



WB1F Fix Linear CCD Scanner

PLC Connection User's Manual



Introduction

Attention

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Graphic Symbol Glossary

This manual uses the following graphic symbols to simplify explanations:

Notes

Graphic Symbol	Description
 Warning	Failure to operate the product in accordance with the information provided may result in severe personal injury or death.
 Caution	Failure to operate the product in accordance with the information provided may result in personal injury or damage to equipment.
	Notes information that should be carefully noted. Failure to operate the product in accordance with the information provided may affect the appearance and performance of the main unit as well as any peripheral devices.
	Denotes additional information that may prove useful for using a given function.

Related manuals

Manuals related to the WB1F are as follows. Refer to them together with this manual.
All related manuals are available for download from our website.

Type	Manual name	Details
B-1780	WB1F Fix Linear CCD Scanner PLC Connection User's Manual (this manual)	Explains about PLC Connection.
B-1741	Instruction Sheet WB1F series	Included with the product.
B-1775	WB1F Fix Linear CCD Scanner User's Manual	Explains an overview and functions of the WB1F, plus basic operating methods.
B-1768	WB1F Fix Linear CCD Scanner Support Tool User's Manual	Included with the support tool. Explains about support tool.
B-1782	WB1F Fix Linear CCD Scanner Menu Sheet	Explains about menu sheet.

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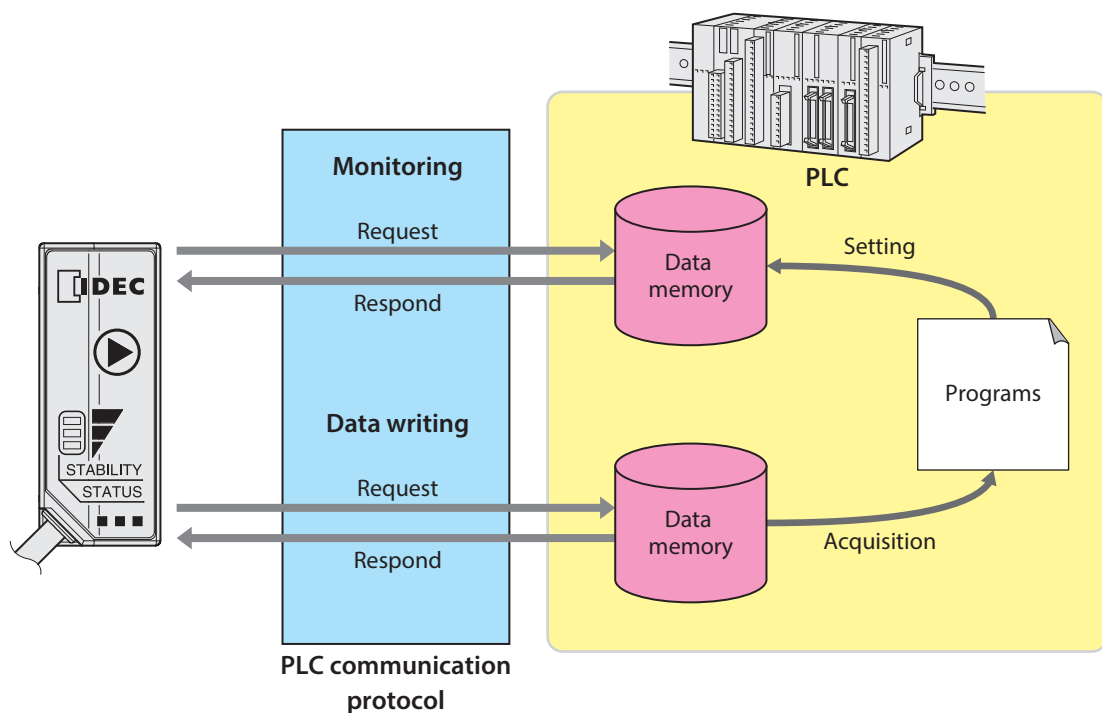
1 Overview

This chapter describes gives an overview, limitations, applicable models, applicable PLCs, and setting parameters of the PLC connection.

1.1 PLC connection

The PLC connection is a device in which the read result of barcodes is directly written to the data memory of a PLC (Programmable Logic Controller).

The WB1F supports the PLC communication protocol, and there is no need to create a specific communication program in the PLC.



What is data memory?

It is the general storage area incorporated in PLC, allowing read and write. The data exchange between the WB1F and PLC uses data memory. The name and size corresponding to the data memory depends on the PLC. For details, refer to [\[3 Setting and Wiring\]](#) on page 3-1.

1.2 Limitation

Follow the limitations below when using the PLC connection.

- Reading operation is available only at single read.
- Operation button, external trigger input and control commands cannot be used to make read requests.
- The installation assistant function and analysis function are not available.
- Reading and editing of the setting values is not available.
- Not compatible with menu sheets.

