Panasonic

Operating Instructions

Arc Welding Robot Controller

Model No. YA-HG Series

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Model No.
YA-HGAKA1E** YA-HGAKA1U** (BX100N)
YA-HGAK21E** YA-HGAK21U** (RS015X)





TAWERS

- Arc Welding Robot Systems -

- Before operating this product, please read the instructions carefully and save this manual for future use. Please also read the operating instructions of peripheral equipment.
- First, please read the “Safety Precautions”.

English version is the original instructions.

WMA630TE0PAB00

2610

♦Table of Contents

Introduction 3

1.Safety Precautions 6
1.1Observe the following for safe welding operation 6

2.Specifications 10
2.1About Model No. 10
2.2Structure and hardware specifications 11
2.2.1E spec. 11
2.2.2U spec. 12
2.3Inputs, outputs and communications .. 14
2.4Specification of built-in welding power source 14
2.5About static characteristic 15
2.6Teach Pendant 16
2.7Accessories for teach pendant 17
2.8Accessories for controller 17
2.9Connecting cable 18
2.10Accessories for connecting cable 18

3.Transportation 19
3.1Transportation methods 19

4.Installation 20
4.1Choosing an installation site 20
4.2Installation site 20

5.Connection 22
5.1Connecting the controller to the manipulator 22
5.1.1Connecting cable for the manipulator 22
5.1.2Attaching EMC countermeasure components (Necessary only for E spec.) 23
5.1.3Connecting cables for the built-in welding power source 24
5.1.4Remarks on using multiple robots 25
5.2Connecting teach pendant 26
5.3Grounding wire connection 27
5.3.1Maximum allowable fault loop impedance ... 28
5.4Connecting primary power source 29
5.4.1Wiring of primary power cable 29
5.4.2Connecting primary cable 30
5.4.3Door handle 31
5.4.4Lock switches with padlock 31
5.5Connecting and control method of external device 32
5.6Using noise filter unit 33

6.External Control Signal Connection 34
6.1Terminal location of the sequencer card 34
6.2Serial interface 35
6.3I/O terminal equivalent circuit 36
6.4Auto start settings 37
6.5External interlock release input 37
6.6Status IN/OUT 38
6.6.1Status INPUT 38
6.6.2Status OUTPUT 39
6.6.3Lamp indication when the servo power is ON 39
6.6.4Status I/O to be allocated to user terminals. 39
6.7Flowchart of Status Outputs 40
6.7.1Operating and Holding output 40
6.7.2Mode change (I/O monitor) 40
6.7.3Error output 41
6.8Connecting to the sequencer card 41
6.8.1SD Memory Card slot (Teach Pendant) 42
6.8.2USB port 42
6.9Built-in welding voltage/current monitor terminal 43

7.Motor Brake Manual Release Switch 44
7.1How to release motor brake 44

8.Maintenance and Inspection 45
8.1Inspection schedule 45
8.2Daily check 46
8.3Periodical check 48

9.Disposal of this product 49

10.Repair Parts List 50
10.1Controller 50
10.2Teach pendant 54

11.Circuit Diagram 56
11.1Controller-Comprehensive circuit diagram 1 56
11.1.1Circuit diagram of controller 56
11.1.2Circuit diagram of amplifier and peripheral 57
11.2Controller-Comprehensive circuit diagram 2 58
11.3Welding power source 59

12.Location of Labels 60
12.1Location of labels 60
12.2Labels 61

13.Appendix 64
13.1License Information 64

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♦Introduction

Thank you for purchasing our Panasonic arc welding robots “TAWERS”. This manual explains TAWERS system configuration and operations of the robot controllers such as specifications, installation and maintenance.

For handling of the manipulator, please refer to the operating instruction of the applied manipulator. For operation of the controller, please refer to the operating instructions of “Teach Pendant for Arc Welding Industrial Robots”.

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♦Information Security and Personal Information Protection

- Take appropriate action to prevent security risks such as outflow of personal information via this product.
- Change your login password periodically to prevent unauthorized operation of the equipment.
- Easy-to-guess passwords may be figured out by third parties. Set a hard-to-guess password and keep it strictly confidential to prevent leaks to third parties.
- If you forgot the password, information may not be able to restored. Make sure to manage the password properly.
- Do not use the same password that you use on other systems or services.
- When entering your password, take care so that third parties may not steal glances at it.
- Take appropriate measures to avoid safety risks and to prevent third parties from illegally using the product, interfering or stopping the use of it.
- Secure the equipment and devices of this product firmly so that they may not be moved or relocated easily.
- Use keys, locks or other means to restrict physical access to the location of the equipment.
- Handle personal information in accordance with national laws and regulations.

♦Disclaimer

Our company and its affiliates (including any subcontractor, sales company or agent) shall not assume or undertake any responsibility or liability of the following:

- Any problem arising out of, or directly or indirectly attributable to, the failure of user to carry out those normal installation, normal maintenance, normal adjustment and periodical check of this Product.
- Any damage arising out of any force majeure, including but not limited to, act of God.
- Any misoperation, abnormal operation, or other malfunction that are not attributable to our company.
- Any intellectual property rights issues (process patent infringement) resulting from the use of this product (including the case where the products manufactured using this product are subject of dispute).
- Any malfunction or defect of this Product that is directly or indirectly the result of any malfunction or defect of one or more related parts or products that are not supplied by our company. Or any problem arising out of, or directly or indirectly attributable to, the combination of this Product with any other products, parts or software that are not supplied by our company. (including problems due to network failure, external cooperating service failure, or improper security setting on PC not supplied by our company)
- Any damages such as lost profits or operational losses caused by this product, or other indirect, derivative, consequential or punitive damages (including loss of data or information, and damages related to personal information management and handling).
- Any failure or damage caused by attempts to extract or decipher the software incorporated in this product.
- Any malfunction or related damage resulting from hacking or illegal intrusion or attack to the equipment or network.
- Any damages arising out of leakage of information left inside the equipment at the time of repair, transfer or disposal of the equipment.

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- This operating instructions manual is based on the information as of October, 2026.
- The information in this operating instructions manual is subject to change without notice.

1. Safety Precautions

Please read the “Safety manual” (separate volume) for detail safe handling.
In case of using the product in a system, please also read the operating instructions of peripheral equipment.

♦Signal Words and Safety Symbols

Signal Words		Safety Symbols	
⚠ WARNING	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.		Indicates a prohibited action.
⚠ CAUTION	Indicates a potentially hazardous situation, which, if not avoided, could result in minor injury or property damage.		Indicates a mandatory action.
			Indicates a hazard alert.

1.1 Observe the following for safe welding operation

⚠ WARNING

Welding Power Unit

Observe the following cautions to prevent accidents that can cause serious injuries.

(1) Never use the welding power unit for other than welding purpose, such as for pipe thawing.
(2) It is very important to comply with all instructions, safety warnings, cautions and notes mentioned. Failure to do so can result in serious injury or even death.
(3) Work of driving source at the input side, selecting work site, handling, storage and piping of high pressure gas, storage of welded products and also disposal of waste should be performed according to the operating instructions and national, state and local codes and regulations.
(4) Prevent any unauthorized personnel to enter in and around the welding work area.
(5) Only educated and/or skilled persons who well understand this welding power unit should install, operate, maintain and repair the unit.
(6) Only educated and/or skilled persons who well understand the operating instructions of the unit and who are capable of safe handling should perform operation of the unit.

Against Electric Shock



Observe the following instructions to prevent the hazard.

(1) Only educated and/or skilled persons should perform grounding of the case of the welding power unit, the base metal and jigs electrically connected to the base metal.
(2) Before installation or maintenance work, turn off all input power including power at the power distribution box and wait for at least five minutes to discharge electrical current from the capacitors. Check to make sure that no charged voltage present at capacitors before touching any parts.
(3) Do not use undersized, worn, damaged or bare wired cables.
(4) Connect cables firm and insulate the connected parts.
(5) Do not use the product with a case and panel removed or not in place.
(6) Do not handle the welding power unit with torn or wet gloves.
(7) Wear safety harness in case of working above floor level.
(8) Perform periodic checks without fail. Repair or replace any damaged parts as needed prior to use.
(9) Turn off all equipment when not in use.
(10) Do not touch any live parts.
(11) The welding power unit must be grounded and the work must be grounded in accordance with ANSI Z49.1 (For North America).

Electromagnetic Wave



Observe the following cautions to prevent radio interference due to welding current and high frequency for arc start.

(1) Electromagnetic wave generated during welding operation may have adverse affects on medical equipment in the periphery of the equipment in operation and the welding work site. If you wear a pacemaker, consult your physician before going near the welding work site.
(2) Provide proper grounding work of all equipment including electronic devices and safety devices near the welding work site. Conduct an additional electromagnetic shielding work if needed.
(3) Lay the welding cable as short as and as close to the floor or ground as possible. Lay the base metal cable and the torch cable along to each other to reduce generation of electromagnetic wave.
(4) Never share the ground work of the base metal and welding power unit with other equipment.

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⚠ WARNING

(5) Provide measures against noise to the external equipment, such as sequencer of the jig, proximity switch and area sensor, if such equipment is affected by the inverter noise from the robot or welding power unit. For details of the measures, please refer to the operating instructions of the external equipment.

Ventilation and Protective Equipment



Oxygen deficit, fume and gas generated during welding can be hazardous.

(1) Provide sufficient ventilation or wear breathing equipment specified by the applicable law (occupational safety and health regulation, ordinance on the prevention of oxygen deficiency and the like).
(2) Use a local exhauster specified by the applicable law (occupational safety and health regulation, rules on preventing injury by inhaled dust or etc.) or wear a protective breathing gear. If a protective breathing gear is used, it is recommended to use one with an electric fan with high protection performance.
(3) When conducting welding in the bottom, such as tank, boiler and the hold of a ship, use a local exhauster or wear breathing equipment specified by the applicable laws and regulations.
(4) When conducting welding in a confined area, make sure to provide sufficient ventilation or wear breathing equipment and have a trained supervisor observe the workers.
(5) Do not conduct welding at a site where degreasing, cleaning or spraying is performed. Conducting welding near the area where any of these types of work is performed can generate toxic gases.
(6) When welding a coated steel plate, provide sufficient ventilation or wear protective breathing gear. (Welding of coated steel plates generates toxic fume and gas.)
(7) Never ventilates with oxygen. Refer to ANSI Z49.1(For North America).

Against Fire, Explosion or Blowout



Observe the following cautions to prevent fires explosion or blowout.

(1) Remove any flammable materials at and near the work site to prevent exposure of such flammable materials to the spatter. If they cannot be relocated, cover them with a fireproofing cover.
(2) Do not conduct welding near flammable gases. Do not place the electric equipment near flammable gases, otherwise, such gases may catch fire from a spark of electricity inside the electric equipment.
(3) Do not bring the hot base metal near flammable materials immediately after welding.
(4) When welding a ceiling, floor or wall, remove all flammable including ones located in hidden places.
(5) Connect cables firm and insulate the connected parts. Improper cable connections or touching of cables to any electric current passage of the base metal, such as steel beam, can cause fire.
(6) Connect the base metal cable as close as possible to the welding section.
(7) Do not weld a sealed tank or a pipe that contains gas.
(8) Keep a fire extinguisher near the welding site for an emergency.

No Disassembling/Modification



Unauthorized disassembling or modification can cause fire, electric shock or breakdown.

(1) Contact Panasonic sales representatives for repair work.
(2) As for inspection of the inside the product if needed, follow the instructions in the operating instructions.

⚠ CAUTION

Installing Shielding (Curtain etc.)



Arc flash, flying spatter and slugs generated during welding can damage your eyes, skin and hearing.

(1) When welding or monitoring welding operation, wear safety glasses with sufficient light blocking structure or use a protective mask designed for welding operation.
(2) When welding or monitoring welding operation, wear protective clothing designed for welding operation, such as leather gloves, leg cover and leather apron, and also wear long-sleeve shirts.
(3) Install a protective curtain around the welding operation site to prevent exposure of eyes of people in the surrounding area to the arc flash.
(4) Be sure to wear noise-proof protective equipment, such as ear muffs and ear plugs, if the noise level is high.

Gas Cylinder and Gas Flow Regulator



Overturn of gas cylinder and blowout of gas flow regulator can cause injury.

(1) The gas cylinder must be handled properly according to the applicable law and in-house standards.
(2) Use the gas flow regulator that is supplied or recommended by our company.
(3) Read the operating instructions of the gas regulator prior to use, and observe the cautions described in it.
(4) Secure the gas cylinder to a dedicated gas cylinder stand.
(5) Do not expose the gas cylinder to high temperature.
(6) When opening the valve of the gas cylinder, do not bring your face close to the discharge outlet.
(7) When the gas cylinder is not in use, be sure to put the protective cap back on.
(8) Do not hang the welding torch on the gas cylinder. Do not allow the electrode to touch to the gas cylinder.
(9) Only the specified contractor should perform disassembly or repair work on the gas flow regulator. Such works require some expertise.

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⚠ CAUTION

Rotating Parts



Rotating parts can cause injury.

(1) Keep away from rotating parts, such as cooling fans and feed rollers of the wire feeder, or hand, finger(s), hair or part of your clothes may be caught by the rotating parts resulting in injury.
(2) Do not use the product with a case and panel removed or not in place.
(3) Only educated and/or skilled persons who well understand welding machines should perform maintenance and repair work. During maintenance or repair work, provide fence or the like around the welding machine so that any unauthorized person can not come close to the working area carelessly.

Welding Wire



Welding wire, especially wire tip part can cause injury.

(1) Do not perform inching operation or pull the torch switch with your eyes, face or body close to the end of the welding torch. Wire extends out from the end of the welding torch and may stick into the eye, face or body.
(2) In case of using a torch cable with the resin liner, straighten the torch cable and reduce the preset feed amount (current) to half or less before applying the wire inching.
(3) If the high speed wire inching is executed with the torch cable extremely-bended, the welding wire may pass through the resin liner and the cable.
Replace any damaged liner/cable with a new one without fail. Never use a damaged liner/cable, or it can cause gas leak or insulation deterioration.

Against Insulation Deterioration



Insulation deterioration can cause fire of welding power unit.

(1) Keep enough distance from welding power unit when performing welding or grinding operation so as to prevent such spatters or iron particles from getting into the power unit.
(2) Perform inspection and maintenance work periodically so as to prevent insulation deterioration due to accumulated dust or dirt.
(3) When spatters or iron particles get into the welding power unit, turn off the power switches of the welding power unit and power distribution box, and then use dry air to blow them off.

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Information on hazardous constituents as specified in sub-rule1 of rule16 in electrical and electronic equipment.
Declaration of Conformity with the requirements of the E-Waste (Management) Amendment Rules, 2023 with the sub-rule1 of rule16 limits with respect to Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls, Polybrominated diphenyl ethers.
The content of hazardous substance with the exemption of the applications listed in SCHEDULE II of the E-Waste (Management) Second Amendment Rules, 2023:

1. Lead (Pb) –not over 0.1 % by weight.
2. Cadmium (Cd) –not over 0.01 % by weight.
3. Mercury (Hg) –not over 0.1 % by weight.
4. Hexavalent chromium (Cr6+) –not over 0.1 % by weight.
5. Polybrominated biphenyls (PBBs) –not over 0.1 % by weight.
6. Polybrominated diphenyl ethers (PBDEs) –not over 0.1 % by weight.



For the purpose of recycling to facilitate effective utilization of resources, please return this product to a nearby authorized collection center, registered dismantler of recycler, or Panasonic service center when disposing of this product.

For products that use batteries, please refer to the information below.
The battery (batteries) complies with Battery Waste Management (Amendment) Rules, 2023 for India Panasonic Life Solutions India Pvt Limited.
EPR No. 452686556104058240

Please see the Panasonic website for further information on collection centers, etc. or call the customer care toll-free number.

https://www.panasonic.com/in/corporate/e-waste-management.html

Do's & Don'ts		
No.	Do's	Don'ts
1	All electrical and electronic products are required to be handed over only to the Authorized recycler.	The product should not be opened by the user himself / herself, but only by authorized service personnel.
2	The product should be handed over only to authorized recycler for disposal.	The product is not meant for re-sale to any unauthorized agencies / scrap dealers / kabariwalas.
3	Keep the product in an isolated area, after it becomes non-functional / unrepairable so as to prevent its accidental breakage	The product is not meant for mixing into household waste stream.
4	Refer to Operating Instructions for handling of end of life products	Do not keep any replaced spare part(s) from the product in an exposed area.
5	Always dispose of products that have reached end of life at Panasonic Life Solutions India Authorized Service Centre.	Do not donate old electronic items to anybody. Do not dispose of your product in garbage bins along with municipal waste that ultimately reaches landfill.
6	Wherever possible or as instructed, separate the packaging material according to responsible waste disposal options and sorting for recycling.	Do not give e-waste to informal and unorganized sectors like Local Scrap Dealers / Rag Pickers.

Information about the packaging materials used for this product and all related products is given below.

Plastic Waste Management Rules - India	
Brand owner / Importer Name	Panasonic Life Solutions India Pvt Limited
EPR No.	2023030608544812298
Thickness	> 50Microns

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2. Specifications

2.1 About Model No.

Model number	Code number: Manipulator	Code number: Controller	Specifications
YA-HGAKA1***	YA-HFMKA1***	YA-2KCKA1***	WG4 type controller (“Integrated with welding power source” type) controller
YA-HGAK21***	YA-HFMK21***	YA-2KCK21***	

Of the model number, ”***” consists of one-letter “Model group” code followed by a “Manipulator type” code of two alphanumeric characters.

- **Model group**

Model group code	Basic design policy
E	The robot is designed in accordance with the following European directives, European regulations, UK regulations and EN standards, and made a declaration of incorporation. EU directives : 2006/42/EC(Until January 19, 2027) and 2014/30/EU. EU regulations : (EU) 2023/1230 (From January 20,2027) UK regulations : S.I. 2008/1597 and S.I. 2016/1091 EN standards : EN ISO 10218-1:2011, EN 60204-1:2018, EN IEC 60974-1:2018 +A1:2019, EN IEC 60974-5:2019 and EN 60974-10:2014 +A1:2015 Before put into service the Robot in the European market the Robot system shall be designed in accordance with the manufacturers specification described in this manual and instruction manual. Remodeling and/or modifying this product not in accordance with the manufacturers specification then this declaration will loose its validity . Authorised Representative: Panasonic Connect Europe GmbH Panasonic Testing Centre Winsbergring 15, 22525 Hamburg, Germany **< Note >** The robot is designed to be integrated into the customer's equipment and made a declaration of incorporation as a partly completed machinery in accordance with EU directive, 2006/42/EC or EU regulation, (EU) 2023/1230. Therefore, the CE mark is not affixed to the product.
U	The robot is designed in accordance with the following safety regulations and standard applied in the US and Canadian markets. UL1740:2018 CAN/CSA Z434-14 Notice: Exporting the machine into Canada Please bear in mind that exporting this product to Quebec, Canada requires all name plates and manuals of the product shall be written in French.

Attention to the export of the product to EU member states and UK

Products other than E model group code do not meet the requirements specified in the EU Directives or UK regulations which are the EU and UK safety ordinance. Please bear in mind that those products may not be brought as is into the EU member state, any other country which has signed the EEA accord or UK.

- **Two-digit alphanumeric digits**

The digits relate to manipulator type.
Please refer to the operating instructions of the manipulator.

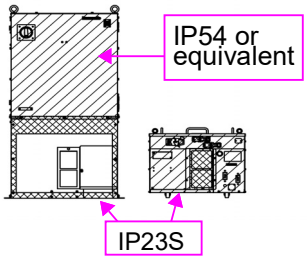
- **Example: Model number “YA-HGAKA1E00”**

The model number “YA-HGAKA1E00” is a floor installation type manipulator for welding operation with standard arm (BX100N WG4) generally intended for use in European markets.

