Balai Pengembangan Talenta Indonesia
Pusat Prestasi Nasional
Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi

MERDEKA BELAJAR

LKS SMK TINGKAT NASIONAL

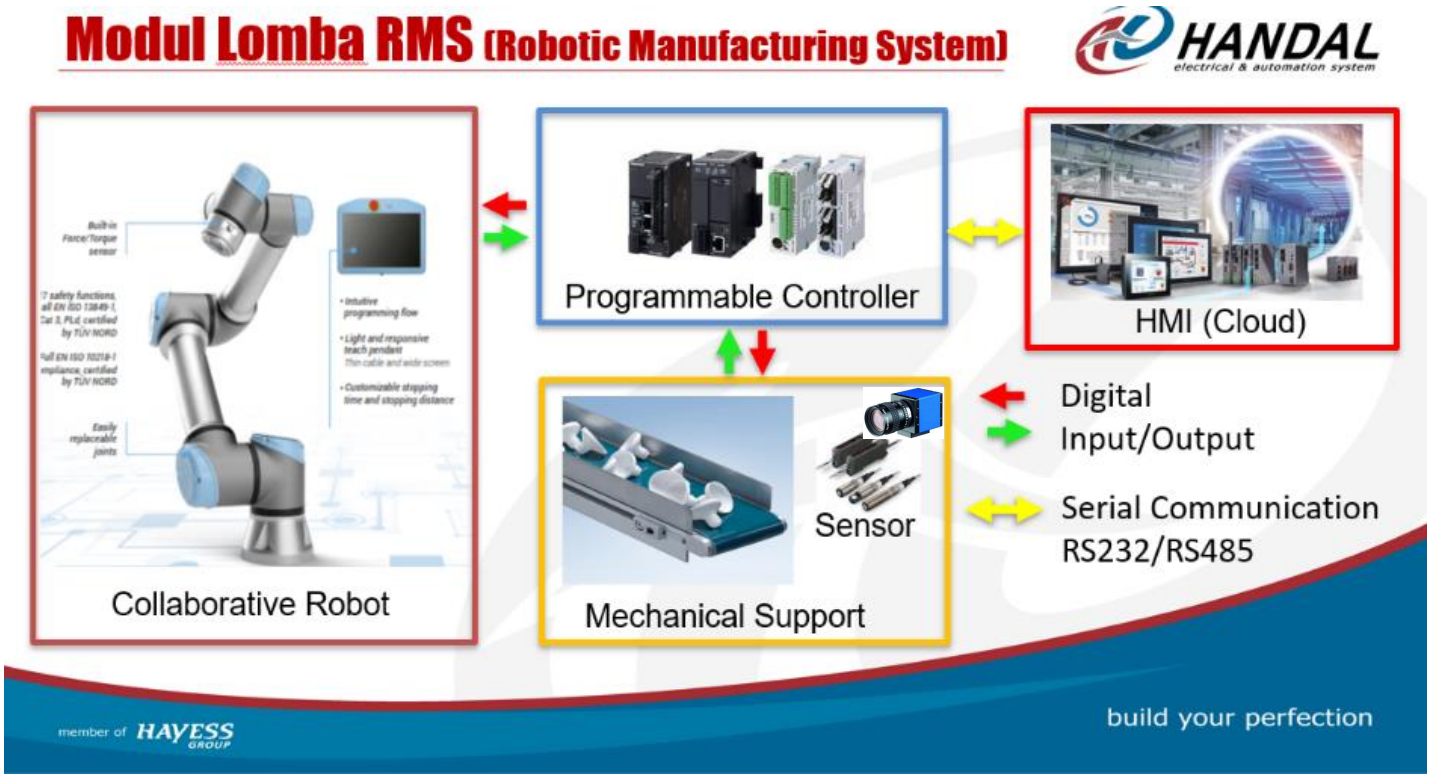
SMK

Kisi-Kisi

Lomba Kompetensi Siswa Nasional 2024

Robot Sistem Manufaktur

(Robot Manufacturing System)



COLLABORATIVE ROBOTS

Hardware

HANDAL electrical & automation system

1. Control Box

member of HAYESS GROUP

build your perfection

Control I/O

HANDAL electrical & automation system

- Safety
  - Emergency stop
  - Safeguard stop
- Remote
  - Power on/off
- Power
  - 2A internal PSU
  - External PSU
- Config. signals
  - 8 inputs
  - 8 outputs
  - 24V DC, PNP
- Digital signals
  - 8 inputs
  - 8 outputs
  - 24V DC, PNP
- Analog signals
  - 2 inputs
  - 2 outputs
  - 0-10V DC
  - 4-20 mA