1.3 Applicable Models

The WB1F that supports the function is as follows:

Model	Version of main application	Remarks
WB1F-100S1B	A-002.010.00 and higher	Only supports WB1F model RS-232 type. Does not support USB type.

1.4 Applicable PLC

The function is supported by the following PLCs:

Manufacturer	Series	Model	Connection method	Protocol
Mitsubishi Electric	MELSEC iQ-R	RJ71C24* ¹	RS-232	MC protocol (Model 4, 4C frame, with Checksum)
		RJ71C24N-R2		
	MELSEC iQ-F	FX5-232-BD* ¹		
		FX5-232ADP* ¹		
	MELSEC Q	QJ71C24N* ¹		
		QJ71C24N-R2		
	MELSEC L	LJ71C24		
		LJ71C24-R2* ¹		

- *1 In IDEC, the operation check is performed by these models.
For the other models, please perform the operation check at the customer's side before use.

1.5 Setting Parameters (WB1F)

The setting parameters and setting values necessary for the PLC connection are as follows:
Adjust the setting according to the using environment.




- All the settings of the WB1F should be performed before using the PLC connection.
- When the device of setting the WB1F (as PC) is different from the device to be connected through the PLC connection, prepare a cable supporting both devices.
- Do not access or change any settings that are not listed here.
- Do not access or change any settings in reserved areas.
- When the setting values have been changed, save the setting value by "Save Set Values" on the control command.
Turning OFF the power, resetting, or changing the operation mode without performing "Save Set Values" will return to the setting value that existed before change.



When configuring settings that specify ASCII code for the setting value, be aware of the following points.

- **NUL** (00H) cannot be used as a setting value.
 - The characters up to the first **NUL** (00H) are considered the data and any data after that is not valid.
- Setting value (hex) of bold face is default value (Setting at the time of factory shipments).

Item	Sub item	Address (hex)	Size (dec)	Default (hex)	Setting value (hex)	Remarks
RS-232 setting	Communication speed	0100	1	03	00 : 1,200bps 01 : 2,400bps 02 : 4,800bps 03 : 9,600bps 04 : 19,200bps 05 : 38,400bps 06 : 57,600bps 07 : 115,200bps 0a : 600bps	After saving, the settings are reflected when the power is turned on, the WB1F is reset, or the operation mode is changed.
	Data length	0101	1	01	00 : 7bits 01 : 8bits	
	Parity	0102	1	01	00 : NONE 01 : EVEN 02 : ODD	
	Stop bits	0103	1	00	00 : 1bit 01 : 2bits	
	Flow control	0104	1	00	00 : NONE 01 : CTS/RTS	
PLC Connection	Function enabled	06C0	1	00	00 : Disabled 01 : Enabled	If enabled, it will begin the process to establish a connection with connected external devices at start up. New settings will be reflected after saving and resetting the device.
	Protocol Select	06C1	1	00	00 : MC Protocol Format 4 4C (Q,L Series)	Select the communication protocol of the external device that is to be connected to the WB1F.
	Monitoring cycle	06C2	1	0A	01 - FF : Setting Value × 10ms (10ms to 2,550ms)	Configure the monitoring interval for the special area.
	Timeout	06C3	1	14	01 - FF : Setting Value × 100ms (100ms to 25,500ms)	Configures response timeout from a PLC.

