IEC Standard

IEC 60870-5-101 Driver

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Introduction

This manual describes how to connect display and the External Device (target PLC).

In this manual, the connection procedure will be described by the following sections:



1. System Configuration

The system configuration for IEC 60870-5-101 devices and the display connected are shown as follows.

Series Name	CPU	Link I/F	SIO Type	Configuration Example	Cable Diagram
TELVENT	SM-CPU	COM		Example 1	1
Selta STCE	CPU2000	COM A COM B	RS-232C	Example 2	2

- Connection Configuration
 - 1:1 Connection



Master

Slave

IPC COM Port

When connecting IPC with an External Device, the COM port used depends on the series and SIO type. Please refer to the IPC manual for details.

Usable port

Carias		Usable Port	
Series	RS-232C	RS-422/485(4 wire)	RS-422/485(2 wire)
PS-2000B	COM1 ^{*1} , COM2, COM3 ^{*1} , COM4	-	-
PS-3450A, PS-3451A, PS3000-BA, PS3001-BD	COM1, COM2*1*2	COM2*1*2	COM2*1*2
PS-3650A (T41 model), PS-3651A (T41 model)	COM1 ^{*1}	-	-
PS-3650A (T42 model), PS-3651A (T42 model)	COM1 ^{*1*2} , COM2	COM1*1*2	COM1*1*2
PS-3700A (Pentium®4-M) PS-3710A	COM1 ^{*1} , COM2 ^{*1} , COM3 ^{*2} , COM4	COM3*2	COM3*2
PS-3711A	COM1 ^{*1} , COM2 ^{*2}	COM2 ^{*2}	COM2 ^{*2}
PS4000 ^{*3}	COM1, COM2	-	-
PL3000	COM1 ^{*1*2} , COM2 ^{*1} , COM3, COM4	COM1 ^{*1*2}	COM1*1*2
PE-4000B Atom N270	COM1, COM2	-	-
PE-4000B Atom N2600	COM1, COM2	COM3 ^{*4} , COM4 ^{*4} , COM5 ^{*4} , COM6 ^{*4}	COM3 ^{*4} , COM4 ^{*4} , COM5 ^{*4} , COM6 ^{*4}
PS5000 (Slim Panel Type Core i3 Model) ^{*5*6}	COM1, COM2 ^{*4}	COM2 ^{*4}	COM2 ^{*4}
PS5000 (Slim Panel Type Atom Model) ^{*5*6}	COM1, COM2 ^{*7}	COM2*7	COM2*7
PS5000 (Enclosed Panel Type) ^{*8}	COM1		
PS5000 (Modular Type PFXPU/PFXPP) ^{*5*6} PS5000 (Modular Type PFXPL2B5-6)	COM1 ^{*7}	COM1 ^{*7}	COM1 ^{*7}
PS5000 (Modular Type PFXPL2B1-4)	COM1, COM2 ^{*7}	COM2*7	COM2*7

*1 The RI/5V can be switched. Use the IPC's switch to change if necessary.

*2 Set up the SIO type with the DIP Switch. Please set up as follows according to SIO type to be used.

*3 When making communication between an External Device and COM port on the Expansion slot, only RS-232C is supported. However, ER (DTR/CTS) control cannot be executed because of the specification of COM port.

For connection with External Device, use user-created cables and disable Pin Nos. 1, 4, 6 and 9. Please refer to the IPC manual for details of pin layout.

- *4 Set up the SIO type with the BIOS. Please refer to the IPC manual for details of BIOS.
- *5 When setting up communication between an External Device and the RS-232C/422/485 interface module, use the IPC (RS-232C) or PS5000 (RS-422/485) cable diagrams. However, when using PFXZPBMPR42P2 in a RS-422/485 (4-wire) configuration with no flow control, connect 7.RTS+ and 8.CTS+, and connect 6.RTS- and 9.CTS-. When using RS-422/485 communication with External Devices, you may need to reduce the transmission speed and increase the TX Wait time.
- *6 To use RS-422/485 communication on the RS-232C/422/485 interface module, the DIP Switch setting is required. Please refer to "Knowledge Base" (FAQs) on the support site. (http://www.pro-face.com/trans/en/manual/1001.html)

Settings	FAQ ID
PFXZPBMPR42P2, RS422/485 change method	FA263858
PFXZPBMPR42P2 termination resistor setting	FA263974
PFXZPBMPR44P2, RS422/485 change method	FA264087
PFXZPBMPR44P2 termination resistor setting	FA264088

*7 Set up the SIO type with the DIP Switch. Please refer to the IPC manual for details of DIP Switch.

The BOX Atom has not a switch to set the RS-232C, RS-422/485 mode. Use the BIOS for the setting.

*8 For the connection with the External Device, on the user-created cable read as if the connector on the Display-side is a M12 A-coding 8 pin socket. The pin assignment is the same as described in the cable diagram. For the M12 A-coding connector, use PFXZPSCNM122.

DIP Switch settings (PL3000 / PS3000 Series)

DIP Switch	Setting	Description
1	OFF ^{*1}	Reserved (always OFF)
2	OFF	SIQ terms DS 222C
3	OFF	SIO type: KS-252C
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA (RXA): Not available
8	OFF	Short-circuit of SDB (TXB) and RDB (RXB): Not available
9	OFF	PS (PTS) Auto control model Dischlod
10	OFF	KS (K1S) Auto control mode. Disabled

RS-232C

*1 When using PS-3450A, PS-3451A, PS3000-BA and PS3001-BD, turn ON the set value.

