Embedded based teaching pendant optimized for industrial robots.

DTP7H-W
Hardware user's manual

(R1) Version

DAINCUBE Corp.
ARM Cortex-A9 WEC7 System

FORM 170703F – 2017.07.03

DTP7H-W Hardware user's manual
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Preface

Important information
This documentation is intended for qualified audience only. The product described herein is not an end user product. It was developed and manufactured for further processing by trained personnel.

Disclaimer
Although this document has been generated with the utmost care no warranty or liability for correctness or suitability for any particular purpose is implied. The information in this document is provided “as is” and is subject to change without notice.

Trademarks
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Product support
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Safety precautions

Be sure to observe all of the following safety precautions.

Strict observance of these warning and caution indications are a MUST for preventing accidents, which could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and related symbols given below, before you proceed to the manual.

Symbols

The following symbols may be used in this specification:

Warning

Warnings indicate conditions that, if not observed, can cause personal injury.

Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.

Note

Notes call attention to important information that should be observed.

Revision history

Revision	Data	Comment
Version 0.1	2017.07.03	Initial Version
Version 1.0	2018.07.01	New Version
Version 1.1	2018.09.01	Changing DDR3 memory Changing SPI flash memory
Version 1.2	2018.11.23	Change option Changing SPI flash memory(Booting)
Version 1.3	2019.04.01	Add Emergency Stop Switch table, Change Mode Select Switch table
Version 1.4	2019.05.28	Change Mode Select Switch table
Version 1.5	2019.06.20	Excluding external SPI memory specifications

Contents

1. Introduction

Thank you very much for purchasing our product.
Improper usage or mishandling may result in a product not only being unable to deliver full functions but also produce unexpected troubles or shorten the product's life.
Please read this manual carefully, and operate the product properly by paying attention to its handling. When operating the product, always keep this manual at hand and read the relevant items as required.

1.1. General precautions

- Be sure to read this Instruction Manual for proper use of this product.
- Part or all of this Instruction Manual may not be used or reproduced without permission.
- Please take note that we shall not be liable for any effects resulting from using this Instruction manual.
- This manual may be modified when necessary because of improvement of the product, modification or changes in specifications.
- Some drawings in this manual are shown as a typical example and may differ from the shipped product.

2. Safety information

- Before unpacking and installing the product or adding devices on it, carefully read all the manuals that came with the package.
- Avoid using product in extreme dust, humidity and temperature conditions. Do not place the product in wet area.
- Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord. Otherwise, electric shock may result.
- After turning OFF power, wait at least five minutes before servicing the product. Otherwise, residual electric charges may result in electric shock.

Warning

- Be sure to check grounding before you use the unit. Danger of personal injury due to electric shock!
- Be sure to use the unit within the voltage range indicated.
- The operator must have a sufficient educational level and must know details of intended use described in the user's manual.
- Be sure to check the wiring to the main unit.
- When the user (customer) extends wiring, malfunction may occur due to faulty wiring. In this case, inspect wiring thoroughly and check it for properness before turning on the power.
- Before operating the unit, be sure to check that there is no danger in or around the operating range.
- Do not allow water or oil to get on the unit and the power cord.
- Install the unit in a place which can endure its weight and conditions while running.
- Take care not to squeeze and thus damage the cable with any object.
- Do not lay the cable over sharp edges to avoid damaging the cable sheath.
- Check the mounting screws regularly so that they are always firmly tightened.
- Never touch terminals directly or internal parts of controller.
- Do not disassemble or modify the product.
- Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord.
- Connect the power supply after completing the adjustment of all the cables and switches.

Caution

- After the shutdown window, turn off the power supply. Otherwise the components could be destroyed or undefined signals could occur.
- To prevent the equipment from falling to the ground.
- Never lay the device onto unstable surfaces. It could fall to ground and thus be damaged.
- It is recommended to use the unit in an environment where no electrical noise is present. In noisy environments, use a filter fitted.
- Never lay the device close to heat sources or into direct sunlight.

- Avoid exposing the device to mechanical vibrations, excessive dust, and humidity or to strong magnetic fields.
- Make sure that no foreign objects or liquids can penetrate into the device.
- Wipe the power plug with a clean, dry cloth periodically to eliminate dust.
- Always pay special attention to the robot's movement in the Teaching Mode.

3. Warranty and warranty coverage

The Teaching pendant you purchased has been delivered upon completion of our strict shipping test.

3.1. Warranty period

The warranty period is as follows:

- 12 months after our shipment.

3.2. Scope of the warranty

Where a defective condition occurs during proper use conditions and obviously under the responsibility of the manufacturer, within the term above, we shall repair the product without charge.

However, any items that apply to the following are excluded from the warranty coverage.

- The warranty is not valid if the defect is due to accidental damage, mishandling, misuse, voltage fluctuation, high/low voltage or natural disaster.
- If the product is repaired or tried to repair from unauthorized personal/Repair Shop.
- If the product serial number is tempered.
- The product is defective due to wear of parts, which can be considered as consumable parts by the nature. (such as a cable)
- Defects resulting from changes over time such as natural color fading of paint.
- Defects resulting from mishandling or improper use.
- Defects resulting from an inadequacy or error in maintenance and inspection.
- Defects resulting from the use of any part other than our genuine parts.
- Defects resulting from a modification not approved by us or our dealers.

Only a delivered product shall be singly warranted, and no damage induced by the defect of the delivery product can be warranted. For repair, transport the product to our factory.

3.3. Service coverage

The cost of a delivered product does not include expenses for program creation and engineer dispatching. Therefore, the following are charged separately even within the warranty term:

- Maintenance and inspection.
- Technical guidance and technical training in the operating instructions.
- Technical guidance and technical training on program-related matters such as program creation.

4. Description

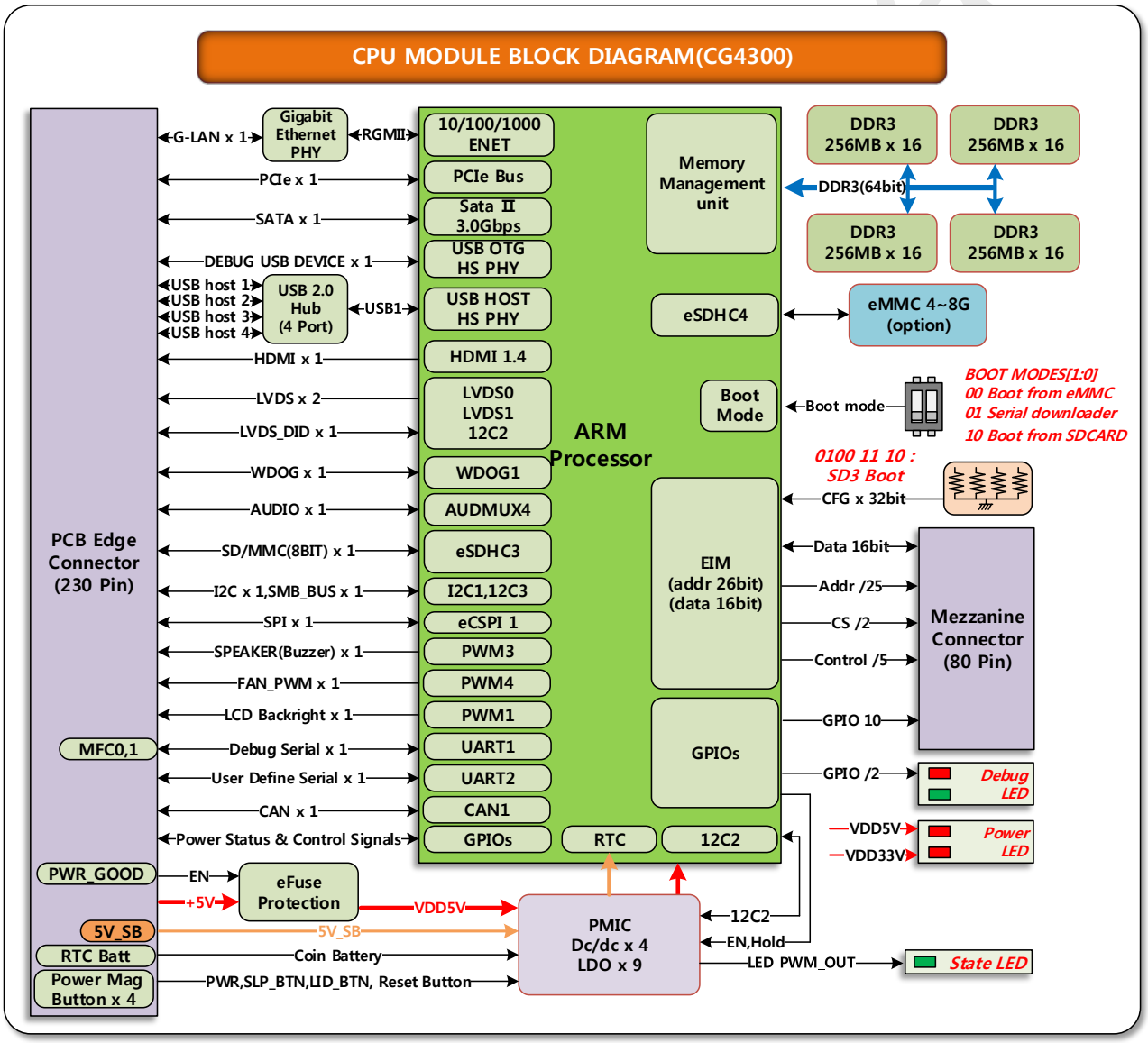
The DTP7H-W is an embedded-based teaching pendant with a high-performance Cortex-A9 (ARM Cortex-A9 800MHz) processor.
It accommodates various demands of the industrial field, supports various communication methods, and uses WEC7(Windows Embedded Compact 7) OS. With most known Visual Studio development tools and Open Sources, you can develop applications more easily.

Equipped with a user-friendly WinCE users can develop applications more quickly and easily.
The DTP7H-W device driver and sample program are all provided by customer support.

4.1. Processor Module Specifications

The processor module is "CG4300" developed by Daincube Co., Ltd.

32-bit RISC ARM Cortex-A9 Core was developed using a high-performance, low-power processor.
It is an ARM core that integrates ARM architecture V7-A and various peripherals.



[Figure 4-1] CG4300 Block Diagram

■DTP7H hardware specifications

Item	Contents	Remarks
Processor	ARM Cortex-A9 800MHz(11500 DMIPS)	i.MX6 Solo
Memory	DDR3 512MByte	
FLASH	MLC type eMMC 8GByte	
M-RAM	2MByte(nonvolatile memory)	
LCD	TFT 7inch 1024x600, 16.7M Color, LED Backlight	
Touch	4-wire Analog-resistive	
O/S	Windows Embedded Compact 7	
Buzzer	12Ø/ 1 ton , Front 60db(min)	
RTC	0℃ Lithium 3 years (Min)	
LED	Left 3 Color LED X 3, Right 3 Color LED X 3	
Debug Port	Micro USB Serial Port(RS-232)	
Storage	SD-Card, USB Host, USB Device	
Keypad	Jog(+, -) 12ea, Function 3ea, Direction 4ea	
Safety Switch	Emergency stop/Select/3-step Enabling	
Communication	Ethernet 1port	
	Ethernet 1port (option)	
	RS-485 1port	
Emergency CAP	Option	
Select Switch CAP	Option	
Hand Strap	20mm(Width) X 170mm(Length)	
Power supply voltage	DC 24V ±5%	
Power consumption	Max. DC24V / 500mA	
Temperature	Operating 0℃ to +50℃	
	Storage -20℃ to +70℃	
Humidity	10~85%RH (Non-condensing)	
Unit/Paint color	Housing for ABS, Black color	
Size	195 x 270 x 72mm	Without Cable and EMG CAP
Weight	Max. 1000g	Without Cable and EMG CAP
Cooling Method	Ambient	

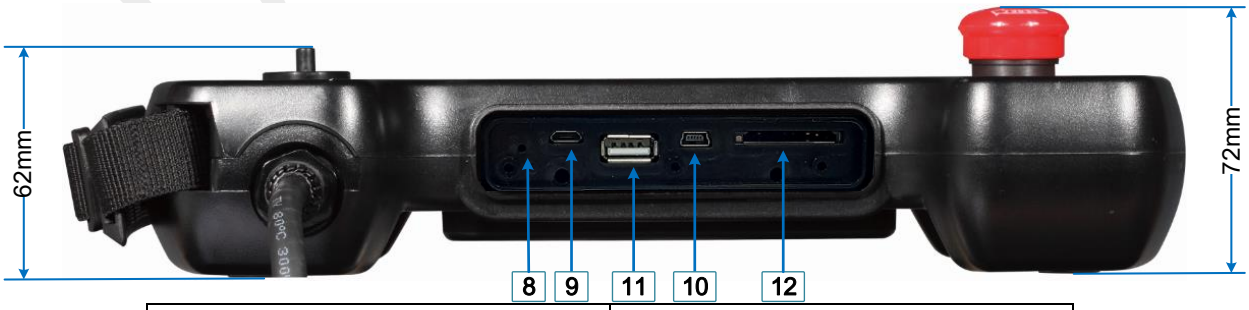
[Table 4-1] H/W specifications

4.2. Front view

1 - TFT-LCD with touch screen	5 - Hand Strap
2 - Mode Switch	6 - Left Keypad
3 - Emergency Switch	7 - Right Keypad