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2.2 Structure and hardware specifications

2.2.1 E spec.

Item		Specifications
Structure and IP class		Closed box type, IP54 or equivalent, IP68 (Fan part) Teach pendant, IP40 or equivalent. 
Cooling method		Indirect air cooling (Circulating internal air),
Input power source **(*1)** (Mean power)		3-phase, 342 VAC to 484 VAC (26 kVA) (18 kW), (380 VAC to 440 VAC (±10 %)) 50 Hz / 60 Hz (±2 %) (neutral earthing)
Full load current		37 A
Interrupting Current Rating		2.5 kA
Grounding		Protective Earth (PE) grounding is required. Functional Earth (FE) is required depending on applied system.
Body color		Black
Teaching method		Teaching playback
The number of control axes		6 axes simultaneously (Max. 24 axes)
The number of external axes		Motor capacity: 20 kW External axis controller with 6 exterior type axes (Total motor capacity: 20 kW or less) <Note> Built-in type external axis controller is not supported.
Path control		PTP and CP (Linear and circular interpolation)
Position detection method		Electronic type absolute pulse encoder
Position control method		Software servo control
Speed control method		Constant linear velocity control (during CP control)
Speed range	at teaching operation	Max. speed can be controlled within the safety speed range from 0.01 m/min to 15 m/min (Default setting: 15 m/min)
	at playback operation	0.01 m/min to 999.99 m/min (Direct input method)
	Set rang	Select from m/min, inch/min, m/s and cm/min
Memory system		IC memory (Battery back-up system)
Memory capacity and software		Memory
Connecting cable to manipulator		Max. 30 m
Dimensions (W x D x H)		630 mm x 550 mm x 1 243 mm (Projection parts are not included.)
Operating ambient temperature, humidity		0 to 40 °C, 20 to 90 %RH (50 % RH or less at 40 °C, and 90 % RH or less at 20 °C.) No due condensation
Transportation / Storage temperature		-25 °C to 60 °C
Mass (Weight)		170 kg (375 lbs.), (Excluding the Teach pendant and connecting cable.)
Altitude		2 000 m or less
Motor overload protection		No thermal memory function
Short-circuit current verification range **(*2)**		800 A to 1.5 kA (G4) 800 A to 2.5 kA (WG4) 800 A to 5 kA (WGH4)

Note

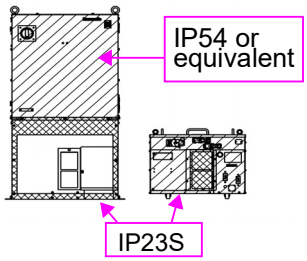
For details of software and operation of the controller, please refer to the operating instruction [Operation].

(*1) Power capacity is measured using our operation pattern at an ambient temperature of 25 ℃ when the rated voltage is input with 100 % pseudo load state.
Power capacity varies with surrounding environment and operation pattern.

(*2) The safety protection device functions normally in the electrical facility that has the described current capacity.

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2.2.2 U spec.

Item		Specifications
Structure and IP class		Closed box type, IP54 or equivalent, IP68 (Fan part) Teach pendant, IP40 or equivalent. 
Cooling method		Indirect air cooling (Circulating internal air),
Input power source (*1) (Mean power)		3-phase, 342 VAC to 506 VAC (26 kVA) (18 kW), (380 VAC to 460 VAC (±10 %)) 50 Hz / 60 Hz (±2 %) (neutral earthing)
Full load current		37 A
Interrupting Current Rating		10 kA
Grounding		Protective Earth (PE) grounding is required. Functional Earth (FE) is required depending on applied system.
Body color		Black
Teaching method		Teaching playback
The number of control axes		6 axes simultaneously (Max. 24 axes)
The number of external axes		Motor capacity: 20 kW External axis controller with 6 exterior type axes (Total motor capacity: 20 kW or less) <Note> Built-in type external axis controller is not supported.
Path control		PTP and CP (Linear and circular interpolation)
Position detection method		Electronic type absolute pulse encoder
Position control method		Software servo control
Speed control method		Constant linear velocity control (during CP control)
Speed range	at teaching operation	Max. speed can be controlled within the safety speed range from 0.01 m/min to 15 m/min (Default setting: 15 m/min)
	at playback operation	0.01 m/min to 999.99 m/min (Direct input method)
	Set rang	Select from m/min, inch/min, m/s and cm/min
Memory system		IC memory (Battery back-up system)
Memory capacity and software		Memory
Connecting cable to manipulator		Max. 30 m
Dimensions (W x D x H)		630 mm x 550 mm x 1 243 mm (Projection parts are not included.)
Operating ambient temperature, humidity		0 to 40 °C, 20 to 90 %RH (50 % RH or less at 40 °C, and 90 % RH or less at 20 °C.) No due condensation
Transportation / Storage temperature		-25 °C to 60 °C
Mass (Weight)	BX100N	170 kg (375 lbs.), (Excluding the Teach pendant and connecting cable.)
	RS015X	168 kg (370 lbs.), (Excluding the Teach pendant and connecting cable.)
Altitude		2 000 m or less
Motor overload protection		No thermal memory function
Short-circuit current verification range (*2)		800 A to 5 kA

Note

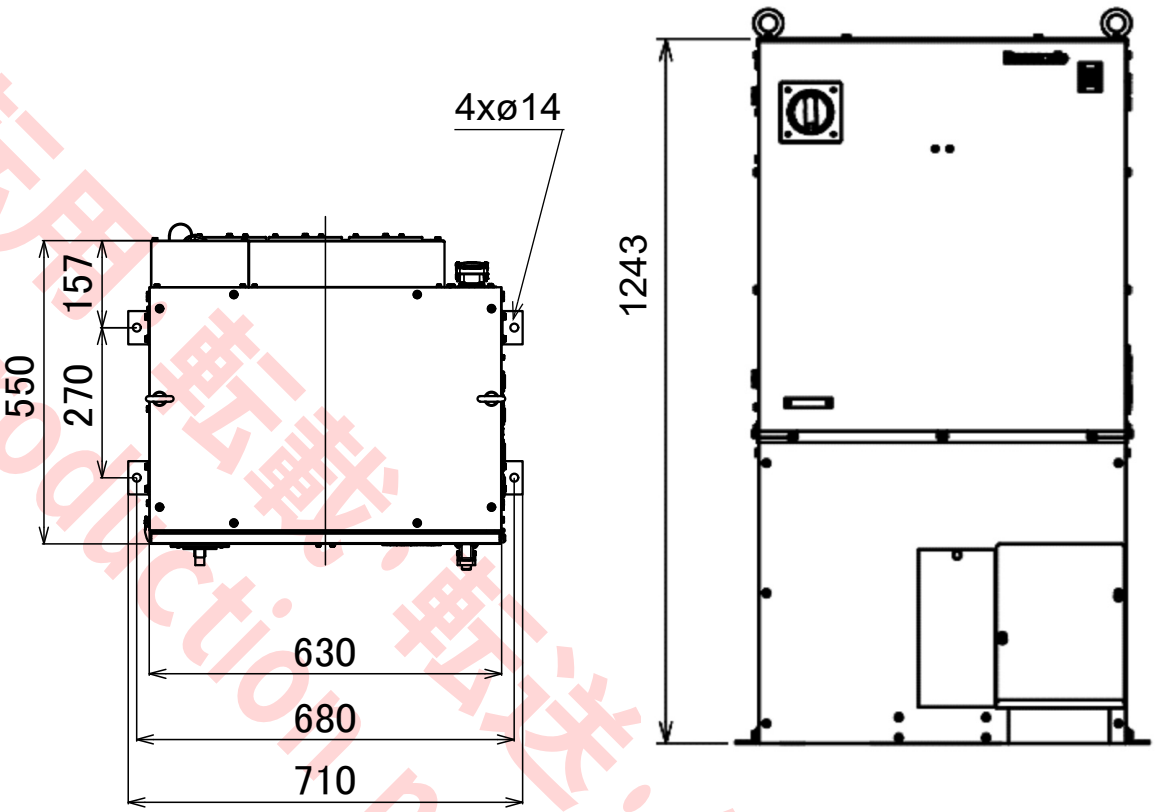
For details of software and operation of the controller, please refer to the operating instruction [Operation].

(*1) Power capacity is measured using our operation pattern at an ambient temperature of 25 ℃ when the rated voltage is input with 100 % pseudo load state.
Power capacity varies with surrounding environment and operation pattern.

(*2) The safety protection device functions normally in the electrical facility that has the described current capacity.

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● Dimensions



［Unit: mm］

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2.3 Inputs, outputs and communications

Item	Input and output		Specifications
Status I/O	Input		1. Start 2. Hold 3. Error release 4. Teaching mode 5. Operating mode 6. Servo ON
	Output		1. Running 2. Hold status 3. Error 4. Operating mode 5. Teaching mode 6. Servo ON 7. Ready 8. Alarm
Common I/O	Input		40 points
	Output		40 points
	I/O allocation		Allocate program start method input and other status I/O
Other I/O	Input		Safety Holder input
	Input specs.		Photo-coupler (ON/OFF of 24 VDC, 5 mA)
	Output specs.	T spec.	NPN transistor, Open collector
Safety I/O(*1)	Dual circuit input		• TP emergency stop • Enabling switch • Mode select switch • Use safety inputs (8 points)
	Output		4 points, Relay contact output 4 points, FET output, source type
	Safety input allocation		Allocation of safety I/O through safety settings is available, for example, external emergency stop, external enabling switch, door stop and protective stop.
External memory, Communication Interface	Controller		Optional RS-232C, RS-422 and Ethernet(*2)
	Teach Pendant		SD memory, SDHC memory USB2.0 port: 2 ports(*3)

(*1): For details of safety I/O, see “Functional safety manual”.

(*2): Connect only with LAN in the plant.

(*3): Do not turn off the power switch while connecting with SD memory or USB memory.

2.4 Specification of built-in welding power source

Item	Specifications
Built-in welding power source	YA-2KD351T00, (YA-2KD351T**)
Applicable welding method	CO2, MAG, Stainless steel MIG, Pulsed MAG, Stanless steel pulsed MIG
Control method	Inverter type
Maximum no-load voltage	83 VDC
Standard load voltage output display	30 A, 15.5 V to 350 A, 31.5 V
Output current adjustable range	30 ADC to 350 ADC
Output voltage adjustable range	12 VDC to 36 VDC
Rated duty cycle (10-minute cycle)	80 % (for CO2, MAG, Stainless steel MIG welding) 60 % (for Pulsed MAG, Stainless steel pulsed MIG)
Output terminal connection	M8 bolt connection
Insulation class	Main transformer: F, Reactor: E, Power factor improvement reactor: H
Standards to be complied with	JIS C 9300-1 (T type), IEC60974-1 (Y type, E type), UL551-2009 (U type)
Mass	51 kg (T type), 58 kg (Y type, E type, U type)
EMC classification	Class A

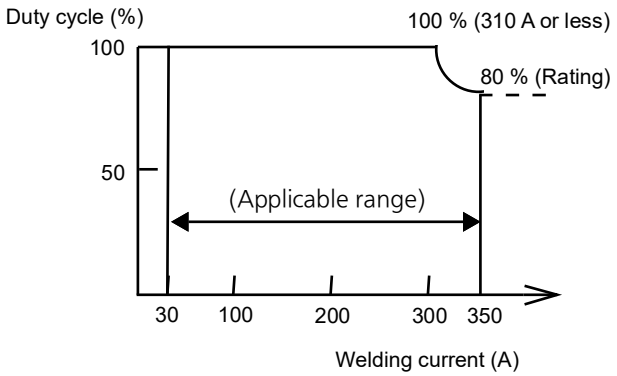
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• About “Duty cycle”

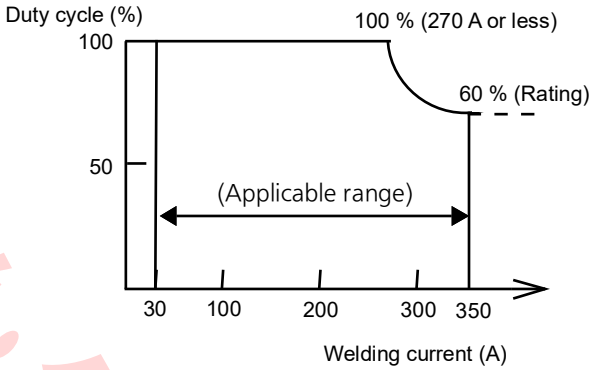
“Rated duty cycle 80 %” means that the machine can weld for a total of 8 minutes out of any 10 minutes at the rated current, and then must cool down during the remaining 2 minutes to prevent overheating.
(8 min./10 min.) x 100 % = 80 %

- Use of the machine exceeding the rated duty cycle can cause the machine temperature to exceeds its allowable value, and deterioration or burning of the machine may be the result.
- If the machine is used in combination with other products, such as welding torch, please apply the lowest rated duty cycle among the applied products.
- The indicated duty cycles at 40 °C or above are simulation value.

(GMAW)



(Pulsed GMAW)

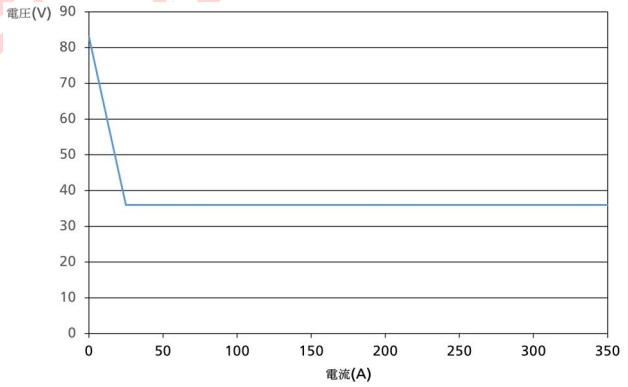


• About “Maximum no-load voltage”

The teach pendant can display the welding voltage up to 62.5 V. Any voltage that is beyond 62.5 V such as the maximum no-load voltage is displayed “62.5” on the teach pendant.

2.5 About static characteristic

The static characteristic of this welding power source is the following constant voltage characteristic.



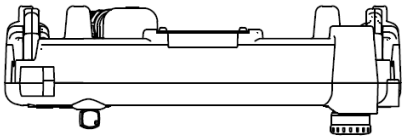
• Thermistor protection

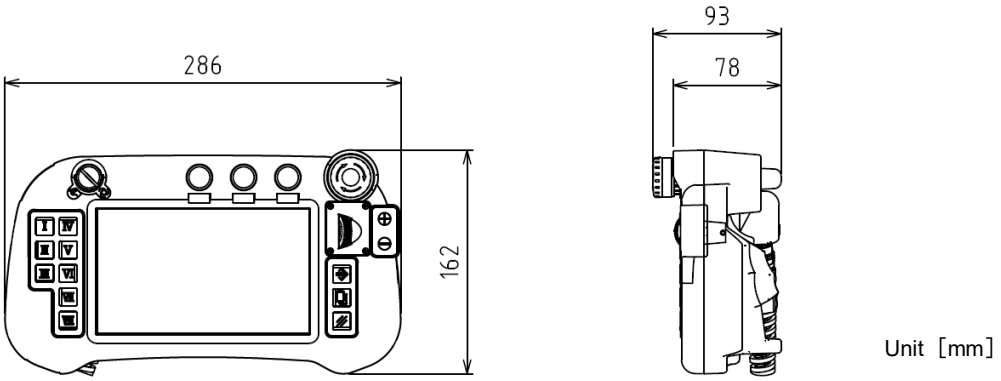
The welding power source is equipped with the thermistor at the radiator fin of the semiconductor to monitor the temperature.When the welding power source is in an abnormal temperature state due to over-duty cycle, over-rated output current, or decrease in cooling efficiency, the control circuit is activated to stop the output and indicate the error state.

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2.6 Teach Pendant

Item	Specifications
Model number	WSAUR00001ZZ
Environmental protection class	IP40 or equivalent
Display	7 inches width TFT color graphic LCD
Memory in TP	IC memory
SD memory card slot	SD memory, SDHC memory
USB 2.0 port	2
Enabling switch	3 points action
Emergency stop switch	1 point
Connecting cable	10 m (Dedicated cable, connector connection)
Mass (Weight)	980 g (Cables not included)



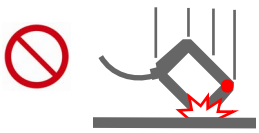


Unit [mm]

NOTIFY



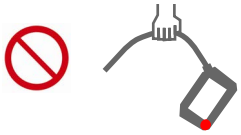
Do not touch the label area for an extended period of time.
Or it may cause a low-temperature burn.



Careful not to drop the teach pendant.
Or it may result in teach pendant damage and/or injury.



Do not place anything on the teach pendant.
Do not apply any strong force or impact especially on the LCD part.
Or it may result in damage of teach pendant and LCD.



Do not pick up or handle the teach pendant by the cable or the connector part.
Hold the teach pendant by the body at any time.
Or excess load will be applied to the connection, which can damage the teach pendant.

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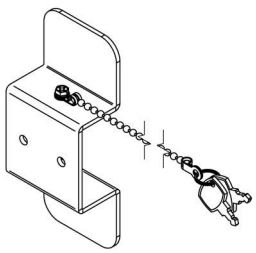
2.7 Accessories for teach pendant

Description	Part number	Repair parts order number	Q'ty	Note	Safety part
Label for Key switch (Sheet type)	ANS31017	ANS31017	1		
Saddle	SP15N	SP15N	1		
Upset bolt	XVGZ3+F8FJ	YZA384	2		

2.8 Accessories for controller

Description	Part number	Repair parts order number	Q'ty	Note	Safety part
TP hook (*)	WSAKC047PX	WSAKC047PX	1		
Bolt (*)	XVGZ3+F6FJ	YWW14	1		
Ball chain (*)	MTNK012740AA	MTNK012740AA	1		
Mode select switch key (*)	AS6-SK-132	YAB178	1 set	2 pcs/set	
Name plate (For origin mark)	ANU51519	ANU51519	1		
Fastener key (For the front door lock)	Fastener attachment	-	2		
Clamp filter	J0KG00000014	J0KG00000014	1	Noise suppression component	
Nylon tie	AB150	YAW87	1	Noise suppression component	
Nylon tie fixture	TMS20	YWW39	1	Noise suppression component	
Rubber sheet	AFQ41158	AFQ41158	2		
Bolt	XVGZ8+F25FJ	YZA239	2		
Washer	XWE8FJ	YZA225	2		
Nut	XNG8GFJ	YZA198	2		

(*) : They are factory assembled,



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2.9 Connecting cable

Cable to connect manipulator and controller varies with mondeil number. Provide a cable whose length is suitable to the installation environment.
There are two types of cables, fixed cable and movable cable.

Note

The maximum cable length is 30 m.

2.10 Accessories for connecting cable

Description	Part number	Repair parts order number	Q'ty	Note	Safety part
Ferrite core	MTNE001280AA	MTNE001280AA	1	Noise suppression component	
Safety key	MTNK012257AA	MTNK012257AA	1	Noise suppression component	
Protective cover	WSAFQ00160AA	WSAFQ00160AA	1	Noise suppression component	

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3. Transportation

3.1 Transportation methods

⚠ CAUTION

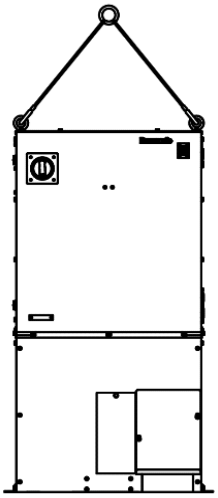
In case of using a crane, be sure not to stand under or near the lifted controller.
In case of using forklift, be sure no personnel shall hold the controller. Otherwise, there is a risk of injury.

Any transportation method that may apply any shock to the controller shall be avoided.

(1) Crane or forklift should be handled by qualified personnel.

(2) In principle, use a crane to transport a controller for installation or re-installation. When a crane is used, hang the controller with double-wire through the attached two eyebolts as illustrated in the figure on the right.

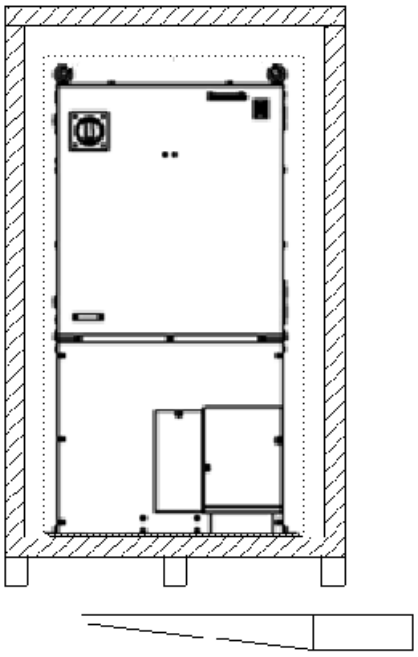
- Double-wire hanging method.
  Hook the wires to the provided eyebolts.



About eyebolts

Eyebolts are important safety parts. When they are lost or broken, purchase Panasonic genuine eyebolts for your safety.

(3) In case it is necessary to use folk lift for transportation, pack and fix the controller in the transportation package before moving it.



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4. Installation

⚠ CAUTION

The installation shall be made by qualified installation personnel and should conform to all national and local codes.

4.1 Choosing an installation site

- Locate indoors with ambient temperature 0 °C to 45 °C.
- Avoid exposure to direct sun light.
- Locate the controller outside the work envelope of the manipulator and also as close to the manipulator as possible.
- Locate in a place with low humid, less dusty and less oily smoke.
- Free from flammable or corrosive gas.
- No obstacle within the work envelope of the manipulator.
- A place where inspection and disassembling work can be conducted easily.
- A place large impact or vibration is not transmitted.
- A place no large electrical noise source exists.
- Avoid exposure to the rain or water spray.
- Humidity relative to temperature:
  - Up to 50 % at 45 °C
  - Up to 90 % at 20 °C
- Altitude above sea level: Up to 2 000 m.
- Inclination to installation surface: Max. 10 degrees.