RS-422/485 (4 wire)

DIP Switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIO tomos DS 422/485
3	ON	SIO type: KS-422/485
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	OFF	Short-circuit of SDA (TXA) and RDA (RXA): Not available
8	OFF	Short-circuit of SDB (TXB) and RDB (RXB): Not available
9	OFF	PS (PTS) Auto control model Dischlod
10	OFF	KS (K1S) Auto control mode. Disabled

RS-422/485 (2 wire)

DIP Switch	Setting	Description
1	OFF	Reserved (always OFF)
2	ON	SIQ trans DS 422/495
3	ON	SIO type: KS-422/485
4	OFF	Output mode of SD (TXD) data: Always output
5	OFF	Terminal resistance (220 Ω) insertion to SD (TXD): None
6	OFF	Terminal resistance (220 Ω) insertion to RD (RXD): None
7	ON	Short-circuit of SDA (TXA) and RDA (RXA): Available
8	ON	Short-circuit of SDB (TXB) and RDB (RXB): Available
9	ON	PS (PTS) Auto control model Enchlad
10	ON	KS (K1S) Auto control mode. Enabled

2. Selection of External Device

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Manufacturer	Select the maker of the External Device to be connected. Select "IEC Standard"
Series	Select a model (series) of the External Device to be connected and connection method. Select "IEC 60870-5-101". Check the External Device which can be connected in system configuration. C "System Configuration"
Port	Select the Display port to be connected to the External Device. (Select COM1)

3. Example of Communication Setting

Examples of communication settings of the display and the external device recommended by Pro-face are shown.

3.1. Setting Example 1

- Setting of GP-Pro EX
 - Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC]. Please select REE Profile for TELVENT devices.

Device/PLC1
Summary Change Device/PLC
Manufacturer IEC Standard Series IEC 60870-5-101 Port COM1
Text Data Mode 1 Change
Communication Settings
SID Type 💿 RS232C 💿 RS422/485(2wire) 💿 RS422/485(4wire)
Speed 19200
Data Length O 7 O 8
Parity O NONE O EVEN O ODD
Stop Bit 1 2
Flow Control O NONE O ER(DTR/CTS) O X0N/X0FF
Timeout 3 🚖 (sec)
Retry 2
Wait To Send 0 🚊 (ms)
EC 60870-5-101 Parameters
Transmisson Mode Unbalanced Set REE Profile
Common Address of ASDU
Frame Length 255 🚔 byte(s)
Size of Link Address 1 🗾 byte(s)
Size of ASDU Address 2 💌 byte(s)
Size of Object Info. 1 vyte(s)
Size of of Cause of Transmission 1 J byte(s)
RI / VCC
In the case of RS232C, you can select the 9th pin to RI (Input) or VEC (5V Power Supply). If you use the Digital's RS232C
Isolation Unit, please select it to VCC. Default
Device-Specific Settings
Allowable Number <u>Add Device</u> of Devices/PLCs 16
No. Device Name Settings Device
1 PLC1 Interaction Profile=REE, Common Address of ASDU=1, Link Addres

Device Settings

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings]

• Station Configuration

💕 Individual Device Settings	×
PLC1	
Station Configuration Information Object Address Configuration	
Controlled Station	
Link Address	1
Common Address of ASDU	1
Please confirm that Link Address and Common Address of ASDU are Link Address : <0 ~ 65534> : When Size of Link Address is 2. <0 ~ 254> : When Size of Link Address is 1. Common Address of ASDU: <1 ~ 65534> :When Size of ASDU Address is 2. <1 ~ 254> : When Size of ASDU Address is 1.	within range.
Clock Synchronization	
Time Interval (In Minutes)	15 🛨
Synchronize Display Unit Clock	
Synchronize After Initialization	
Command Transmission Procedure	
Command Transmission Method © Select/Execute	C Direct Execute
Use Execute Termination	N
 OK	Default

Please set the following configuration items as shown below.

Configuration items	Setting
Synchronize Display Unit Clock	ON
Synchronize After Initialization	ON
Command Transmission Method	Select /Execute
Use Execute Termination	ON

• Information Object Address Configuration

Please select REE profile for TELVENT devices.

Individual Device Settings	;			
Station Configuration Information	on Object Address (Configuration	1	
Interoperability Profile				
Profile		REE		•
(Please reconfirm all address profile.)	settings that you a	are using if y	ou have change	ed the
Address of Object Information				
Name	Start Address	Range	End Address	ASDU Name
Single Point Information	1000	9999	10999	SP
Double Point Information	11000	1999	12999	DP
Measured Value	13000	1999	14999	ME
Single Command	15000	1999	16333	SL IT
Step Position	19000	1999	20999	ST
Set Point Command	21000	1999	20000	SE
Double Command	23000	1999	24999	DC
Regulating Command	25000	1999	26999	RC
			OK (<u>0)</u>	Default Cancel

External Device Settings

External Device settings vary depending on the device. Refer to your External Device manual for details.

3.2. Setting Example 2

- Setting of GP-Pro EX
 - Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].

