot No.	—
TT	Task type	EV, SS, IP, HS, MS, BG
EEE	Task entry No.	—
PPP	Page No.	—
>	Action	–: Read >: Write S : Set R : Reset
RRR	Row No.	—
CC	Column No.	—

Example) {Stn1}-{1:S3PU55}-MS000:ACT_1_B:001-0001:01

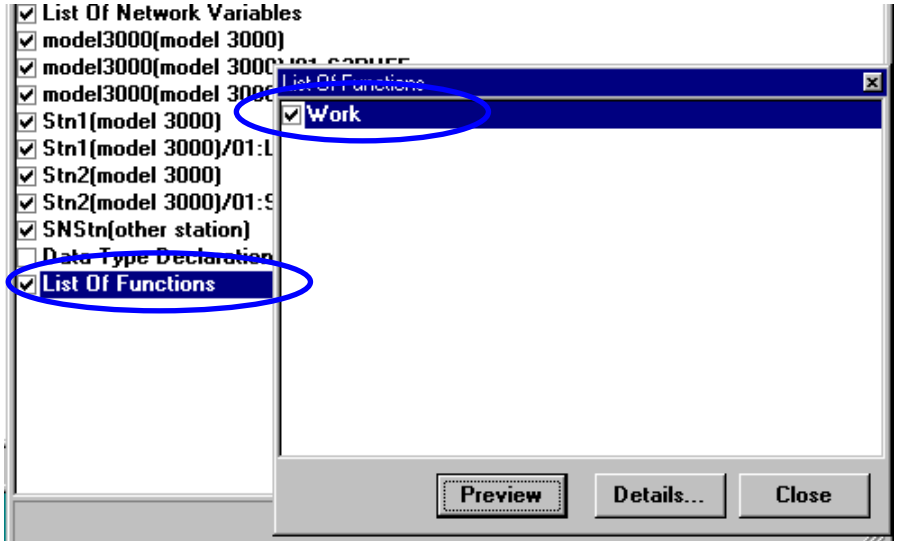
■ Printing the function reference list

This reference list can be printed where functions of library are used

Target functions: Program, Function, Function Block

Printed locations: Station, Controller, Program, Line

1) Select <File><Page Setup> from the Document Printing, Select 'Landscape'.
2) Select the function list, and start printing.



- Form of display is as follows:

Functions	Reference
Function	Used in FBK: {Station name}-{S:Controller name} -POU name:POU no.:Action name:PPP>RRR:CC
Function block	Used in Function: {Station name}-{S:Controller name} -POU name:POU no.:Action name:PPP>RRR:CC
Program	Used in Program: {Station name}-{S:Controller name} -TTEEE:Action name:PPP>RRR:CC

Symbol description
See 'Variable Reference'.

Appendix A
Messages

When the error dialogs or the information dialogs are displayed, please check to take actions in following list.

◆ Note

- When the transmission error is occurred, please check the following points:
  Cable connection
  Destination node status (See 'System Log'.)
  IP address setting (In case of Ethernet.)

  If you want to know the errors of controller or network equipment, please see these manuals.
- Environment, applications, and transmission status make errors which is not listed. When the problem is not cleared, please contact the 'User Support' with the following information.
  Using tool version
  Environment
  Operations

No.	Messages	Measure
3052	File sharing lock count exceeded.	Please execute the DB maintenance, and execute it again.
3502	The data description has some errors. Check the numeric range, string length, time unit or separators, please.	Please input a value with the notation according to data type.
4000	The drive has no media or is not ready.	Please set media, such as FD and MO, to a drive. At the time of writing, please switch the write-protected off.
5001	Current product path is not registered.	Please set up a current product path by the product manager.
5002	Input your system name, please.	Please input the system name of one or more characters.
5003	Length of system name must be below 64 characters.	Please input a system name within the number of fixed characters.
5004	System name cannot has the following characters. # ' * . / : ; < > ? @ [\ ] |	Please do not input an invalid character into a system name.
5005	The system is not found or deleted.	This system is already deleted by other users. Please update a product tree in the newest state.
5006	The system has already created.	This system name already exists. Please update a product tree in the newest state.
5012	This system is used by other users.	This system is already used by other users. After other users exit V-Tool, please operate it again.
5040	The Program registered in 'TaskEntries' has no records in 'PouEntries'.	Please re-register the existing program after deleting a task entry.
5041	The Program registered in 'TaskEntries' has no records in 'Libraries'.	Please re-register a program after deleting a task entry or a POU entry.
5045	The number or data type of task entry parameters is not in agreement.	Please set the dummy argument of a task entry, the number of actual parameters, and data type on a task-entry argument window.