Safety		Remote	Power
Emergency Stop	24V	12V	PWR
	EI0	GND	GND
	24V	ON	24V
	EI1	OFF	0V
Safeguard Stop	24V		
	SI0		
	24V		
	SI1		

Configurable Inputs		Configurable Outputs	
24V	24V	0V	0V
CI0	CI4	CO0	CO4
24V	24V	0V	0V
CI1	CI5	CO1	CO5
24V	24V	0V	0V
CI2	CI6	CO2	CO6
24V	24V	0V	0V
CI3	CI7	CO3	CO7

Digital Inputs		Digital Outputs	
24V	24V	0V	0V
DI0	DI4	DO0	DO4
24V	24V	0V	0V
DI1	DI5	DO1	DO5
24V	24V	0V	0V
DI2	DI6	DO2	DO6
24V	24V	0V	0V
DI3	DI7	DO3	DO7

Analog	
Analog Inputs	AG
	AI0
	AG
	AI1
Analog Outputs	AG
	AO0
	AG
	AO1

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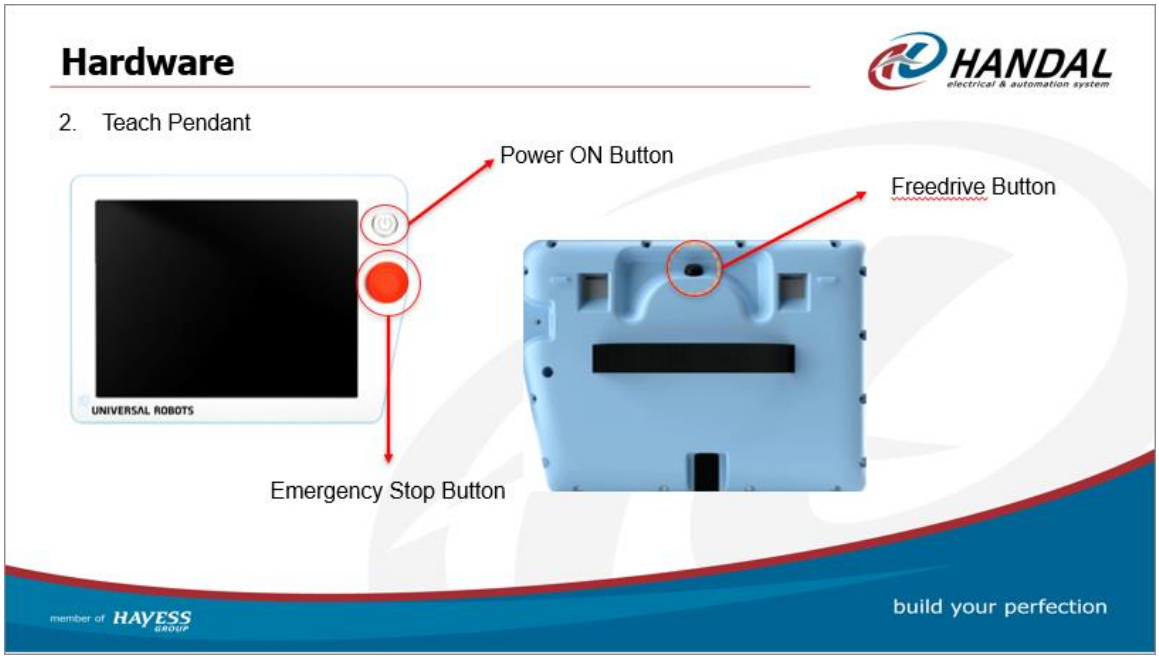
Hardware
HANDAL
electrical & automation system
2. Teach Pendant
Power ON Button
Freedrive Button
UNIVERSAL ROBOTS
Emergency Stop Button
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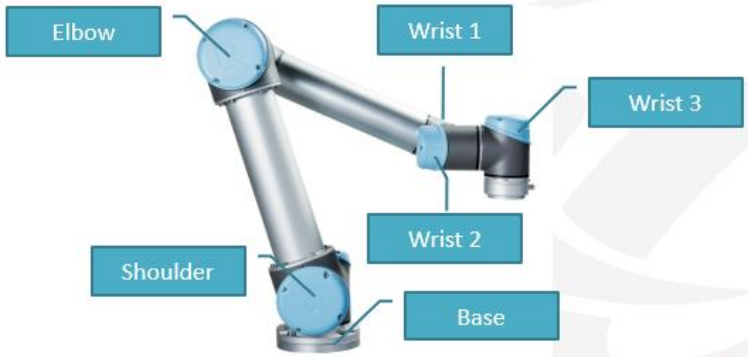
Hardware