Device/PLC 1					
Summary					Change Device/PLC
Manufacturer IEC Sta	ndard	Series IE	C 60870-5-1	D1	Port COM1
Text Data Mode	1 <u>Change</u>				
Communication Settings					
SIO Type	RS232C	O RS422/485(2wire	e) O F	S422/485(4wire)	
Speed	19200	T			
Data Length	O 7	• 8			
Parity	NONE	C EVEN	O ODD		
Stop Bit	● 1	O 2			
Flow Control	NONE	C ER(DTR/CTS)	C XON/	KOFF	
Timeout	3 🕂 (sec)			
Retry	2 📫				
Wait To Send	0 🗧 (ms)			
⊢IEC 60870-5-101 P	arameters ——				
Transmisson Mode		Unbalanced	~	REE Profile	
Common Address o	FASDU	1 📩			
Frame Length		255 🕂	byte(s)		
Size of Link Addres	s	1 💌	byte(s)		
Size of ASDU Addr	ess	2 💌	byte(s)		
Size of Object Info.		1 💌	byte(s)		
Size of of Cause of	Transmission	1 💌	byte(s)		
RI / VCC	• RI	O VCC			
In the case of RS2 or VCC (5V Power	32C, you can selec Supply). If you use	x the 9th pin to RI (Input) the Digital's RS232C	ut)		
Isolation Unit, pleas	e select it to VCC.	-		Default	
Device-Specific Settings					
Allowable Number of Devices/PLCs	Add I 16	Device			
No. Device Name	Settings				Add Indirect Device
👗 1 PLC1	Profile=	Generic,Common Addre	ess of ASDU	=1,Link Add	.

NOTE	 Please confirm that the following IEC 60870-5-101 parameters are configured according to PLC settings. Size of Link Address
	 Size of ASDU Address Size of Object Info.

• Size of Cause of Transmission

Device Settings

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings]

• Station Configuration

🚔 Individual Device Settings	×
PLC1	
Station Configuration Information Object Address Configuration	
Controlled Station	
Link Address	1
Common Address of ASDU	1 😳
Please confirm that Link Address and Common Address of ASDU are Link Address : <0 ~ 65534> : When Size of Link Address is 2. <0 ~ 254> : When Size of Link Address is 1. Common Address of ASDU: <1 ~ 65534> :When Size of ASDU Address is 2. <1 ~ 254> : When Size of ASDU Address is 1.	within range.
Clock Synchronization	15
Time mervar (m minutes)	
Synchronize Display Unit Clock	
Synchronize After Initialization	
Command Transmission Procedure	
Command Transmission Method Select/Execute	C Direct Execute
Use Execute Termination	
	Default
ОК	(<u>0</u>) Cancel

NOTE

• Please specify Command Transmission Method according to PLC settings.

• Information Object Address Configuration

Profile (Please reconfirm all address profile.)	s settings that you a	Generi re using if y	ic ou have change	▼ ed the		
ddress of Object Information						
Name	Start Address	Bange	End Address			
Single Point Information	1000	qqqq	10999	SP SP Adme		
Double Point Information	11000	1999	12999	DP		
Measured Value	13000	1999	14999	MF		
Single Command	15000	1999	16999	SC		
Integrated Total	17000	1999	18999	IT		
Step Position	19000	1999	20999	ST		
Set Point Command	21000	1999	22999	SE		
Double Command	23000	1999	24999	DC		
Regulating Command	25000	1999	26999	BC		
<u>dit</u>						

NOTE

• Please specify correct ranges of objects according to PLC settings by selecting "Generic" profile.

External Device Settings

External Device settings vary depending on the device. Refer to your External Device manual for details.

4. Setup Items

Setup the Display's communication settings in GP-Pro EX or in Display's offline mode. The setting of each parameter must match that of the External Device.

4.1. GP-Pro EX Setup Items

Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].

Device/FLC1						
Summary Change Device/PLC						
Manufacturer IEC Standard Series IEC 60870-5-101 Port COM1						
Text Data Mode 1 Change						
Communication Settings						
SIO Type IC RS232C IC RS422/485(2wire) IC RS422/485(4wire)						
Speed 19200						
Data Length O 7 O 8						
Parity O NONE O EVEN O ODD						
Stop Bit O 2						
Flow Control O NONE O ER(DTR/CTS) O XON/XOFF						
Timeout 3 😴 (sec)						
Retry 2						
Wait To Send 🛛 🔁 (ms)						
- IFC 60870-5-101 Parameters						
Transmisson Mode Unbalanced BEE Profile						
Common Address of ASDU						
Frame Length 255 😴 byte(s)						
Size of Link Address 1 J J byte(s)						
Size of ASDU Address 2 July byte(s)						
Size of Object Info. 1 vte(s)						
Size of of Cause of Transmission 1 J byte(s)						
In the case of RS232C, you can select the 9th pin to RI (Input)						
Isolation Unit, please select it to VCC. Default						
Device-Specific Settings						
Allowable Number Add Device						
No. Device Name Settings Device						
1 PLC1 Imp Profile=REE,Common Address of ASDU=1,Link Addres						

Note:

Use the "REE Profile" link to set all the required communication parameters for communicating with SAITEL equipment.

Setup Items	Description				
SIO Type	Select "RS232"	elect "RS232"			
Speed	Select the communication speed.	(Set 19200 Kbps)			
Data Length	Select "8"				
Parity	Select "NONE"				
Stop Bit	Select "1"				
Flow Control	Select "NONE"				
Timeout	Use an integer value from 1 to 12 for which the Display waits for the Device.	7 to enter the time (second) response from External			
Retry In case of no response from the External Device, use an integer from 0 to 255 to enter how many times the Display retransmits the command.					
Wait to Send	Jse an integer from 0 to 255 to enter standby time (ms) for he Display from receiving packets to transmitting next commands.				
IEC101 Related Parameters					
Transmission Mode		Only "Unbalanced Mode" is supported			
Common Address of ASDU					
Frame Length	Please select according to	Fixed to 255.			
Size of Link Address	REE Profile.				
Size of ASDU Address	values]				
Size of Object Information					
Size of Cause of Transmission					

