Motoman® NX100 Controller

MotoPos-T1000 Positioner Manual

Part Number: 152163-1CD
Revision 0

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Chapter 1
Introduction

1.1 About This Document

This manual provides information for the MotoPos-T1000 positioner and contains the following sections:

CHAPTER 1 - INTRODUCTION
Provides general information about the structure of this manual, a list of reference documents, and customer service information.

CHAPTER 2 - SAFETY
This section provides information regarding the safe use and operation of Motoman products.

CHAPTER 3 - MOTOPOS-T1000 INSTRUCTIONS
Provides detailed information for the MotoPos-T1000 positioner.

1.2 Reference to Other Documentation

For additional information refer to the following:

- NX100 Controller Manual (P/N 149201-1)
- Concurrent I/O Manual (P/N 149230-1)
- Operator's Manual for your application
- Vendor manuals for system components not manufactured by Motoman

1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (MotoPos-T1000)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on back side of robot arm)
- Robot Sales Order Number (located on back of controller)

Notes

Chapter 2
Safety

2.1 Introduction

It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06-1999. The address is as follows:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338
INTERNET: www.roboticsonline.com

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming, Operation, and Maintenance Safety (Section 2.6)

2.2 Standard Conventions

This manual includes the following alerts – in descending order of severity – that are essential to the safety of personnel and equipment. As you read this manual, pay close attention to these alerts to insure safety when installing, operating, programming, and maintaining this equipment.

DANGER!
Information appearing in a DANGER concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.

WARNING!
Information appearing in a WARNING concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.

CAUTION!
Information appearing in a CAUTION concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

Note: Information appearing in a Note provides additional information which is helpful in understanding the item being explained.

2.3 General Safeguarding Tips

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06-1999, section 4.2.5, Sources of Energy, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

2.4 Mechanical Safety Devices

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06-1999 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety equipment is provided as standard:

- Safety fences and barriers
- Light curtains and/or safety mats
- Door interlocks
- Emergency stop palm buttons located on operator station, robot controller, and programming pendant

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

2.5 Installation Safety

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06-1999 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 Programming, Operation, and Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to program, operate, and maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place. Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Do not enter the robot cell while it is in automatic operation. Be sure that only the person holding the programming pendant enters the workcell.
- Check the E-STOP button on the programming pendant for proper operation before programming. The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Back up all programs and jobs onto suitable media before program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.

- Any modifications to PART 1, System Section, of the robot controller concurrent I/O program can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1, System Section. Making any changes without the written permission of Motoman will VOID YOUR WARRANTY!
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. YOUR WARRANTY WILL BE VOID if you use these special passwords.
- The robot controller allows modifications of PART 2, User Section, of the concurrent I/O program and modifications to controller parameters for maximum robot performance. Great care must be taken when making these modifications. All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot and other parts of the system. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations.
- Check and test any new or modified program at low speed for at least one full cycle.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Use proper replacement parts.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

Notes

MOTOPOS-T1000 POSITIONER
INSTRUCTIONS

TYPE: YR-MPT1000-A15 (WITH 2000 kg PAYLOAD)
YR-MPT1000-A16 (FOR NORTH AMERICAN STANDARD WITH 2000 kg PAYLOAD)
YR-MPT1000-F00 (FOR SPECIAL SPECIFICATION WITH 2000 kg PAYLOAD)
YR-MPT1000-F01 (FOR SPECIAL SPECIFICATION WITH 2000 kg PAYLOAD)
YR-MPT1000-F02 (FOR SPECIAL SPECIFICATION WITH 2000 kg PAYLOAD)
YR-MPT1000-F03 (FOR SPECIAL SPECIFICATION WITH 2000 kg PAYLOAD)

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOPOS INSTRUCTIONS

MOTOMAN SETUP MANUAL
MOTOMAN-MANIPULATOR INSTRUCTIONS
YASNAC XRC INSTRUCTIONS
YASNAC XRC OPERATOR'S MANUAL
YASNAC XRC OPERATOR'S MANUAL FOR BEGINNERS
MOTOPOS INSTRUCTIONS

The YASNAC XRC operator's manuals above correspond to specific usage.
Be sure to use the appropriate manual.