3. Robot 6-Axis



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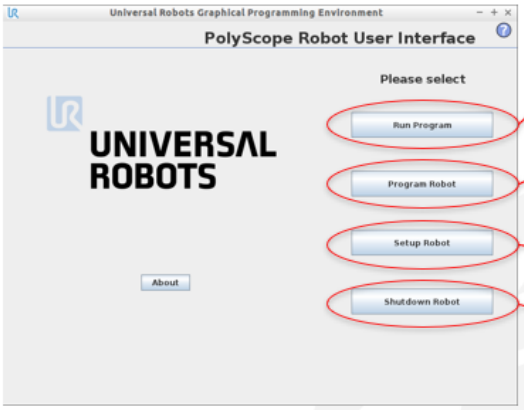
PolyScope Robot



Untuk menjalankan program robot yang sudah tersimpan

Untuk membuat/edit program robot, serta simulasi program

Untuk inisialisasi robot, kalibrasi touch screen, setting network (IP Address), Install URCaps dan lainnya

Untuk mematikan robot dan kontroler

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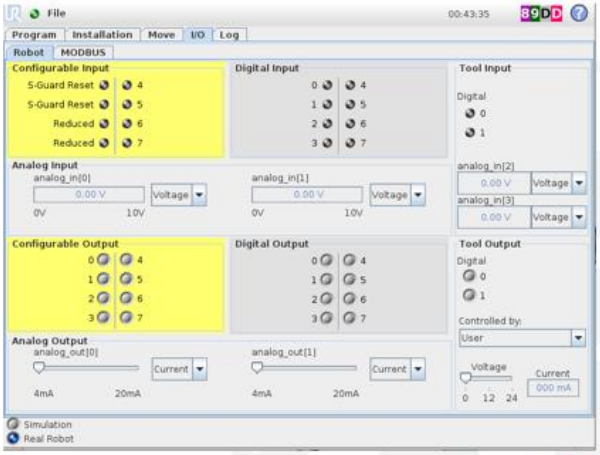
I/O Maps



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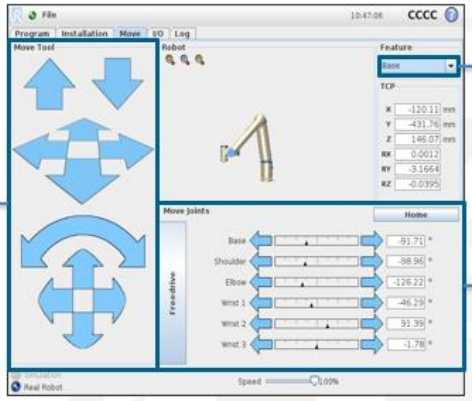
Robot Jog



Pemilihan feature untuk jog robot

Jog robot keseluruhan

Jog per joint

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Tool Center Point

HANDAL electrical & automation system

Cara setting Tool Center Point

1. Buka Program atau Load program yang sudah ada > Klik tab Installation

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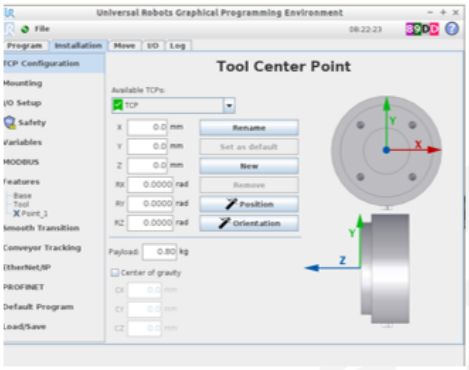
Tool Center Point

HANDAL electrical & automation system

2. Tekan Menu TCP Configuration, lalu timbang berat dari robot tool



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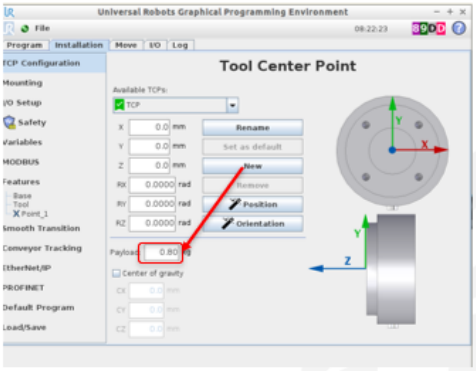
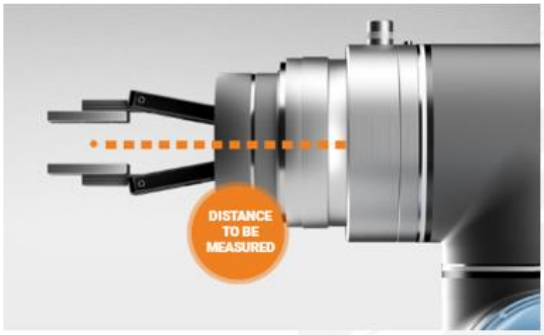
Tool Center Point

