

PROTECTED

- Body
■ Unit W

Engineering
Instruction

Communication Memo

TMNA Administration	TMC Administration
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This memo is equivalent to Technical Standards and Manuals.

Body Manufacturing Engineering Div.
Chassis Engineering Dept.

Distribution			Title	Full EtherNet/IP Conversion for GOP Standard Control Panels Used in Arc Welding Robot Cell Equipment				Department General Manager	Group Manager	Engineer																																				
	Jig & Tool	○						Honma	Katayama	Ono Idera																																				
Non-TMC	W-non-TMC Plants	○	<p>1. Purpose</p> <p>To standardize standard control panels (GOP panels) used in arc welding robot cell equipment with EtherNet/IP (ENIP), and to establish updated GOP-R4X as a replacement for discontinued devices.</p> <p>2. Application scope</p> <p>All newly fabricated arc welding robot cell equipment</p> <p>3. Application timing</p> <p>From 120D</p> <p>4. Model</p> <p>1) 2) 3) 4) 5)</p> <table><tr><td><u>GOP-R4X</u></td><td>-</td><td><u>IE</u></td><td><u>20</u></td><td>--</td><td><u>JA</u></td><td>-</td><td><u>A0</u></td><td rowspan="5">[-(Option)]</td></tr><tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p> </p>							<u>GOP-R4X</u>	-	<u>IE</u>	<u>20</u>	--	<u>JA</u>	-	<u>A0</u>	[-(Option)]																												
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Assigning additional options for communication cards to the end of the model indicates that the panel will be delivered with these installed.

Option models are assigned as a set to decrease the number of characters in the model.

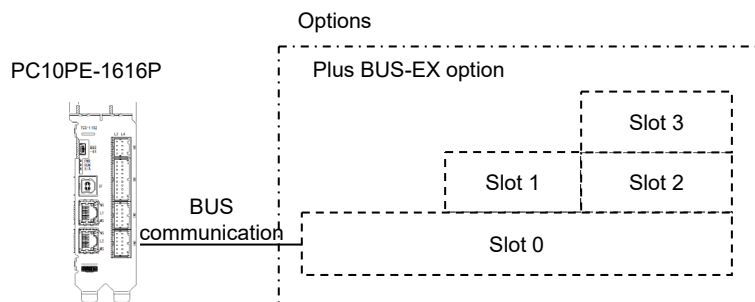


Figure 2 - Communication card options

Table 1 - Option models

Option model		Robot Han connector presence	Light shutter presence	Slot			
					1	2	3
C	0	Yes	Yes	None	None	None	None
C	1	Yes	Yes	BUS-EX	No	No	No
C	B	Yes	Yes	BUS-EX	No	EX2	No
C	E	Yes	Yes	BUS-EX	DLINK-M	No	No
C	O	Yes	Yes	BUS-EX	DLINK-M	EX2	No
D	0	Yes	No	None	None	None	None
D	1	Yes	No	BUS-EX	None	None	None
D	B	Yes	No	BUS-EX	None	EX2	No
D	E	Yes	No	BUS-EX	DLINK-M	None	None
D	O	Yes	No	BUS-EX	DLINK-M	EX2	None
E	0	No	Yes	None	None	None	None
E	1	No	Yes	BUS-EX	None	None	None
E	B	No	Yes	BUS-EX	None	EX2	None
E	E	No	Yes	BUS-EX	DLINK-M	No	None
E	O	No	Yes	BUS-EX	DLINK-M	EX2	None
F	0	No	No	None	None	None	None
F	1	No	No	BUS-EX	None	None	None
F	B	No	No	BUS-EX	None	EX2	None
F	E	No	No	BUS-EX	DLINK-M	None	None
F	O	No	No	BUS-EX	DLINK-M	EX2	None

5. Model by destination

Table 2 - List of models by destination

** indicates the version.

Destination	Plant	Model	Notes
Japan	All plants	GOP-R4X-IE20-JP- **	
North America, Canada	TMMK, TMMI, TMMC	GOP-R4X-UL20-EN- **	
Europe	TMUK	GOP-R4X-IE38-EN- **	IE20 where using 200V primary power supply.
	TMMF	GOP-R4X-IE38-FR- **	
	TMMT	GOP-R4X-IE38-TR- **	
South America	TDB	GOP-R4X-NR20-PT- **	
	TASA	GOP-R4X-IE38-EN- **	
South Africa	TSAM	GOP-R4X-IE38-ZA- **	The language is English (EN), but a note is added for the power cable wire color.
Asia	TMMIN, TMT, TKM	GOP-R4X-IE38-EN- **	IE20 where using 200V primary power supply.
	GTMC, TFTM, SFTM	GOP-R4X-IE38-ZH- **	