[Figure 4-2] Front function

4.3. Bottom view and dimension

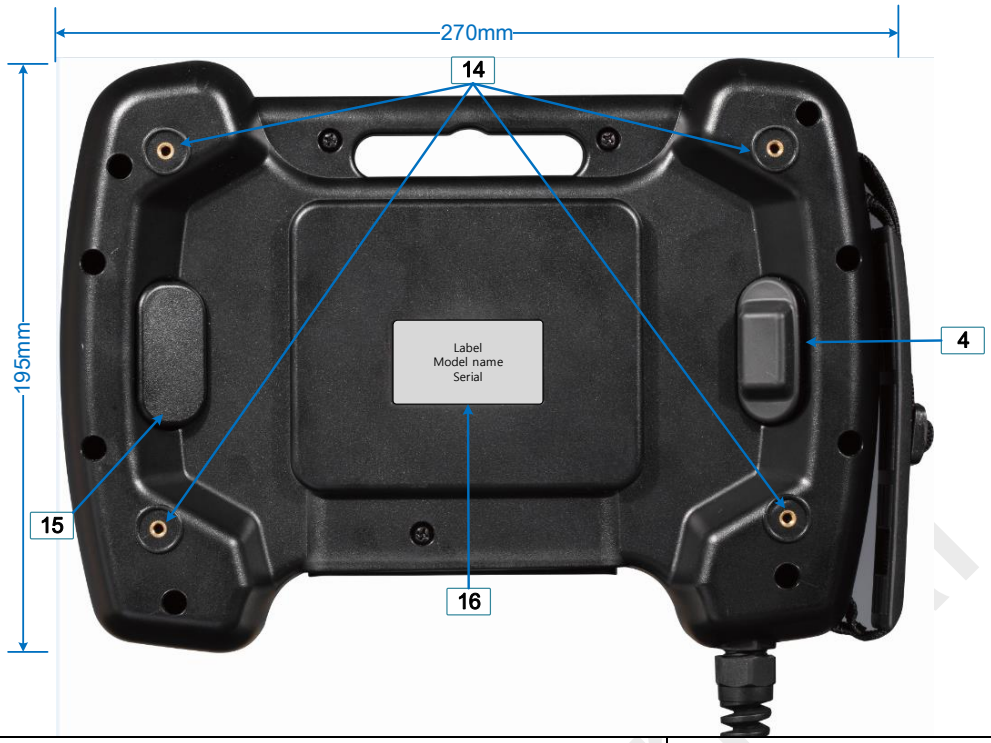


8 - Reset switch	11 - USB host
9 - Debug Serial	12 - SD-Card
10 - USB device (*option)	

[Figure 4-3] Bottom function

Note: These ports are used for software development and testing.

4.4. Rear view and dimension



4 - Left Enabling Switch	14 - Mount hole
15 - Right Enabling Switch(*Option)	16 - Label

[Figure 4-4] Rear function

4.5. System cable

1 - Circular plug 26pin connector	2 - Power and Switch connector
3 - Communication connector(Ethernet 2)	4 - Communication connector(Ethernet 1)
5 - Communication connector(RS-485)	6 - Anti-angle cable grand

[Figure 4-5] Main system cable

5. Features

DTP7H-W is an embedded type Teaching pendant for WinCE users.
We have applied the latest high performance Arm Processor, and you can Visual Studio development tools, you can develop applications most of the time.

5.1. The key features of DTP7H-W include

- Teaching pendants optimized for industrial robots.
- Round type ergonomic design products.
- Gorgeous graphical user interface and fast and easy button operation configuration.
- Support for various WinCE application software.
- Real Time Clock and Lithium Coin Battery
- Buzzer for alarm
- USB HOST, SD-Card
- Communication - Ethernet 2Port, RS-485
- Safety(Emergency stop, Enabling) switch: Redundant switches

5.2. Operating and Display panel

- Mobile 7inch 1024x600 16.7M Color TFT LCD with LED Backlight
- 4-wire resistive touch
- Membrane keys with tactile
- 3-Color 6 status LEDs
- Desk top operation
- Accessories such as wall brackets and desktop holders for mounting

5.3. LCD & Touch screen

Items	Specification
Type	TFT LCD
Size	7.0'(154.2 X 85.9mm)
Resolution	1024 X 600
Representation	16.7M
Background lighting	24 LEDs (Light Emitting Diode)
Touch screen	4-Wire Analog-Resistive

Note: For smooth touch operation, we recommend removing a LCD protective film.

5.4. Safety switch

Emergency Stop Switch, Select Switch, Enabling Switch to Cable can be connected to the System IO of the main controller.
Depending on the cable connection method Emergency Stop Switch Redundant configurations are possible.
Enabling Switch has used the 3 Level switch to operate all the emergency situation.
Select Switch has been implemented to allow you to select the three states.

5.5. User's interface

DTP7H-W user interface is a touch screen and can use the touch screen to easily control a GUI of the platform.

- Keypad interface
  - Left side: Direction 4ea and function 3ea
  - Right side - jog (+.-) 12EA (6Axis motor JOG Switch)
  - Left /right 3 Color LED implemented 3ea on each available according to the application.

5.6. Communication

DTP7H-W provide different interfaces for communication with the main controller, and basically provides the Ethernet communication.
RS-485 can be used to select one ways.

6. Function

This chapter describes how to operate the teaching pendant.

6.1. Operation keys and functions

[Figure 6-1] Pendant Controls and Function

(1) LCD Display

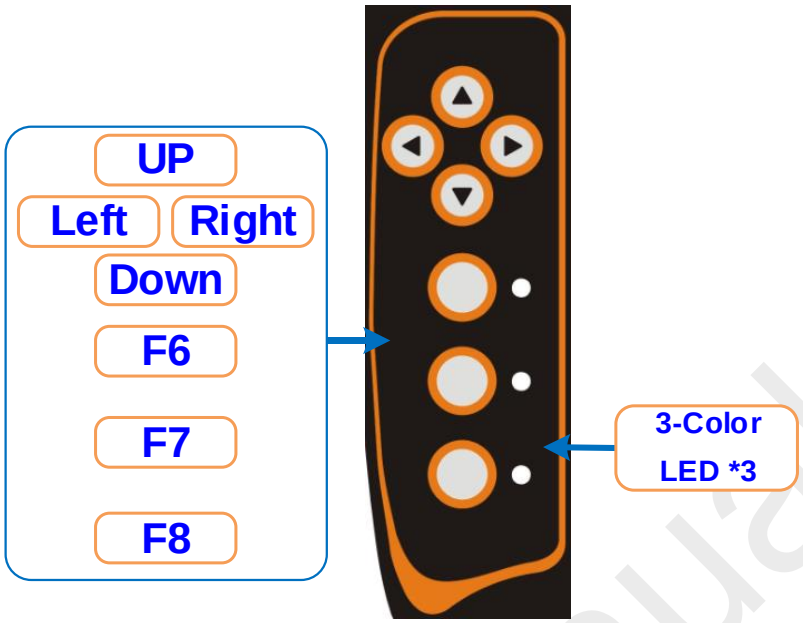
The 7" TFT LCD display area contains 1024 x 600pixels and can display up to 16.7M colors.
Shows programs and motion status for the UI.

(2) Touch panel

The touch panel is a resistive touch.
The LCD screen of the teaching pendant is also a touch panel. By touching the buttons or data entry areas displayed on the screen, it is possible to perform operations and make selections.

(3) Left keypad

The functions for each key and LEDs is defined when the user development.
See the software API manual for more information.



[Figure 6-2] Left keys and LEDs

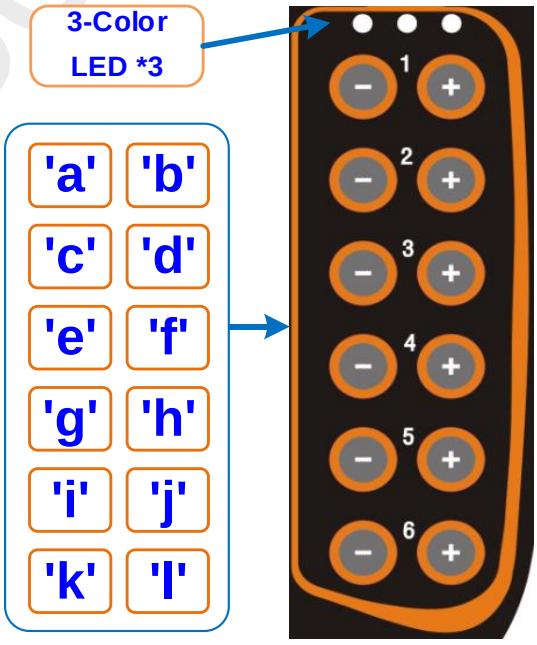
- Direction key: Left, Right, Up, Down key function.
- F6, F7, F8 Key: 3 function keys, the user defined the application.
- The right side of the LED can be assigned user functions.

(4) Right keypad (Axis Keys)

The functions for each key is set when the user development.
See the software API manual for more information.

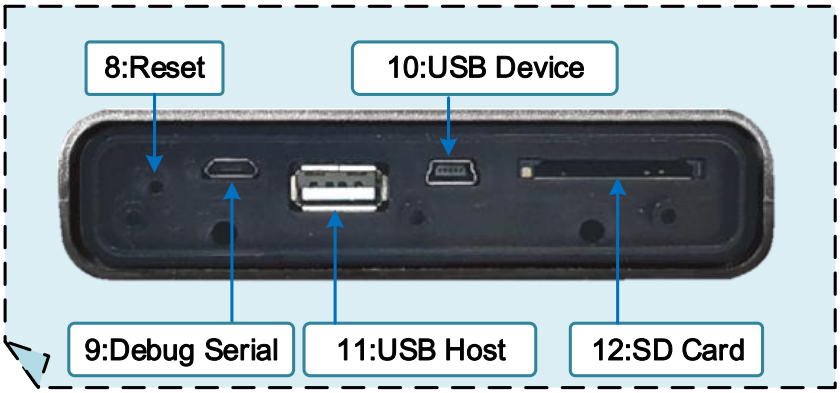
Generally, Use the axis keys to move the robot. The axis key's specific functions are available only from the Manual Menu screen, as manual robot motion can be initiated from only the teaching pendant Manual Motion screen.

The response to the axis keys depends on the robot motion settings.



[Figure 6-3] Right keys and LEDs

(5) Bottom side debugging port



[Figure 6-4] Interface for development

Interface ports should be used to open the protection cover.

- 8: Reset Switch - System Reset
- 9: Debug Serial - RS-232 Serial port(Micro USB Port)
- 10: USB Device - (Option) unused
- 11: USB Host - Mouse, key Board, USB memory stick
- 12: SD-Card - Software Update, SD-Card memory stick

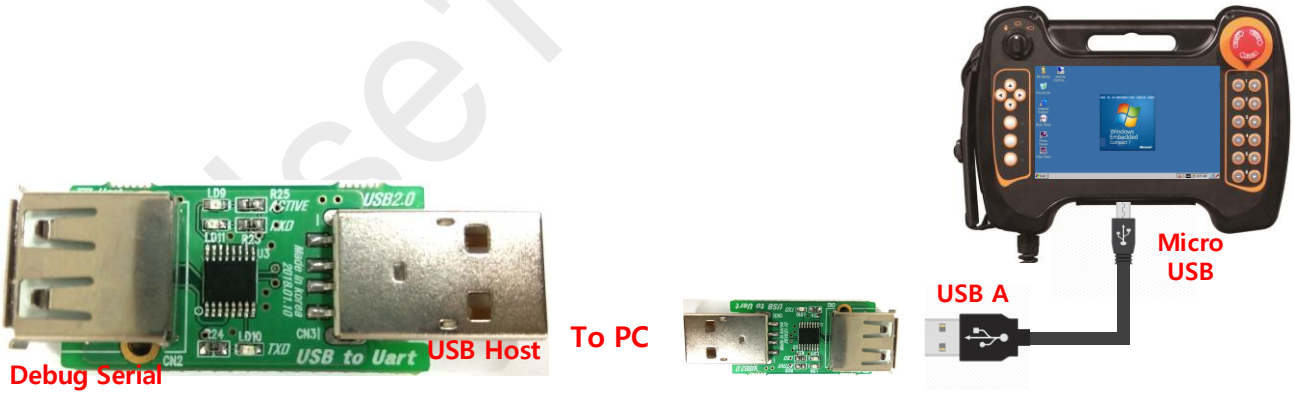
- Micro USB

⚠ Never connect to a regular USB

Debugging Serial Port for developers.
Debug Serial dongles are available for developers only.

- Debug Serial developers

DTP7H-W development debugging dongle.