No.	Messages	Measure
5081	I/O module cannot be registered, because the slot number of I/O interface or controller module is not correct, or module's parameter is not set yet.	In the case of the parallel I/O: Please register a management controller (S, L) into a left end. 'Left end' means the slot 1 (model 3000), or the slot 0 (model2000). When you use the extended I/O unit of model 3000, please register an interface module into the slot 0. In the case of the serial I/O: When you use SIF (Interface) module, please register a management controller (L3) with a SIF parameter. In the case of importing the serial I/O: Before importing I/O modules of SIF, please register SIF module and set the parameters using "Product Tree" and "Module Parameter".
5082	The I/O connection of controller is too full for the same type I/O Modules.	The I/O connection area which assigns parallel I/O is full. Please extend an area using 'I/O connection area change'.
5083	Please register a Network Module, before registering the Variables.	Please register network modules (TN etc.) before registering the RIO's I/O variable, and connect with a network.
5084	The network variables has registration. It cannot delete.	Before deleting this module, please delete the network variable which assigned to it.
5085	The type of S controllers must be same.	When you register two or more S controllers in the same station, please register S controller same type.
5086	The I/O variables has registration. It cannot delete.	Before deleting this module, please delete the I/O variable which assigned to it.
5087	The name can not be changed, because the station global variables are already registered more than 1KW.	Please re-size the total amount of the station variables to less than 1kW.
5088	The block transfer has registration. It cannot delete.	Before deleting this module, please delete the block transfer registration of MELPLAC I/O.
5107	The user function cannot be added in the controller. Because the Pou Entries of the controller is too full.	Please delete an unnecessary program.
5109	Other users are saving. Please retry after waiting for a while.	After other users is completed to save, please save again.
5260	The Function or Function Block is not registered.	This Function or Function Block is not registered into a library. Please re-register.
5261	The Function or Function Block is not compiled.	This Function or Function Block has not been compiled. Please compile Function or Function Block.
5303	Please input some name as variable, member or Data type.	Please input the variable of one or more characters.
5304	The length is too long.	Please change the variable name as less than 20 characters.
5305	The top character is invalid.	The initial character of a variable should use an alphabetic character.

No.	Messages	Measure
5306	The string except the top has invalid characters.	Please use an alphabetic character, an underscore '_' after the 2nd character of a variable.
5307	Sequential under score cannot be used.	Please do not use an underscore '_' continuously.
5308	The name is reserved by IEC61131-3 or V-TOOL.	Please do not use reserved key-word.
5352	Please input some name as Data type.	Please input the data type of one or more characters.
5353	Array type description needs 2 dots. 'Array[0..99] of -- '.	When you define an array type, please input '..' between the minimum and maximum of a subscript.
5354	Array type description needs '[' and ']'. 'Array[0..99] of --'.	When you define an array type, please bundle a subscript with '[]'.
5355	Array type description needs two boundary indexes that must be natural number. 'Array[0..99] of --'	When you define an array type, please input a subscript by the positive number.
5356	Array type description needs lower boundary index that must be '0'. 'Array[0..99] of --'	When you define an array type, please give the minimum of a subscript as 0.
5357	Array type description needs upper boundary index that must be from '0' to '65535'. 'Array[0..99] of --'	When you define an array type, please give the maximum of a subscript as less than 65535.
5358	Array type description needs keyword 'OF'. 'Array[0..99] of --'	When you define an array type, please input 'OF' before data type.
5359	The data type must be elementary data type or the type that is defined in the Libraries.	Please input into data type a based type or the data type registered in the library.
5360	The data type is in the Library but has no members of STRUCT.	In case of a user definition type: Please specify the data type by which the structure member was defined. In case of a function block type: Please specify a function block name which already compiled.
5361	Data type 'PTR' or 'PTRB' is only used in parameter of Program, Function Block or Function and cannot be with 'Array[ ] of '.	Please use a PTR and a PTRB type independently by argument declaration of Program, Function Block, or Function.
5362	Type name of Program, Function, or Function Block is not used in this scope.	Please do not use the name of Program, Function, or Function Block as the global variable.
5363	Type name of Program or Function is not used in this scope.	Please do not use the name of Program or Function as the local variable.
5364	Type name of Function Block is only used in VAR declaration of Program or Function Block and cannot be with 'Array [] of '.	Please use the name of Function Block as the VAR declaration of Program or Function Block. Please do not define as the array type.
5402	Setting value is invalid. Because the data type is not elementary type or the scope is not static local variable of Program or Function Block.	The value of a variable can be set, when data type is a based type only. At the time of a local variable, the value of a value can be set in the VAR declaration of Program and Function Block only.
5590	Please wait a minute. The last finding runs still now.	After other users' cross-reference display is closed, please try again.