6. Purchasing method

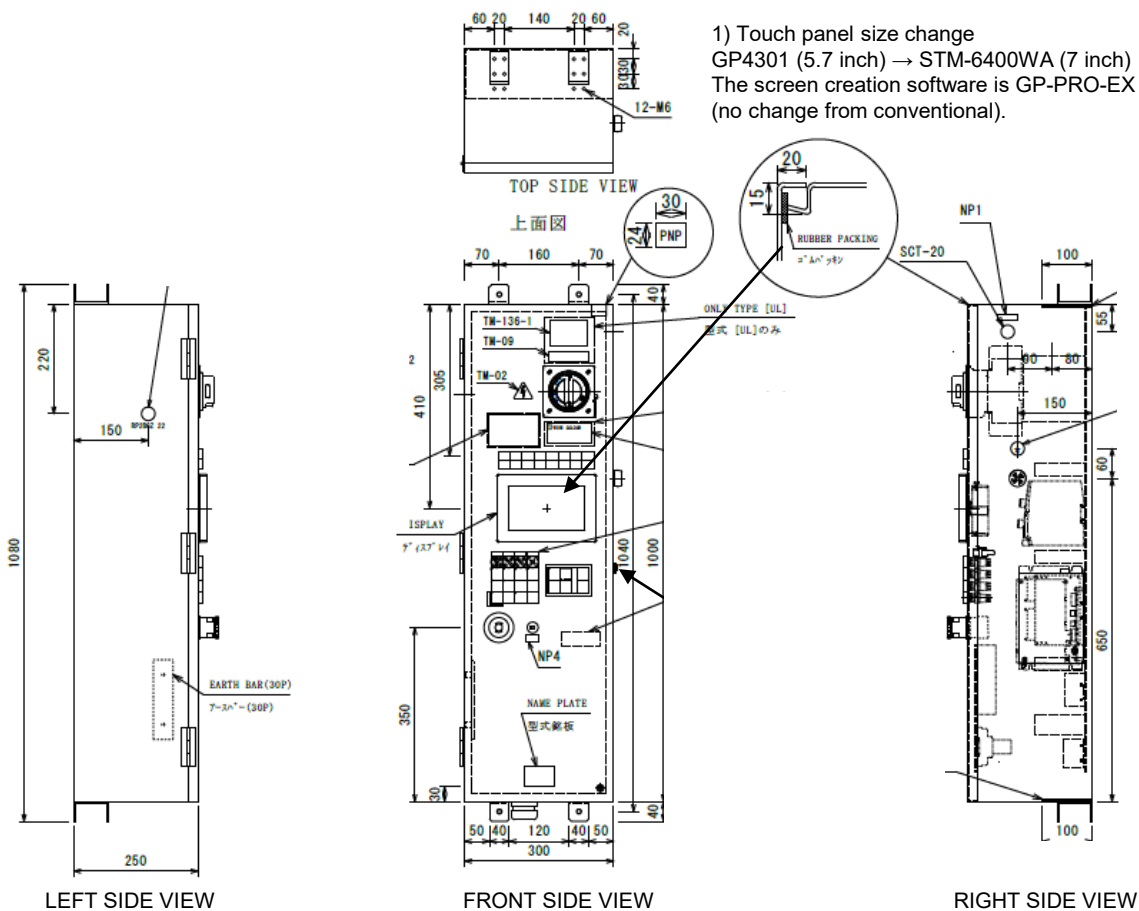
Supplier: JTEKT

7. Appearance drawing

a) The main changes are as follows.