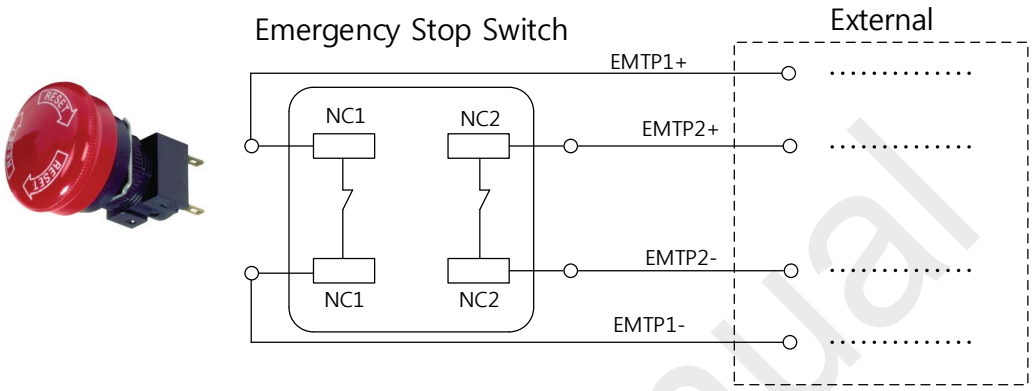
[그림 6.1] How to connect with debug serial dongle

Plug in the USB port of the PC and connect the USB socket (Debug Serial) to the Debug connector of the DTP7H-W using a micro USB cable.

This port is used for development purposes.
In general, it closed with a protection cover.

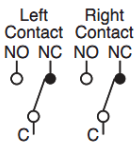
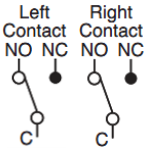
[Figure 6-5] Protection cover

(6) Emergency Stop Switch



[Figure 6.2] Emergency Stop Switch

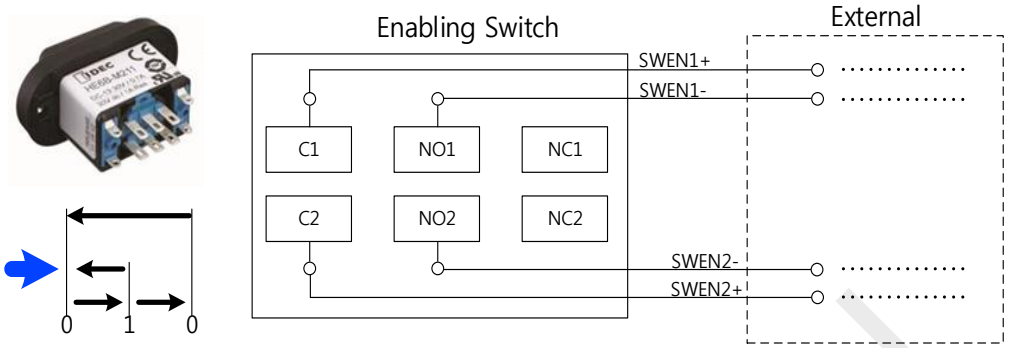
The teaching pendant Emergency stop Switch (the large red knob at the top right of the pendant) is a safety feature which disables the Robot power, immediately stopping the robot.

Position	Picture	Symbol	EMTP 1 (+,-)	EMTP 2(+,-)
Not pressed			**Short**	**Short**
Pressed			**Open**	**Open**

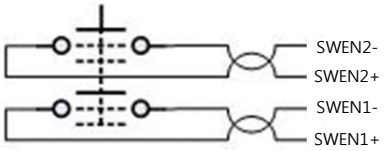
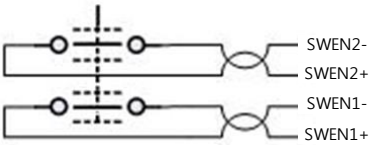
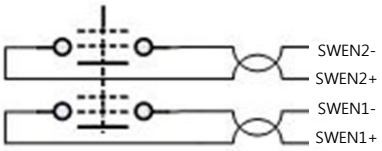
[Table 6-1] Emergency Stop Switch switch

(7) Enabling Switch

The pendant is equipped with a 3-position enabling switch. The enabling switch is located on the rear side of the pendant, as shown in the figure above.
The switch is also called dead-man switch.



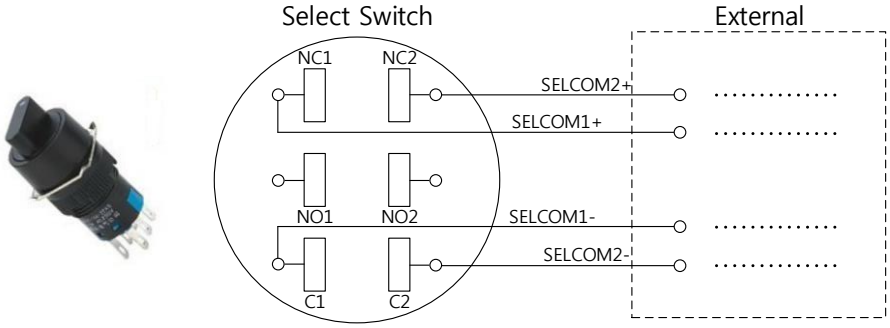
[Figure 6-6] Enabling switch

Action	Position	Picture	Symbol
Not pressed	Null		
Pressed	Enabling		
Pressed strong	Panic		

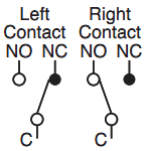
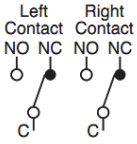
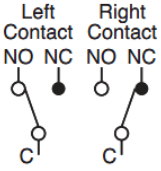
[Table 6-2] Enabling switch function table

(8) Mode Select Switch

This switch can be set as manual, automatic, or single as an example.



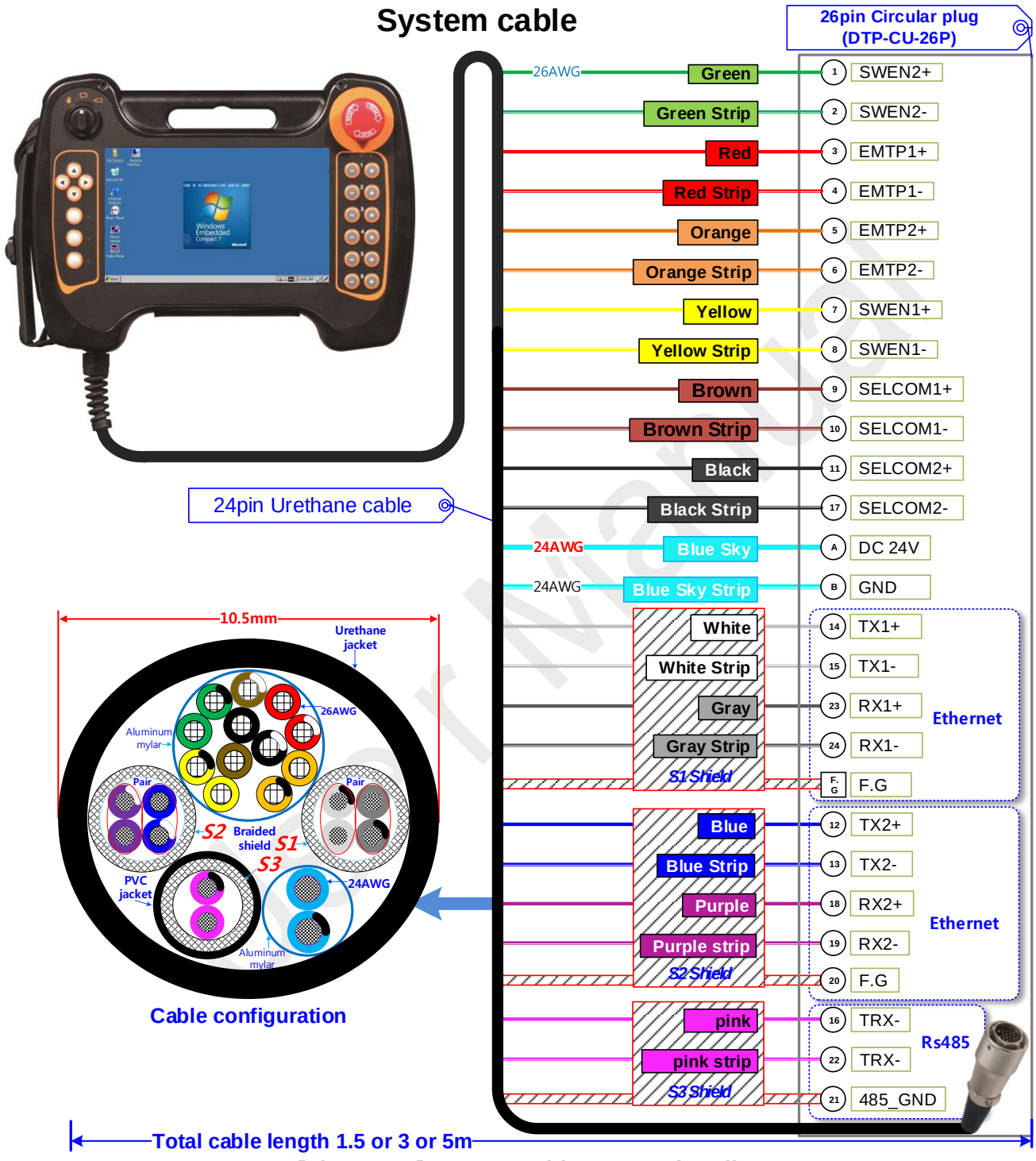
[Figure 6-7] Select switch

Position	Picture	Symbol	SELCOM 1 (+,-)	SELCOM 2(+,-)
Left			Short	Open
Center			Short	Short
Right			Open	Short

[Table 6-3] Select switch function table

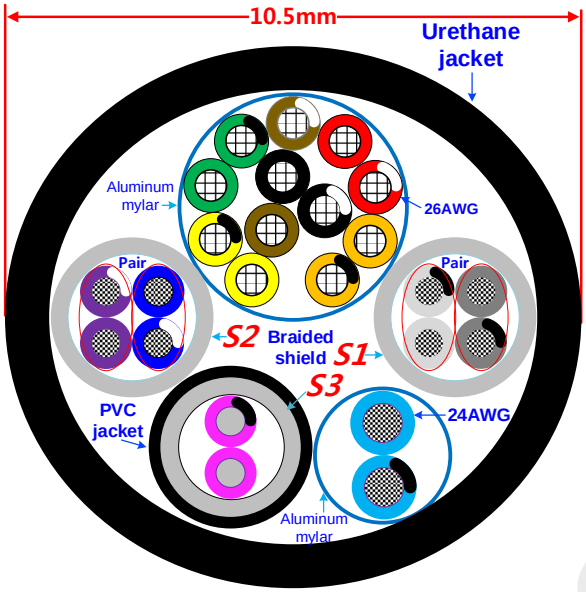
6.2. System cable and connector

System cable is a customer order specifications.
Cable lengths and types, connector types and specifications can be selected by the customer.



[Figure 6-8] System cable connection diagram

(1) System Cable configuration



[그림 6.3] 케이블 구성

(2) 26pin circular plug pin map

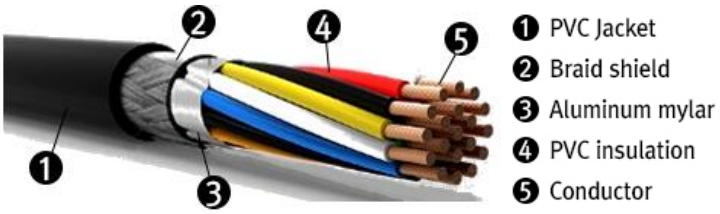
Plug Pin	Name	Description	Cable Color
System I/O			
3	EMTP1+	Emergency Switch the First signal (+)	**Red**
4	EMTP1-	Emergency Switch the First signal (-)	**Red Strip**
5	EMTP2+	Emergency Switch the second signal (+)	**Orange**
6	EMTP2-	Emergency Switch the second signal (-)	**Orange Strip**
7	SWEN1+	Enabling Switch the first signal (+)	**Yellow**
8	SWEN1-	Enabling Switch the first signal (-)	**Yellow Strip**
1	SWEN2+	Enabling Switch second signal (+)	**Green**
2	SWEN2-	Enabling Switch second signal (-)	**Green Strip**
9	SELCOM1+	Select Switch first signal (+)	**Brown**
10	SELCOM1-	Select Switch first signal (-)	**Brown Strip**
11	SELCOM2+	Select Switch second signal (+)	**Black**
17	SELCOM2-	Select Switch second signal (-)	**Black Strip**
Network 1 - Ethernet 1			
14	TX1+	Ethernet Transmit+	**White**
15	TX1-	Ethernet Transmit-	**White Strip**
23	RX1+	Ethernet Receive+	**Gray**
24	RX1-	Ethernet Receive–	**Gray Strip**
F.G	F.G	Frame ground	**S1 Shield**
Network 2 - Ethernet 2			
12	TX2+	Ethernet Transmit+	**Blue**
13	TX2-	Ethernet Transmit-	**Blue Strip**
18	RX2+	Ethernet Receive+	**Purple**
19	RX2-	Ethernet Receive–	**Purple strip**
20	F.G	Frame ground	**S2 Shield**
Serial – RS-485			
16	TRX D+	Data+	**Pink**
22	TRX D-	Data-	**Pink Strip**

21	485_GND	Isolation RS-485 GND	**S3 Shield**
Power			
A	VCC	DC 24V	**Blue Sky**
B	GND	Ground	**Blue Sky Strip**
Samwoo Connector Part number : SRC6A21-26P-G(26p)			

[Table 6-4] Circular plug pin assignment

Note: Ethernet1 default support.