< Note >

When installing the product on a inclined surface, make sure to fix the product to the floor.

- Avoid wind to the arc (Provide windshields.)
- Free from abnormal amount of dust, acid, corrosive gases or substances etc. other than those generated by welding process.
- Avoid places where metallic substances or combustible foreign materials can get into the welder through the air inlets.
- IP code

Part	IP code
Controller body	IP54 or equivalent
Teach pendant	IP42 or equivalent

Note

- If a significant noise source (plasma or high frequency etc.) exists at or around the installation site, please consult us in advance.
- Refer to the environmental protection class (IP class) of each machine. (See “Specifications”).

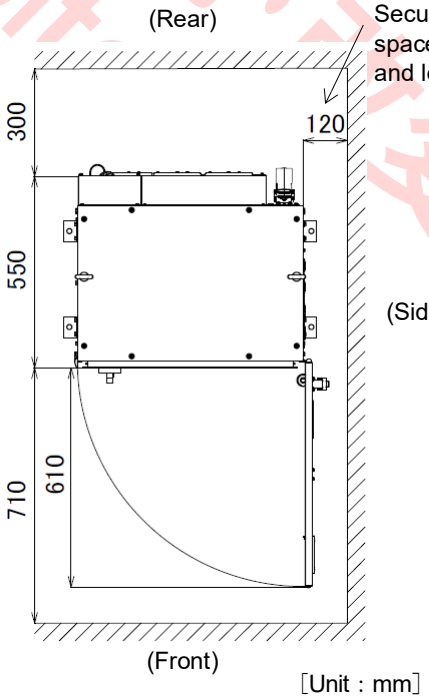
4.2 Installation site

(1) Locate the controller outside of the work envelope of the manipulator and also outside the safety fenced area. Make sure to maintain space from any wall or peripheral equipment (see the figure on the right) from any wall or peripheral equipment for maintenance and inspection work and to control temperature inside of the controller.

(2) Do not place anything above and lower part of the controller. Temperature inside the controller rises which may cause temperature anomaly.

< Note >

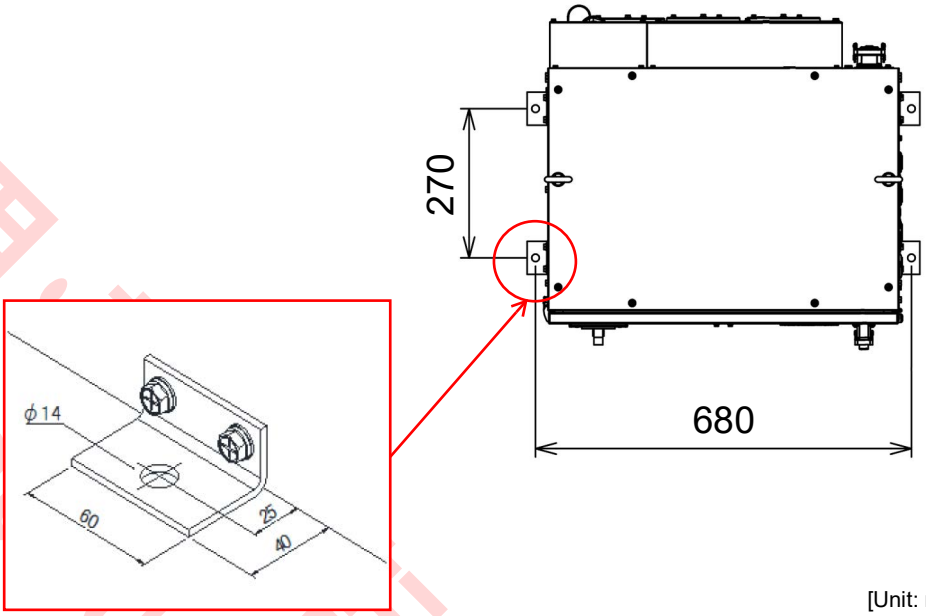
- The case of the controller works as heat radiator. Do not interrupt the cooling effect.
- Depending on devices to be connected with the controller and cable specifications of the cable, secure the space larger than the one specified in the figure on the right.



[Unit : mm]

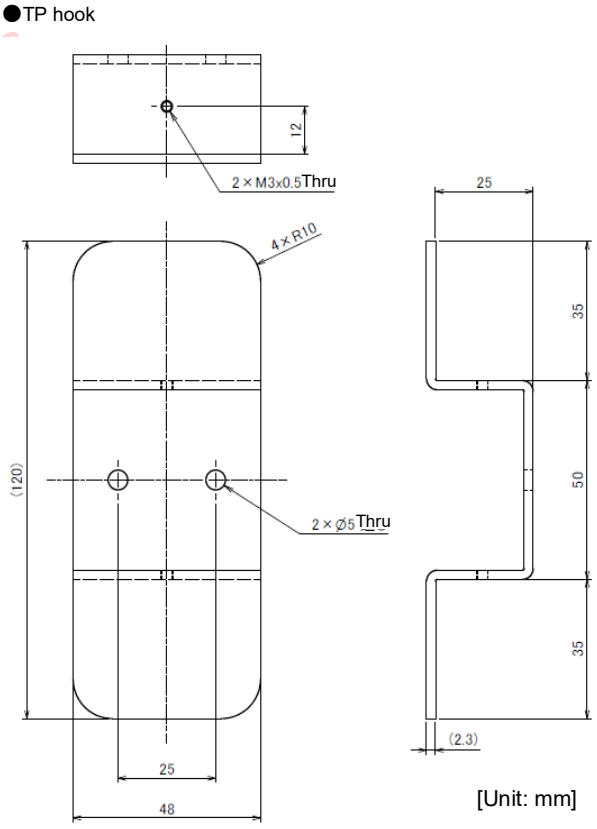
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(3) Installation method
Fix the fixing plates of the controller to the ground or bedplate with M12 anchor bolts.



[Unit: mm]

(4) Teach pendant
Hook the teach pendant on the provided TP hook.
TP hook should be installed outside of both the safety fence and the work envelope of the manipulator so as to prevent possible danger due to mode change inside the safety fenced area. A mode switch key is chained with ball chain to the TP hook.



[Unit: mm]

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5. Connection

CAUTION

The installation shall be made by qualified installation personnel and should conform to all national and local codes. Otherwise, there is a risk of fire and electric shock.

5.1 Connecting the controller to the manipulator

5.1.1 Connecting cable for the manipulator

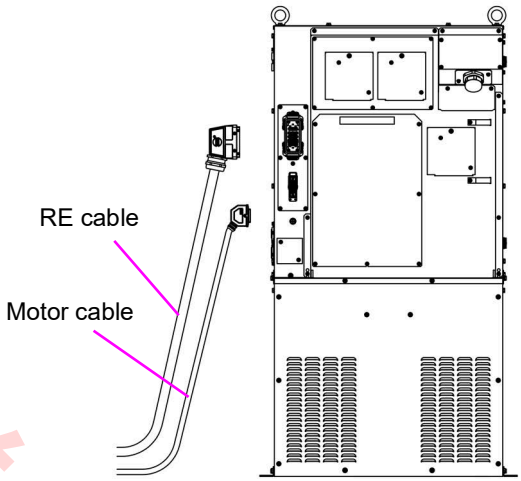
(1) Connect the motor cable and RE cable to the connectors for controller and manipulator respectively. Make sure to push the cables until the gap between the connector and cable connector case becomes 1 mm or smaller.

< Note >

Wide gap between the plug and the receptacle may cause bent pin of the connector.

(2) Push down the hook lever to the arrow direction and lock the plug.

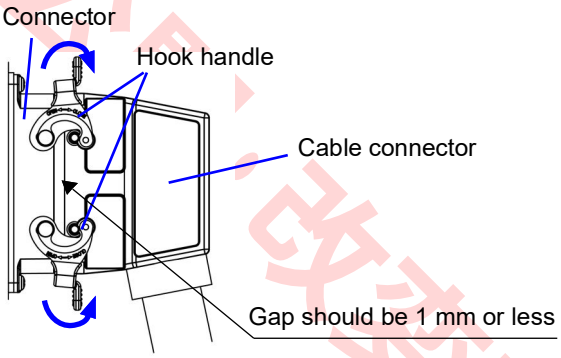
(3) Reaffirm that the cable is locked completely.



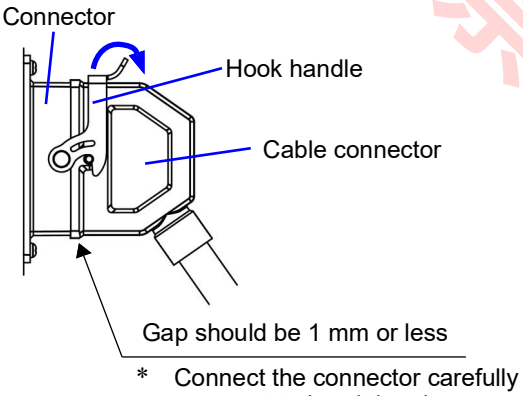
Note

- Make sure to connect the controller to the manipulator of the same production number as the controller. The origin data of the manipulator (robot position control origin), which forms a pair with the controller is saved in the controller.

● Motor cable side



●RE cable side

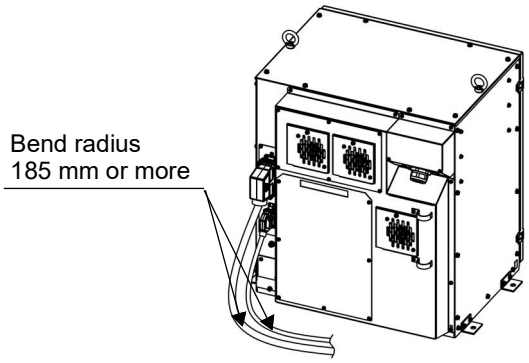


* Connect the connector carefully so as not to bend the pins.

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Note

- For RE cable and motor cable, secure at least 185 mm bend radius.
- At the time of laying those cables to the front side of the controller, do not bend them forcibly, or it can cause breaking of wire. Lay the cables naturally.
- Route it so as to avoid load to be applied. As for the flexing cable, refer to section “2.9 Connecting cable”.



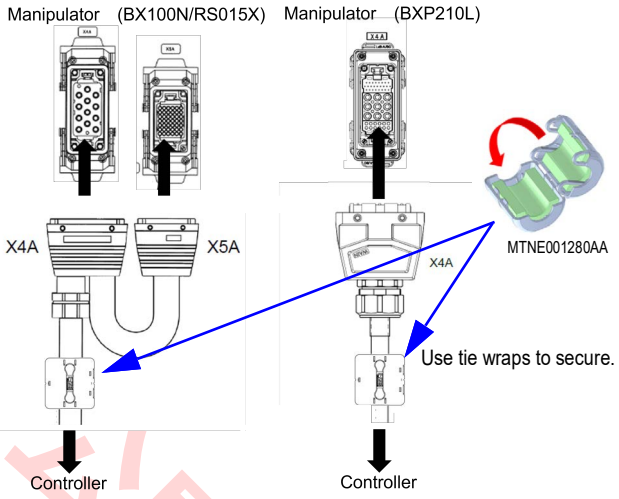
5.1.2 Attaching EMC countermeasure components (Necessary only for E spec.)

This section is applicable only to E specifications.

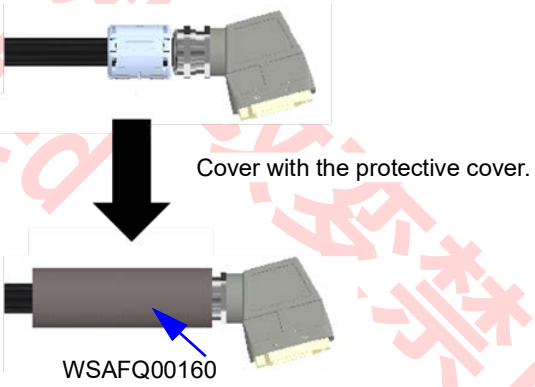
Attach the supplied ferrite cores to the connector cables that connect controller and manipulator.
Secure them to the roots of the connectors without leaving any gaps.

< Note >

After attaching, secure the ferrite cores with included tie wraps to prevent them from moving.

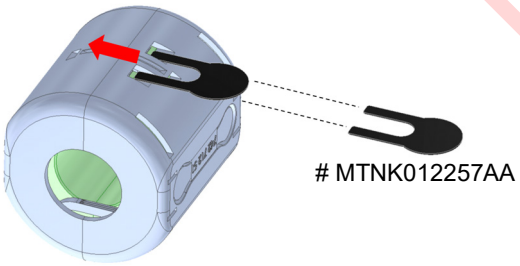


When installing MTNE001280AA on the manipulator side, please cover the ferrite core with the included protective cover (WSAFQ00160) to prevent spatter, and secure both ends with a tie band.



How to Remove :

Insert the supplied ferrite key in the direction shown in the figure on the right.
Do not apply excessive force, as this may cause damage.



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5.1.3 Connecting cables for the built-in welding power source

(1) Connect the output cable (customer preparation) from welding power source to the output terminal (-) for “BASE METAL” with attached M8 bolt. (Recommended tightening torque: 10.1 N•m-13.4 N•m)

(2) Connect the welding power cable to the output terminal (+) for “TORCH” with the attached M8 bolt. (Recommended tightening torque: 10.1 N•m-13.4 N•m)

(3) Connect the base metal voltage detection cable (-) to the voltage detection terminal on the left side of the output terminal (-) for “BASE METAL” terminal.

(4) Re-install the output terminal cover back in place.

No.	Name	Remarks
a	Output (-)	For base metal Bore diameter: 10.5 mm Connect with the provided M8 bolt.
b	Output cable	*Customer preparation article (Cable size: 60 mm^2 in dia.)
c	Output (+)	For welding torch Bore diameter: 10.5 mm Connect with the provided M8 bolt.
d	Power cable *1	5 m (standard)
e	Base metal detection cable *1	10 m Bore diameter: 6 mm
f	Terminal cover	

*1: Provided as incidental equipment.

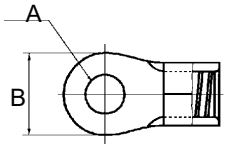
Note

After connecting the base metal cable and the power cable, make sure to insulate the connecting part with insulating tape.

• Output cable should be a welding cable or a tough rubber sheathed cable (excluding one with vinyl). The cable length should not be unnecessarily long.

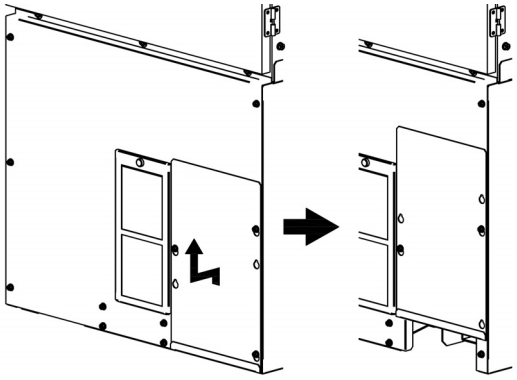
Treat the end of the cable with crimp terminal. Use the crimp terminal of the following size.

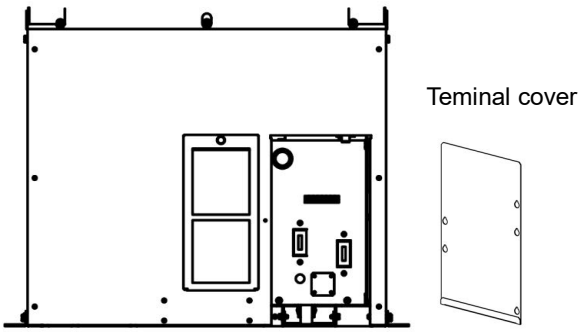
A	8.4 mm (dia.)
B	29 mm or less

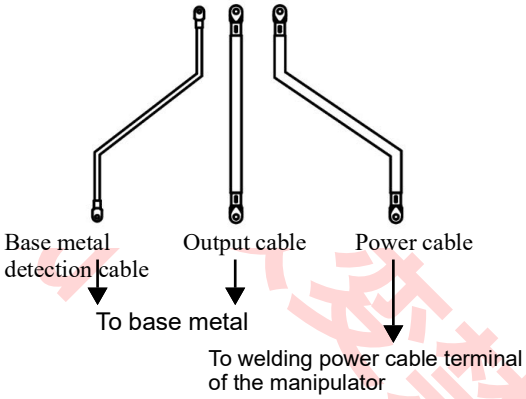


<Connection of Output cable/Power cable>

Terminal cover is factory installed at the lower left position at shipment. After completing connection of the output and power cables, fix the terminal cover at the lower right position.







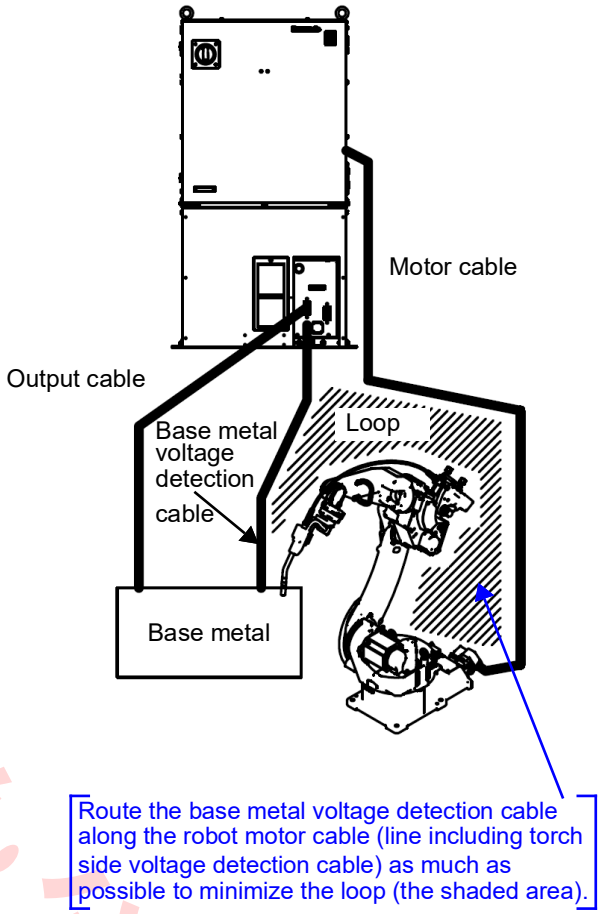
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Note

To show maximum performance of the product, observe the following important points and connect cables properly. Improper connection can cause troubles such as unstable arc (increase in spatter).

<Important points>

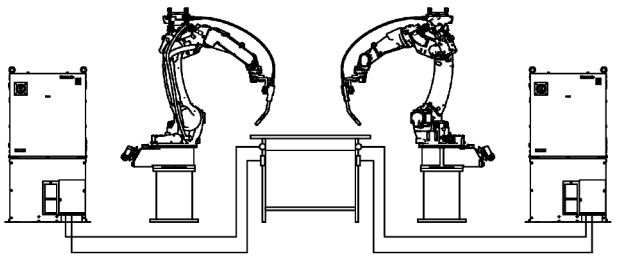
- Route the base metal voltage detection cable and the torch side voltage detection cable that is incorporated into motor cable and torch cable as close as possible to minimize the “Loop” area that is surrounded by those two cables. Minimizing the “Loop” area may reduce the influence of the induction noise.
- If it is necessary to extend the motor cable (line including torch-side voltage detection cable), the longer the distance (or cable length) is, the more significant the influence caused by the size of “Loop” area becomes. Route the cables attentively to reduce the “Loop” area as much as possible.
- Route the base metal voltage detection cable with the minimum length. Cut off the excess.



5.1.4 Remarks on using multiple robots

To weld one workpiece with multiple robots, observe the following:

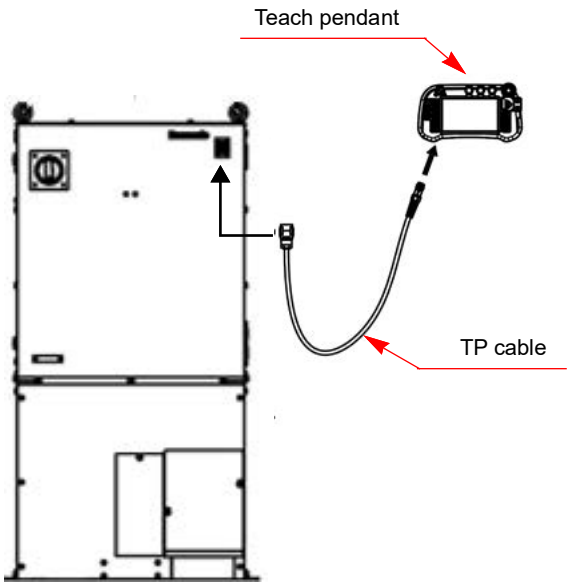
- Connect the work cable and voltage detection line of each robot to the closest possible portion to each weld. Be sure the distance between each robot’s cable/line connection portions is 500 mm or more. (Weld output of other robots can make the weld unstable)
- Be sure the multiple robots do not share one work cable or voltage detection line.