YASKAWA

MANUAL NO.
HS0481357 ①

MANDATORY

- This instruction manual is intended to explain operating instructions and maintenance procedures primarily for the MOTOPOS.
- General items related to safety are listed in the Setup Manual Section 1: Safety. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the MOTOPOS and YASNAC XRC.
In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.

WARNING

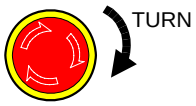
- Before operating the MOTOPOS, check that servo power is turned OFF when the emergency stop buttons on the playback panel or programming pendant are pressed.
  When the servo power is turned OFF, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned OFF.

  Injury or damage to machinery may result if the emergency stop circuit cannot stop the MOTOPOS during an emergency. The MOTOPOS should not be used if the emergency stop buttons do not function.

  Emergency Stop Button 

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the MOTOPOS. Then turn the servo power ON.

  Injury may result from unintentional or unexpected MOTOPOS motion.

  Release of Emergency Stop 

- Always set the Teach Lock before entering the MOTOPOS work envelope to teach a job.

  Operator injury can occur if the Teach Lock is not set and the MOTOPOS is started from the playback panel.

- Observe the following precautions when performing teaching operations within the working envelope of the MOTOPOS :
  - View the MOTOPOS from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Ensure that you have a safe place to retreat in case of emergency.

  Improper or unintended MOTOPOS operation may result in injury.

- Confirm that no persons are present in the work envelope of MOTOPOS and that you are in a safe location before:
  - Turning ON the YASNAC XRC power.
  - Operating the MOTOPOS with the programming pendant.
  - Running check operations.
  - Performing automatic operations.

  Injury may result if anyone enters the working envelope of the MOTOPOS during operation. Always press an emergency stop button immediately if there is a problem.The emergency stop buttons are located on the right side of both the YASNAC XRC playback panel and programming pendant.

CAUTION

- Perform the following inspection procedures prior to conducting MOTOPOS teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  -Check for problems in MOTOPOS movement.
  -Check for damage on insulation and sheathing of external cables.

- Always return the programming pendant to the hook on the XRC cabinet after use.

  The programming pendant can be damaged if it is left in work area of the MOTOPOS, on the floor, or near fixtures.

- Read and understand the Explanation of the Warning Labels in the Setup Manual before operating the MOTOPOS.

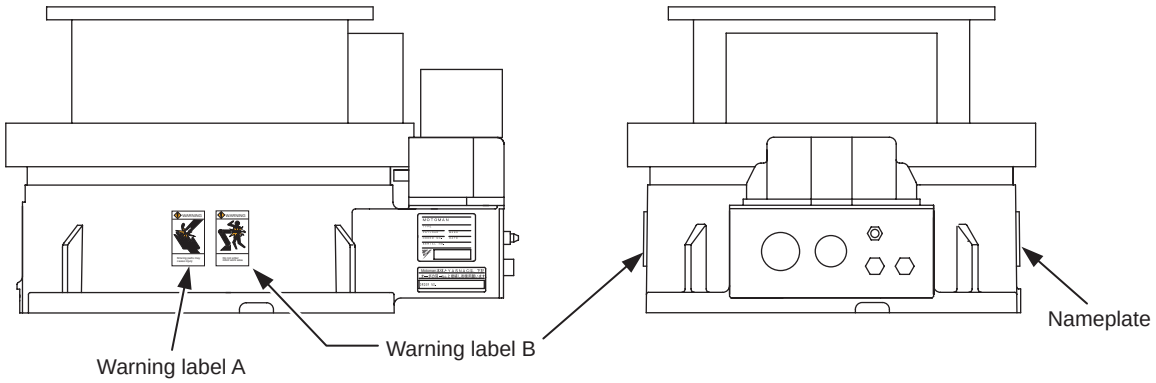
Definition of Terms Used Often in This Manual

The MOTOPOS is the positioner for the YASKAWA industrial robot.
The MOTOPOS usually consists of MOTOPOS positioner unit, a controller unit, a playback panel, a programming pendant, and power cables.
In this manual, the equipment is defined as follows:

Equipment	Definition in this Manual
YASNAC XRC Controller	XRC
YASNAC XRC Playback Panel	Playback Panel
YASNAC XRC Programming Pendant	Programming Pendant

Explanation of Warning Labels

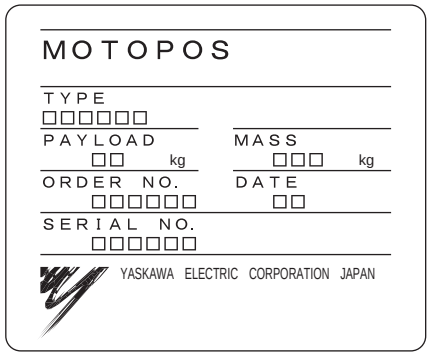
The following warning labels are attached to the MOTOPOS.
Always follow the warnings on the labels.
Also, an identification label with important information is placed on the body of the MOTOPOS. Prior to operating the MOTOPOS, confirm the contents.