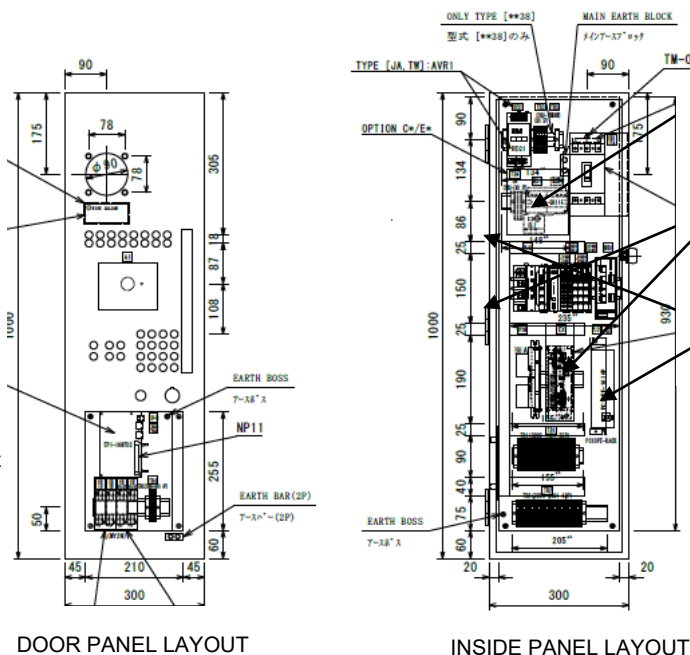
1) Touch panel size change

GP4301 (5.7 inch) → STM-6400WA (7 inch)
The screen creation software is GP-PRO-EX
(no change from conventional).



4) I/O additions
(EP1-16NTD2)
Input / output: 32-bit

*The GOP-R4M
conventional I/O bit
count is reduced.



2) Safety circuit full ENIP conversion
Omron NE1A → Omron NX-SL5500

3) PLC high-speed and high-capacity
conversion
This has changed from PC10G to
Nano10GX.

Figure 3 - Main changes

b) GOP-R4X installation dimensions

Installation on equipment is the same as for GOP-R4M.

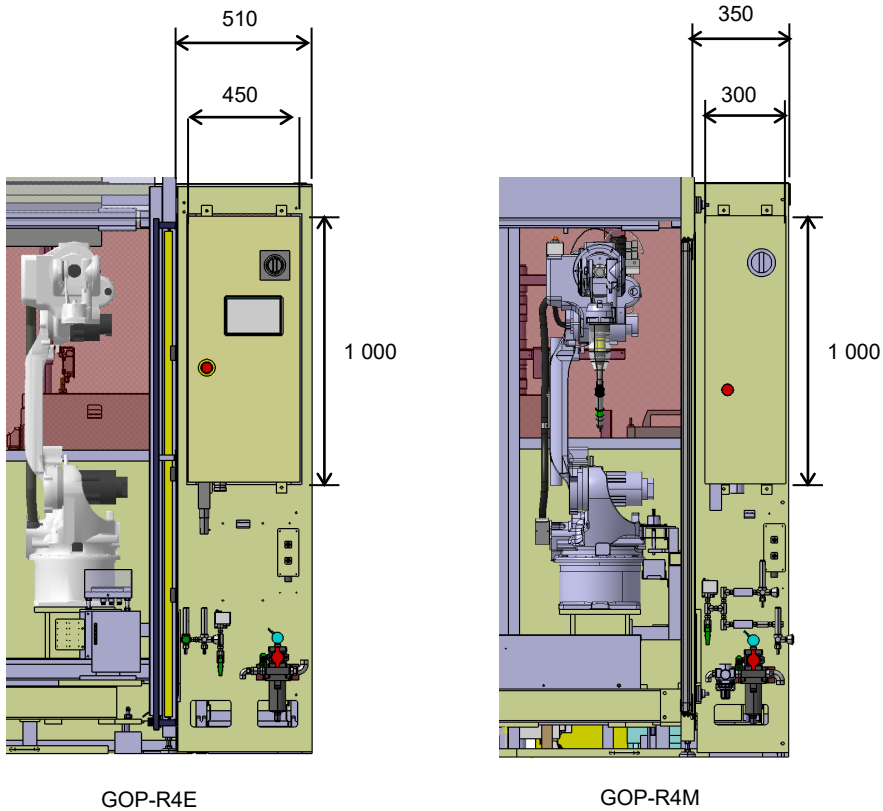


Figure 4 - Installation dimensions

8. Control PLC

a) The PLC (PC-10P-DP-IO) has been changed to PC10PE-1616P.

This changes to a high-speed CPU and to high-capacity equipment memory (4Mbyte → 8Mbyte).