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5.2 Connecting teach pendant

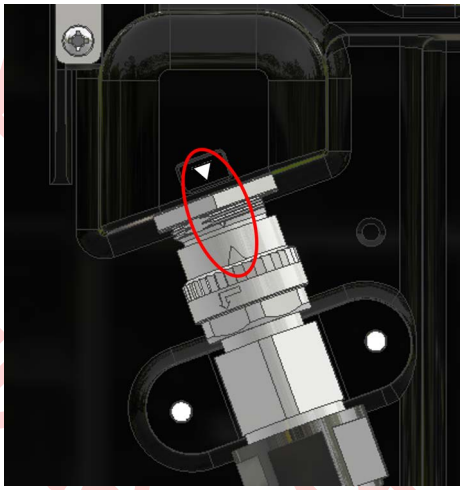
Connect the TP cable to the connector of the teach pendant.



Note

To connect the TP cable to the controller, do not bend the cable near the connector. Connecting the cable with the cable near the connector bent can damage the connecting pins.

Match the △ mark on the TP cable side connector and the △ mark on the TP case.
Then insert the connector straight so that it does not tilt until it makes a clicking sound.



Note

To disconnect the TP cable, turn the TP cable side coupling in the direction of the arrow shown on the figure, and then pull it out straight.

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5.3 Grounding wire connection

⚠ WARNING

HIGH LEAKAGE CURRENT
Provide grounding work before connecting grounding wire to conductive parts to ground high leakage current to the ground. Otherwise, risk of fire and electric shock.

⚠ CAUTION

Provide grounding to the protective earth terminal (PE) of the controller exclusively.
Check the grounding work before operation. Otherwise, there is a risk of fire and electric shock.

If protective earth (PE) is not provided, the contact current of this product exceeds 3.5 mA. Be sure to use a cable with 14 mm^2 in diameter or more to provide protective earth. The protective earth guides leaked current to the ground to prevent electric shock caused by leaked current.

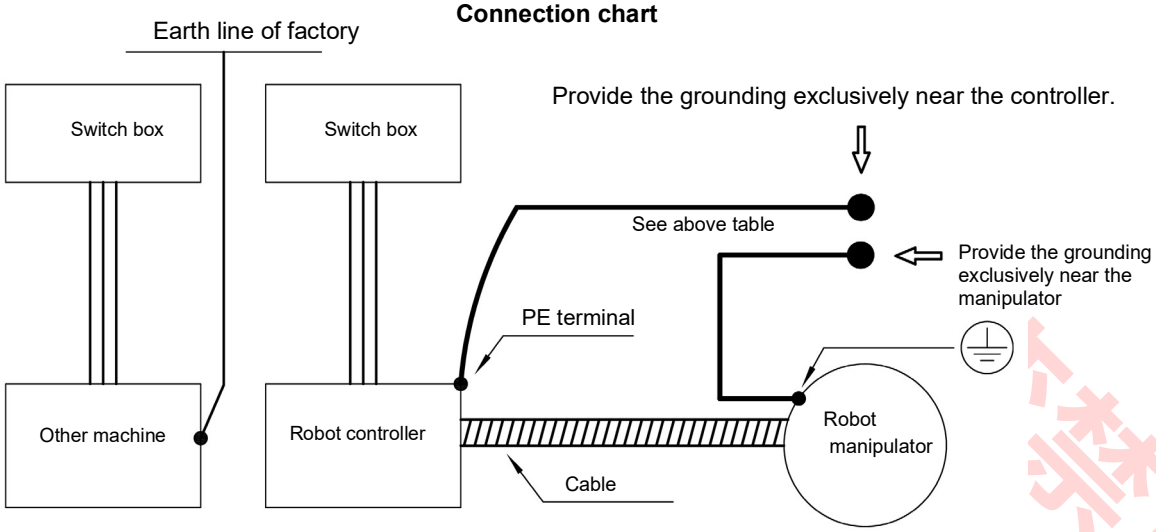
A current of 5 % or more of the input current may flow to the protective grounding wire. Therefore, make sure to connect the metallic cases around this product (within 2.5 m) to the equi-potential bonding of this product.

Countries	Grounding resistance	Size of protective grounding wire
Japan	100 ohm or less	14 mm^2 or more.
Others	Conform to all national and local codes	

Note

Size of the protective earth wires for other devices shall be according to the corresponding instruction.

Connection chart



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5.3.1 Maximum allowable fault loop impedance

It meets the requirements of EN 60364-4-41 under the following conditions:

* Input cable and ground cable should be 10 m or less.

Type of TN system (E spec.)

CB, CP, NFB		System Voltage	Maximum allowable fault loop impedance
Model	Rated Current		
BW63EAG-3P060WA	60 A	197 V	0.23 ohm

Type of TN system (U spec.)

CB, CP, NFB		System Voltage	Maximum allowable fault loop impedance
Model	Rated Current		
BW125JAGU-3P075WA	75 A	197 V	0.21 ohm

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5.4 Connecting primary power source

5.4.1 Wiring of primary power cable

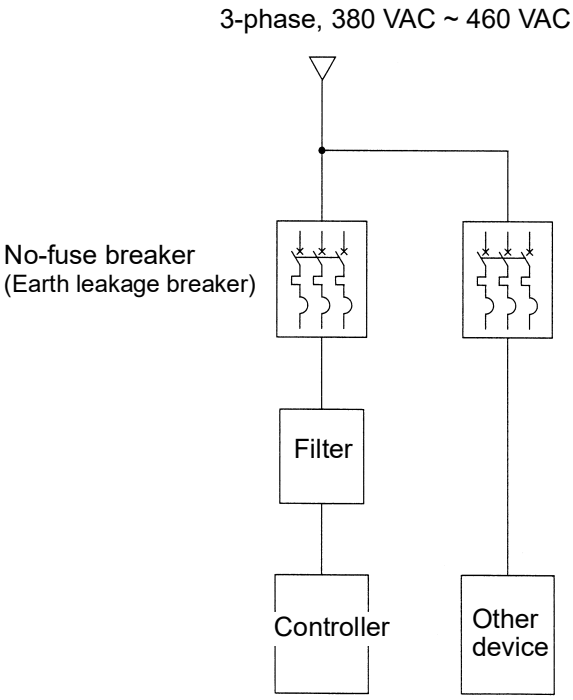
Input power capacity	Cable size
26 kVA (18 kW)	14 mm^2 or more AWG6 or more

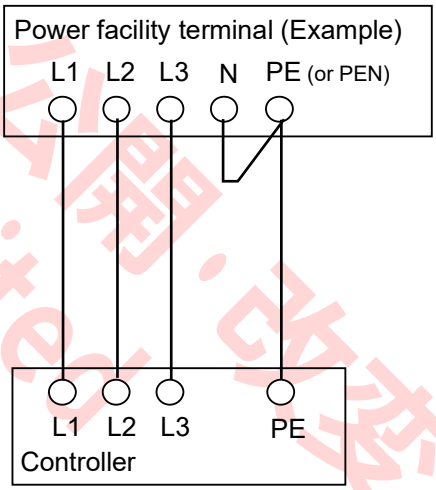
- Be sure to provide no-fuse breaker (earth leakage breaker) or switch with fuse of specified capacity for each controller separately.
  - YA-2J series: 15 A
    (If total motor capacity of applied exterior type of external axes exceeds 10.5 kW: 30 A)
  - YA-2K series: 60 A

- If an earth leakage breaker is used, make sure to provide specified grounding work. It is recommended to use an earth leakage breaker of medium sensitivity and high speed type. The recommended rated sensitivity currents that can prevent malfunction of the earth leakage breaker are as follows.
  - a robot used alone: 100 mA,
  - a robot with external axes: 200 mA
  For details and about grounding work, please consult your local electrical engineers.

- To prevent noise from entering through the power cable, if it is the case, install a filter before the primary input.

- As an EMC measure, install the supplied noise filter. For details, see the operating instructions of the noise filter.
  --- Noise filter No.: YA-2KPUN2E00
  ---Operating instructions No.: WMA641TE0P (E spec)





- **To connect to a power facility other than 380 V to 460 V:**

- You can use PEN for the ground terminal PE of power facility.

⚠ WARNING

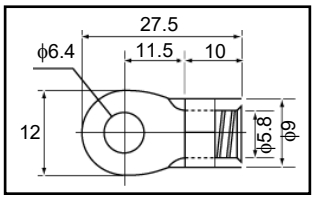
Make sure to ground the neutral point of the power supply. Otherwise, there is a risk of fire and damage to equipment.

- Please prepare a transformer to convert voltage to 380 VAC to 460 VAC at your end.

Note

Here shows the specifications of the terminal part of the input power cable for this product. Please prepare at your end.

Recommended clamp terminal:
14 mm^2, M6



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5.4.2 Connecting primary cable

⚠ CAUTION

To prevent electric shock, turn off the power switch of the power distribution box before connecting input cable, and confirm safe before operation. Otherwise there is a risk of electric shock and injury.

NOTIFY

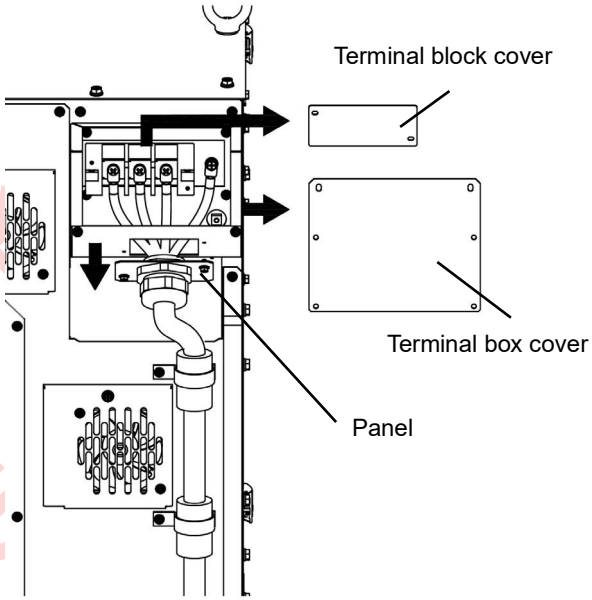
Do not connect a primary power cable of peripheral equipment to the breaker or terminal block inside the controller, or it will cause malfunction or breakdown. Otherwise there is a risk of breakdown and malfunction.

(1) Remove the terminal box cover, the terminal block cover, and the panel.
- Terminal box cover: M4 bolt
- Panel: M4 bolt
- Terminal block cover: M3 bolt

(2) Pass the input power cable through the cord lock attached to the panel, and then connect to the input power terminal.
- Outside diameter of the cord lock adaptive cable:
  32 mm to 34 mm

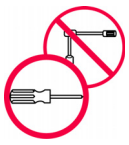
(3) Install the panel, and then install the terminal block, and the terminal box cover back in place.

(4) Protect the cable coating with the attached rubber sheet, then fix the input power cable to the bottom of the terminal box with the attached saddle.



Note

Connecting screw
- Do not use a wrench
- Tightening torque:
  2.5 N•m to 3.0 N•m



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5.4.3 Door handle

The door handle is used to turn ON/OFF the switch. Normally the door handle is in the ON state during operation.

Note

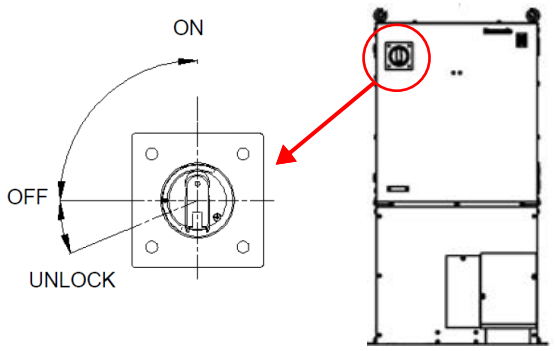
- Allow 3 seconds interval after turning off the door handle and before back ON again.
  If the interval is not long enough, the alarm “Accidental power failure is detected.” can occur. In such a case, turn power on again.
- Please allow 3 to 5 minutes of cooling down of the inside of the built-in welding power source after completing welding operation before turning off the door handle.

< Operation >

(1) Turn the door handle clockwise to turn ON the switch, and counter-clockwise to turn it OFF. Turn the door handle counter-clockwise further to UNLOCK the door.

(2) Before closing the door, set the handle to the OFF position.

* When the door switch is turned on, power to the robot controller part and built-in welding power source are turned on.



5.4.4 Lock switches with padlock

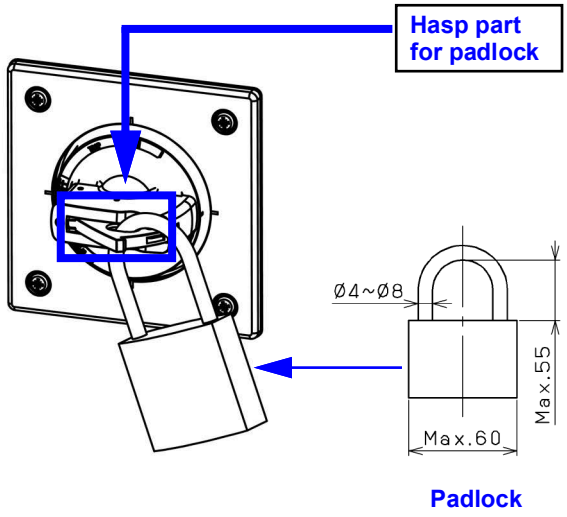
1) Lock the door handle switch

Use a padlock (customer preparation) to lock the door handle at the OFF position regardless of the door opened/closed state.

(a) Set the door handle to the OFF position.

(b) Push the end of the handle, then the hasp for a padlock comes out.

(c) Put a padlock on the door handle to lock.



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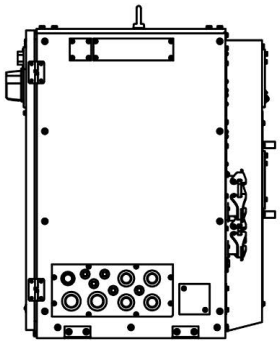
5.5 Connecting and control method of external device

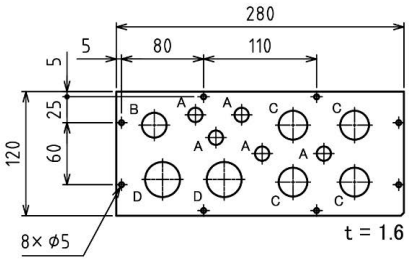
NOTIFY

Observe the following instructions in case of connecting external equipment.

- Apply a radio shield wire as I/O connecting cable between an external device and robot I/O circuit in order to protect the controller from noise.
- Connect the shield wire to the FE terminal ( ) on the rear side of the controller.
- The FE terminal is provided to prevent noise.
- If a system comprises a machine which generates high frequency (such as TIG, plasma), the robot I/O circuit may be damaged by the high frequency noise. Be sure to design so that any external input to the system should use a no-voltage contact signal and any output to an external device should be converted into relay contact output.
- Do not place anything other than optional units specified by us inside the controller. Failure to follow the instruction can cause an abnormal temperature error or to fail in securing safety.
- At the time of wiring to the inside of the controller, make sure to apply measures against noise by running the lead-in cables along the side panel or base panel to keep the lead-in cables away from the boards and cables inside the controller.
- If a trouble, such as an error stop, whose probable cause is noise from external equipment occurs, use a noise filter unit. The noise filter unit prevent introduction of external noise into the unit. For details, please refer to section “5.6 Using noise filter unit“.
- Do not connect the ground cable to the COM of the sequencer card. Otherwise, it will cause the controller to malfunction or break down.

• For cables to be connected with an external device or robot I/O circuit, draw cables through the wire ports of the IO panel at the right bottom of the controller. At that time, remove the grommet with membrane from the wire port to be used.
Use cord lock or the like to fix the cable.





As for each of the following connections, please refer to the specified section.

Safety I/O circuit	Functional safety manula
External device	6. External Control Signal Connection

I/O panel hole diameter (Unit: mm)	
Hole A (5 pcs.)	14
Hole B (1 pcs.)	24
Hole A (4 pcs.)	28
Hole A (2 pcs.)	34

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5.6 Using noise filter unit

● Part list

No	Description	Q'ty	Note
1	Clamp filter	1	Accessories
2	Fixing band	1	
3	Fixing plate	1	

● Installation

(1) Connecting procedure varies with COM the signal wire is connected to. (See the figure on the right.)

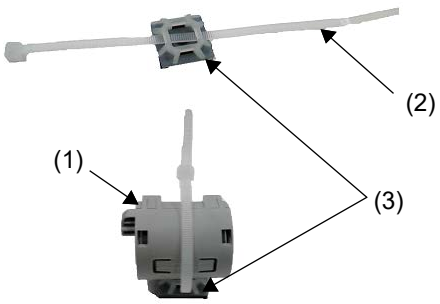
(a) Disconnect the signal wire from COM , wind it around the clamp filter four turns, and then connect it to COM (A).

(2) Bind the clamp filter and the fixing plate and fix them on the bottom plate of the controller.

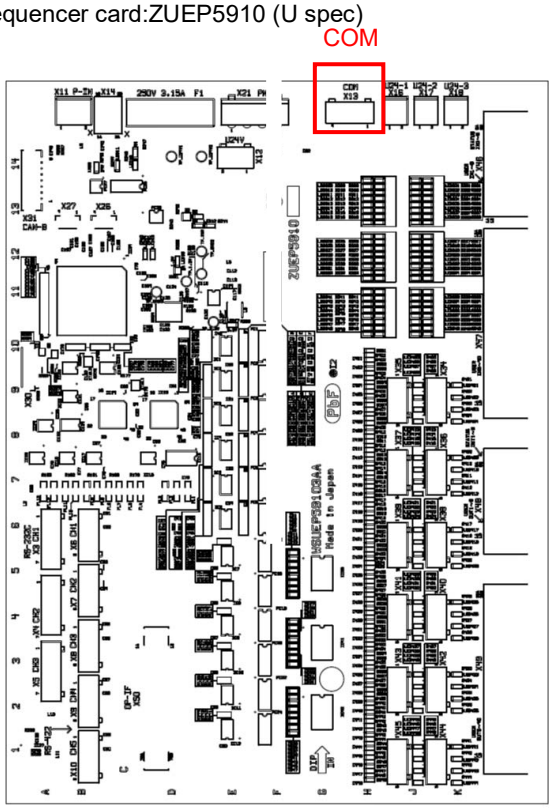
Note

Check the following of the following phenomena occur.
The detector activates without a collision.
The servo turns off on its own during the welding operation in program test mode.
A file closes on its own during the welding operation in program test mode.

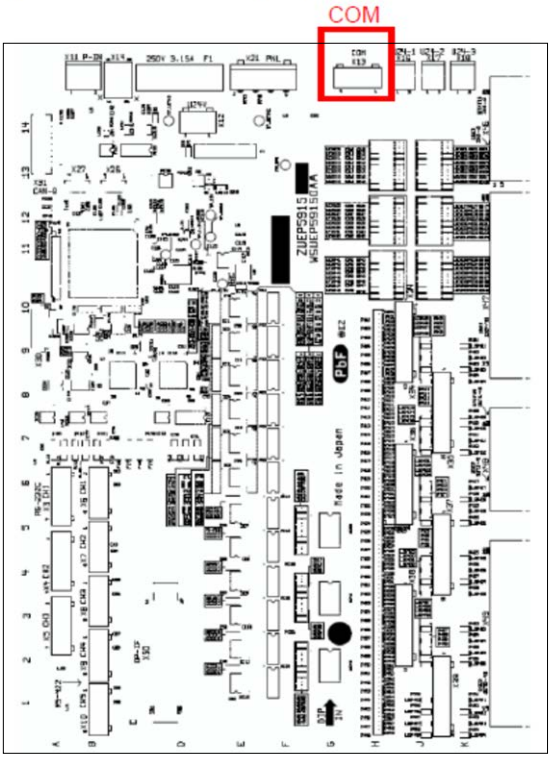
- Check if shielded cables are used.
- Check if the clamp filter is attached to the input/output signal cable.
- Disconnect all input/output signal wires and then check if the above phenomena still occur. If the same error occurs, please consult your local Panasonic distributor.



