

# OMRON FB Library Start-up Guide

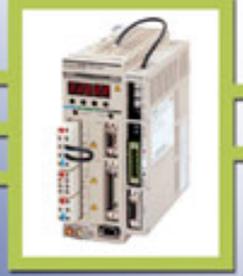
*Ethernet*

*Controller Link*



*Device Net*

*Serial network*



This OMRON FB Library Start Up Guide introduces you how to connect PLC that uses “OMRON FB Library” and other devices, with specific examples. This Guide does not include limiting conditions of usage of each unit/control component, or combination of them. Please read user's/operation manual of each product for the actual application.

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Chapter 3 OMRON FB Library List

For higher efficiency design of facility/device using Omron's programmable controller and control component, Omron supports Function Block (hereinafter FB) with programmable controller SYSMAC CS/CJ series and programming tool CX-Programmer V.5.0. In addition, Omron provides “**OMRON FB Library**” for easier programming of data exchange with various control components attached to PLC through various units and networks. “**OMRON FB Library**” is a collection of FB software function components that you can incorporate into your system as it is.

Omron is going to add more components to this OMRON FB Library to contribute for higher efficiency and quality of your PLC programming.

This OMRON FB Library Start Up Guide introduces you how to connect PLC that uses “**OMRON FB Library**” and other devices, with specific examples. Refer to these examples for your design of facilities and devices using Omron's PLC and control component.

## PLC models for which you can use OMRON FB Library

CS1G-CPU□□H (Unit Ver.3.0 or later)

CS1H-CPU□□H (Unit Ver.3.0 or later)

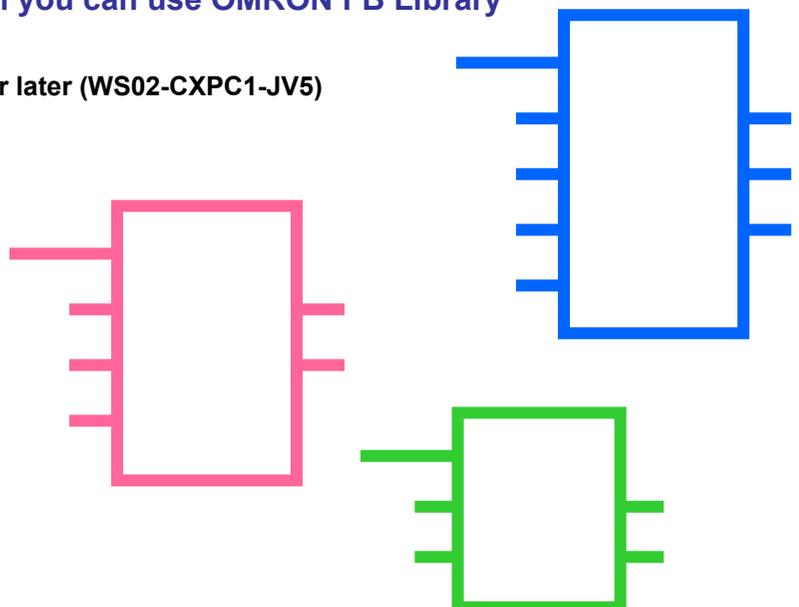
CJ1G-CPU□□H (Unit Ver.3.0 or later)

CJ1H-CPU□□H (Unit Ver.3.0 or later)

CJ1M-CPU□□ (Unit Ver.3.0 or later)

## Programming tool for which you can use OMRON FB Library

CX-Programmer Ver.5.0 or later (WS02-CXPC1-JV5)



## ***Chapter 1 What is OMRON FB Library?***

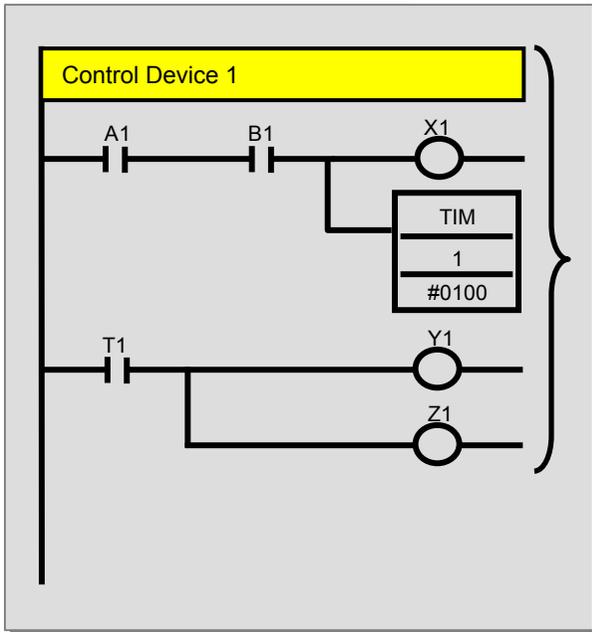
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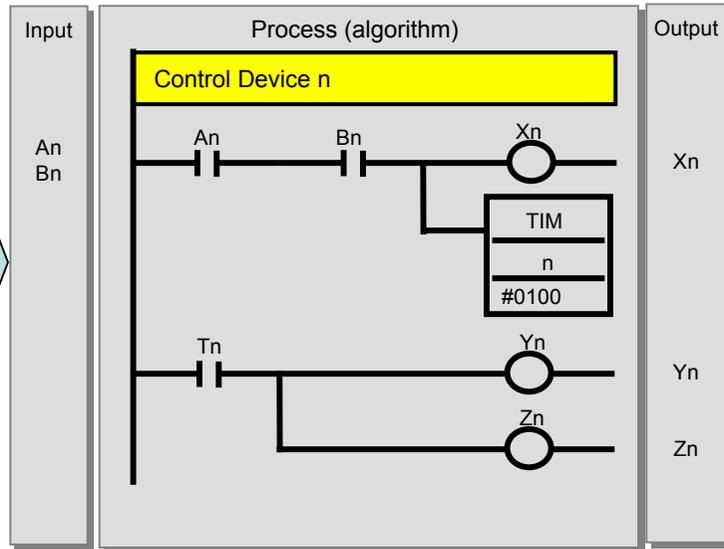
# 1. What is a Function Block?

“Function Blocks” are predefined programs (or functions) contained within a single program element that may be used in the ladder diagram. A contact element is required to start the function, but inputs and outputs are editable through parameters used in the ladder arrangement. The functions can be reused as the same element (same memory) or occur as a new element with its own memory assigned.

Partial Ladder program for machine A

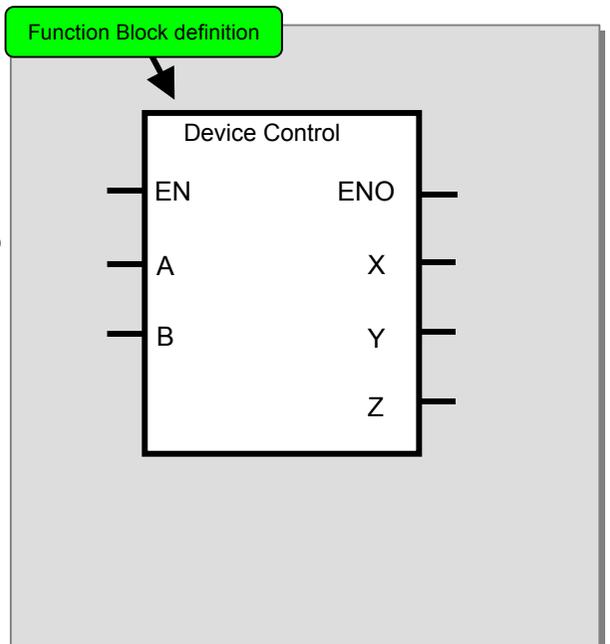
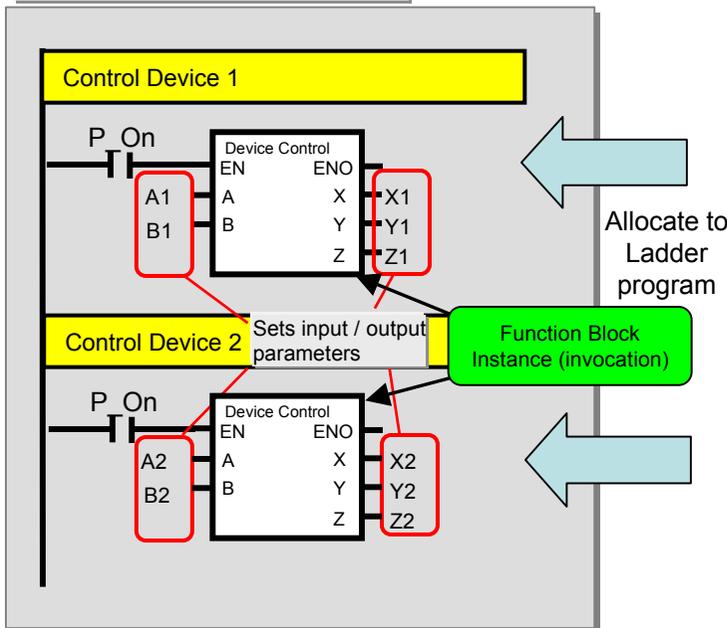


Defining Inputs and Outputs...



Produce template

Partial Ladder program for machine A

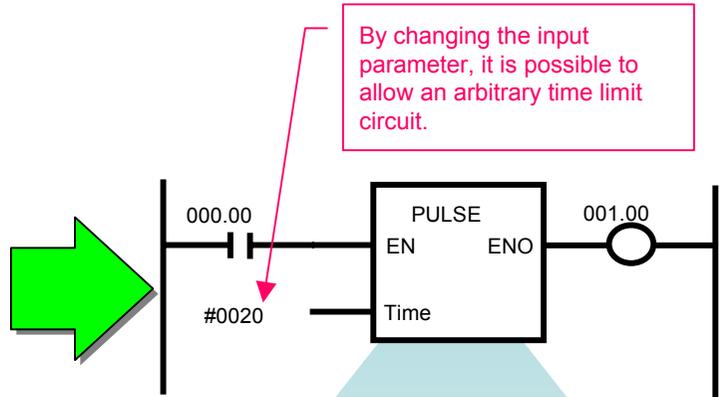
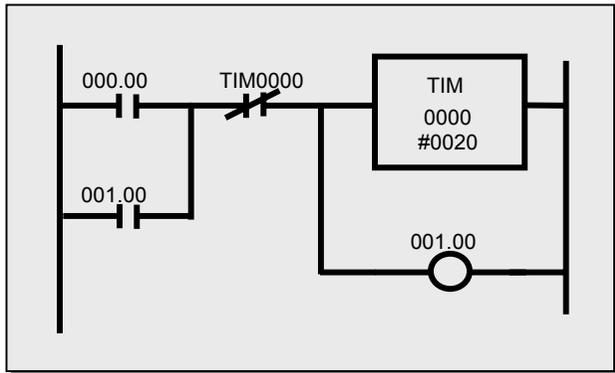


Function Block definition ...This contains the defined logic (algorithm) and I/O interface. The memory addresses are not allocated in the Function Block Definition  
 Function Block instance(invocation) ...This is the instruction that will call the function block instance when used by the ladder program, using the memory allocated to the instance. As the memory (addresses) used are allocated and perform individually for each Function Block instance, no error occurs when one Function Block definition is called from more than one instances.

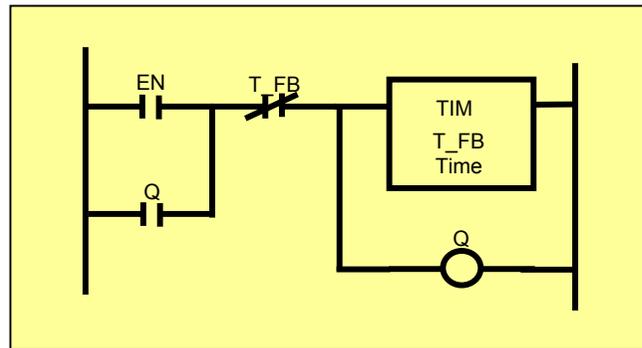
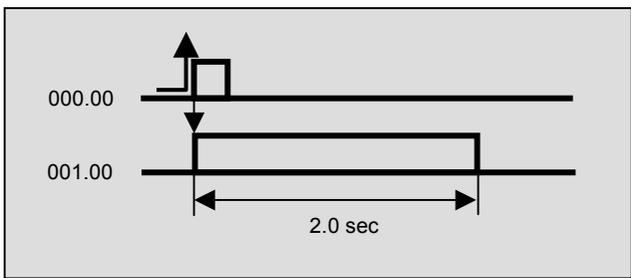
## 2. An Example of a Function Block

The following figures describe an example of a function block for a time limit circuit, to be used in the ladder. It is possible to edit the set point of the TIM instruction to reallocate the set time for turning off the output in the ladder rung. Using the function block as shown below, it is possible to make the time limit of the circuit arbitrary by only changing one specific parameter.

Ladder diagram



Timing chart



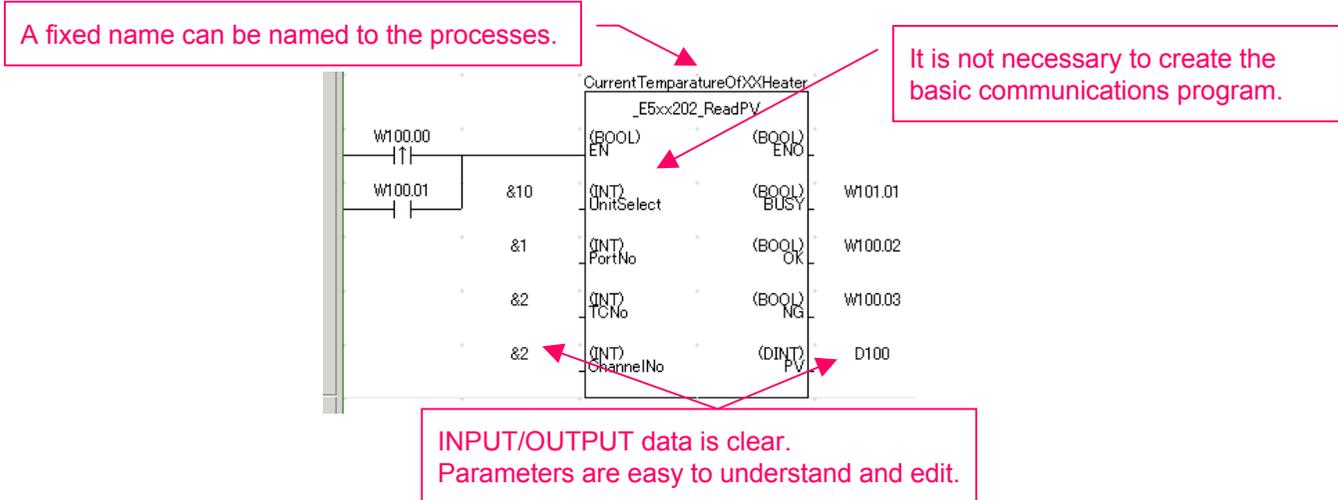
### 3. Overview of the OMRON FB Library

The OMRON FB Library is a collection of predefined Function Block files provided by Omron. These files are intended to be used as an aid to simplify programs, containing standard functionality for programming PLCs and Omron FA component functions.

#### 3-1. Benefits of the OMRON FB Library

The OMRON FB Library is a collection of function block examples that aim to improve the connectivity of the units for PLCs and FA components made by Omron. Here is a list of the benefits to be gained from using the OMRON FB Library:

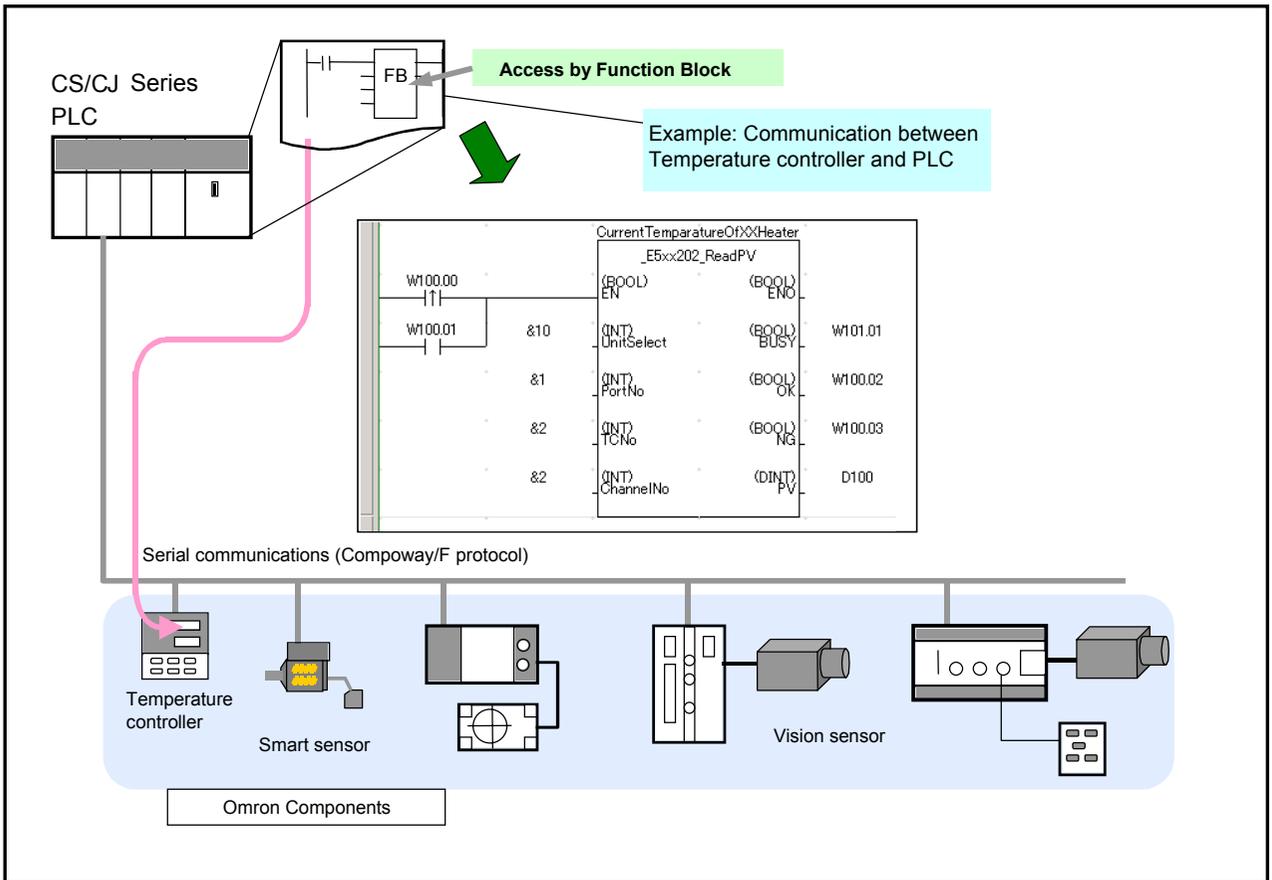
- (1) No need to create ladder diagrams using basic functions of the PLC units and FA components  
More time can be spent on bespoke programs for the external devices, rather than creating basic ladder diagrams, as these are already available.
- (2) Easy to use  
A functioning program is achieved by loading the function block file to perform the target functionality, then by inputting an instance (function block call instruction: invocation) to the ladder diagram program and setting addresses (parameters) for the inputs and outputs.
- (3) Testing of program operation is unnecessary  
Omron has tested the Function Block library. Debugging the programs for operating the unit and FA components for the PLCs is unnecessary for the user.
- (4) Easy to understand  
The function block has a clearly displayed name for its body and instances. A fixed name can be applied to the process.  
  
The instance (function block call instruction: invocation) has input and output parameters. As the temporary relay and processing data is not displayed, the values of the inputs and outputs are more visible. Furthermore, as the modification of the parameters is localised, fine control during debugging etc. is easier.  
  
Finally, as the internal processing of the function block is not displayed when the instance is used in the ladder diagram, the ladder diagram program looks simpler to the end user.
- (5) Extensibility in the future  
Omron will not change the interface between the ladder diagram and the function blocks. Units will operate by replacing the function block to the corresponding FB for the new unit in the event of PLC and the FA component upgrades, for higher performance or enhancements, in the future.



3-2-1. Example of using the OMRON FB Library - 1

Controlling the predefined components made by Omron can be easily achieved from the PLC ladder diagram.

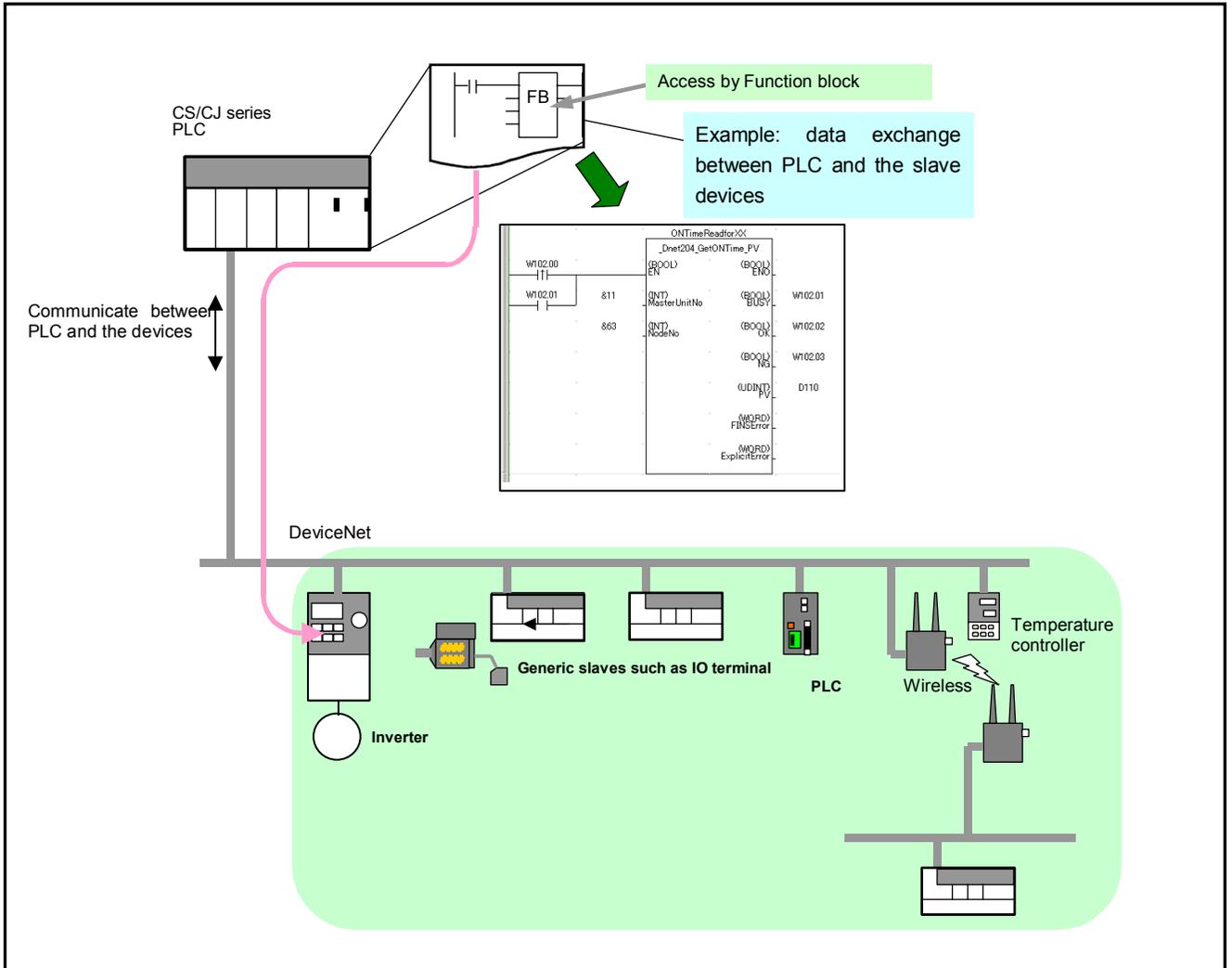
- Ability to configure low-cost communications (RS-232C/485)



3-2-2. Example of using the OMRON FB Library - 2

High performance communications can be made by DeviceNet level.

- Ability to communicate between PLC and DeviceNet slaves easily.



### 3-3. Content of the OMRON FB Library

The OMRON FB Library consist of the following:

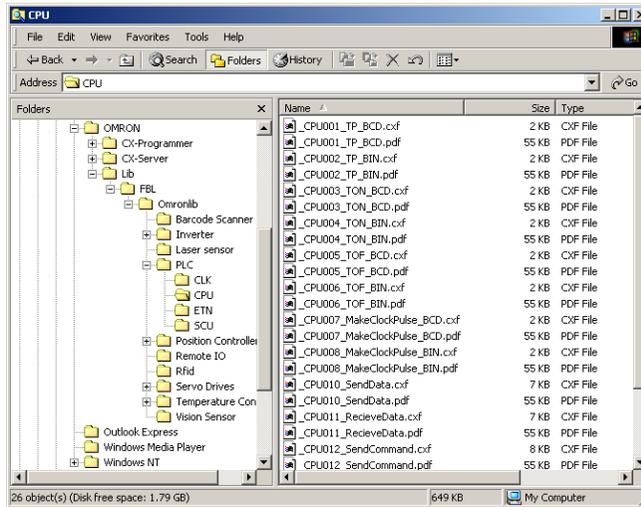
#### 3-3-1. OMRON FB Part Files

The OMRON FB Part file is prepared using the ladder diagram function block, for defining each function of the PLC unit and the FA component.

The files contain a program written in ladder diagram and have the extension .CXF.

The file name of the OMRON FB Part file begins with ‘\_’ (under score).

When the OMRON FB Library is installed onto a personal computer, the OMRON FB Part files are classified in the folder appropriate to each PLC Unit and FA component in the Omron Installation directory.



#### 3-3-2. Library reference

The library reference describes the operation specifications of the OMRON FB Part file, and the specifications of the input and the output parameters for each. The file format for this is PDF.

When the OMRON FB Library is used, the user should select the OMRON FB Part file, set the input / output parameters, and test the program operations referring to the library reference.

V60x200		Read Data Carrier Data _V60x200_ReadData	
FB name	_V600_ReadData		
Symbol			
File name	#Lib#\FBL\English\omronlib\FID#\V600#\V60x200_ReadData10.cxf		
Applicable models	CS1W-V600C11/V600C12 and CJ1W-V600C11/V600C12 ID Sensor Units		
Basic function	Reads data from a Data Carrier.		
Conditions for usage	Other • This FB cannot be executed if the ID Sensor Unit is busy. The NG Flag will turn ON if an attempt is made.		
Function description	Data is read from the specified area of the Data Carrier specified by the <i>Unit No.</i> and <i>Vendor No.</i> Up to 2048 bytes (1024 words) can be read at one time. The word designation for storing the data is specified using the area type and beginning word address. For example, for D1000, the area type is set to P_DM and the beginning word address is set to &1000.		
EN input condition	Connect EN to an OR between an upwardly differentiated condition for the start trigger and the BUSY output from the FB.		
Restrictions input variables	<ul style="list-style-type: none"> <li>Always use an upwardly differentiated condition for EN.</li> <li>If the input variables are out of range, the ENO Flag will turn OFF and the FB will not be processed.</li> <li>Always specify a head number of &amp;1 for One-Head ID Sensor Units (CS1W-V600C11 and CJ1W-V600C11).</li> </ul>		

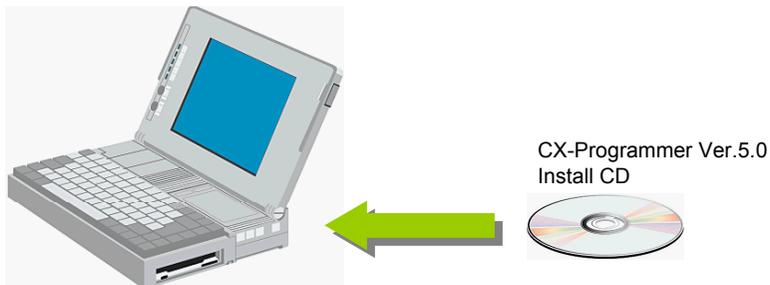
### 3-4. File Catalog and Where to Access the OMRON FB Library

#### 3-4-1. Catalog of OMRON FB Library files

Type	Target components	Number of OMRON FB Part files (at the time of July '04)
FA components	Temperature controller, Smart sensor, ID sensor, Vision sensor, 2 dimensions bar code reader	approx. 80
PLC	CPU unit, Memory card, Special CPU IO unit (Ethernet, Controller Link, DeviceNet unit, Temperature control unit)	approx. 95
Motion control components	Position control unit Inverter Servo motor driver	approx. 30

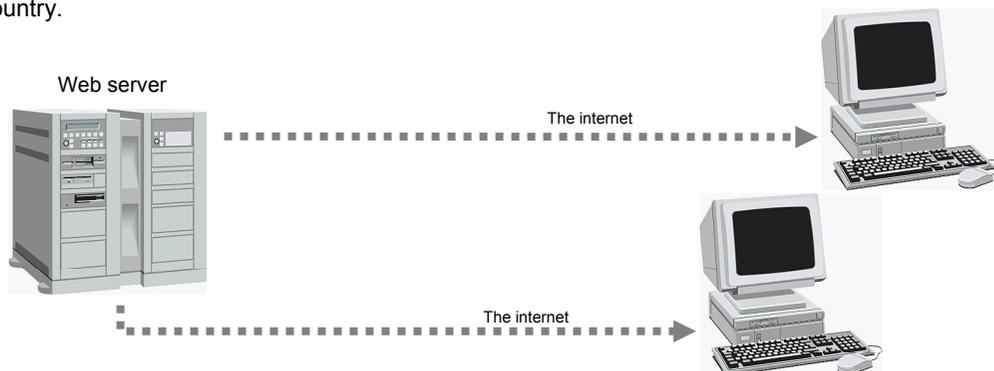
#### 3-4-2. CX-Programmer installation CD

CX-Programmer Ver.5.0 installation CD contains the OMRON FB Library files. The user can select to install the OMRON FB Library during the installation of CX-Programmer Ver.5.0.



#### 3-4-3. Accessing OMRON FB Library files from Web server

The latest version OMRON FB Library files will be provided by Omron on the Web server. New files will be added to support new or enhanced PLC units and FA components. The download service of the OMRON FB Library is provided as a menu of Omron Web in each country.



## **Chapter 2**

### **Connecting Method for Units/Control Components**

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- 2-1 Controller Link Unit CJ1W-CLK21 -V1
- 2-2 DeviceNet Slave (DRT2 Series) DRT2-□□□□
- 2-3 Position Control Unit CJ1W-NCF71
- 2-4 Position Control Unit CJ1W-NC113/133/213/233/413/433
- 2-5 Position Control Unit CS1W-NC113/133/213/233/413/433
- 2-6 Inverter 3G3MV-A2□□□/-AB□□□/-A4□□□, 3G3RV-A2□□□/-A4□□□
- 2-7 Servo Driver R88D-WT□□/-WT□□□H/-WT□□HL, R7D-AP□□H/-AP□□L
- 2-8 RFID V600-H□□
- 2-9 Vision Sensor F160-C10
- 2-10 2D Code Reader V530-R2000/-R160/-R150V3
- 2-11 Smart Sensor ZX-SF11, ZX-LD40, ZX-LDA11-N
- 2-12 Temperature Controller E5ZN-2□
- 2-13 Temperature Control Unit CJ1W-TC001/101/003/103/002/102/004/104

## 2-1 Controller Link Unit

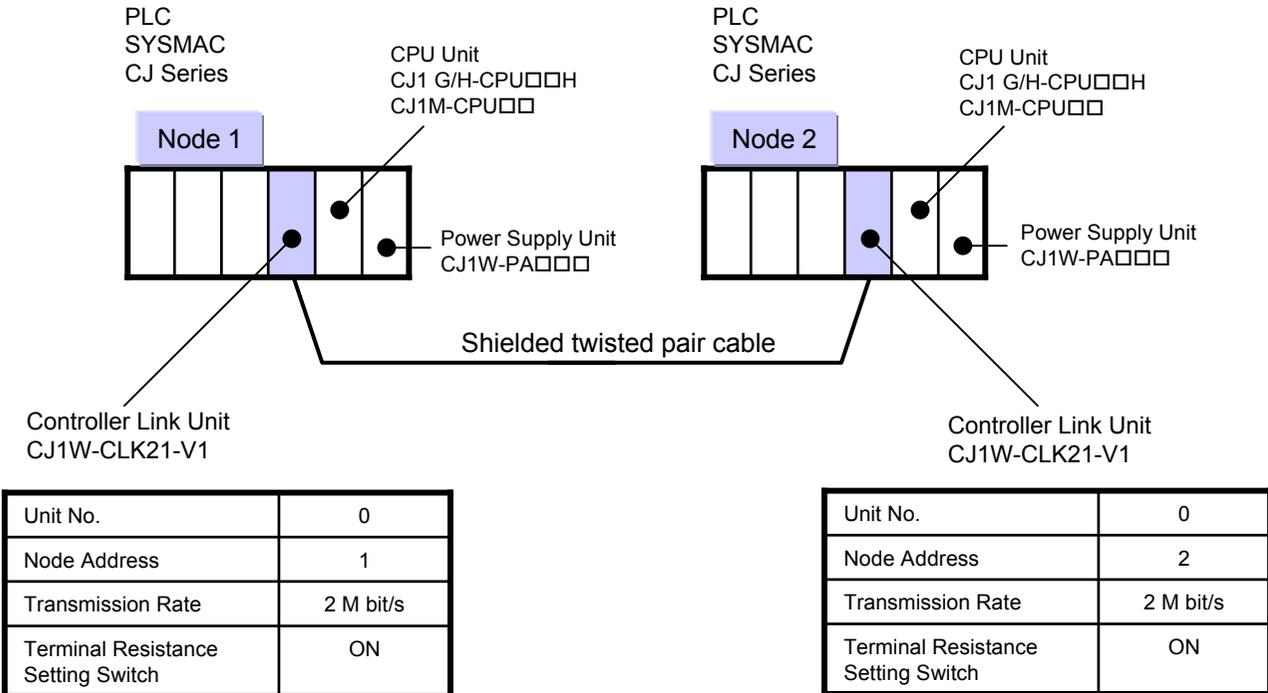
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CJ1W-CLK21-V1

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Shown below is an example of using Controller Link unit for data link operation under automatic configuration.

### 1. Hardware Configuration



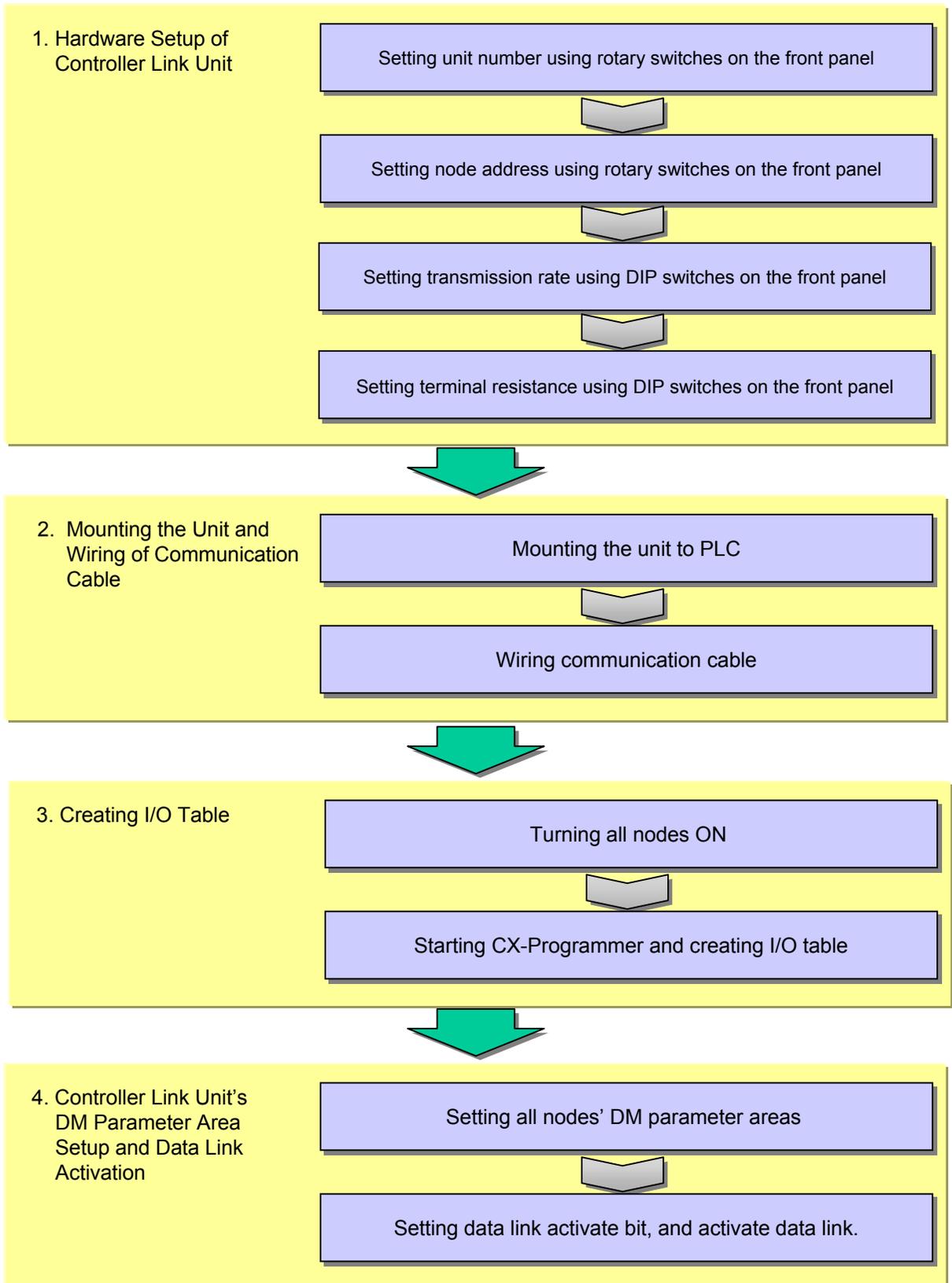
Use the following shielded twisted pair cable:

Type Code	Manufacturer
ESVC 0.5×2C-13262	Bando Electric Wire
ESNC 0.5×2C-99-087B	Nihon Electric Wire & Cable

Shown below are M3 crimping contacts suitable for communication cable.

Manufacturer	Type Code	Remarks
JST Mfg.	V1.25-N3A	U-shaped crimping contact with vinyl insulation
	V1.25-MS3	O-shaped crimping contact with vinyl insulation
Molex	VSY1.25-3.5L	U-shaped crimping contact with vinyl insulation
	RAV1.25-M3	O-shaped crimping contact with vinyl insulation

## 2. Operational Workflow

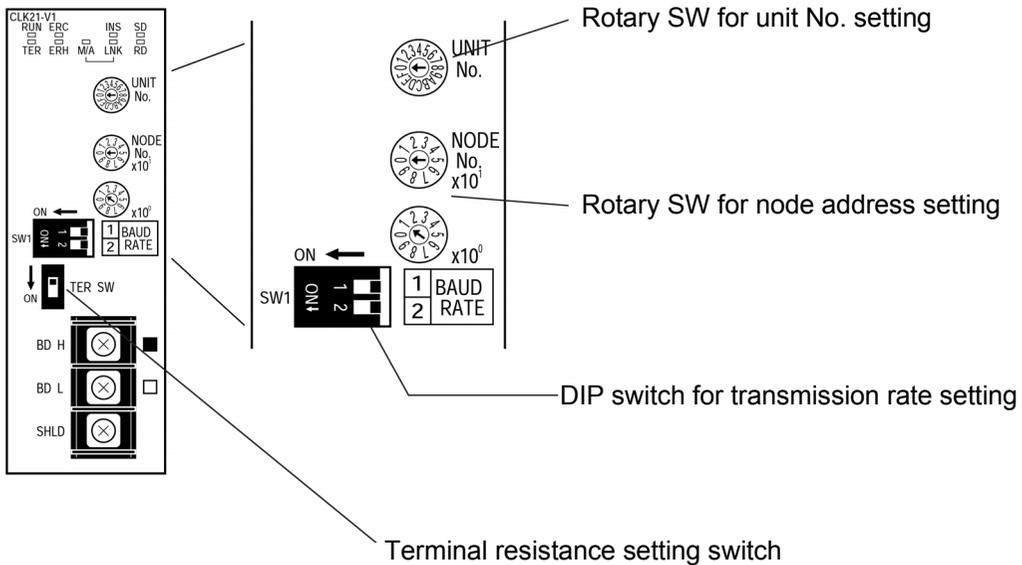


Refer to Operation Manuals for detail instructions.  
Wiring Type Controller Link Units Operation Manual (W309-E1)  
Optical Ring Controller Link Units Operation Manual (W370-E1)

## 2-1. Hardware Setup of Controller Link Unit

### 2-1-1. Hardware Switches

CJ1W-CLK21-V1



### 2-1-2. Unit Number Setting



UNIT No.