3. Masukkan hasil pengukuran ke kolom payload dalam satuan kilogram



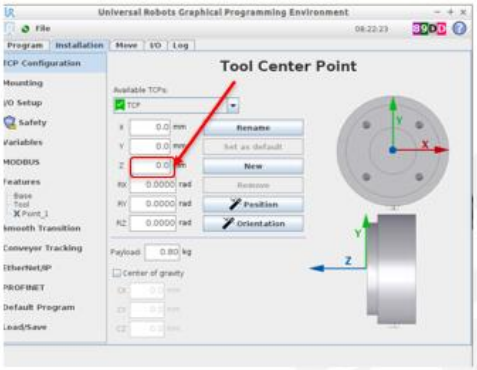
Tool Center Point

4. Ukur jarak dari mounting robot ke titik pusat robot tool



Tool Center Point

5. Masukkan hasil pengukuran ke kolom Z dalam satuan milimeter



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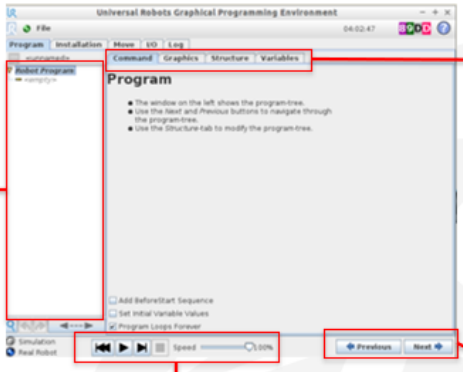
Programming Robot



Program tree (daftar urutan program)

Command : untuk edit perintah dari setiap instruksi

Graphics : tampilan 3D dari actual posisi robot

Structure : untuk memasukkan perintah program ke program tree

Variables : daftar variable yang telah dibuat

Toggle untuk pindah program node

Toggle run program robot

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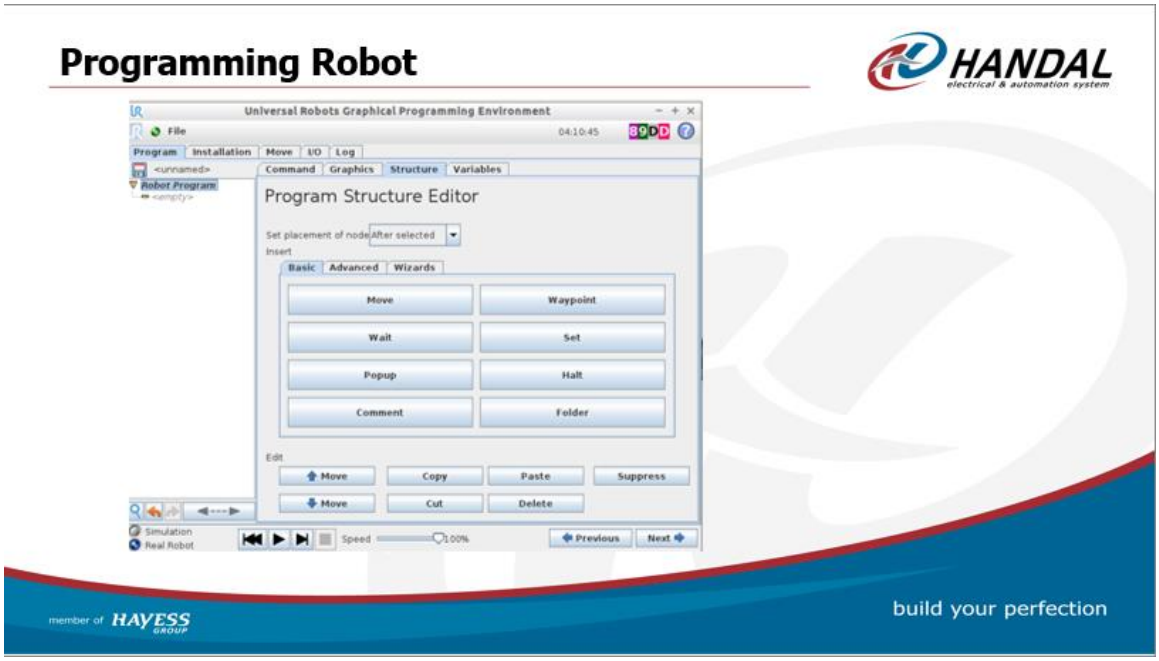
Programming Robot
HANDAL
electrical & automation system
Universal Robots Graphical Programming Environment
File
04:10:45
Program
Installation
Move
I/O
Log
Command
Graphics
Structure
Variables
Robot Program
Program Structure Editor
Set placement of node
After selected
Insert
Basic
Advanced
Wizards
Move
Waypoint
Wait
Set
Popup
Halt
Comment
Folder
Edit
Move
Copy
Paste
Suppress
Move
Cut
Delete
Simulation
Real Robot
Speed
100%
Previous
Next
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HUMAN MACHINE INTERFACE (HMI) & INDUSTRIAL IoT