WARNING Label A:

WARNING Label B:

Nameplate



1 Receiving

CAUTION
• Confirm that the MOTOPOS and the XRC have the same order number. Special care must be taken when more than one units of MOTOPOS are to be installed. If the numbers do not match, MOTOPOS may not perform as expected and cause injury or damage.

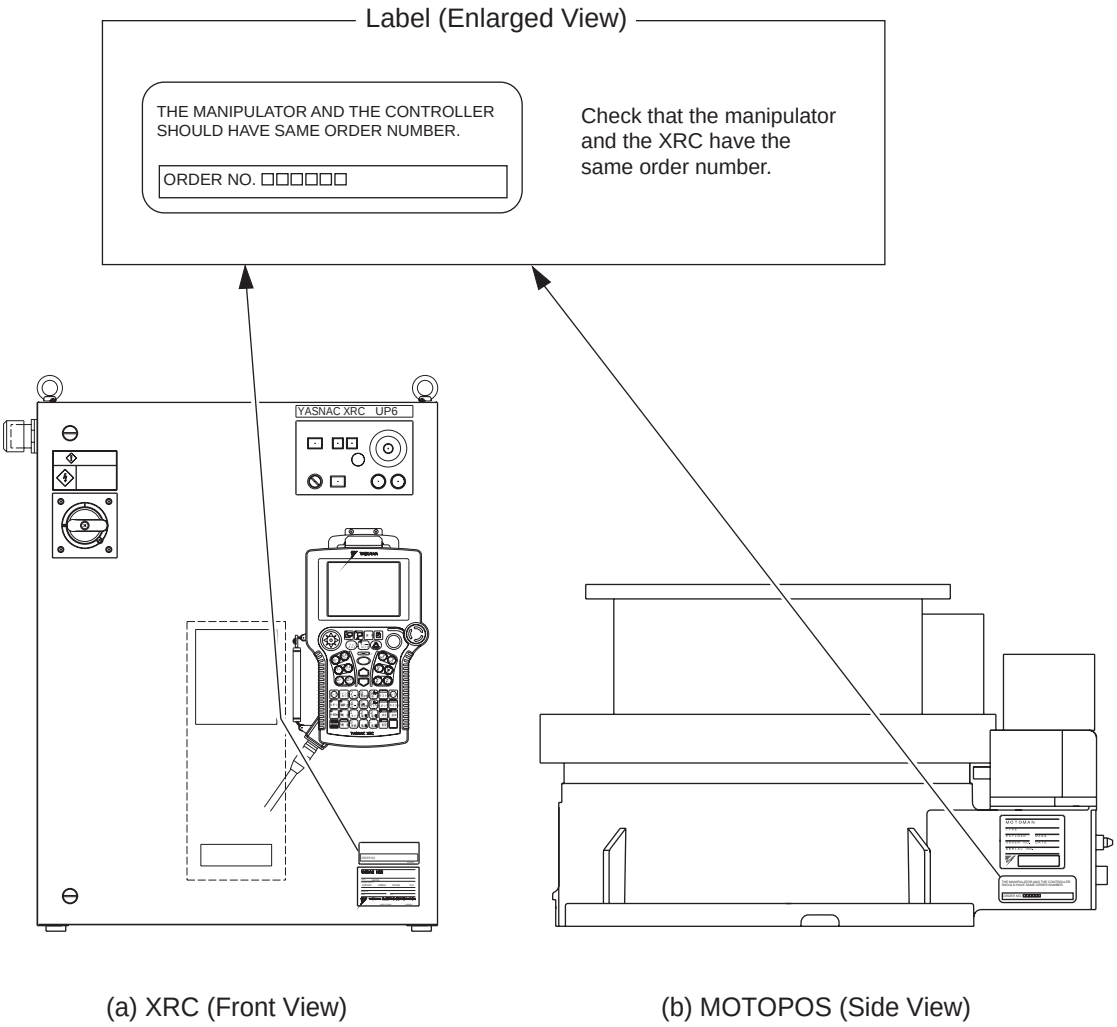
1.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.
Standard delivery includes the following six items (information for the content of optional goods is given separately):