No.	Messages	Measure
5605	The pou is not in database or deleted. The registration has stopped.	The program opened now does not exist. It may have been deleted by other users. Please check the registration of a program.
5608	The variable name is already defined. The registration has stopped.	Please input other names.
5609	This scope is too full of variables. The registration has stopped.	Please delete an unnecessary variable.
5610	This controller is deleted. The registration has stopped.	The controller opened now does not exist. It may have been deleted by other users. Please check the registration of a controller.
5630	Receiver registrations are full.	Please close an unnecessary screen and try again.
5643	This product is occupied by the user.	After an this user's editing task is completed, please try again.
5650	Import error: It is not the file made at the same time.	Please use the a series of FD created by one export operation.
5651	Import error: It is not the file of V2Port type.	Please use the file or FD created by Version2 export.
5653	Import error: The system is already exist.	Please change a system name before importing.
5655	Compression or Expand process is running. Please wait for a while.	Please try again, after other users' the import or export work is completed.
5656	Other users or other applications are using this system.	After you and all users exit V-Tool, please operate it again.
5663	Disk full.	Please check the availability of HDD.
5665	File open error.	Please set up the read-out authority of a file correctly.
5666	File read error.	Please set up the read-out authority of a file correctly.
5667	File write error.	Please remove write protect. Or please cancel the attribute only for read-out.
5668	File delete error.	Please remove write protect. Or please cancel the attribute only for read-out.
5669	The file is broken.	Please use the file created by the export function of Version 2.
5683	The import file has some errors.(POU declaration part)	There are some errors in the specified contents of a PRG/FBK/FUN file. Please check the contents or try again from the target export.
5685	The import file has some errors.(Mapping variables)	There are some errors in the specified contents of a PRG/FBK/FUN file. Please check the contents or try again from the target export.
5686	The import file has some errors.(POU)	There are some errors in the specified contents of a PRG/FBK/FUN file. Please check the contents or try again from the target export.
5687	The import file has some errors.(TYP)	There are some errors in the specified contents of a TYP file. Please check the contents or try again from the target export.