Set the Unit Numbers for node 1 and 2 as described on the left

Unit Number = 0

\* As the factory default setting is 0, it is not need to be set.

### 2-1-3. Node Address Setting

Set the node address using flat-blade screw driver.

10 digits - NODE No. x10<sup>1</sup>

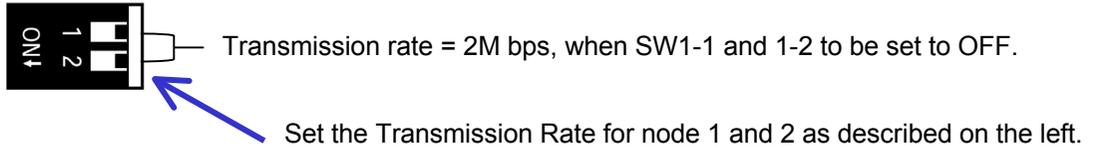
Unit digits - x10<sup>0</sup>

Example of setting Node Address = 1

Node Address	Node Address
1	2
0	0
1	2

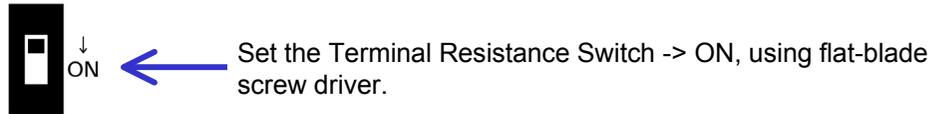
\* Factory default setting is 01.

### 2-1-4. Transmission Rate Setting



\*As the factory default setting is 2M bps, it is not need to be set.

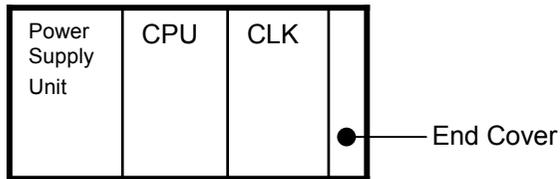
### 2-1-5. Terminal Resistance Setting



\* The factory default setting is OFF.

### 2-1-6. Mounting the Unit

Configure CPU Unit, Power Supply Unit and CLK Unit.

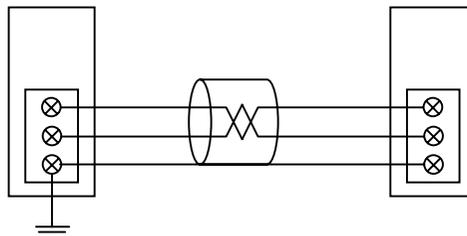


Mount the unit as shown above and use sliders on the top and bottom of the unit to fix the unit.

### 2-1-7. Wiring Communication Cable

Connect all shielded wires to the terminal board and on one end of the network directly ground it .

BDH ■  
BDL □  
SHLD



BDH ■  
BDL □  
SHLD

Use the specified communication cable (twisted pair cable) to connect the nodes by multi-drop.

Terminal has a marking printed on it that indicates the signal wire. Connect the cable so that signal wire and the marking should match. Markings indicate the signal wires as shown below:

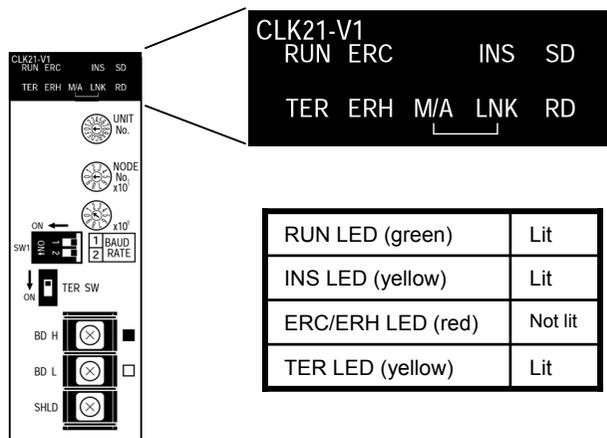
Mark	Signal name	Line color
■	BDH (communications data high)	Black
□	BDL (communications data low)	White
None	SHLD (shield)	-

### 2-1-8. Creating I/O Table

Turn all node PLCs ON, connect the support tool, then create the I/O table.  
By these procedure, Controller Link unit constructs the network.

### 2-1-9. Operation Condition Check with LED

Check whether ERR/ALM LED (red) of the CPU unit is lit off.  
Check whether LEDs of the Controller Link unit are as shown below.



<Reference> LED shows the operation condition.

Name	Color	Status	Meaning
RUN (operating)	Green	Lit	Unit operating normally.
		Not lit	Unit error.
TER (terminating resistance)	Yellow	Lit	Terminating resistance switch is ON.
		Not lit	Terminating resistance switch is OFF.
ERC (communica- tions error)	Red	Lit	Communications error, node address setting error (same address set twice), or hardware error
		Not lit	Normal operation
ERH (PLC error)	Red	Lit	PLC error, PLC interface error, EEPROM error, unit number error, or I/O table not set
		Not lit	No error.
INS (network participation)	Yellow	Lit	Unit is participating (inserted) in the network.
		Not lit	Unit is not participating (inserted) in the network.
SD (send)	Yellow	Lit	Data transmission.
		Not lit	No data transmission.
RD (receive)	Yellow	Lit	Data reception.
		Not lit	No data reception.
M/A (data link mode)	Yellow	Lit	Manual (see note)
		Not lit	Automatic
LNK (data link)	Yellow	Lit	Data links participating.
		Flashing	Error in data link table.
		Not lit	Not in a data link or data link inactive.

### 2-1-10. DM Parameter Area Setting Up of Controller Link Unit and Data Link Activate

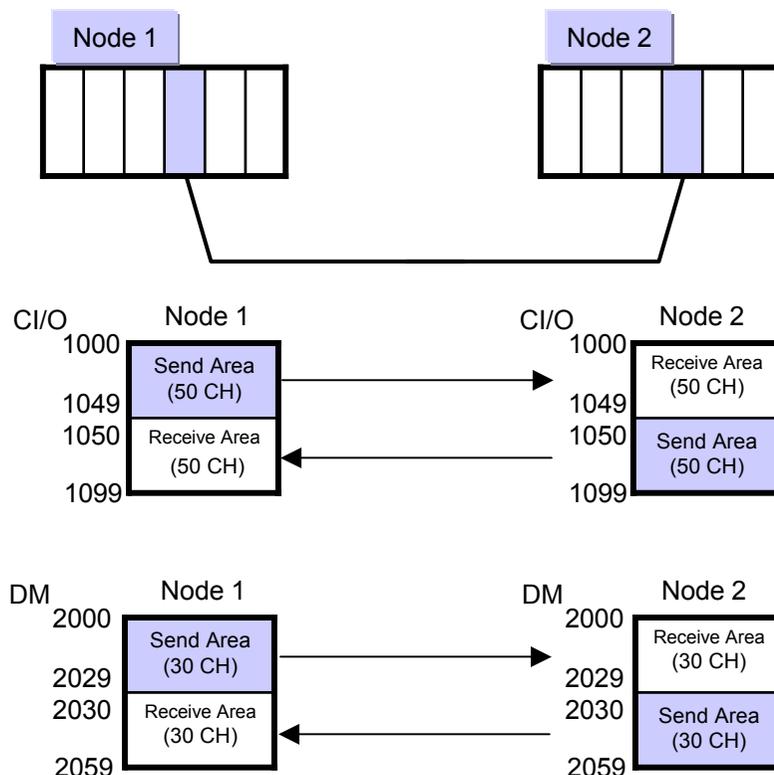
Write the following figures in the each DM parameter areas of node 1 and 2, using CX-Programmer.

CH	Setup Value	Description
D30000	0010 Hex	Master station normal station configuration: Master station Wire type 62 nodes configuration: Up to 32 nodes Data link mode: Automatic configuration
D30001	1000 Hex	Area type CIO start CH 1000CH 50 CHs for 1 node
D30002	8000 Hex	
D30003	0050 Hex	
D30004	2000 Hex	Area type DM start CH DM20000CH 30 CHs for 1 node
D30005	8200 Hex	
D30006	0030 Hex	
D30007	0000 Hex	Status storing area is default
D30008	0003 Hex	Data link participation node 1, node 2
D30009	0000 Hex	
D30010	0000 Hex	
D30011	0000 Hex	

For details of the setting, refer to [Notice] "DM Parameter Allocation" on the next page.

#### Arrangement of Created Data Link

By setting parameters above, following Data Link is arranged.





## 2-2. Usage Example of FB Component

FB “Start Data Link”

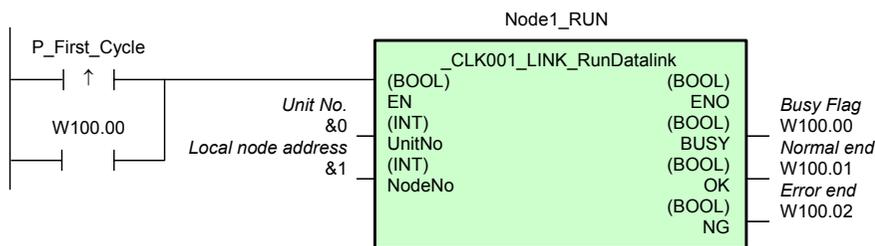
FB Name        \_CLK001\_LINK\_RunDatalink

File Name       \_CLK001\_LINK\_RunDatalink10.cxf

Functional Overview       Starts the data links

At power on (A200.11, 1 cycle ON flag is ON at power ON), use Controller Link unit’s soft SW to set DM parameter area’s data link activation bit to ON to activate the data link.

If data link is normally activated, W100.01 turns to ON.



### Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1(ON):FB started 0(OFF):FB not started
Unit No.	UnitNo	
Local node address	NodeNo	

[OUTPUT] (Output Variables)

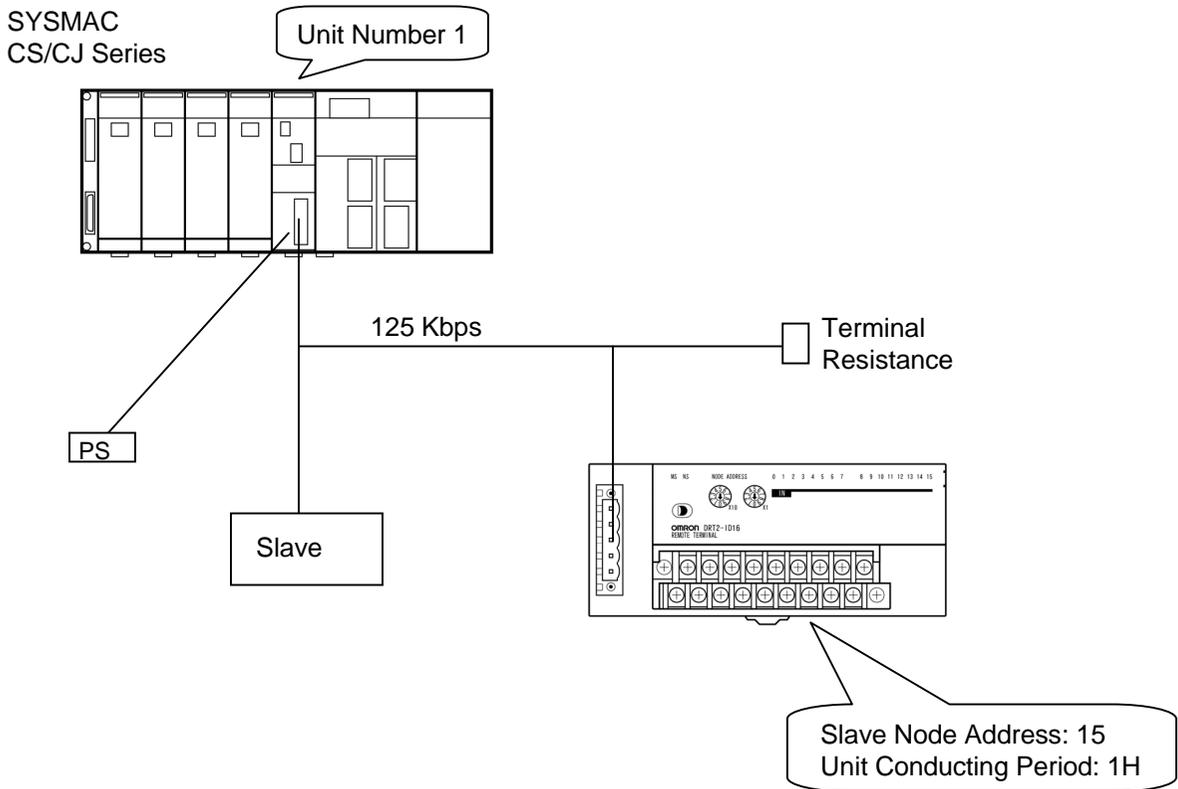
Name	Variable name	Description
ENO (May be omitted.)	ENO	1(ON):FB processed normally. 0(OFF):FB not processed or ended in ann error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends normally.

## 2-2 DeviceNet Slave (DRT2 Series)

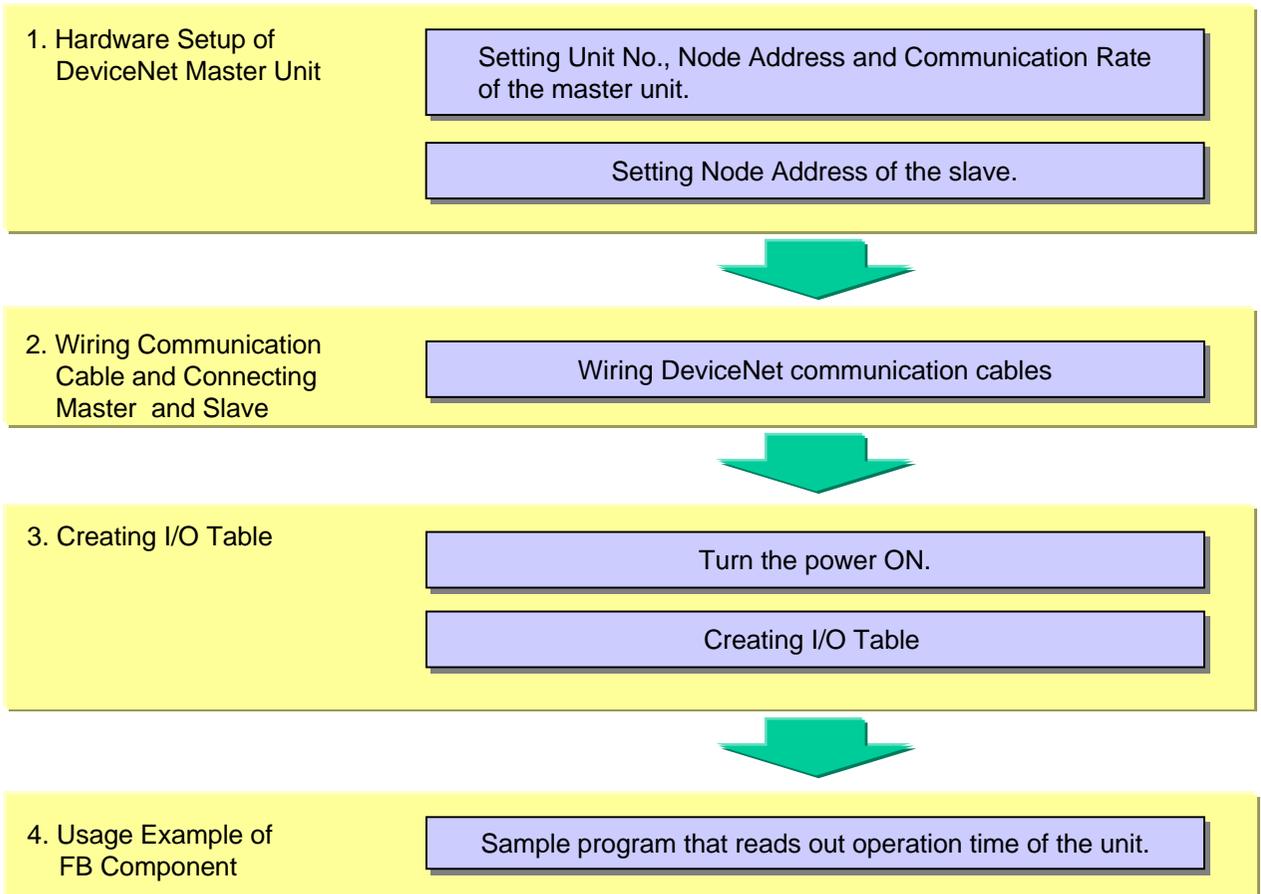
DRT2-□□□□

Shown below is an example of using CS/CJ series CPU unit to read unit conducting period of DeviceNet slave (DRT2 series).

### 1. Hardware Configuration

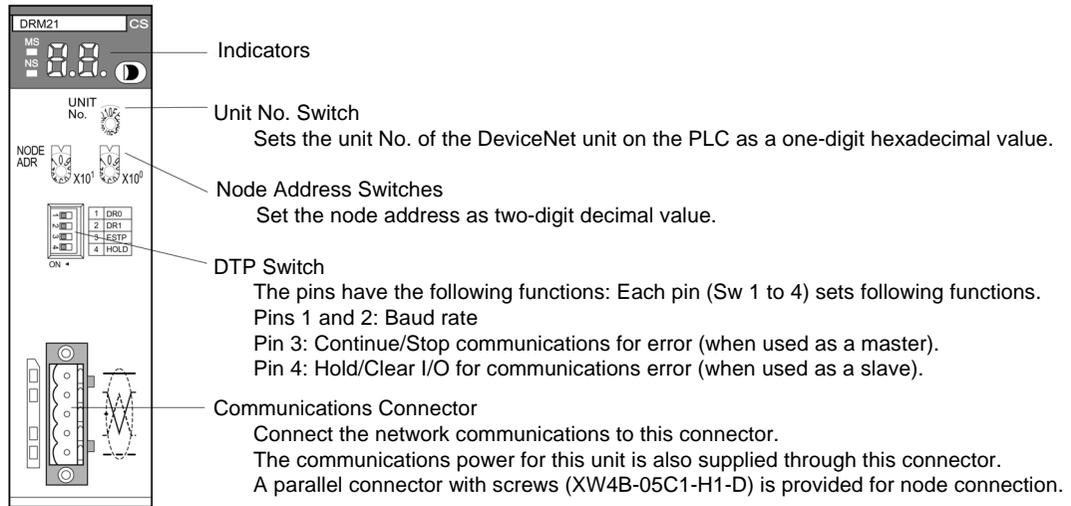


## 2. Operational Workflow



## 2-1. Hardware Setup

### 2-1-1. Master Unit Hardware Setup



(1) Set the master unit number (Unit Number Setup Switch)



In this example, unit number is set to 1.  
The unit number must not overlap that of other CPU Bus unit connected to the same PLC.

Setup Method	1-digit Hexadecimal Number
Setup Range	0 to F

(2) Set the master node address.

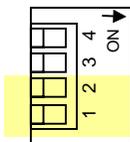


In this example, node address is set to 63.  
The node address must not overlap that of other node (slave) in the network.  
Do not use 0.

Setup Method	2-digit Decimal Number
Setup Range	1 to 63

(3) Set up the communication speed.

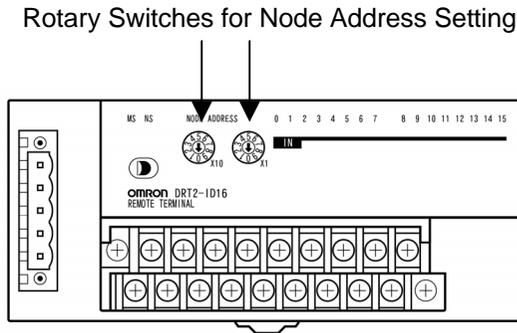
Set the communication rate of the master unit to 125K bps.



In this example, switches 1 and 2 are set to OFF.

Pin		Baud Rate
1	2	
OFF	OFF	125 K bit/s
ON	OFF	250 K bit/s
OFF	ON	50 K bit/s
ON	ON	Not allowed

## 2-1-2. Slave Hardware Setup



(1) Set the slave node address (rotary switch) .



In this example, node address is set to 15.  
The node address must not overlap that of other node (master/slave) in the network.

Node Address Setting (One's digit)

Node Address Setting (Ten's digit)

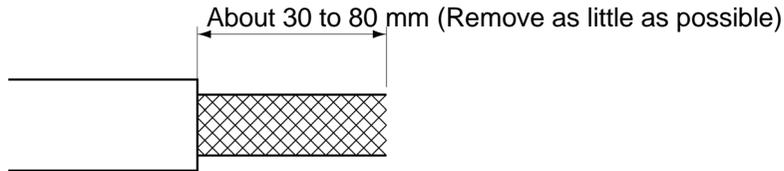
Setup Method	2-digit Decimal Number
Setup Range	0 to 63

## 2-2. Wiring Communication Cable and Connection between Master and Slave

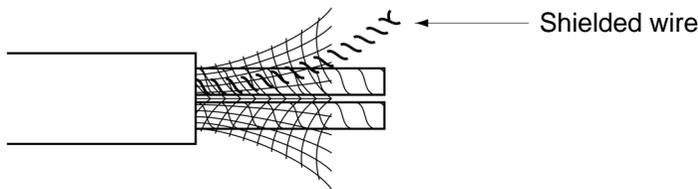
### 2-2-1. Making Communication Cable

Use the following procedure to make a communication cable and attach the connector.

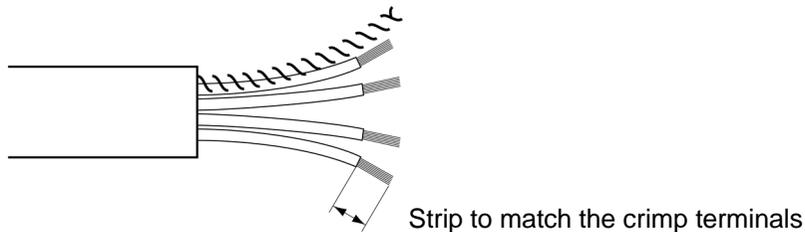
1. Peel the cable sheath by 30~80 mm while taking care not to damage the shield net. Do not peel much. Peeling too much can cause short circuit.



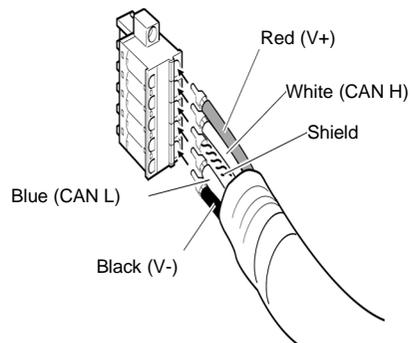
2. Unweave the wire net carefully. You will find one bare shielded twisted wires, other than signal and power wires (it is harder a little than the net and you can feel it by touching) .



3. Cut and remove excess shield net, remove aluminum tape that covers signal and power wires, and peel the sheath of signal and power wires for crimping terminal. Twist the peeled signal and power wires tightly.

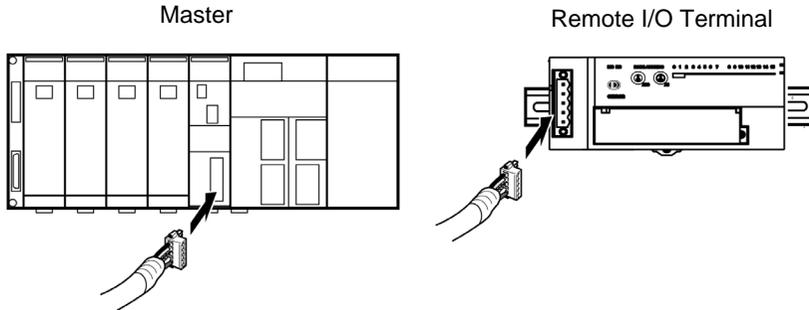


4. Attach a crimping terminal on the peeled part of the cable, then cover it with vinyl tape or heat shrinkable tube.
5. Then, insert signal, power, and shielded wires into connector holes while taking care of connector direction. Wires must be inserted into holes in the order of red, white, shielded, blue, and black from the top.



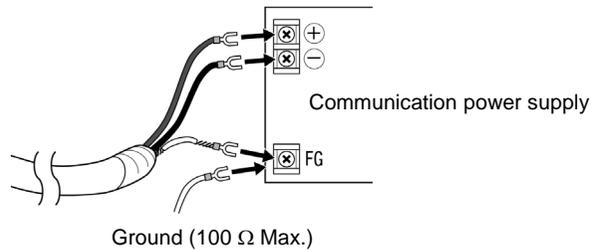
### 2-2-2. Connecting Communication Cable to Node

Align the directions of node and cable connectors and insert the cable connector into the node connector until the cable connector tab fits into the node connector.



### 2-2-3. Connecting Communication Power Supply

Connect V+ (red) and V- (black) of the communication cable to power source (DC24V).



### 2-2-4. Creating I/O Table

Turn all node power ON and set CX-Programmer online, then create the I/O table.

### 2-3. Usage Example of FB Component

FB “Read Present Unit ON Time”

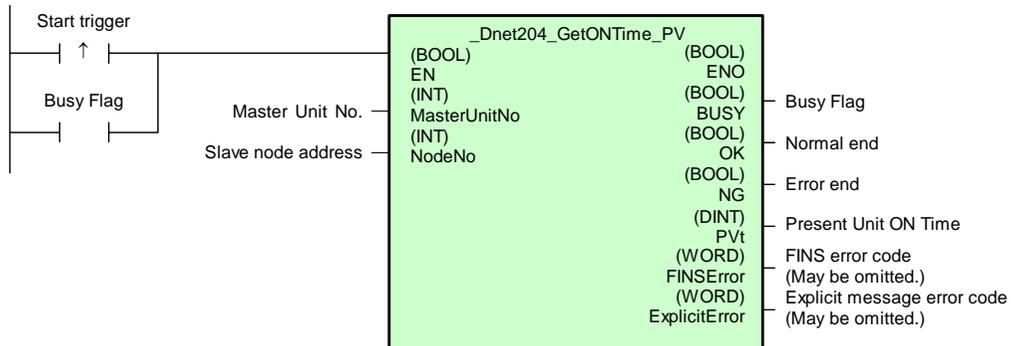
FB Name        \_Dnet204\_GetONTime\_PV

File Name       \_Dnet204\_GetONTime\_PV10.cxf

Functional Overview Reads the present Unit ON time(conduction time)from slaves connected to DeviceNet

#### Program Example

When contact A is set to ON, current value of the unit conducting period of the specified slave of the node address 15 is read out and outputted to D0. As a result, &10 is stored in D0.



#### Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Master Unit No.	MasterUnitNo	Specify the unit number of the DeviceNet Master Unit.
Slave node address	NodeNo	Specify the node address of the slave.

[OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally.
Busy Flag	BUSY	0 (OFF): FB not processed or ended in an error.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.
Present Unit ON Time	PV	The present Unit ON time is output (unit: 0.1 h). For example, &20 would be output for 2 hours.
FINS error code (May be omitted.)	FINSError	The FINS error code is output. A code of #0000 is output for a normal end. Refer to the <i>Related Manuals</i> for details on the error codes.
Explicit message error code (May be omitted.)	ExplicitError	Outputs the explicit message error code. A code of #0000 is output for a normal end. Refer to the <i>Related Manuals</i> for details on the error codes.

## **2-3 Position Control Unit**

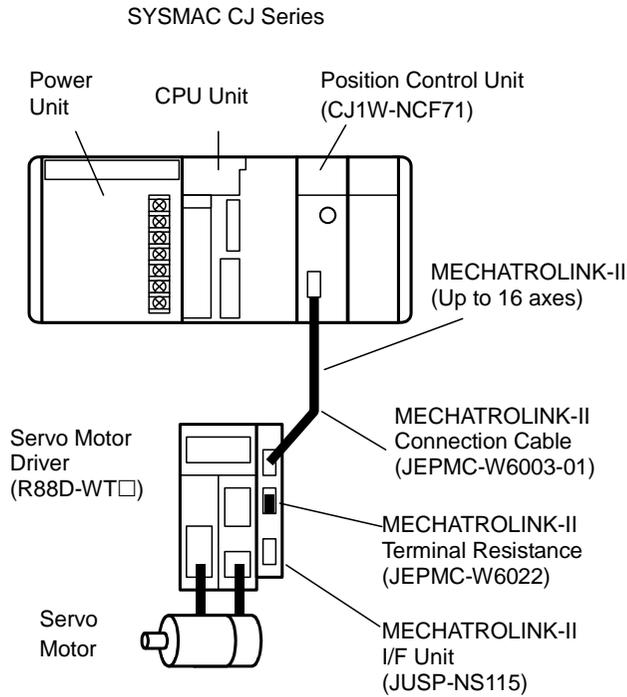
---

**CJ1W-NCF71**

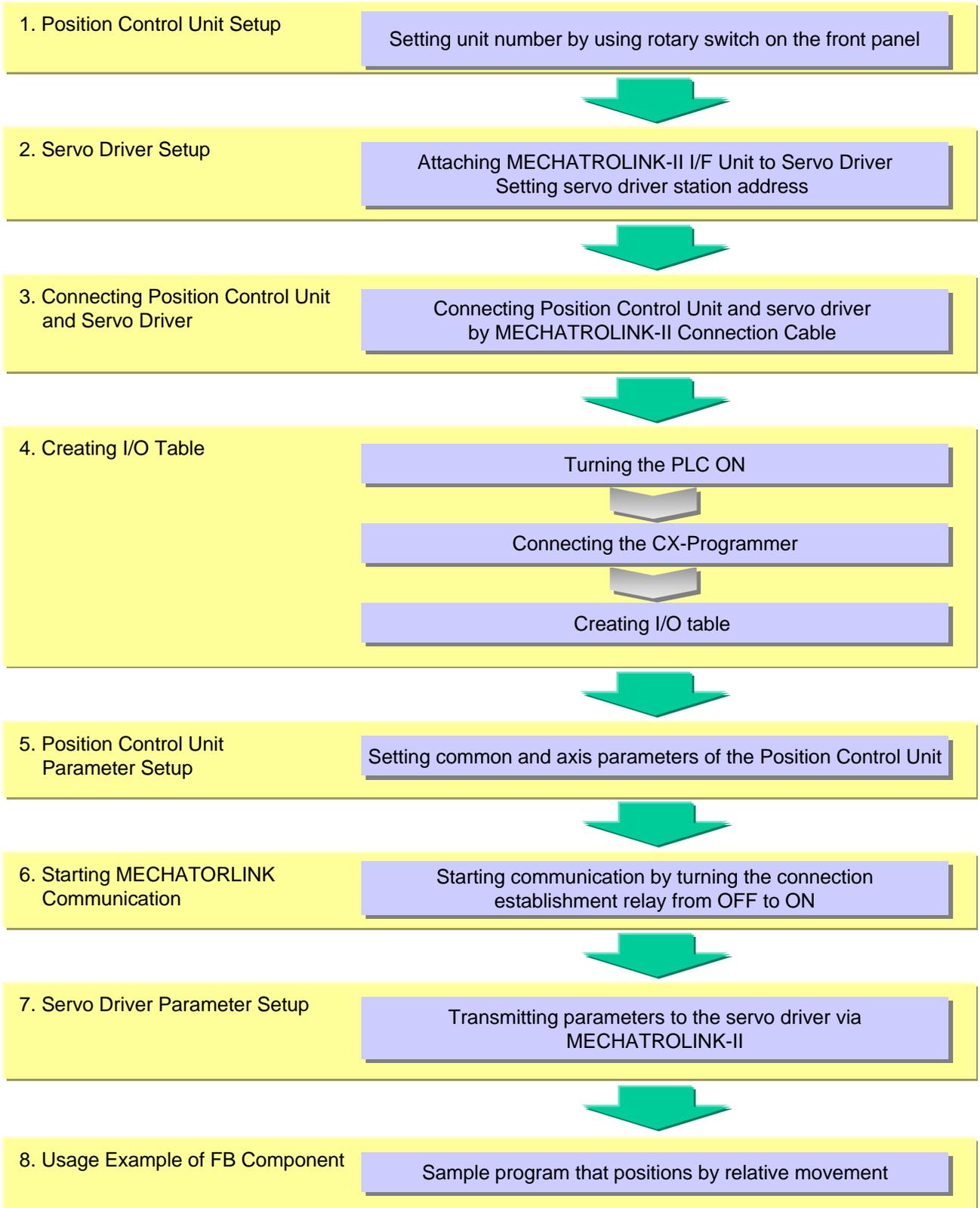
---

Shown below is an example of using Position Control Unit for CJ series to move a servo motor (1-axis) connected to Position Control Unit of unit number 0 to a position of 2000 (command unit) with speed of 2000 (command unit/s) by relative move command.

## 1. Hardware Configuration



## 2. Operational Workflow



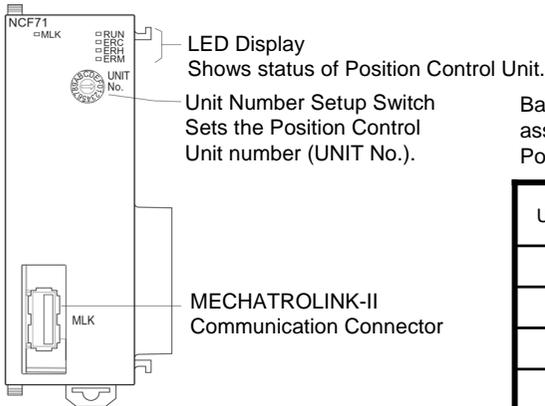
## 2-1. Position Control Unit Setup

Set the Position Control Unit number and servo drive station address.  
Set the Position Control Unit number to 0.

\* Unit Number (UNIT No.) Setup Switch  
Sets the Position Control Unit number (UNIT No.) as a CPU Bus unit.

### Name of Parts

CJ1W-NCF71



Setup Range: 0 to F (Unit No.0 to Unit No.15)  
Note: Factory setup is 0.

Based on the configured unit number, CPU Bus unit relay area is assigned.  
Position Control Unit uses the area as a relay area of common operation.

Unit Number	Channel Assignment (CH)	Unit Number	Channel Assignment (CH)
0	1500 to 1524	8	1700 to 1724
1	1525 to 1549	9	1725 to 1749
2	1550 to 1574	10	1750 to 1774
3	1575 to 1599	11	1775 to 1799
4	1600 to 1624	12	1800 to 1824
5	1625 to 1649	13	1825 to 1849
6	1650 to 1674	14	1850 to 1874
7	1675 to 1699	15	1875 to 1899

Caution: Before setting up the unit number, you must turn off the power.

## 2-2. Servo Driver Setup

Setting station address of the servo driver  
Mount MECHATROLINK-II I/F units to servo drivers.  
Set their addresses to "1", "2", and "3".

\* Servo Driver (W Series)

W series servo driver requires MECHATROLINK- I/F unit JUSP-NS115 (Yaskawa Electric). The following product versions are available.

You can find a version number on the side label.

W Series Servo Driver: Ver.39 or later

I/F Unit: VER.\*\*\*03 or later

**Remarks** W series servo driver and I/F unit cannot operate normally if any of them is older product version than the above. Use the appropriate product version as shown above.

Use SW1 and SW2 to configure MECHATROLINK communication setting.

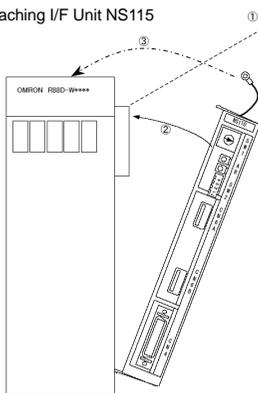
Do not change other bits of SW2 than bit 3 from factory shipment settings.

\* Station Number Setting

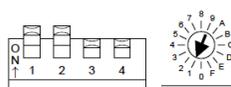
Use rotary switch (SW1) and piano switch (SW2-3) to configure the settings as shown in the following table. SW2-3 is 10H digit and SW1 is the lower digit.

Do not change the setting while the unit is turned on.

Attaching I/F Unit NS115



- (1) Remove the connector cover on the W series driver's option connector (CN10).
- (2) Attach NS115.
- (3) For grounding, connect NS115's ground cable using a screw on a part marked as "G".



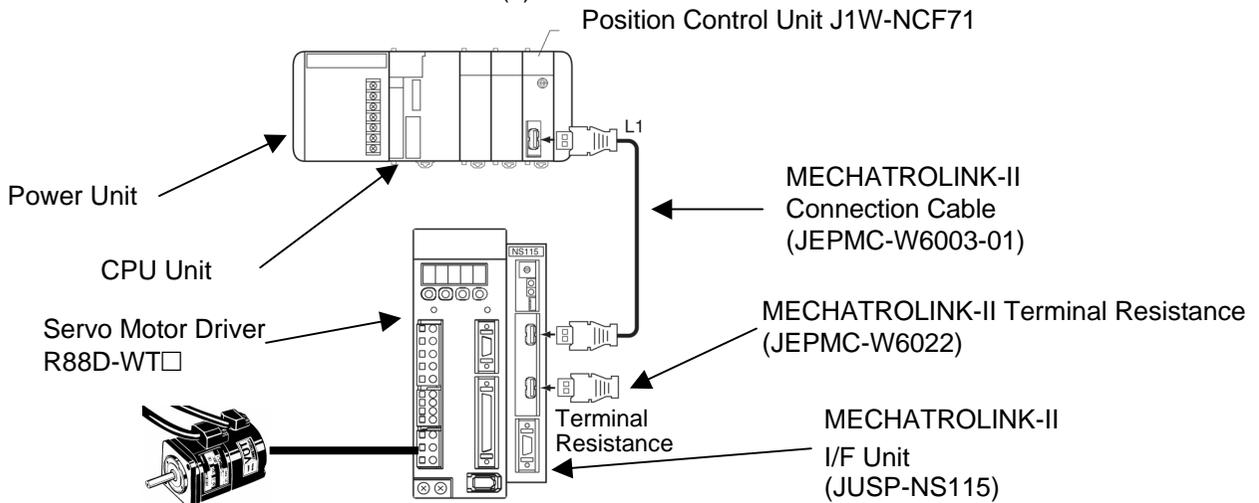
SW2-bit3	SW1	Station Number
OFF	0	0: Do not set up
	1 to F	1 to 15 (01H to 0FH)
ON	0 to F	16 to 30 (10H to 1EH)

## 2-3. Connecting Position Control Unit and Servo Driver

Connect the Position Control Unit and servo drivers as shown below:

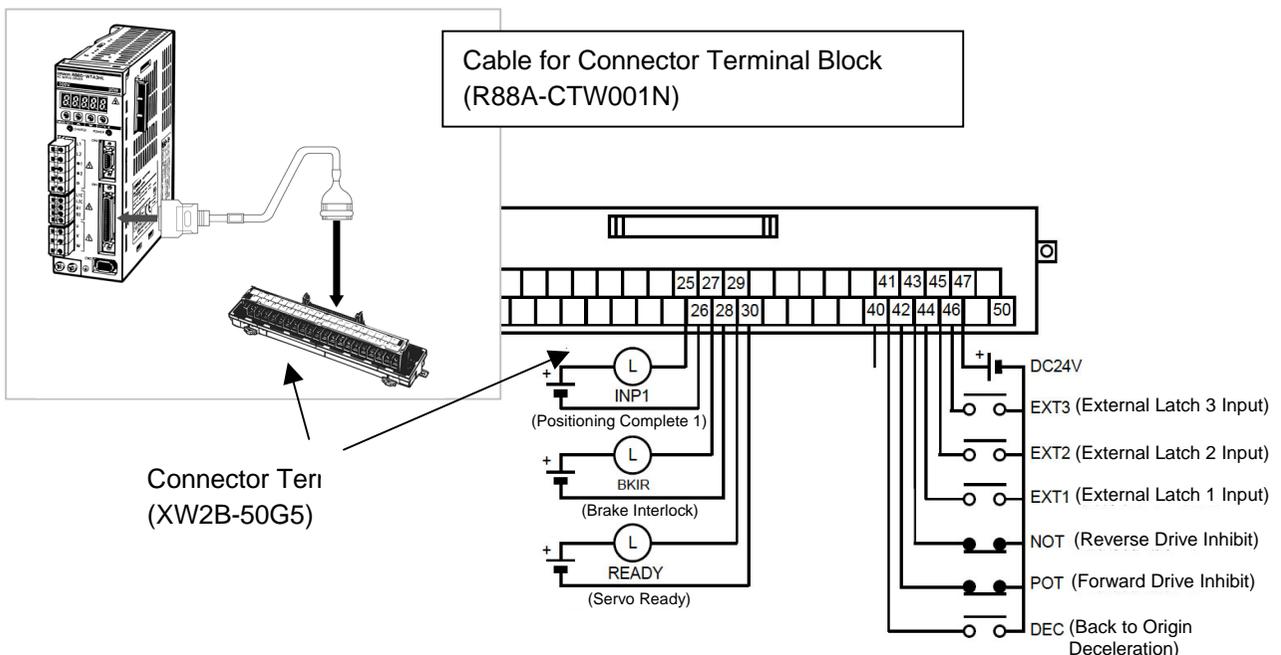
### Connection for MECHATROLINK-II Communication

Shown below is an example of MECHATROLINK-II communication cable connection between a Position Control Unit and servo driver(s).