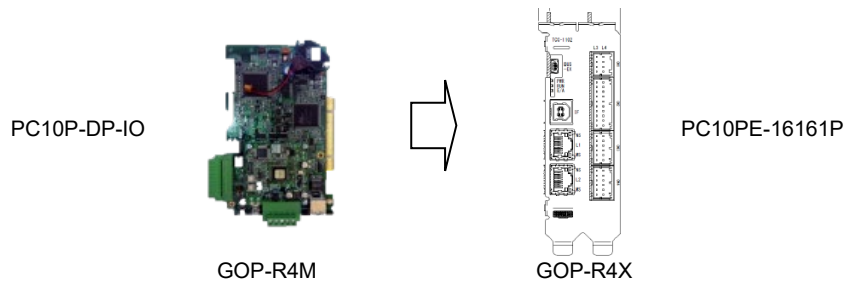


Figure 5 - Adopting PC10PE-1616P

c) Compatible with autonomous decentralized / hierarchical control that uses EtherNet/IP

- 1) Compliant with "WMS SEI3610n Control Hierarchy and Ethernet" and "SEI3611n Methods for Using EtherNet/IP."
- 2) Built-in Phoenix Contact FL MGUARD 1105 (with NAT function)
- 3) Using Balluff IO-Link master for IO-Link compatibility.

PC10P-16161P built-in communication port

- ① L1: EtherNet / IP / EtherCAT-M
- ② L2: EtherNet / IP / FL-net
- ③ L3: PC link / computer link / SN-I/F
- ④ L4: PC link / computer link
- ⑤ PCI-Express card edge
- ⑥ Expansion bus

Programmer: PCwin2 is used.

Note: This can be downloaded from the website if a PCwin license has been obtained.