No.	Messages	Measure
5691	The export file has some errors.(Data type of the function)	The data type of the return value of specified FUNCTION is not defined. please try again after a definition by the program editor
5692	The export file has some errors.(No STRUCT declaration)	The member of the specified structure is not defined. Please try again after defining a member in the Library.
5693	The data type is not defined or incorrect.	The data type of the variable currently used within the PRG/FBK/FUN file specified at the time of the import is not defined as a library, or there are some errors in the notation. Please register or import the target data type into a library.
5700	The input variables has registration. It cannot delete.	Please delete the input variable, before deleting the output variable of a station variable or a network variable.
5701	The network variables of TC-net100 LAN has registration. It cannot delete.	Please delete the network variable of TC-net100LAN, before deleting this network variable.
5703	Set the 'Middle speed I/O schedule num' to 2 or more.	Please set the 'Middle speed I/O schedule num' of the module parameter of RIO to 2 or more, and register a variable again.
5704	Since IQNo is mismatching, the duplicate addressing to this address is not allowed.	Please change or delete registered variables, before register new one.
5705	Total size of variables is over than IQ max size of RIO controller.	Please reduce variable registrations to store I/O connection area.
5816	The server component is not set up or may have wrong version.	Please check the tool's version of Server PC.
5817	The file is not found.	Please check the tool setup of Server PC.
5830	Define the return value of function and re-draw.	There are some errors in the definition of the function.
5882	Memory runs short.	Please check the availability of memory.
6035	The name is double defined.	Please input other names.
6036	Please enter the value existing in the list box.	Selected characters other than a selection candidate.
6037	The station is empty or deleted.	Please check the existence of this station.
6038	The controller is empty or deleted.	Please check the existence of this controller.
6039	The unit is empty or deleted.	Please check the existence of this unit.
6040	The Bus is empty or deleted.	Please check the existence of this bus.
6042	The network is empty or deleted.	Please check the existence of this network.
6057	This line cannot be changed or deleted.	Please do not change fixed library name 'Work'.
6059	The slot number or product has already added.	Please update the display of a product tree.
6080	The string is empty.	Please input a character.
6082	There are invalid string.	Please check an input character.
6083	The word is double defined.	The same character is already registered. Please input other characters.

No.	Messages	Measure
6091	There are no room to add the product.	Registration is the maximum. Additional registration cannot be carried out.
6092	There are no module to be able to connect to the network.	A newly connectable module is not in a network.
6100	Cyclic invocation is not allowed.	Member registration of itself cannot be carried out at the member of the structure.
6101	The string length is out of the range.	Please lessen input-statement number of letters.
6102	'(*' or '*)' cannot be used.	Please delete '(*' or '*)' from a comment.
6103	The data type which member was defined cannot be changed.	Since the member of the structure is already registered, a name cannot be changed.
6104	The data type cannot be changed after defining program.	Since the circuit is already written, a name cannot be changed.
6150	It is not numeric.	Please input a numeric value.
6151	The value is out of range.	Please input a value within the limits.
6152	Please selecting YES(1) or NO(0).	(See this left.)
6153	There are no room for the Pou entry.	Please delete the POU entry of an unnecessary program.
6154	It cannot be set up, since the Pou was not registered to the controller,	The task entry in a controller is deleted. Please update the task-entry screen.
6155	Changing the task entry value cannot be continued. Please try again after writing to the controller.	The maximum number which can be changed simultaneously is 30. When you change 30 or more task entries, please try after dividing.
6156	Deleting the task entry cannot be continued. Please reduce the number.	The maximum number which can be changed simultaneously is 150. When you change 150 or more task entries, please try after dividing.
6160	It is not numeric.	Please input a numeric value.
6161	The value is out of range.	Please input a value within the limits.
6162	The variable is not defined.	Please input a registered variable.
6180	The pou is not in database or deleted.	Please reset up the variable for a display once again.
6182	The Variable is not found or The data type is not basic data.	Please input the variable name which already exists.
6181	Input value error. The variable name is not available, or the data type is not base type.	Please reset up the variable for a display once again.
6183	Input value error. The local and controller variables are available.	Please input the variable of a controller.
6184	Input the VAR declared variable of Program or Function Block.	The variable declared by VAR_TEMP or VAR_INPUT cannot be specified.
6250	The transmit speed is not valid.	Characters other than a selection candidate are inputted into the transmitting speed.
6251	The output node is not valid.	Characters other than a selection candidate are inputted into the transmitting node.
6252	The output controller is not valid.	Characters other than a selection candidate are inputted into the output controller.