### Connection example of control I/O connector (CN1)

Shown below is an example of connection for standard I/O signals.



## 2-4. Creating I/O Table

Set CX-Programmer online and create I/O table.

## 2-5. Position Control Unit Parameter Setup

Set up common and axis parameters.  
Set this Position Control Unit number to 0.

### Common Parameter

Common parameters, which define relay areas for data exchange between NC and CPU units, must be configured to use your Position Control Unit.

#### - Common Parameter Setup

Set up the following values to arbitrary areas from DM01000 to DM01011.

DM Channel	Setting	Common Parameter Setup Item	Description
DM01000	00H0(Hex)	Output relay area setup for operations of each axis	Assigns the start channel of output relay area for operations of each axis to CI/O100CH. Output relay for axis 1: 100~124CH
DM01001	0064(Hex)	Output relay area start channel for operations of each axis	
DM01002	00H0(Hex)	Input relay area setup for operations of each axis	Assigns the start channel of input relay area for operations of each axis to CI/O500CH. Input relay for axis 1: 500~524CH
DM01003	01F4(Hex)	Input relay area start channel for operations of each axis	
DM01004	0040(Hex)	Scan list setup (axes 1~2)	Assigns a servo driver to axis 1 of the Position Control Unit.
DM01005 ~ DM01011	Set 0000 for all.	Scan list setup (axes 3~16)	

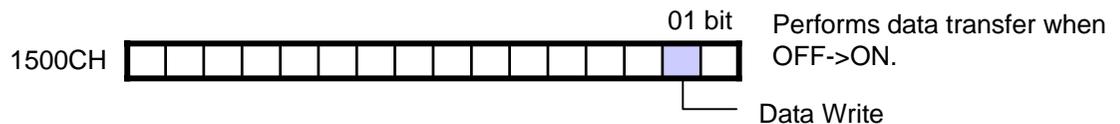
#### - Common Parameter Write to Position Control Unit

Writes common parameter values configured in areas from DM01000 to DM01011 into the Position Control Unit.

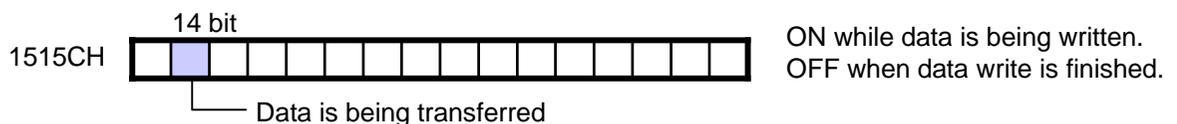
Set information for data transfer in the Position Control Unit's relay area for common operation as shown below.

Channel	Setting	Data Transfer Setup Item	Description
1506CH	000C(Hex)	Write Channel Count	Number of write channels: 0C(Hex)=12
1507CH	0082(Hex)	Write Source Area	Start channel of source data to be written =DM01000
1508CH	03E8(Hex)	Write Source Channel	
1509CH	1838(Hex)	Write Destination Address	Destination address to be written in the Position Control Unit 1838(Hex)= Start address of common parameters

Data write relay is assigned to contact 1500.01. When this contact is turned from OFF to ON, data write is started into the Position Control Unit.

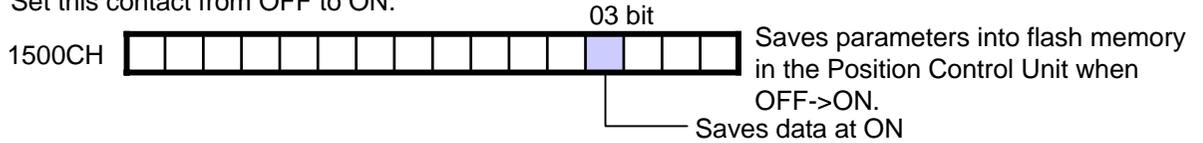


When data write is finished, data transferring flag turns to OFF. Data transferring flag is assigned to contact 1515.14.

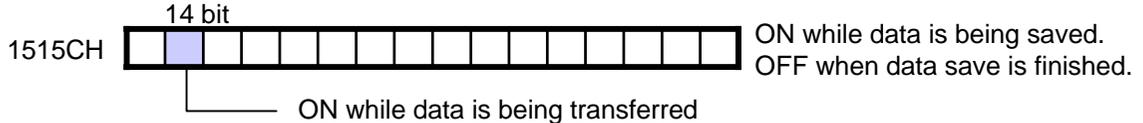


- Saving Position Control Unit Setup

Saves configured common parameters into flash memory in the Position Control Unit.  
Data save relay of relay areas for common operation is assigned to contact 1500.03.  
Set this contact from OFF to ON.



Data transferring flag is assigned to contact 1515.14.



- Restarting Position Control Unit

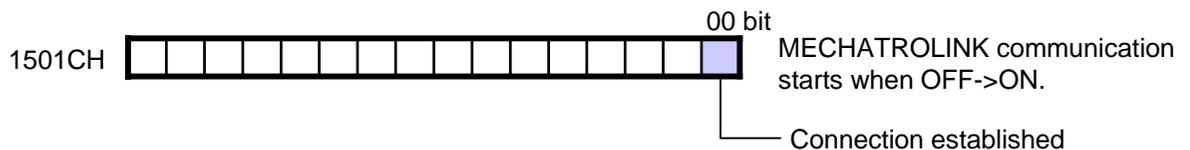
When saving of Position Control Unit setup is finished, restart the Position Control Unit to enable the setup. Turn off the PLC main unit and turn it again, or perform Position Control Unit restart.  
Restart flag is assigned to AR501.00.

**Axis Parameter**

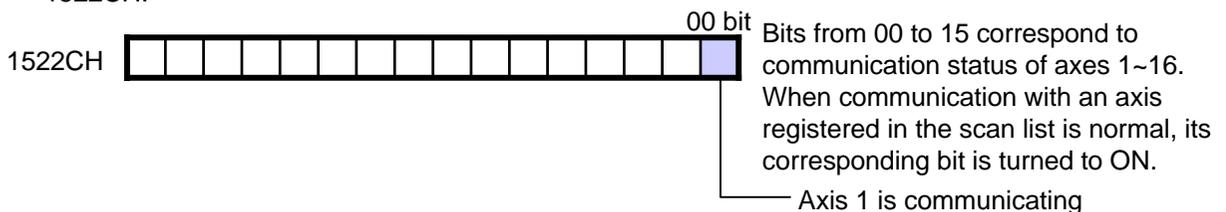
This operation example uses axis parameters of the Position Control Unit's factory setup.  
We recommend that you use dedicated software (WS02-MNTC1) that is easy to set up when you change axis parameters. For how to set up parameters using CPU unit's free addresses, see documentation W426-E1 "4-4 Axis Parameters".

**2-6. Starting MECHATROLINK Communication**

MECHATROLINK communication starts when the connection establishment relay of relay areas for common operations is turned from OFF to ON. For Position Control Unit with unit number 0, connection establishment relay is assigned to contact 1501.00.



If communication with the registered device is normal, a bit is set that corresponds to the axis communication status of relay areas for common operation. For Position Control Unit with unit number 0, axis communication status is assigned to each bit of 1522CH.



## 2-7. Servo Driver Parameter Setup

Set up servo parameters for a connected servo driver.

For details of servo parameters, see User's Manual of W series AC SERVO MOTORS/SERVO DRIVERS.

[Notice]

When PLC program sends data by using "\_NCF401\_WriteParameter" of FB Library, but this example shows change of external input signal assignment through the front panel.

### Procedure

#### - Activate setup mode

PRO2W operation	Front panel key operation	Display example	Explanation
			(Status Display Mode)
			Press the MODE/SET Key to go into Setting Mode

#### - Configure parameter No.

PRO2W operation	Front panel key operation	Display example	Explanation
	 DATA<< (less than 1 s)		Set the parameter number you want to set or check. If the parameter number is too big, you can set the operation to be performed more quickly while changing the operation digits, using the Left Key (front panel: DATA Key for less than 1 s) or Right Key.

#### - Indicate parameter value

PRO2W operation	Front panel key operation	Display example	Explanation
			(The parameter number is displayed.)
	 (1 s min.)		Press the DATA Key (front panel: DATA Key for 1 s min.) to display the parameter setting.

Parameter No..	Parameter Name	Setting
Pn50A	Input signal selection 1	2881
Pn50B	Input signal selection 2	8883
Pn511	Input signal selection 5	6541

Set values shown above to 50B and 511 in the same manner.

This configures assignment of external input signals (input signal selection) for the servo driver as shown below:

Input Terminal (CN1)	Input Signal Name	Description	Remarks (at Factory Setup)
40	-	Free	RUN (Operation Command Input)
41	DEC	Back to Origin Deceleration LS (Origin Proximity Input Signal)	MING (Gain Reduction Input)
42	POT	Forward Drive Inhibit Input (Forward Limit Input Signal)	No assignment
43	NOT	Backward Drive Inhibit Input (Backward Limit Input Signal)	No assignment
44	EXT1	External Latch Signal 1 (External Interrupt Input Signal 1)	RESET (Alarm Reset Input)
45	EXT2	External Latch Signal 2 (External Interrupt Input Signal 2)	PCL (Forward Current Limit Input)
46	EXT3	External Latch Signal 3 (External Interrupt Input Signal 3)	NCL (Backward Current Limit Input)

This is a standard setup of input signals when a servo driver (R88D-WT□) and MECHATROLINK-II I/F Unit (JUSP-NS115) are combined.

## 2-8. Usage Example of FB Component

FB “Relative Move”

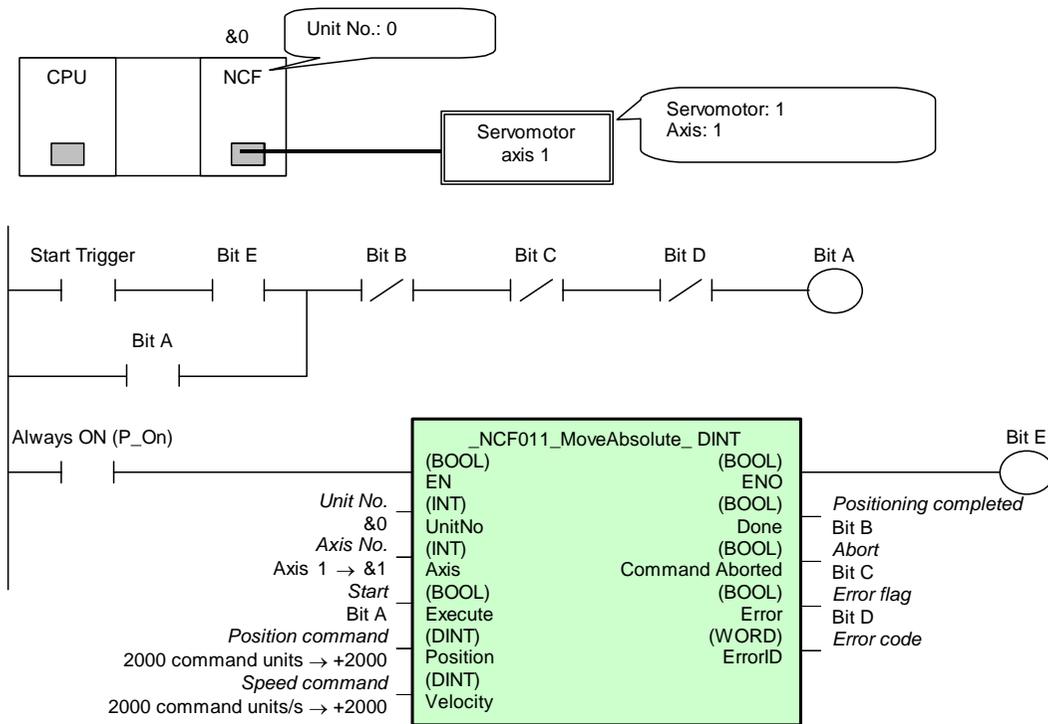
FB Name        \_NCF021\_MoveRelative\_DINT

File Name       \_NCF021\_MoveRelative\_DINT10.cxf

Functional Overview               Positions using a relative move.

### Program Example

Servo motor (1-axis) connected to NCF of unit number 0 is moved to position of 2000 (command unit) with speed of 2000 (command unit/s) by relative move command.



After normal movement, W01.03 is set to ON by 1 cycle.

If an error occurs by any reason, W10.05 is set to ON by 1 cycle.

Ref: Before using this FB, servo lock must be ensured.  
Perform servo lock by using another FB's “\_NCF00\_Power” before performing the above.

## Variables Table

### [INPUT] Input Variables

Name	Variable name	Description
EN	EN	1 (ON): FB started 0 (OFF): FB not started.
Unit No.	UnitNo	
Axis No.	Axis	Specify the axis number.
Start	Execute	:Relative Move Start
Position command	Position	Specifies a relative movement distance. The unit is "command unit".
Speed command	Velocity	Specify the target speed. Unit: Command units/s The actual speed of the operation will change if the Speed Command is changed while Execute is ON.

### [OUTPUT] Output Variables

Name	Variable name	Description
ENO	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error. FB not processed Invalid inputs parameter ended in an error Not finished to read the common parameter
Positioning completed	Done	Turns ON when the positioning operation has been completed.
Abort	CommandAborted	Turns ON when the other Move command done (Duplicate Move) Stopped with DECELERATION STOP or EMERGENCY STOP.
Error flag	Error	Turns ON when an error has occurred in the FB.
Error code (May be omitted.)	ErrorID	Returns the error code when an error has occurred in the FB. Refer to the <i>Related Manuals</i> for details on errors. A code of #0000 will be returned when the unit number or axis number is out of range.

## **2-4 Position Control Unit**

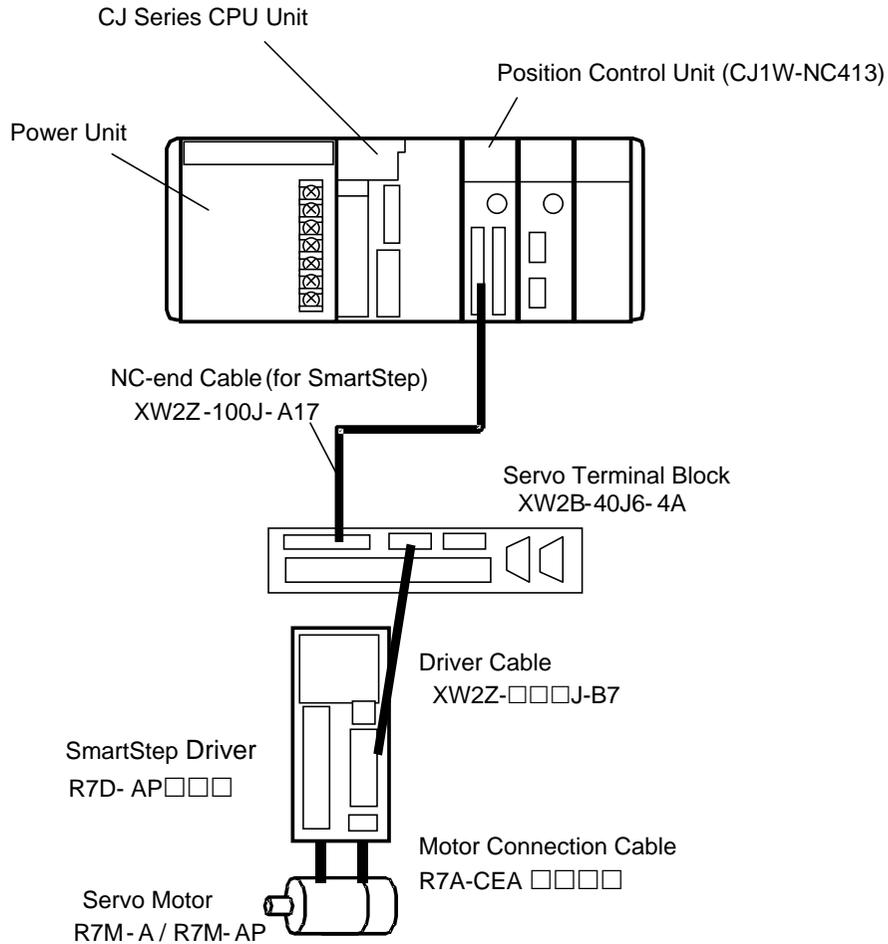
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**CJ1W-NC113/133/213/233/413/433**

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Shown below is an example of X-axis operation command using Position Control Units for CJ series to set up parameters and operation commands. Servo motor (1-axis) connected to NCx of unit number 0 is moved to position of 2000 (command unit) with speed of 2000 (command unit/s) by absolute move command.

## 1. Hardware Configuration



## 2. Operation Workflow

### 1. Hardware Setup

Setting unit number using rotary switches on the front of the unit



### 2. Connecting Position Control Unit and Servo Driver

Connecting Position Control Unit and servo driver using cables, terminal block, etc.



### 3. Creating I/O Table

Turning the PLC ON



Connecting the CX-Programmer



Creating I/O table



### 4. Position Control Unit Parameter Setup

Setting common and axis parameters



### 5. Servo Driver Parameter Setup

Adjusting servo driver's gain by using the switch on the front panel

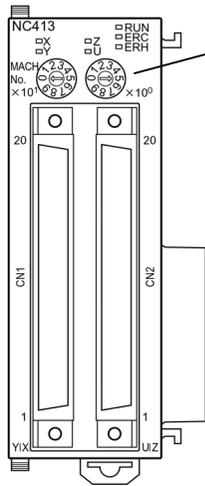


### 6. Usage Example of FB Component

Sample program that positions by relative movement

## 2-1. Hardware Setup

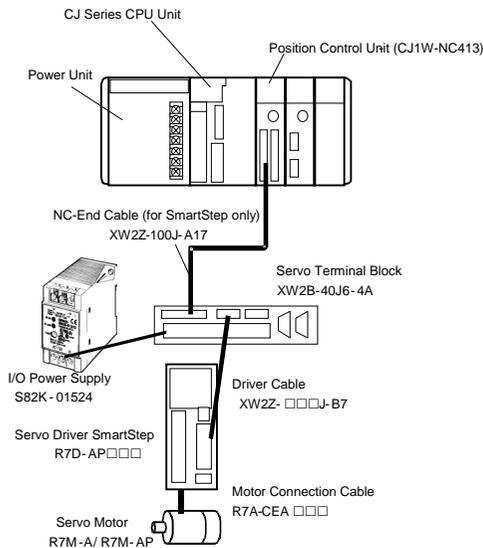
Set the Position Control Unit number.



Use a flat-blade screwdriver or other tool to set the unit number to "00".

## 2-2. Connecting Position Control Unit and Servo Driver

Connect the Position Control Unit and servo drivers as shown below:



Name	Type Code	Q'ty
Position Control Unit	CJ1W-NC413	1
Dedicated Terminal Block with Communication Function	XW2B-40J6-4A	1
NC-End Cable (for SmartStep only)	XW2Z-100J-A17	1
Driver Cable (for SmartStep only)	XW2Z-100J-B7	1
Servo Driver SmartStep	R7D-APA3L	1
Motor Connection Cable	R7A-CEA003S	1
Servo Motor	R7M-A03030	1
I/O Power Supply	S82K-01524	1

### Notice on Wiring

- If you use a component of different type in your system from the above, see servo system complete catalog or others and ensure the combination.
- SmartStep must be connected to X-axis side. You cannot use it on Y-axis side only.

## 2-3. Creating I/O Table

Set CX-Programmer online and create I/O table.

## 2-4. Position Control Unit Parameter Setup

Set up common and axis parameters.

### Common Parameter

In this example, common parameter is as shown below when unit number is set to 0.

Word (same for all models)	Setting	Name	Configuration / Explanation
DM20000	#0000	Operating data area designation	Specifies setup area for operation data. 0000: Fixed DM for Special I/O unit
DM20001	#0000	Beginning word of operation data area	Specifies start channel for operation data area. Valid if 000D or 0X0E is specified in the above.
DM20002	#0F01	Axis parameter designation	Shown below are typical settings: 0000: Operates by parameters in the Position Control Unit. 0F01: Initial value in the Position Control Unit (factory setup). 0001: Parameter specified in DM
DM20003	#0000	Not used	This area is not used. Leave set to 0000.

Setup is enabled when the unit is turned on or restarted.

Turn the PLC OFF and ON again.

To change and use axis parameters, you must set the bit OFF like DM20002=#0E00 (for details, see documentation W397-E1).

### Axis Parameter

Initial factory setup is used here.

Activate the unit by force with initial factory setup by using common parameter DM20002 shown above.

If you need to change, modify parameters shown above, set and use parameters at CX-Position.

## 2-5. Servo Driver Parameter Setup

### Servo Parameter

SmartStep provides gain setup switch in the front that allows easier adjustment.

First, set gain setup switch to “3” and turn the unit ON.

If the movement is not good, adjust it by automatic or manual tuning.

Actual unit may require finer adjustment of servo parameters, thus you must adjust the unit individually.

For details, see I533-E1 “4-2 Switch Setting”, “4-5 Gain Adjustment”, and “4-6 User Parameter”.

Note that detail parameter adjustment requires the parameter unit (R7A-PR02A).

## 2-6. Usage Example of FB Component

FB “Absolute Move”

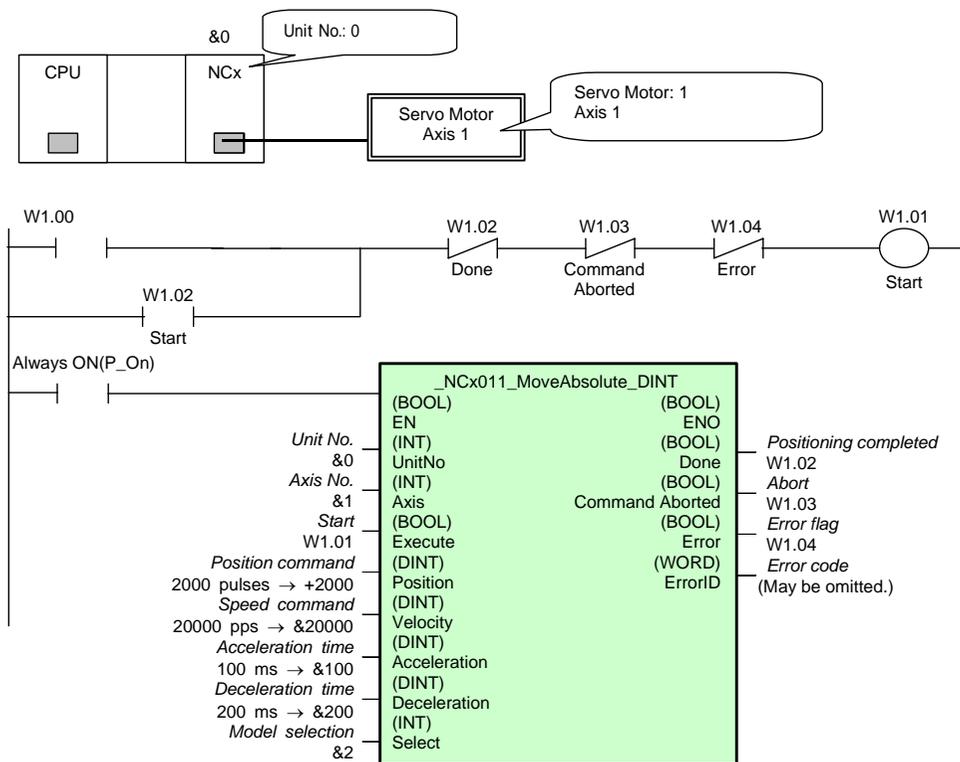
FB Name `_NCx011_MoveAbsolute_DINT`

File Name `_NCx011_MoveAbsolute_DINT10.cxf`

Functional Overview Positions using an absolute move.

### Program Example

Servo motor (1-axis) connected to NCx of unit number 0 is moved to position of 2000 (command unit) with speed of 2000 (command unit/s) by absolute move command.



After normal move, set W1.02 to ON.

If an error occurs by any reason, W1.04 is set to ON.

Ref: If the origin is not determined, MoveAbsolute cannot be executed. You must determine the origin by origin search or preset beforehand. Origin search can be performed another FB's “\_NCx050\_HOME”.

## Variables Table

### [INPUT] (Input Variables)

Name	Variable Name	Description
EN	EN	1(ON): FB started 0(OFF): FB not started
Unit No.	UnitNo	
Axis No.	Axis	&1: X axis &2: Y axis &3: Z axis &4: U axis
Start	Execute	↕ Starts the absolute move.
Position command	Position	Specify the target speed. Unit: Pulses
Speed command	Velocity	Specify the target speed. Unit: pps The actual speed of the operation will change if the Speed Command is changed while Execute is ON.
Acceleration time	Acceleration	Specify the acceleration time. Unit: ms
Deceleration time	Deceleration	Specify the deceleration time. Unit: ms
Model selection	Select	&1: 1-axis Unit (NC1xx) &2: 2-axis Unit (NC2xx) &4: 4-axis Unit (NC4xx)

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Positioning completed	Done	Turns ON when the positioning operation has been completed.
Abort	Command Aborted	1(ON): Aborted - Other Move is moved (multiple activation) - Terminated by STOP
Error flag	Error	Turns ON when an error has occurred in the FB.
Error code (May be omitted.)	ErrorID	Returns the error code when an error has occurred in the FB. Refer to the <i>Related Manuals</i> for details on errors. A code of #0000 will be returned when the unit number of axis number is out of range.

## **2-5 Position Control Unit**

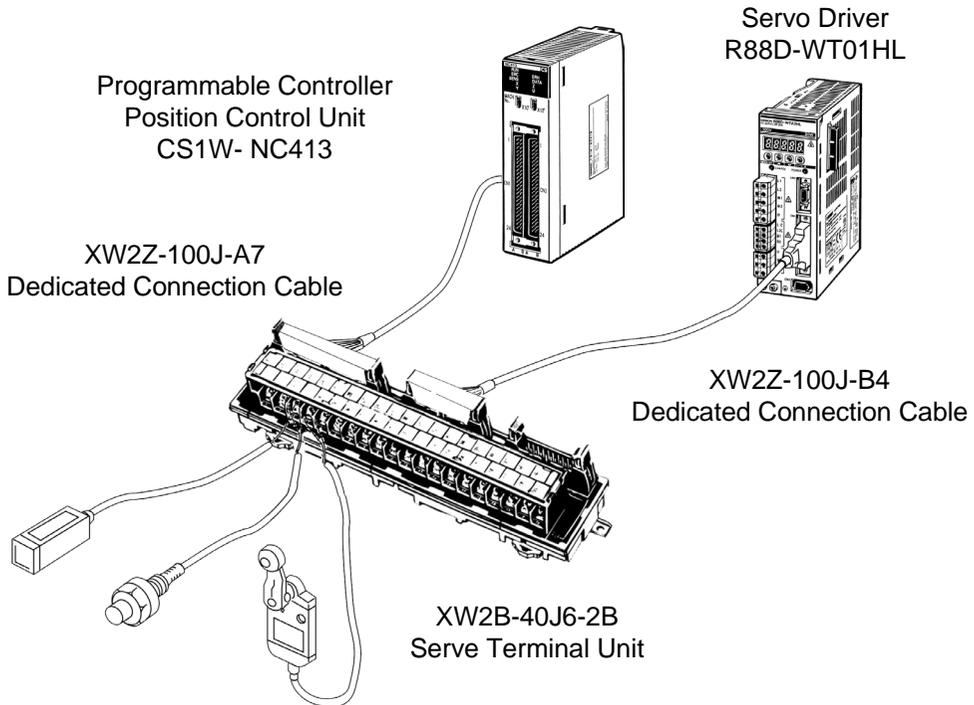
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**CS1W-NC113/133/213/233/413/433**

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You can use Position Control Units for CS series to set up parameters and operation commands. Shown below is an example of CS1W-NC413 that uses servos for 4 axes performing X-axis operation command. Servo motor (1-axis) connected to NCx of unit number 0 is moved to position of 2000 (command unit) with speed of 2000 (command unit/s) by absolute move command.

### 1. Hardware Configuration



## 2. Operational Workflow

### 1. Hardware Setup

Setting unit number by using rotary switch on the front panel.



### 2. Connecting Position Control Unit and Servo Driver

Connecting the Position Control Unit and servo drivers via cable and terminal block conversion unit, etc.



### 3. Creating I/O Table

Turning the PLC ON



Connecting the CX-Programmer



Creating the I/O table



### 4. Position Control Unit Parameter Setup

Setting common and axis parameters of the Position Control Unit.



### 5. Servo Driver Parameter Setup

Adjusting servo driver's gain by using switch on the front panel.

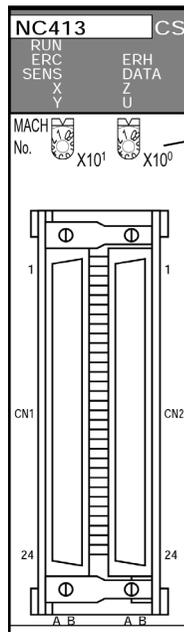


### 6. Usage Example of FB Component

Sample program that positions by absolute movement.

## 2-1. Hardware Setup

Set the Position Control Unit number.



Use a flat-blade screwdriver or other tool to set the unit number to "00".

[Notice]

To set up, you must turn off the power.

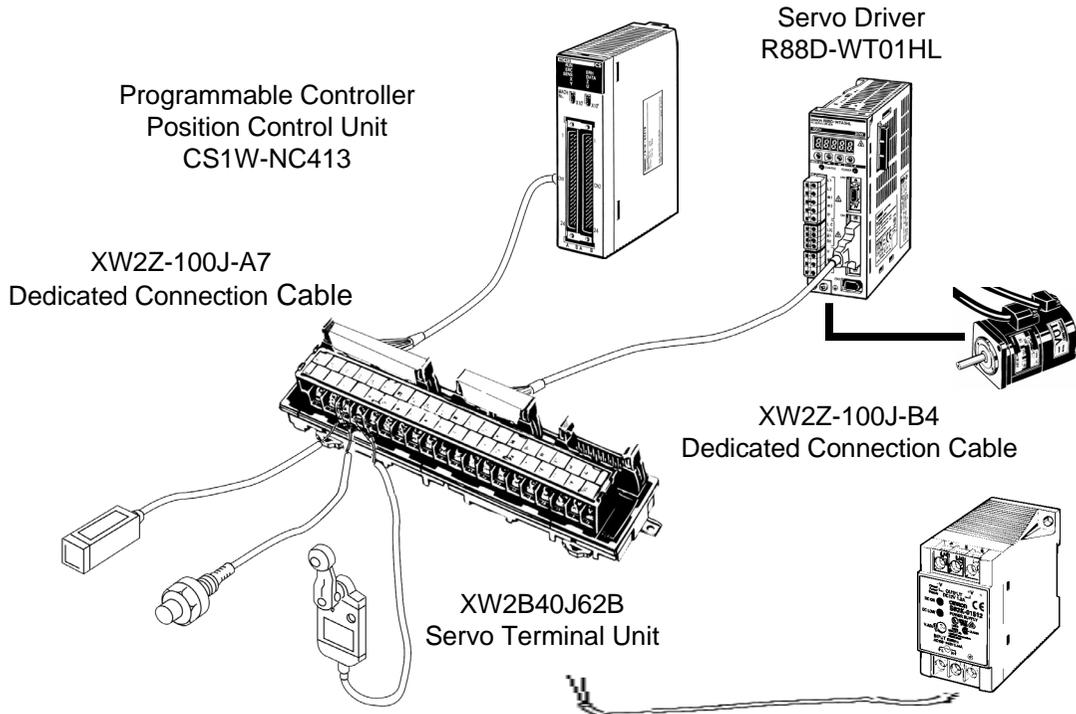
## 2-2. Connecting Position Control Unit and Servo Driver

- Using servo terminal unit that integrates connector and terminal block allows you to reduce wiring between servo driver and position control unit.
- Connection cable and terminal unit depend on the servo driver to be connected. For details, see W376-E1 "3-7 Connection for Servo Terminal Unit".

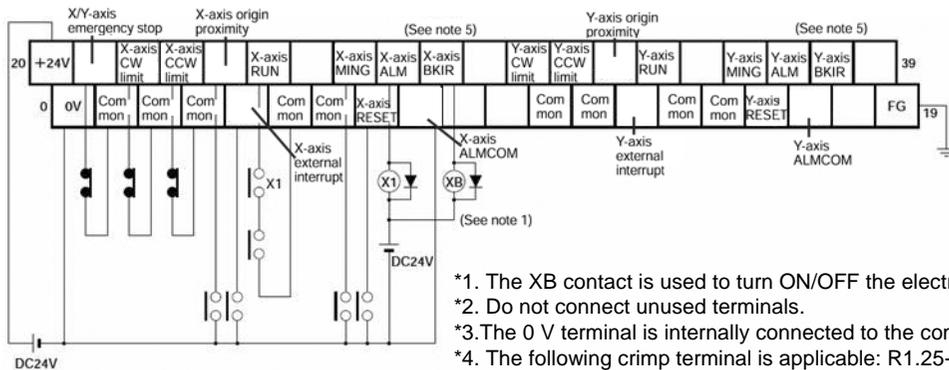
### ■ Primary Components

Name	Type Code	Q'ty
Position Control Unit	CJ1W-NC413	1
Dedicated Terminal Board for 2-Axis	XW2B-40J6-2B	1
NC-End Cable (for W servo)	XW2Z-100J-A7	1
Driver-End Cable (for W servo only)	XW2Z-100J-B4	1
Servo Driver	R88D-WT01HL	1
Motor Connection Cable	R88A-CAWA003S	1
Encoder Cable	R88A-CRWA003C	1
Motor	R88M-W10030H	1
I/O Power Supply	S82K-01524	1

■ Connection Example



For wiring of junction unit, see W series user's manual I531-E1 "2-7 Servo Junction Unit and Cable Specification".



- \*1. The XB contact is used to turn ON/OFF the electromagnetic brake.
- \*2. Do not connect unused terminals.
- \*3. The 0 V terminal is internally connected to the common terminals.
- \*4. The following crimp terminal is applicable: R1.25-3 (round with open end).
- \*5. Allocate BKIR (Brake Lock) to CN1 pin 27.

2-3. Creating I/O Table

Set CX-Programmer online and create I/O table.

## 2-4. Position Control Unit Parameter Setup

Set up common and axis parameters.

### ■Common Parameter

In this example, common parameter is as shown below when unit number is set to 0.

DM20000	#0000	Operating data area designation	Specifies setup area for operation data. 0000: Fixed DM for Special I/O unit
DM20001	#0000	Beginning word of operation data area	Specifies start channel for operation data area. Valid if 000D or 0X0E is specified in the above.
DM20002	#0F01	Axis parameter designation	Shown below are typical settings: 0000: Operates by parameters in the Position Control Unit. 0F01: Initial value in the Position Control Unit (factory setup). 0001: Parameter specified in DM
DM20003	#0000	Not used	This area is not used. Leave set to 0000.

Setup is enabled when the unit is turned on or restarted.

Turn the PLC OFF and ON again.

To change and use axis parameters, you must set the bit OFF like DM20002=#0E00 (for details, see the documentation).

### ■Axis Parameter

Initial factory setup is used here.

Activate the unit by force with initial factory setup by using common parameter DM20002 shown above.

If you need to change, modify parameters shown above, set and use parameters at CX-Position.

## 2-5. Servo Driver Parameter Setup

### ■Servo Parameter

If you use a motor with no load, you can check the operation under initial factory setup.

If the movement is not good, adjust it by automatic or manual tuning.

To actually use the unit connecting to a machine, finer adjustment might be required. You must adjust the unit with the machine.

For details, see user's manual SBCE-309 "4-7 Adjustment Function".

## 2-6. Usage Example of FB Component

FB “Absolute Move”

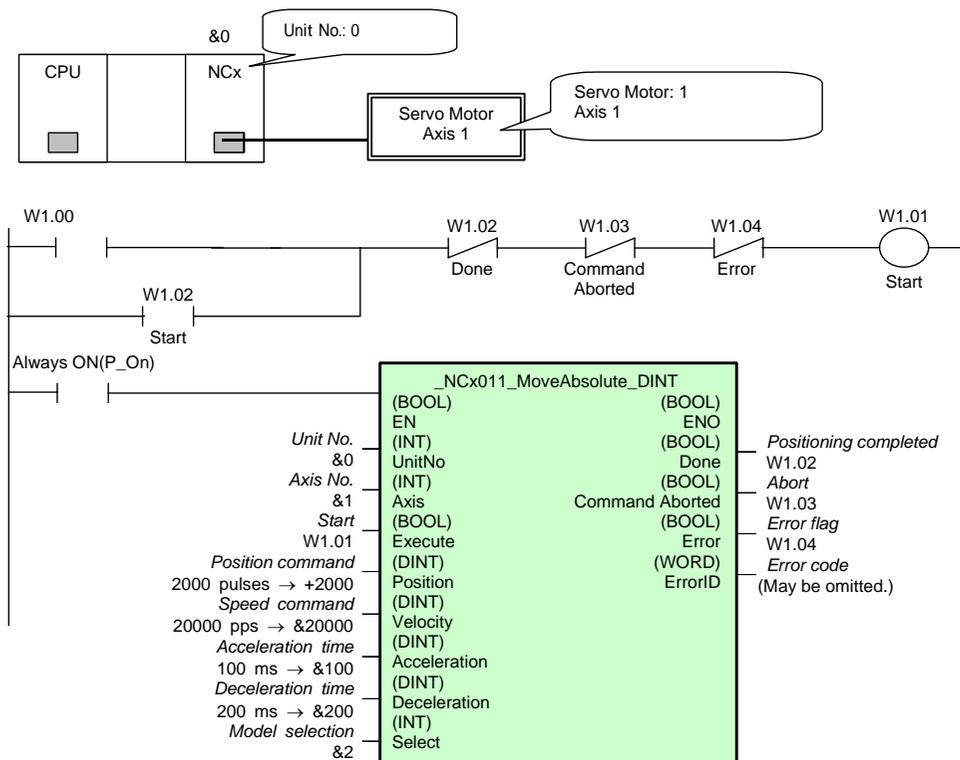
FB Name `_NCx011_MoveAbsolute_DINT`

File Name `_NCx011_MoveAbsolute_DINT10.cxf`

Functional Overview    Positions using an absolute move.

### Program Example

Servo motor (1-axis) connected to NCx of unit number 0 is moved to position of 2000 (command unit) with speed of 2000 (command unit/s) by absolute move command.



After normal move, W1.02 is set to ON.

If an error occurs by any reason, W1.04 is set to ON.

[Notice]

If the origin is not determined, MoveAbsolute cannot be executed. Perform origin search and determine the origin before.

## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started 0 (OFF): FB not started.
Unit No.	UnitNo	
Axis No.	Axis	&1: X axis &2: Y axis &3: Z axis &4: U axis
Start	Execute	↕ Starts the absolute move.
Position command	Position	Specify the target position. Unit: Pulses
Speed command	Velocity	Specify the target speed. Unit: pps The actual speed of the operation will change if the Speed Command is changed while Execute is ON.
Acceleration time	Acceleration	Specify the acceleration time. Unit: ms
Deceleration time	Deceleration	Specify the deceleration time. Unit: ms
Model selection	Select	&1: 1-axis Unit (NC1xx) &2: 2-axis Unit (NC2xx) &4: 4-axis Unit (NC4xx)

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Positioning completed	Done	Turns ON when the positioning operation has been completed.
Abort	Command Aborted	1(ON): Aborted - Other Move is moved (multiple activation) - Terminated by STOP
Error flag	Error	Turns ON when an error has occurred in the FB.
Error code (May be omitted.)	ErrorID	Returns the error code when an error has occurred in the FB. Refer to the <i>Related Manuals</i> for details on errors. A code of #0000 will be returned when the unit number of axis number is out of range.

## 2-6 Inverter

---

3G3MV-A2□□□/-AB□□□/-A4□□□

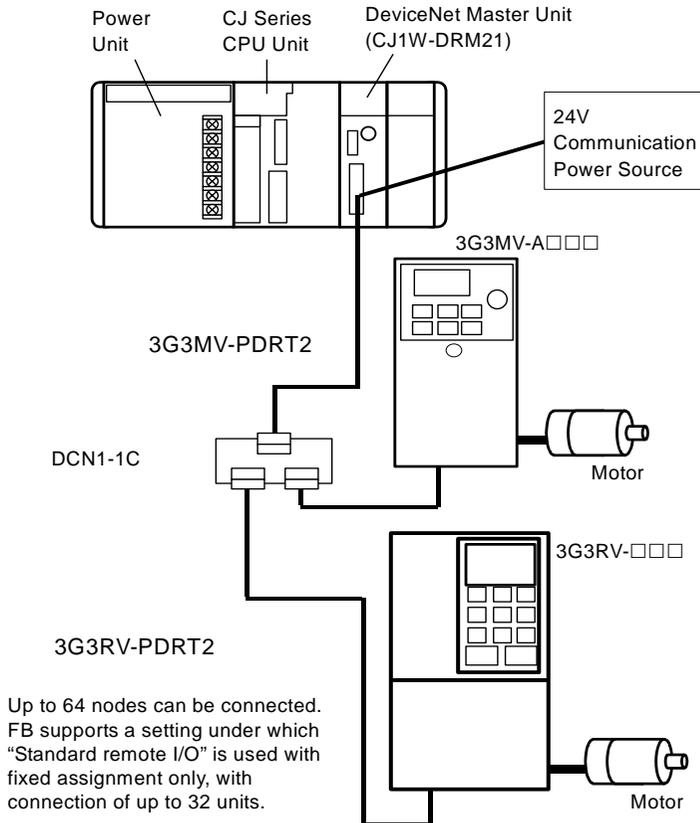
---

3G3RV-A2□□□/-A4□□□

---

Shown below is an example of using CS/CJ series CPU unit to start/stop a motor or set the parameters.