Sequencer card:ZUEP5910 (U spec)



Sequencer card:ZUEP5915 (E spec)



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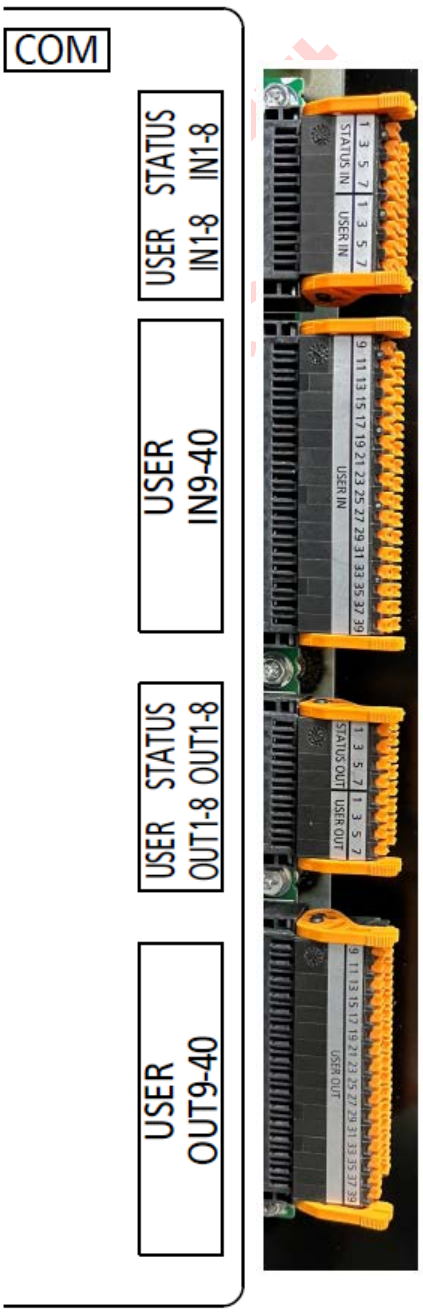
6. External Control Signal Connection

6.1 Terminal location of the sequencer card

Specifications	Part number	Output type
U	ZUEP5910	Open collector (NPN)
E	ZUEP5915	Open collector (PNP)

Note

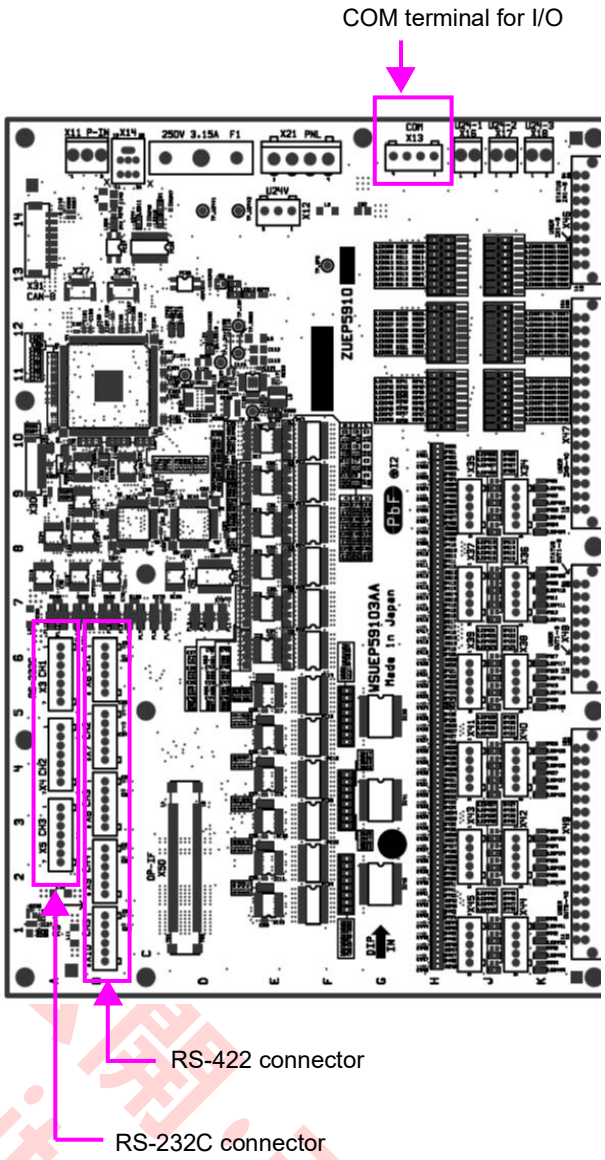
- Allocation of User I/O terminals vary with start method.
- Terminals marked with
  *: An additional setting is needed to enable the signal.
  **: Functions vary with the circuit board (see left table).



Front		Terminal	PIN #	Back		Terminal	PIN #
STATUS IN	1	Servo ON	8A	STATUS IN	2	OPR confirm	8B
	3	Operating mode	7A		4	Teaching mode	7B
	5	(Reserved)	6A		6	Error release	6B
	7	Start	5A		8	Hold	5B
USER IN	1	User-IN 001	4A	USER IN	2	User-IN 002	4B
	3	User-IN 003	3A		4	User-IN 004	3B
	5	User-IN 005	2A		6	User-IN 006	2B
	7	User-IN 007	1A		8	User-IN 008	1B
USER IN	9	User-IN 009	16A	USER IN	10	User-IN 010	16B
	11	User-IN 011	15A		12	User-IN 012	15B
	13	User-IN 013	14A		14	User-IN 014	14B
	15	User-IN 015	13A		16	User-IN 016	13B
	17	User-IN 017	12A		18	User-IN 018	12B
	19	User-IN 019	11A		20	User-IN 020	11B
	21	User-IN 021	10A		22	User-IN 022	10B
	23	User-IN 023	9A		24	User-IN 024	9B
	25	User-IN 025	8A		26	User-IN 026	8B
	27	User-IN 027	7A		28	User-IN 028	7B
	29	User-IN 029	6A		30	User-IN 030	6B
	31	User-IN 031	5A		32	User-IN 032	5B
	33	User-IN 033	4A		34	User-IN 034	4B
	35	User-IN 035	3A		36	User-IN 036	3B
	37	User-IN 037	2A		38	User-IN 038	2B
	39	User-IN 039	1A		40	User-IN 040	1B
STATUS OUT	1	Alarm	8A	STATUS OUT	2	Error	8B
	3	Operating mode	7A		4	Teaching mode	7B
	5	Ready	6A		6	Servo ON	6B
	7	Running	5A		8	Hold status	5B
USER OUT	1	User-OUT 001	4A	USER OUT	2	User-OUT 002	4B
	3	User-OUT 003	3A		4	User-OUT 004	3B
	5	User-OUT 005	2A		6	User-OUT 006	2B
	7	User-OUT 007	1A		8	User-OUT 008	1B
USER OUT	9	User-OUT 009	16A	USER OUT	10	User-OUT 010	16B
	11	User-OUT 011	15A		12	User-OUT 012	15B
	13	User-OUT 013	14A		14	User-OUT 014	14B
	15	User-OUT 015	13A		16	User-OUT 016	13B
	17	User-OUT 017	12A		18	User-OUT 018	12B
	19	User-OUT 019	11A		20	User-OUT 020	11B
	21	User-OUT 021	10A		22	User-OUT 022	10B
	23	User-OUT 023	9A		24	User-OUT 024	9B
	25	User-OUT 025	8A		26	User-OUT 026	8B
	27	User-OUT 027	7A		28	User-OUT 028	7B
	29	User-OUT 029	6A		30	User-OUT 030	6B
	31	User-OUT 031	5A		32	User-OUT 032	5B
	33	User-OUT 033	4A		34	User-OUT 034	4B
	35	User-OUT 035	3A		36	User-OUT 036	3B
	37	User-OUT 037	2A		38	User-OUT 038	2B
	39	User-OUT 039	1A		40	User-OUT 040	1B

● **Sequencer card**

Terminal or connector	Application
COM	Common.



6.2 Serial interface

The sequencer card is provided with serial connectors to connect optional units and/or welding power source.

Connector	Application
RS-232C RS-422	For an optional units or digital communication of welding power source.

Refer to the following correspondence table of port numbers and connectors.

Connector	Port number	Connector symbol
RS-232C	Port 1	232C-1(X3)
	Port 2	232C-2(X4)
	Port 3	232C-3(X5)
RS-422	Port 1	422-1(X6)
	Port 2	422-2(X7)
	Port 3	422-3(X8)
	Port 4	422-4(X9)
	Port 5	422-5(X10)

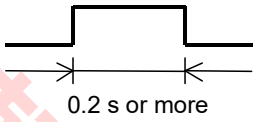
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6.3 I/O terminal equivalent circuit

<table>
<tr><td>Spec.</td><td colspan="2"></td></tr>
<tr><td>U</td><td>

● **Input terminal equivalent circuit**

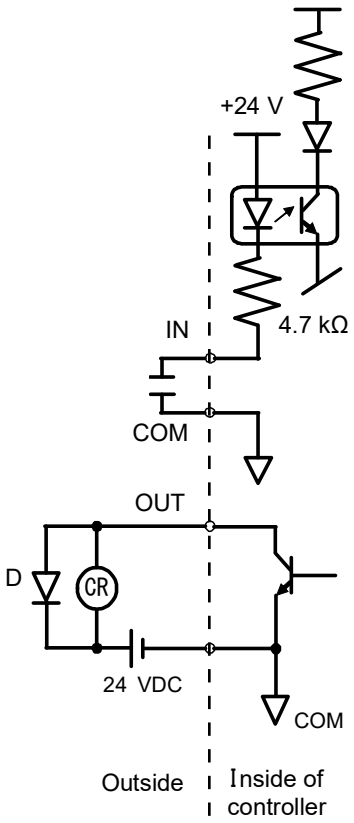
• To receive no-voltage ON/OFF contact signal from an external equipment.
• External relay contact to be connected... 1 ohm or less, Chattering .....10 ms or less
• Pulse amplitude of an input signal should be 0.2 s or more.



● **Output terminal equivalent circuit**

• Rated output is 24 VDC, 75 mA, NPN transistor open collector output.
• Use a relay whose coil voltage is 24 VDC and coil current is 75 mA DC or less, and attach a noise absorption diode: D (100 V, 1 A).

</td><td>



</td></tr>
<tr><td>E</td><td>

● **Power to activate input/output**

• It is necessary to apply 24 VDC of supply voltage between 24 VDC input and COM. Turn ON/OFF the power synchronous to the control power of the controller.
• The power to be provided by customer.
  • Voltage: 24 VDC +10 %+/-0 %
  • Capacity: 75 W or more
• Apply noiseless stable power.

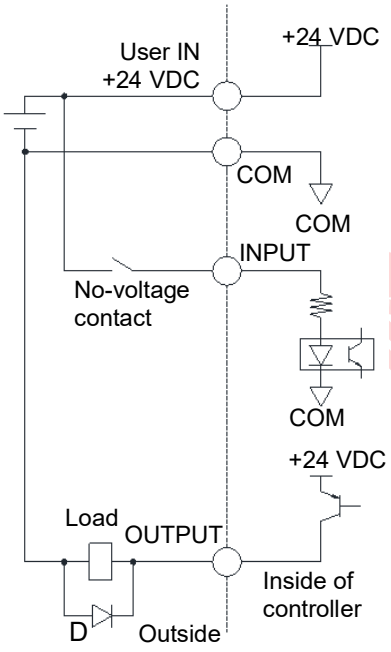
● **Input terminal equivalent circuit:**

• To receive no-voltage ON/OFF contact signal from an external equipment.
• External relay contact to be connected 1 ohm or less
• Chattering 10 ms or less
• Pulse amplitude of an input signal should be 0.2 s or more.

● **Output terminal equivalent circuit**

• Open collector (PNP) output.
• Rated output is 24 VDC, 75 mA
• Use a relay whose coil voltage is 24 VDC and coil current is 75 mA DC or less, and attach a noise absorption diode: D (100 VDC, 1A).
• Rated load of the emergency stop output: 5A, 30 VDC.

</td><td>



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</table>

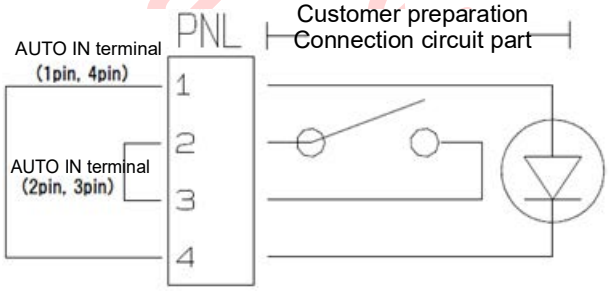
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6.4 Auto start settings

For details of settings and usage of the auto start, please refer to the operating instructions (Teach pendant for arc welding industrial robots.)

6.5 External interlock release input

PNL connector is provided as the input part to release the interlock of the sequencer card from outside. To use this function either connect the separately sold operation box to the connector or provide a connection circuit at user's end by refering to the following specification. To use it, software settings for this function is also needed.
For details, refer to the operating instructions (Operation).



【Recommended rated specifications
Switch: 24 VDC, 3 A
LED: 24 VDC, Rated current: 10 mA
(Limited resistor insid LED: 2.4 k-ohm)

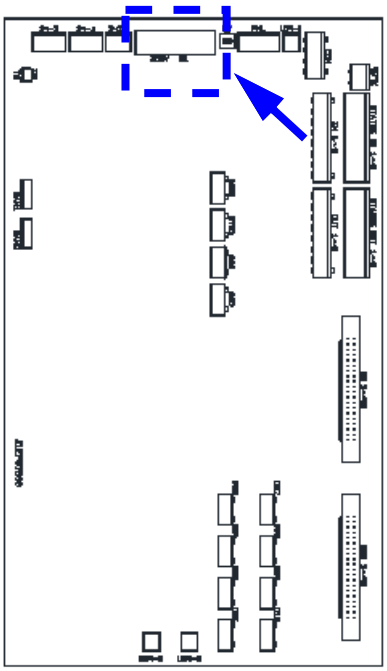
Procedure to release the interlock

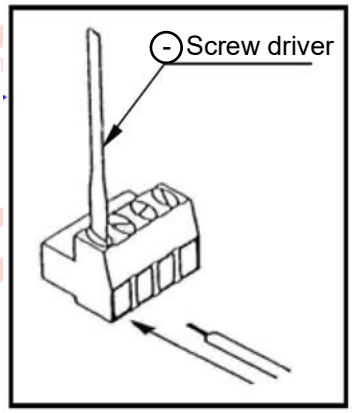
(1) After switch the mode select switch on the teach pendant to AUTO side,
Turn on the "AUTO MODE" on the operation box, or turn on the switch that is connected to the "AUTO IN" of the customer prepared part.

(2) In AUTO mode, after restarting from "Door stop input", turn on the "AUTO MODE" on the operation box, or turn on the switch that is connected to the "AUTO IN" of the customer prepared part.

- **PNL connector part**
The plug part (see the figure on the right) of this PNL connector part is removable.
To connect a lead wire, remove the coating of the ellad wire about 7 mm from the tip, and then tighten it with a precision driver.
(Tightening torque: 0.5 N・m to 0.6 N・m)

Applicable electric wire: 0.2 mm^2 to 2.5 mm^2
(AWG24 to AWG12)





Note
Install the switch that is connected to the " AUTO IN" outside the safety fence. Install an emergency stop switch along with the switch that is connected to the "AUTO IN" .
For the connection of the emergency stop switch and settings, see " Functional safety manual".

Note
For E/U spec., the interlock must be released to operate in AUTO mode.

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6.6 Status IN/OUT

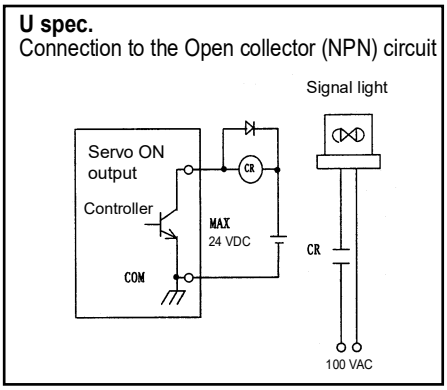
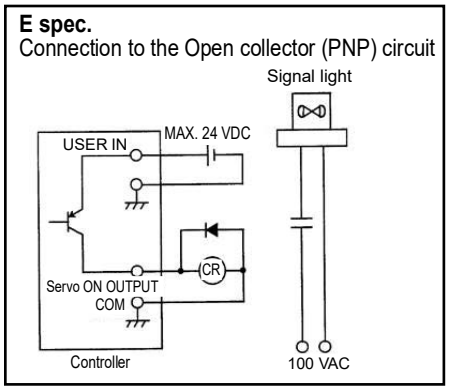
Dedicated input/output terminals to send signals when the robot is in specified state or to change robot status according to the signal received.

6.6.1 Status INPUT

- Dedicated input terminals

Status INPUT	Description
External servo ON input	Turn ON to enable servo power ON if the following conditions are all satisfied. Condition 1: Status output signal 'Ready' output signal is ON. Condition 2: Mode select switch is set to operation mode ('AUTO' position) and not in Mode error state. Condition 3: Mode select is set to auto-operation (in operation mode) Condition 4: Mode select switch is not switched to 'TEACH' position due to override in operation. Condition 5: The 'Emergency stop' input is not ON. The input signal must satisfy the following conditions. The input signal must be ON in 0.2 second after the 'Ready' output signal goes ON. The input signal must be kept ON for 0.2 second or more. If you try to turn on servo within 1.5 seconds after turning it off, "Retry to turn on servo" is displayed and servo doesn't turn on .
Error release input	When the robot is in an error state and the error dialog box is displayed, turn ON this input to close the dialog box. At that time, the error output goes off if it is in ON state. Input signal is effective when the signal state is switched and kept for 0.2 second or more.
Start input	Turn ON this input signal to run a program. In a hold state, turn on to restart. The input signal is ignored under the following conditions. • The servo power is OFF. • Auto-operation is not set. • In error condition. • Stop input is ON. • In override state.
Stop input	• Turn ON this input signal to bring the operating robot into a hold state. • While the signal is ON, re-start, manual operation and trace operation are not operable. • The robot remains in a hold state even if this signal is turned OFF. • To restart operation, turn ON the start input signal.
Operating mode input	• It is to switch the mode from teaching mode to operation mode. • Use this input when the robot is in teaching mode and operation mode is desired. • When the input signal is turned ON, a message to switch the mode select switch to operation mode appears. • Switch the mode select switch to 'AUTO' or turn OFF the operating mode input to close the message box. Please be advised that while the message box is displayed, the robot is in the error state.
Teaching mode input	• It is to switch the mode from operation mode to teaching mode. • Use this input when the robot is in operation mode and teaching mode is desired. • When the input signal is turned ON, a message to switch the mode select switch to teaching mode appears. • Switch the mode select switch to 'TEACH' or turn OFF the teaching mode input to close the message box. Please be advised that while the message box is displayed, the robot is in the error state.
OPR confirm input	In case of using the operation box, turn ON this input signal to release the interlock occurred at the time of switching to AUTO mode. (You can also use the AUTO mode switch on the operation box to release the interlock.) **< Note >** • The interlock at the time of switching to AUTO mode occurs if the controller is equipped with the operation box either as standard (for UL or CE specification) or as optional. • It is necessary to complete the management settings for the operation box to enable this input. Please refer to the operating instructions (Operation) for details.

6.6.2 Status OUTPUT

Status OUTPUT	Description
Alarm output	• The signal is output when the robot goes into an alarm condition. (At that time servo power is turned OFF) • Unless power is turned OFF, the output signal remains in ON state.
Error output	• The signal is output while the robot is in an error condition. • The signal is turned OFF when the error is released.
Operating mode output	• The signal is output in operation mode (including override.) • While the message box to switch to teaching mode is displayed (by turning on the 'Teaching mode' input), if the operation mode is selected, this signal remains ON.
Teaching mode output	• The signal is output in teaching mode (excluding override.) • While the message box to switch to operation mode is displayed (by turning on the 'Operating mode' input), if the teaching mode is selected, this signal remains ON.
Ready output	• The signal is output when the robot is ready to receive a status input signal. • It goes OFF when the robot is in an alarm condition or when the 'Emergency stop' input is ON.
Servo ON output	• The signal is output when the servo power is ON. <Examples of installing a signal light> **U spec.** Connection to the Open collector (NPN) circuit  **E spec.** Connection to the Open collector (PNP) circuit 
Running output	• The signal is output while running a program (including override.) • It is turned OFF when the robot goes in hold or emergency stop state, and turned ON again when the robot is re-started.
Hold status output	• The signal is output when the running program is stopped in operation mode. • The signal is output while the robot is in a hold state due to an error or emergency stop input, and is turned OFF when re-started. • The signal is turned OFF when the mode select switch is placed in 'TEACH' position. When the mode select switch is placed in operation mode and the robot is ready to restart after turning on servo power, the signal is turned ON.