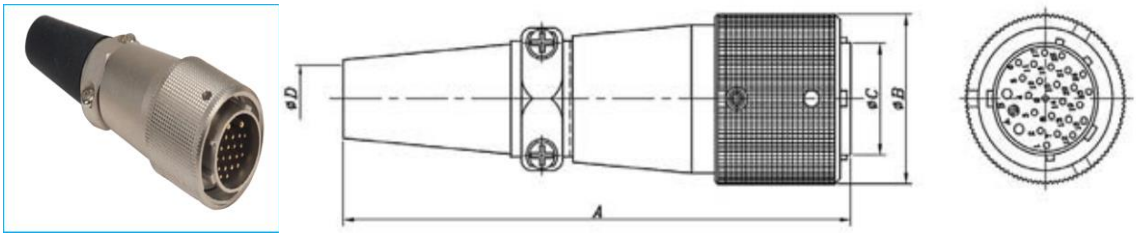
(3) cable specification



Item		Unit	Specification
AWG 26#×2 pair×2	Construction	NO. / mm	7 / 0.16TA
	Wire thickness	A-472	0.79 ¢
	Color		(Blue×Blue Strip + Purple×Purple Strip) (Gray×Gray Strip + White×White Strip)
	Braided shield	mm	7/0.10×16
AWG 26#×1 pair	Construction	NO. / mm	7 / 0.16TA
	Wire thickness	A-472	0.79 ¢
	Color		Pink x Pink Strip
	Sheath	PVC	3.18 ¢
	Braided shield	mm	5 / 0.10 × 16
AWG 26#×12C	Construction	NO. / mm	7 / 0.16TA
	Wire thickness	A-472	0.79 ¢
	Color		(Blue×Blue Strip + Purple×Purple Strip) (Gray×Gray Strip + White×White Strip)
AWG 24#×2C	Construction	NO. / mm	11 / 0.16
	Wire thickness	A-472	1.15 ¢
	Color		Blue Sky, Blue Sky Strip
Tapping the whole			(26#×2Pr×2) + (26#×1Pr) + (26#×12C) + (24#×2C)
	Thickness	Nom. Thick	mm
Jacket		Urethane	10~10.3 ¢ ⇓

[Table 6-5] Cable specification

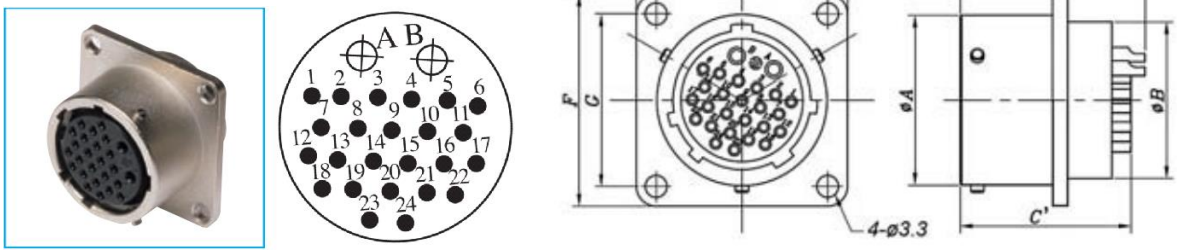
(4) Circular plug connector



Part Number	A	ØB	ØC	ØD
SRC6A21-26P	98.0	31.0	20.4	12.2

[Figure 6-9] Circular plug connector information

(5) Circular receptacle connector



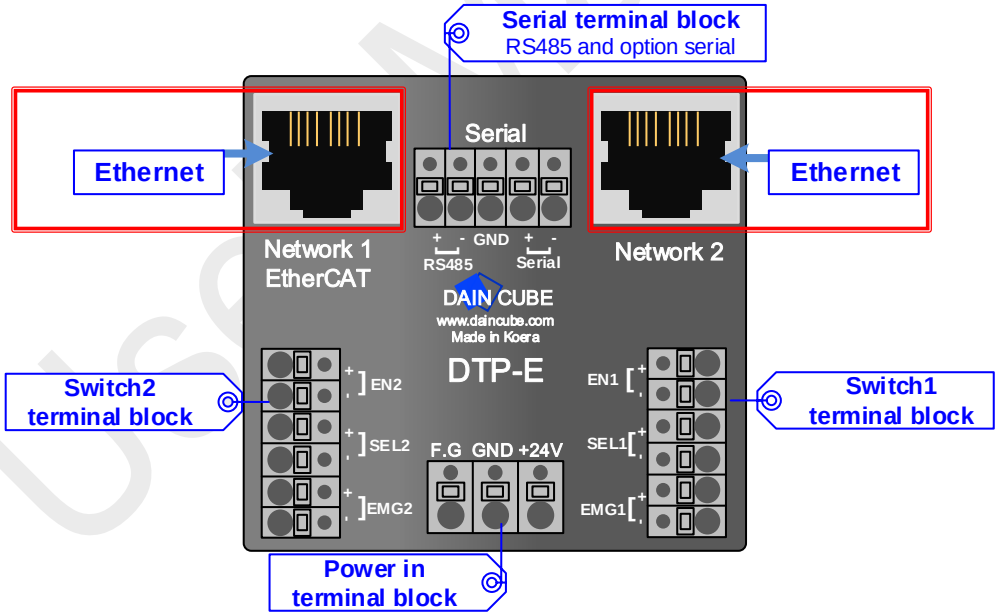
Part Number	A	ØB	C(C')	D	E	F	G
SRC2A21-26S	25.6	23.6	27.7(25.5)	14	2.3	32	26

[Figure 6-10] Circular receptacle connector information

7. Optional accessories

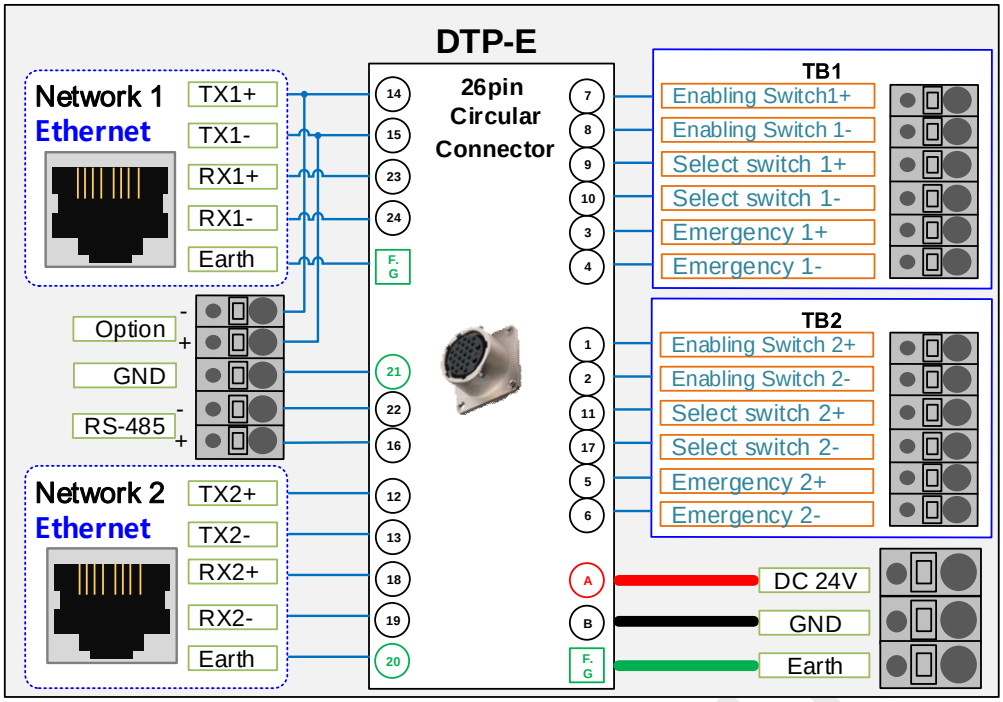
7.1. Junction box

Signal of the 26pin receptacle connector are connected to each function Connector or terminal block.



[Figure 7-1] Junction box connector diagram

- Network 1 - Ethernet port
- Network 2 - Ethernet port
- Serial terminal block - RS-485 port, Option Serial(Please contact us.)
- Switch terminal block - Redundant switches (Enabling, Emergency stop, Select)
- Power in terminal block - DC24V input

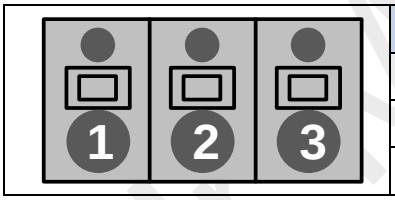


[Figure 7-2] Junction box pin map

If you are using a junction box, you can use a standard cable that can easily be purchased on the market.

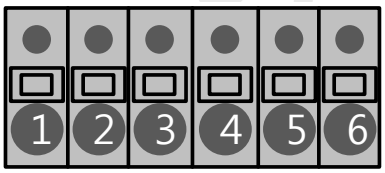
7.1.1. Junction box pin configuration

■ Power in terminal block



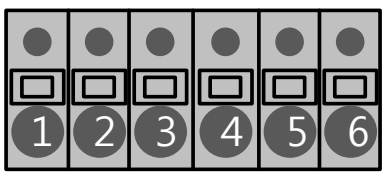
Pin	Description
1	F.G
2	GND
3	+24V

■ **Switch1 terminal block**



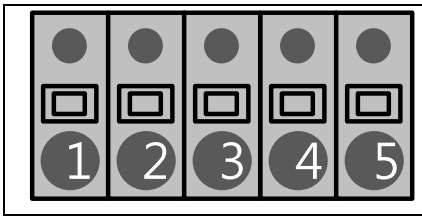
Pin	Description
1	Emergency 1 signal (-)
2	Emergency 1 signal (+)
3	Select 1 signal (-)
4	Select 1 signal (+)
5	Enabling 1 signal (-)
6	Enabling 1 signal (+)

■ **Switch 2 terminal block**



Pin	Description
1	Emergency 2 signal (-)
2	Emergency 2 signal (+)
3	Select 2 signal (-)
4	Select 2 signal (+)
5	Enabling 2 signal (-)
6	Enabling 2 signal (+)

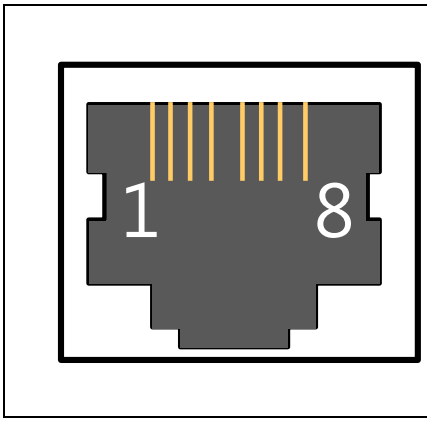
■ Serial terminal block



Pin	Description
1	TRX D+
2	TRX D-
3	NC
4	NC
5	GND

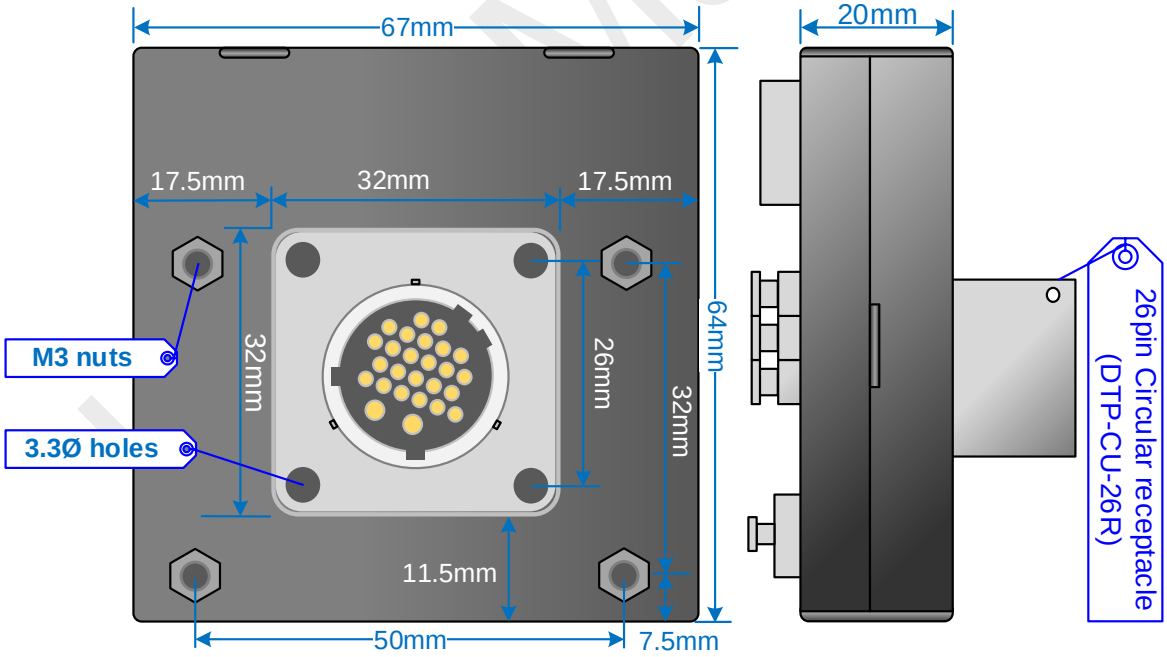
* Option: For Use to Please test.