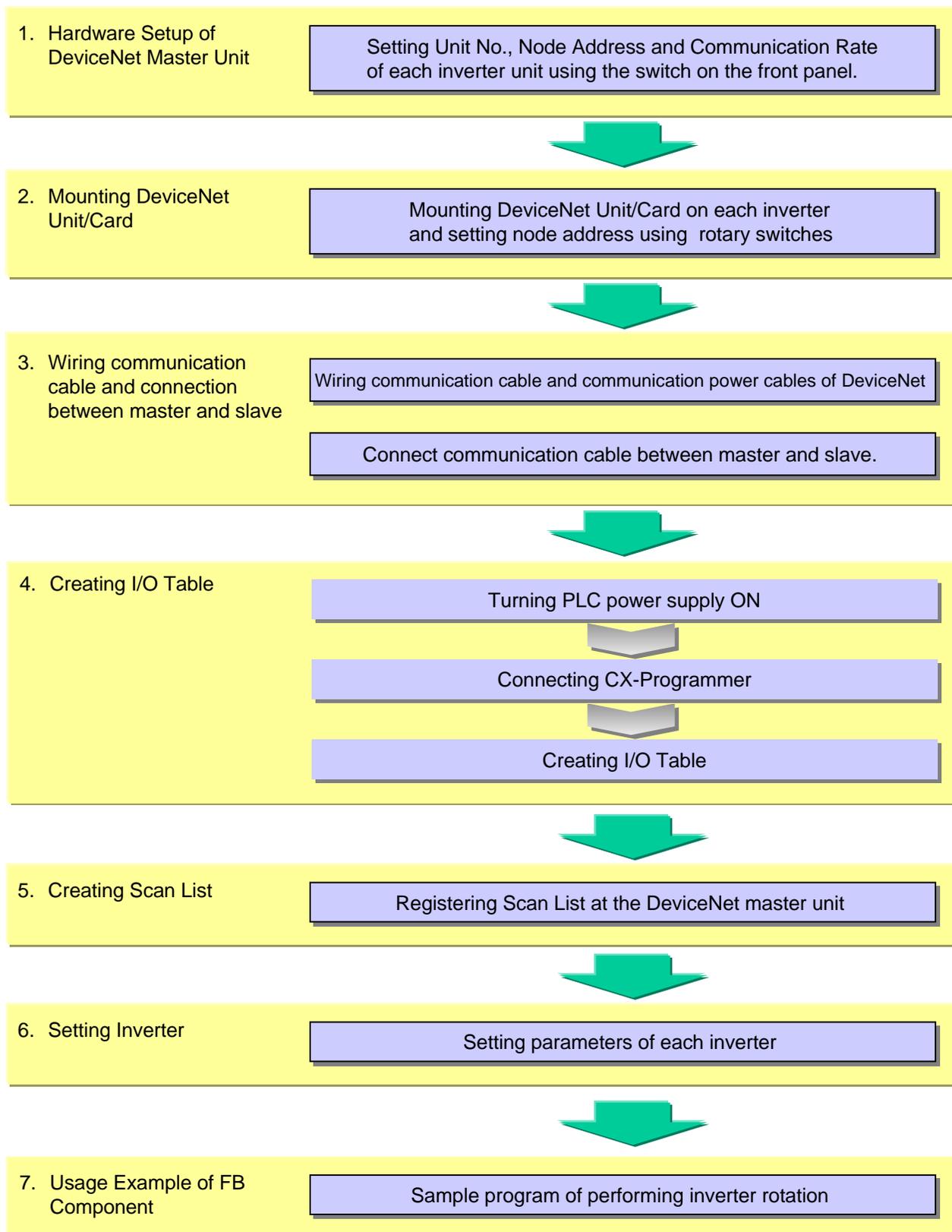
## 1. Hardware Configuration



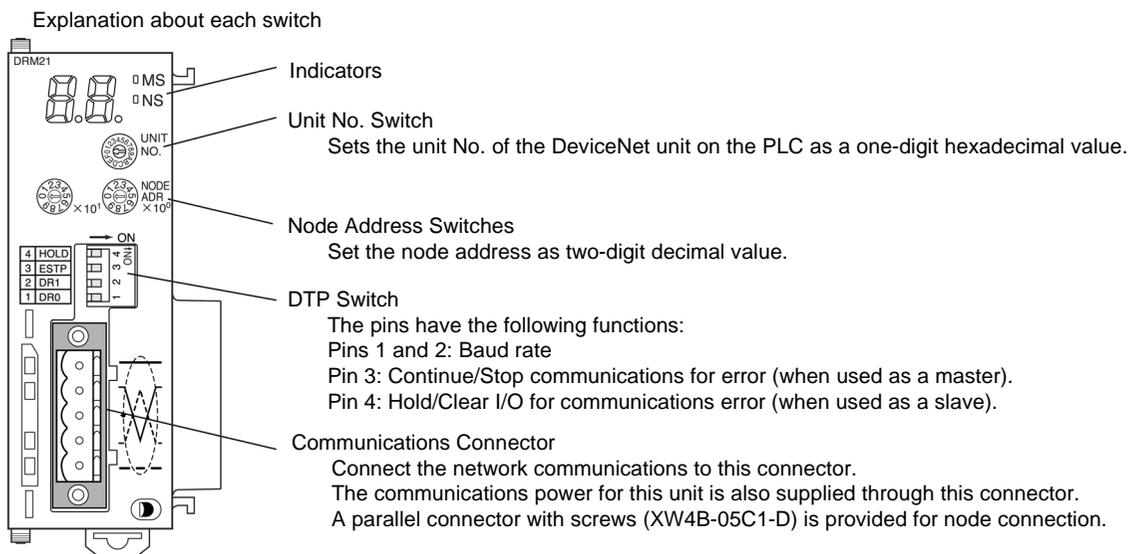
At this place the Main Unit model No. of Inverter is not restricted.  
Inverters to communicate with are listed below. Please select at your choice.  
(When using more than one inverters mixture of models is also available.)

Communication Slave Unit Type Code	Main Unit of Inverter		Remarks
	Series	Type Code	
3G3MV-PDRT2	3G3MV series	3G3MV-A2□□□	3-phase 200V
		3G3MV-AB□□□	Single-phase 200V
		3G3MV-A4□□□	3-phase 400V
3G3RV-PDRT2	3G3RV series	3G3RV-A2□□□	3-phase 200V
		3G3RV-A4□□□	3-phase 400V

## 2. Operation Workflow



## 2-1. Master Unit Hardware Setup



### (1) Set the master unit number (Unit Number Setup Switch)

In this example, unit number is set to 10 "A".

The unit number must not overlap that of other CPU Bus unit connected to the same PLC.



Setup Method	1-digit Hexadecimal Number
Setup Range	0 to F

### (2) Set the master node address.



In this example, node address is set to 63.

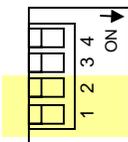
The node address must not overlap that of other node (slave) in the network.

Do not use 0.

Setup Method	2-digit Decimal Number
Setup Range	1 to 63

### (3) Set up the communication speed.

Set the communication rate of the master unit to 125K bps.



In this example, switches 1 and 2 are set to OFF.  
(Factory default setting: SW 1 to 4 are set to OFF.)

Pin		Baud Rate
1	2	
OFF	OFF	125 K bit/s
ON	OFF	250 K bit/s
OFF	ON	50 K bit/s
ON	ON	Not allowed

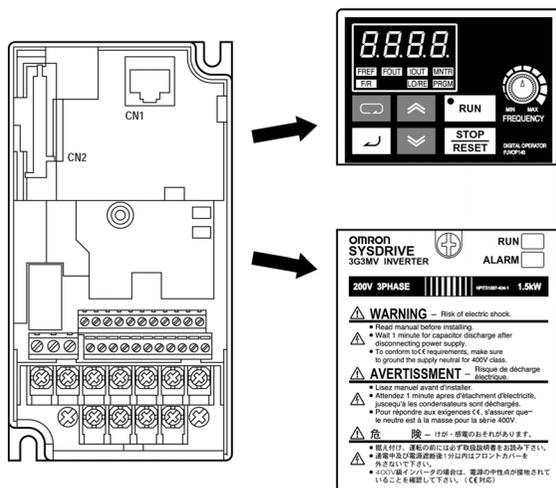
## 2-2. Mounting DeviceNet Communication Unit/Card

### 2-2-1. G3MV-PDRT2 (3G3MV)

#### Mounting Procedure

- (1) Demount the inverter's front cover, terminal block cover, and digital operator.

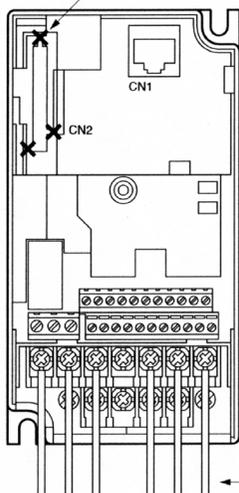
[Note] Do not touch inside of the inverter while the unit is activated in order to avoid electric shock. Operate after a minute or later from turning off of display LED or CHARGE lamp.



- (2) Connect wires between inverter main unit's main circuit and control circuit terminals (Complete the wiring for inverter main unit terminal board before mounting the DeviceNet communication unit, which will hide the terminal board when mounted).

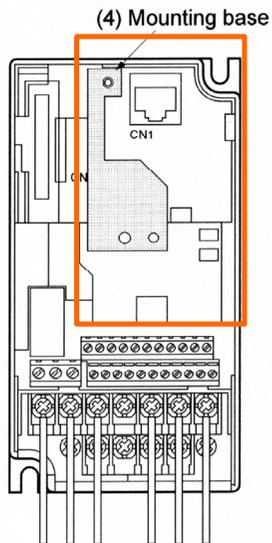
- (3) After demounting the inverter's digital operator, you will see a block fixed at three points under the operator. Use a nipper or other tool to separate these three fixed points and remove the block, then you will see a connector for an optional unit. Be careful so that any object or dirt should not get into the connector.

(3) Using pliers, cut sections indicated with "X."



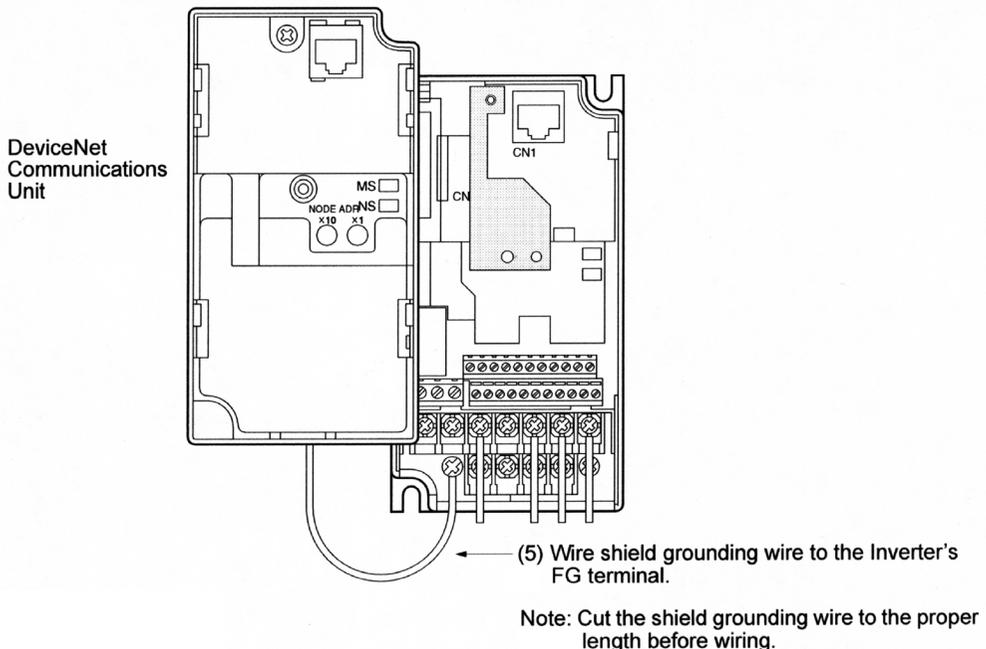
(2) Wire the main circuit terminals and control circuit terminals.

- (4) Attach the auxiliary mounting bracket on screws that fixed the digital operator and terminal board cover, and use auxiliary screws to fix them.



\* Do not forget to attach the mounting bracket.

- (5) In the back of DeviceNet communication unit, there is a grounded terminal to which shielded communication cable is connected. Connect this terminal and the inverter's FG terminal.

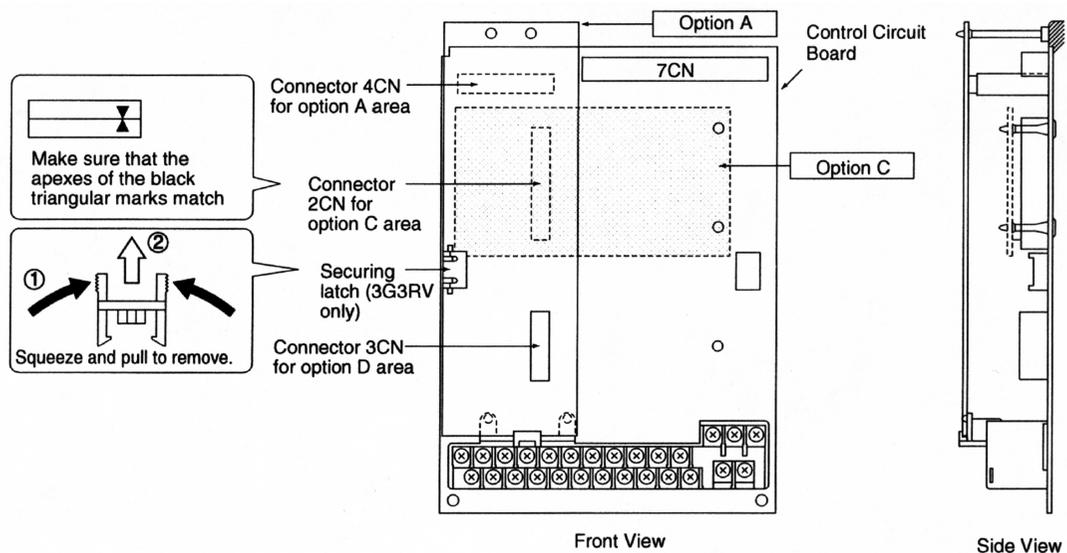


- (6) Fit the DeviceNet communication unit's connector and the inverter's one on the right position, then connect the inverter and the unit. Press the unit until you hear a click sound.
- (7) Use screws on the top of DeviceNet communication unit to clamp the bracket in step (4).

## 2-2-2. 3G3RV-PDRT2 (3G3RV/3G3FV)

### Mounting Procedure

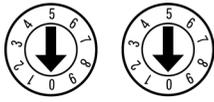
- (1) Turn off the inverter's main circuit power. After 5 minutes or later, demount the inverter's front cover and check if the CHARGE lamp is lit off.
- (2) DeviceNet communication card is "C option". Mount it on the C option's position as shown below.
- (3) For 3G3RV, remove a clamping tooth for C and D options.
- (4) Insert the auxiliary spacer into the spacer hole on the mounting base of the inverter main unit.
- (5) Fit the option card connector and the controller board connector on the right position, insert the spacer on the card's spacer hole. Press the spacer into the hole until you hear a click sound.
- (6) For 3G3RV, mount the clamping tooth that you have removed.
- (7) Connect the shield ground cable for option card to FG terminal 12(E) of the inverter's controller board.
- (8) See from the side to make sure that the connector is completely inserted. If not, press the connector again.



\* When DeviceNet communication card is loaded, no other C option can be loaded.

### 2-2-3. Setting Slave Node Address

Set the slave node address (rotary switch)



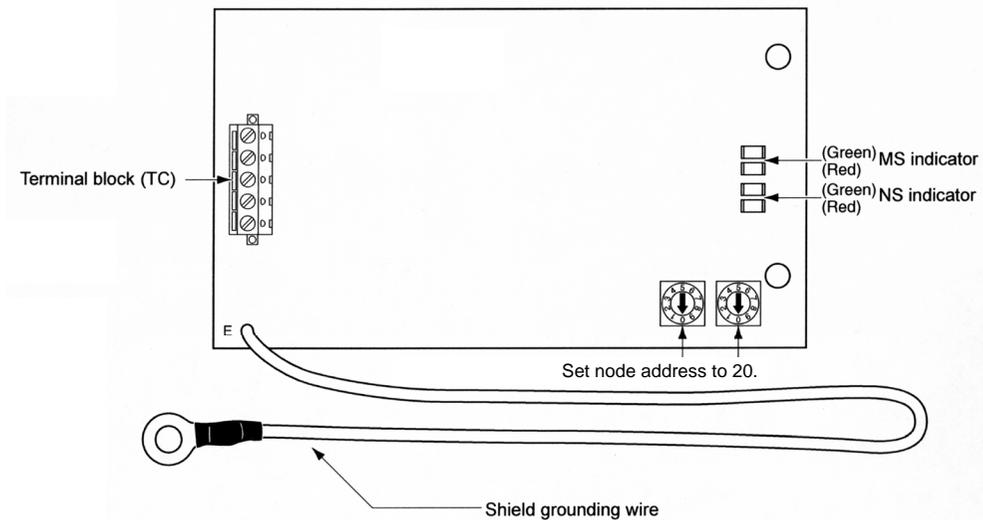
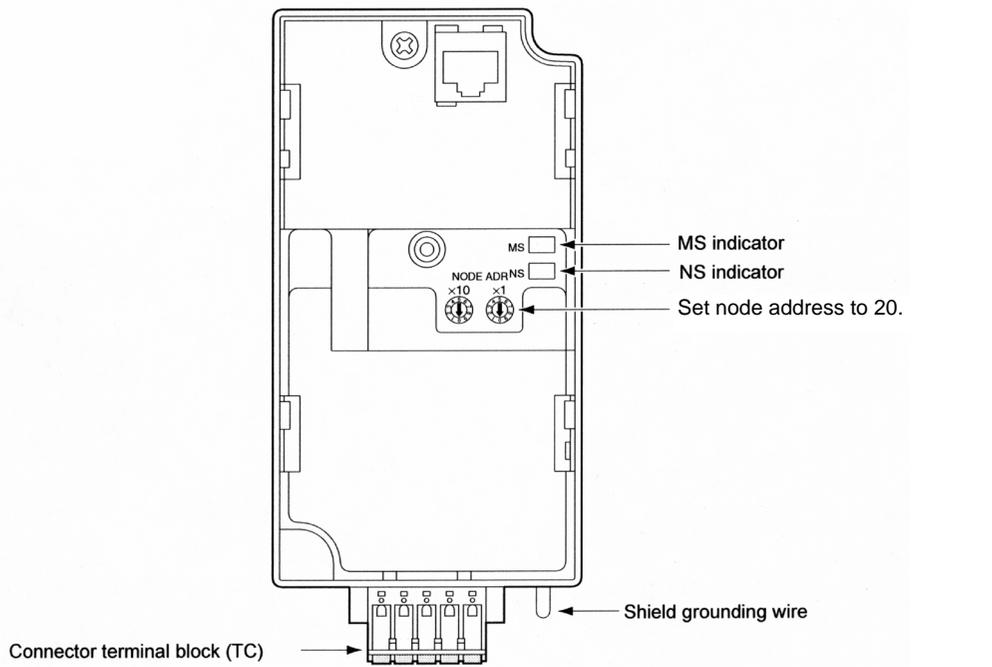
Setup Method	2-digit Decimal Number
Setup Range	0 to 63

Node Address Setting (One's digit)

Node Address Setting (Ten's digit)

In this example, node address of 3G3MV is set to 15 and that of 3G3RV is set to 30. The node address must not overlap that of other node (master/slave) in the network. See below for the Switch location.

Switch location for 3G3MV

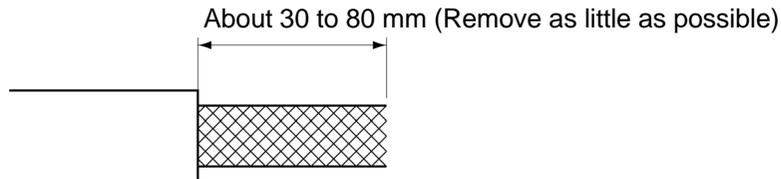


## 2-3. Wiring Communication Cable and Connection between Master and Slave

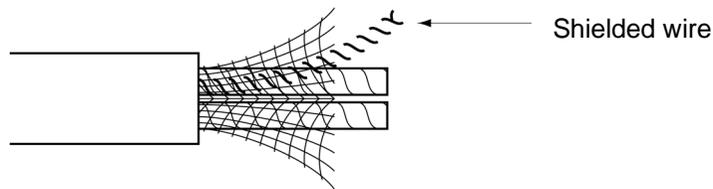
### 2-3-1. Making Communication Cable

Use the following procedure to make a communication cable and attach the connector.

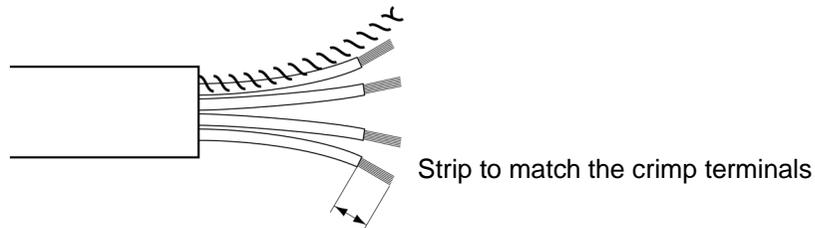
1. Peel the cable sheath by 30~80 mm while taking care not to damage the shield net. Do not peel much. Peeling too much can cause short circuit.



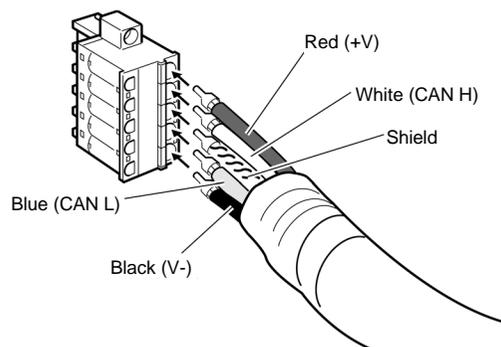
2. Unweave the wire net carefully. You will find one bare shielded twisted wires, other than signal and power wires (it is harder a little than the net and you can feel it by touching) .



3. Cut and remove excess shield net, remove aluminum tape that covers signal and power wires, and peel the sheath of signal and power wires for crimping terminal. Twist the peeled signal and power wires tightly.



4. Attach a crimping terminal on the peeled part of the cable, then cover it with vinyl tape or heat shrinkable tube.
5. Then, insert signal, power, and shielded wires into connector holes while taking care of connector direction. Wires must be inserted into holes in the order of red, white, shielded, blue, and black from the top.



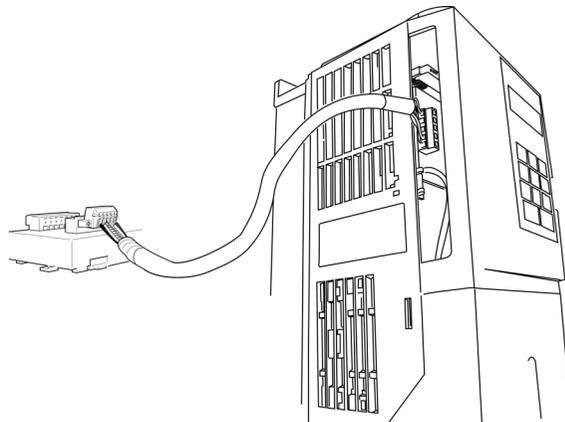
### 2-3-2. Connection of Communication Cable to Node

Align the directions of connectors at the node side and cable side, and insert the convex part of the cable into the node connector completely.



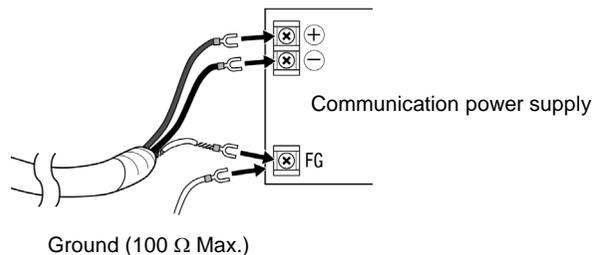
### 2-3-3. Connection of 3G3RV

The Terminal Block of DeviceNet Communication Card is not a connector. Connect the cable connected with DeviceNet Communication Card to T-branch Tap as shown below.



### 2-3-4. Connecting Communication Power Supply

Connect V+ (red) and V- (black) of the communication cable to power source (DC24V).



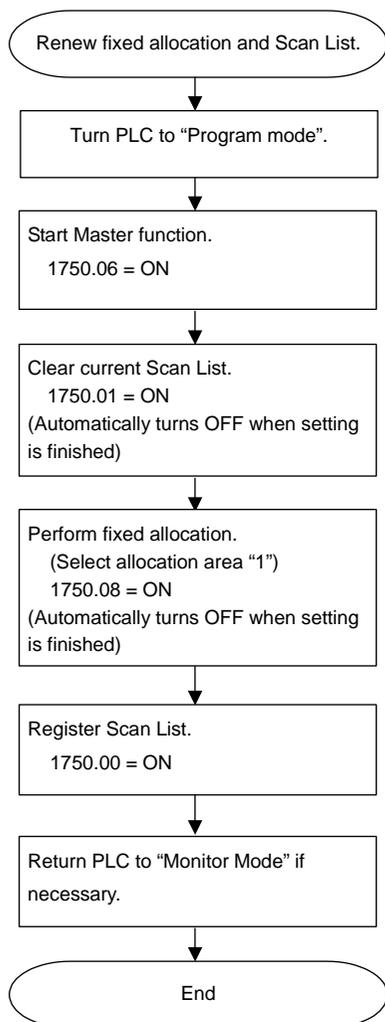
## 2-4. Creating I/O Table

Set CX-Programmer online and create I/O table.

## 2-5. Creating and Registering the Scan List

Scan List is something like an I/O Table on DeviceNet, which registers information of the Slaves that the Master Unit connected with. This List is necessary as this is information indicating where in PLC each slave assigns remote I/O.

In the FB Library of the Inverter, the “Standard remote I/O” set at the shipment is conditioned to be used as the fixed allocation.



Master switch	Area Selection	OUT(SYSMAC→INV)		IN(SYSMAC←INV)	
		n	CH	m	CH
1750.08	(1) &1 Factory setting	n=3200	3200 CH to 3263 CH	m=3300	3300 CH to 3363 CH
1750.09	(2) &2	n=3400	3400 CH to 3463 CH	m=3500	3500 CH to 3563 CH
1750.10	(3) &3	n=3600	3600 CH to 3663 CH	m=3700	3700 CH to 3763 CH

\* 1750 = 1500 + 25 CH X (CPU Bus Unit No. of DeviceNet Master)

Concerning detail explanation including meaning of setting are written at “3-1 Outline of Allocation Relay and DM Area”, “4-2 Scan List” and “4-3 Fixed Allocation” of DeviceNet Master Unit Manuals (W380-E1).

## 2-6. Inverter setting

For performing DeviceNet Communication, the following parameters have to be set.

\* The parameters shown here is incorporated into DeviceNet communication Unit when power is turned ON.

For this reason, change of parameter must be made after turning OFF the source power.

### 2-6-1. 3G3M series Inverter Parameter Setting

Parameter constant No.	Name	Setup figure	Factory setting	Description
n003	Operation command selection	3	0	Input from option (DeviceNet Communication Unit) is enabled
n004	Frequency command selection	9	0	Frequency command from option (DeviceNet Communication Unit) is enabled
n035	Unit selection at frequency command selection/reference	0	0	Unit: Hz

Concerning other parameters set depending upon operation conditions.

Concerning change and detail of parameter, check the following manuals.

I527-E1 3-1 Operation of Digital Operator

I539-E1 4-1 SYSDRIVE 3G3MV Series Set-up

### 2-6-2. 3G3RV series Inverter Parameter Setting

Parameter constant No.	Name	Setup figure	Factory setting	Description
b1-01	Frequency command setting	3	1	Frequency command by Option Card (DeviceNet communication card)
b1-02	Operation command selection	3	1	Operation command by Option Card (DeviceNet communication card)
F6-01	Operation selection at communication error	1	1	Free run stop/error detection
F6-02	Detection method selection at communication outer error input	0	0	Detect always
F6-03	Operation selection at communication outer error input	1	1	Free run stop/error detection
o1-03	Unit selection at frequency command selection/reference	0	0	Unit: Hz

Concerning other parameters set depending upon operation conditions.

Concerning change and detail of parameter, check the following manuals.

I532-E1 3-2 Digital Operator

I539-E1 4-2 SYSDRIVE 3G3RV Series Set-up

## 2-7. Usage Example of FB Component

FB “Move Inverter Hz”

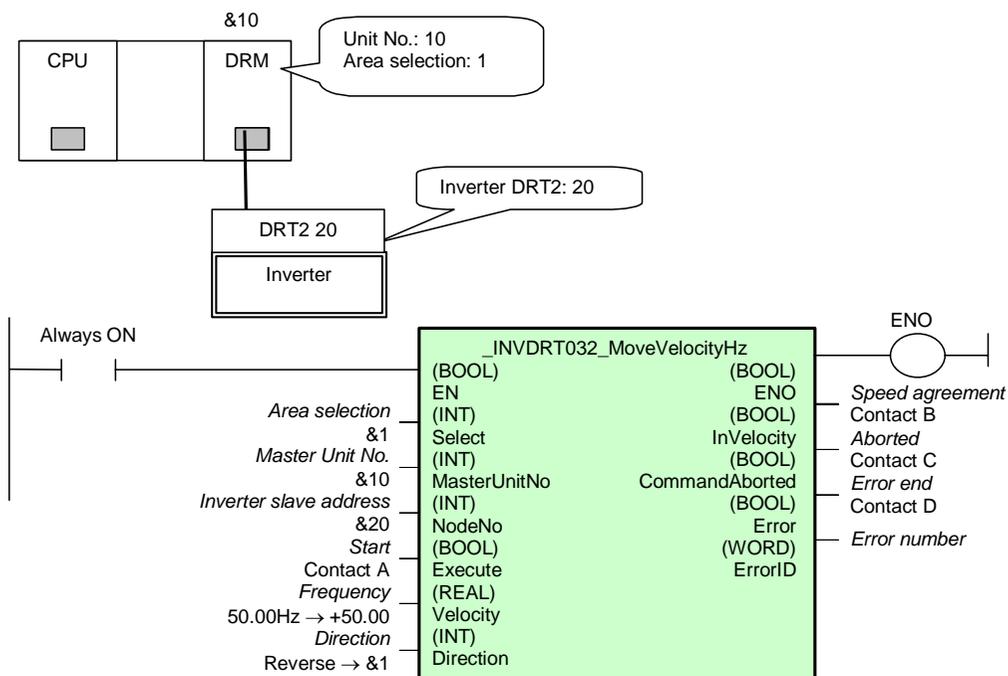
FB Name `_INVDRT032_MoveVelocityHz`

File Name `_INVDRT032_MoveVelocityHz10.cxf`

Functional Overview Outputs a run signal, rotation direction, and speed to the Inverter.

### Program Example

Rotate the Inverter 20 connected with DeviceNet Unit No.10.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Data type	Default	Range	Description
EN	EN	BOOL			1 (ON): FB started 0 (OFF): FB not started.
Area selection	Select	INT	&1	&1 to &3	Specifies the DeviceNet I/O memory area. Specify the area set using the software switch in the DeviceNet Unit. &1: Fixed allocations, IN: CIO 3300, OUT: CIO 3200 &2: Fixed allocations, IN: CIO 3500, OUT: CIO 3400 &3: Fixed allocations, IN: CIO 3700, OUT: CIO 3600
Master Unit No.	MasterUnitNo	INT	0	&0 to &15 #0 to #F	The unit number of the DeviceNet Unit
Inverter slave address	NodeNo	INT	&0	&0 to &63	The address of the slave
Start	Execute	BOOL	0(OFF)		1 (ON): Operation started 0 (OFF): All of the following are turned OFF: InVelocity, CommandAborted, Error, and ErrorID.
Frequency	Velocity	REAL	0	+0.00 to +400.00	Specify the frequency in units of 0.01. Any digits below the setting unit are truncated.
Direction	Direction	INT	&0	&0 to &1	&0: Forward &1: Reverse

### [OUTPUT](Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error. <ul style="list-style-type: none"> <li>• FB is not activated.</li> <li>• Input Variables are out of range.</li> <li>• Error end of FB</li> <li>• Common parameters are not read in</li> </ul>
Speed agreement	InVelocity	1 (ON): Speed agreement
Aborted	CommandAborted	1 (ON): Aborted <ul style="list-style-type: none"> <li>• Other Move is activated (Multiple activation)</li> <li>• Stopped using STOP.</li> </ul>
Error end	Error	0 (OFF): Other status 1 (ON): Error in FB
Error number	ErrorID	#0000: No error or communications error prevented getting the error number #0001 to #FFFF: Error number from Inverter Refer to the <i>Related Manuals</i> for details.

## 2-7 Servo Driver

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R88D-WT□□/-WT□□□H/-WT□□HL,

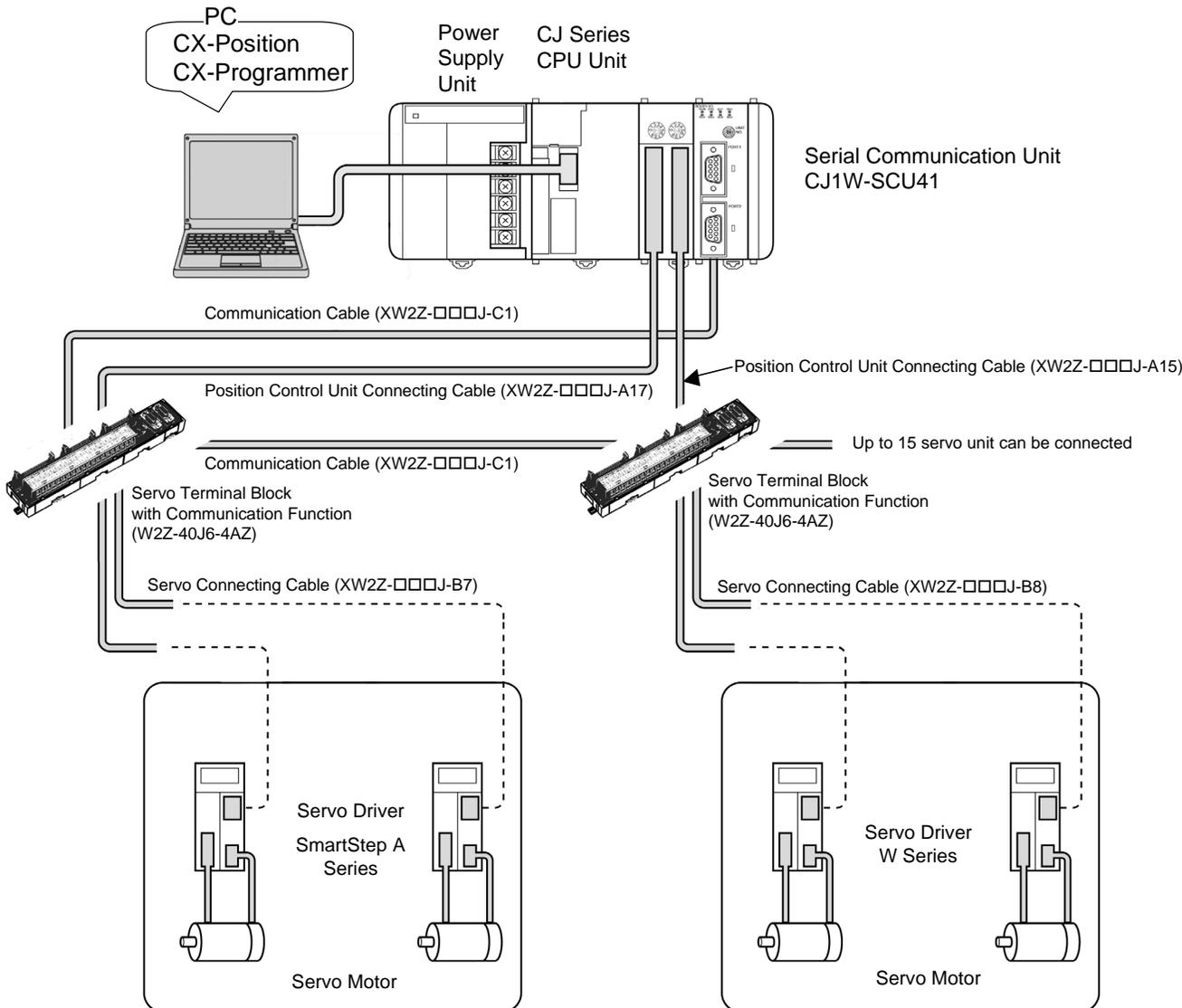
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R7D-AP□□H/-AP□□L

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Shown below is an example of using CS/CJ series CPU unit to write/read parameters or display the status.  
 Read Pn101 "Velocity Loop Integration Time Constant" from Servo Unit No. 6 of W series Servo Driver connected with Serial Communication Unit No.5.

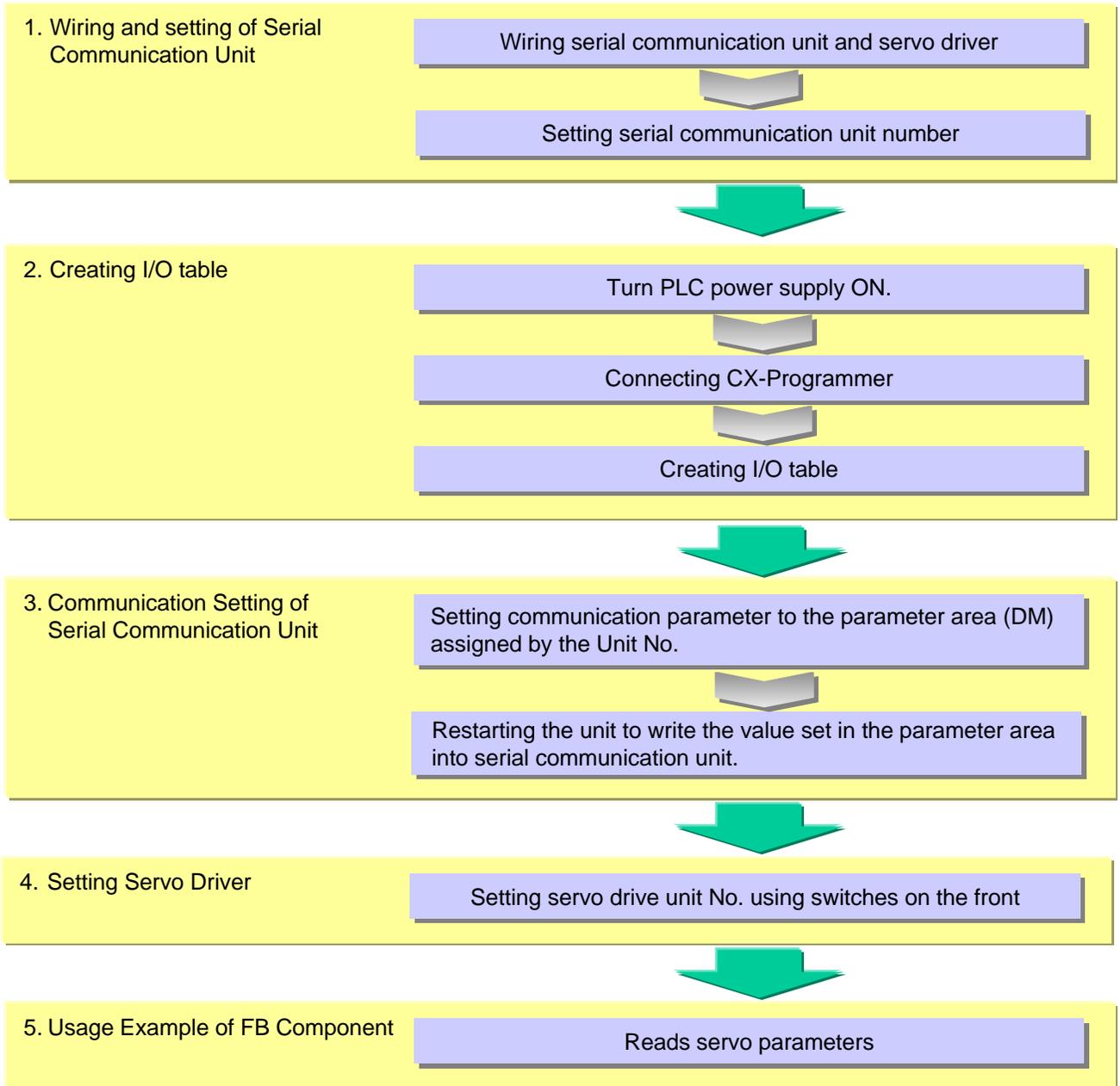
## 1. Hardware Configuration



[Note]

\* If you make your own driver cable, refer to document I531-E1 "2-6 Cable Connector Specification".