Panasonic FP/KW

Supported Series: NAIS (Matsushita) FP/KW series include FP-X, FP-XH, FP-Σ, FP0, FP1, FP2, FP2SH, FP10SH, FP7
Website:http://pewa.panasonic.com/

HMI Settings:

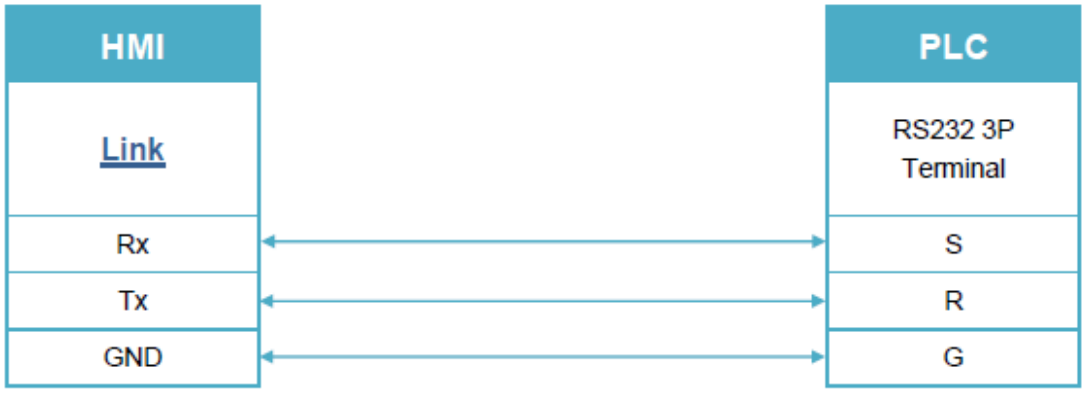
Parameters	Recommended	Options	Notes
PLC type	Panasonic FP/KW		
PLC I/F	RS232	RS232/RS485	
Baud rate	9600	9600, 19200, 38400,	
Data bits	8	7 or 8	
Parity	Odd	Even, Odd, None	
Stop bits	1	1 or 2	
PLC sta. no.	1	1-32	Must match the PLC port setting. FP3 must set to 0.

*Support communications between HMI and PLC in pass-through mode
*Set LW-9903 to 2 to enhance the speed of download/upload PLC program in pass-through mode
*When using pass-through, the driver will stop communication between HMI and PLC.

Diagram 2

RS-232 (FP0 CPU : 9P D-Sub to 3P Terminal)

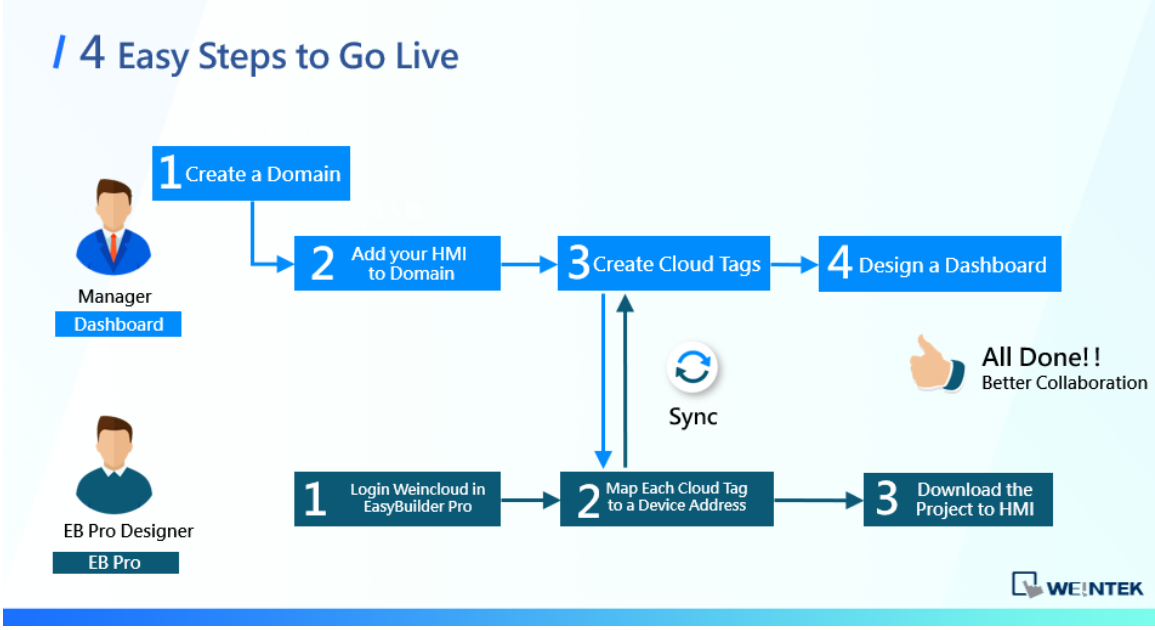
The serial port pin assignments may vary between HMI models, please click the following link for more information.