■ Network 1,2



Pin	LAN1
1	TX+
2	TX-
3	RX+
4	-
5	-
6	RX-
7	-
8	-

7.1.2. Junction box Mechanical Information

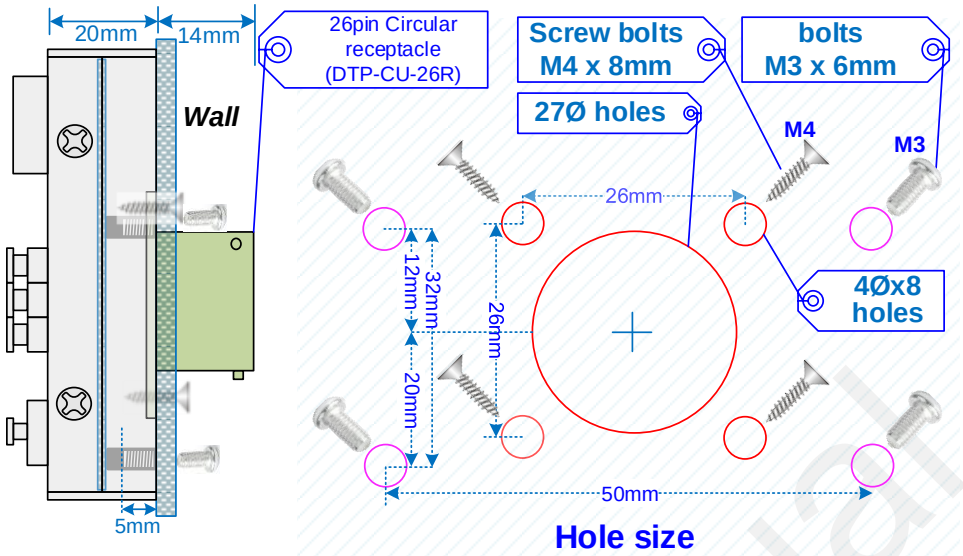


[Figure 7-3] mechanical drawing

■ Connect the 26pin system cable.

7.1.3. Junction Box Installation Instructions

Dimensional diagram of a drill hole for installation.

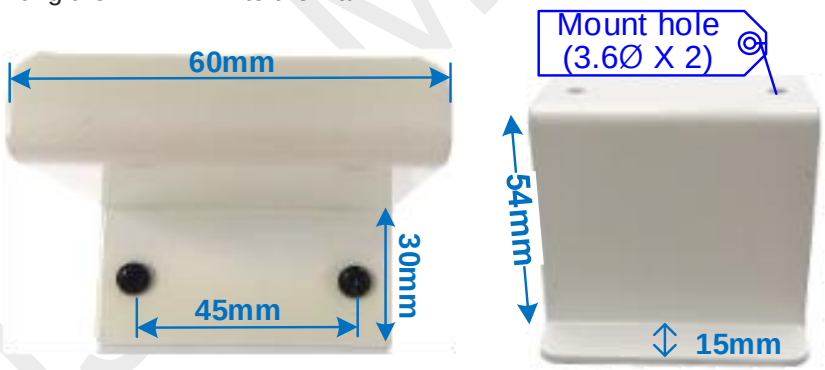


[그림 7.4] 설치를 위한 드릴 홀 정보

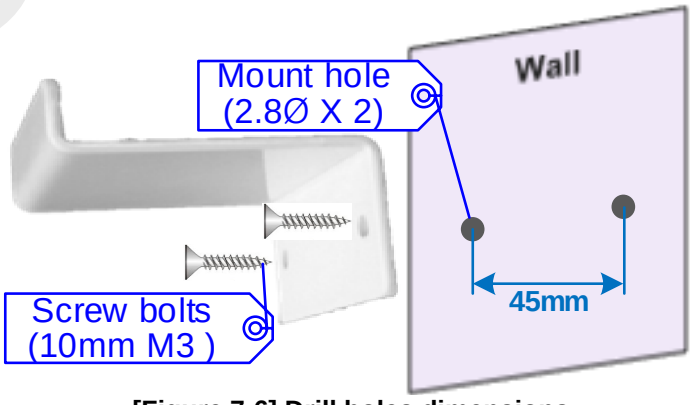
- Mounting holes: The drilling in the wall 27Ø, 4Ø holes as shown in the figure.
- Junction box mounting: junction box is fixed using a circular 26pin connector mounting hole.
- Use the M4 (length 8mm) screw when mounted on the wall.

7.2. Wall Bracket

The bracket for mounting the DTP7H-W to the wall.



[Figure 7-5] Wall Bracket Mechanical dimensions



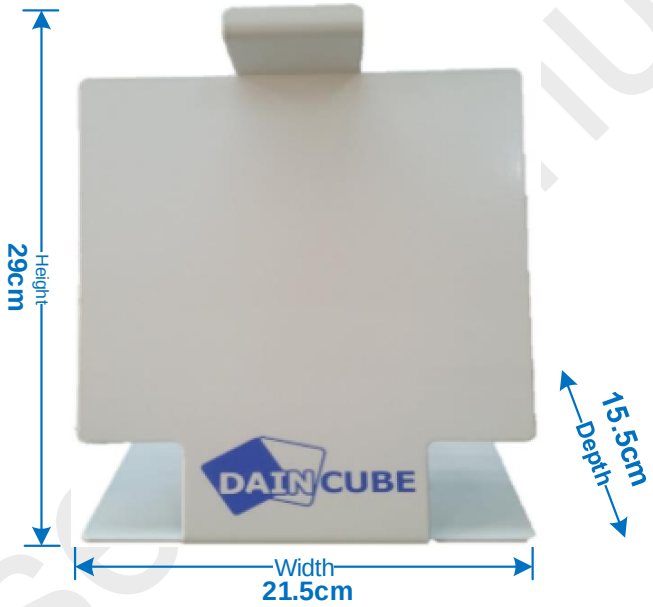
[Figure 7-6] Drill holes dimensions

- The 2 hole(2.8Ø) spacing of 45mm is required for mounting.
- Use M3(10mm) screw type bolts.

[Figure 7-7] Wall mounted appearance

7.3. Holder

This is the holder that the DTP7H-W Mounting on a desk.



[Figure 7-8] holder

7.4. Protective caps for switches

Select Switch Cap
DTP7-CAP-SEL

Select Switch Cap
DTP7-CAP-EMG

[Figure 7-9] Protective caps for switches

7.5. Other accessories parts

USB Cable
(DTP7-CU-USB)

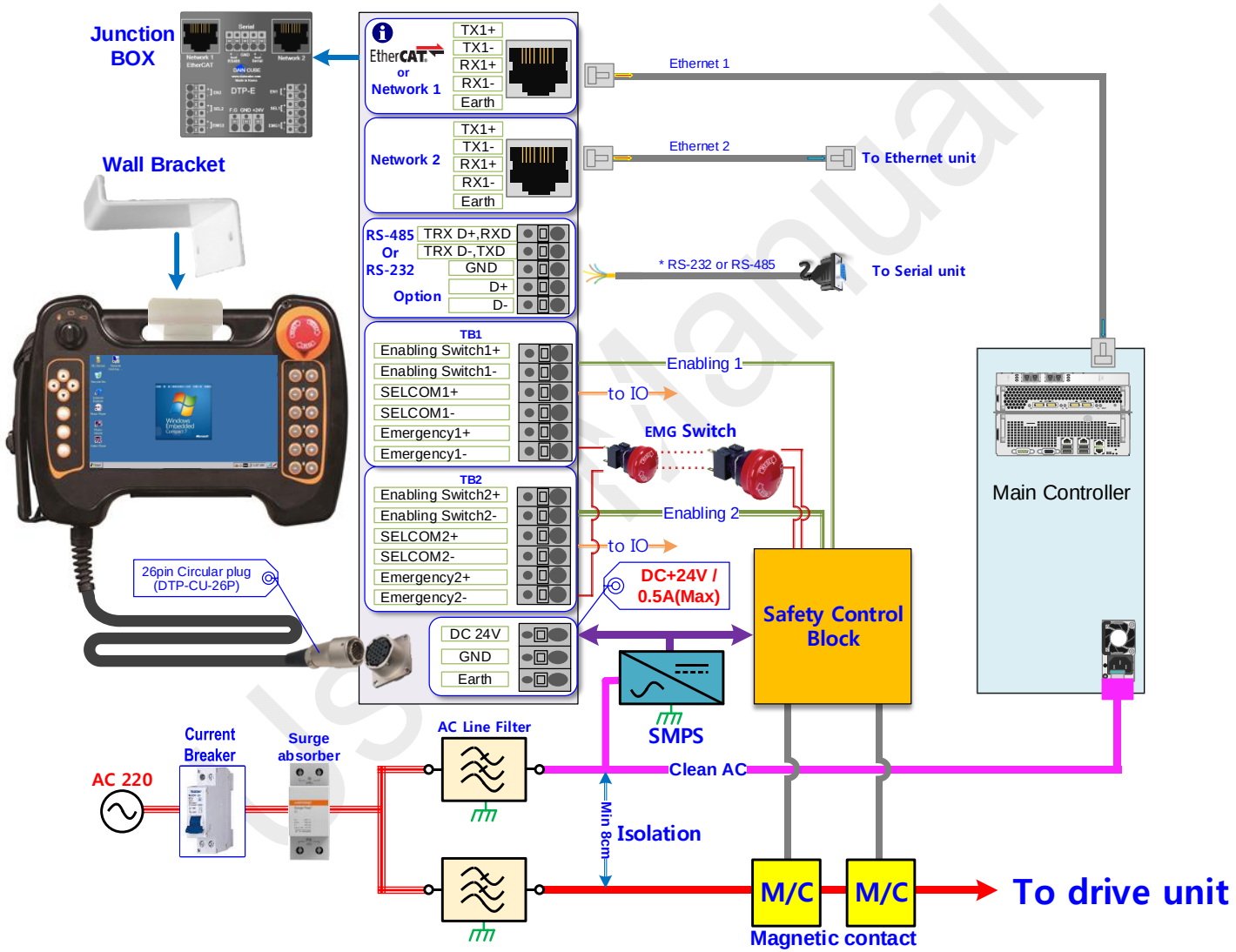
Debug Serial Cable
(DTP7-CU-DBG)

[그림 7.10] 기타 액세서리

- USB Cable : USB 2.0 Cable - A-Male to Mini-B (1.2Meters)
- Serial Debug cable : USB 2.0 Cable - A-Male to Micro 5Pin-B

8. Installation guide

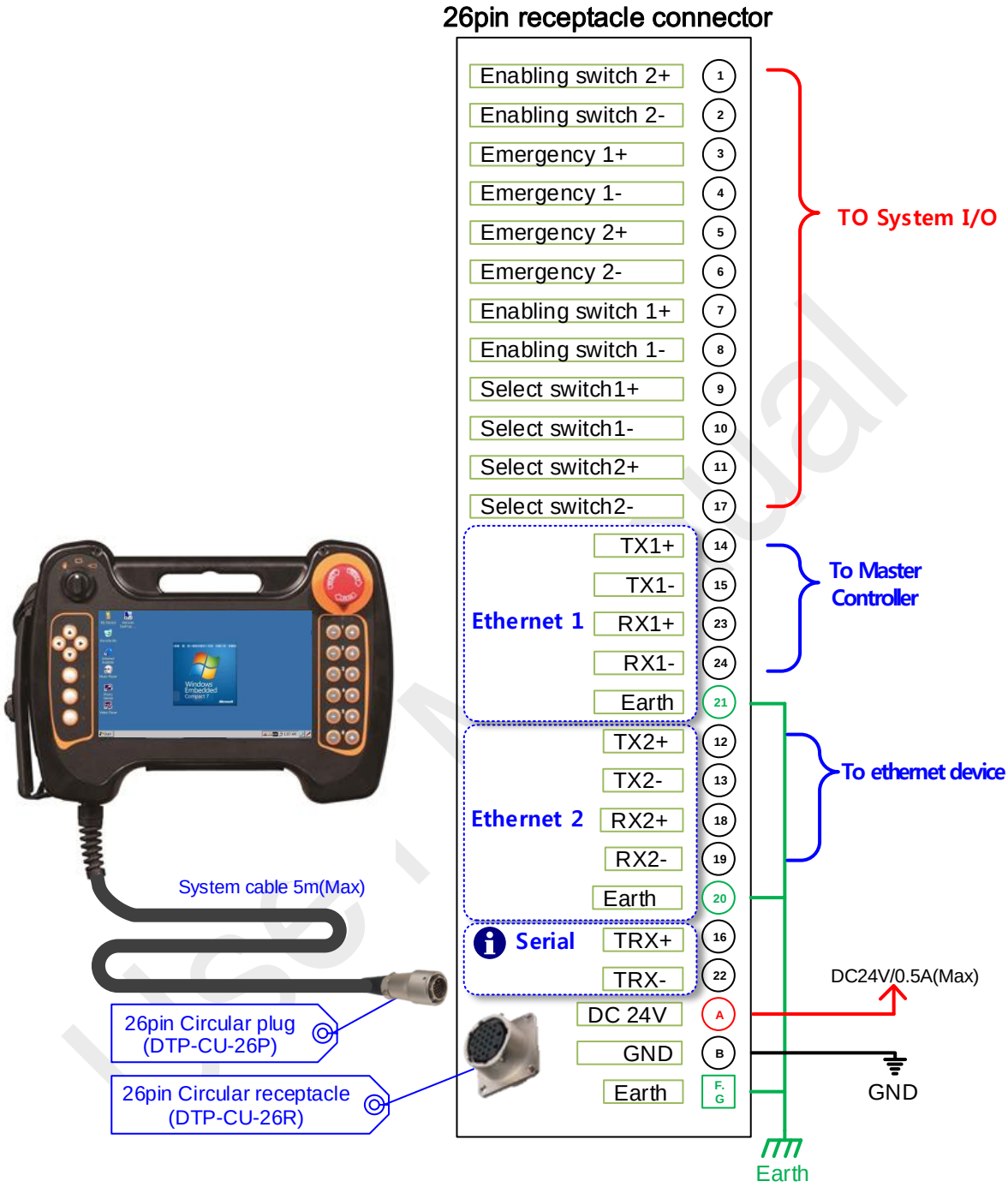
Thank you for purchasing the DTP7H-W Teaching pendant. Please install the device after you understand in detail the contents of the document.
This document contains recommendations for wiring, to reduce noise emissions generated by the driven components.