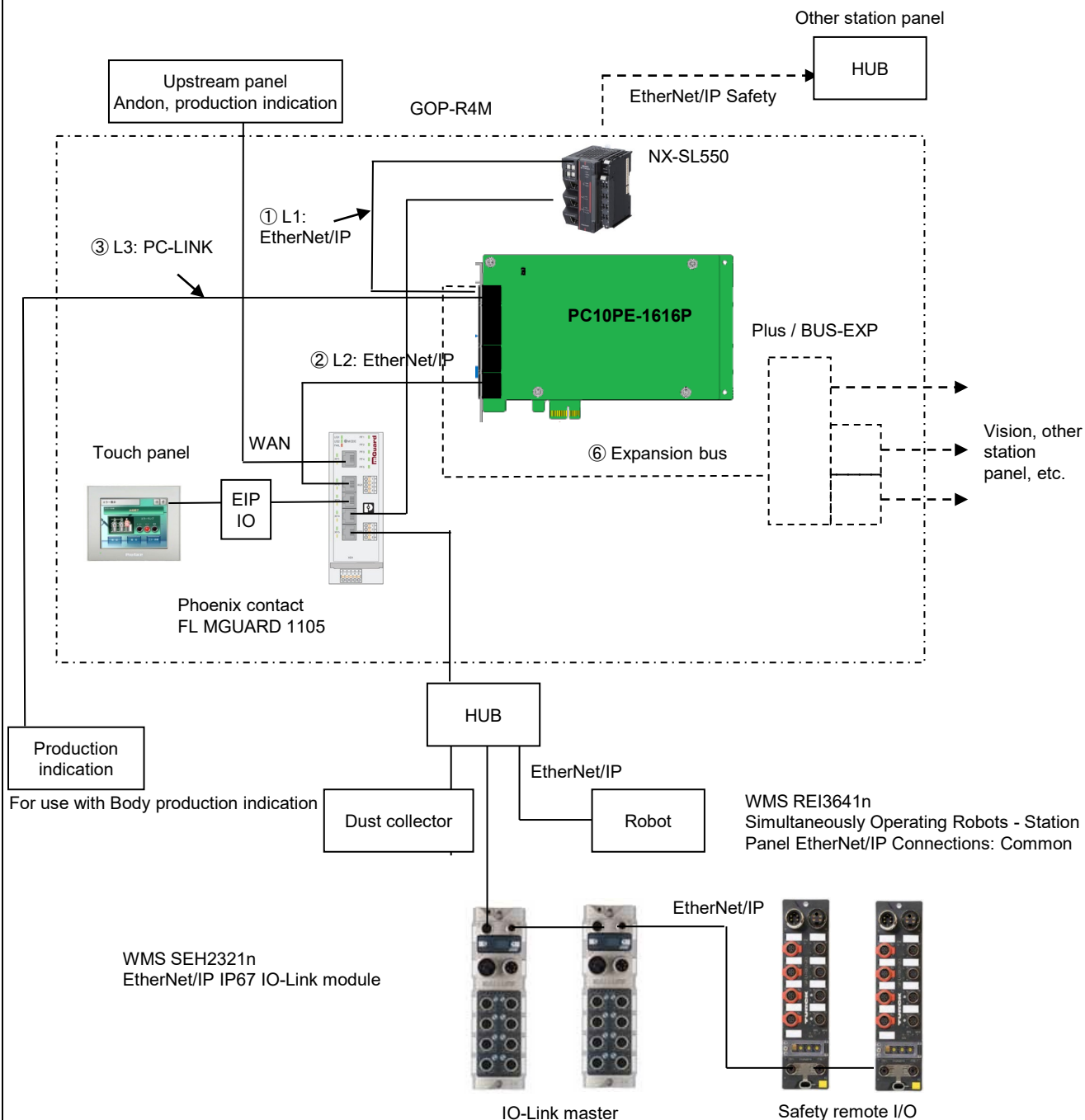


Figure 6 - System configuration using EtherNet/IP

Table 3 - Comparison of basic PLC specifications

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No	Item	PC10P-DP-IO(GOP-R4M)		PC10PE-1616P(GOP-R4X)	
1	Program system	Stored program system			
2	Program control system	Cyclic calculation system, with constant scanning function, constant period interrupt function			
3	Input / output control system	Image register system			
4	Basic command processing speed	0.018μs ~ / command		2.0ns ~ / command	
5	Applied command processing speed	0.06 ~ several μs / command		60.0ns ~ several hundred ns / command	
6	Basic commands	19 types			
7	Timer / counter commands	21 types			
8	Applied commands	Over 450 types			
9	Program capacity	180K words (60K words × 3, PC10 mode compatibility) + FB library 60K words + standard library 32K words + user library 32K words + event monitor: 64Kbyte *1			
10	Memory element	CMOS-RAM, flash EPROM *2		Backup via nonvolatile memory	
11	Battery	Chargeable (lithium secondary battery: battery life of 5 years)		None	
12	External I/O bit count	PC10P-DP, PC10P-DP-IO, PC3JP, PC3JP-GP: I/O expansion via BUS		I/O expansion via Plus BUS-EX (input: 108 bits, output 72 bits)	
		PC10P-DP-IO.PC3JP-GP: 80 bits (input: 40 bits, output: 40 bits)			
13	Internal output bit count	86,016 bits (4,864 bits × 3 + 8,192 bits + 65,536 bits) *1		86,016 bits (4,096 bits × 3 + 8,192 bits + 65,536 bits)	
14	Keep relay bit count	18,688 bits (4,096 bits × 3 + 4,096 bits) *1		6,400 bits (768 bits × 3 + 4,096 bits)	
15	Timer function	0.1 ~ 6,553.5s/ 0.01 ~ 655.35s, 0.001 ~ 65.535s/ 1 ~ 65,535s Total 9,728 bits (2,560 bits × 3 + 2,048 bits) *1		0.1 ~ 6,553.5s/ 0.01 ~ 655.35s, 0.001 ~ 65.535s/ 1 ~ 65,535s Total 9,728 bits (2560 bits × 3 + 2,048 bits)	
	Counter function	1 ~ 65,535			
16	Link relay bit count	38,912 bits (2,048 bits × 3 + 8,192 bits)			
17	Rising edge / falling edge detection	11,778 bits (2,560 bits × 3 + 4,096 bits)			
18	Data register	164KW (12KW × 3 + 128KW) *1 File register: 256KW directly assignable *1 Flash register: 4Mbyte, for reading flash memory) *1 Writing is possible in 64Kbyte units.		164KW (12KW × 3 + 128KW) File register: 256KW directly assignable Flash register: 4Mbyte, for reading flash memory) Writing is possible in 64Kbyte units.	
19	Link register	6KW/16 bit (2KW × 3)			
20	Equipment information memory	4Mbyte		8Mbyte	
22	Communication function (Built-in)	Port L1	PC / CMP-LINK / SN-I/F		EtherNet / IP*3 / EtherCAT-M *3: Select one.
		Port L2	PC / CMP-LINK		EtherNet / IP*3 / FL-net *3: Select one.
		Port L3	FI-net / Ethernet / FL remote master / EtherNet / IP		PC link / computer link / SN-I/F
		Port L4	DLNK-M2		PC link / computer link
		Port L5	PCI bus I/F (HPC link assignment)		PCI-Express card edge (HPC link assignment)

*1: PC10 mode has been selected.