6.6.3 Lamp indication when the servo power is ON

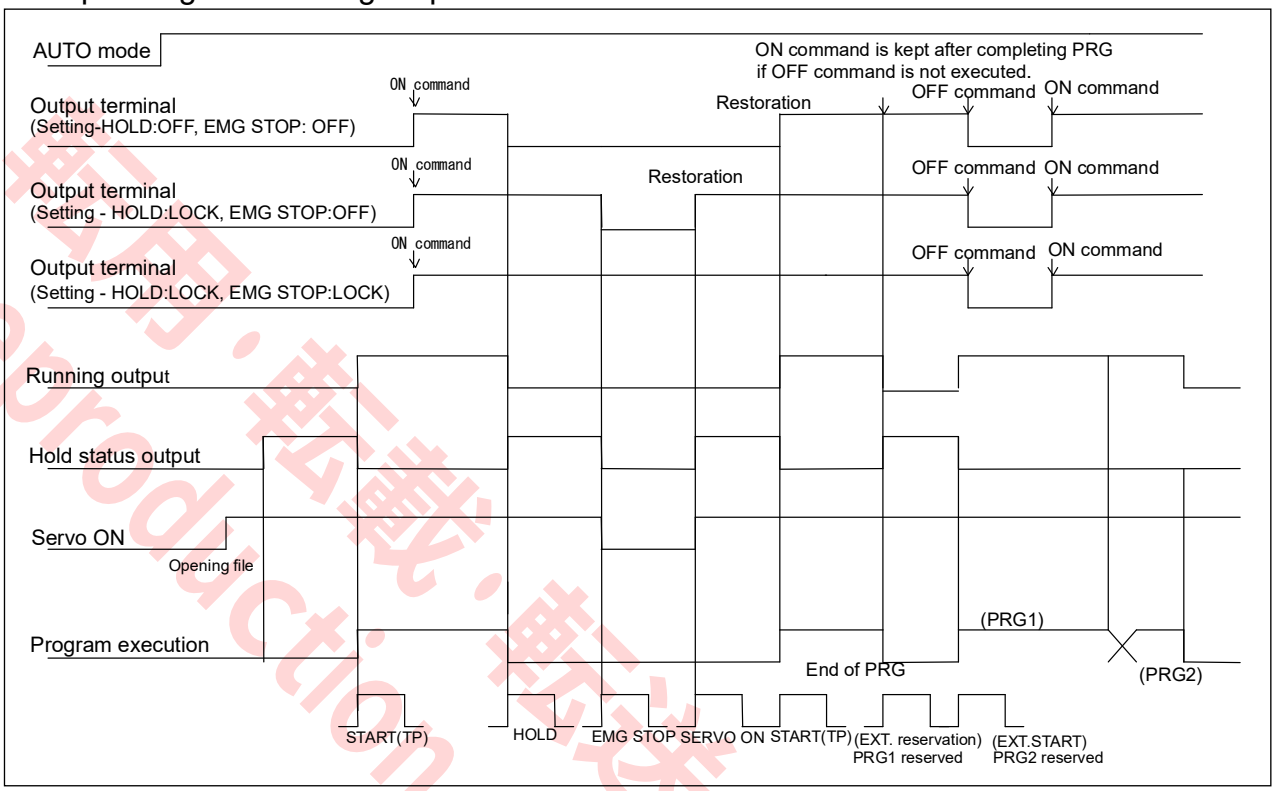
To indicate that the servo power is ON, provide an indicator lamp for each robot. Connect the customer-supplied lamp according to the wiring example "Servo ON Output" in the previous section.

6.6.4 Status I/O to be allocated to user terminals

For details of setting procedure and functions of status I/Os allocated to the user terminals, please refer to the operating instructions (Teach pendant for arc welding industrial robots.)

6.7 Flowchart of Status Outputs

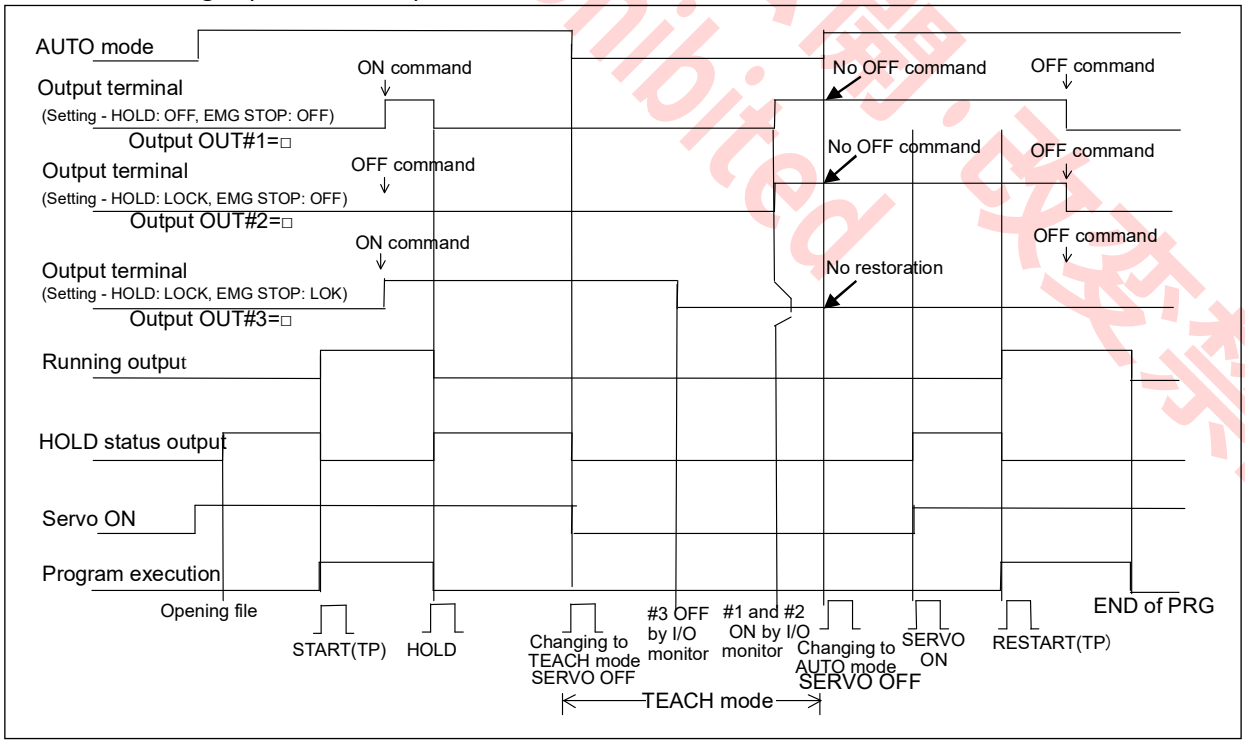
6.7.1 Operating and Holding output



Note

The chart is drawn as positive logical setting case.

6.7.2 Mode change (I/O monitor)

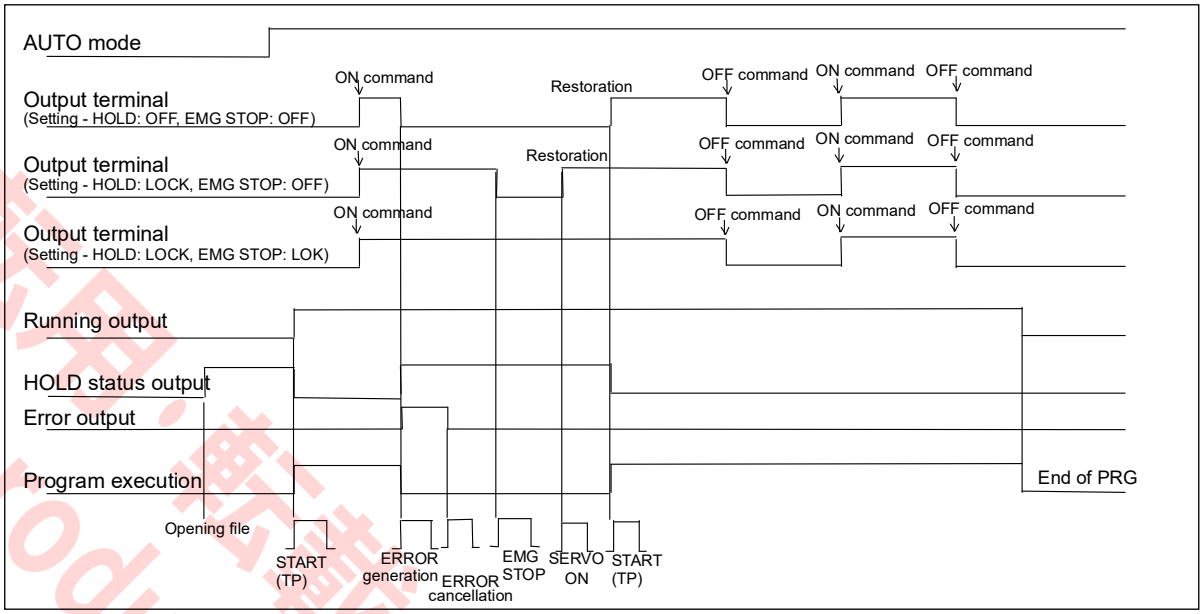


Note

The chart is drawn as positive logical setting case.

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6.7.3 Error output



Note

The chart is drawn as positive logical setting case.

6.8 Connecting to the sequencer card

- This part employs a connector. It is possible to remove it from the P.C. Board.
- It is a push-in type connector.

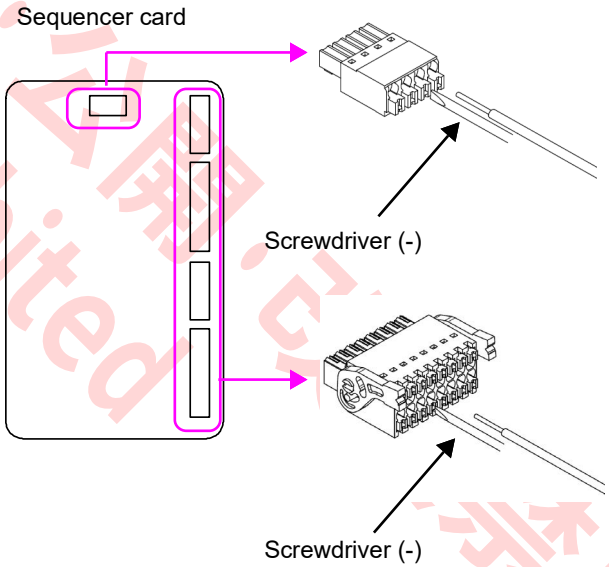
<Procedure>

(1) Peal off the insulation coating at the end part of the lead wire (about 10 mm from the end).



(2) With a flathead 2.5 mm screwdriver or so, insert the wire while holding down the button next to each terminal hole.

(3) Once inserted the wire properly, release the button next to the terminal to lock the wire.



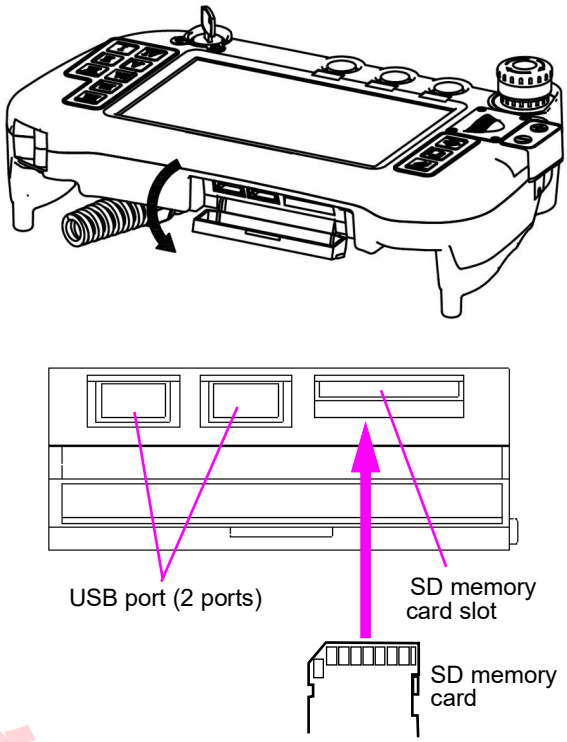
Applicable wire: 0.2 mm^2 to 0.75 mm^2 (AWG24 - AWG18)

Applicable wire size				About Ferrule terminal			
Single wire (mm^2)	Stranded wire (mm^2)	AWG	Bare wire length (mm)	Applicability	Tip diameter (mm)	Conductive part size (mm)	Recommended Ferrule terminal model number
0.2	0.2	24	10 or more	Applicable	1.5 or less	10 or more	AI 0.25-10 YE
0.3	0.3	22					AI 0.34-10 TQ
0.5	0.5	20					AI 0.5-10 WH
0.75	0.75	18					AI 0.75-10 GY

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6.8.1 SD Memory Card slot (Teach Pendant)

The teach pendant is equipped with a SD memory card slot. Open the cover at the bottom of the teach pendant to access the SD memory card slot.
Open the cove and attach the memory card to it to use.



- SD MEMORY CARD

[SD]
Maximum capacity_2GB, Maximum speed_Class 10
[SDHC]
Maximum capacity_32GB, Maximum speed_Class 10
[Corresponding format]
FAT, FAT32, exTAT,
* Prohibition of use of NTFS

6.8.2 USB port

The teach pendant is provided with two USB ports on the left side of the SD memory card slot. You can connect a USB-compatible keyboard or memory when you use Windows.

- USB port

[USB]
2.0 High-Speed (480 Mbps) responding type (Theoretical value)
[Type-A connector]
[Corresponding format]
FAT, FAT32, exTAT
* Prohibition of use of NTFS

<Usage note for USB port>
- The port supports USB 2.0 but does not support Hi-Speed USB.
- Applicable devices for the port are keyboard and memory.
- Depending on the type of keyboard, some functions, such as multimedia, are not available.

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6.9 Built-in welding voltage/current monitor terminal

If it is necessary to use welding voltage/currentor monitor function of built-in power source, use the welding voltage/current monitor terminal.

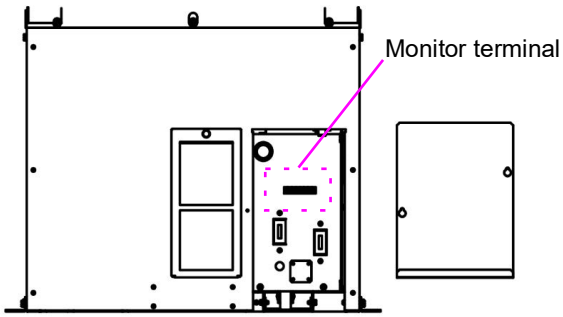
♦Connecting to welding voltage/ current monitor terminal

(1) Remove the terminal cover at the lower part of the controller front panel.

(2) The monitor terminals are located on the right side of the output terminal.

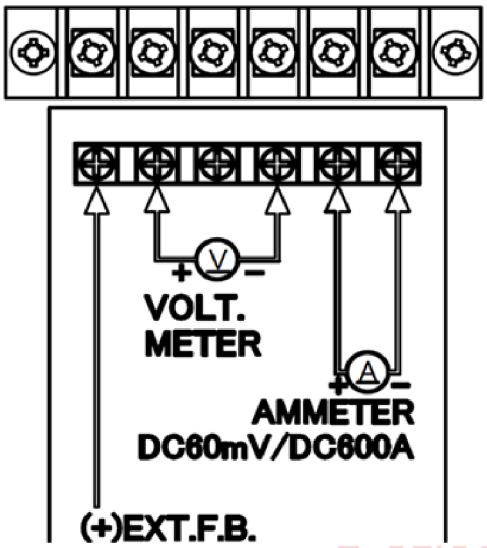
(3) In the same manner as the output cable, draw the cable from the underside of the power to connect the external device and the monitor terminal.

(4) Re-install the output terminal cover



♦Layout and functions of the monitor terminals

Terminal name	Function
+ Ⓐ – Ammmeter	Connect a DC ammeter between those terminals to monitor welding current value. (Output terminals from the shunt resistor 600 A, 60 mV)
+ Ⓥ – Volt meter	Connect a DC voltmeter between those terminals to monitor welding voltage value.
(+) EXT.F.B.	It is an external (+) voltage feedback terminal. Connect an incidental device such as high voltage touch sensor between this terminal and the base metal voltage detection terminal to detect welding voltage to the device.



Note

Independently wire the DC ammeter and the DC voltageter.

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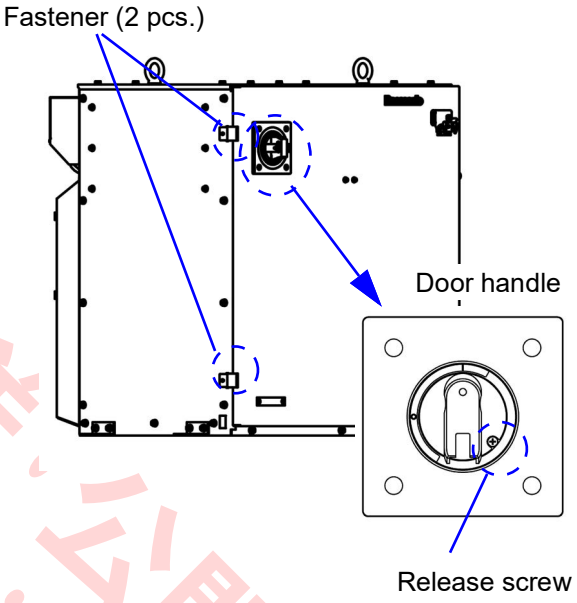
7. Motor Brake Manual Release Switch

⚠ CAUTION

Be careful of the arm downward motion when you release a motor brake.
The robot arm will descend under its own weight if a motor brake is released, which can cause personal injury or damage to a device. Prior to releasing a brake, take measures not to descend the arm or check to confirm that no personnel or no device that may be damaged exists.

7.1 How to release motor brake

Manual motor brake release switches for all axes respectively are located inside of the controller.



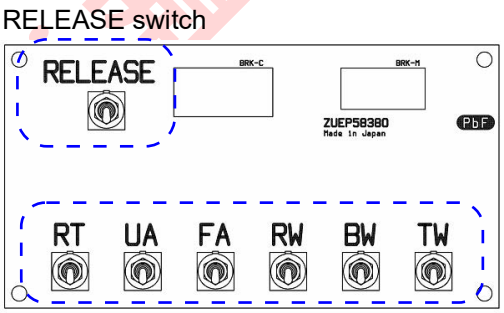
(1) Press the emergency stop switch.

< Note >

Make sure to hold the emergency stop switch in the ON (or pressed) position.

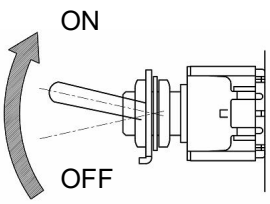
(2) Turn on the breaker of the controller.
(3) Release the fastener of the front door.
(4) Turn the door handle release screw with either phillips-head or flathead screwdriver. Then the door handle can be unlocked while holding power to the controller in the ON position.

(5) Access the brake release card installed inside of the controller.
Of the axis select switches, turn on an axis switch you want to release the motor brake.
While holding the axis switch in the ON position, turn on the RELEASE switch to release the selected axis motor brake of the manipulator.



Note

All switches are momentary switches. Once the switch is released, the switch automatically goes back to the OFF position.



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8. Maintenance and Inspection

⚠ CAUTION

Maintenance and inspection work must be performed by qualified personnel who have completed the appropriate training programs and also well understand the contents.
Prior to conducting maintenance and inspection work, turn off the power switch and leave it for the inner capacitor discharge and sufficient cooling of the heat generation parts.

8.1 Inspection schedule

Maintenance and inspection works are inevitable to ensure full functions and performance of the robot and at the same time to ensure safety during operation.

(1) Refer to the table in the next page for the check items.
(2) Since the inspection intervals are set according to standard operation hours, apply either months or hours whichever is shorter as the standard. In case of operation on two shifts, the every 500-hour inspection shall normally be performed every 1.5 months. Hours correspond to time while the controller is in the ON state.
(3) It is recommended to have the overall inspection including overhauls specified by us at the time of every 2 000-hour inspection. If you enter into a periodical inspection contract with our company, our periodical inspections will start with a 2 000-hour (annual) inspection.

Inspection schedule
● Daily inspection
● Every 500 hours (or every third month)
● Every 2 000 hours (or every year)
● Every 4 000 hours (or every second year)
● Every 6 000 hours (or every third year)
● Every 8 000 hours (or every forth year)
● Every 10 000 hours (or every fifth year)

Note

- The above schedule is based on when the controller is used for arc welding operation.
- Inspection of the product is available as fare-paying service. For details, please contact Panasonic representatives.