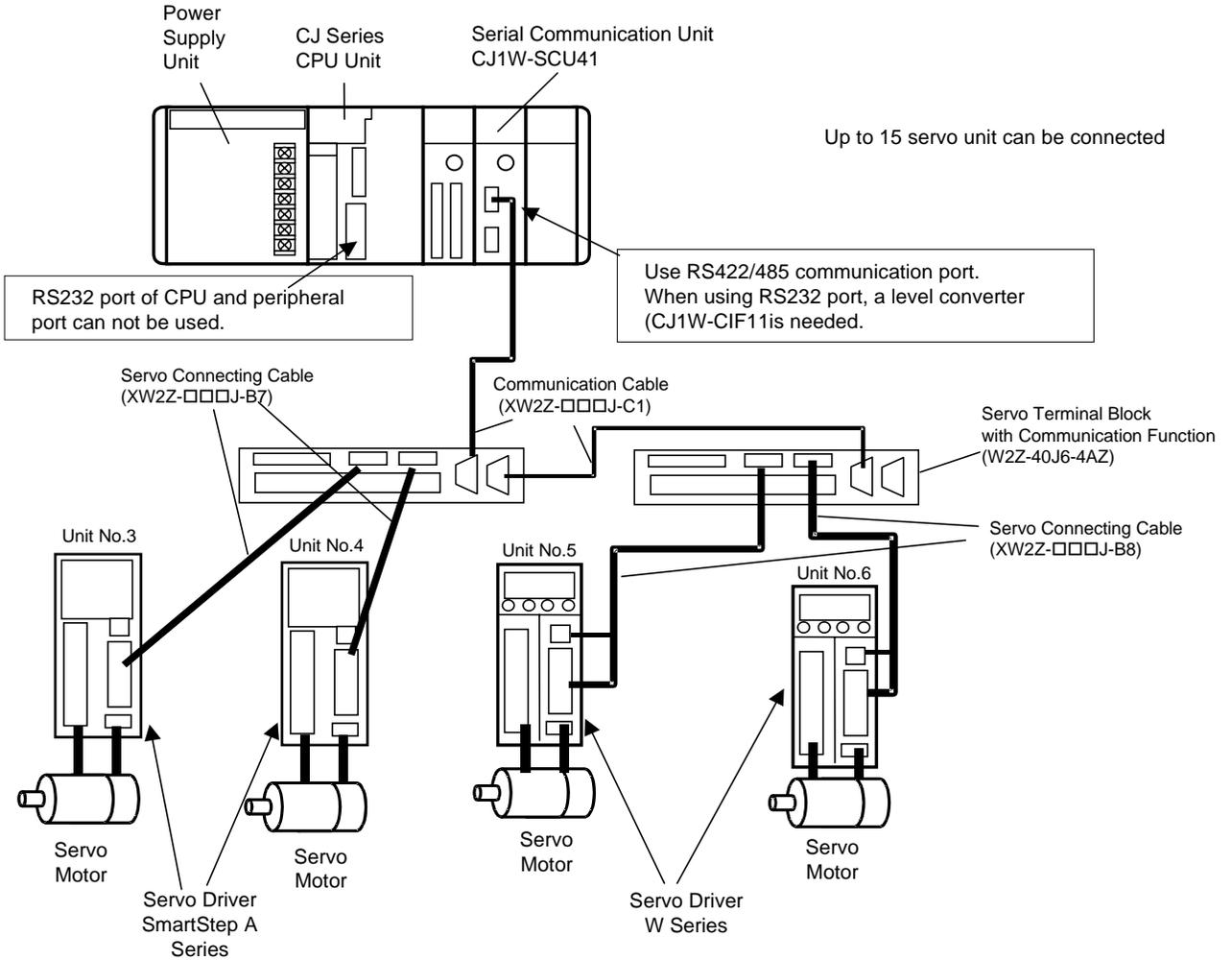
## 2. Operational Workflow



## 2-1. Wiring and setting of Serial Communication Unit

### 2-1-1. Setting of Serial Communication Unit and Servo Driver

Configure serial communication unit and servo driver as shown below.

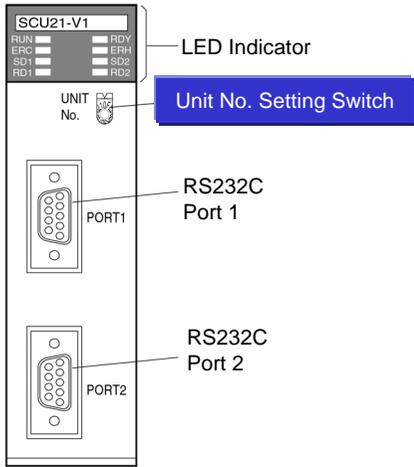


Wiring with the serial communication cable is described in this document. When connected to Position Control Unit or I/O power supply, refer to user's manual for servo drivers, I531-E1, I533-E1.

### 2-1-2. Setting Serial Communication Unit Number

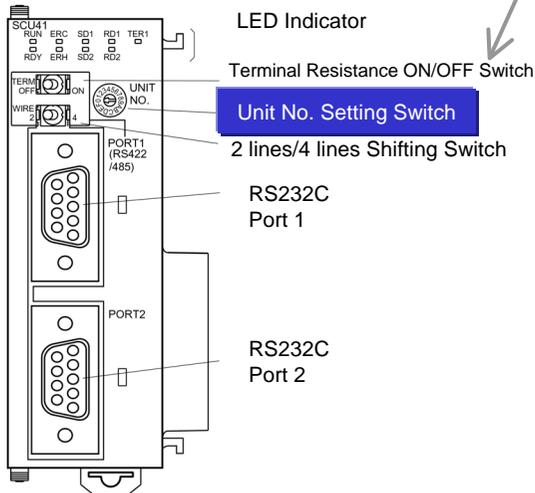
Set the unit number to "5". Set the switch to 5.

CS1W-SCU21-V1

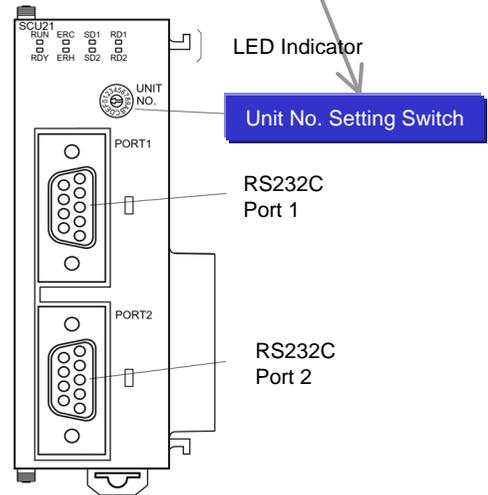


Set the unit number to "5" using flat-blade screw driver.

CS1W-SCU41-V1



CS1W-SCU21-V1



## 2-2. Creating I/O table

Connecting CX-Programmer, Create I/O table.

## 2-3. Communication Setting of Serial Communication Unit

### 2-3-1. Parameter Setting

Set communication specifications by writing down the following value onto the parameter area.

$$m = D30000 + 100 \times \text{Unit Number (CH)}$$

Board		Unit		Description	CJ1W-SCU41 Unit No. 5, Port 1	
(CS Series Only)		(CS/CJ Series)			DM	Setup Value
Port 1	Port 2	Port 1	Port 2			
D32000	D32010	m	m+10	Bit 00~04: Communication conditions	DM30500	#8904 *
				Bit 08~11: Serial communication mode		
D32001	D32011	m+1	m+11	Bit 00~03: Transmission rate	DM30501	#0006
D32008	D32018	m+8	m+18	Bit 15: Transmission method	DM30508	#0000
D32009	D32019	m+9	m+19	Bit 00~15: Maximum byte count for transmission data	DM30509	#03E8

\* If you use macro with the above, D32000/D32010/m/m+10 must be #8604.

Set communication specification as follows in this example.

Communication Specification with servo driver

Transmission Rate	9600 bit/s
Bit Configuration	Start 1 bit
	Data 7 bits
	Stop 1 bit
	Even parity 1 bit
Synchronization	Start-stop synchronization
XON/XOFF	None
Shift Control	None
Communication Method	Half duplex

Mode Selection of Serial Communication Unit

Parameter	Setup value
Serial Communication Mode	9: Serial gateway 6: Macro mode (only if macro is used for PLC)

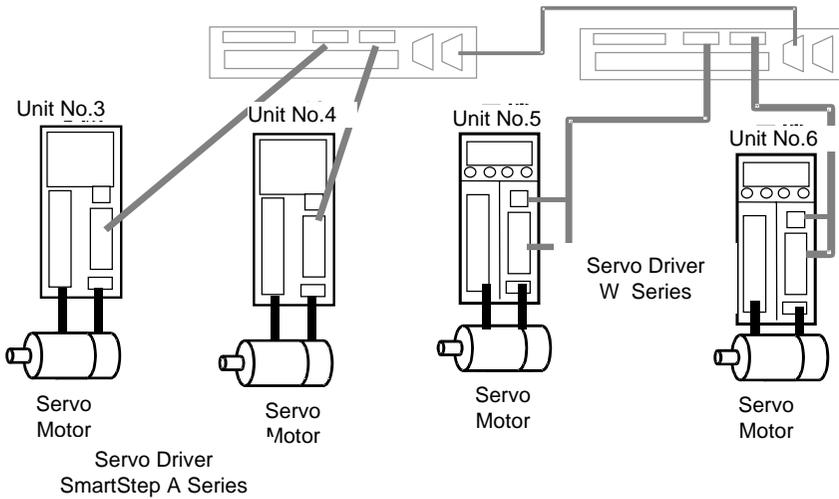
### 2-3-2. Unit Restart

Parameters at the serial communication unit is reflected when power supply is restarted from the OFF position.

## 2-4. Servo Driver Setting

### ■ Setting Servo Unit No.

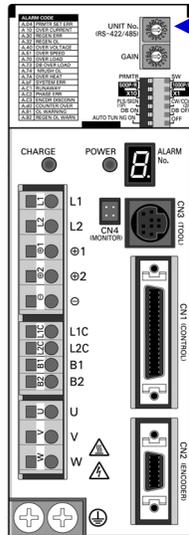
Set SMART STEP to Unit No.3 and 4 and W Series to Unit No. 5 and 6.



\* Setting depends on the models.

### ● SMART STEP A Series

Set the rotary switches shown bellow, Unit No.3 and 4.

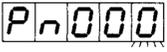
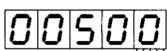
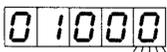
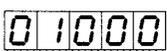
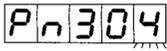


Unit No. Setting Switch  
Set unit No. to 3 and 4, using flat-bladed screw drive.

### ●W Series

Set the unit No. with the parameter by digit 2 of Pn000.2 to 6.

#### Operation Procedure

PR02W	Front panel key operation	Display example	Explanation
			(System Check Mode)
			Press the MODE/SET Key to change to Setting Mode.
	 (1 s min.)		Press DATA Key (front panel: DATA Key for 1 s min.). The parameter number Pn304 setting will be displayed.
 	 		Press the Up or Down Key to change the setting to 01000.
	 (1 s min.)		Press the DATA Key (front panel: DATA Key for 1 s min.) to save the data to memory (the setting display will flash for approximately 1 s).
(Approx. 1 s later)			After the display has finished flashing, it will return to normal.
	 (1 s min.)		Press the DATA Key (front panel: DATA Key for 1 s min.) to return to the parameter number display.

Set the unit No. with the parameter by digit 2 of Pn000.2 to 5.

## 2-5. Usage Example of FB Component

FB "Read Servo Parameter"

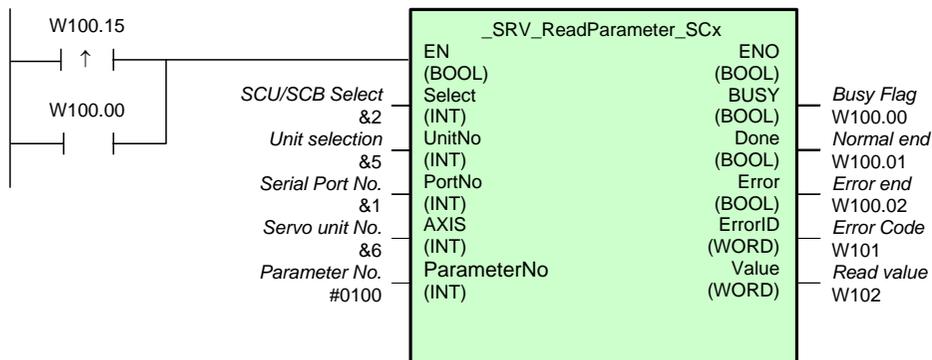
FB Name        \_SRV201\_ReadParameter

File Name       \_SRV201\_ReadParameter 10.cxf

Functional Overview        Reads parameter information from the Servo Driver.

### Program Example

Read Pn101 "Velocity Loop Integration Time Constant" from Servo Unit No. 6 of W series Servo Driver connected with Serial Communication Unit No.5.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connected Unit and serial port. Connected to CPU Unit Connection not possible to CPU Unit. Connected to SCB Unit selection #BBBB (UnitSelect) Serial Port No. &1: Port 1 (PortNo) &2: Port 2 Connected to SCU Unit selection Unit No. (&0 to &15) (UnitSelect) Serial Port No. &1: Port 1 (PortNo) &2: Port 2
Serial Port No.	PortNo	
Axis No.	Axis	The communications unit number of the Servo Driver. (W Series: Pn000.2) (SmartStep: Front-panel rotary switch)
Parameter No.	ParameterNo	Specifies the parameter to read as a hexadecimal number #0XXX where XXX is the numeric portion of the parameter number PnXXX. Refer to the <i>Related Manuals</i> for details on parameter numbers.

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	Done	0 (OFF): Other end status 1 (ON): Communications completed with no error
Error end	Error	0 (OFF): Other end status 1 (ON): One of the following error occurred. <ul style="list-style-type: none"> <li>• CMND instruction could not be executed (other message being processed).</li> <li>• An input variable is out of range.</li> <li>• The corresponding parameter number is not supported.</li> </ul>
Error code	ErrorID	#0000: Normal end
Read value	Value	The value returned from the Servo Driver.

### 3. References

#### Target Servo Driver

Shown below are target servo drivers for communication (multiple models can coexist)

	Type Code	Type Code
W Series	R88D-WT__H R88D-WT___H	Single-phase 200V, 3-phase 200V
	R88D-WT__HL	R88D-WT__HL
SmartStep A Series	R7D-AP__H	Single-phase 200V, 3-phase 200V
	RD-AP__L	Single-phase 100V

#### Target PLC Models

Serial communication unit (Ver. 1.2 or more) is needed.

You can use level converter from RS232 to RS422 (CJ1W-CIF11) to communicate through a RS422 port.

PLC	Communication Unit Type Code	Specification
CJ1	CJ1W-SCU41-V1	RS422/485 1 port + RS232 1 port
	CJ1W-SCU21-V1	RS232 2 ports
CS1	CS1W-SCB41-V1	RS422/485 1 port + RS232 1 port
	CS1W-SCB21-V1	RS232 2 ports
	CS1W-SCU21-V1	RS232 2 ports

#### Level converter from RS232 to RS422



Name	Model	Specification
RS422 Converter	CJ1W-CIF11	Direct connection with RS232 type 9-pin connector at PLC.
	NT-AL001	For PLC side, dedicated cable XW2Z-070T-1 is required.

\* In both cases, you need to make the cable by yourself as RS422 side is a terminal block.

## Servo Wiring Devices

## - Servo Terminal Board

We recommend servo terminal board with communication.

Name	Name	Name
Servo Terminal Unit with Communication	Servo Terminal Unit with Communication	Servo Terminal Unit with Communication

## - Communication Cable

This cable is used to connect serial communication unit or board to servo terminal board. If you use three or more servo motors, the same cable can be used between servo terminal boards.

Name	Name	Name
Communication Cable for Serial Communication Unit	Communication Cable for Serial Communication Unit	Communication Cable for Serial Communication Unit

\* It cannot be connected to RS232 connector. Use CJ1W-CIF11 for RS232.

## - Position Control Unit Connection Cable

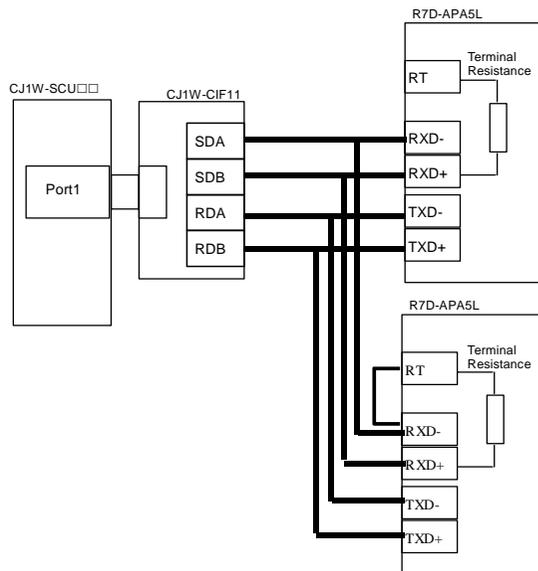
Select an appropriate cable for servo terminal board and position control unit from the following table.

Position Control Unit	Servo Driver	Connection Cable Type Code	Servo Terminal Block
CS1W-NC213 CS1W-NC413	W Series	XW2Z-□□□J-A7	XW2B-20J6-4A with Communication
	SmartStep	XW2Z-□□□J-A9	
CS1W-NC233 CS1W-NC433	W Series	XW2Z-□□□J-A11	
	SmartStep	XW2Z-□□□J-A13	
CJ1W-NC213 CJ1W-NC413	W Series	XW2Z-□□□J-A15	
	SmartStep	XW2Z-□□□J-A17	
CJ1W-NC233 CJ1W-NC433	W Series	XW2Z-□□□J-A19	
	SmartStep	XW2Z-□□□J-A21	
CS1W-NC113	W Series	XW2Z-□□□J-A6	XW2B-20J6-4B without Communication
	SmartStep	XW2Z-□□□J-A8	
CS1W-NC133	W Series	XW2Z-□□□J-A10	
	SmartStep	XW2Z-□□□J-A12	
CJ1W-NC113	W Series	XW2Z-□□□J-A14	
	SmartStep	XW2Z-□□□J-A16	
CJ1W-NC133	W Series	XW2Z-□□□J-A18	
	SmartStep	XW2Z-□□□J-A20	

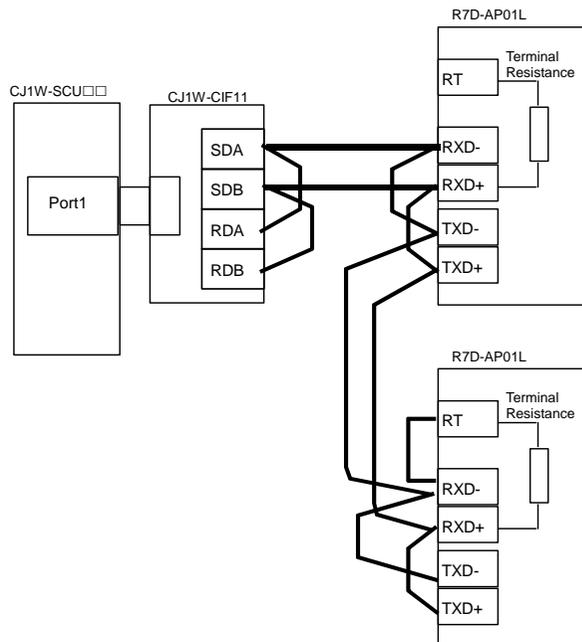
\* Single-axis communication cable for Position Control Unit is not prepared. Use two-axes cable or make by yourself.

## Terminal Resistance Treatment

In case of 4-wire (RS422): (Use RT only for the final servo)



In case of 2-wire RS485: (Use terminal resistance only for the final driver)



Using servo terminal unit with communication makes it easier to connect RS422 (4-wire) with specified cable.

In this case, it is helpful to use terminal resistance switch on servo terminal board, rather than RT terminal.

## 2-8 RFID (ID Sensor)

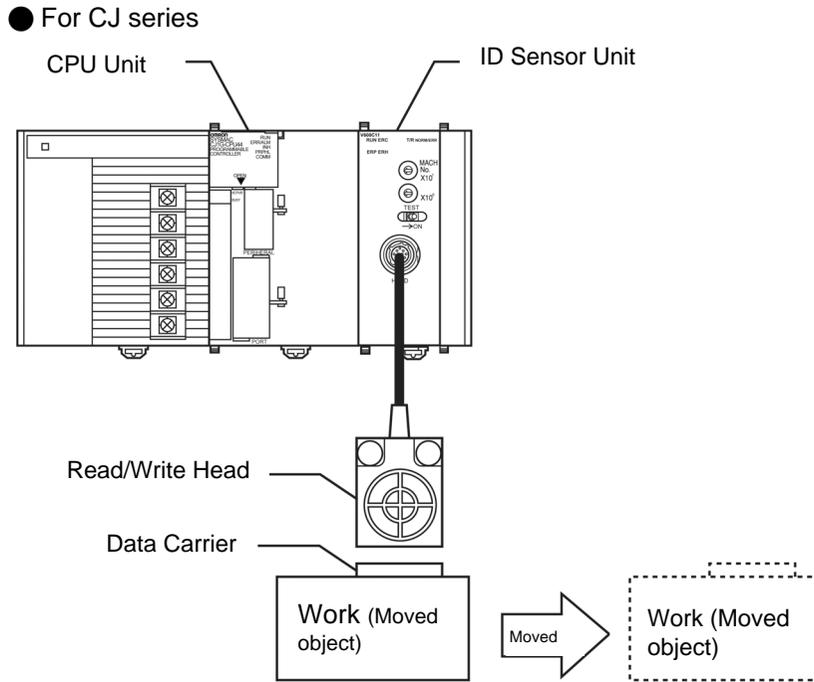
---

V600-H□□

---

Shown below is an example of constructing a system that writes data into workpiece and reads the data again.

### 1. Hardware Configuration



Shown above is an example of the configuration of 1-head type ID sensor unit (CJ1W-V600C11).

## 2. Operational Workflow

### 1. Hardware Setup of ID Sensor Unit

Setting DIP switch and unit number



Mounting the unit to PLC



Connecting the read/write head to the ID sensor unit



Turning on the PLC



### 2. Software Setup of ID Sensor Unit

Setting ID sensor unit operation



### 3. Creating I/O Table

Connecting the CX-Programmer



Creating I/O table



### 4. Usage Example of FB Component

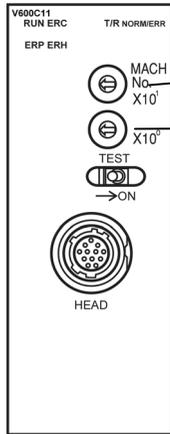
Sample program that reads and writes data carrier data.

## 2-1. Hardware Setup

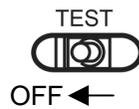
Set the switches of the ID Sensor Unit as follows.

CJ1W-V600C11

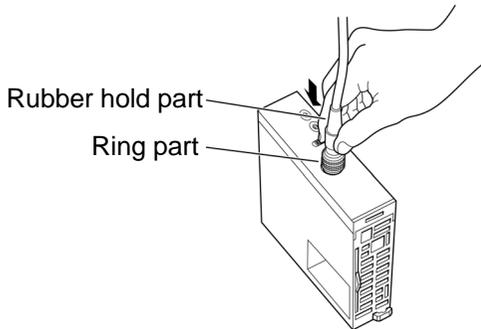
Set the Unit No. to 01 using flat-blade screwdriver or other tool.



Check whether communication test switch is OFF.



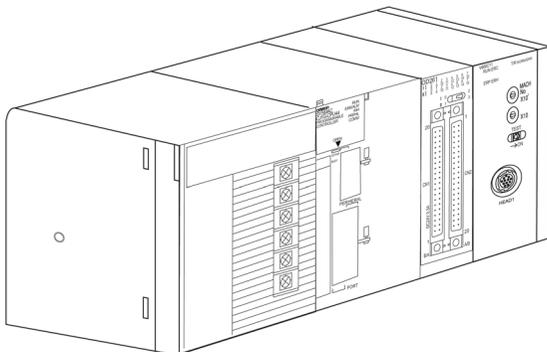
Connect to the Read/Write Head.



1. Hold the rubber hold part of the connector and insert the connector in align with the key slot of the Unit.
2. Press the cable connector straight down until it fits into the Unit.

Note: Press the connector holding the rubber hold part, as the connector is not locked when pressed holding the ring part.

Set the unit and turn the PLC ON.



## 2-2. Software Setting of ID Sensor Unit

Set the software switches of ID Sensor Unit as shown below.  
In order to restart the Unit, turn PLC power supply OFF → ON.

Address	Value
D20100	#0000
D20101	#0000

### Details of ID Sensor Unit Setting

DM No.		Bit No.	Setting	Description	Set value
Head No.1 of CS1W-V600C11 CS1W-V600C12 CJ1W-V600C11 CJ1W-V600C12	Head No 2 of CS1W-V600C12 CJ1W-V600C12				
m	m+100	12-15	System setting	Unused	-
		08-11		Operation mode switch setting	0: Enabled (BCD single digit) 1: Disabled (BCD single digit)
		04-07		Setting with or without verification when writing	0: With verification (BCD single digit) 1: Without verification (BCD single digit)
		00-03		Communication mode setting	0: Communication distance priority (BCD single digit) 1: Communication speed priority (BCD single digit)
m+1	m+101	00-15	Auto- stop waiting time setting	Data carrier waiting time when single auto-stop or repeat auto-stop is set at the communication assignment.  Beyond this time, return the "carrier non-existence" error signal.	0001 to 9999 (x 0.1 sec.) 0000 indicates no limitation

Refer to User's Manual for details.

## 2-3. Creating I/O Table

Set CX-Programmer online and create the I/O table.

## 2-4. Usage Example of FB Component

FB “Write Data to Data Carrier”

FB Name        \_V60x400\_WriteData

File Name       \_V60x400\_WriteData10.cxf

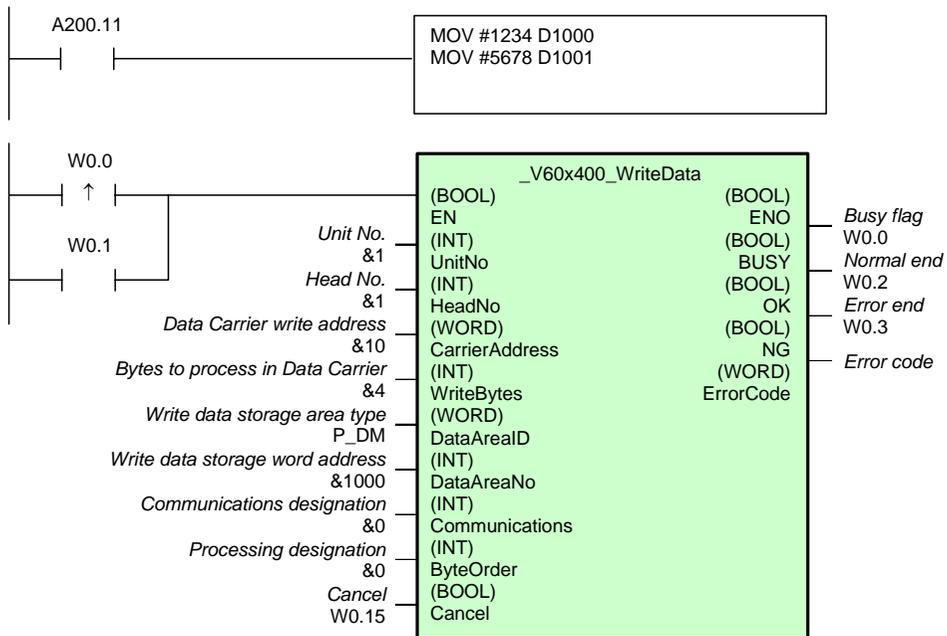
Functional Overview               Writes data to a Data Carrier.

### Program Example

When contact W0.00 is ON, ID sensor writes data “12 34 56 78” into carrier’s address 10.

After normal write, contact W0.02 is set to ON by 1 cycle.

If an error occurs by any reason, contact W0.03 is set to ON by 1 cycle.



## Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description																																								
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.																																								
Unit No.	UnitNo																																									
Head No.	HeadNo	&1: Head 1 &2: Head 2 (Two-Head Controllers only)																																								
Data Carrier write address	CarrierAddress	Specify the address in the Data Carrier.																																								
Bytes to process in Data Carrier	WriteBytes	Nothing will be performed and a normal end will be output for &0. Consider the Data Carrier capacity when setting.																																								
Write data storage area type	DataAreaID	P_CIO (#00B0): CIO Area P_WR (#00B1): Work Area P_HR (#00B2): Holding Area P_DM (#0082): DM Area P_EM0 (#0050) to P_EM5 (#0055): EM Area bank 0 to C																																								
Write data storage word address	DataAreaNo																																									
Communications designation	Communications	&0: Trigger &1: Auto &2: Repeat auto																																								
Processing designation	ByteOrder	Specify the storage order of the write data &0: Upper to lower &1: Lower to upper  0: Upper to lower <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Address</th> <th>CPU memory</th> <th>Unit memory</th> <th>Data Carrier memory</th> </tr> </thead> <tbody> <tr> <td>n</td> <td>01</td> <td>02</td> <td>01</td> </tr> <tr> <td>n+1</td> <td>03</td> <td>04</td> <td>02</td> </tr> <tr> <td>n+2</td> <td></td> <td></td> <td>03</td> </tr> <tr> <td>n+3</td> <td></td> <td></td> <td>04</td> </tr> </tbody> </table> 1: Lower to upper <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Address</th> <th>CPU memory</th> <th>Unit memory</th> <th>Data Carrier memory</th> </tr> </thead> <tbody> <tr> <td>n</td> <td>02</td> <td>01</td> <td>01</td> </tr> <tr> <td>n+1</td> <td>04</td> <td>03</td> <td>02</td> </tr> <tr> <td>n+2</td> <td></td> <td></td> <td>03</td> </tr> <tr> <td>n+3</td> <td></td> <td></td> <td>04</td> </tr> </tbody> </table>	Address	CPU memory	Unit memory	Data Carrier memory	n	01	02	01	n+1	03	04	02	n+2			03	n+3			04	Address	CPU memory	Unit memory	Data Carrier memory	n	02	01	01	n+1	04	03	02	n+2			03	n+3			04
Address	CPU memory	Unit memory	Data Carrier memory																																							
n	01	02	01																																							
n+1	03	04	02																																							
n+2			03																																							
n+3			04																																							
Address	CPU memory	Unit memory	Data Carrier memory																																							
n	02	01	01																																							
n+1	04	03	02																																							
n+2			03																																							
n+3			04																																							
Cancel	Cancel	0→1: Cancels processing.																																								

## [OUTPUT] (Output Variables)

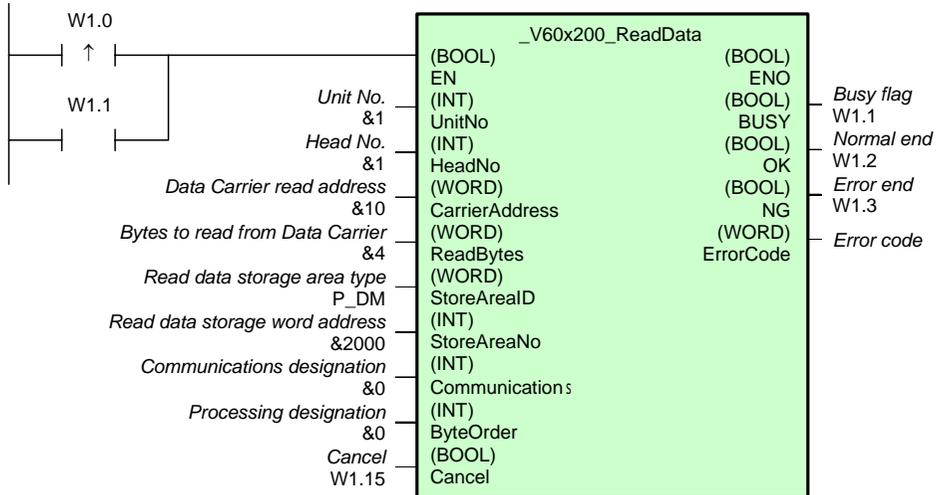
Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.
Error code (May be omitted.)	ErrorCode	Outputs the results from the ID Sensor Unit. Refer to the <i>Related Manuals</i> for details. #0070: Data Carrier communications error #0071: Verification error #0072: Data Carrier missing error #0076: Status Flag #007A: Data Carrier address error #007B: Battery warning #007C: Head error #007D: Write protection error #FFFF: Input parameter error

FB “Read Data Carrier Data”

FB Name                    \_V60x200\_ReadData  
File Name                   \_V60x200\_ReadData10.cxf  
Functional Overview       Reads data to a Data Carrier.

**Program Example**

When contact W1.00 is ON, ID sensor reads 4-byte data from address 10.  
After normal readout, contact W1.02 is set to ON by 1 cycle and the readout value is outputted to D2000.  
If an error occurs by any reason, contact W1.03 is set to ON by 1 cycle.



## Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit No.	UnitNo	
Head No.	HeadNo	&1: Head 1 &2: Head 2 (Two-Head Controllers only)
Data Carrier read address	CarrierAddress	Specify the address in the Data Carrier.
Bytes to read from Data Carrier	ReadBytes	Consider the Data Carrier capacity when setting. Nothing will be performed and a normal end will be output for &0.
Read data storage area type	RecvAreaID	P_CIO (#00B0): CIO Area P_WR (#00B1): Work Area P_HR (#00B2): Holding Area P_DM (#0082): DM Area P_EM0 (#0050) to P EMC (#005C): EM Area bank 0 to C
Read data storage word address	RecvAreaNo	
Communications designation	Communications	&0: Trigger &1: Auto &2: Repeat auto
Processing designation	ByteOrder	Specify the storage order of the read data &0: Upper to lower &1: Lower to upper  0: Upper to lower Address    Data Carrier memory    CPU Unit memory 0010    01    ←→    01 02 0011    02           03 04 0012    03 0013    04  1: Lower to upper Address    Data Carrier memory    CPU Unit memory 0010    01    ←→    02 01 0011    02           04 03 0012    03 0013    04
Cancel	Cancel	0→1: Cancels processing.

[OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.
Error code (May be omitted.)	ErrorCode	Outputs the results from the ID Sensor Unit. Refer to the <i>Related Manuals</i> for details. #0070: Data Carrier communications error #0071: Verification error #0072: Data Carrier missing error #0076: Status Flag #007A: Data Carrier address error #007B: Battery warning #007C: Head error #007D: Write protection error #FFFF: Input parameter error

## 2-9 Vision Sensor

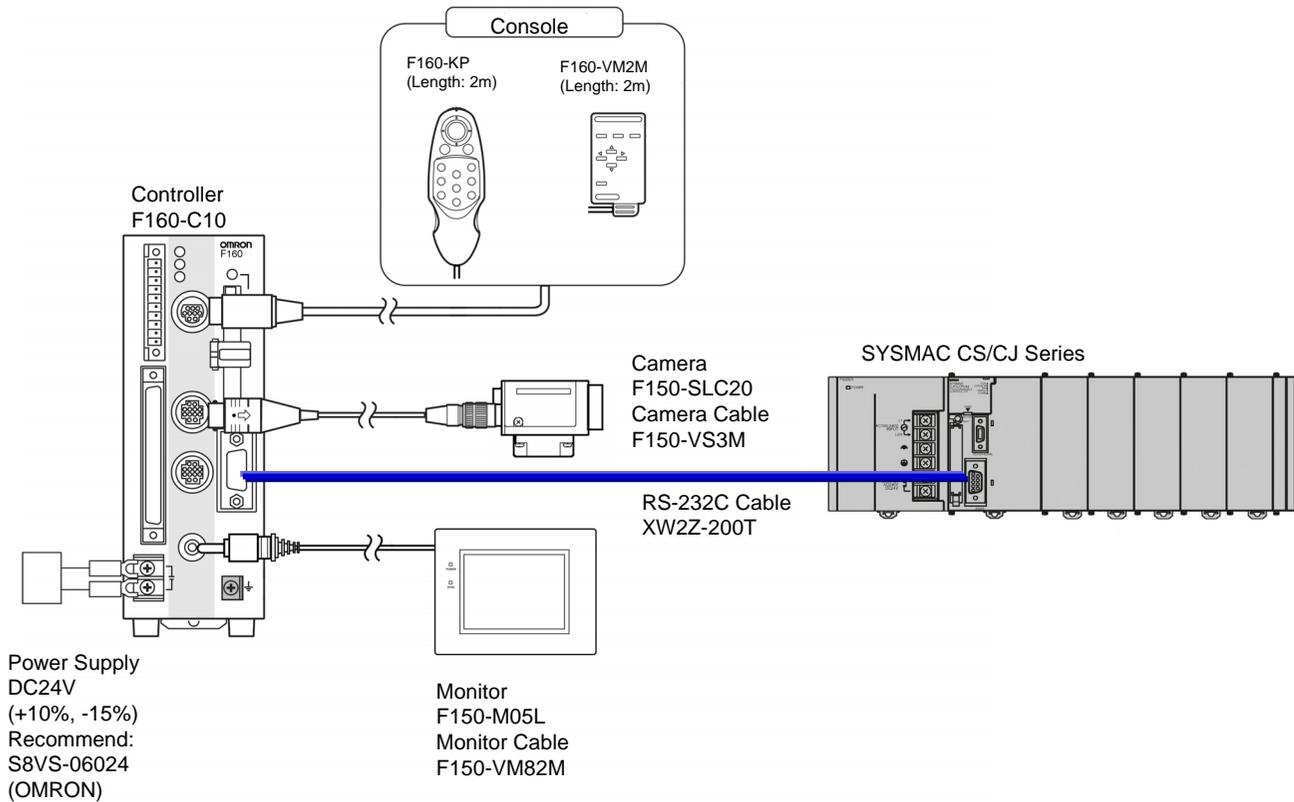
---

F160-C10

---

Shown below is an example of using CS/CJ series CPU unit to change scene number of vision sensor and acquire the scene number.