- NOTE
- Refer to the GP-Pro EX Reference Manual for Indirect Device. Cf. GP-Pro EX Reference Manual "Changing the Device/PLC at Runtime (Indirect Device)"

Device Settings

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings]

• Station Configuration

Findividual Device Settings	×
Station Configuration Information Object Address Configuration	
Controlled Station	
Link Address	1
Common Address of ASDU	1
Please confirm that Link Address and Common Address of ASDU are Link Address : <0 ~ 65534> : When Size of Link Address is 2. <0 ~ 254> : When Size of Link Address is 1. Common Address of ASDU <1 ~ 65534> :When Size of ASDU Address is 2. <1 ~ 254> : When Size of ASDU Address is 1.	within range.
Clock Synchronization	
Time Interval (In Minutes)	15 🛨
Synchronize Display Unit Clock	
Synchronize After Initialization	
Command Transmission Procedure	
Command Transmission Method Select/Execute	C Direct Execute
Use Execute Termination	
	Default
OK	U) Cancel

Setup Items	Description		
Link Address	Set the Slave station Link Address here.		
Common Address of ASDU	Set the slave station Common Address of ASDU		
Time Interval (in Minutes)	Set the frequency to send "Clock Synchronization Command [CON 103]"		
Synchronize Display Unit Clock	Check this to adjust the Display unit clock when PLC sends time for Clock Synchronize command		
Synchronize After Initialization	Set whether clock synchronization must be followed after initialization		
Command Transmission Method	Select Select / Execute or Direct Execute according to PLC settings		
Use Execute Termination	Set whether the target PLC transmits "Activation Termination" after executing a command.		

NOTE

 Please confirm that Link Address and Common Address of ASDU are within range of the values.

• Information Object Address Configuration:

🖆 Individual Device Settings 🛛 🔀							
PLC1							
Station Configuration Informatio	n Object Address C	Configuration]				
Interoperability Profile							
Profile	Profile REE						
(Please reconfirm all address profile.)	(Please reconfirm all address settings that you are using if you have changed the profile.)						
Address of Object Information							
Name Single Point Information Double Point Information Measured Value Single Command Integrated Total Step Position Set Point Command Double Command Regulating Command	Start Address 1000 11000 13000 15000 17000 21000 23000 25000	Hange 9999 1999 1999 1999 1999 1999 1999 19	End Address 10999 12999 14999 16999 20999 22999 24999 26999	ASUU Name SP DP ME SC IT ST SE DC RC			
			OK (<u>0)</u>	Default			

NOTE

- Please refer to External Device user manual for more details about how to setup Link Address and other settings.
- When "REE" profile is selected, Address of object information is fixed.
- When "Generic" profile is selected, address of object information can be configured.

4.2. Setup Items in Offline Mode

• Refer to the Maintenance/Troubleshooting guide for information on how to enter offline mode or about the operation. Cf. Maintenance/Troubleshooting Guide "Offline Mode"

Communication Settings

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings] in the off-line mode. Touch the External Device you want to set from the displayed list.

	Comm.	Device	Option				
	IEC 60870-5-101		<u> </u>	[COM1]	Page 1/2		
		SIO Type	RS232	C	•		
		Data Length	0 7	• 8			
		Parity Stop Bit	 NON 1 	IE 🔶 EVEN	💮 ODD		
		Flow Control	NONE	۷ ۷			
		Timeout(s)		3 👻			
		Retry		2			
		Wait To Send(ms)		0 💌			
		(
		Exit		Back	2014/06/22 21:18:27		
Setup Items Setup Descriptions							
		Select the SIO T	ype to communi	cate with Externa	al Device		
		IMPORTANT					
SIC	О Туре	To make the communication settings correctly, confirm the serial					
		interface specific quarantee the or	cations of Display	y unit for [SIO Ty munication type f	pej. We cannot that the serial		
		interface does no	ot support is spe	cified. For details	concerning the		
		serial interface s	pecifications, ref	er to the manual	for Display unit.		
Sp	eed	the Display.	iunication speed	between the Ext	ernal Device and		
Da	ta Length	Select data leng	th.				
Pa	rity	Select how to check parity.					
Sto	pp Bit	Select a Stop bit length					

Setup Items	Setup Descriptions
Flow Control	Select the communication control method to prevent overflow of transmission and reception data.
Timeout	Use an integer from 1 to 127 to enter the time (s) for which the Display waits for the response from the External Device.
Retry	In case of no response from the External Device, enter how many times the Display retransmits the command, from "0 to 255".
Wait To Send	Enter the standby time (ms) from when the Display receives packets until it transmits the next command,

♦ IEC 60870-5-101 Parameters:

Comm	Device	Opti	ion				
IEC 60870-5-	-101			[COM1]	Page 2/2		
Common Address of ASDU 1 Size of Link Address 2 Size of ASDU Address 2 Size of Object Info. 1 Size of Cause of Trans. 1							
	Exit			Back	2014/06/22 21:18:34		
Setup	Setup Items			etup Descriptio	ns		
Common Addre	Common Address of ASDU			Displays Common Address of ASDU.			
	Size of Link Address Coloct the Link Address Cize [1 at 0 Dites]						

Size of Link Address	Select the Link Address Size. [1 or 2 Bytes]
Size of ASDU Address	Select the size of ASDU Address [1 or 2 Bytes]
Size of Object Information	Select the Size of Object Information address[1 or 2 or 3 Bytes]
Size of Cause of Transmission	Select the Size of Cause of Transmission [1 or 2 Bytes]

IMPORTANT

Please select IEC60870-5-101 specific parameters according to the External Device/PLC. If the setting does not match, communication error happens.