- Manipulator
- XRC
- Programming pendant
- Cable between the XRC and the manipulator (2 cables or 3 cables)
- MOTOPOS
- Cable between the MOTOPOS and the XRC (2 cables)

1.2 Checking the Order Number

Check that the order number of the MOTOPOS corresponds to the XRC. The order number is located on a label as shown below.



(a) XRC (Front View) (b) MOTOPOS (Side View)

Fig. 1 Location of Order Number Labels

2 Transportation

CAUTION

- Sling applications and crane or forklift operations must be performed by authorized personnel only.

  Failure to observe this caution may result in injury or damage.

- Avoid excessive vibration or shock during transportation.

  The system consists of precision components. Failure to observe this caution may adversely affect the performance.

2.1 Transporting Method

2.1.1 Using a Crane

As a rule, when removing the MOTOPOS from the package and moving it, a crane should be used. The MOTOPOS should be lifted using wire rope threaded through attached eyebolts.

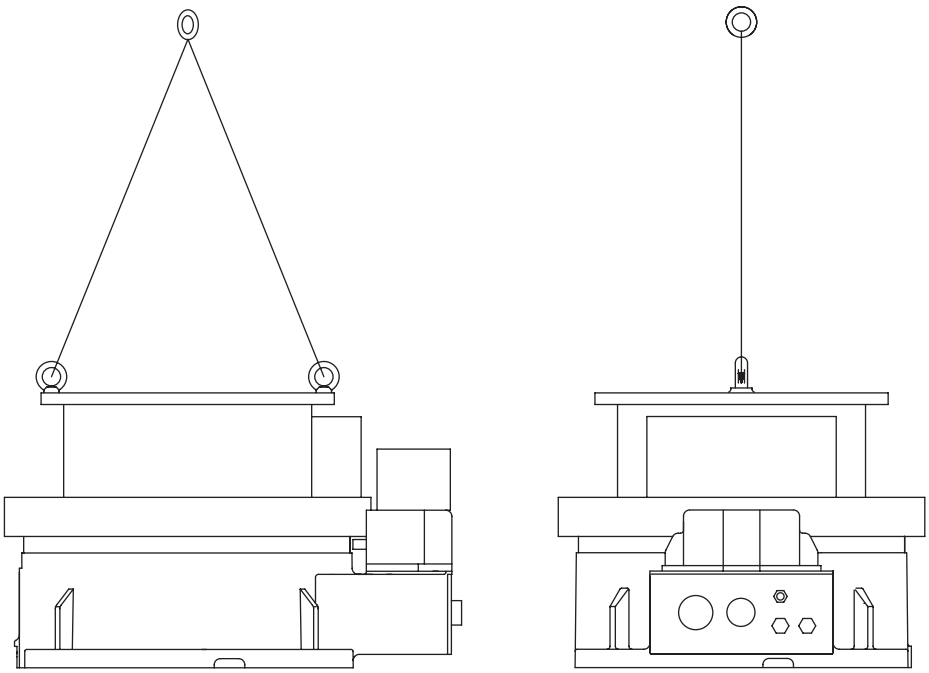


Fig. 2 Transporting Position

2.1 Transporting Method

NOTE

- Check that the eyebolts are securely fastened.
- The weight of the MOTOPOS is approximately 300 kg. Use a wire rope strong enough to withstand the weight.
- Attached eyebolts are designed to support the MOTOPOS weight. Never use them for anything other than transporting the MOTOPOS.
- Avoid exerting force on the table or motors when transporting. To avoid injury, be careful when using transporting equipment other than a crane or forklift.

3 Installation

WARNING

- Install the safeguarding.

  Failure to observe this warning may result in injury or damage.

- Install the MOTOPOS in a location where the MOTOPOS with a jig does not hit against anything such as the wall or the safeguarding.

  Failure to observe this warning may result in injury or damage.

- Do not start the MOTOPOS or even turn ON the power before it is firmly anchored.