Item	Sub item	Address (hex)	Size (dec)	Default (hex)	Setting value (hex)	Remarks
PLC Connection	Retry Count	06C4	1	05	01 - FF : Times	Sets the number of command retransmissions to a PLC.
	Barcode data storage endian	06C5	1	00	00 : Lower→Upper 01 : Upper→Lower	To configure the order of stocked data in data memory of PLC.
	Reserved	06C6-06C7	1	-	-	
	Special Area Start Address	06C8	4	00	00000000 - FFFFFFFF : Special Area Start Address	When configuring the settings ensure that the special area and the scanner information area do not overlap. The special area requires 4 words (8 bytes) of data memory.
		06C9		00		
		06CA		00		
		06CB		00		
	Scanner Information Area Start Address	06CC	4	10	00000000 - FFFFFFFF : Scanner Information Area Start Address	
		06CD		00		
		06CE		00		
		06CF		00		
	Reserved	06D0-06DF	16	-	-	
	Protocol Parameter [0]	06E0	2	0000	0000 - FFFF : Protocol Parameter	
		06E1				
	Protocol Parameter [1]	06E2	2	0000	0000 - FFFF : Protocol Parameter	
		06E3				
	Protocol Parameter [2]	06E4	2	0000	0000 - FFFF : Protocol Parameter	
		06E5				
	Protocol Parameter [3]	06E6	2	0000	0000 - FFFF : Protocol Parameter	
		06E7				
	Protocol Parameter [4]	06E8	2	0000	0000 - FFFF : Protocol Parameter	
		06E9				
	Protocol Parameter [5]	06EA	2	0000	0000 - FFFF : Protocol Parameter	
		06EB				
	Protocol Parameter [6]	06EC	2	0000	0000 - FFFF : Protocol parameter	The meaning of the setting depends on each protocol selected.
		06ED				
	Protocol Parameter [7]	06EE	2	0000	0000 - FFFF : Protocol Parameter	
		06EF				
	Protocol Parameter [8]	06F0	2	0000	0000 - FFFF : Protocol Parameter	For details, refer to  [3 Setting and Wiring] on page 3-1.
		06F1				
	Protocol Parameter [9]	06F2	2	0000	0000 - FFFF : Protocol Parameter	
		06F3				
Protocol Parameter [10]	06F4	2	0000	0000 - FFFF : Protocol Parameter		
	06F5					
Protocol Parameter [11]	06F6	2	0000	0000 - FFFF : Protocol parameter		
	06F7					
Protocol Parameter [12]	06F8	2	0000	0000 - FFFF : Protocol Parameter		
	06F9					
Protocol Parameter [13]	06FA	2	0000	0000 - FFFF : Protocol Parameter		
	06FB					
Protocol Parameter [14]	06FC	2	0000	0000 - FFFF : Protocol Parameter		
	06FD					
Protocol Parameter [15]	06FE	2	0000	0000 - FFFF : Protocol Parameter		
	06FF					

2 Operation Specifications


This chapter describes the operation specification of the PLC connection.

2.1 Overview

The WB1F periodically reads the PLC data memory. When the data memory which is being read has any change, the function assigned to the data memory is performed.

This mechanism allows to perform each function of the WB1F only by setting the data memory of PLC to the specified value.

2.2 Assigning Data Memory

The WB1F performs reading and writing to the “Special area” and the “Scanner Information Area” assigned to the PLC data memory. When using this function, set where to assign these two areas in the data memory. For details of the setting, refer to  [\[1.5 Setting Parameters \(WB1F\)\]](#) on page 1-3.

2.3 Special Area

With the special memory area starting address as a header, the following functions shown in the table below are assigned to the data memory. By setting the corresponding bit of the corresponding address to "1", each function can be performed. The WB1F performs the requested function, and then performs zero clear of the special area.

The zero clear after the function is executed targets not only the corresponding bit of the corresponding address, but the special area entirely.

Address (OFFSET)	bit	Function	Contents
0	0	PLC Connection end	Ends the PLC Connection.
	1 - 7	Reserved	
	8	Start barcode reading	Starts barcode reading
	9	Stop barcode reading	Stops barcode reading.
	10 - 15	Reserved	
1	0	OK Output OFF	Stops the OK Output.
	1	OK Output ON	Starts the OK Output (the operation logic and operation time follows the setting value.)
	2	NG Output OFF	Stops the NG Output.
	3	NG Output ON	Starts the NG Output (the operation logic and operation time follows the setting value.)
	4	PWM Output OFF (When successful settings)	Stops the PWM Output.
	5	PWM Output ON (When successful settings)	Starts the PWM Output. (Frequency, duration, and duty follow the setting values.)
	6	PWM Output OFF (When failure settings)	Stops the PWM Output.
	7	PWM Output ON (When failure settings)	Starts the PWM Output. (Frequency, duration, and duty follow the setting values.)
	8	Indicator LED (Red) OFF	Sets the Indicator LED (Red) to the OFF state.
	9	Indicator LED (Red) ON	Sets the Indicator LED (Red) to the ON state (the lighting pattern and the lighting time follows the setting value.)
	10	Indicator LED (Orange) OFF	Sets the Indicator LED (Orange) to OFF state.
	11	Indicator LED (Orange) ON	Sets the Indicator LED (Orange) to ON state (the lighting pattern and the lighting time follows the setting value.)
	12	Indicator LED (Green) OFF	Sets the Indicator LED (Green) to OFF state.
	13	Indicator LED (Green) ON	Sets the Indicator LED (Green) to ON state (the lighting pattern and the lighting time follows the setting value.)
	14	Reserved	
15	Reserved		
2	0-15	Reserved	
3	0-15	Reserved	

When multiple bits are set to 1 at the same time, the lowest one is preferably executed for both address and bit. The other functions are ignored.

e.g. When the following three bits are set to 1 at the same time:

- [Bit 8 of Address 0]
- [Bit 9 of Address 0]
- [Bit 0 of Address 1]

The function only assigned to Bit 8 of Address 0 is executed.

e.g. When the following three bits are set to 1 at the same time:

- [Bit 0 of Address 0]
- [Bit 9 of Address 0]
- [Bit 0 of Address 1]

The function only assigned to Bit 0 of Address 0 is executed.