2.7.2. cMT1106X / cMT2078X / cMT2108X / cMT2108X2 / cMT2108X2 (V2)

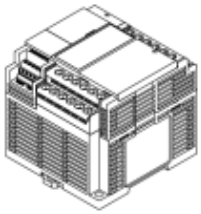
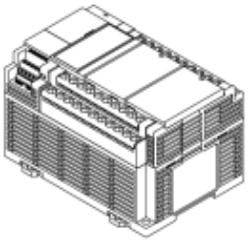
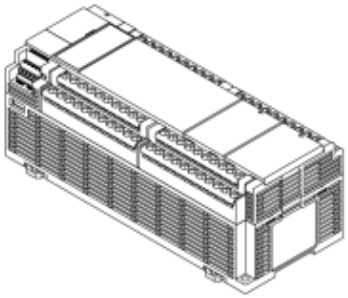
COM1 [RS232], COM3 [RS232] 9 Pin, Male, D-sub

PIN#	COM1 [RS232]	COM3 [RS232]
1		
2	RxD	
3	TxD	
4		
5	GND	
6		
7	RTS	TxD
8	CTS	RxD
9	GND	


4 Easy Steps to Go Live
1 Create a Domain
2 Add your HMI to Domain
3 Create Cloud Tags
4 Design a Dashboard
Manager
Dashboard
Sync
All Done!!
Better Collaboration
1 Login Weincloud in EasyBuilder Pro
2 Map Each Cloud Tag to a Device Address
3 Download the Project to HMI
EB Pro Designer
EB Pro
WEINTEK

Programmable Logic Controller (PLC)

1.1.1 FP-XH Control Units

The following types are available depending on the number of points, power supply, and output type.

Number of points	14 points / 30 points / 60 points
Power supply	100 to 240 V AC or 24 V DC
Output	Relay or transistor (NPN output or PNP output)