[그림 8.1]] Installation example for power and servo AMP

8.1. 26pin system cable configuration

Please turn off the main power and connect the DTP7H-W.



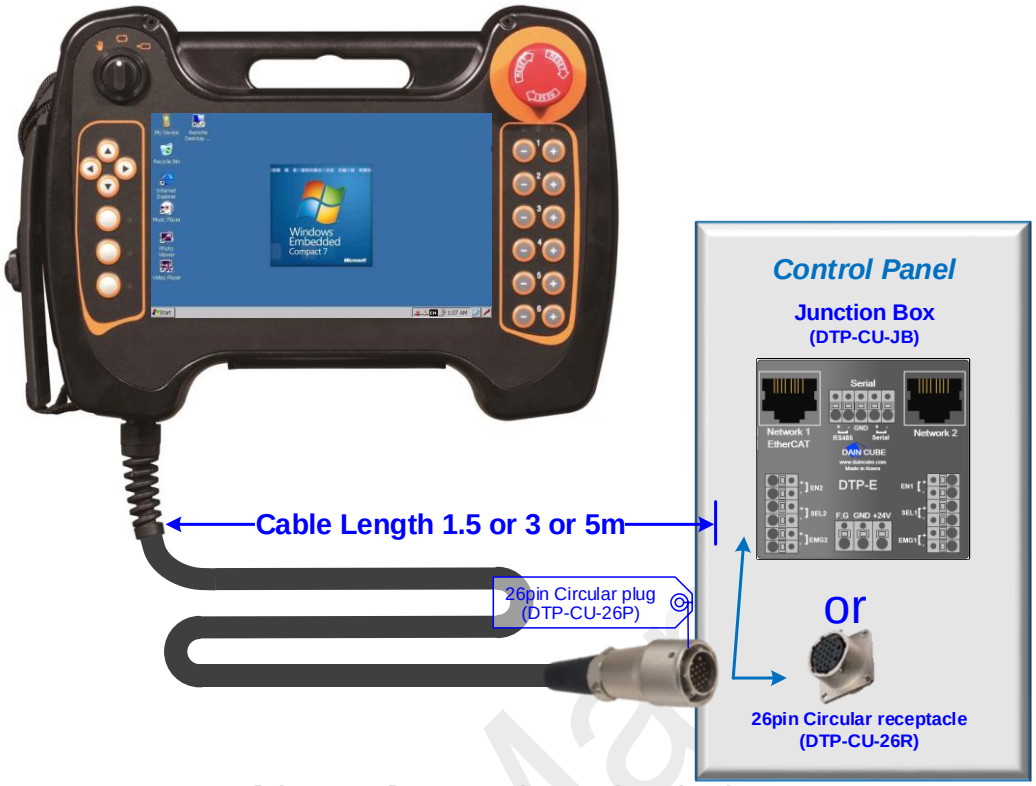
[Figure 8-2] 26pin system cable configuration

Serial – One of RS-232 or RS-485 must be selected in advance. (Optional)

- Enabling, Emergency stop, Select switch is connected to the Safety controller.
- Ethernet 2 port
- Serial 1port
- Power input : DC24V/500mA(max)

8.2. Connections example

■ Junction box



[Figure 8-3] Connections to junction box

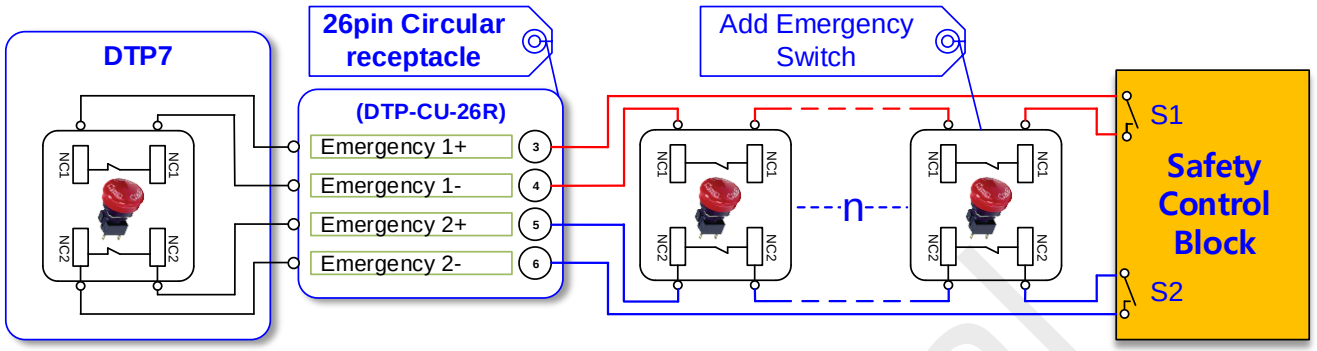
■ Control box

[Figure 8-4] Connections to Control Box

8.3. Wiring

8.3.1. Emergency Stop Switch wiring

The emergency stop switch used on the DTP7H-W features two circuits.
The contacts are normally closed.

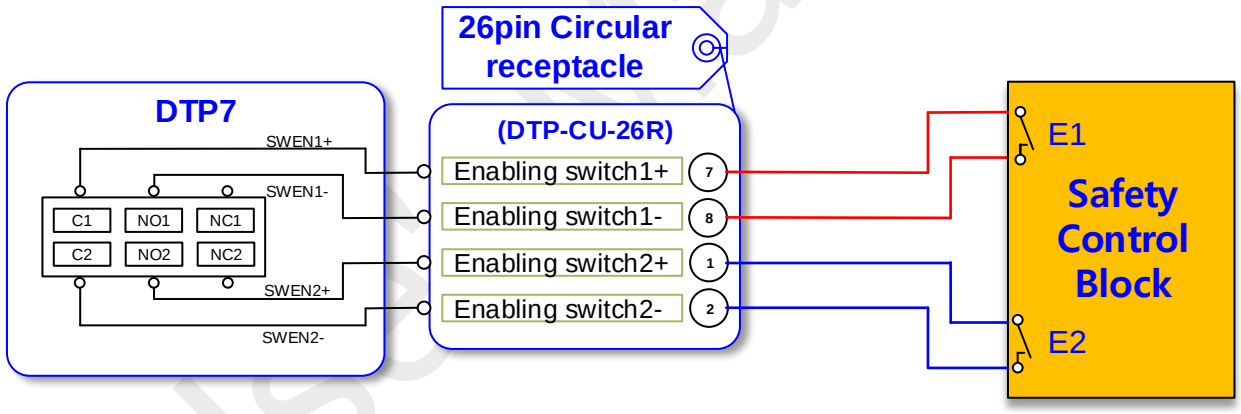


[Figure 8-5] Emergency Stop Switch wiring example

As shown in the figure, the wiring in series with the safety control block.

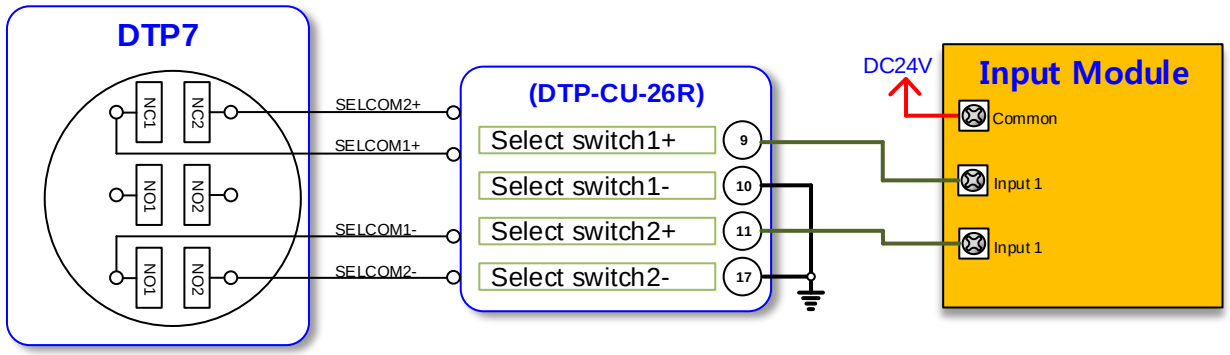
8.3.2. Enabling Switch wiring

The enabling switch used on the DTP7H-W features two circuits.
The enabling switch is connected to a dry contact.



[[Figure 8-6] Enabling Switch wiring example

8.3.3. Select Switch wiring



[Figure 8-7] Select Switch wiring example

8.3.4. Power

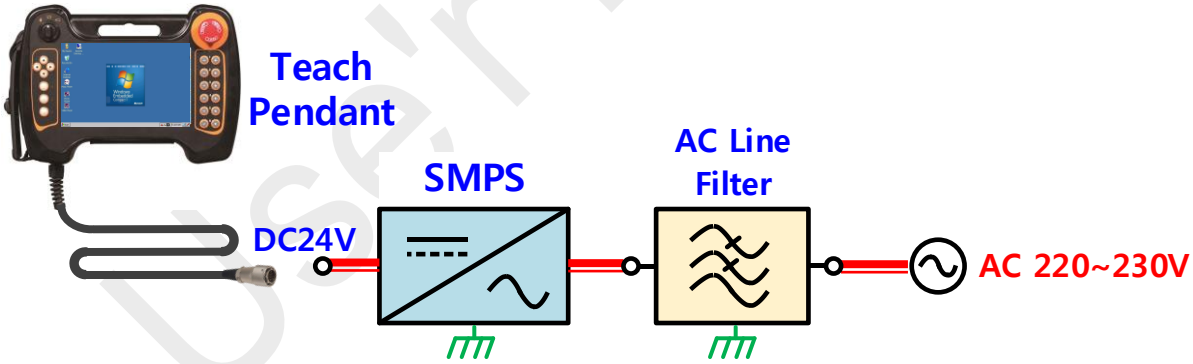
- The power supply is DC24V. Voltage regulation should be within ± 5%.
- Power lines are twisted a densely as possible, and should be connected as short as possible.
- Please use power with less Noise between lines and ground.
- If Noise is more or larger, use an isolation transformer or Noise Filter.
- Power-line should be used the thickest (2mm or more). So that no voltage fluctuations.
- Separate the motor wiring and the DC power and signal line wiring as far as possible. Please drop as possible over 100mm.
- Please separate the DC24V line from the motor line.
- Lightning-proof Surge absorber should be used to safety from such as lightning strikes and surges. Install the surge protector.

[그림 8.8] Surge absorber

Note: Surge absorber should be selected to allow the voltage is higher than the maximum input voltage.

8.3.5. Noise

- EMI: Electro Magnetic Interference
- EMS: Electro Magnetic Susceptibility



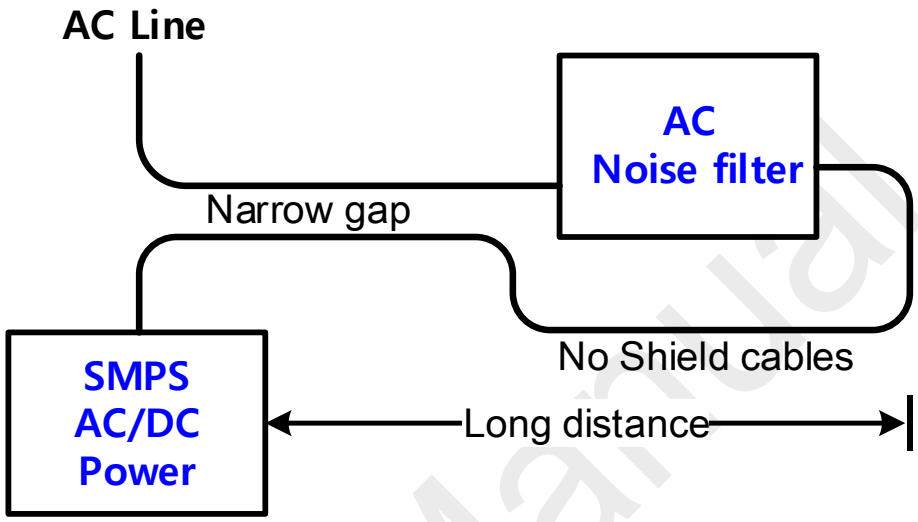
[그림 8.9] 전원 단 Noise 필터 적용

- Noise Filter must be installed on AC220V line. Motor noise so that it does not directly affect.
- Electronic components are caused the problems such as short lifetime or a deterioration or malfunction because of intense noise.