Device Settings

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings]. Touch the External Device you want to set from the displayed list, and touch [Device].

	Comm.	Devi	ce	Option					
	IEC 60870-5-101				[COM1]	Page 1/2			
	Devic	e/PLC Nam	e PL	01					
	Profile REE Link Address 1 Common ASDU Address 1 (Please confirm that the Link Address and Common ASDU address are within range) Clock Synchronization: Clock Sync, Interval(min) Sync, Display unit Clock Sync, After Init. Command Transmission Procedure: Transmission Method Select Use Execute Termination								
Exit Back					2014/06/22 21:18:40				
	Setup Items			Setup Descriptions					
Pr	ofile		Displays selected profile.						
Lir	nk Address		Select the Link Address of the External Device/PLC						
Co	ommon ASDU		Address Select the Common ASDU Address of the External Device/PLC						
Cl	ock Sync.Interva		Select the Time Interval (in minutes) to send Clock Synchronization command.						

Common ASDU	Address Select the Common ASDU Address of the External Device/PLC
Clock Sync.Interval	Select the Time Interval (in minutes) to send Clock Synchronization command.
Sync. Display unit	Clock Select to adjust Display unit clock when Time data received from External Device/PLC.
Sync. After Init.	Set whether clock synchronization must be followed after initialization
Transmission Method	Set the command transmission sequence to use from the following options. Select /Execute Direct Execute
Use Execute Termination	Set whether the target PLC transmits "Activation Termination" after executing a command.

Comm.	Device	Option					
IEC 60870-5-101 Devic	e/PLC Name JPL Name Single Point Inf	C1 St ormation 10	[COM1] art Address	Page 2/2			
	Double Point Information Step Position Information Measured Values Integrated Totals Single Command Double Command Regulating Command Set Point Command			1999 1999 1999 1999 1999 1999 1999 199			
	Exit		Back	2014/06/22 21:18:46			
Setup Items		Setup Descriptions					
Name	Displays Ado	Displays Address Object Information Name					
Start Address	Displays Ado	Displays Address Object Information Start Address					
Range	Displays Add	Displays Address Object Information Range.					

Option

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Equipment Settings]. Touch the

External Device you want to set from the displayed list, and touch [Option].

	Comm.	Device	Option					
	IEC 60970-5-101			[COM1]	Page 1/1			
	IEC 60870-9-101	RI / VCC In the case the 9th pin Power Suppl RS232C Isol it to VCC.	• RI of RS232C, you to RI(Input) or y).If you use th ation Unit, plea	[CUMI] can select VCC(5V ne Digital's ise select	Page 1/1			
		Exit		Back	2014/06/22 21:18:52			
	Setup Items		Setup	Descriptions				
RI	You can switch between RI/VCC on the 9th pin when you sele RS-232C for SIO type.RI/VCCTo connect to the IPC, you need to switch between RI/5V usin the IPC selector switch. Refer to your IPC manual for details.							
N	• GP-4100 series, GP-4*01TM, GP-Rear Module, LT-4*01TM and LT-Rear Module do not have the [Option] setting in the							

offline mode.

5. Cable Diagrams

The following cable diagrams may be different from cable diagrams recommended by External Device Manufacturer. Please be assured there is no operational problem in applying the cable diagrams shown in this manual.

- The FG pin of the External Device body must be grounded according to your country's applicable standard. Refer to your External Device manual for details.
- SG and FG are connected inside the Display. When connecting the External Device to SG, design your system to avoid short-circuit loops.
- Connect an isolation unit if the communication is not stable due to noise or other factors.
- The connector type or signal name may vary depending on the External Device.

Connect correctly corresponding to the External Device interface specifications.

5.1. Cable Diagram 1

Display (Connection Port)		Cable	Remarks
GP3000 (COM1) GP4000 ^{*1} (COM1) SP5000 ^{*2} (COM1/2) SP-5B00 (COM1) ST (COM1) LT3000 (COM1) IPC ^{*3} PC/AT	1A	User created cable	The cable length must be 15m maximum.
GP-4105 (COM1) GP-4115T (COM1) GP-4115T3 (COM1)	1B	User created cable	The cable length must be 15m maximum.
LT-4*01TM (COM1) LT-Rear Module (COM1)	1C	RJ45 RS-232C Cable (5m) by Pro-face PFXZLMCBRJR21	The cable length must be 5m maximum.

*1 All GP4000 models except GP-4100 series and GP-4203T

*2 Except SP-5B00

*3 Only the COM port which can communicate by RS-232C can be used. ∽ ■IPC COM Port (page 4)

1A)

	Disj D-Sub 9	olay side) pin (socket) Shield E	External	Device side
	Pin	Signal name		Pin	Signal name
Display	2	RD(RXD)	←	3	SD
	3	SD(TXD)		6	RD
	5	SG		4	SG
	7	RS(RTS)	─┐┊└┊┊╴-[5	SG
	8	CS(CTS)	$- \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$		
	Shell	FG	<u> </u>		

1B)

	Display side Terminal block	Shield	External	Device side
	Signal name	/ 7\	Pin	Signal name
Display	RD(RXD)		3	SD
	SD(TXD)	}	6	RD
	SG	} - ÷ • ÷ ÷ · ·	4	SG
	RS(RTS)	┠─┐┊└ ┊┊ ──	5	SG
	CS(CTS)			

1C)



5.2. Cable Diagram 2

Display (Connection Port)		Cable	Remarks
GP3000 (COM1) GP4000*1 (COM1) SP5000*2 (COM1/2) SP-5B00 (COM1) ST (COM1) LT3000 (COM1) IPC*2 PC/AT	2A	User created cable	The cable length must be 15m maximum.
GP-4105 (COM1) GP-4115T (COM1) GP-4115T3 (COM1)	2B	User created cable	The cable length must be 15m maximum.
LT-4*01TM (COM1) LT-Rear Module (COM1)	2C	RJ45 RS-232C Cable (5m) by Pro-face PFXZLMCBRJR21	The cable length must be 5m maximum.