No.	Messages	Measure
6253	Changing the talker block cannot be done since network variables are defined.	(See this left.)
6254	The word size is not valid.	The word of TC-net100LAN scan block has following restrictions. Restriction: 64 multiples & not registered as other blocks.
6255	Clearing the talker block cannot be done since block ranges are defined.	In TC-net100LAN, when two or more continuation blocks are registered as the same block ('block range'), please delete by selecting the head block of them.
6260	Const is not valid.	Characters other than a selection candidate are only inputted into read-out.
6263	Drag & Drop is not available between the different kind controllers.	(See this left.)
6267	Please get Editor's right of the program.	It cannot edit, unless the program editor is the edit mode.
6273	Please register Module parameters, before registering the I/O Variable.	(See this left.)
6274	The value is out of range.	Please input the value, which can be selected from the list.
6300	The string length is out of range. (below 50 characters)	Please reduce the number of characters of a comment.
6301	'(*' or '*)' can not be used.	Please delete '(*' or '*)' from a comment.
6302	It is not numeric.	Please input a numeric value into Word No.
6303	The value is out of range.	Please input a positive-number value into Word No.
6304	It is not numeric.	Please input a numeric value into Bit No.
6305	The value is out of range.	Please input the value of 0-15 into Bit No.
6306	Value setting is not valid except BOOL data type.	When you set up Bit No, please set data type to BOOL.
6307	The declaration type cannot be accepted.	(See this left.)
6308	The declaration property cannot be accepted.	(See this left.)
6309	It is not numeric.	Please input a numeric value into Order No.
6310	The value is out of range.	Please input a positive-number value into Order No.
6321	The Pointer Argument is not available for monitoring.	(See this left.)
6346	There is no enough block memory for mapping the following new word No.	There is no empty memory required in order to assign a variable. Please try batch compling.
6348	Word No. and the data type cannot be changed after defining input variable.	the address -- please once delete a receiving side to make a data type change

No.	Messages	Measure
6349	Duplicate addressing is not allowed the Word No.	Since the number of IQ No. assigned to existing word No. is odd, existing word No. is overlapped and a variable 2 words or more cannot be assigned to it. Please reassign first from a variable 2 words or more.
6363	Too full for input or output parameters .[Bout]	Please reduce the number of arguments.
6364	Too full for Input or output parameters.[Wout]	Please reduce the number of arguments.
6365	Too full for Input or output parameters.[Bin]	Please reduce the number of arguments.
6366	Too full for Input or output parameters.[Win]	Please reduce the number of arguments.
6601	A monitor is stopped	Please start a monitor again.
6602	Please perform a monitor after control write-in processing	(See this left.)
6603	The cable may be not connected or the controller may be not ready.	Please check connection of a cable or the state of a controller and try again.
6604	This monitoring can not be continued and stopped. Please start to monitor again.	Please start a monitor again.
6850	Cannot insert it in this location. Change to override mode by INS key.	When you draw a SFC circuit, please make it overwrite mode.
6851	Row count you can delete must be below 12.	The minimum numbers of sequences are 12 sequences.
6852	Row count you can insert must be below 36.	The maximum numbers of sequences are 36 sequences.
6853	Cannot insert Page here.	Please do not include other instruction word in the line which inserts a page break.
6915	The selected Function or Function Block is not supported by this controller.	Please choose the function which can be used by the this controller, or a function block.
6916	Program Editor is now waiting for your answer. Close the active dialog of Program Editor and try to open again.	Please try again after closing the active dialog opened now.
6917	This program is occupied by the user who is during editing, swapping or forcing.	After edit of other users or a swap force is completed, please try again.
6918	This program has been changed by following user. Close and Open the view again.	(See this left.)
6923	The program is not found in the Library.	Please re-register a program after deleting a task entry and POU entry.
6925	The program is not found in the Library.	Please re-register a program after deleting a task entry and POU entry.
6942	The maximum number of a Program Editor was exceeded.	Please try again after closing an unnecessary screen.
6980	The format is mistaken. Specification Format vHMI.exe /M xx [/C] System\Station\UnitNo\ModuleNo\Task\TaskEntryNo	(See this left.)
6981	The program corresponding to conditions is not found.	(See this left.)