[Figure 8-10] AC noise filter

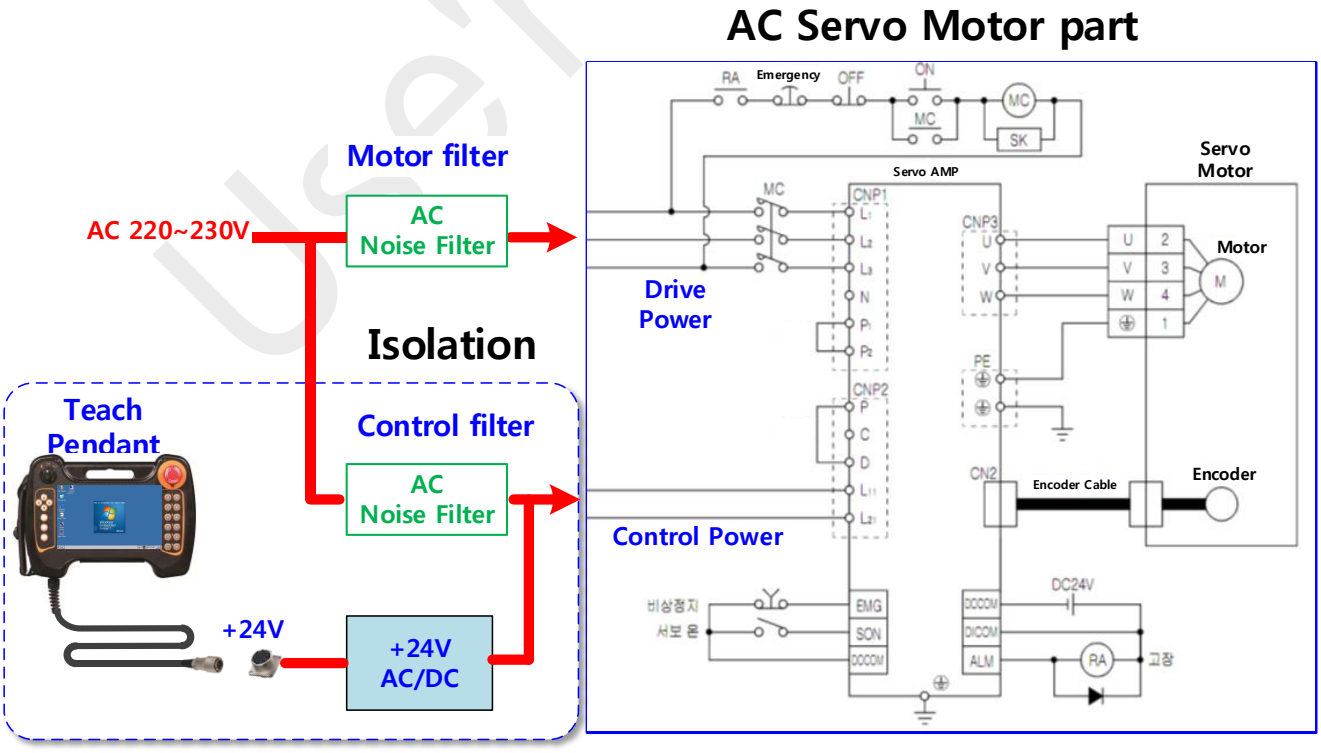
Warning	**Make sure the AC filter capacitor safety (PE) ground and connected correctly. You can avoid injury and / or damage to the equipment.**

Note: The filter is an essential element of protection against electromagnetic disturbance Filters prevent emitted interference acting on the power line and vice versa.



[Figure 8-11] Noise filter incorrect installation

■ The supply cable to the noise filter and outgoing cables from the noise filter must not run parallel to each other (see illustration):
■ Servo Motor part and DTP7H-W part Filter method used as below.



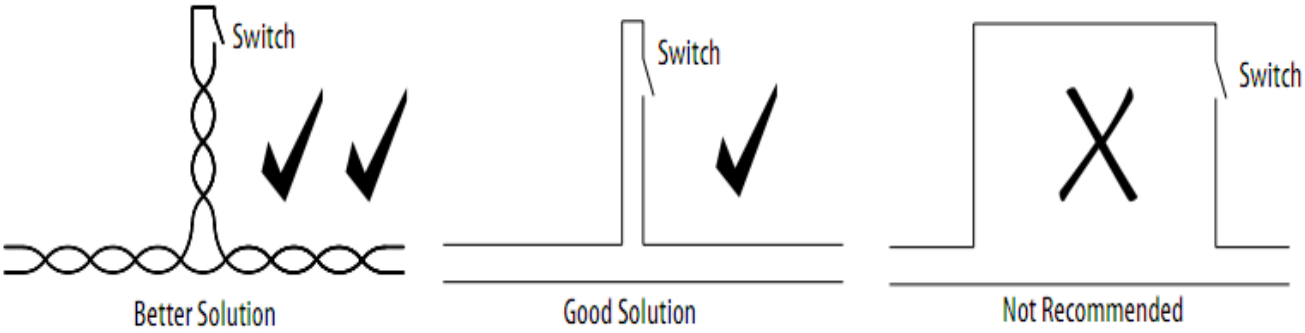
[Figure 8-12] Example: AC 220V line noise filter used

8.3.6. Method wiring

(1) Signal and communication cables is placing a high-voltage cable or power line over a distance of 10cm, please not affected by the noise and magnetic field
(2) If possible use separate ducts for power cables and control lines.
(3) All cable should be the Shield cable.

Note	According to the NFPA79 approved by the United States, when the shielded wire is not used for wiring between a servo amplifier and a servo motor, the wiring must be insulated from wiring of other control or signal circuits. (Example: 100 mm or more for 20 A or less)

(4) Minimizing the loops



[Figure 8-13] Avoiding loops in wiring designs

Note:

Wires that form a loop make an efficient antenna. Run feed and return wires together rather than allowing a loop to form. Twisting the pair further reduces the antennae effects and can significantly reduce EMI.

(5) Excess cable

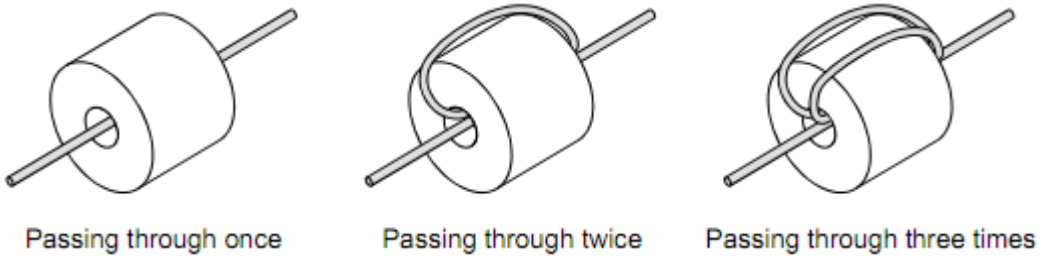
[Figure 8-14] Excess cable treatment

(6) Cabling instructions:

- Do not coil excess cable of different types (for example, motor power and feedback) together. An efficient transformer is formed at HF.
- Cable lengths should ideally be trimmed to fit the application.
- If excess cable cannot be trimmed, it should be laid in an 'S' or figure eight pattern (refer to the figure below).

(1) Ferrite core

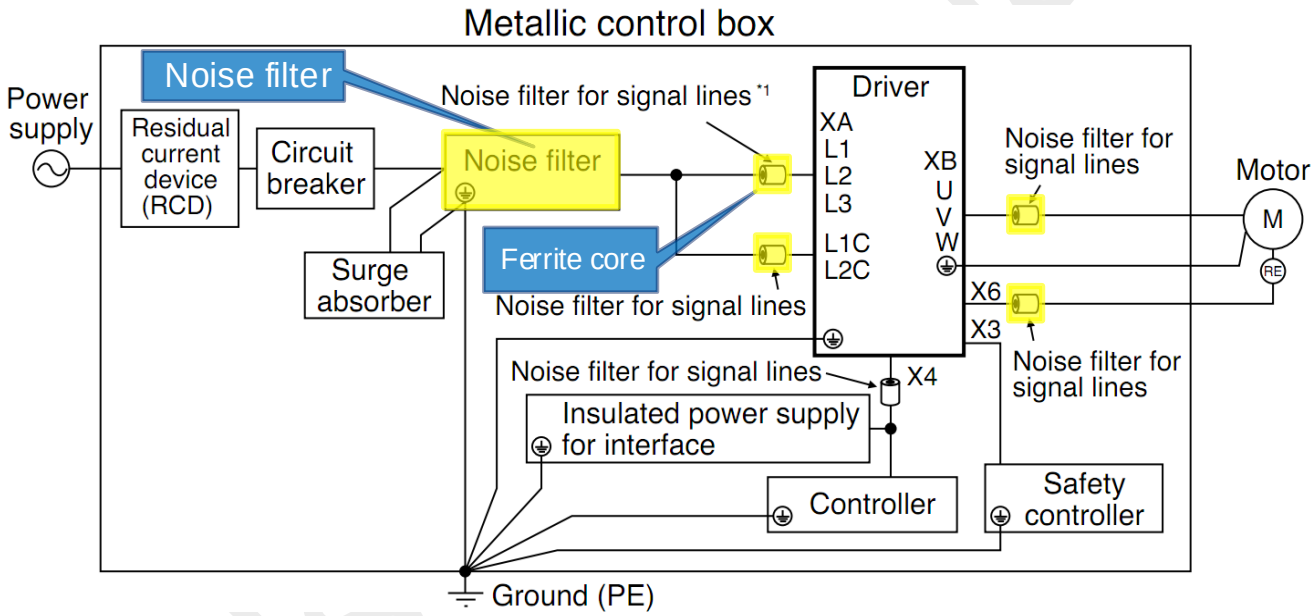
Ferrite core turn



[Figure 8.15] Ferrite core turn

Note: Using ferrite cores, increase the maximum number of turns around the ferrite for optimum results.

■ **Servo drive wiring for conformity to EC directives and UL standards.**



[Figure 8-16] Panasonic AC Servo drive Installation manual

Note: Servo drive part must install the Noise Filter and Ferrite core as shown in the figure.

For more information, please refer to the motor drive manual.

It is recommended to use the following Ferrite core.

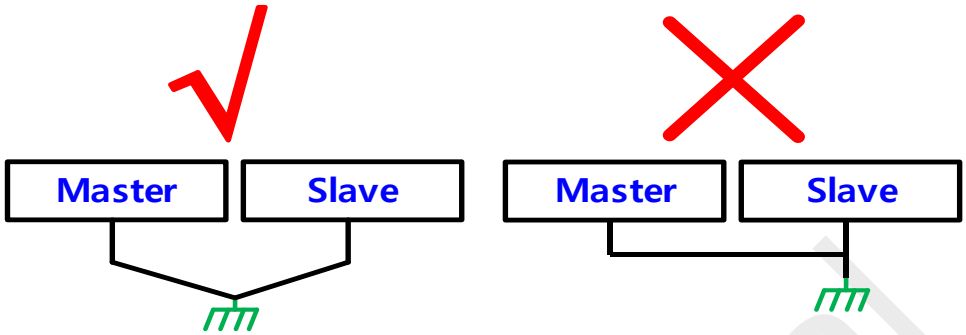
Option part No.	Manufacturer's part No.	Manufacturer
DV0P1460	ZCAT3035-1330	TDK Corp.

[Figure 8-17] TDK ferrite core

■ NEC TOKIN: ESD-SR-250, SEIWA ELECTRIC: E04SRM563218: It's possible to use.

8.3.7. Earthing

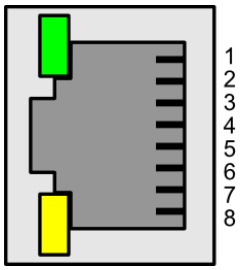
- The F.G pin in a circle Connector must be wired to the F.G terminal of the SMPS.
- Earth pin on LAN1 and LAN2 is a signal Shield.
- Earth wire should be used more than 2 mm.
- The length of the ground line is as short as possible.
- AC Power Earth and control system Ground are must be isolated.



[Figure 8-18] Earth wiring methods

8.3.8. Ethernet wiring

The following pin assignment is used for the DTP7H-W Ethernet master.



RJ45	26pin receptacle pin	name	Description
1	14	Tx+	Transmit Data +
2	15	Tx-	Transmit Data -
3	23	Rx+	Receive Data +
6	24	Rx-	Receive Data -
shield	21	Cable shield	Functional earth

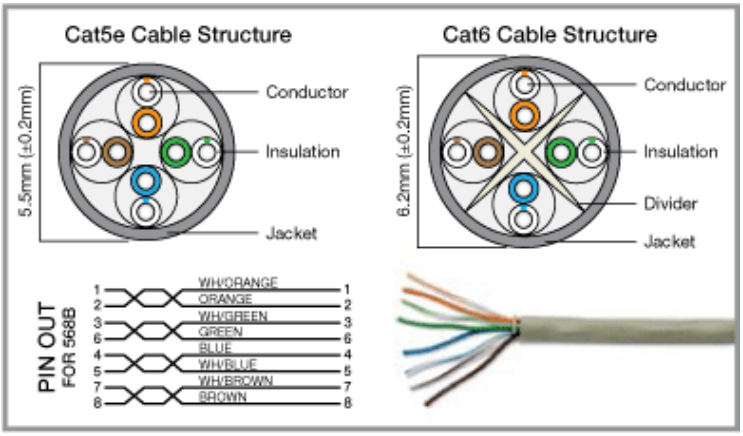
[Table 8-1] Ethernet connector map

8.3.9. Ethernet cable

- DTP7H-W Ethernet communication cable recommended specification
  - Cable minimum requirements : CAT.5E STP
  - Recommended: over CAT6
  - Plug: STP CAT.5E RJ-45 8P8C (Metal materials)

    (※ you should connect the shield between the cable and the plugs.)
  - In case of use the FTP / STP cable, you should use the Metal plug to connect the plug the shield and ground wires.