*2: The PC10P-DP program is backed up in flash EPROM, and PC3JP is backed up in E2PROM.

*3: Functions are compatible with ver. 1.00 or later.

PC10PE-1616P: Please use PCwin2, version V1.7 R02 or later.

9. Safety controller

Maker: Omron

Name: Safety network controller

Model: NX-SL5500

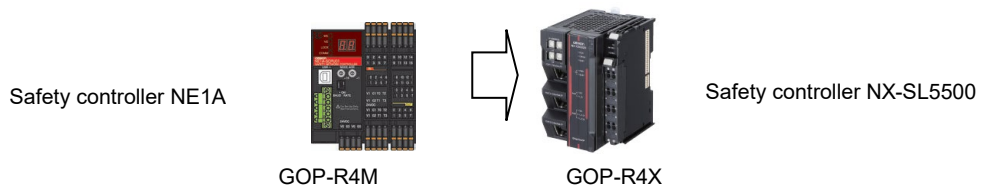


Figure 7 - Adopting safety controllers

NE1A used a network configurator, but NX-SL5500 uses Omron sysmacstudio.

10. Touch panel display device

a) A commercially available touch panel display device will be adopted.

Part name: STM-6400WA (7 inch)

Model: PFXST6400WAD

Maker: Digital (Meiji Electric)

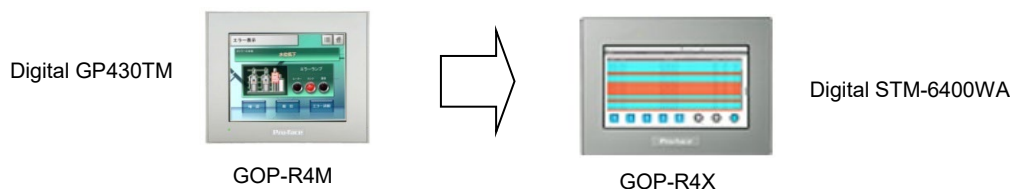


Figure 8 - Increasing the touch panel size

Table 4 - Touch panel display device specifications

Item	GP430TM	STM-6400WA
Display device	TFT color LCD	TFT color LCD
Display size	5.7" (320 × 240)	5.7" (800 × 480)
Display colors	65,536 colors	16,000,000 colors
Backlight	White LED (sent to the maker for replacement)	White LED (replacement is not possible.)
Mass	0.62Kg or less	0.8Kg or less
Rated voltage (power consumption)	SC24V (6.8W or less)	SC24V (9W or less)
Screen creation software	GP-ProEX (compensated)	GP-ProEX (compensated)

b) Screen creation tool (this is the same tool as for GOP-R4M)

Product name: GP-Pro EX Ver**

Model: PFXEDV**

** indicates the version.

Digital GP-PRO-EX

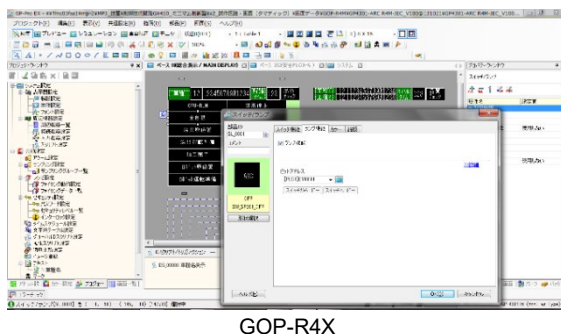


Figure 9 - Screen creation tool

c) Other

1) GP-PRO-EX allows Chinese character code in the PLC register (ex.: Fault history) to be displayed.

Conventional SCREENWORKS was unable to display Chinese character code, so either English or Japanese was used to display the fault history.

2) Installing Runtime engine WinGP in a computer allows the computer to be used as a display device.