1.2 List of Unit Model Numbers

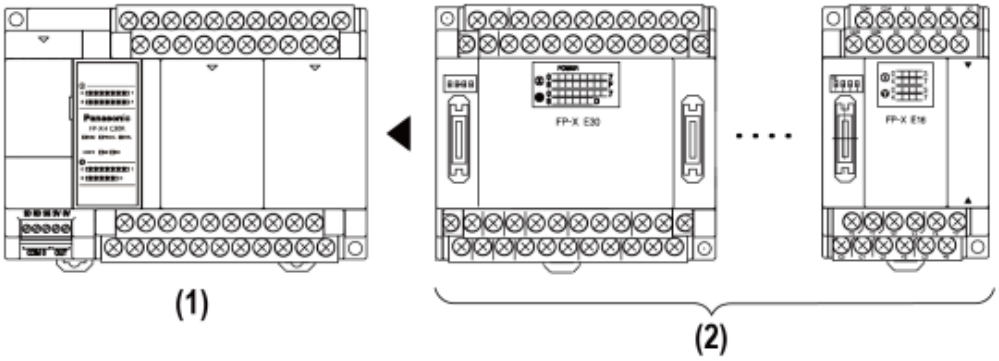
1.2.1 FP-XH Control Units

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
FP-XH C14R Control Unit	8-point DC input, 6-point relay output	100 to 240 V AC	AFPXHC14R
		24 V DC	AFPXHC14RD
FP-XH C14T Control Unit	8-point DC input, 6-point transistor output (NPN)	100 to 240 V AC	AFPXHC14T
		24 V DC	AFPXHC14TD
FP-XH C14P Control Unit	8-point DC input, 6-point transistor output (PNP)	100 to 240 V AC	AFPXHC14P
		24 V DC	AFPXHC14PD
FP-XH C30R Control Unit	16-point DC input, 14-point relay output	100 to 240 V AC	AFPXHC30R
		24 V DC	AFPXHC30RD
FP-XH C30T Control Unit	16-point DC input, 14-point transistor output (NPN)	100 to 240 V AC	AFPXHC30T
		24 V DC	AFPXHC30TD
FP-XH C30P Control Unit	16-point DC input, 14-point transistor output (PNP)	100 to 240 V AC	AFPXHC30P
		24 V DC	AFPXHC30PD
FP-XH C60R Control Unit	32-point DC input, 28-point relay output	100 to 240 V AC	AFPXHC60R
		24 V DC	AFPXHC60RD
FP-XH C60T Control Unit	32-point DC input, 28-point transistor output (NPN)	100 to 240 V AC	AFPXHC60T
		24 V DC	AFPXHC60TD
FP-XH C60P Control Unit	32-point DC input, 28-point transistor output (PNP)	100 to 240 V AC	AFPXHC60P
		24 V DC	AFPXHC60PD

1.3.1 Restrictions on Using FP-X Expansion Units

■ Restrictions on the number of Expansion Units and mounting order (1)

- Up to 8 Expansion Units can be connected.



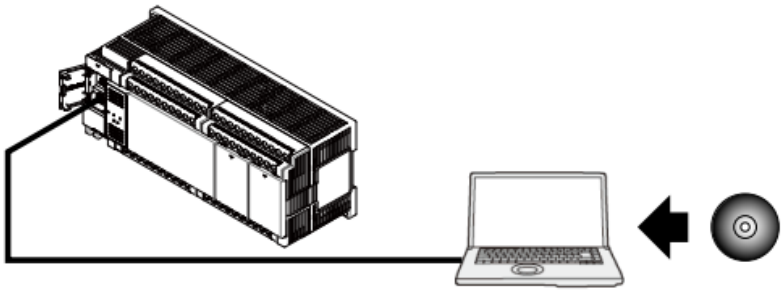
(1)	FP-XH Control Units	(2)	FP-X Expansion Units

■ Maximum number of control inputs / outputs

Type of Control Unit	Control unit No. of inputs / outputs of a single control unit	FP-X-E30 No. of inputs / outputs when using Expansion Units
FP-XH C14 Control Unit	14 points	Max. 254 points
FP-XH C30 Control Unit	30 points	Max. 270 points
FP-XH C60 Control Unit	60 points	Max. 300 points

1.4 Programming Tools

1.4.1 Software Usage Environment and Applicable Cables



■ **Tool software**

Software type	Operating system	Hard disk capacity	Product no.
Control FPWIN GR7	Windows (R) 10 (32-bit version / 64-bit version) Windows (R) 8.1 (32-bit version / 64-bit version) Windows (R) 8 (32-bit version / 64-bit version) Windows (R) 7 SP1 or later (32-bit version / 64-bit version) Windows (R) Vista SP2 Windows (R) XP SP3	120 MB or more	AFPSGR7EN
Control FPWIN Pro7	Windows (R) 10 (32-bit version / 64-bit version) Windows (R) 8.1 (32-bit version / 64-bit version) Windows (R) 8 (32-bit version / 64-bit version) Windows (R) 7 SP1 or later (32-bit version / 64-bit version)	400 MB or more	AFPSPR7A

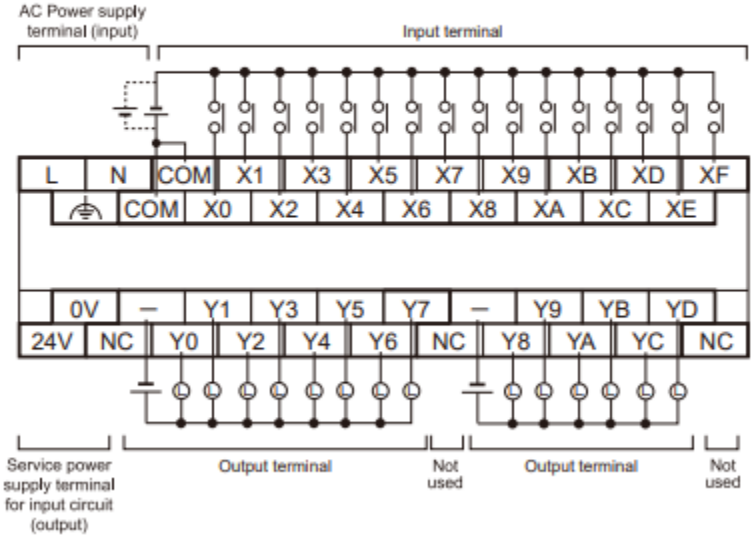
(Note 1) The latest version is provided free of charge via our website (https://industrial.panasonic.com/ac/e/dl_center/software/). Use the latest version.