  The MOTOPOS may overturn and cause injury or damage.

CAUTION

- Do not install or operate a MOTOPOS which is damaged or lacking parts.

  Failure to observe this caution may cause injury or damage.

3.1 Installation of the Safeguarding

To insure safety, be sure to install safeguarding. It prevents unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance.

Responsibility for Safeguarding (ISO 10218)
The user of a manipulator or robot system shall ensure that safeguards are provided and used in accordance with Sections 6, 7, and 8 of this standard. The means and degree of safeguarding, including any redundancies, shall correspond directly to the type and level of hazard presented by the robot system consistent with the robot application. Safeguarding may include but not be limited to safeguarding devices, barriers, interlock barriers, perimeter guarding, awareness barriers, and awareness signals.

3.2 Mounting Procedures for MOTOPOS Baseplate

The MOTOPOS should be firmly mounted on a baseplate or foundation strong enough to support the MOTOPOS and withstand repulsion forces in acceleration and deceleration.

Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the MOTOPOS.
The flatness for installation must be kept at 0.5 mm or less: if the flatness of the mounting face is insufficient, the shape of the MOTOPOS may deform and its functional ability may be compromised. Mount the baseplate either as indicated in " Fig. 3.2.1 In Case of Installing the MOTOPOS and Manipulator on a Common Baseplate " and " Fig. 3.2.2 In Case of Mounting the MOTOPOS on the Floor ".

Table 1 Maximum repulsion forces of the MOTOPOS

Maximum torque when rotary axis used	11270 N·m (1150 kgf·m)

3.2.1 In Case of Installing the MOTOPOS and Manipulator on a Common Baseplate

The baseplate should be rugged and durable to ensure that the MOTOPOS and the manipulator are in the correct relative position. Thickness of the baseplate and the size of the mounting anchor bolts should meet the recommendations in the manual for the manipulator to be combined.
Mount the MOTOPOS base securely with four hexagon head screws M20 (recommended length: 70 mm). Tighten the screws and anchor bolts securely so that they will not work loose during the operation.

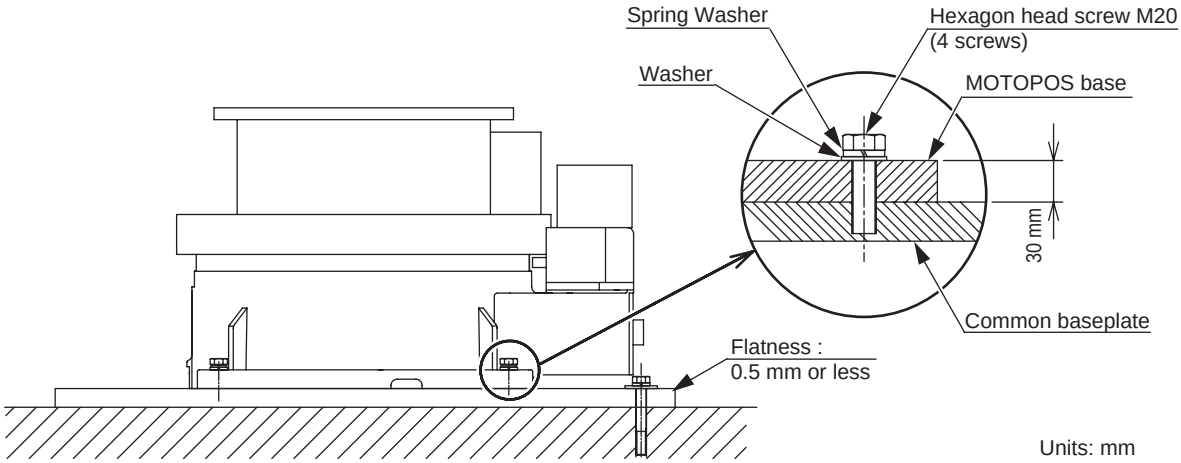


Fig. 3 Mounting the MOTOPOS Baseplate on the Common Base

3.2.2 In Case of Mounting the MOTOPOS on the Floor

The floor should be strong enough to support the MOTOPOS. Construct a solid foundation with the appropriate thickness to withstand maximum repulsion forces of the MOTOPOS as shown in " Table 1 Maximum repulsion forces of the MOTOPOS ". As a rough standard, when there is a concrete floor thickness of 200 mm or more, a baseplate (MOTOPOS baseplate thickness of 36 mm or more) can be fixed directly to the floor with anchor bolts M20. Before mounting the MOTOPOS on the floor, check the flatness, cracks, etc. of the floor. If there are any cracks and the like on the floor, they should be repaired before installation. Any thickness less than 200 mm is insufficient for mounting, even if the floor is concrete.