*1 All GP4000 models except GP-4100 series and GP-4203T

*2 Except SP-5B00

*3 Only the COM port which can communicate by RS-232C can be used.

☞ ■IPC COM Port (page 4)

2A)

	Disj D-Sub 9	olay side) pin (socket	.)	Sł	nield		External D-Sub 9	Device side pin (socket)
	Pin	Signal name			\sim		Pin	Signal name
Display	2	RD(RXD)	•	<u>i</u>			3	SD(TXD)
	3	SD(TXD)		-		-	2	RD(RXD)
	5	SG		-			5	SG
	7	RS(RTS)		ļ			7	RS(RTS)
	8	CS(CTS)			\ /		8	CS(CTS)
	Shell	FG		<u> </u>	····		Shell	FG

2B)

	Display side Terminal block	Shield	External D-Sub 9	Device side pin (socket)
	Signal name	$\overline{7}$	Pin	Signal name
Display	RD(RXD)	← [3	SD(TXD)
	SD(TXD)		2	RD(RXD)
	SG		5	SG
	RS(RTS)		7	RS(RTS)
	CS(CTS)	-	8	CS(CTS)
		· · · · · · · · · · · · · · · · · · ·	Shell	FG



6. Supported Device Address

The following table shows the range of supported device addresses. Please note that the actual supported range of the devices varies depending on the External Device to be used. Please check the actual range in the manual of your External Device.

NOTE

• When use any address range, set the [Generic] in [Information Object Address Configuration] tab - [profile] of [Individual Device Settings].

Device Name	Description	Range	Note
SP	Single Point Information	1000 ~ 10999	Read only
DP	Double-Point Information	11000 ~ 12999	Read only
ME	Measured Value	13000 ~ 14999	Read only
SC	Single Command	15000 ~ 16999	Write only
IT	Integrated Totals	17000 ~ 18999	Read only
ST	Step Position Information	19000 ~ 20999	Read only
SE	Set Point Command	21000 ~ 22999	Write only
DC	Double Command	23000 ~ 24999	Write only
RC	Regulating Step Command	25000 ~ 26999	Write only

Each device consists of several sub category and elements. The following
table lists the sub category and elements for each Device group

Device	Sub Category / Element		Description	Noto
Name	Category	Element	Description	Note
SP	SIQ	SPI	Single Point Information 0: OFF 1: ON	*1
		BL	0: Not Blocked 1: Blocked	*1
		SB	0: Not Substituted 1: Substituted	*1
		NT	0: Topical 1: Not Topical	*1
		IV	0: Valid 1: Invalid	*1
		IV	Valid	*1
	TIME	SU	Summer Time	*1
		MSEC	Milliseconds	*2
		MIN	Minute	*2
		HOUR	Hour	*2
		DAY	Day	*2
		MONTH	Month	*2
		YEAR	Year	*2
	DIQ	BL	Blocked / Not Blocked	*1
		SB	Substituted / Not Substituted	*1
DP		NT	Topical / Not Topical	*1
		IV	Valid / Invalid	*1
		DPI	Double Point Information	*2

Device	Sub Category / Element		Description	Nata
Name	Category	Element	Description	Note
		IV	Valid	*1
		SU	Summer Time	*1
		MSEC	Milliseconds	*2
חח		MIN	Minute	*2
DP		HOUR	Hour	*2
		DAY	Day	*2
		MONTH	Month	*2
		YEAR	Year	*2
	VTI	Т	Transient	*1
	VII	VAL	Value	*2
		OV	Overflow / No Overflow	*1
		BL	Blocked / Not Blocked	*1
	QDS	SB	Substituted / Not Substituted	*1
		NT	Topical / Not Topical	*1
		IV	Valid / Invalid	*1
ST		IV	Valid	*1
•		SU	Summer Time	*1
		MSEC	Milliseconds	*2
		MIN	Minute	*2
	TIME	HOUR	Hour	*2
			Day	*2
			Day	<u>ک</u>
			Month	<u>∠</u>
			real	<u>ک</u>
		00	Overnow / No Overnow	*4
	0.50	BL	BIOCKEd / NOT BIOCKED	**
	QDS	SB	Substituted / Not Substituted	*1
		NI	I opical / Not I opical	*1
		IV	Valid / Invalid	*1
	VA	VAL	Measured Value	*2
ME		IV	Valid	*1
		SU	Summer Time	*1
		MSEC	Milliseconds	*2
		MIN	Minute	*2
		HOUR	Hour	*2
		DAY	Day	*2
		MONTH	Month	*2
		YEAR	Year	*2
		VAL	Counter value	*2
		SQ	Sequence	*2
		01	(Carry) Counter Overflow / No	*4
	BCR	CY	Överflow	^1
			Counter Adjusted / Not	*4
		CA	Adjusted	^1
		IV	Counter value Valid / Invalid	*1
ІТ		IV	Valid	*1
		SU	Summer Time	*1
		MSEC	Milliseconds	*2
		MIN	Minute	*2
	TIME	HOUR	Hour	*2
			Dav	*2
		MONTH	Month	*2
			Voor	*0
80	800	I EAK	lical Single command state	<u>۲</u> *۱
	500	303		*0
		DCS		2
RC	RCO	RCS	Regulating step command	*2
SE	VA	VAL	Value (Normalized / Scaled / short floating point)	*2

*1 Bit Address Only *2 Word Address Only

7. Error Messages

Error messages are displayed on the screen of the Display as follows: "No. : Device Name: Error Message (Error Occurrence Area). Each description is shown below.

ltem	Description
No.	Error number
Device Name	Name of the external device where an error has occurred.
	Device /PLC name is the title of the External Device set
	with GP-Pro EX (Initial value [PLC1])
Error Message	Displays messages related to an error that has occurred
Error occurrence	Displays the device address of the External device where
Area	an error has occurred or error codes received from the
	External Device.