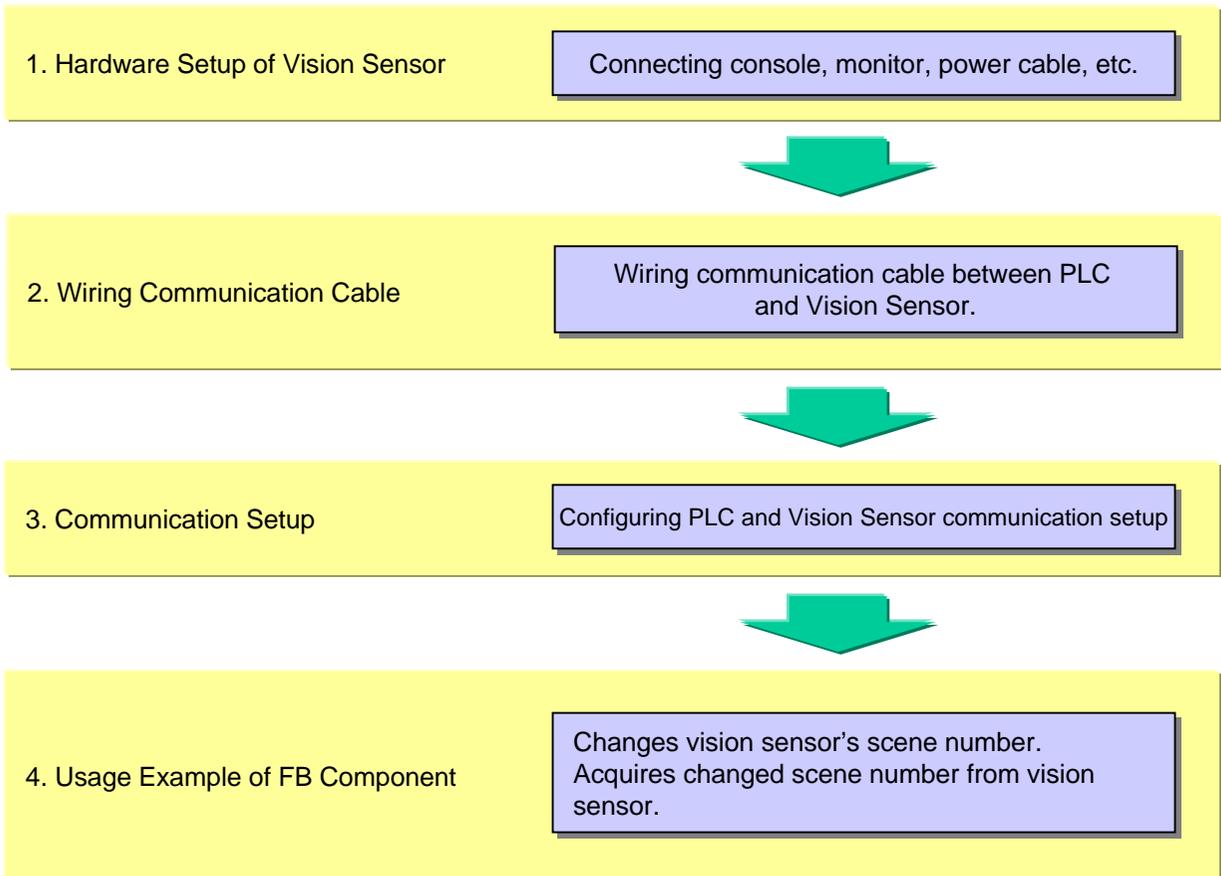
## 1. Hardware Configuration



[Note]

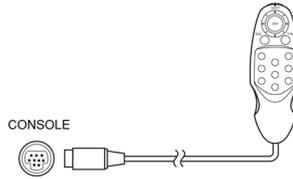
This drawing shows connection to CPU unit's built-in port.  
Connection is available for serial communication unit/board.

## 2. Operational Workflow

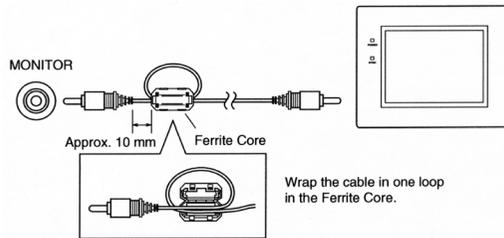


## 2-1. Hardware Setup

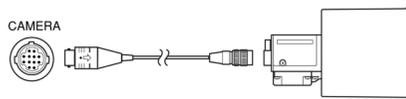
### 2-1-1. Connect a console to the vision sensor.



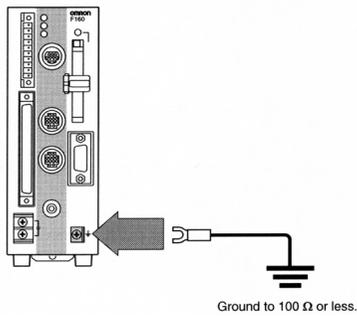
### 2-1-2. Connect a monitor cable to the vision sensor.



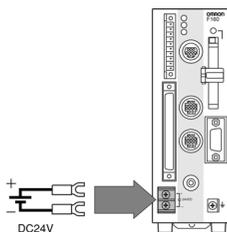
### 2-1-3. Connect a camera cable to the vision sensor and the camera.



### 2-1-4. Connect a ground cable.



### 2-1-5. Connect a power cable.



Provide a power supply that satisfies the following conditions:

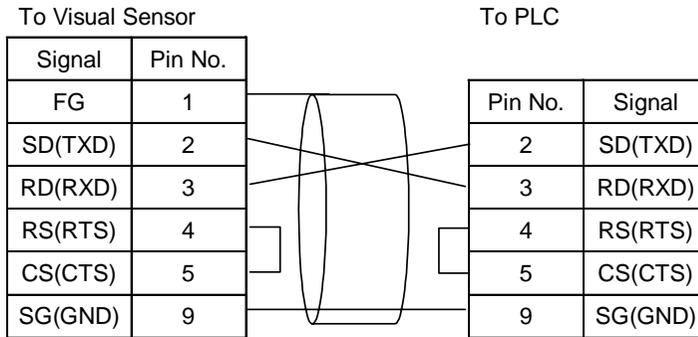
Output current	Source Voltage
1.6A or more	DC24V +10%, -15%

Recommendation: S82K-05024 (Omron)

## 2-2. Wiring the Communication Cable

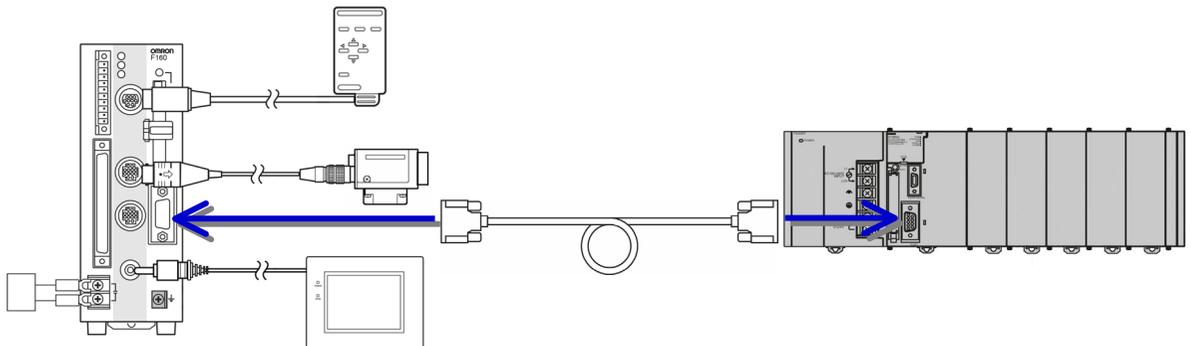
### 2-2-1. Wiring the RS-232C Communication Cable as shown bellow.

Recommended cable:  
XW2Z-200T (2m)  
XW2Z-500T (5m)



\* If you make your own cable, its length must be 15 m or shorter.

### 2-2-2. Connect a cable between CPU unit's communication port of PLC and the vision sensor.



### 2-3. Communication Setup 1

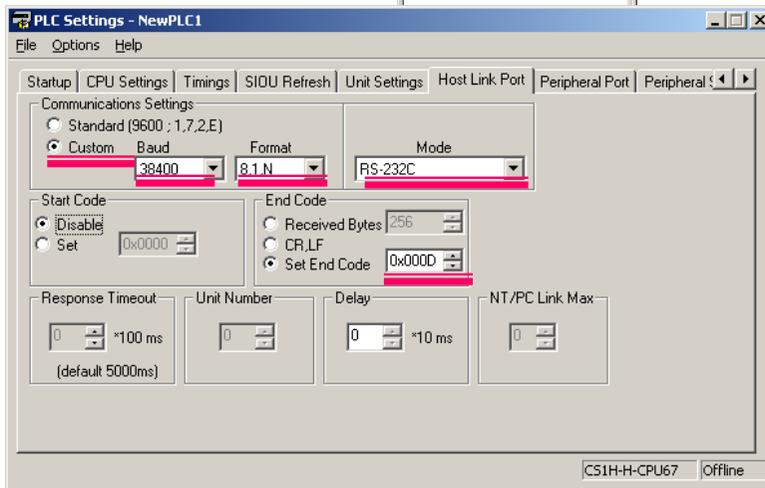
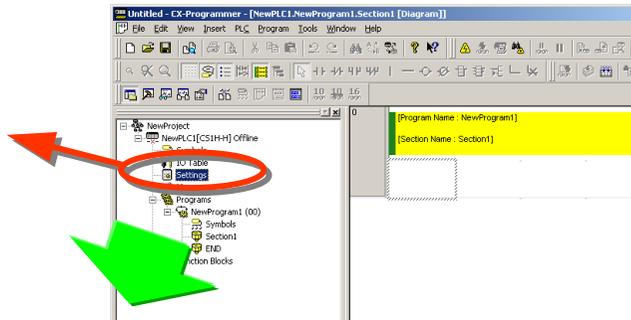
Configure the communication setting as shown below:

Communication Mode	Free Transmission Mode
Communication Speed	38400 bps
Data Bit Length	8 bits
Parity Check	None
Stop Bit	1 bit
Start Code	None
End Code	End code setting: 0x0D (CR)

#### PLC Setting

Activate CX-Programmer, then click PC System Setup icon

PC System Setup screen pops up.



Set items marked by red underlines to values as shown above. Then connect PLC online and transmit the PC system setup.

#### Vision Sensor Setting

None. Use with the default factory setup.

## 2-4. Usage Example of FB Component

FB “Change Scene”

FB Name            \_Fxxx201\_ChangeSceneNo

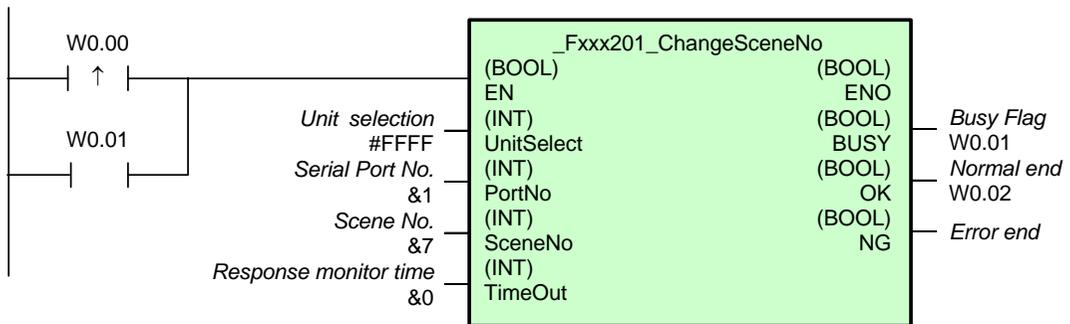
File Name           \_Fxxx201\_ChangeSceneNo10.cxf

Functional Overview            Changes the scene.

### Program Example

When contact W0.00 is ON, scene number change of the vision sensor is started (in the example shown below, scene number is changed to 7). After normal scene change, contact W0.02 is set to ON by 1 cycle.

If an error occurs by any reason, contact W0.03 is set to ON by 1 cycle.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connection Unit and the serial port.  <ul style="list-style-type: none"> <li>■ Connected to CPU Unit Unit selection #FFFF Serial port No. Not accessed. (&amp;1 recommended)</li> <li>■ Connected to Serial Communication Board(SCB) Unit selection #BBBB Serial port No. &amp;1: Port 1 &amp;2: Port 2</li> <li>■ Connected to Serial Communication Unit(SCU) Unit selection SCU Unit No. (&amp;0 to &amp;15) Serial port No. &amp;1: Port 1</li> </ul>
Serial Port No.	PortNo	
Scene No.	SceneNo	Specify the scene number.
Response monitor time	TimeOut	Specify the response monitor time (unit: 100 ms). For example, &100 means 10 seconds. &0: Default (5 seconds)

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally.
Busy Flag	BUSY	0 (OFF): FB not processed or ended in an error.
Normal end	OK	Automatically turns OFF when processing is completed.
Error end	NG	Turns ON for one cycle when processing ends normally.

FB “Get Scene Number”

FB Name                \_Fxxx200\_GetSceneNo

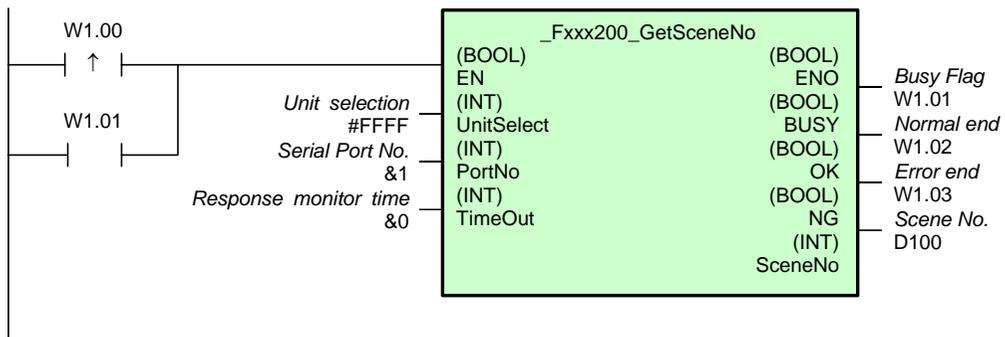
File Name             \_Fxxx200\_GetSceneNo10.cxf

Functional Overview    Reads the scene number.

**Program Example**

When contact W0.00 is ON, scene acquisition of the vision sensor is started. After normal scene number acquisition, contact W1.02 is set to ON by 1 cycle and the scene number is outputted to D100.

If an error occurs by any reason, contact W1.03 is set to ON by 1 cycle.



### Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connection Unit and the serial port. ■ Connected to CPU Unit Unit selection #FFFF Serial port No. Not accessed. (&1 recommended) ■ Connected to Serial Communication Board(SCB) Unit selection #BBBB Serial port No. &1: Port 1 &2: Port 2 ■ Connected to Serial Communication Unit(SCU) Unit selection SCU Unit No. (&0 to &15) Serial port No. &1: Port 1 &2: Port 2
Serial Port No.	PortNo	
Response monitor time	TimeOut	Specify the response monitor time (unit: 100 ms). For example, &100 means 10 seconds. &0: Default (5 seconds)

[OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.
Scene No.	SceneNo	

# 2-10 2D Code Reader

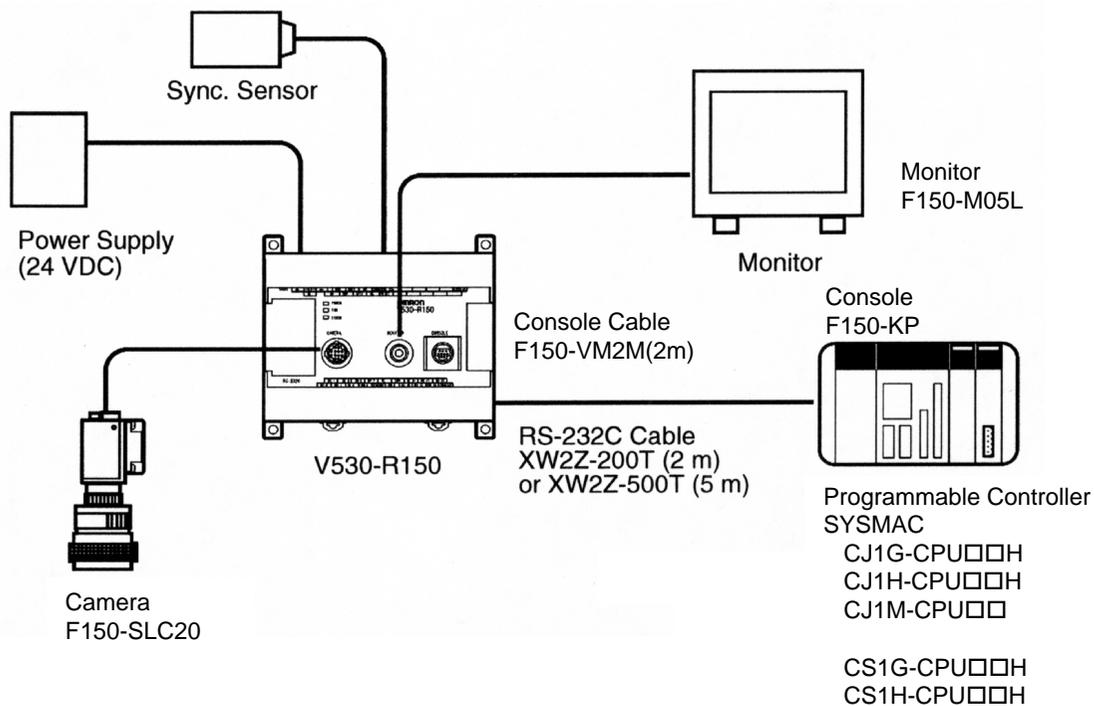
---

V530-R2000/-R160/-R150V3

---

Shown below is an example of using CS/CJ series CPU unit to allow code reader to read QR Code.

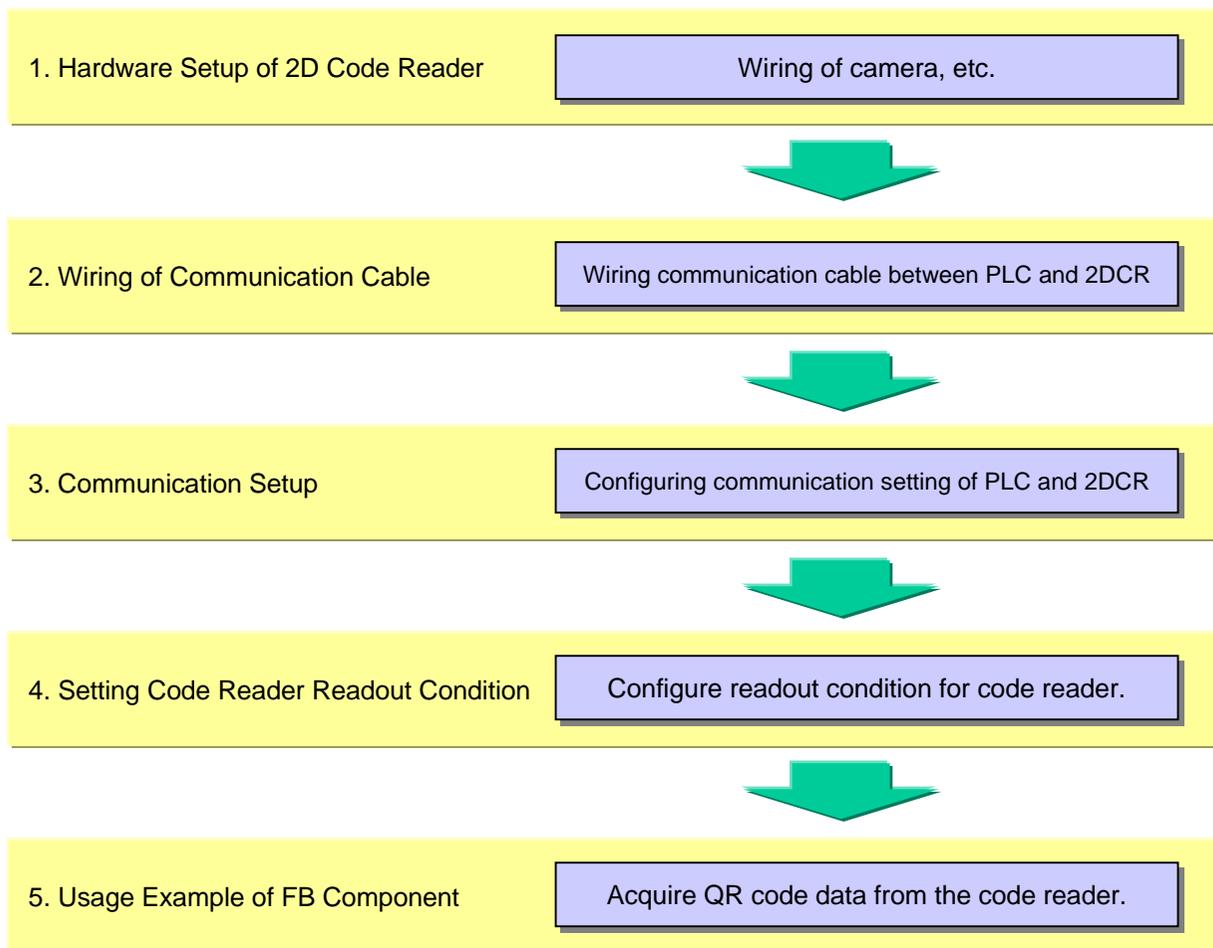
## 1. Hardware Configuration



[Notice]

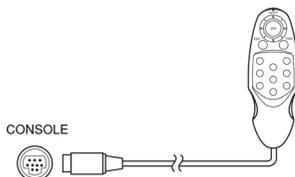
This drawing shows connection to CPU unit's built-in port.  
Connection is available for serial communication unit/board.

## 2. Operational Workflow

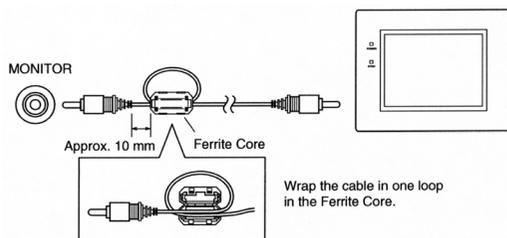


## 2-1. Hardware Setup

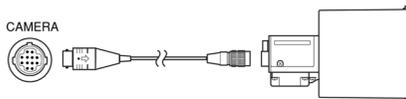
### 2-1-1. Connect a console to the code reader.



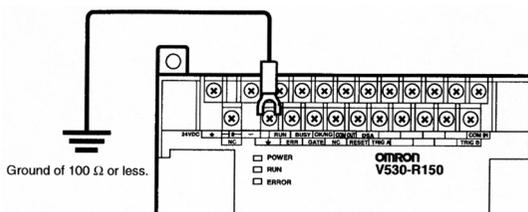
### 2-1-2. Connect a monitor cable to 2DCR.



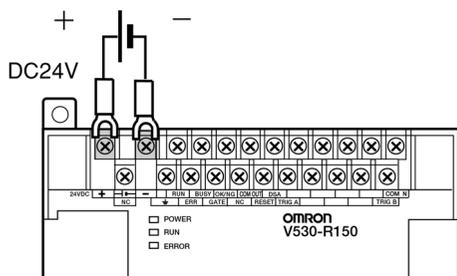
### 2-1-3. Connect a camera cable to 2DCR and a camera.



### 2-1-4. Connect a ground cable.



### 2-1-5. Connect a power cable.



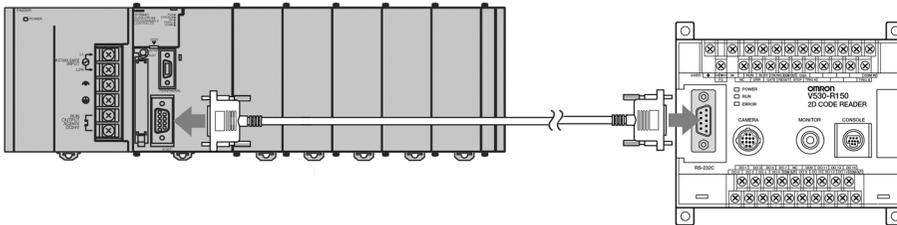
Provide a power supply that satisfies the following conditions:

Output Current	Source Voltage
1.6A or more	DC24V +10%, -15%

Recommendation: S82K-05024 (Omron)

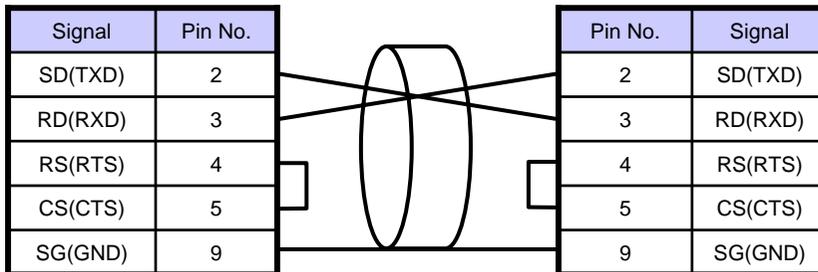
## 2-2. Wiring the Communication Cable

Connect the two-dimensional code reader to the built-in 232C port of the CPU unit.



### Recommended Cable

- XW2Z-00T (2 m)
- XW2Z-500T (5 m)



\* If you make your own cable, its length must be 15 m or shorter.

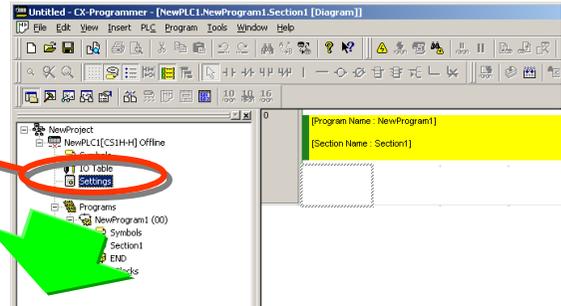
### 2-3. Communication Setup

Configure the communication setting as shown below:

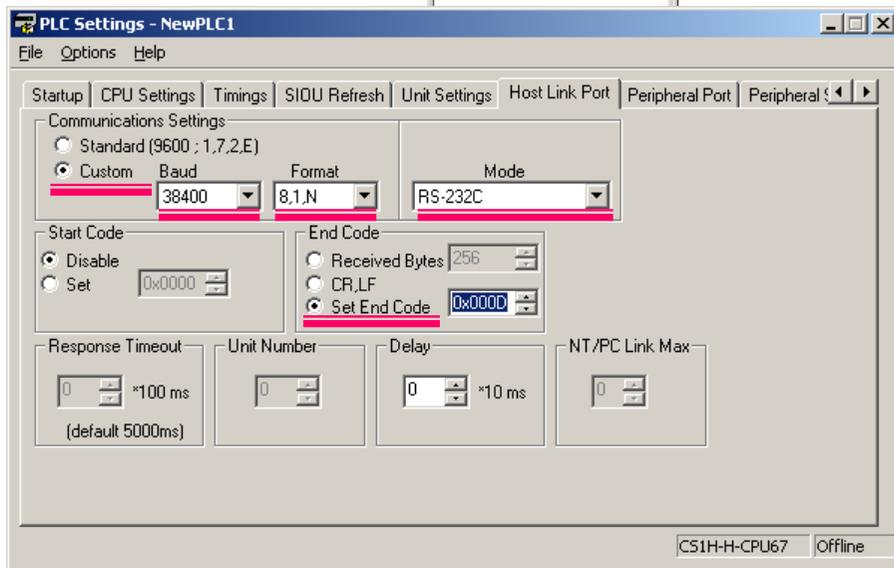
Communication Mode	Free Transmission Mode
Communication Rate	38400 bps
Data Bit Length	8 bits
Parity Check	None
Stop Bit	1 bit
Start Code	None
End Code	#000D (CR)

#### PLC Setting

Activate CX-Programmer, then click PC System Setup icon

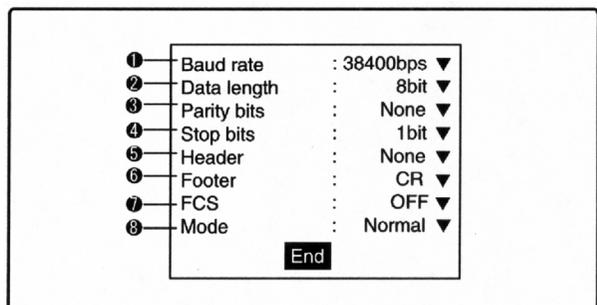


PC System Setup screen pops up.



#### 2D Code Reader Setting

None.  
Use with the default factory setup.



## 2-4. Setting Readout Conditions for the Code Reader

1. Turn the monitor and the code reader ON.  
A screen is displayed as shown bellow.

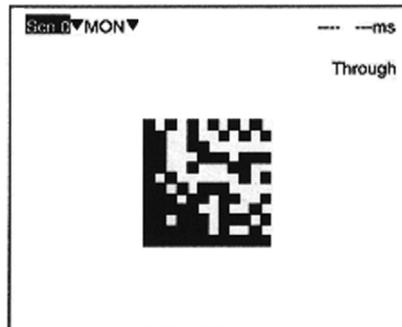
A startup message appears followed by a processing message. After a short pause, the initial screen appears. The following screen appears the first time power is turned ON.



2. Use the camera to take a picture.

Be sure that the 2-dimensional code is correctly displayed within the field of vision on the monitor.

The through image is displayed by pressing the SHIFT + Down Keys. If not displayed correctly, adjust the focus, camera setting distance, and lighting.

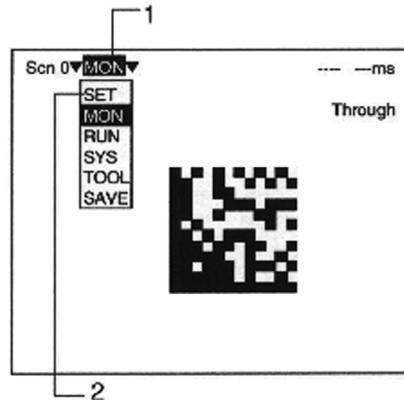


3. Read and note the QR Code.

(Use the shutter speed of 1/100 and symbol color of black.)

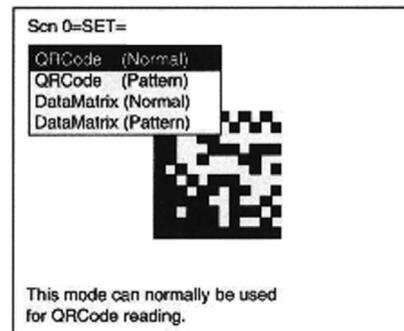
1. Move the cursor to **MON** (monitor) using the Right Key and press the ENT Key.

The mode selections are displayed.

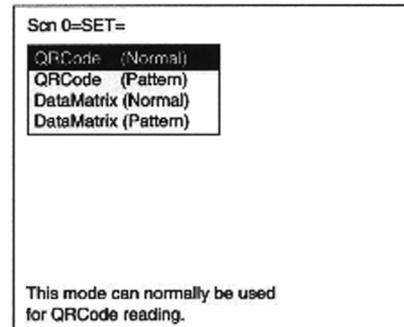


2. Move to **SET** using the Up Key and press the ENT Key.

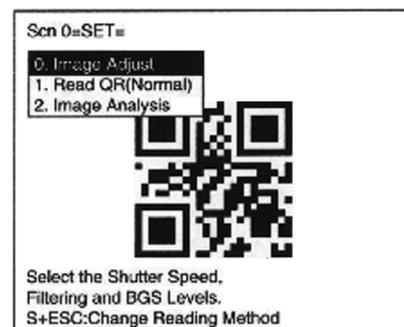
The following screen is displayed.  
The screen is in SET mode.



3. Select **Read QR (Normal)**.



4. Select **0. Image Adjust (DM)**.

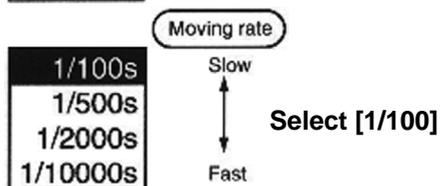


**5. Select *Shutter Speed*.**

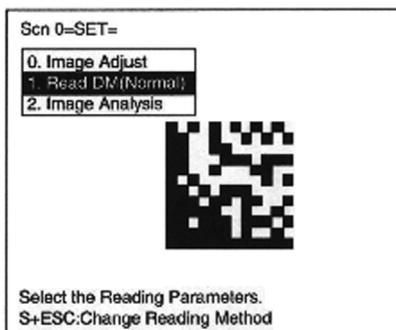


**6. Select the shutter speed according to the movement of the reading object.**

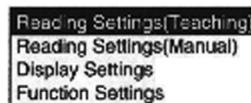
Press the ENT Key to set the shutter speed. The display will return to the window shown in step 5.  
Press the ESC Key once to go back to the window shown in step 4.



**7. Select *1. Read QR (Normal)*.**



**8. Select *Reading Settings QR (Teaching)*.**



**9. Select the required symbol color.**

Use the Up/Down Keys to select the required setting, and validate this setting by pressing the ENT Key. The display will return to the window shown in step 8.



**Select [Black]**

Black: Black symbol printed on white base.

White: White symbol printed on black base.



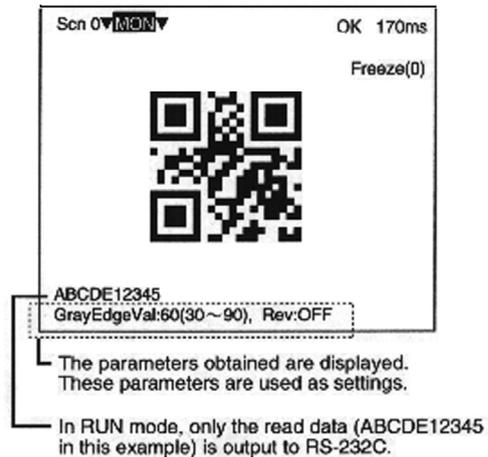
**10. Press the ESC Key to return to the window shown in step 7.**

**11. Press the ESC Key once more to return to MON (monitor) mode.**



12. Press the TRIG Key on the Console to perform one reading.

Parameters will be registered based on the results of the first reading.



If the reading is performed correctly, the teaching function will automatically turn OFF. To redo the settings, go to SET mode and repeat the procedure from step 7.

It is possible to view and, if necessary, change the parameter setting in **Reading Settings (Manual)**.

Refer to I531-E1 for details.

If reading is not performed correctly (NG), the teaching function will stay ON. To turn the teaching function OFF, select **Reading Settings (Manual)** from the screen shown in step 8, and press the ENT Key. The teaching function will be turned OFF by entering the **Reading Settings (Manual)** window.

13. Setup is completed.

## 2-5. Usage Example of FB Component

FB “Execute Read”

FB Name                    \_2DCR401\_ExecRead

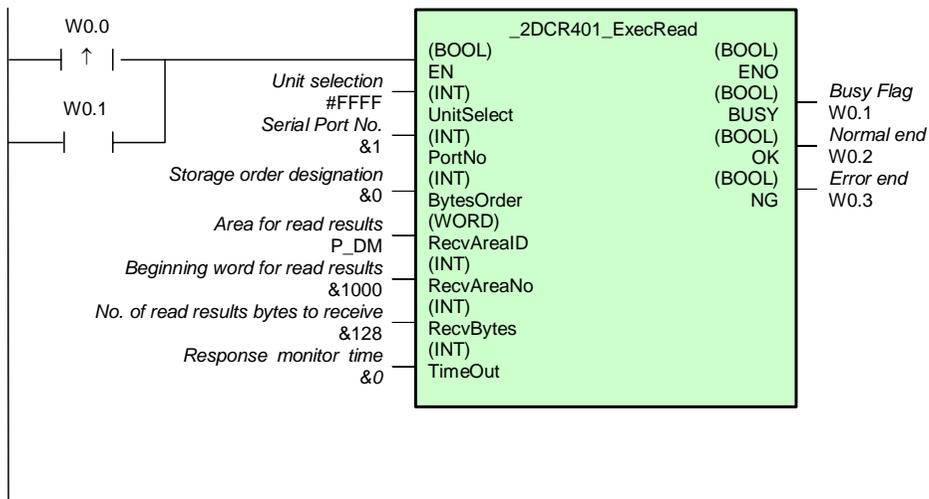
File Name                 \_2DCR401\_ExecRead.cxf

Functional Overview       Executes one read for a 2D Code Reader.

### Program Example

When contact W0.00 is ON, code reader starts reading. After normal readout, contact W0.02 is set to ON by 1 cycle and the result is outputted to D1000.

If an error occurs by any reason, contact W0.03 is set to ON by 1 cycle.



## Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description																														
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.																														
Unit selection	UnitSelect	Specify the Unit selection and the serial port.																														
Serial Port No.	PortNo																															
		<ul style="list-style-type: none"> <li>■ Connected to CPU Unit Unit selection #FFFF Serial port No. Not accessed. (&amp;1 recommended)</li> <li>■ Connected to Serial Communication Board(SCB) Unit selection #BBBB Serial port No. &amp;1: Port 1 &amp;2: Port 2</li> <li>■ Connected to Serial Communication Unit(SCU) Unit selection SCU Unit No. (&amp;0 to &amp;15) Serial port No. &amp;1: Port 1 &amp;2: Port 2</li> </ul>																														
Storage order designation	ByteOrder	<p>Storage order for read data &amp;0: Upper byte to lower byte &amp;1: Lower byte to upper byte</p> <p>0: Upper to lower</p> <table style="margin-left: 40px;"> <tr> <td>Address</td> <td>Read data</td> <td>CPU Unit memory</td> </tr> <tr> <td>0010</td> <td>01</td> <td>01 02</td> </tr> <tr> <td>0011</td> <td>02</td> <td>03 04</td> </tr> <tr> <td>0012</td> <td>03</td> <td></td> </tr> <tr> <td>0013</td> <td>04</td> <td></td> </tr> </table> <p style="margin-left: 40px;">←→</p> <p>1: Lower to upper</p> <table style="margin-left: 40px;"> <tr> <td>Address</td> <td>Read data</td> <td>CPU Unit memory</td> </tr> <tr> <td>0010</td> <td>01</td> <td>02 01</td> </tr> <tr> <td>0011</td> <td>02</td> <td>04 03</td> </tr> <tr> <td>0012</td> <td>03</td> <td></td> </tr> <tr> <td>0013</td> <td>04</td> <td></td> </tr> </table> <p style="margin-left: 40px;">←→</p>	Address	Read data	CPU Unit memory	0010	01	01 02	0011	02	03 04	0012	03		0013	04		Address	Read data	CPU Unit memory	0010	01	02 01	0011	02	04 03	0012	03		0013	04	
Address	Read data	CPU Unit memory																														
0010	01	01 02																														
0011	02	03 04																														
0012	03																															
0013	04																															
Address	Read data	CPU Unit memory																														
0010	01	02 01																														
0011	02	04 03																														
0012	03																															
0013	04																															
Area for read results	RecvAreaID	P_CIO (#00B0): CIO Area P_WR (#00B1): Work Area P_HR (#00B2): Holding Area P_DM (#0082): DM Area P_EM0 (#0050) to P EMC (#005C): EM Area bank 0 to C																														
Beginning word for read results	RecvAreaNo																															
No. of read results bytes to receive	RecvBytes																															
Response monitor time	TimeOut	Specify the response monitor time (unit: 100 ms). &0: Default (99 seconds)																														

## [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.

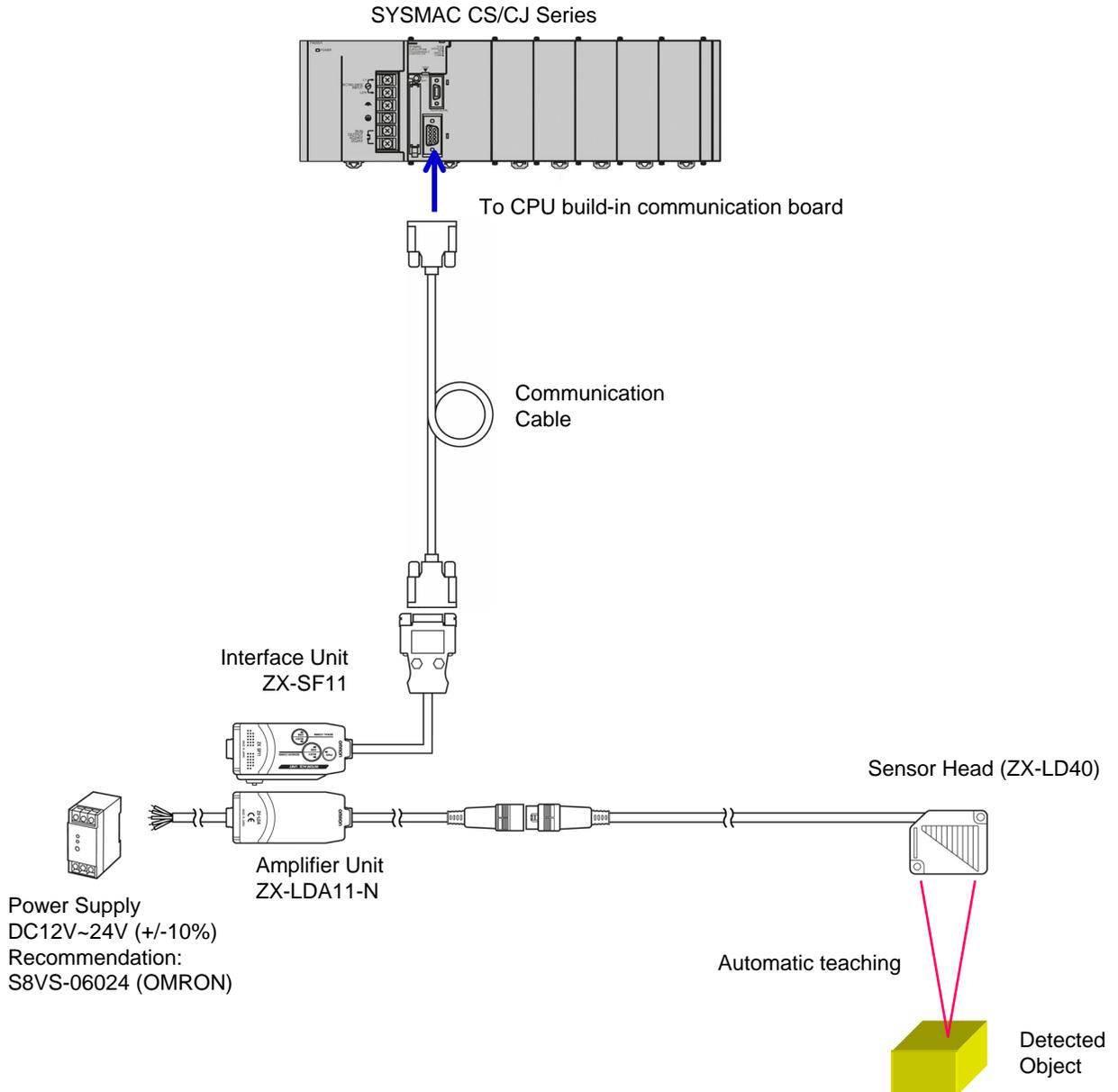
## 2-11 Smart Sensor

---

ZX-SF11, ZX-LD40, ZX-LDA11-N

Shown below is an example of performing automatic Smart Sensor teaching by the command from CJ1. Then, CJ1 reads out HIGH threshold value and LOW threshold value that Smart Sensor generated by the automatic teaching.