2.4 Scanner Information Area

With the scanner information area starting address as a header, the functions shown in the table below are assigned to the data memory of PLC. The WB1F writes the barcode data and the data length in the scanner information area.

Address (OFFSET)	bit	Function	Contents
0	0 - 15	Data length	Writes the data length of the barcode data.
1	0 - 7	Data [0]	Writes the read barcode data. The storage order of the barcode data follows the setting values.
	8 - 15	Data [1]	
2	0 - 7	Data [2]	
	8 - 15	Data [3]	
3	0 - 7	Data [4]	
	8 - 15	Data [5]	
⋮	⋮	⋮	



The barcode data quantity is variable. Assure an adequate area of expected data length or more.

e.g. Storage example to the scanner information area

The below shows an example of storing data into the scanner information area.

The setting of the barcode data storage order can change the storage order to the data memory.

[Condition]

Scanner information area starting address: 100

Data memory Data length: 16 bits

Barcode data: "ABCDEFGHI[CR][LF]" 11 bytes

Position	0	1	2	3	4	5	6	7	8	9	10
ASCII	A	B	C	D	E	F	G	H	I	[CR]	[LF]
HEX	41H	42H	43H	44H	45H	46H	47H	48H	49H	0DH	0AH

- [Storing image] (Barcode data storing order: Lower→Upper)

Address	Upper byte	Lower byte	Remarks
100	000BH		<- Number of barcode data: 11 bytes
101	42H	41H	<- Stored in the order of lower byte and upper byte.
102	44H	43H	
103	46H	45H	
104	48H	47H	
105	0DH	49H	
106	00H	0AH	<- The upper byte is padded with 00H .

- [Storage image] (barcode data storage order:Upper→Lower)

Address	Upper byte	Lower byte	Remarks
100	000BH		<- Number of barcode data: 11 bytes
101	41H	42H	<- Stored in the order of upper byte and lower byte.
102	43H	44H	
103	45H	46H	
104	47H	48H	
105	49H	0DH	
106	0AH	00H	<- The lower byte is padded with 00H.

2.5 Start and End

The PLC connection can be started and ended in the following conditions:

Start condition

With Address "06C0 (PLC connection – function Enabled) in the setting parameter of the WB1F set and stored to "01 (Enable), turn the power from OFF to ON.



When the start condition is established, the Indicator LED (Green) starts flashing.
After blinking stops, the PLC connection starts.

End condition

- Depress the Operation button of the WB1F for 5 seconds.
- Set the PLC Connection End Bit in the Special Area of the PLC data memory to "1".