Example of an Error Message:

"RHAA035: PLC1: Error has been responded for device write command (Error Code: 2[02H])"

NOTE	 Refer to your External Device manual for details on received error codes. 			
		Refer to "When an error is displayed (Error Code List)" in "Maintenance/Troubleshooting		
		Manual" for details on the error messages common to the driver.		

Error Messages specific to the External Device

Error No	Error Message	Description
RHxx128	(Node Name): NACK: message not accepted. Link busy	PLC sends NACK for Displays request.
RHxx129	(Node Name): Link service not functioning	PLC replied this for Display request in Control byte [Function Code]
RHxx130	(Node Name): Link service not implemented	PLC replied this for Display request in Control byte [Function Code]
RHxx131	Configured object information range is too large. Please reduce the range	Insufficient memory to allocate the specified device address ranges.
RHxx132	(Node Name): Command confirmation timed out.	PLC does not reply to commands. Please check communication settings.
RHxx133	(Node Name):Initialization procedure timed out.	PLC does not respond to interrogation command. Please check communication settings.

8. Interoperability list

8.1. Network configuration

Point-to-poin	t
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- $\hfill\square$ Multiple point to point
- □ Redundant lines

Multi-point-party line

Multi point star

8.2. Physical layer

Transmission speed (control direction)					
Unbalanced	Unbalanced interface	Balanced interchange	circuit X.24/X.27		
interchange circuit	circuit V.24/V.28				
V.24/V.28	Recommended if >				
standard	1200 bit/s				
□ 100 bit/s	■ 2400 bit/s	□ 2400 bit/s	□ 56000 bit/s		
□ 200 bit/s	■ 4800 bit/s	□ 4800 bit/s	□ 4000 bit/s		
□ 300 bit/s	■ 9600 bit/s	□ 9600 bit/s			
□ 600 bit/s	■ 19200 bit/s*	□ 19200 bit/s			
□ 1200 bit/s		□ 38400 bit/s			
* not defined in 870-5-10	01				
Transmission anond (manitor direction)					
Transmission speed (mo	onitor direction)				
Transmission speed (mo	onitor direction) Unbalanced interface	Balanced interchange	circuit X.24/X.27		
Transmission speed (me Unbalanced interchange circuit	onitor direction) Unbalanced interface circuit V.24/V.28	Balanced interchange	circuit X.24/X.27		
Transmission speed (me Unbalanced interchange circuit V.24/V.28	onitor direction) Unbalanced interface circuit V.24/V.28 Recommended if >	Balanced interchange	circuit X.24/X.27		
Transmission speed (me Unbalanced interchange circuit V.24/V.28 standard	Ditor direction) Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s	Balanced interchange	circuit X.24/X.27		
Transmission speed (me Unbalanced interchange circuit V.24/V.28 standard □ 100 bit/s	Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s ■ 2400 bit/s	Balanced interchange	circuit X.24/X.27 □ 56000 bit/s		
Transmission speed (me Unbalanced interchange circuit V.24/V.28 standard I 100 bit/s I 200 bit/s	onitor direction) Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s ■ 2400 bit/s ■ 4800 bit/s	Balanced interchange	circuit X.24/X.27 □ 56000 bit/s □ 4000 bit/s		
Transmission speed (me Unbalanced interchange circuit V.24/V.28 standard I 100 bit/s I 200 bit/s I 300 bit/s	 bitor direction) Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s 2400 bit/s 4800 bit/s 9600 bit/s 	Balanced interchange	circuit X.24/X.27 □ 56000 bit/s □ 4000 bit/s		
Transmission speed (mo Unbalanced interchange circuit V.24/V.28 standard In 100 bit/s In 200 bit/s In 300 bit/s In 600 bit/s	 bnitor direction) Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s 2400 bit/s 4800 bit/s 9600 bit/s 19200 bit/s* 	Balanced interchange	circuit X.24/X.27		
Transmission speed (me Unbalanced interchange circuit V.24/V.28 standard I 100 bit/s I 200 bit/s I 300 bit/s I 600 bit/s I 1200 bit/s	 bnitor direction) Unbalanced interface circuit V.24/V.28 Recommended if > 1200 bit/s 2400 bit/s 4800 bit/s 9600 bit/s 19200 bit/s* 	 Balanced interchange 2400 bit/s 4800 bit/s 9600 bit/s 19200 bit/s 38400 bit/s 	circuit X.24/X.27		

8.3. Link layer

Frame format FT1.2, single character 1 and the fixed timeout interval are used exclusively in this companion standard.