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8.2 Daily check

♦Inspections before turning on the power

	Parts	Item	Service	Remarks
1	Ground cable Cables	• Looseness • Breaking or damage of wire	• Re-tightening. • Replacement	
2	Safety fence	Damage	Repair	
3	Controller	Attachment of spatter/dust.	Removal of spatter/dust.	
		Clogged filter.	Clean/replace filter (*)	
4	Working area	Tidiness		

Note

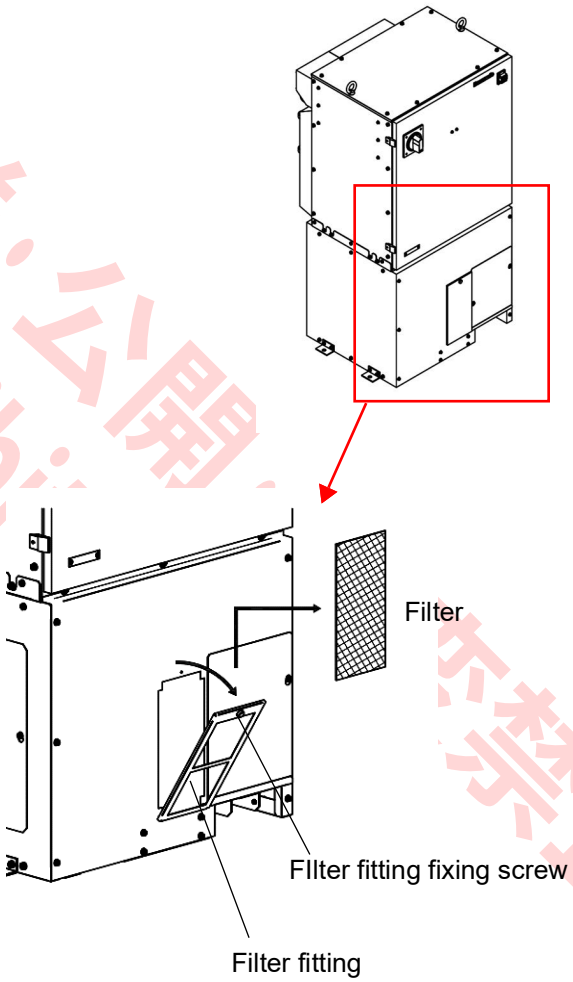
For inspections about manipulator, welding torch, nozzle and tip, see the operating inspections of each item

Note

(*) **: About filter at the air inlet fan**

The air inlet fan at the side panels of the welding power source unit is covered with a filter.

- Clean the filter periodically. And remove dust and/or spatter attached to the filter. Using the controller with clogged filter may degrade its cooling performance of the fan, and performance of the robot will be deteriorated, as a result, the "Temperature error" may occurs.
- In case of "Temperature error"(W1210, W1220), check the filter and clean or replace it as necessary.
  Adhesion of dust to the cooling fan of the built-in welding power unit reduces cooling performance, which, as a result, can cause the "Temperature error". In that case, clean the cooling fan.
  (If the error recurs after cleaning the cooling fan, please consult Panasonic representatives.)



- How to replace filter

(1) Loosen the fixing screw of the filter fitting. Then open the filter fitting and remove the filter.

(2) Insert a new filter into the filter fitting, and then close the filter fitting. Then tighten the filter fitting fixing screw.

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♦Inspections after turning on the power

CAUTION	Check to confirm that no personnel are present within the robot work envelope before turning on the power.

	Parts	Item	Service	Remarks
1	Emergency stop switch	After turning on the servo power, the servo power goes off immediately after turning on the emergency stop switch.	If not, • Repair • Consult us if causes are not clear.	Do not use the robot unless the switch is repaired.
2	Fan	Cooling air inlet fan of the controller rotates. No attachment of dust on the fan.	If not, clean the fan.	Be sure to turn off the power to the controller before cleaning the fan.
3	Controller	No abnormal vibration, noise or odor from the built-in welding power source	If not, consult us if causes are not clear.	Do not use the robot unless the manipulator is repaired.

Note

For inspections about manipulator, see the operating inspections of each item.

Note

The fan for the built-in welding power source (2 pcs. on the front panel side) may not rotate immediately after power on. It starts rotation with increasing temperature of the built-in welding power source after starting actual operation. It stops rotation when the temperature of the built-in welding power source decreases after stopping actual operation.

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8.3 Periodical check

Interval						Item	Inspection and service
3 mth	1 yr.	2 yr.	3 yr.	4 yr.	5 yr.		
O						Screws at covers	Check tightness and re-tighten if necessary.
O						Connecting cable connectors	Check tightness and re-tighten if necessary.
O						Other consumable components	Replace with new one if necessary

Note

- Electromagnetic contactors or cooling fans:
  Please treat them as consumable when performing periodical check and maintenance work. Those components have a certain life cycle electrically and mechanically.
- For details, please consult our service section. If you have a periodical inspection contract with our company, our periodical inspections will start with a 2 000-hour (annual) inspection.
- For inspection of the manipulator, please refer to the operating instructions of the manipulator.

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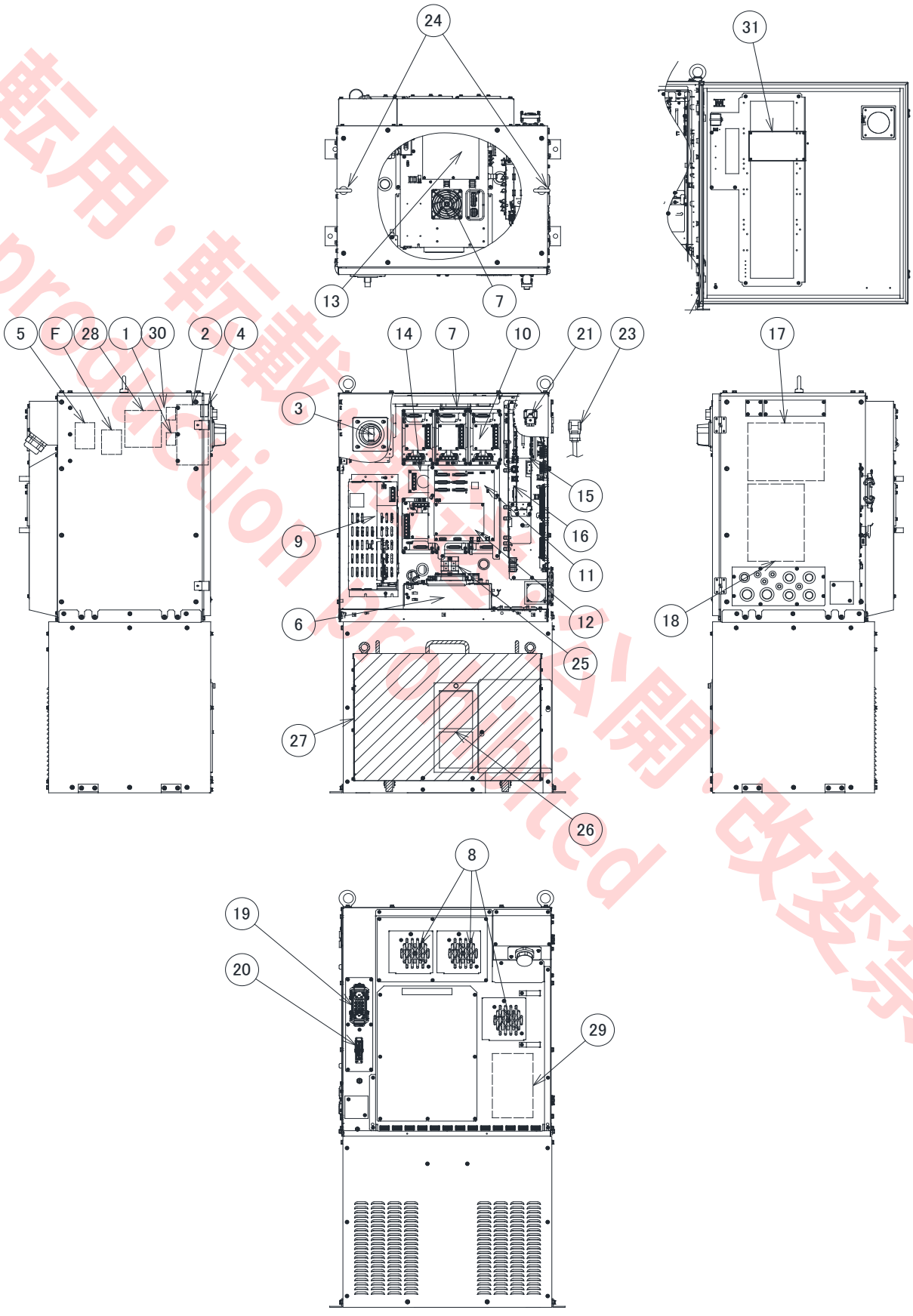
9. Disposal of this product

After disposal of this product, data in the controller might go to third parties.
To prevent this, perform **All Clear** in **Memory clear** menu before disposal. For details, refer to “Operating Instructions [Operation]”.

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10. Repair Parts List

10.1 Controller



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No.	Description	Part number	Repair part order number	Q'ty	Note	Safety parts	Class
1	Anti-surge Parts	WSAEB00025	WSAEB00025	1			D
2	Breaker	MTNC001521AA	MTNC001521AA	1	E spec	O	D
		MTNC001539AA	MTNC001539AA	1	U spec		
3	Door handle	MTNK009282AA	MTNK009282AA	1	E spec		C
		MTNK010037AA	MTNK010037AA	1	U spec		
4	Terminal Cover	MTNE000994AA	MTNE000994AA	1			C
5	Magnetic Switch	MTNC000708AA	MTNC000708AA	1			C
6	DC Power Supply Unit	WSAEU00356ZZ	WSAEU00356ZZ	1			C
6-1	Power Card	ZUEP5957	ZUEP5957	(1)			C
6-2	DC Power Supply	MTNC001110AA	MTNC001110AA	(1)			C
6-3	DC Power Supply	MTNC001111AA	MTNC001111AA	(1)			C
6-4	DC Power Supply	MTNC001112AA	MTNC001112AA	(2)			C
6-5	Capacitor Unit	MTNE000874AA	MTNE000874AA	(3)			C
7	Cooling Fan	MTND000182AA	MTND000182AA	2			B
8	Cooling Fan Assy	WSAEB00022	WSAEB00022	3			C
8-1	Cooling Fan	MTND000183AA	MTND000183AA	(1)			C
9	Converter Unit	WSAEU00059ZZ	WSAEU00059ZZ	1	E spec		C
		WSAEU00331ZZ	WSAEU00331ZZ	1	U spec		C
9-1	Converter	WSAEU00058ZZ	WSAEU00058ZZ	(1)	E spec		C
		WSAEU00332ZZ	WSAEU00332ZZ	(1)	U spec		C
9-2	Boot Relay Card	ZUEP5955_A1	ZUEP5955_A1	(1)			C
10	Servo Amplifier Unit	WSAED00052ZZ	WSAED00052ZZ	*	• YA-HFAKM1:RW/BW/TW • YA-HFAKA1:RT/RW/BW/TW • YA-HFAK21:FA	O	C
		WSAED00053ZZ	WSAED00053ZZ	*	• YA-HFAKM1:RT/UA/FA • YA-HFAKA1:UA/FA • YA-HFAK21:RT/UA	O	C
		WSAED00055ZZ	WSAED00055ZZ	*	YA-HFAK21:BW/TW	O	C
		WSAED00056ZZ	WSAED00056ZZ	*	YA-HFAK21:RW	O	C
11	6-axis Servo CPU Card	ZUEP5991	ZUEP5991	1			C
12	Safety Monitor Card	ZUEP5926	ZUEP5926	1		O	C
13	EXT Power IF Card 2	ZUEP5995	ZUEP5995	1			C
14	Capacitor Card	ZUEP5993	ZUEP5993	1			C

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No.	Description	Part number	Repair part order number	Q'ty	Note	Safety parts	Class
15	Backplane Card	ZUEP5960	ZUEP5960	1			C
16	Main CPU Card	ZUEP5912	ZUEP5912	1			C
17	Robot Safety Card	ZUEP5919	ZUEP5919	1		O	C
18	Sequencer Card - E spec	ZUEP5915	ZUEP5915	1	Open collector (PNP) output		C
	Sequencer Card - U spec	ZUEP5910	ZUEP5910	1	Open collector (NPN) output		C
19	Motor Panel Harness	WSAWC00629	WSAWC00629	1	YA-HFAKM1/KA1		C
		WSAWC00787	WSAWC00787	1	YA-HFAK21		C
20	RE Panel Harness	WSAWC00630	WSAWC00630	1			C
21	TP Harness	WSAWC00565	WSAWC00565	1			C
22	Flat Cable	MTNW003064AA	MTNW003064AA	3	RW/BW/TW		C
		MTNW003065AA	MTNW003065AA	3	RT/UA/FA		C
23	TP Cable	WSAWC029LT	WSAWC029LT	1	• Standard: 10 m • Various lengths are available up to 30 m. • For details, please contact Panasonic representatives.		B
24	Eye-bolt *1)	XVN12FJ	XVN12FJ	1			B
25	Terminal Block	K4AA02H00101	K4AA02H00101	1			C
26	Filter	AKC41124	AKC41124	1			C
27	Welding Power Source	WSAEU00213ZZ	WSAEU00213ZZ	1	E spec		C
		WSAEU00214ZZ	WSAEU00214ZZ	1	U spec		C
28	Transformer	WSUTU53220	WSUTU53220	1			C
29	Reactor	WSAEL00003AA	WSAEL00003AA	2			C
30	Fuse holder	K3GZ1YG00001	K3GZ1YG00001	2	U spec		C
31	Brake release card	ZUEP5883	ZUEP5883	1	E/U spec		C
F	Fuse holder	K3GZ1YG00002	K3GZ1YG00002	1			C

(*1) Eyebolts are important safety parts. When they are lost or broken, purchase Panasonic genuine eyebolts for your safety.

<Class> A: Consumable parts, rather short replacement cycle.
B: Assemblies and parts of high frequency in motion.
C: Important electric parts.
D: Parts rather long replacement cycle.

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♦List of fuses

No.	Installation location	Part code	Part number	Repair part order number	Q'ty	Note	Safety parts
1	Fuse holder (See "10.1 Controller" (F))		K5D153YY0004	K5D153YY0004	3	15 A (E spec)	O
			K5D153YYA145	K5D153YYA145	3	15 A (U spec)	O
2	ZUEP5910	F1	K5D312YY0012	K5D312YY0012	1	3.15 A (U spec)	O
3	ZUEP5915	F1	K5D502YYA129	K5D502YYA129	1	5 A (E spec)	O
4	ZUEP5957	F1,F2	K5D802YY0007	K5D802YY0007	2	8 A	O
5	Fuse holder (See "10.1 Controller" (No.30))		K5D502YY0014	K5D502YY0014	2	5 A (U spec)	O

●How to replace the U-spec. fuse, number K5D502YY0014
(U specification models have two additional fuses on the rear of the breaker.)

(1) Turn the fuse holder (K3GZ1YG00001) tab to remove it.

(2) Remove the fuse from the fuse holder. Replace it with a new one.

(3) Return the replaced fuse with the fuse holder to its original position.

Note

Since fuses have polarity, be sure to insert them in the direction shown below.
If the polarity is reversed, no power will be applied, and the controller will not turn on.



Fuse
K5D502YY0014

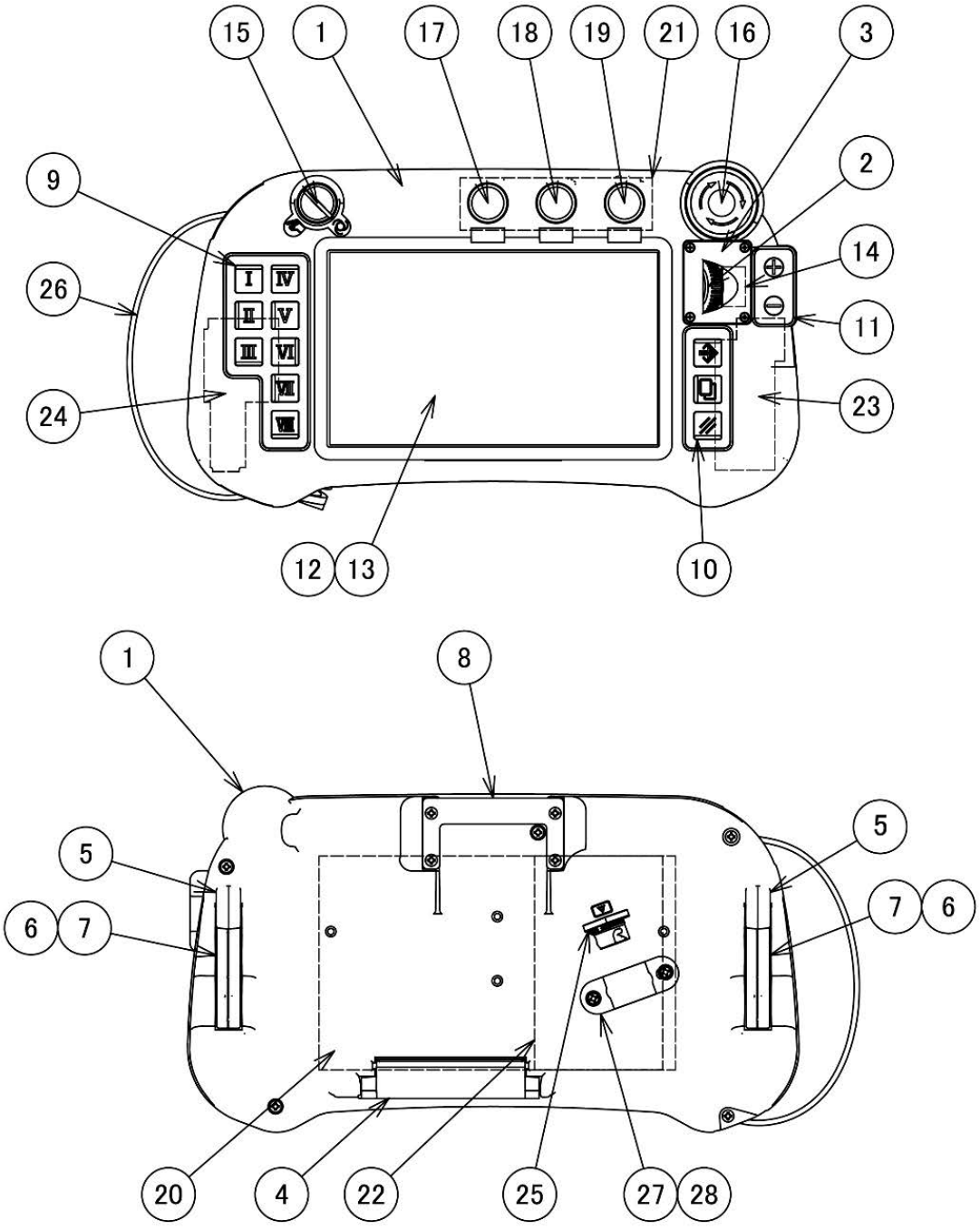
Insert



Fuse holder
K3GZ1YG00001

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10.2 Teach pendant



No.	Description	Part number	Repair part order number	Q'ty	Note	Safety parts	Class
1	Case body	WSAKH00003	WSAKH00003	1			D
2	Dial	AKC31006	AKC31006	1			D
3	Jog cover	WSAKC00087	WSAKC00087	1			D
4	Cover	WSAKC00086	WSAKC00086	1			B
5	Trigger	AKC31009	AKC31009	2			B
6	Lever 1	WSAKC00175	WSAKC00175	2			B
7	Lever 2	WSAKC00176	WSAKC00176	2			B
8	TP hanger	WSAKC00089	WSAKC00089	1			D
9	Key Sheet Left	MTNS001075	MTNS001075	1			B
10	Key Sheet Right	MTNS001076	MTNS001076	1			B
11	Key Sheet UP	MTNS001077	MTNS001077	1			B
12	Touch Panel	MTNS001074	MTNS001074	1			B
13	LCD	MTNS001073	MTNS001073	1			B
14	Encoder	MTNS001071	MTNS001071	1			B
15	Key Switch harness	WSAWC00159	WSAWC00159	1			B
16	EMGSW harness	WSAWC00158	WSAWC00158	1		O	B
17	Push button switch	A165TGYMNMA1	YABD40	1			B
18	Push button switch	A165TWMNMA2	YAW173	1			B
19	Push button switch	A165TGYMNMA3	YAB122	1			B
20	TP CPU Card	ZUEP5909	ZUEP5909	1			C
21	TP UP Card	ZUEP5941	ZUEP5941	1			C
22	TP Safety Card	ZUEP5920	ZUEP5920	1		O	C
23	TP Right Safety Card	ZUEP5940	ZUEP5940	1		O	C
24	TP Left Safety Card	ZUEP5939	ZUEP5939	1		O	C
25	TP harness	WSAWC00393	WSAWC00393	1			B
26	TP band	WSAKC00146	WSAKC00146	1			B
27	Saddle	SP15N	SP15N	(1)			B
28	Upset bolt	XVGZ3+F8FJ	YZA384	(2)			B
-	TP system SC	WSAYF00041	WSAYF00041	-			B