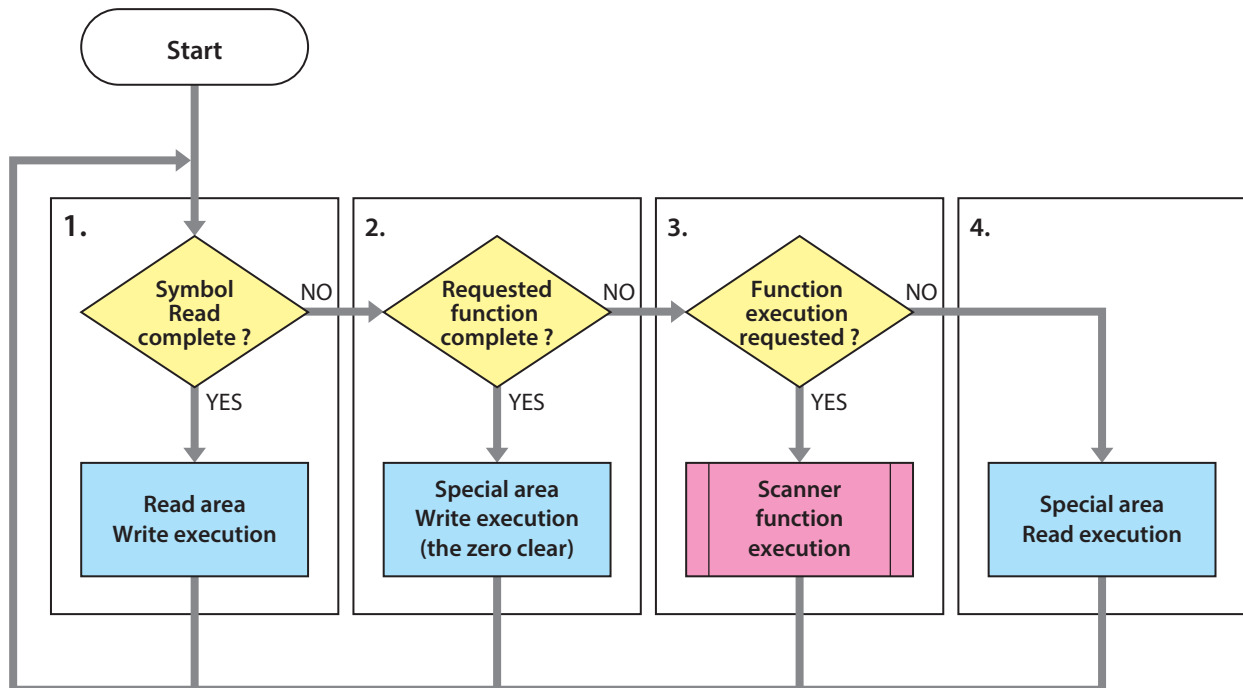


When the end condition is established, the Indicator LED (Red) starts blinking.
After blinking stops, the PLC connection ends.

2.6 Operation Sequence

The WB1F repeatedly performs the following four operations:

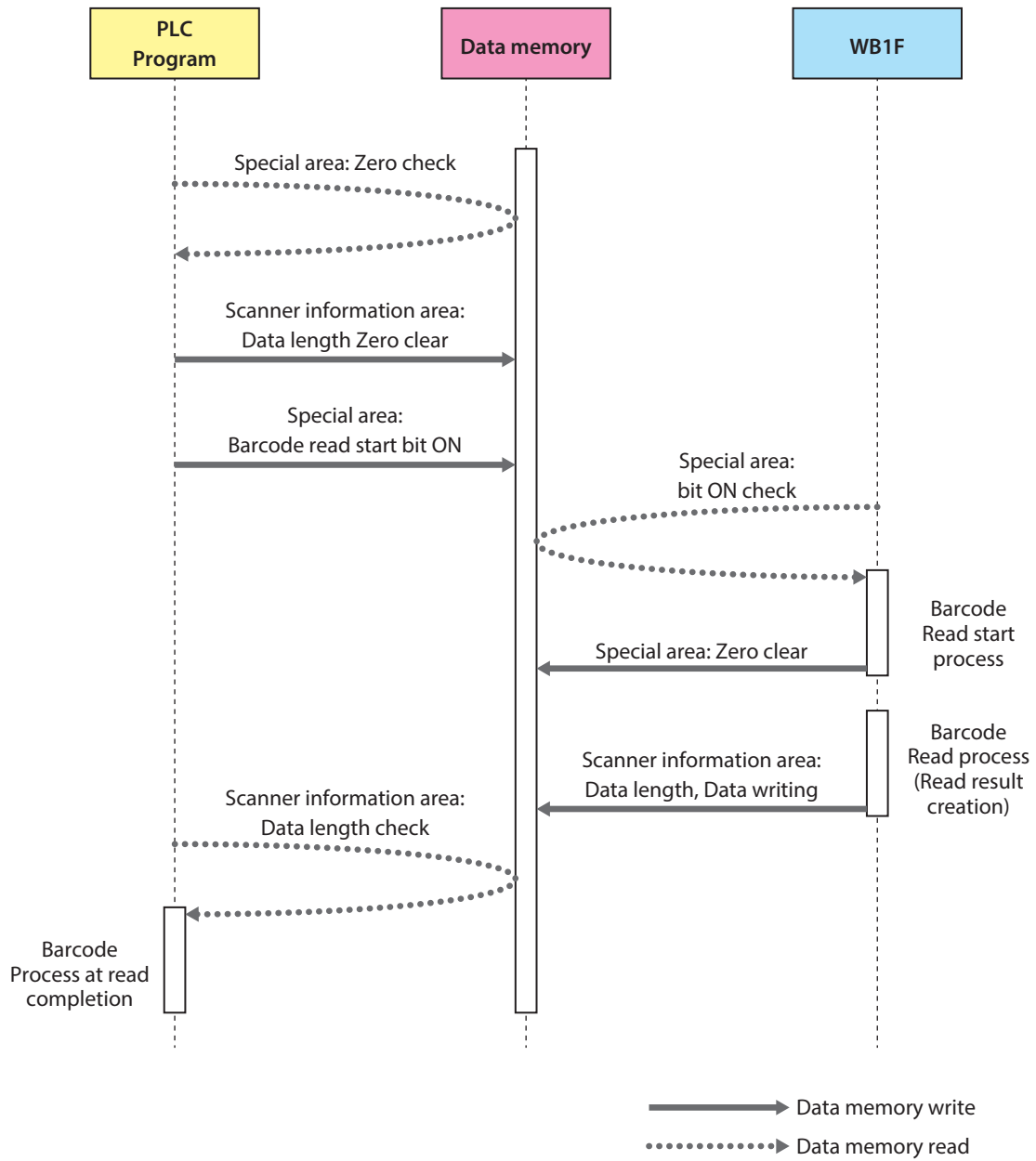
- 1** When barcode reading is completed, the writing of barcode data to the scanner information area is performed.
- 2** When the execution of the requested function is completed, the zero clear of the special area is performed.
- 3** When the bit in the special area is 1, and there is a request of function execution, the assigned function is performed.
- 4** If the above 1 to 3 is not applicable, reading of the special area is performed.