Link transmission Address field of the link □ Balanced transmission □ Not present (balanced only) Unbalanced transmission One octet Two octets Frame length □ Structured 255 Maximum length L (number of octets) Unstructured 8.4. Application layer Common address of ASDU One octet Two octets Information object address One octet ■ Structured Two octets □ Unstructured ■ Three octets

■ Two octets (with originator address)

Cause of transmission

One octet

8.5. ASDUs

Process information in monitor direction	Short name
I <1> := Single-point information	M_SP_NA_1
\square <2> := Single-point information with time tag	M_SP_TA_1
■ <3> := Double-point information	M_DP_NA_1
\Box <4> := Double-point information with time tag	M_DP_TA_1
■ <5> := Step position information	M_ST_NA_1
\Box <6> := Step position information with time tag	M_ST_TA_1
\square <7> := Bitstring of 32 bit	M_BO_NA_1
\square <8> := Bitstring of 32 bit with time tag	M_BO_TA_1
\square <9> := Measured value, normalized value	M_ME_NA_1
\Box <10> := Measured value, normalized value with time tag	M_ME_TA_1
<11> := Measured value, scaled value	M_ME_NB_1
\Box <12> := Measured value, scaled value with time tag	M_ME_TB_1
\Box <13> := Measured value, short floating point value	M_ME_NC_1
\Box <14> := Measured value, short floating point value with time tag	M_ME_TC_1
■ <15> := Integrated totals	M_IT_NA_1
\Box <16> := Integrated totals with time tag	M_IT_TA_1
\Box <17> := Event of protection equipment with time tag	M_EP_TA_1
\Box <18> := Packed start events of protection equipment with time tag	M_EP_TB_1
\Box <19> := Packed output circuit information of protection equipment with time tag	M_EP_TC_1
\Box <20> := Packed single-point information with status change detection	M_PS_NA_1
□ <21> := Measured value, normalized value without quality descriptor	M_ME_ND_1
■ <30> := Single-point information with time tag CP56Time2a	M_SP_TB_1
<31> := Double-point information with time tag CP56Time2a	M_DP_TB_1
<32> := Step position information with time tag CP56Time2a	M_ST_TB_1
\Box <33> := Bitstring of 32 bit with time tag CP56Time2a	M_BO_TB_1
\Box <34> := Measured value, normalized value with time tag CP56Time2a	M_ME_TD_1
\Box <35> := Measured value, scaled value with time tag CP56Time2a	M_ME_TE_1
Solution < Solution So	M_ME_TF_1
\Box <37> := Integrated totals with time tag CP56Time2a	M_IT_TB_1
□ <38> := Event of protection equipment with time tag CP56Time2a	M_EP_TD_1
C <39> := Packed start events of protection equipment with time tag CP56Time2a	M_EP_TE_1
\Box <40> := Packed output circuit information of protection equipment with time tag CP56Time2a	M_EP_TF_1

Process information in control direction	
■ <45> := Single command	C_SC_NA_1
■ <46> := Double command	C_DC_NA_1
<47> := Regulating step command	C_RC_NA_1
<48> := Set point command, normalized value	C_SE_NA_1
□ <49> := Set point command, scaled value	C_SE_NB_1
\Box <50> := Set point command, short floating point value	C_SE_NC_1
\Box <51> := Bitstring of 32 bit	C_BO_NA_1
System information in monitor direction	
\Box <70> := End of initialization	M_EI_NA_1
System information in control direction	
□ <100>:= Interrogation command	$C_{IC}NA_{1}$
<101>:= Counter interrogation command	C_CI_NA_1
\Box <102>:= Read command	C_RD_NA_1
<103>:= Clock synchronization command	C_CS_NA_1
□ <104>:= Test command	C_TS_NA_1
□ <105>:= Reset process command	C_RP_NA_1
□ <106>:= Delay acquisition command	C_CD_NA_1
<107>:= Test command with time tag CP56Time2a	C_TS_TA_1
Parameter in control direction	
<110>:= Parameter of measured value, normalized value	P_ME_NA_1
<111>:= Parameter of measured value, scaled value	P_ME_NB_1
<112>:= Parameter of measured value, short floating point value	P_ME_NC_1
□ <113>:= Parameter activation	P_AC_NA_1
File transfer	
□ <120>:= File ready	F_FR_NA_1
\Box <121>:= Section ready	F_SR_NA_1
\Box <122>:= Call directory, select file, call file, call section	F_SC_NA_1
<123>:= Last section, last segment	F_LS_NA_1
\Box <124>:= Ack file, ack section	F_AF_NA_1
□ <125>:= Segment	F_SG_NA_1
□ <126>:= Directory {blank or X, only available in monitor (standard)	F_DR_TA_1

direction}

8.6. Basic application functions

Station initialization

Remote initialization

Cyclic data transmission

Cyclic data transmission

Read procedure

General interrogation

Global

Clock synchronization

Command transmission

 \square Direct command transmission

 \Box Direct set point transmission

- Select and execute command
- Select and execute set point
- \Box C_SE ACTTERM used
- No additional definition
- □ Short pulse duration (duration determined by a system parameter)
- □ Long pulse duration (duration determined by a system parameter)
- □ Persistent output

Transmission of integrated totals

□ Counter request

- \Box General request counter
- □ Counter freeze without reset
- \Box Counter freeze with reset

Parameter loading

- □ Threshold value
- \Box Smoothing factor
- \square Low limit for transmission of measured value
- \Box High limit for transmission of measured

Parameter activation

 \Box Act/deact of persistent cyclic or periodic transmission of the addressed object

 $\frac{\text{Test procedure}}{\Box \text{ Test procedure}}$

File transfer

- File transfer in monitor direction
- □ Transparent file
- □ Transmission of disturbance data of protection equipment
- □ Transmission of sequences of events
- $\hfill\square$ Transmission of sequences of recorded analogue values

File transfer in control direction □ Transparent file

Background scan □ Background scan

Acquisition of transmission delay