No.	Messages	Measure
6982	The system is not found. Please check to see System ID is right.	(See this left.)
6983	The station is not found. Please check to see a Station Name is right.	(See this left.)
6984	The unit is not found. Please check to see Unit No is right.	(See this left.)
6985	The module is not found. Please check to see Module No is right.	(See this left.)
6986	There is a variable specified in order to open a program, or no equipment.	(See this left.)
6987	The task is not found. Please check to see a Task is right.	(See this left.)
6988	The task entry is not found. Please check to see Task Entry No is right.	(See this left.)
7000	Getting the module name has failed.	The controller may have been deleted by other users. Please update the display of a product tree.
7001	Getting the POU entries info has failed.	The controller may have been deleted by other users. Please update the display of a product tree.
7080	Register main unit at first please.	Please register main-unit composition.
7081	The module for downloading is not registered.	Please register the module for download.
7082	There is no product to download.	Please register the module for upload.
7083	The module for uploading is not registered.	Please unite registration of a main unit and a main module with a mounting state.
7084	Registration of main unit configuration is not in agreement with controller.	Please register a controller into a station.
7085	Can not make 'Tool-Source', because there are 'Local Variable' declarations which are not fit for it. After 'Batch-Compiling', please try again.	(See this left.)
7136	Please change to Ethernet connection. [System Status] window is not available via RS-232C connection.	Please change into Ethernet connection.
7139	The left end controller is not registered.	please register S controller into a left end. 'Left end' means the slot 1 (model 3000), or the slot 0 (model2000).
7140	The hardware configuration is not downloaded.	please download a configuration once again
7141	Operation mode is not matched.	Please change an operation mode into RUN or RUN-F.
7142	This controller does not support the function. Check software version of this controller.	Please check the version of a controller, and the function currently supported.
7143	RS-232C cable connected to wrong module.	Please connect an RS-232C cable to the target module correctly.
7144	The format is mistaken. Specification Format: SysView.exe [/T /M] System, Station.	(See this left.)

No.	Messages	Measure
7145	The format is mistaken. Specification Format: SysView.exe [/T /M] System, Station, SlotNo, BusNo, UnitNo, DisplayNo.	(See this left.)
7146	The system is not found. Please check to see System Name is right.	(See this left.)
7147	The station is not found. Please check to see a Station Name is right.	(See this left.)
7150	The format is mistaken. Specification Format: SysLog.exe [/T /M] System, Station, SlotNo.	(See this left.)
7152	The system is not found. Please check to see System Name is right.	(See this left.)
7153	The station is not found. Please check to see a Station Name is right.	(See this left.)
7155	The module is not found. Please check to see Module Name is right.	(See this left.)
7480	PV No is already selected. Change [PVP] value.	Please input other PV No (es).
7481	Tag No is already exist. Change Tag No.	Please input other Tag No (es).
7700	Cannot print due to a problem with the current printer setup.	Make sure the printer is turned on and online.
7752	5800I/O address setting error.(Condition: TOP<ADRS<=BOT)	The address switch of an AIEX card (AIEX-5862, RTD-5863) must be filling mentioned setups between the TOP switches of AI-5861 and BOT switches by which the private bus connection was carried out. Please improve the address selection of 5800 I/O.
7753	5800I/O AI card is not connected via private bus.	An AIEX card (AIEX-5862, RTD-5863) cannot be used alone, but it is necessary to surely connect it with AI-5861 by private bus. Please improve registration and the parameter of 5800 I/O card.
7754	The same mode must be set in 'I/O Signal processing mode' of the multi CPU configuration.	When some controllers are registered in the main unit as 'multi CPU configuration', the same mode must be set in 'I/O Signal processing mode' of the each controller.
7755	The middle speed I/O scheduling of RIO is not correct. Please register a RIO variable again.	To register a RIO variable again, please change 'I/O Speed' of I/O variable and set it again. The middle speed I/O will be re-scheduled.
7830	The communication request is busy.	Please try again.
7831	The hardware registration was changed. Please refresh the data.	(See this left.)
7832	No hardware registration in the controller. Please download it.	Please use it after downloading a configuration to a controller.
7857	Cannot print due to a problem with the current printer setup.	Make sure the printer is turned on and online.
7858	If you changed 'Middle speed I/O schedule num', please register a RIO variable again.	To register a RIO variable again, please change 'I/O Speed' of I/O variable and set it again. The middle speed I/O will be re-scheduled.