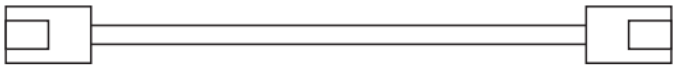
[Figure 8-19] FTP metal cable plug



[Figure 8-20] Cat 5e, Cat 6 cable

CAUTION	**Risk of communication faults!** Malfunctions in communications may happen when using inappropriate cables. Use only network cables of the categories 5 (Cat 5e, Cat 6 or Cat 7) or higher within Ethernet ® networks.

■ Straight through patch cable is recommended.



Pin No.	Wire color
1	White-Green
2	Green
3	White-Orange
4	Blue
5	White-Blue
6	Orange
7	White-Brown
8	Brown
Connector hood	Shielded wire *

Wire color	Pin No.
White-Green	1
Green	2
White-Orange	3
Blue	4
White-Blue	5
Orange	6
White-Brown	7
Brown	8
Shielded wire *	Connector hood

* Connect the shielded wire of the cable to the connector hood at both ends of the cable.

[Figure 8-21] Straight cable pin map

9. Package

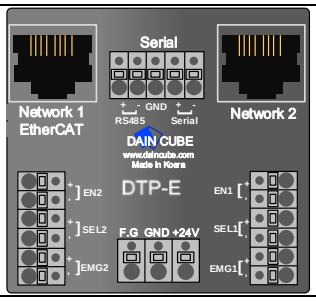
9.1. Packing list

DTP7H-W purchase the package configuration is shown below.

■ **Basic parts**

Item	Photo	Description	Quantity
DTP7H-W		Basic configuration ✓ Main part ✓ WEC7	1
System Cable **DTP7-CU-26P- ***M** **1.5M** **3M** **5M** **cn**		Length option : 1.5 ~ 5m Connector option :  26pin connector  Raw Cable	1
Development CD **DTP7H-CD-W**		*Option	1

■ **Option and accessories Parts**

Item	photo	Description	Quantity
Junction Box **DTP7-CUE-JB**		*Option	1
Circular receptacle connector **DTP7-CU-26R**		*Option	1

Emergency Switch cap **DTP7-CAP-EMG**		*Option	1
Select Switch cap **DTP7-CAP-SEL**		*Option	1
USB cable **DTP7-CU-USB**		*Option	1
USB to Serial only Dongle.		*Option	1
Debug Serial USB Micro B Cable **DTP7-CU-DBG**		*Option	1
DTP7-holder		*Option	1
DTP7- Wall Bracket		*Option	1

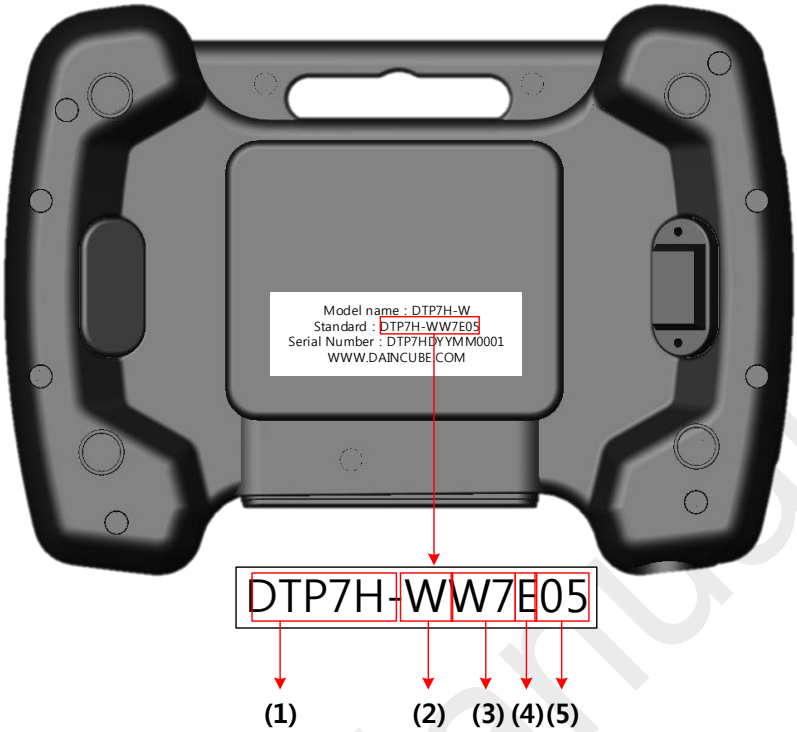
[Table 9-1] Packing list

Note: Please make sure there are no missing parts of the items listed in the checklist above

Note: Available for individual purchase by package

9.2. Packing & label

(1) Label

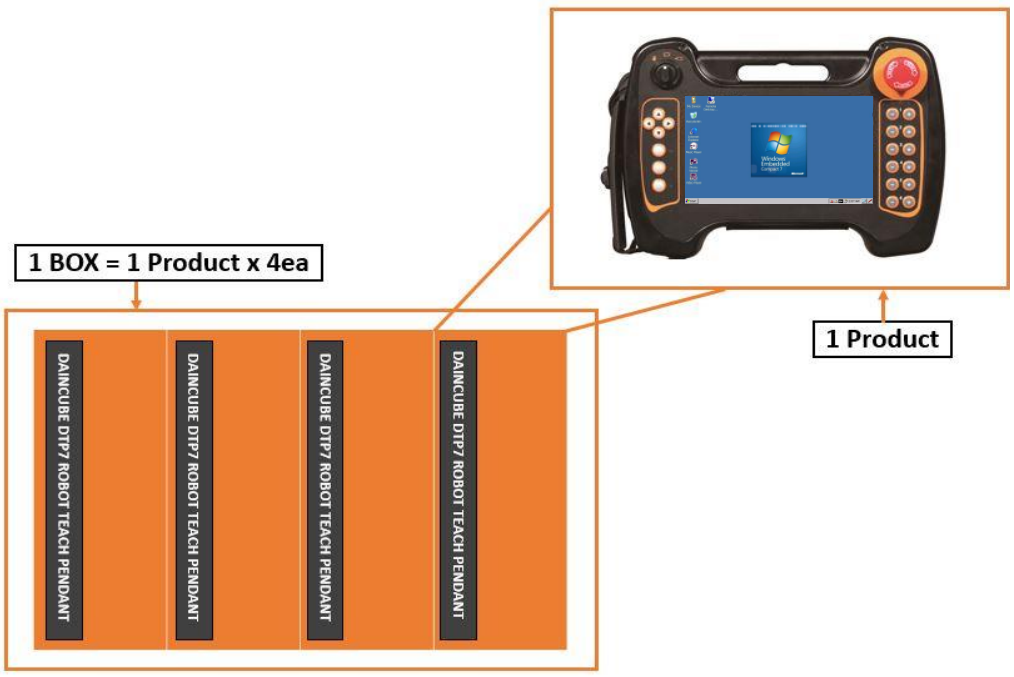


[Figure 9-1] Labeling position

(1)Model name	(2) Item	(3) O/S	(4) Communication	(5) Cable length
◆ DTP7H-W(WEC7)	◆W(WEC7)	◆W7(WEC7)	◆4(RS-485) ◆E(Ethernet) ◆N(None)	◆01(1.5M) ◆03(3M) ◆05(5M) ◆CN(Option)

[Table 9-2] Labeling rules

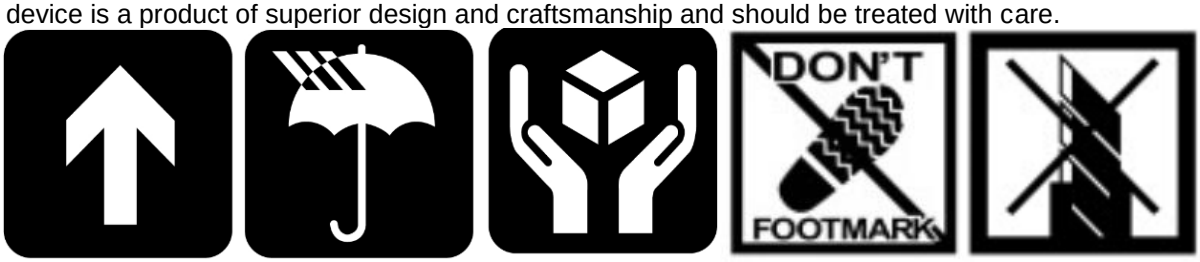
(2) Packing product: 1Box = 1Product x 4ea



[Figure 9-2] Carton box

10. General care and maintenance

Your device is a product of superior design and craftsmanship and should be treated with care.



The following suggestions will help you.

- Keep the device dry. Precipitation, humidity, and all types of liquids or moisture can contain minerals that will corrode electronic circuits. If your device does get wet, allow it to dry completely.
- Do not use or store the device in dusty, dirty areas. Its moving parts and electronic components can be damaged.
- Do not store the device in hot areas. High temperatures can shorten the life of electronic devices, damage cable, and warp or melt certain plastics.
- Do not store the device in cold areas. When the device returns to its normal temperature, moisture can form inside the device and damage electronic circuit boards.
- Do not attempt to open the device.
- Do not drop, knock, or shake the device. Rough handling can break internal circuit boards and fine mechanics.
- Do not paint the device. Paint can clog the moving parts and prevent proper operation.
- Unauthorized modifications or attachments could damage the device and may violate regulations governing radio devices.

10.1. Cleaning

To clean the pendant, use a soft cloth dampened with a small amount of water or a mild cleaning agent.

11. EC directives and standards

The list of safety standards on the robot. This section does not cover the safety design methods and safety equipment installation.

11.1. EC directives

2006/42/EC Directive for the safety of machinery with the application MD 2006/42/EC
2004/108/EC EMC directive
2011/65/EC RoHS directive

11.2. Standards

EN ISO 12100: Safety of machinery - General principles for design – Risk assessment and risk reduction
EN ISO 13849-1: Safety of machinery, safety related parts of control systems
-Part 1: General principles for design
EN ISO 13850: Safety of machinery - Emergency stop - Principles for design
EN ISO 10218-1: Robots for industrial environments - Safety requirements -Part1 Robot
EN ISO 9787: Robots and robotic devices -- Coordinate systems and motion nomenclatures
EN ISO 9283: Manipulating industrial robots, performance criteria, and related test methods
EN ISO 13732-1: Ergonomics of the thermal environment - Part 1

EN 61000-6-4(2007+A1:2011): Terminal disturbance voltage, Radiated disturbance
EN 61000-3-2:2014: Harmonic Distortion
EN 61000-3-3:2013: Voltage fluctuations & flicker
EN 61000-6-2:2005: Include below test types
EN 61000-4-2:2009: Electrostatic discharge
EN 61000-4-3:2006 +A1:2008+A2:2010: Radiated, radio-frequency, electromagnetic field
EN 61000-4-4:2004 +A1:2010: Electrical fast transient / burst

EN 61000-4-5:2006: Surge
EN 61000-4-6:2009: Conducted disturbances, induced by radio-frequency fields
EN 61000-4-8:2010: Power frequency magnetic field
EN 61000-4-11:2004: Voltage dips, short interruptions and voltage variations

Korea Standard
KN 61000-6-3 : Conducted tests (mains port), electromagnetic conduction test (communication ports)
KN 14-1 : Discontinuous disturbance test
KN 61000-6-3 : Electromagnetic radiation test
KN 61000-6-1, KN 61000-4-2: Electrostatic discharge immunity test
KN 61000-6-1, KN 61000-4-3: Radiated RF electromagnetic field immunity test
KN 61000-6-1, KN 61000-4-4: EFT/ Burst immunity test
KN 61000-6-1, KN 61000-4-5: Surge immunity test
KN 61000-6-1, KN 61000-4-6: Conducted immunity test
KN 61000-6-1, KN 61000-4-8: Power frequency magnetic field immunity test
KN 61000-6-1, KN 61000-4-11: Voltage drop and momentary power failure immunity test

12. Reference list

A list of installation related reference materials.
Please refer to the documents below for more details.

- Mitsubishi -EMC Installation Guidelines for General-Purpose AC Servo.
- YASKAWA: AC Servo Drive Technical Manual
- LS Industrial Systems: AC Servo Drive user's Manual
- Control Techniques: Motor Drives Installer's Guide.
- DELTA: EMC Standard Installation Guide for AC Motor Drives.
- Electrical design method considering EMC
- Rockwell Automation : Servo Drive Installation

Check the local regulations for disposal of electronic products.

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste.
Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment.
The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

We hereby declare that the product is in compliance with the essential requirements and other relevant provisions of European Directive 2014/30/EC(The Electromagnetic Compatibility Directive).

We hereby declare that the product is in compliance with the essential requirements and other relevant provisions of Korea Directive (EMC standards)
Standard: Information Communication equipment such notice with regard to the assignment and management of the laboratory