When creating a PLC program, note the following:

- (1) After checking that the special area is all "0", make the bit in the special area to "1".
(On the PLC program, even when the different bit is 1 in the different timing, it is regarded that plural bits are set to 1 at the same time depending on the communication timing.)
- (2) Before requesting to start reading the barcode, perform zero clear for the scanner information area (data length).
- (3) If the connection between the WB1F and PLC cannot be established after the specified times of retry, the process is transferred to the "Special Area Read".
- (4) When the bit in the special area is "1" when the communication is restored, the corresponding function is performed.
(Even for the function requested by the PLC program before the communication was unsuccessful, when the bit in the special area is "1" when the communication is established, the function is performed.)

e.g. PLC program and access to the data memory of WB1F

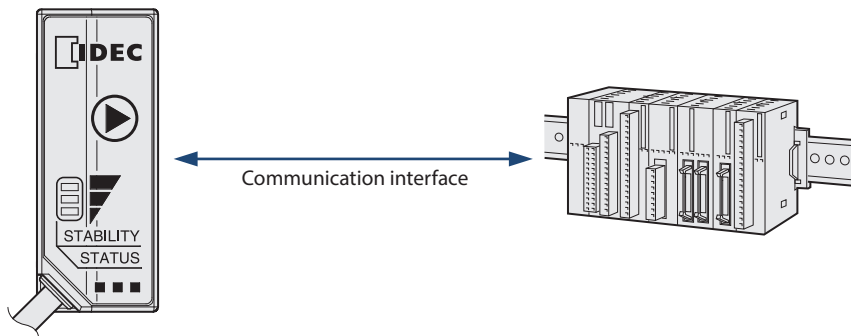


3 Setting and Wiring

This chapter describes the connection between the WB1F and PLC.

3.1 Connection to PLC

To use the PLC connection function, configure the WB1F model and the PLC; then, connect the WB1F model and PLC communication interfaces.



- To find the WB1F model, main unit and PLC interface specifications, please refer to the respective user's manuals for each.
- Please refer to the PLC manual for more information about PLC configuration.

3.2 MC Protocol Connection

3.2.1 Overview

The MC protocol performs data sending/receiving between the WB1F and the MELSEC sequencer.

The MC protocol is the abbreviation of "MELSEC Communication Protocol," which is the communication protocol for the MELSEC sequencer allowing the sequencer to communicate with external devices (such as the WB1F)

The WB1F can send/receive the data to/from the MC protocol supporting devices in the following conditions:

Protocol	Format 4, 4C frame, Check sum
Series supported *1	MELSEC iQ-R/iQ-F/Q/L series
Connection method	RS-232
Data memory	Data register

*1 For the details of supporting devices, refer to [\[1.4 Applicable PLC\]](#) on page 1-2.

3.2.2 WB1F Setting examples

To perform the data send/receive with the MELSEC sequencer, the setting of the RS-232 of the WB1F as well as the PLC connection is necessary.

When selecting the MC protocol, the protocol parameters [0] to [15] means the following setting respectively.

Protocol Parameter [0]	Station No.
Protocol Parameter [1]	Network No.
Protocol Parameter [2]	PC No.
Protocol Parameter [3]	I/O No. of the unit requested
Protocol Parameter [4]	Station No. of the unit requested
Protocol Parameter [5]	Local station No.
Protocol Parameter [6] to [15]	Not used

Here describes the setting examples of the WB1F:

Item	Sub Item	MC protocol Parameter	Address (hex)	Size (dec)	Setting example (hex)	Remarks
RS-232 settings	Communication speed		0100	1	03	03 : 9,600bps
	Data length		0101	1	01	01 : 8bits
	Parity		0102	1	01	01 : EVEN
	Stop bits		0103	1	00	00 : 1bit
	Flow control		0104	1	00	00 : NONE
PLC Connection	Function enabled		06C0	1	01	01 : Enabled
	Protocol Select		06C1	1	00	00 : MC Protocol Format4 4C(Q,L Series)
	Monitoring cycle		06C2	1	0A	0A : 10 × 10ms (100ms)
	Timeout		06C3	1	14	14 : 20 × 100ms (2,000ms)
	Retry Count		06C4	1	05	05 : 5 times
	Barcode data storage endian		06C5	1	00	00 : Lower→Upper
	Special Area Start Address		06C8	4	00	00000000 : D00000
			06C9		00	
			06CA		00	
			06CB		00	
	Scanner Information Area Start Address		06CC	4	10	00000010 : D000016
			06CD		00	
			06CE		00	
			06CF		00	
	Protocol Parameter [0]	Station No.	06E0	2	0000	0000 : Station No. 0
			06E1			
	Protocol Parameter [1]	Network No.	06E2	2	0000	0000 : Network No. 00
06E3						
Protocol Parameter [2]	PC No.	06E4	2	00FF	00FF : PC No. FF	
		06E5				
Protocol Parameter [3]	I/O No. of the unit requested	06E6	2	03FF	03FF : I/O No. of the unit requested 03FF	
		06E7				
Protocol Parameter [4]	Station No. of the unit requested	06E8	2	0000	0000 : Station No. of the unit requested 00	
		06E9				
Protocol Parameter [5]	Local station No.	06EA	2	0000	0000 : Local station No. 00	
		06EB				



The protocol parameter with the MC protocol set means that the parameter is named with the name of MC protocol component.

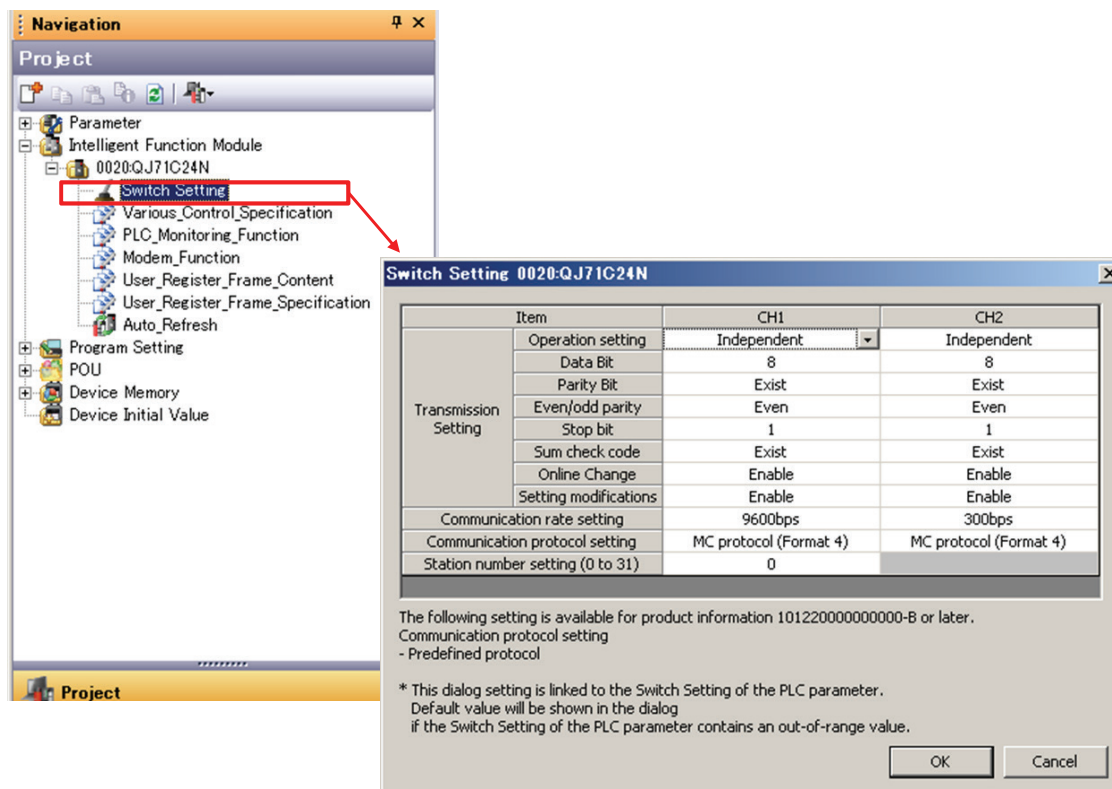
3.2.3 PLC Setting example

The following table shows the setting example of the serial communication unit, QJ71C24N.

	Parameter	Setting example	Remarks
Transmission setting	Operation setting	Independent	
	Data Bit	8	Align with the setting for WB1F.
	Parity Bit	Exist	Align with the setting for WB1F.
	Even/odd parity	Even	Align with the setting for WB1F.
	Stop bit	1	Align with the setting for WB1F.
	Sum check code	Exist	
	Online Change	Enable	
	Setting modifications	Enable	
	Communication rate setting	9,600bps	Align with the setting for WB1F.
	Communication protocol setting	MC protocol (Format 4)	
	Station number setting (0 to 31)	0	Align with the setting for WB1F.