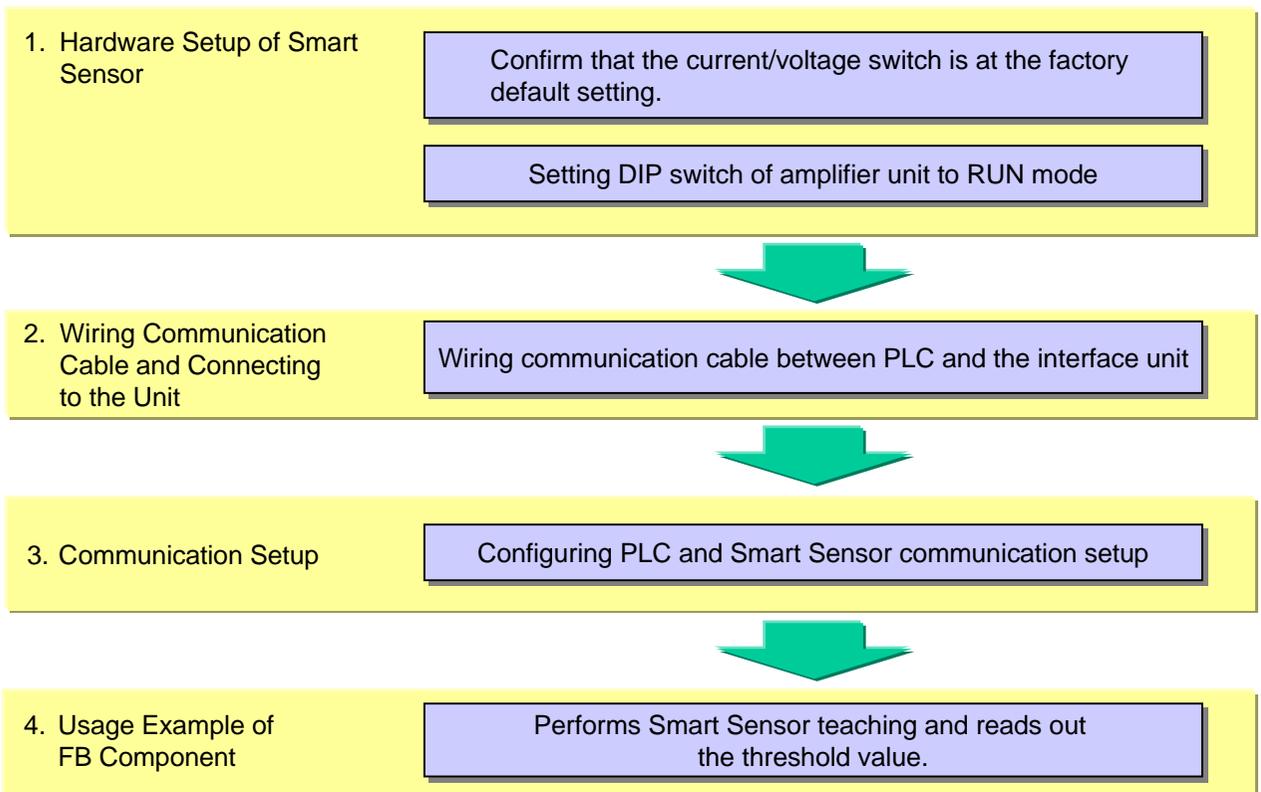
## 1. Hardware Configuration



[Note]

This drawing shows connection to CPU unit's built-in port.  
Connection is available for serial communication unit/board.

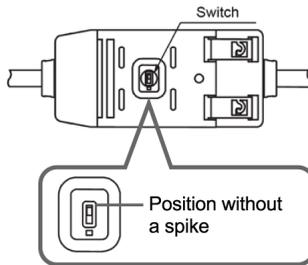
## 2. Operational Workflow



## 2-1. Hardware Setup

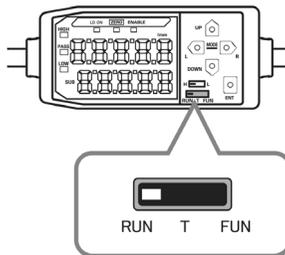
### 2-1-1. Interface Unit Setting

Check whether the current/voltage changing switch on the bottom of the interface unit is under initial state (set to a position without a spike).



### 2-1-2. Amplifier Unit Setting

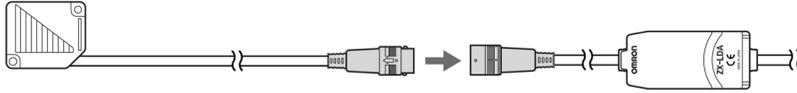
Change the amplifier unit to RUN mode.



## 2-2. Wiring the Communication Cable and Connecting to the Unit

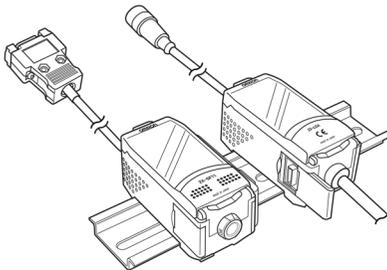
### 2-2-1. Wiring between Amplifier Unit and Sensor

Insert the sensor connector into amplifier unit connector until it is locked.



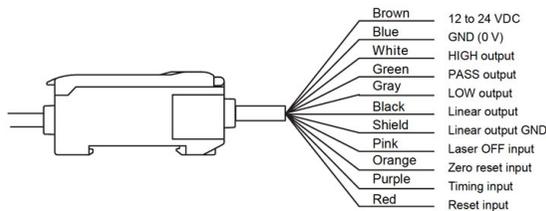
### 2-2-2. Connecting of the Amplifier to Interface Unit

Open the connection cover of the amplifier unit and insert interface unit into amplifier unit connector.



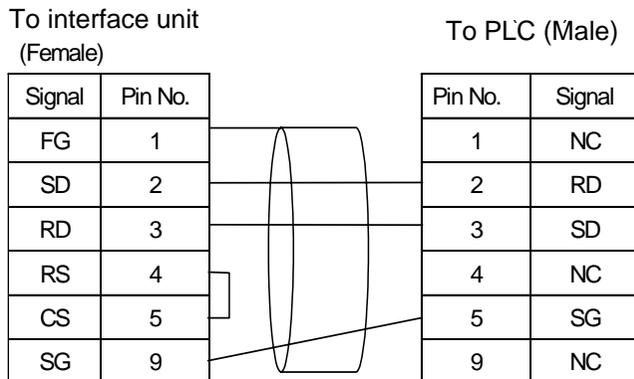
### 2-2-3. Connecting Power Cable to Smart Sensor

Connect DC12V~24V(+/-10%) power source to brown (1) and 0V to blue (2).



### 2-2-4. Wiring Communication Cable

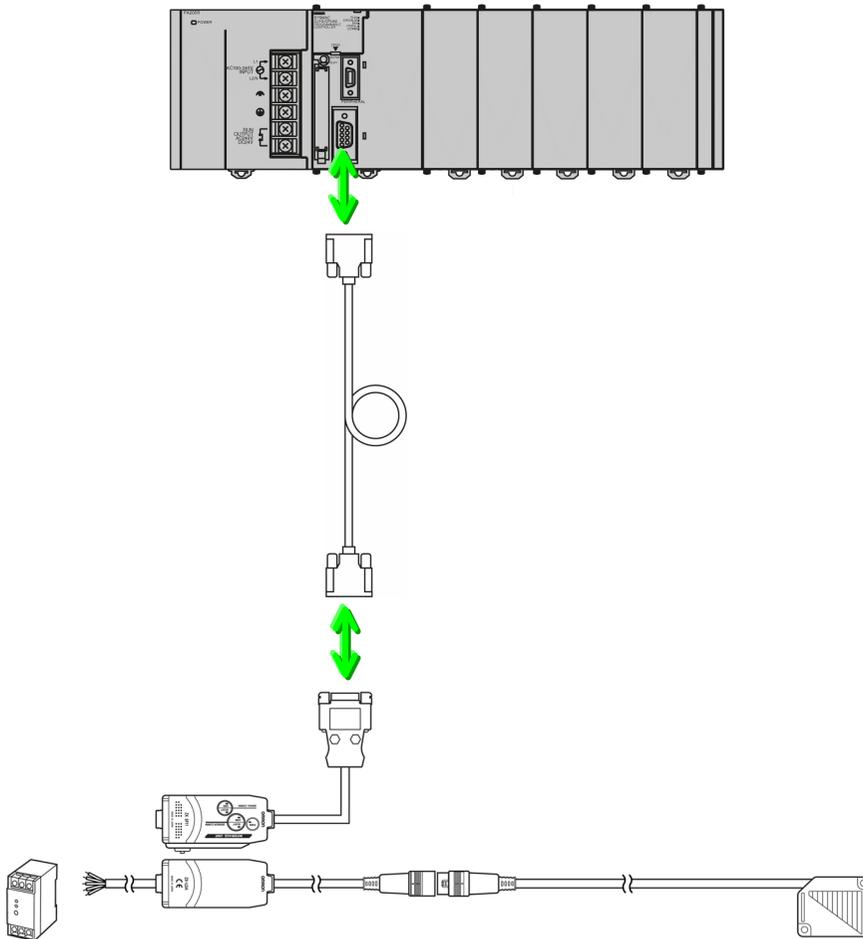
Wire the communication cable as shown bellow.



\* Cable length must be 15 meter or longer.

### 2-2-5. Communication Cable Connection

Connect the interface unit, communication cable, and the built-in RS232C port of the CPU unit.



### 2-3. Communication Setup

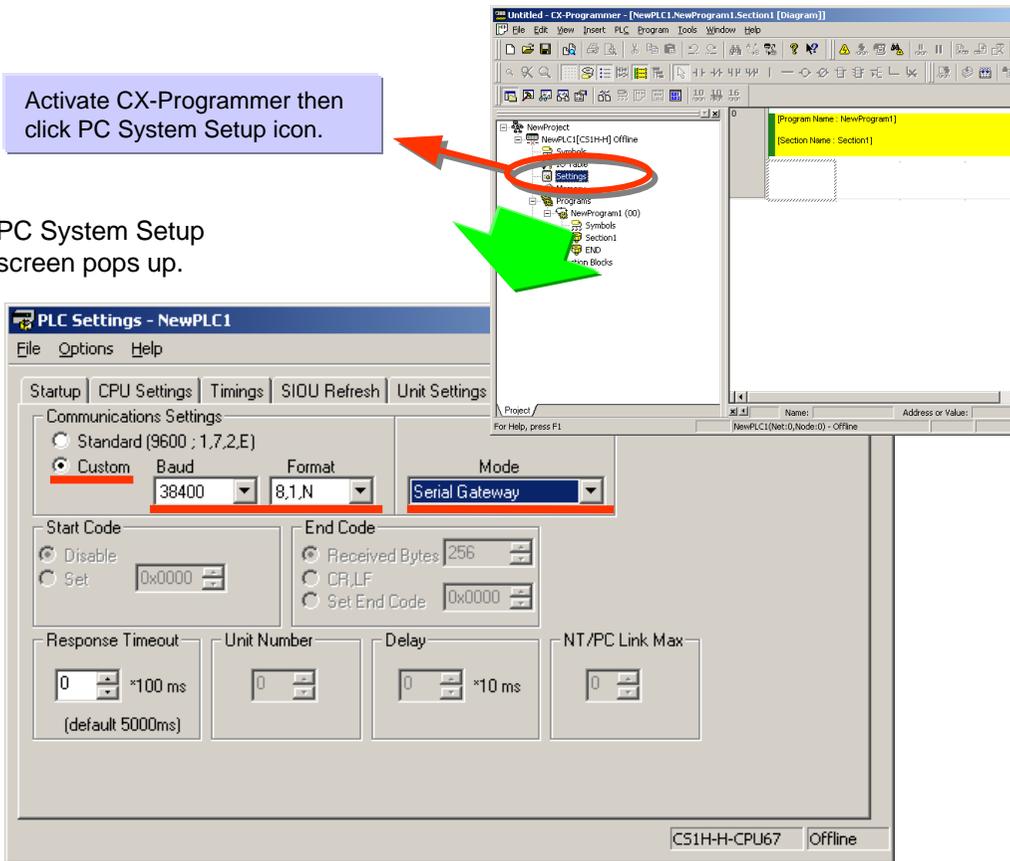
Configure the communication setting as shown below:

Communication Mode	Serial gateway mode
Communication Speed	38400 bps
Data Bit Length	8 bits
Parity Check	None
Stop Bit	1 bit

#### PLC Setting

Activate CX-Programmer then click PC System Setup icon.

PC System Setup screen pops up.



Set items marked by red underlines to values as shown above. Then connect PLC online and transmit the PC system setup.

#### Smart Sensor Setting

None. Use with the default factory setup.

## 2-4. Usage Example of FB Component

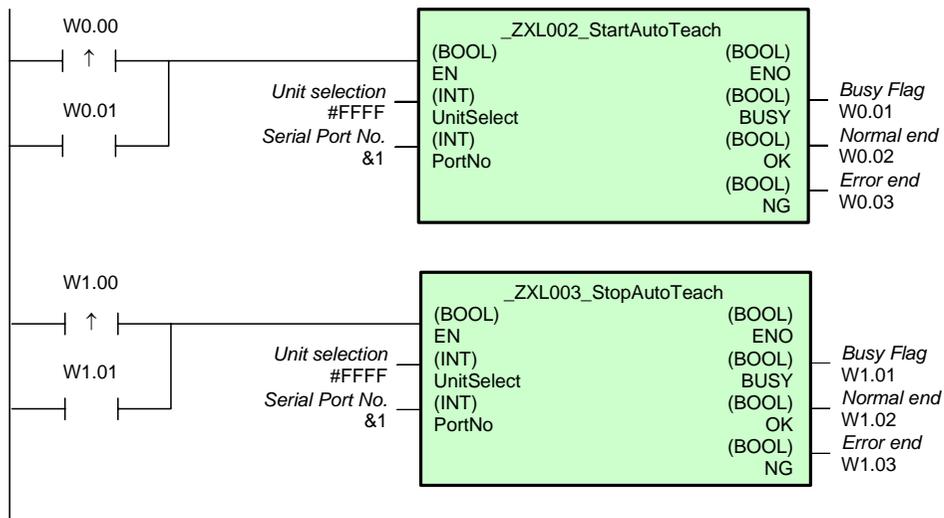
When contact W0.00 is ON, automatic teaching of Smart Sensor is started. When W1.00 is ON, automatic teaching is terminated. After normal automatic teaching, contact W1.02 is set to ON by 1 cycle and these HIGH and LOW threshold values are stored in D0, D1 and D2, D3.

FB “Start Autoteaching”

FB Name        \_ZXL002\_StartAutoTeach  
File Name       \_ZXL002\_StartAutoTeach10.cxf  
Functional Overview     Starts automatic teaching.

FB “Stop Autoteaching”

FB Name        \_ZXL003\_StopAutoTeach  
File Name       \_ZXL003\_StopAutoTeach10.cxf  
Functional Overview     Ends automatic teaching.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connection Unit and the serial port. Connected to CPU Unit Model selection &0: CPU Unit No. Not accessed. (&0 recommended) Serial port No. Not accessed. (&2 recommended) Connected to SCB Model selection &1: SCB Unit No. Not accessed. (&0 recommended) Serial port No. &1: Port 1 &2: Port 2 Connected to SCU Model selection &2: SCU Unit No. &0 to &15 Serial port No. &1: Port 1 &2: Port 2
Serial Port No.	PortNo	

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.

FB “Read High Threshold”

FB Name `_ZXL207_ReadHighThreshold`

File Name `_ZXL207_ReadHighThreshold10.cxf`

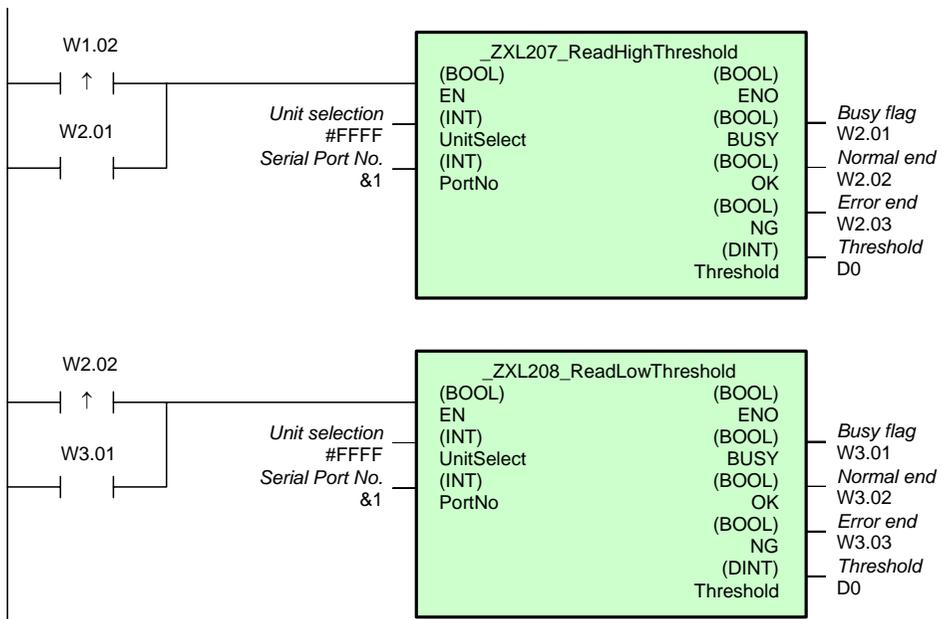
Functional Overview Reads the high threshold value from the Smart Sensor.

FB “Read LOW Threshold”

FB Name `_ZXL208_ReadLowThreshold`

File Name `_ZXL208_ReadLowThreshold10.cxf`

Functional Overview Reads the low threshold value from the Smart Sensor.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connection Unit and the serial port.  Connected to CPU Unit Model selection   &0: CPU Unit No.           Not accessed. (&0 recommended) Serial port No.   Not accessed. (&2 recommended) Connected to SCB Model selection   &1: SCB Unit No.           Not accessed. (&0 recommended) Serial port No.   &1: Port 1 &2: Port 2  Connected to SCU Model selection   &2: SCU Unit No.           &0 to &15 Serial port No.   &1: Port 1 &2: Port 2
Serial Port No.	PortNo	

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.

# 2-12 Temperature Controller

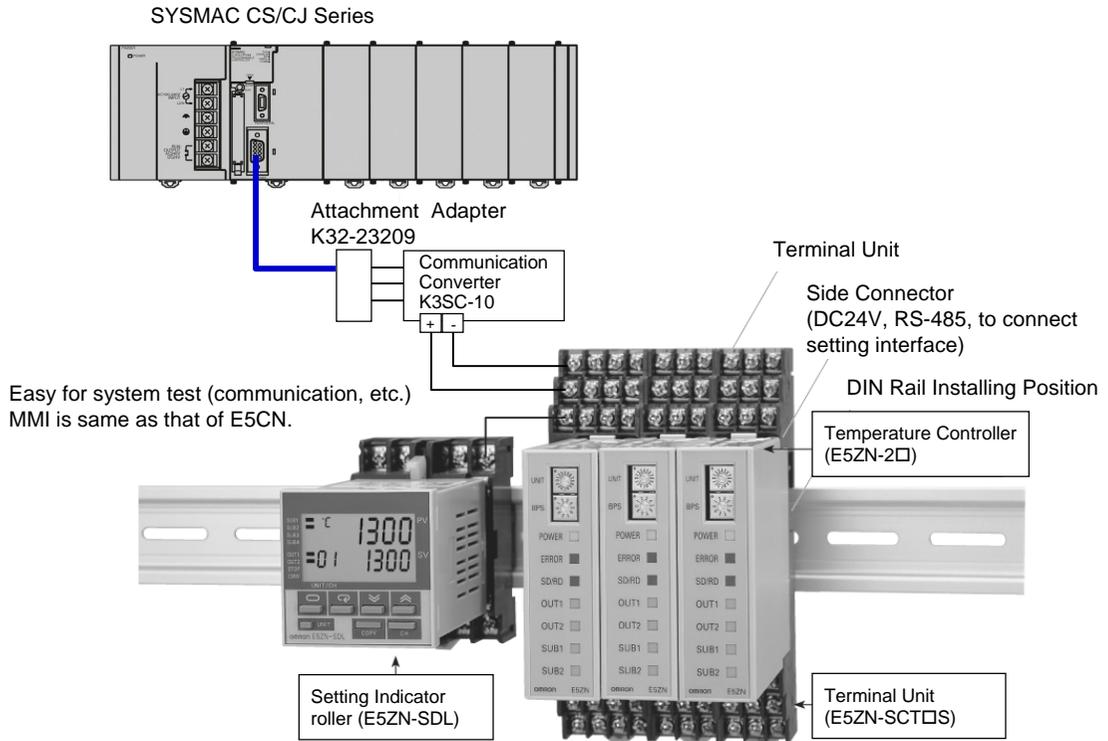
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E5ZN-2□

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Shown below is an example of using CS/CJ series CPU unit to read current values of temperature controller E5ZN's unit number 1 and 3.

### 1. Hardware Configuration



[Note]

This drawing shows connection to CPU unit's built-in port.  
Connection is available for serial communication unit/board.

## 2. Operational Workflow

### 1. Hardware Setup of Temperature Controller E5ZN

Setting Unit No. using rotary switch on front panel

Setting communication rate using rotary switch on front panel

Connecting terminal unit Temperature Controller to Terminal Unit

Wiring Setting Indicator and Power Cable

Setting and Wiring DIP switches of Communication Converter

### 2. Wiring Communication Cable and Connecting to Unit

Wiring Communication Cable and connecting to build-in communication port of CPU

### 3. Communication Setup

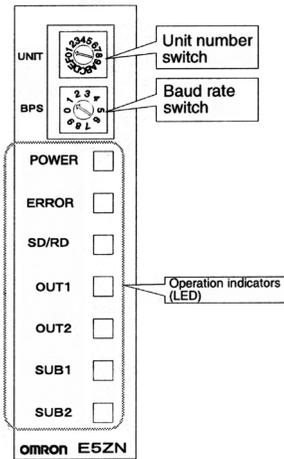
Configuring PLC and E5ZN communication setup

### 4. Usage Example of FB Component

Reads out current value from the specified channel of the temperature controller

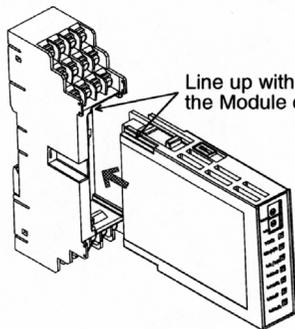
## 2-1. Hardware Setup

### 2-1-1. Setting Unit No/ and Communication Rate



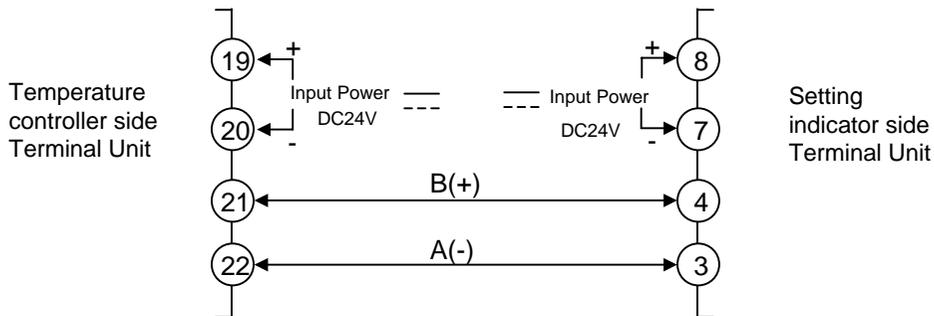
Set the temperature controller's unit number setup switch to "1" and communication speed setup switch to "1" (9600 bps) using flat-bladed screw driver.

### 2-1-2. Configuration of Temperature Controller and Terminal Unit



Fit the temperature controller to the terminal unit's guide and fix tightly.

### 2-1-3. Wiring Setting Indicator and Power Cable

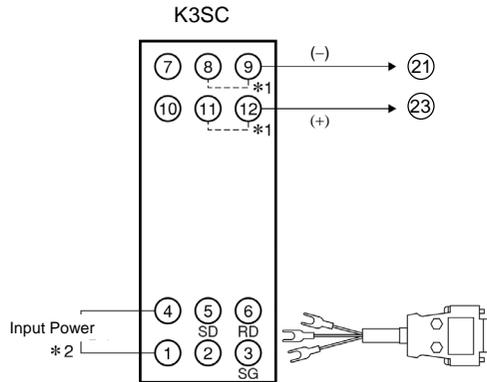


Connect the power cable to terminals 19-20 on the temperature controller side, And to terminals 7-8 on the setting indicator side.

Connect terminal 4 on the setting indicator side to terminal 21 on the temperature controller side. Connect terminal 3 on the setting indicator side to terminal 22 on the temperature controller side.

#### 2-1-4. Setting Communication Converter

Set DIP SW9 of communication converter (K3SC) to OFF. Connect communication converter's terminal number 9 and 12 to terminal unit's terminal number 23 and 24 respectively. Connect the power cable to the communication converter's terminals 1 and 4. Connect SG (gray), SD (orange), and RD (white) of attachment adapter (K32-23209) to the communication converter's terminals 3, 5, and 6 respectively.

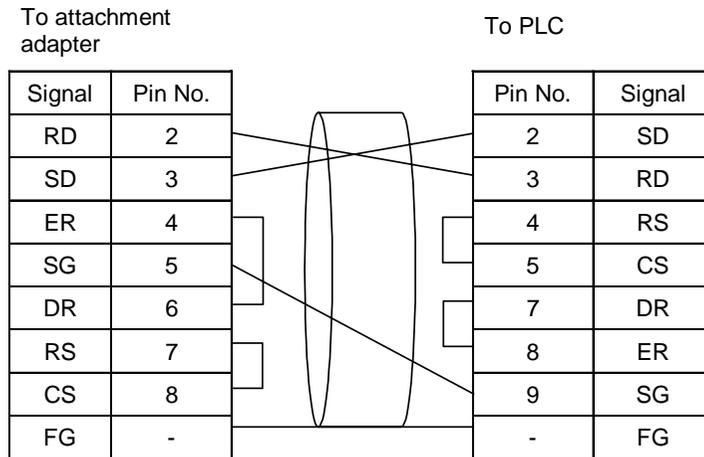


[Note]

- 1: If the communication condition is set to RS-485 (DIP SW9 is OFF), short-circuit (8)-(9) and (11)-(12) internally.  
Available input voltage is AC100 to 240V or AC/DC24V (no polarity).

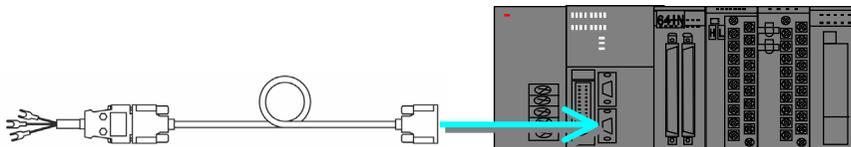
## 2-2. Wiring the Communication Cable and Connecting to the Unit

### 2-2-1. Wiring Communication Cable



- Connect SD signal of attachment adapter and SD signal of PLC side.
- Cable length must be 15 m or less.

### 2-2-2. Connect the attachment adapter to the built-in 232C port of the CPU unit.



## 2-3. Communication Setup

Configure the communication setting as shown below:

Communication Mode	Serial gateway mode
Communication Speed	9600 bps
Data Bit Length	7 bits
Parity Check	Even parity
Stop Bit	2 bits

### PLC Setting

Activate CX-Programmer then click PC System Setup icon.

PC System Setup screen pops up.

The screenshot shows the 'PLC Settings - NewPLC1' dialog box with the 'Unit Settings' tab selected. Under 'Communications Settings', the 'Standard (9600; 7.2.E)' radio button is selected. The 'Baud' is set to 9600, 'Format' to 7.2.E, and 'Mode' to Serial Gateway. The 'Start Code' is set to 'Disable' and 'End Code' is set to 'Received Bytes' (256). The 'Response Timeout' is 0 \*100 ms (default 5000ms), 'Unit Number' is 0, 'Delay' is 0 \*10 ms, and 'NT/PC Link Max' is 0. The status bar at the bottom indicates 'CS1H-H-CPU67' and 'Offline'.

Set items marked by red underlines to values as shown above.  
Then connect PLC online and transmit the PC system setup.

### Temperature Controller Setting

None. Use with the default factory setup.

## 2-4. Usage Example of FB Component

FB “Read Process Value”

FB Name                    \_E5xx202\_ReadPV

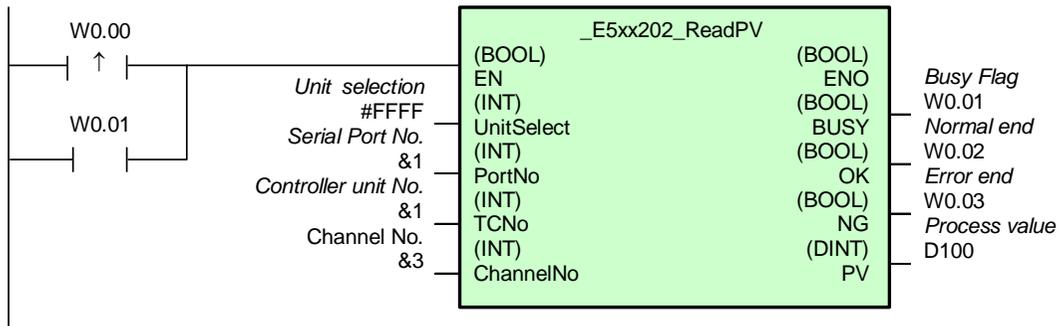
File Name                 \_E5xx202\_ReadPV10.cxf

Functional Overview      Reads the process value of the specified channel of a Controller.

### Program Example

When contact W0.00 is ON, readout of current values start from three channels of temperature controller’s unit number 1. After normal readout termination, contact W0.02 is set to ON by 1 cycle and the current values are outputted to D100.

If an error occurs by any reason, contact W0.03 is set to ON by 1 cycle.



## Variables Table

### [INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started. 0 (OFF): FB not started.
Unit selection	UnitSelect	Specify the connection Unit and the serial port.  <ul style="list-style-type: none"> <li>■ Connected to CPU Unit Unit selection #FFFF Serial port No. Not accessed. (&amp;1 recommended)</li> <li>■ Connected to Serial Communication Board(SCB) Unit selection #BBBB Serial port No. &amp;1: Port 1 &amp;2: Port 2</li> <li>■ Connected to Serial Communication Unit(SCU) Unit selection SCU Unit No. (&amp;0 to &amp;15) Serial port No. &amp;1: Port 1 &amp;2: Port 2</li> </ul>
Serial Port No.	PortNo	
Controller unit No.	TCNo	Specify the unit number of the Controller. E5AR/E5ER &0 to &99 E5ZN &0 to &15 (#0 to #F) E5CN/E5CN-U &0 to &99
Channel No.	ChannelNo	E5AR/E5ER Specify the channel number. &1: Channel 1 Etc. &4: Channel 4 E5ZN Specify the channel number. &1: Channel 1 &2: Channel 2 E5CN/E5CN-U Always &1.

### [OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.
Busy Flag	BUSY	Automatically turns OFF when processing is completed.
Normal end	OK	Turns ON for one cycle when processing ends normally.
Error end	NG	Turns ON for one cycle when processing ends in an error.
Process value	PV	The unit depends on the input type.

**[INTERNAL] (Internal Variables)**

Internal variables are not outputted from FB.

If FB's NG flag turns ON, you will find the error details by monitoring the following internal variables.

Name	Variable Name	Description
Error Code	ErrorCode	Outputs result information of the command to the temperature controller. See below for details.

**Error Code Description**

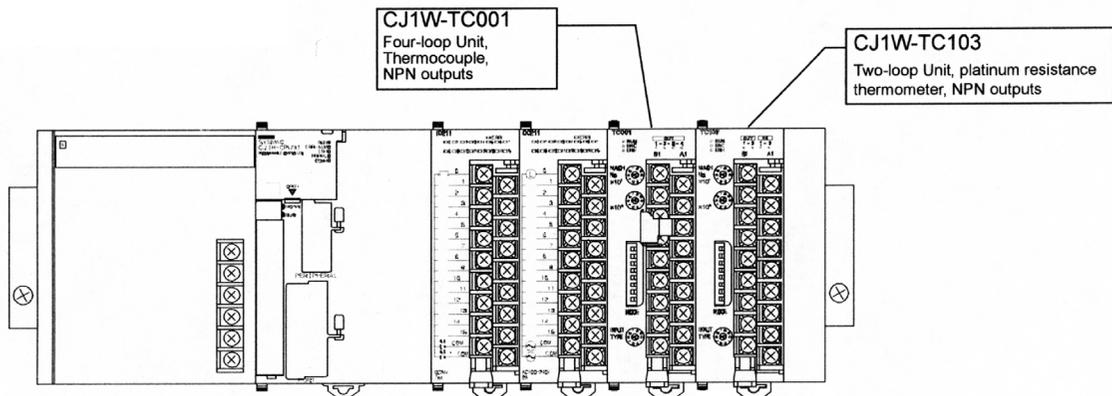
Code	Description	Details
0000	Normal Termination	
2203	Operation Error	Unit error, unit change, display unit error, internal non-volatile memory error

## 2-13 Temperature Control Unit

CJ1W-TC001/101/003/103/002/102/004/104

Shown below is an example of using CJ1W-TC001 Temperature Control Unit for CJ series, and Supposing Unit No. is 0 and use K-type thermocouple (-200 to 1,300°).

## 1. Hardware Configuration



### [Notice]

1. Shown above is a usage example of 4-loop thermocouple /NPN output type (type code CJ1W-TC001) and 2-loop platinum thermo-resistance with heater disconnection warning//NPN output type (type code CJ1W-TC103). In this example, CJ1W-TC103 is not used and need not to be connected.
2. To stop temperature control, set the loop's STOP bit to 1 (ON). If the control is forced to terminate only by external switch incorporated in the heater, controllability gets worse for PID control.

## 2. Operational Workflow

### 1. Hardware Setup

Setting unit No. using a rotary switch on the front panel

Setting input type using a rotary switch on the front panel

Setting temperature control function using a rotary switch on the front panel

Wiring the compensating lead wire of heat coupler to the unit

### 2. Creating I/O Table

Turning PC main unit ON

Connecting the CX-Programmer

Creating I/O table

### 3. Setting Initial Setup Data

Setting warning mode/warning hysteresis range

Turning restart flag of temperature control unit ON and read setting value into the unit.

### 4. Setting Operation Control Data

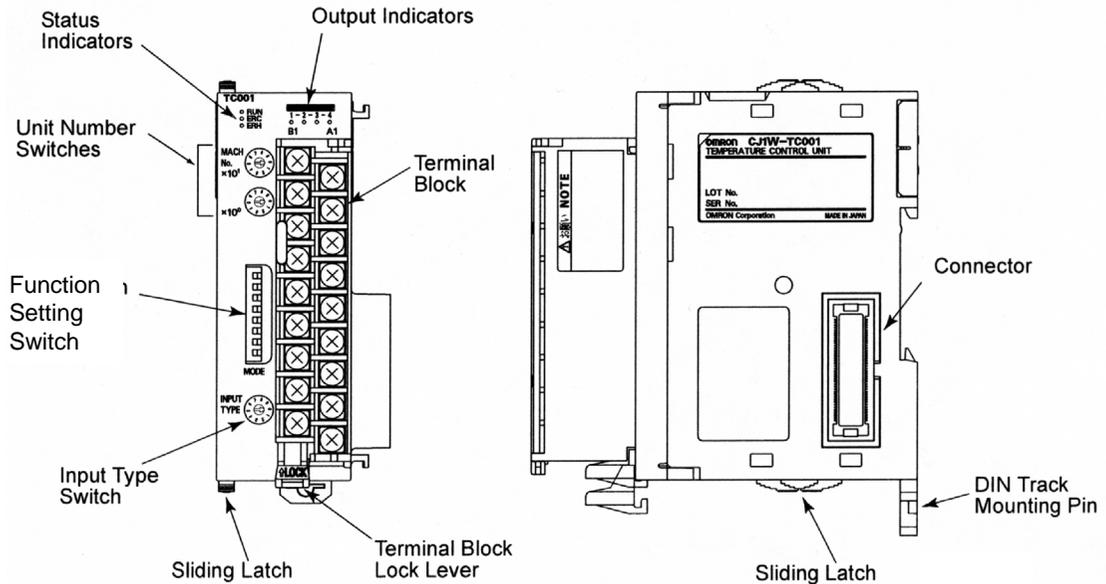
Setting PID constant, operation cycle, alarm mode setting figures, etc in DM parameter area.

### 5. Usage Example of FB Component

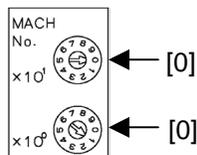
Sample program that set setting value into the temperature setting unit.

## 2-1. Hardware Setup

### 2-1-1. Name of parts and Hardware Switches

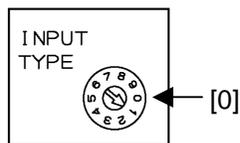


### 2-1-2. Unit Number Setting



Set the Unit No. using flat-blade screw driver, referring the left drawing.

### 2-1-3. Input Type Setting



Set the Input Type using flat-blade screw driver, referring the left drawing.

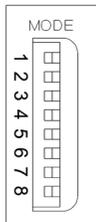
### Input Type and Temperature Range

No.	Input Type	Temperature Ranges
0	K	-200 to 1300°C (-300 to 2300°F)
1	K	0.0 to 500.0°C (0.0 to 900.0°F)
2	J	-100 to 850°C (-100 to 1500°F)
3	J	0.0 to 400.0°C (0.0 to 750.0°F)
4	T	-200.0 to 400.0°C (-300.0 to 700.0°F)
5	L	-100 to 850°C (-100 to 1500°F)
6	L	0.0 to 400.0°C (0.0 to 750.0°F)
7	R	0 to 1700°C (0 to 3000°F)
8	S	0 to 1700°C (0 to 3000°F)
9	B	100 to 1800°C (300 to 3200°F)

### 2-1-4. Temperature Control Function Setting

In this example, only SW8 is set to ON to use factory default setting as it is.

Switch function and factory settings



ON at right

SW No.	Function	ON	OFF	Factory setting
1	Operation when CPU unit is in PROGRAM mode	Continue	Stop	OFF
2	Temperature units (°C/°F)	°F	°C	
3	Data format	16-bit binary	4-digit BCD	
4	Control operation (loops 1 and 3)	Forward (cooling)	Reverse (heating)	
5	Control operation (loops 2 and 4)	Forward (cooling)	Reverse (heating)	
6	Control method	ON/OFF control	PID control	
7	Initialize settings in EEPROM	Initialize	Do not initialize	
8	Transfer settings in EEPROM	Transfer	Do not transfer	ON

### 2-1-5. Wiring of thermocouple

Connect the wiring based on the following terminal assignment.

To use Loop 1, connect the thermocouple to Input 1 and the control target output to Output 1.

CJ1W-TC001 (4 loops, NPN outputs)			
Input 2 –	B1	A1	Input 1 –
Input 2 +	B2	A2	Input 1 +
Cold-junction comp.	B3	A3	N.C.
Cold-junction comp.	B4	A4	N.C.
Input 4 –	B5	A5	Input 3 –
Input 4 +	B6	A6	Input 3 +
Output 2	B7	A7	Output 1
Output 4	B8	A8	Output 3
0 V COM (-)	B9	A9	24 V

\* Do not connect any cable to the N.C terminal

### 2-1-6. Power On

Turn the PC main unit on. Hardware setting described in the chapter 1 must be done when the power is turned off. After power on, SW settings are read (SW settings are read only at power on) .

### 2-1-7. Creating I/O Table

Connect CX-Programmer (Online) when creating I/O table.

### 2-1-8. Configuring Initial Setup Data

Write address constant on the DM as follows.

DM20000=#2300  
DM20002=#0005  
DM20003=#0010

This unit performs initial setup through data exchange with Special I/O unit assignment DM area of the CPU unit. To use temperature warning function, you must configure warning mode and warning hysteresis settings here.