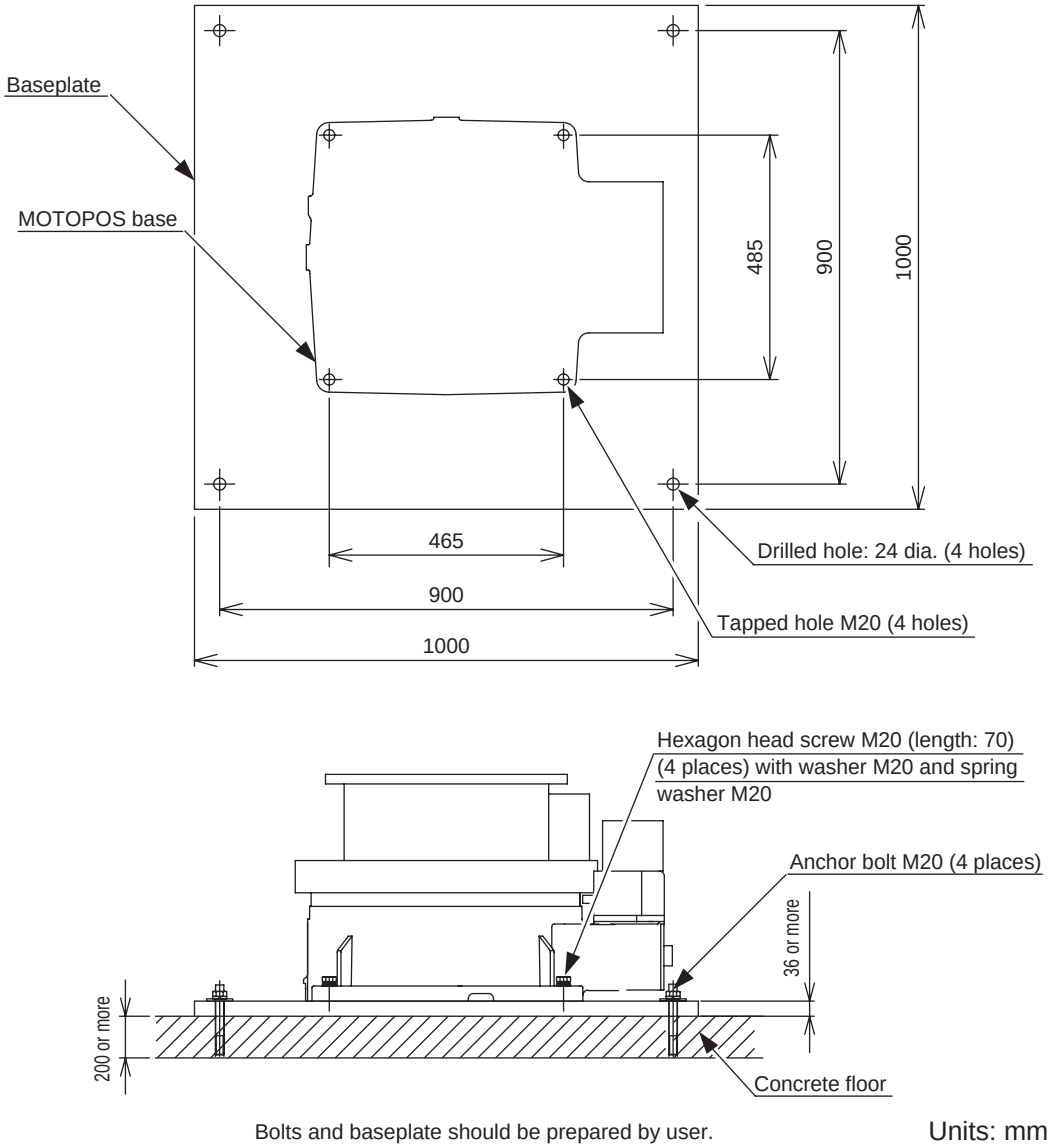


Fig. 4 Fixing the MOTOPOS on the Floor

3.3 Location

When the MOTOPOS is installed, it is necessary to satisfy the undermentioned environmental conditions:

- Ambient Temperature: 0° to +45°C
- Humidity: 20 to 80 %RH (at constant temperature)
- Free from dust, soot, or water
- Free from corrosive gas or liquid, or explosive gas
- Free from excessive vibration (Vibration acceleration: 4.9 m/s^2 [0.5 G] or less)
- Free from large electrical noise (plasma)
- Flatness for installation: 0.5 mm or less

4 Wiring

WARNING

- Ground resistance must be 100 Ω or less.