■ **PC connection cable**

- Use a commercial USB cable.

Cable type	Length
USB 2.0 cable (A:Mini B)	Max. 5 m

■ AFPXHC30T (NPN output)



3.1.2 Concept of I/O Number Allocation

■ I/O numbers of Control Unit

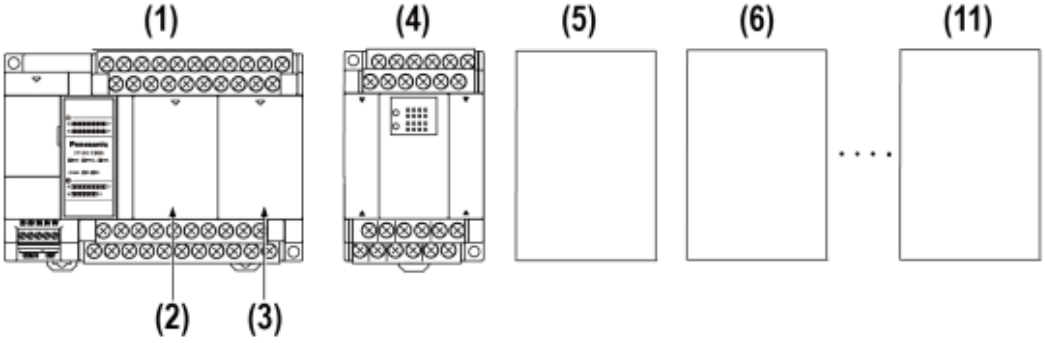
Fixed areas are allocated to I/O numbers.

■ I/O numbers of Expansion Unit

The starting number allocated to each Expansion Unit varies according to the installation position.

■ I/O numbers allocated to Function Cassette

Fixed areas are allocated to I/O numbers according to the installation position.



■ List of I/O numbers

Unit type and installation position		Input		Output	
		I/O number		I/O number	
(1)	Control unit	X0 to X9F	WX0 to WX9	Y0 to Y9F	WY0 to WY9

Unit type and installation position		Input		Output	
		I/O number		I/O number	
(2)	Cassette mounting part 1 (Slot 0)	X100 to X19F	WX10 to WX19	Y100 to Y19F	WY10 to WY19
(3)	Cassette mounting part 2 (Slot 1)	X200 to X29F	WX20 to WX29	Y200 to Y29F	WY20 to WY29
(4)	1st Expansion Unit	X300 to X39F	WX30 to WX39	Y300 to Y39F	WY30 to WY39
(5)	2nd Expansion Unit	X400 to X49F	WX40 to WX49	Y400 to Y49F	WY40 to WY49
(6)	3rd Expansion Unit	X500 to X59F	WX50 to WX59	Y500 to Y59F	WY50 to WY59
(7)	4th Expansion Unit	X600 to X69F	WX60 to WX69	Y600 to Y69F	WY60 to WY69
(8)	5th Expansion Unit	X700 to X79F	WX70 to WX79	Y700 to Y79F	WY70 to WY79
(9)	6th Expansion Unit	X800 to X89F	WX80 to WX89	Y800 to Y89F	WY80 to WY89
(10)	7th Expansion Unit	X900 to X99F	WX90 to WX99	Y900 to Y99F	WY90 to WY99
(11)	8th Expansion Unit	X1000 to X109F	WX100 to WX109	Y1000 to Y109F	WY100 to WY109

(Note 1) The ranges of the I/O numbers which are actually used vary according to the types of cassettes and Expansion Units.

3.2 List of I/O Numbers for Each Unit

3.2.1 FP-XH Control Units

■ **List of I/O numbers**

Unit type	Input		Output	
	No. of input points	I/O number	No. of output points	I/O number
C14	8 points	X0 to X7	6 points	Y0 to Y5
C30	16 points	X0 to X9, XA to XF	14 points	Y0 to Y9, YA to YD
C60	32 points	X0 to X9, XA to XF X10 to X19, X1A to X1F	28 points	Y0 to Y9, YA to YD Y10 to Y19, Y1A to Y1D

BALAI PENGEMBANGAN TALENTA INDONESIA
PUSAT PRESTASI NASIONAL
KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI

Jalan Gardu Rt. 10 Rw. 02, Srengseng Sawah, Kec. Jagakarsa, Kota Jakarta Selatan,
Daerah Khusus Ibukota Jakarta 12640