In this example, set DM20000 to 2300 (BCD: set Warning 1 of Loop 1 to upper limit warning mode and Warning 2 to lower limit warning mode), DM20002 to 0005 (BCD: Warning hysteresis of Warning 1 to 5 deg. C), and DM20003 to 0010 (BCD: Warning hysteresis of Warning 2 to 10 deg. C).

#### SYSMAC CJ Series

[DM area for special I/O unit]	
Allocated DM No.	
Unit 0	D20000 - 20099
Unit 1	D20100 - 20199
Unit 2	D20200 - 20299
Unit 3	D20300 - 20399
Unit 4	D20400 - 20499
Unit 5	D20500 - 20599
Unit 6	D20600 - 20699
Unit 7	D20700 - 20799
Unit 8	D20800 - 20899
Unit 9	D20900 - 20999
,	,
Unit n	D20000+n x100 - D20000 +n x 100+99
,	,
Unit 94	D29400 - 29499



Sending to each unit automatically when power is turned ON or special I/O restart flag is turned ON.

#### Temperature Control Unit

CJ1W-TC□□□□

[Initial setting data]	
D(m)	Loop 1 and 2 Alarm mode setting
D(m+1)	Loop 3 and 4 *1 Alarm mode setting
D(m+2)	Loop 1 to 4 *1 Alarm hysteresis setting
,	
D(m+9)	
m=20000+100 x Unit No.	

Details of these setting items are described in the next page:

Details of the initial setting data item

DM address		Loop	Setting	Units
Word	Bits			
D (m+0)	12 to 15	Loop 1	Alarm 1 mode	Set each loop's alarm modes in BCD (0 to 9), as follows: 0: No alarm 1: Upper and lower-limit alarm 2: Upper-limit alarm 3: Lower-limit alarm 4: Upper and lower-limit range alarm 5: Upper and lower-limit alarm with standby sequence 6: Upper-limit alarm with standby sequence 7: Lower-limit alarm with standby sequence 8: Absolute-value upper-limit alarm 9: Absolute-value lower-limit alarm The values written here are written to RAM.
	08 to 11		Alarm 2 mode	
	04 to 07	Loop 2	Alarm 1 mode	
	00 to 03		Alarm 2 mode	
D (m+1)	12 to 15	Loop 3	Alarm 1 mode	
	08 to 11	Loop 4	Alarm 2 mode	
	04 to 07		Alarm 1 mode	
	00 to 03	Alarm 2 mode		
D (m+2)	00 to 15	Loop 1	Alarm 1 hysteresis	Set each alarm's hysteresis in 4-digit BCD or 16-bit binary, according to the Data Format set on the Temperature Control Unit's DIP switch. The values written here are written to RAM.
D (m+3)	00 to 15		Alarm 2 hysteresis	
D (m+4)	00 to 15	Loop 2	Alarm 1 hysteresis	
D (m+5)	00 to 15		Alarm 2 hysteresis	
D (m+6)	00 to 15	Loop 3	Alarm 1 hysteresis	
D (m+7)	00 to 15	Loop 4	Alarm 2 hysteresis	
D (m+8)	00 to 15		Alarm 1 hysteresis	
D (m+9)	00 to 15	Alarm 2 hysteresis		

[Notice]

- DM number is assigned as  $m = 20000 + 100 \times \text{Unit No.}$
- 2-loop type with heater disconnection warning has no function for loops 3 and 4. Consequently, assignment area for loops 3 and 4 is not used and setting is disabled.
- By setting "FF" for Warning 1 and Warning 2 modes, the loop is disabled, control operation is terminated, and ERC LED cannot be turned on by the alarm.  
Example: To set Loop 3 and 4 to be disabled:  
Set "FFFF" on D (m+1).

### 2-1-9. Setup Data Read into Temperature Control Unit

Special auxiliary relay restarts A50200 when turned ON and then OFF again.

[Notice]

Setup data (warning mode, warning hysteresis range) configured in step 4 are assigned to special I/O unit assignment DM area as the initial setup data of the unit for 10 CHs based on the unit number. Thus if you changed the setting value by following the step 4, you have to set special I/O unit restart flag to OFF -> ON -> OFF based on the following table to restart the unit and read the setting value into the unit. In this example unit number 0 is used, thus A50200 must be set to OFF -> ON -> OFF.

#### Special I/O Restart Bit

Relay No.	Function
A50200	Unit No. 0 Restart Bit
A50201	Unit No. 1 Restart Bit
,	,
A50215	Unit No. 15 Restart Bit
A50300	Unit No. 16 Restart Bit
,	,
A50714	Unit No. 94

Restarts the Unit when turned ON and then OFF again.

### 2-1-10. Configuring Control Data for Operation

Write address constant on the DM as follows.

DM20010=#0010  
DM20011=#0020

Configuration of control data for operation (warning, control frequency, proportional band, integral time) are made through assigned data of special I/O unit assignment DM area.

Note that exchange of control data for operation is performed for every scanning at I/O refreshing of the CPU unit in the order of OUT (CPU unit -> this unit) then IN (this unit -> CPU unit).

In this example, set DM20010 to 0010 (BCD: set Warning 1 value to 10 deg. C) and DM20011 to 0020 (BCD: set Warning 2 value to 20 deg. C). Other values are set to default values.

$m=20000+100 \times \text{Unit No.}$

D (m + 10)	Loop 1	Alarm 1 SV
D (m + 11)		Alarm 2 SV
D (m + 12)		Input Compensation Value
D (m + 13)		Control Period
D (m + 14)		Control Sensitivity
D (m + 15)		Proportional Band
D (m + 16)		Integral Time
D (m + 17)		Derivative Time
D (m + 18)		(Not allocated)
D (m + 19)		(Not allocated)

### 3. Usage Example of FB Component

FB “Write Set Point”

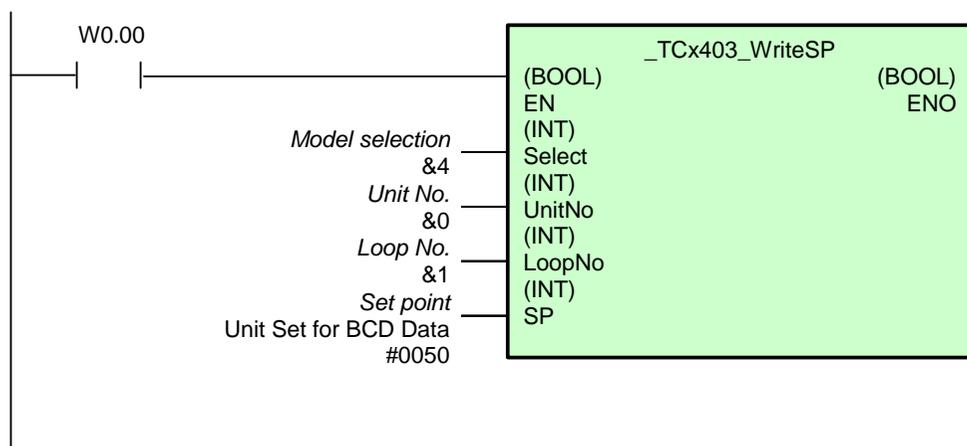
FB Name                    \_TCx403\_WriteSP

File Name                 \_TCx403\_WriteSP10.cxf

Functional Overview       Writes the set point (SP) of the specified loop.

#### Program Example

This function sets the target SP of the specified loop (1 in this example) to 50 degrees C to the TC unit specified by “Type Code Select” and “Unit Number”.



[Note]

Setup range of the target value is not checked by this FB.  
If other input variable is out of the range, ENO is set to OFF to terminate FB.

#### Variables Table

[INPUT] (Input Variables)

Name	Variable name	Description
EN	EN	1 (ON): FB started 0 (OFF): FB not started.
Model selection	Select	&2: Two-loop Unit &4: Four-loop Unit
Unit No.	UnitNo	
Loop No.	LoopNo	The number of loops depends on the Unit.
Set point	SP	The range depends on the input type. Temperature Control Unit Operation Manual (W396), 2-1-3 Input Specifications

[OUTPUT] (Output Variables)

Name	Variable name	Description
ENO (May be omitted.)	ENO (May be omitted.)	1 (ON): FB processed normally. 0 (OFF): FB not processed or ended in an error.

## ***Chapter 3 OMRON FB Library List***

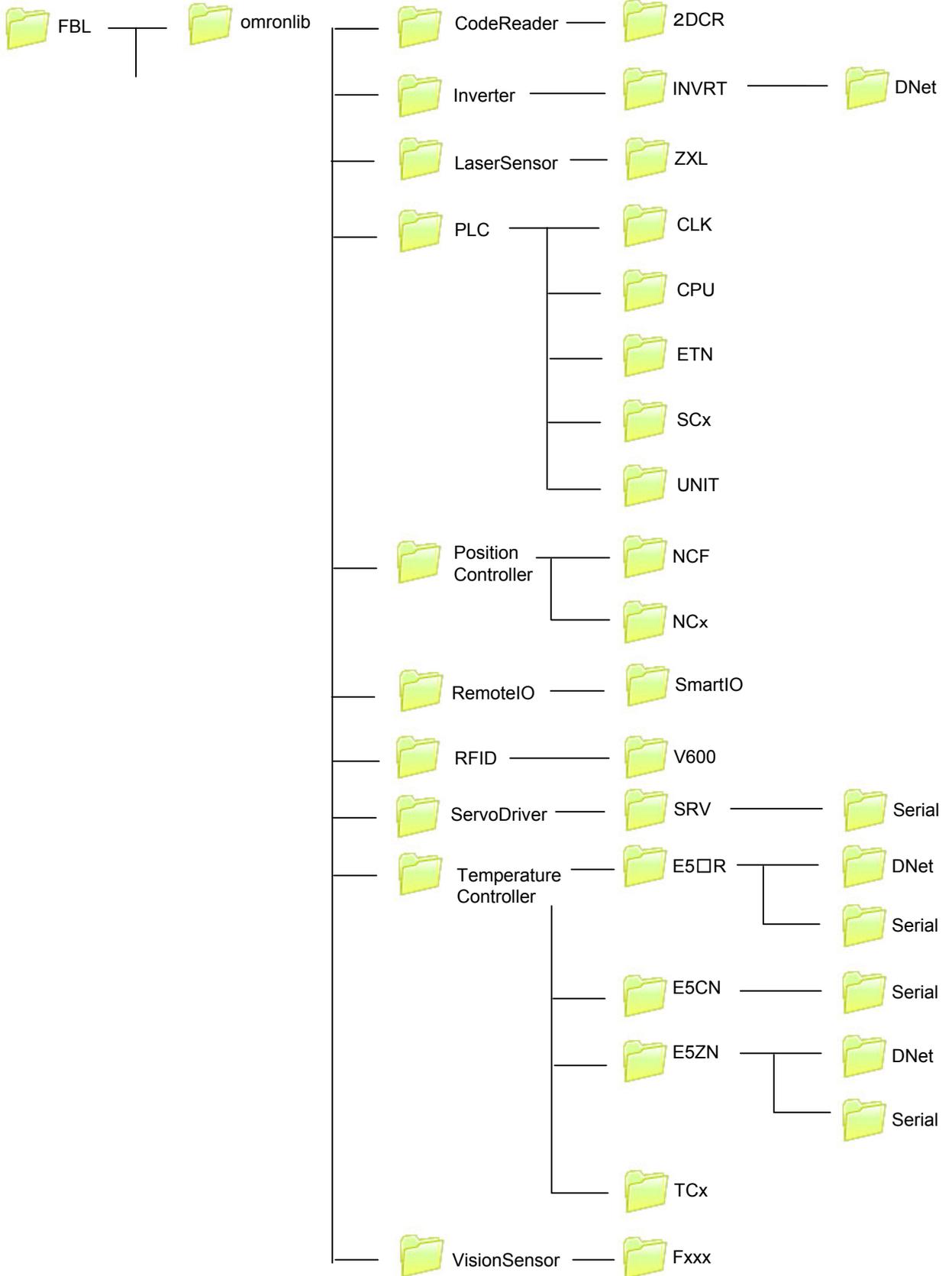
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**Folder Configuration of The OMRON FB Library**

**List of The OMRON FB Library**

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# Folder Configuration of The OMRON FB Library



## □ Code Reader

### 2DCR



	FB Name	Function Name	Basic function	Target
2DCR	_2DCR401_ExecRead	Execute Read	Executes one read for a 2D Code Reader.	V530-R2000 V530-R160 V530-R150V3
	_2DCR201_ChangeSceneNo	Change Scene Number	Changes the scene number of the 2D Code Reader.	
	_2DCR200_GetSceneNo	Get Scene Number	Reads the scene number.	

## □ Inverter

### INVRT



	FB Name	Function Name	Basic function	Target	
INVRT	Dnet	_INVDRT032_MoveVelocityHz	Move Inverter Hz	Outputs a run signal, rotation direction, and speed to the Inverter	3G3MV 3G3RV
		_INVDRT033_MoveVelocityRPM	Move Inverter RPM	Outputs a run signal, rotation direction, and speed to the Inverter	
		_INVDRT060_Stop	Stop Inverter	Stops the Inverter.	
		_INVDRT080_Reset	Reset Inverter Error	An error is reset for the Inverter.	
		_INVDRT200_ReadStatus	Read Inverter Status	Reads status information from the Inverter.	
		_INVDRT201_ReadParameter	Read Inverter Parameter	Reads the setting of a parameter in an Inverter connected to DeviceNet.	
		_INVDRT203_ReadAxisError	Read Inverter Error Information	Reads the error information from an Inverter connected to DeviceNet.	
		_INVDRT401_WriteParameter	Write Inverter Parameter	Writes the setting of a parameter in an Inverter connected to DeviceNet.	

# □ Laser Sensor

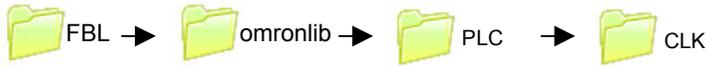
ZXL



	FB Name	Function Name	Basic function	Target
ZXL	_ZXL001_InitializeParameter	Initialize Settings	Initializes the settings in the Smart Sensor.	ZX-LDA-N
	_ZXL002_StartAutoTeach	Start Autoteaching	Starts automatic teaching.	
	_ZXL003_StopAutoTeach	Stop Autoteaching	Ends automatic teaching.	
	_ZXL004_ExecZeroReset	Execute Zero Reset	Executes a zero reset for the Smart Sensor.	
	_ZXL005_StopZeroReset	Release Zero Reset	Releases the zero reset status of the Smart Sensor.	
	_ZXL006_StartLDOFF	Start Load OFF Status	Starts the Load-OFF status.	
	_ZXL007_StopLDOFF	Stop Load OFF Status	Ends the Load-OFF status.	
	_ZXL008_Teach1HighThreshold	Teach 1-point High Threshold	Uses one point to teach the high threshold.	
	_ZXL009_Teach1LowThreshold	Teach 1-point Low Threshold	Uses one point to teach the low threshold	
	_ZXL010_Teach2HighThreshold	Teach 2-point High Threshold	Uses two points to teach the high threshold.	
	_ZXL011_Teach2LowThreshold	Teach 2-point Low Threshold	Uses two points to teach the low threshold.	
	_ZXL200_ReadMemArea	Read Memory Area	Reads data from the variable area.	
	_ZXL201_ReadMainDisplay	Read Main Display Value	Reads the numeric value displayed on the main digital display of a Smart Sensor.	
	_ZXL202_ReadDecimalPoint	Read Decimal Point Position	Reads the decimal point position set for the main digital display of a Smart Sensor.	
	_ZXL203_ReadIncidentLevel	Read Incident Light	Reads the incident light for a Smart Sensor.	
	_ZXL204_ReadResolution	Read Resolution	Reads the resolution for a Smart Sensor.	
	_ZXL205_ReadOutputs	Read Control Output	Reads the high, pass, and low control outputs.	
	_ZXL206_ReadEnableData	Read Enable Data	Checks if the Smart Sensor is currently in enable status.	
	_ZXL207_ReadHighThreshold	Read High Threshold	Reads the high threshold value from the Smart Sensor.	
	_ZXL208_ReadLowThreshold	Read Low Threshold	Reads the low threshold value from the Smart Sensor.	
_ZXL407_WriteHighThreshold	Write High Threshold Data	Writes the high threshold value.		
_ZXL408_WriteLowThreshold	Write Low Threshold Data	Writes the low threshold value.		

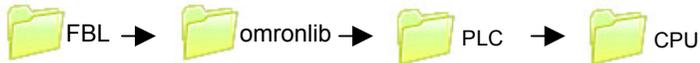
# □ PLC

## CLK



	FB Name	Function Name	Basic function	Target
CLK	_CLK001_LINK_RunDataLink	Start Data Links	Starts the data links.	CS1W-CLK21-V1 CS1W-CLK12-V1 CS1W-CLK52-V1 CJ1W-CLK21-V1
	_CLK002_LINK_StopDataLink	Stop Data Links	Stops the data links.	
	_CLK003_CheckNode32	Monitor Controller Link Node Errors 32	Monitors node communications status and data link status using the network status.	
	_CLK004_CheckNode62	Monitor Controller Link Node Errors 62	Monitors node communications status and data link status using the network status.	

## CPU



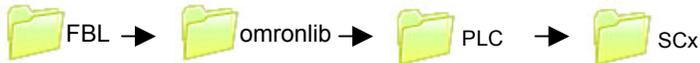
	FB Name	Function Name	Basic function	Target
CPU	_CPU001_TP_BCD	BCD Pulse Timer	Turns ON the output for a specified time after the input turns ON.	CS1G CS1H CJ1G CJ1H CJ1M
	_CPU002_TP_BIN	Binary Pulse Timer	Turns ON the output for a specified time after the input turns ON.	
	_CPU003_TON_BCD	BCD ON Delay	Turns ON the output a specified time after the input turns ON.	
	_CPU004_TON_BIN	Binary ON Delay	Turns ON the output a specified time after the input turns ON.	
	_CPU005_TOF_BCD	BCD OFF Delay	Turns OFF the output a specified time after the input turns OFF.	
	_CPU006_TOF_BIN	Binary OFF Delay	Turns OFF the output a specified time after the input turns OFF.	
	_CPU007_MakeClockPulse_BCD	ke ON Time/OFF Time Clock Pulse in BCD	Generates a clock pulse with the specified ON time and OFF time and outputs it to ENO.	
	_CPU008_MakeClockPulse_BIN	Make ON Time/OFF Time Clock Pulse in Binary	Generates a clock pulse with the specified ON time and OFF time and outputs it to ENO.	
	_CPU010_SendData	Send Data	Sends data to a node on a network.	
	_CPU011_ReceiveData	Receive Data	Receives data from a node on a network.	
	_CPU012_SendCommand	Send Command	Sends command data to a node on a network.	
	_CPU013_PMCR	Execute Communications Sequence	Calls a registered communications sequence (protocol data) and executes it.	
	_CPU014_RXD	Receive from Communications Port	Receives the specified number of bytes of data from the port.	
	_CPU015_TXD	Send from Serial Port	Sends the specified number of bytes of data from the port.	

## ETN



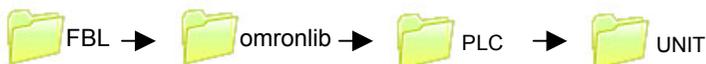
	FB Name	Function Name	Basic function	Target
ETN	_ETN001_SOCKET_TcpOpenPassive	Open TCP Socket Passive	Issues a request to the specified Ethernet Unit to open a TCP socket using passive processing.	CS1W-ETN21 CS1W-ETN11 CS1W-ETN01 CJ1W-ETN21 CJ1W-ETN11 CJ1W-ETN01
	_ETN002_SOCKET_TcpOpenActive	Open TCP Socket Active	Issues a request to the specified Ethernet Unit to open a TCP socket using active processing.	
	_ETN003_SOCKET_TcpClose	Close TCP Socket	Performs TCP socket close processing for the specified Ethernet Unit.	
	_ETN004_SOCKET_TcpSend	Send via TCP Socket	Issues a request to the specified Ethernet Unit to send using a TCP socket.	
	_ETN005_SOCKET_TcpRecv	Receive via TCP Socket	Issues a request to the specified Ethernet Unit to receive using a TCP socket.	
	_ETN011_SOCKET_UdpOpen	Open UDP Socket	Issues a request to the specified Ethernet Unit to open a UDP socket.	
	_ETN013_SOCKET_UdpClose	Close UDP Socket	Performs UDP socket close processing for the specified Ethernet Unit.	
	_ETN014_SOCKET_UdpRecv	Receive via UDP Socket	Issues a request to the specified Ethernet Unit to receive using a UDP socket.	
	_ETN015_SOCKET_UdpSend	Send via UDP Socket	Issues a request to the specified Ethernet Unit to send using a UDP socket.	

## SCx



	FB Name	Function Name	Basic function	Target
SCx	_SCx001_ResetPort	Reset Serial Port	Resets a serial port.	CS1W- SCU21-V1 CS1W- SCU41-V1 CJ1W- SCU21-V1 CJ1W- SCU41-V1 CS1W- SCB21-V1 CS1W- SCB41-V1
	_SCx002_PMCR_Abort	Abort in Protocol Macro Mode	Aborts execution in Protocol Macro Mode.	
	_SCx003_PMCR_ReleaseWait	Release Wait	Releases Wait Status in Protocol Macro Mode.	
	_SCx600_SetPortSYSWAY	Set Host Link Port	Sets a serial port to Host Link mode.	
	_SCx601_SetPortNLINK	Set NT Link Port	Sets a serial port to NT Link mode.	
	_SCx602_SetPortPMCR	Set Protocol Macro Mode Port	Sets a serial port to Protocol Macro mode.	
	_SCx603_SetPortNOPRTCL	Set No-protocol Mode	Sets a serial port to No-protocol mode.	
	_SCx604_SetPortGATEWAY	Set Serial Gateway Mode	Sets a serial port to Serial Gateway mode.	
	_SCx605_SetPortLOOPBACK	Set Loopback Test Mode	Sets a serial port to Loopback Test mode.	

## UNIT



	FB Name	Function Name	Basic function	Target
UNIT	_UNIT001_Restart	Unit Restart	Restarts the unit or board.	

# □ Position Controller

## List of The OMRON FB Library

NCF



	FB Name	Function Name	Basic function	Target
NCF	_NCF010_MoveAbsolute_REAL	Move Absolute	Positions using an absolute move.	CJ1W-NCF7
	_NCF011_MoveAbsolute_DINT	Absolute Move	Positions using an absolute move.	
	_NCF020_MoveRelative_REAL	Move Relative	Positions using a relative move.	
	_NCF021_MoveRelative_DINT	Relative Move	Positions using a relative move.	
	_NCF030_MoveVelocity_REAL	Speed Control	Controls the speed.	
	_NCF031_MoveVelocity_DINT	Speed Control	Controls the speed.	
	_NCF040_TorqueControl_REAL	Torque Control	Controls torque.	
	_NCF041_TorqueControl_DINT	Control Torque	Controls torque.	
	_NCF050_Home_REAL	Origin Search	Performs an origin search operation to establish the origin.	
	_NCF051_Home_DINT	Origin Search	Performs an origin search operation to establish the origin.	
	_NCF060_Stop	Stop Deceleration	Decelerates an axis to a stop.	
	_NCF070_Power	Operation Command	Turns the main power circuit ON and OFF.	
	_NCF080_Reset	Reset Axis Error	Resets and axis error.	
	_NCF200_ReadStatus	Read Status	Reads the status of an axis.	
	_NCF201_ReadParameter	Read Parameter	Reads a servo parameter of an axis.	
	_NCF202_ReadBoolParameter	Read Boolean Parameter	Reads a Boolean parameter.	
	_NCF203_ReadAxisError	Read Axis Error	Reads axis error information.	
	_NCF204_ReadActualPosition_REAL	Read Present Position	Reads the present position of an axis.	
	_NCF205_ReadActualPosition_DINT	Read Present Position	Reads the present position of an axis.	
	_NCF401_WriteParameter	Write Parameter	Writes an axis servo parameter.	
_NCF402_WriteBoolParameter	Write Boolean Parameter	Writes a Boolean parameter.		

NCx



	FB Name	Function Name	Basic function	Target
NCx	_NCx010_MoveAbsolute_REAL	Move Absolute	Positions using an absolute move.	CS1W- NC113/133 NC213/233 CS1W- NC413/433 CJ1W- NC113/133 CJ1W- NC213/233 CJ1W- NC413/433
	_NCx011_MoveAbsolute_DINT	Move Absolute	Positions using an absolute move.	
	_NCx020_MoveRelative_REAL	Move Relative	Positions using a relative move.	
	_NCx021_MoveRelative_DINT	Move Relative	Positions using a relative move.	
	_NCx050_Home_REAL	Origin Search	Performs an origin search operation to establish the origin.	
	_NCx051_Home_DINT	Origin Search	Performs an origin search operation to establish the origin.	
	_NCx060_Stop	Deceleration Stop	Decelerates an axis to a stop.	
	_NCx080_Reset	Axis Error Reset	Resets and axis error.	
	_NCx200_ReadStatus	Read Status	Reads the status of an axis.	
	_NCx201_ReadParameter	Read Parameter	Reads a parameter of an axis.	
	_NCx202_ReadBoolParameter	Read Boolean Parameter	Reads a boolean parameter of an axis.	
	_NCx203_ReadAxisError	Read Axis Error	Reads axis error information.	
	_NCx204_ReadActualPosition_REAL	Read Present Position	Reads the present position of an axis.	
	_NCx205_ReadActualPosition_DINT	Read Present Position	Reads the present position of an axis.	
	_NCx401_WriteParameter	Write Parameter	Writes an axis parameter.	
	_NCx402_WriteBoolParameter	Write Boolean Parameter	Writes a Boolean parameter.	
	_NCx600_Setting	Set Unit	Sets the Position Control Unit.	

# □ RemoteIO

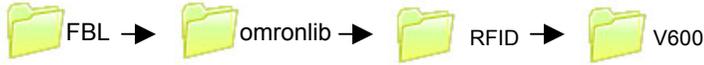
SmartIO



	FB Name	Function Name	Basic function	Target
SmartIO	_Dnet200_GetGenericStat	Read Generic Status	Reads the generic status from slaves connected to DeviceNet.	DRT2- ID16/OD16/R OS16 ID16TA/OD16 TA/MD16TA ID32ML/OD32 ML ID16S/MD16S ID32SLH/OD3 2SLH/MD32S LH ID32SL/OD32 SL/MD32SL ID08C/OC08C HD16C AD04/AD04H DA02 TS04
	_Dnet201_GetNetVoltage_PV	Read Network Voltage Present Value	Reads the present values of the network power supply from slaves connected to DeviceNet.	
	_Dnet202_GetNetVoltage_Min	Read Network Voltage Minimum	Reads the minimum values of the network power supply from slaves connected to DeviceNet.	
	_Dnet203_GetNetVoltage_Max	Read Network Voltage Maximum Value	Reads the maximum values of the network power supply from slaves connected to DeviceNet.	
	_Dnet204_GetONTime_PV	Read Present Unit ON Time	Reads the present Unit ON time (conduction time) from slaves connected to DeviceNet.	
	_Dnet205_GetONTime_Stat	Read Unit ON Time Status	Reads the Unit ON time (conduction time) status from slaves connected to DeviceNet.	
	_Dnet206_GetCounter_IN_PV	Read Input Terminal Maintenance Counter Present Value	Reads the present values of terminal maintenance counters from slaves connected to DeviceNet.	
	_Dnet207_GetCounter_IN_SV	Read Input Terminal Maintenance Counter Set Value	Reads the set values of terminal maintenance counters from slaves connected to DeviceNet.	
	_Dnet208_GetCounter_OUT_PV	Read Output Terminal Maintenance Counter Present Value	Reads the present values of terminal maintenance counters from slaves connected to DeviceNet.	
	_Dnet209_GetCounter_OUT_SV	Read Output Terminal Maintenance Counter Set Value	Reads the set values of terminal maintenance counters from slaves connected to DeviceNet.	
	_Dnet210_GetCounter_Stat	Read Maintenance Counter Status	Reads maintenance counter status from slaves connected to DeviceNet.	
	_Dnet211_GetInputPower_Stat	Read Input Power Status	Reads the input power status from slaves connected to DeviceNet.	
	_Dnet212_GetOutPower_Stat	Read Output Power Status	Reads the power supply status for outputs from slaves connected to DeviceNet.	
	_Dnet213_GetLoadShort_Stat	Read Load Short-circuit Status	Reads the load OFF short-circuit status from slaves connected to DeviceNet.	
	_Dnet214_GetLoadOffWire_Hold	Read Load OFF Wire Hold Status	Reads the load OFF wire hold status from slaves connected to DeviceNet.	
	_Dnet215_GetLoadOffWire_Stat	Read Load OFF Wire Status	Reads the load OFF wire status from slaves connected to DeviceNet. Use this FM for output terminals.	
	_Dnet216_GetOperationTime_PV	Read Operation Time Monitor Present Value	Reads the present values of the operation time monitors from slaves connected to DeviceNet.	
	_Dnet217_GetOperationTime_SV	Read Operation Time Monitor Set Value	Reads the set values of the operation time monitors from slaves connected to DeviceNet.	
	_Dnet218_GetOperationTime_Stat	Read Operation Time Monitor Status	Reads the status of the operation time monitors from slaves connected to DeviceNet.	
	_Dnet219_GetOperationTime_Hold	Read Operation Time Monitor Hold Status	Reads the hold status for operation times from slaves connected to DeviceNet.	
	_Dnet220_GetOperationTime_Peak	Read Operation Time Monitor Peak Value Read	Reads the peak values for operation times from slaves connected to DeviceNet.	
	_Dnet221_GetSensorOffWire_Stat	Read Sensor OFF Wire Status	Reads the sensor OFF wire status from slaves connected to DeviceNet.	
	_Dnet222_GetSensorOffWire_Hold	Read Sensor OFF Wire Hold Status	Reads the sensor OFF wire hold status from slaves connected to DeviceNet.	
	_Dnet223_GetSensorShort_Stat	Read Sensor Power Supply Short-circuit Status	Reads the power supply short circuit status from slaves connected to DeviceNet.	
_Dnet224_GetSensorShort_Hold	Read Sensor Power Supply Short-circuit Hold Status	Reads the power supply short circuit hold status from slaves connected to DeviceNet.		

# □ RFID

## V600



		FB Name	Function Name	Basic function	Target
V600		_V60x001_CheckData	Check Data Carrier Data	The CRC is calculated and written for the data in the Data Carrier.	CS1W-V600C11 CS1W-V600C12 CJ1W-V600C11 CJ1W-V600C12
		_V60x002_ControlWrites	Number of Writes Control	Updates the number of writes stored in the Data Carrier.	
		_V60x200_ReadData	Read Data Carrier Data	Reads data from a Data Carrier.	
		_V60x400_WriteData	Write Data to Data Carrier	Writes data to a Data Carrier.	
		_V60x401_SetBit	Set Data Carrier Bit	Turns ON the specified bit in the Data Carrier.	
		_V60x402_ClearBit	Bit Carrier Bit Clear	Turns OFF the specified bits in the Data Carrier.	
		_V60x403_WriteMaskBit	Write Data Carrier Mask Bits	Writes the specified data to a Data Carrier using the specified mask data.	
		_V60x404_WriteCalculation	Write Calculation	Performs a calculation between Data Carrier data and specified data and writes the result to the Data Carrier.	
		_V60x405_FillData	Fill Data in Data Carrier	Writes fill data to a Data Carrier.	
		_V60x406_Copy	Copy Data Carrier	Copies the data from one Data Carrier and writes it to another Data Carrier.	
	_V60x600_SetSystemSetting	Set System Settings	Sets the mode of the ID Sensor Unit.		

# □ Servo Driver

## SRV



		FB Name	Function Name	Basic function	Target
SRV	Serial	_SRV080_Reset	Reset Servo Error	Resets an error in the Servo Driver.	R88D-Wxx R7D-Axx
		_SRV201_ReadParameter	Read Servo Parameter	Reads parameter information from the Servo Driver.	
		_SRV203_ReadAxisError	Read Servo Error	Reads Servo Driver error information.	
		_SRV206_ReadValue	Read Servomotor Value	Reads a monitor value from the servo driver.	
		_SRV401_WriteParameter	Write Servo Parameter	Changes a parameter in the Servo Driver.	

# □ TemperatureController

E5□R



	FB Name	Function Name	Basic function	Target	
E5□R	Dnet	_E5xxDRT001_ExecOperation	Operation Command	Executes the specified operation command for a Controller on DeviceNet.	E5AR-DRT E5ER-DRT
		_E5xxDRT002_Run	Start Operation	Starts operation for a channel of a Controller on DeviceNet.	
		_E5xxDRT003_Stop	Stop Operation	Stops operation for a channel of a Controller on DeviceNet.	
		_E5xRDRT004_ExecuteAT	Autotune	Starts autotuning for a channel of a Controller on DeviceNet.	
		_E5xRDRT005_CancelAT	Stop Autotuning	Cancels autotuning for a channel of a Controller on DeviceNet.	
		_E5xxDRT200_ReadVariable	Read Variable Area	Reads one element from the variable area of a Controller on DeviceNet.	
		_E5xxDRT201_ReadStatus	Read Status	Reads the status of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT202_ReadPV	Read Process Value	Reads the process value of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT203_ReadSP	Read Set Point	Reads the set point of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT204_ReadCoolingMV	Read Cooling MV	Reads the cooling MV of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT205_ReadHeatingMV	Read Heating MV	Reads the heating MV of the specified channel of a Controller connected to DeviceNet.	
		_E5xRDRT206_ReadValveOpening	Read Valve Opening	Reads the valve opening monitor value for the specified channel of a Controller connected to DeviceNet.	
	_E5xxDRT400_WriteVariable	Write Variable Area	Writes one element to the specified variable area of a Controller on DeviceNet.		
	_E5xxDRT403_WriteSP	Write Set Point	Writes the set point of the specified channel of a Controller connected to DeviceNet.		
	Serial	_E5xx001_ExecOperation	Operation Command	Executes the specified operation command.	E5AR E5ER
		_E5xx002_Run	Start Operation	Starts operation for the specified channel of the specified Controller.	
		_E5xx003_Stop	Stop Operation	Stops operation for the specified channel of the specified Controller.	
		_E5xR004_ExecuteAT	Autotune	Starts autotuning for the specified channel of the specified Controller.	
		_E5xR005_CancelAT	Stop Autotuning	Cancels autotuning for the specified channel of the specified Controller.	
		_E5xx200_ReadVariable	Read Variable Area	Reads one element from the specified variable area.	
		_E5xx201_ReadStatus	Read Status	Reads the status of the specified channel of a Controller.	
		_E5xx202_ReadPV	Read Process Value	Reads the process value of the specified channel of a Controller.	
		_E5xx203_ReadSP	Read Set Point	Reads the set point of the specified channel of a Controller.	
		_E5xx204_ReadCoolingMV	Read Cooling MV	Reads the cooling MV of the specified channel of a Controller.	
_E5xx205_ReadHeatingMV		Read Heating MV	Reads the heating MV of the specified channel of a Controller.		
_E5xR206_ReadValveOpening		Read Valve Opening	Reads the monitor value for valve opening for the specified channel of a Controller.		
_E5xx400_WriteVariable	Write Variable Area	Writes one element to the specified variable area.			
_E5xx403_WriteSP	Write Set Point	Writes the set point of the specified channel of a Controller.			

## E5CN



		FB Name	Function Name	Basic function	Target
E5CN	Serial	_E5x001_ExecOperation	Operation Command	Executes the specified operation command.	E5CN/E5C N-U
		_E5x002_Run	Start Operation	Starts operation for the specified channel of the specified Controller.	
		_E5x003_Stop	Stop Operation	Stops operation for the specified channel of the specified Controller.	
		_E5xN004_ExecuteAT	Autotune	Starts autotuning for the specified channel of the specified Controller.	
		_E5xN005_CancelAT	Stop Autotuning	Cancels autotuning for the specified channel of the specified Controller.	
		_E5x200_ReadVariable	Read Variable Area	Reads one element from the specified variable area.	
		_E5x201_ReadStatus	Read Status	Reads the status of the specified channel of a Controller.	
		_E5x202_ReadPV	Read Process Value	Reads the process value of the specified channel of a Controller.	
		_E5x203_ReadSP	Read Set Point	Reads the set point of the specified channel of a Controller.	
		_E5x204_ReadCoolingMV	Read Cooling MV	Reads the cooling MV of the specified channel of a Controller.	
		_E5x205_ReadHeatingMV	Read Heating MV	Reads the heating MV of the specified channel of a Controller.	
		_E5x400_WriteVariable	Write Variable Area	Writes one element to the specified variable area.	
		_E5x403_WriteSP	Write Set Point	Writes the set point of the specified channel of a Controller.	

## E5ZN



		FB Name	Function Name	Basic function	Target
E5ZN	Dnet	_E5xxDRT001_ExecOperation	Operation Command	Executes the specified operation command for a Controller on DeviceNet.	E5ZN-DRT
		_E5xxDRT002_Run	Start Operation	Starts operation for a channel of a Controller on DeviceNet.	
		_E5xxDRT003_Stop	Stop Operation	Stops operation for a channel of a Controller on DeviceNet.	
		_E5ZNDRT004_ExecuteAT	Autotune	Starts autotuning for a channel of a Controller on DeviceNet.	
		_E5ZNDRT005_CancelAT	Stop Autotuning	Cancel autotuning for a channel of a Controller on DeviceNet.	
		_E5xxDRT200_ReadVariable	Read Variable Area	Reads one element from the variable area of a Controller on DeviceNet.	
		_E5xxDRT201_ReadStatus	Read Status	Reads the status of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT202_ReadPV	Read Process Value	Reads the process value of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT203_ReadSP	Read Set Point	Reads the set point of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT204_ReadCoolingMV	Read Cooling MV	Reads the cooling MV of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT205_ReadHeatingMV	Read Heating MV	Reads the heating MV of the specified channel of a Controller connected to DeviceNet.	
		_E5xxDRT400_WriteVariable	Write Variable Area	Writes one element to the specified variable area of a Controller on DeviceNet.	
		_E5xxDRT403_WriteSP	Write Set Point	Writes the set point of the specified channel of a Controller connected to DeviceNet.	
	Serial	_E5xx001_ExecOperation	Operation Command	Executes the specified operation command.	E5ZN
		_E5xx002_Run	Start Operation	Starts operation for the specified channel of the specified Controller.	
		_E5xx003_Stop	Stop Operation	Stops operation for the specified channel of the specified Controller.	
		_E5xR004_ExecuteAT	Autotune	Starts autotuning for the specified channel of the specified Controller.	
		_E5xR005_CancelAT	Stop Autotuning	Cancel autotuning for the specified channel of the specified Controller.	
		_E5xx200_ReadVariable	Read Variable Area	Reads one element from the specified variable area.	
		_E5xx201_ReadStatus	Read Status	Reads the status of the specified channel of a Controller.	
		_E5xx202_ReadPV	Read Process Value	Reads the process value of the specified channel of a Controller.	
		_E5xx203_ReadSP	Read Set Point	Reads the set point of the specified channel of a Controller.	
		_E5xx204_ReadCoolingMV	Read Cooling MV	Reads the cooling MV of the specified channel of a Controller.	
		_E5xx205_ReadHeatingMV	Read Heating MV	Reads the heating MV of the specified channel of a Controller.	
_E5xR206_ReadValveOpening	Read Valve Opening	Reads the monitor value for valve opening for the specified channel of a Controller.			
_E5xx400_WriteVariable	Write Variable Area	Writes one element to the specified variable area.			
_E5xx403_WriteSP	Write Set Point	Writes the set point of the specified channel of a Controller.			

TCx



	FB Name	Function Name	Basic function	Target
TCx	_TCx002_Run	Start Control	Starts control for the specified loop.	CJ1W-TCx
	_TCx003_Stop	Stop Control	Stops control for the specified loop.	
	_TCx004_ExecuteAT	Autotune	Executes autotuning for the specified loop.	
	_TCx005_CancelAT	Cancel Autotuning	Cancels autotuning for the specified loop.	
	_TCx201_ReadStatus	Read Status	Reads the status of the specified loop.	
	_TCx202_ReadPV	Read Process Value	Reads a process value (PV).	
	_TCx203_ReadSP	Read Set Point	Reads the set point (SP) of the specified loop.	
	_TCx403_WriteSP	Write Set Point	Writes the set point (SP) of the specified loop.	

# □ Vision Sensor

Fxxx



	FB Name	Function Name	Basic function	Target
Fxxx	_Fxx001_Reset	Reset	Restarts the Vision Sensor.	F160 F210
	_Fxx200_GetSceneNo	Get Scene Number	Reads the scene number.	
	_Fxx201_ChangeSceneNo	Change Scene	Changes the scene.	
	_Fxx202_GetSceneGrNo	Get Scene Group Number	Gets the scene group number.	
	_Fxx203_ChangeSceneGrNo	Switch Scene Group	Switches the scene group.	
	_Fxx401_ExecMeasure	Execute Measurement	Executes one measurement.	
	_Fxx402_ExecPictureMeasure	Execute Picture Measurement	Executes one measurement for displayed picture.	

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