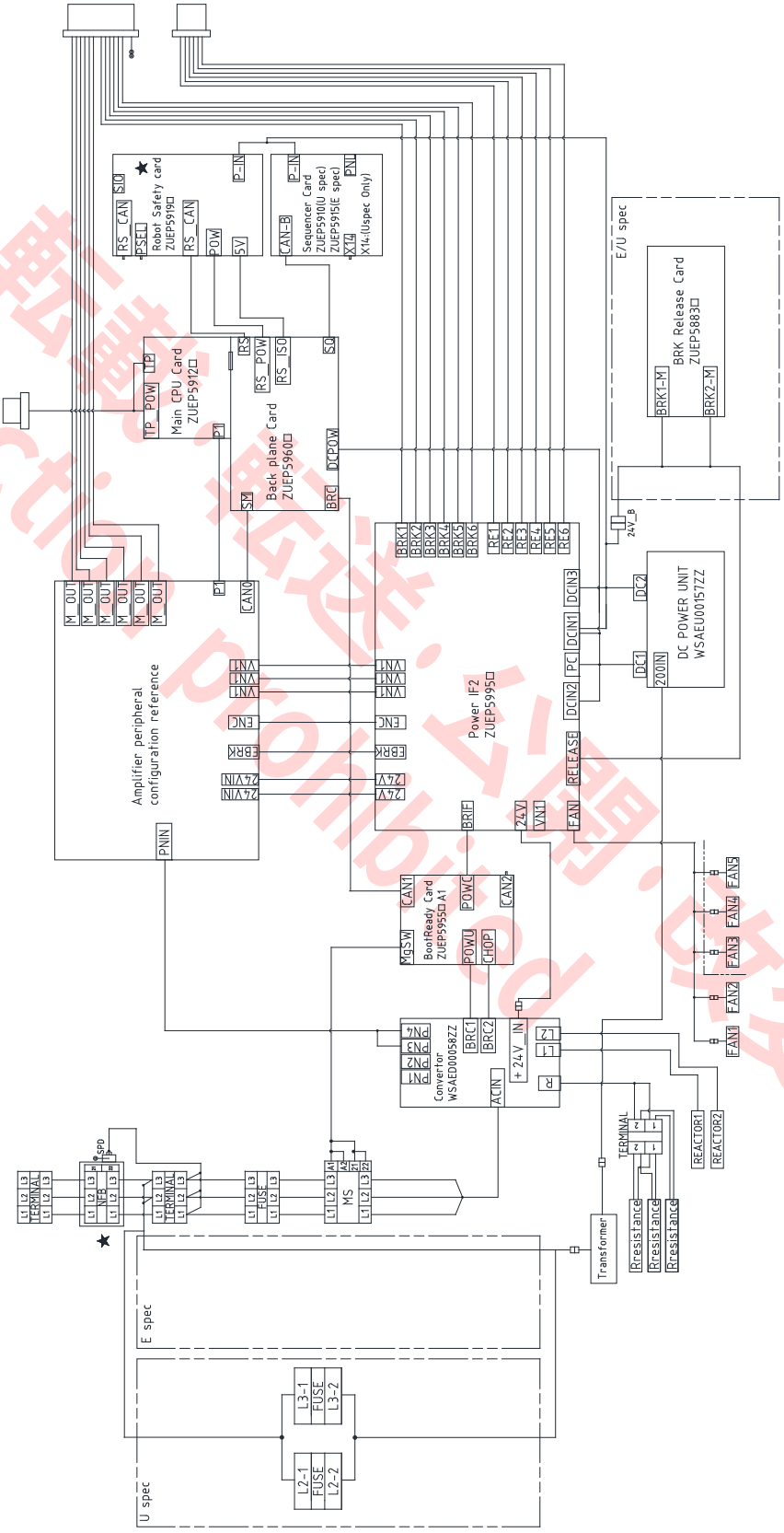
<Class> A: Consumable parts, rather short replacement cycle.
B: Assemblies and parts of high frequency in motion.
C: Important electric parts.
D: Parts rather long replacement cycle.

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11. Circuit Diagram

11. 1 Controller-Comprehensive circuit diagram 1

11.1.1 Circuit diagram of controller



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11.1.2 Circuit diagram of amplifier and peripheral

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11.2 Controller-Comprehensive circuit diagram 2

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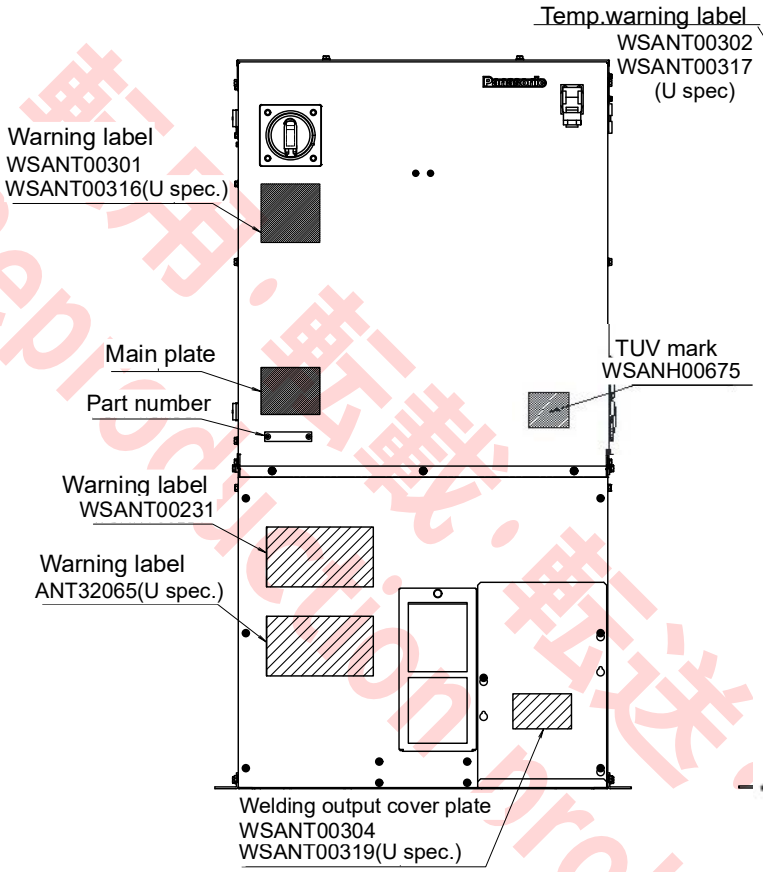
11.3 Welding power source

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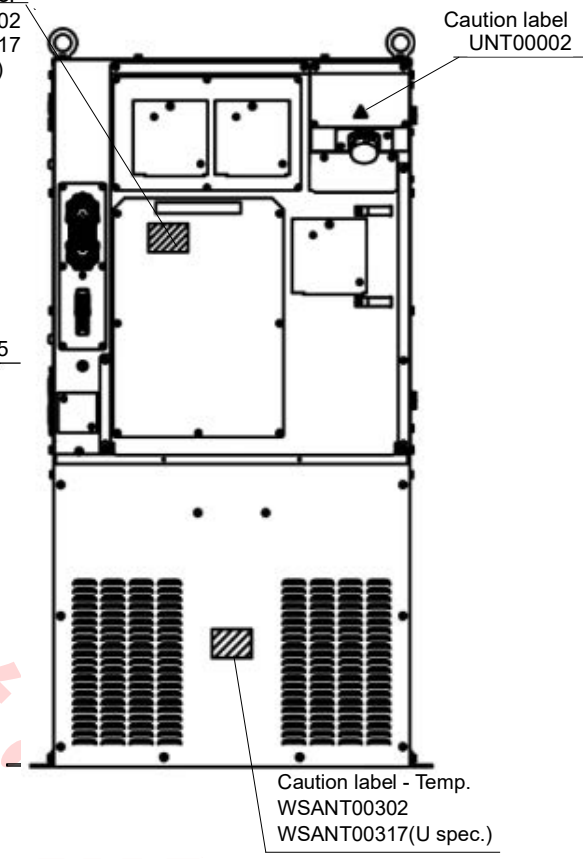
12. Location of Labels

12.1 Location of labels

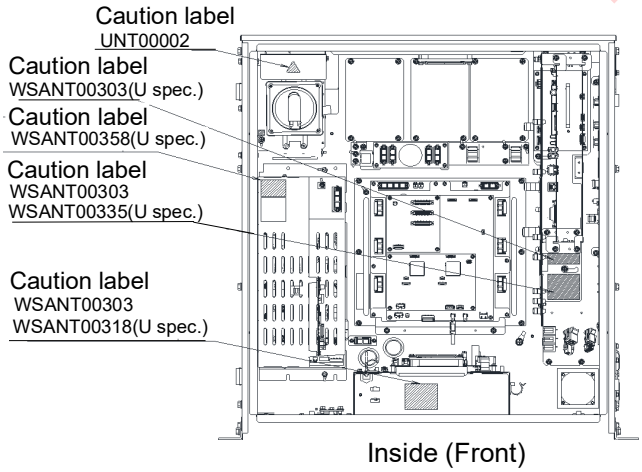
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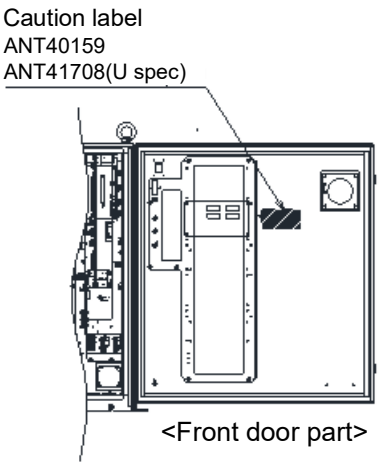
<Front>



<Rear>

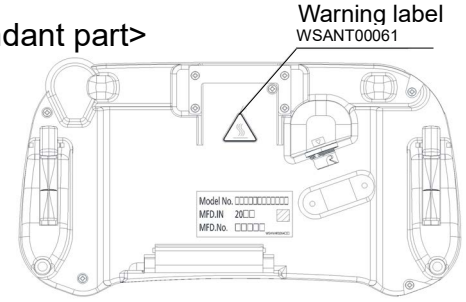


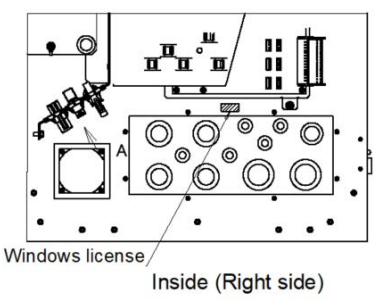
Inside (Front)



<Front door part>

<Teach pendant part>

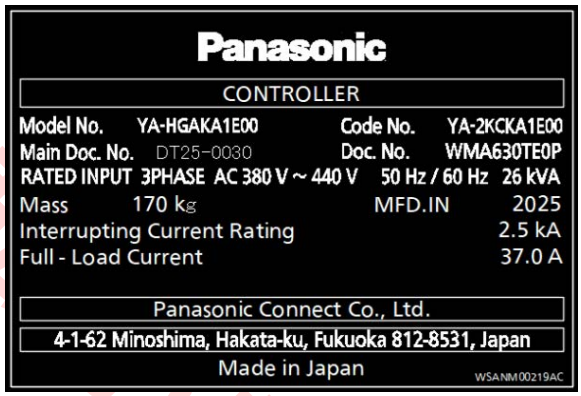




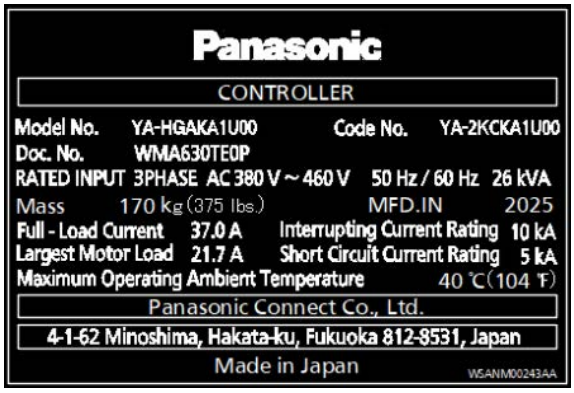
Inside (Right side)

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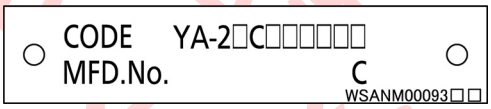
12.2 Labels



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< Type label - Main name plate: U spec >



<Type label - Part number>



<Caution label – UNT00002>



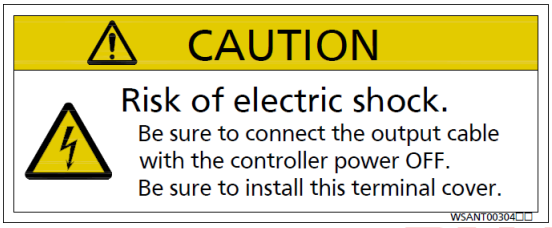
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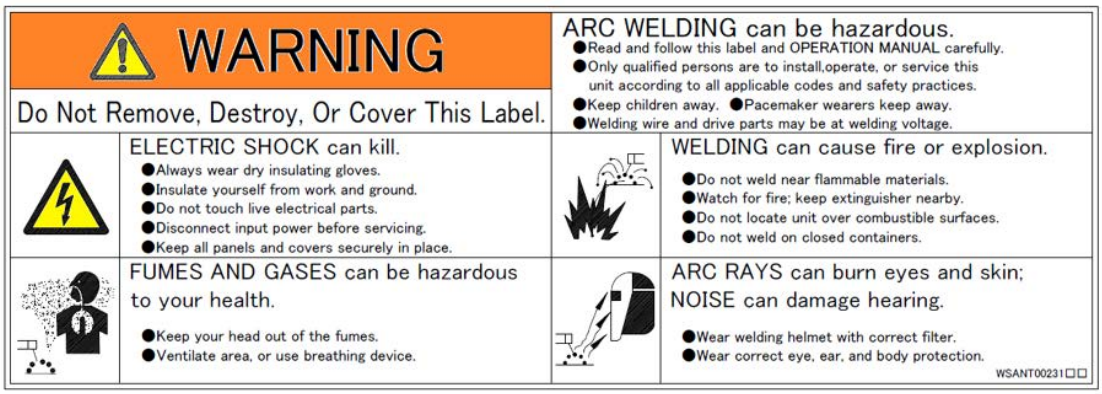


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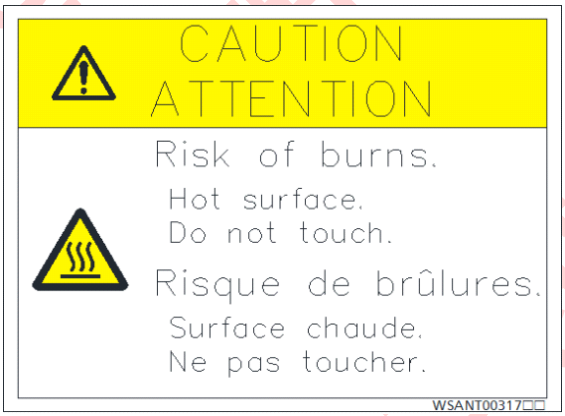


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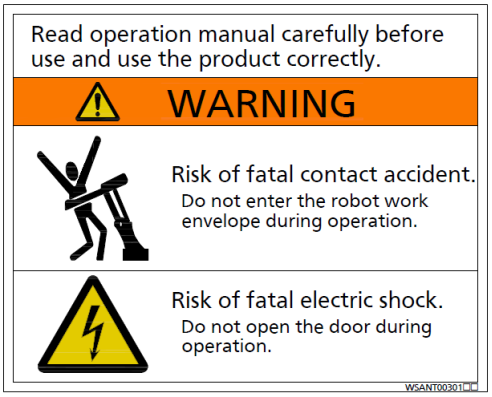
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< Warning label - WSANT00231 >



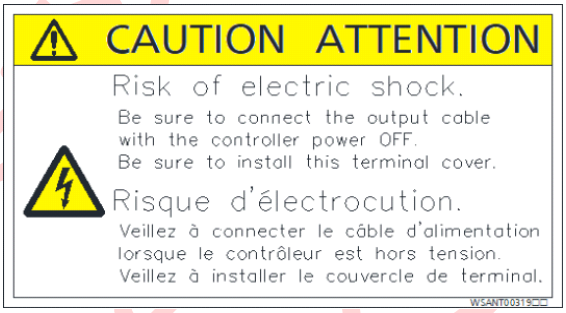
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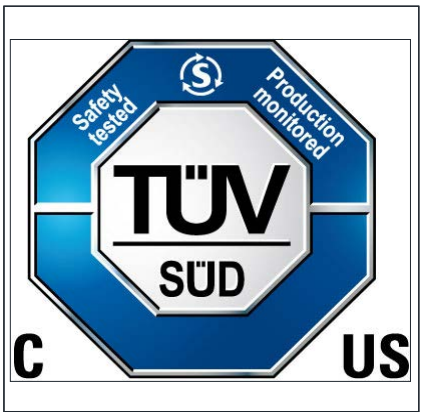
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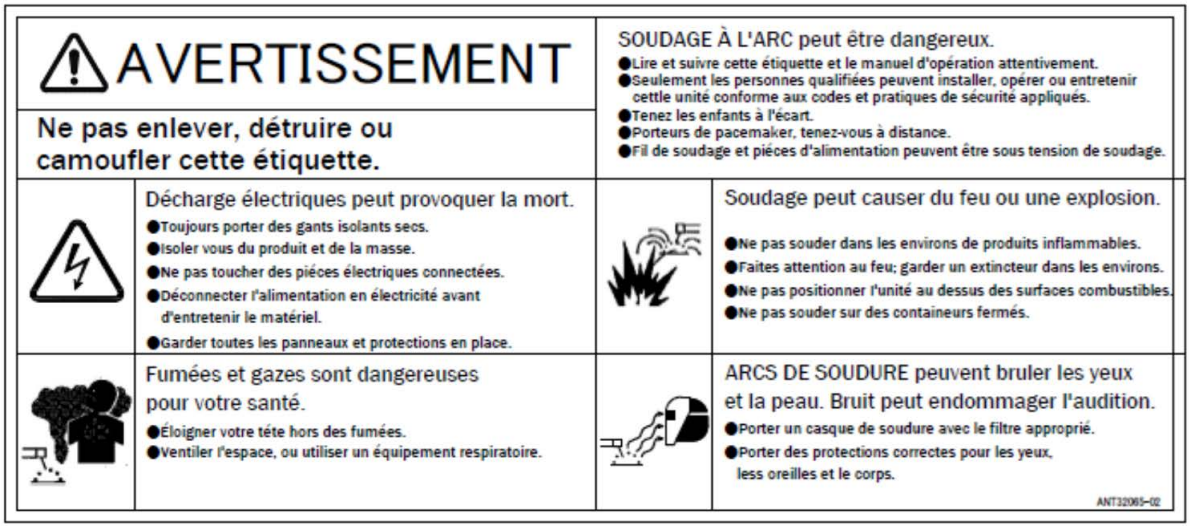
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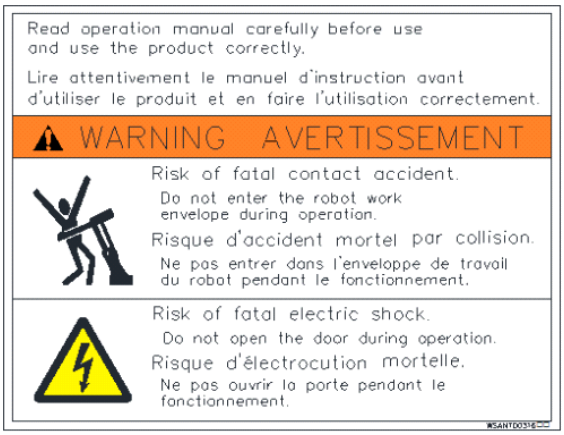
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<TUV mark - WSANH00675>
(U spec.only)



<Warning label - ANT32065 (U spec. only)>



<Warning label - WSANT00316 (U spec. only)>

13. Appendix

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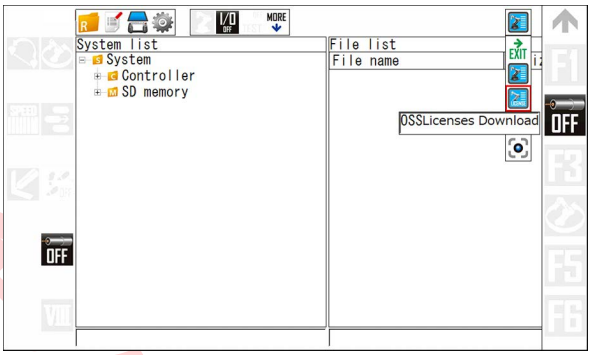
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