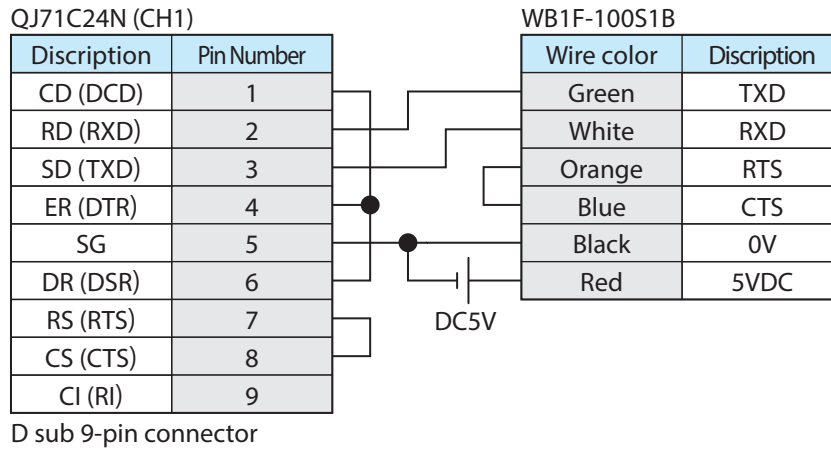
The above setting is available by GX Works2. Here is the step (Connect the WB1F to CH1).

In the Navigation window, double click [Project], [Intelligent Function Unit], [0020:QJ71C24N], [Switch Setting], to open the Switch setting window. Perform setting of the channel (CH) as in the following figure.



3.2.4 Wiring example

The following figure shows the wiring example of a QJ71C24N and a WB1F (WB1F-100S1B).
Perform wiring by referring to the figure. During wiring, turn OFF the power.



Caution

Never reverse the power connections or else damage may result.
When wiring, be sure to read the User's Manual of the WB1F in advance.

4 Menu Sheet

Menu sheets are a collection of labels for use in configuring WB1F Fix Linear CCD Scanner functions. Scanning the listed labels allows the WB1F model's setting values to be changed/saved/referenced. For information on how to use menu sheets, please refer to Menu Sheet WB1F_MenuSheet_E, B-1782. The setting values written in white against a black background in the menu sheet below are the WB1F default values.

1. RS-232 settings

● Communication speed



Reference



1,200bps



2,400bps



4,800bps



9,600bps



19,200bps



38,400bps



57,600bps



115,200bps

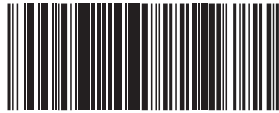


Save

● Data length



Reference



7bit

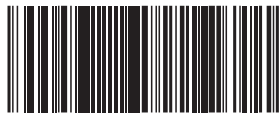


8bit

● Parity



Reference



NONE



EVEN



ODD



Save

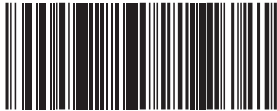
● Stop bits



Reference



1bit

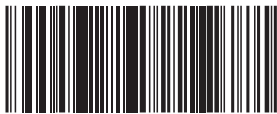


2bit

● Flow control



Reference



None



CTS/RTS



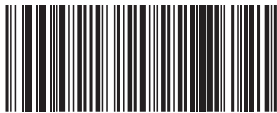
Save

2. PLC Connection

● Function enabled



Reference



Disabled



Enabled

● Protocol Select



Reference



MC Protocol Format 4 4C (Q,L Series)

● Monitoring cycle



Reference

Read the "Hexadecimal input" label
of clause 3 after reading these label.



Setting Value × 10ms
(10ms to 2,550ms)



Save

● Timeout



Reference

Read the "Hexadecimal input" label of clause 3 after reading these label.



Setting Value × 100ms
(100ms to 25,500ms)

● Retry Count



Reference

Read the "Hexadecimal input" label of clause 3 after reading these label.



Times
(1times to 255times)

● Barcodel data storage endian



Reference



Lower→Upper



Upper→Lower



Save

● Special Area Start Address



Reference
4 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2



3



4



Save

● Scanner Information Area Start Address



Reference
4 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2



3



4



Save

● Protocol Parameter [0] : Station No.



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2

● Protocol Parameter [1] : Network No.



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2



Save

● Protocol Parameter [2] : PC No.



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2

● Protocol Parameter [3] : I/O No. of the unit requested



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2



Save

● Protocol Parameter [4] : Station No. of the unit requested



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2

● Protocol Parameter [5] : Local station No.



Reference
2 characters

Read the "Hexadecimal input" label
of clause 3 after reading these label.



1



2



Save

3. Hexadecimal input

0



1



2



3



4



5



6



7



8



9



A



B



C



D



E



F



Cancel



Decision



Save

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