No.	Messages	Measure
7905	User registration is full. Max.:100 users.	please delete registration so that a user's number of registration becomes less than 100
7906	Setting of this tool is not correct.	please set up once again
7907	Following characters and blank cannot be used. ?"/\<>*|:;	Please register so that these characters are not included.
7908	Please specify a user name within 32 characters more than one character.	Please register with the appointed number of characters.
7909	Please specify a comment within 64 characters.	Please register with the appointed number of characters.
7911	Version mismatch error. The same version tools should be set-up on client and server PC.	A server and a client should set up V tool of the same version.
7912	Login error. The Stand-alone PC can not be access from the client PC.	Please connect with PC which setup as servers.
7913	Reserved	Please register in the character of the specified range.
7914	Please specify a password within 32 characters more than one character.	Please register with the appointed number of characters.
7921	Please insert the formatted and writable disk.	(See this left.)
7922	Please insert to the drive empty FD formatted in 1.44MB.	(See this left.)
7930	Cannot copy a file.	The error occurred in the file copy. Please check the holder of source and destination which displayed on an error dialog.
7931	Export error: The file is already exist.	Please remove the file from the holder displayed on an error dialog, or change specification of a file name.
7932	Cannot find the file.	(See this left.)
7933	Please enter the file name.	(See this left.)
7934	Cannot get disk status.	The specified disk is not mounted or is considered to be unusual. Please check a disk state.
7935	Import error: The system is already exist.	Please remove the file from the holder displayed on an error dialog, or change specification of a file name.
7936	Please select a file.	(See this left.)
7939	File open error.	A file is unusual. Please check the state of the disk used.
7940	File read error.	A file is unusual. Please check the state of the disk used.
7941	The file is broken.	A file is unusual. Please check the state of the disk used.
7942	The system name has some errors.	The character which cannot be used as a system name is included, or the number limit of characters is exceeded. Please change a name.

No.	Messages	Measure
7960	This system is used by other users.	This system is used by other users. After other users exited V-Tool, please try again.
8000	Data type is not registered in 'Libraries'.	Please register the user definition type or Function Block type into a library.
8001	POU type is not registered in 'Libraries'.	Please delete this POU entry and re-register a program.
8002	POU type is not registered in 'Pou Entries'.	Please delete this task entry and re-register the existing program.
8003	Member of structure is not registered.	Please register the structure members of a user definition type.
8004	There is circulation reference.	Please change a program not to become circulation reference.
8005	The program have some errors.	Please open a program editor and check an error list.
8006	The POU is not compiled.	Please open a program editor and check an error list.
8007	'Value' has invalid value.	Please input the value according to data type.
8010	The program is empty.	There is not a program. Please delete at the time of an unnecessary program.
8011	Local variable declaration has some errors.	Please open this program and check local variable declaration.
8012	The number or data type of task entry parameters is not in agreement.	Please unite the dummy argument of a task entry, the number of actual parameters, and data type on a task-entry argument screen.
8053	The controller is empty.	Please execute batch-compiling the system in which this controller exists.
8054	This scope is too full of variables.	There is no vacant area of the address. Please delete an unnecessary variable.
8100	The POU Entry is already used. Please delete it, and make it again.	From the bottom of a POU entry, since seven pieces are the objects for the tool sources, please do not use them.
8101	The size of CODE is too large. Cannot download with source. Please open Resource Report and confirm CODE size.	Please consider a setup which includes neither the monitor source information nor comment information.
8102	Station name is already defined. Reverse generation was canceled. Please check the station configuration.	Existing station name is registered in Tool-source for Reverse generation. Please change the name or delete this station using “Product Tree”, before retry uploading.
8103	TagNo is already defined. Reverse generation was canceled. Please check the TagNo registration.	Existing TagNo is registered in Tool-source for Reverse generation. Please change or delete these TagNo using “Tag Editor”, before retry uploading.

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TOSHIBA CORPORATION

Transmission Distribution & Industrial Systems Company
Microelectronics & System Components Department - System Components Support Group
1, Toshiba-Cho, Fuchu-Shi, Tokyo, 183-8513, Japan Tel +81-42-333-2206

1, Toshiba-Cho, Fuchu-Shi, Tokyo, 183-8513, Japan

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