  Failure to observe this warning may result in fire or electric shock.

- Before wiring, make sure to turn OFF the primary power supply, and put up a warning sign. (ex. DO NOT TURN ON THE POWER.)

  Failure to observe this warning may result in fire or electric shock.

CAUTION

- Wiring must be performed by authorized or certified personnel.

  Failure to observe this caution may result in fire or electric shock.

4.1 Grounding

Follow the local regulations and electrical installation standards for grounding. The recommended grounding wire size is 5.5 mm^2 or more.

NOTE

- Never use this line sharing with other ground lines or grounding electrodes for other electric power, motor power, welding devices, etc.
- Where metal ducts, metallic conduits, or distributing racks are used for cable laying, ground in accordance with Electric Equipment Technical Standards.

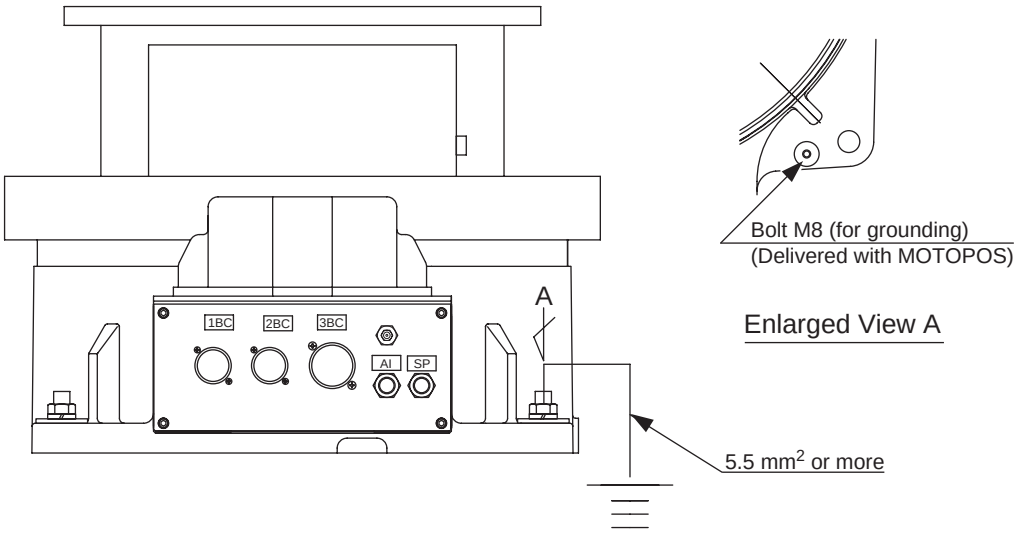


Fig. 5 Grounding Method

4.2 Cable Connection

There are two cables for the power supply; a power cable (1BC) and an encoder cable for detection (2BC). Connect the MOTOPOS base connectors and the XRC using both cables. Refer to (a) and (b) of " Fig. 6 Connection of the MOTOPOS and the XRC ".

4.2.1 Connection to the MOTOPOS

Before connecting the cables to the MOTOPOS, check the numbers on both cables and the MOTOPOS base connectors. Connect each cable adjusting the cable connector positions to the main key positions of the MOTOPOS, and then tighten the nut until it clicks.

4.2.2 Connection to the XRC

Remove the cover of the XRC side. Pass the power cable (1BC) and the encoder cable (2BC) through the opening for the cables, and then fasten bolts on the opening.
Connect the power cable (1BC) to the boards. Be sure to check the numbers on both the cable and board connectors before connecting, and to fasten the bolts on connectors to prevent cables from loosening.
Connect the signal cable (2BC) to the SERVOPACK and the board. Be sure to check the numbers on both the cable and the SERVOPACK board connectors before connection.

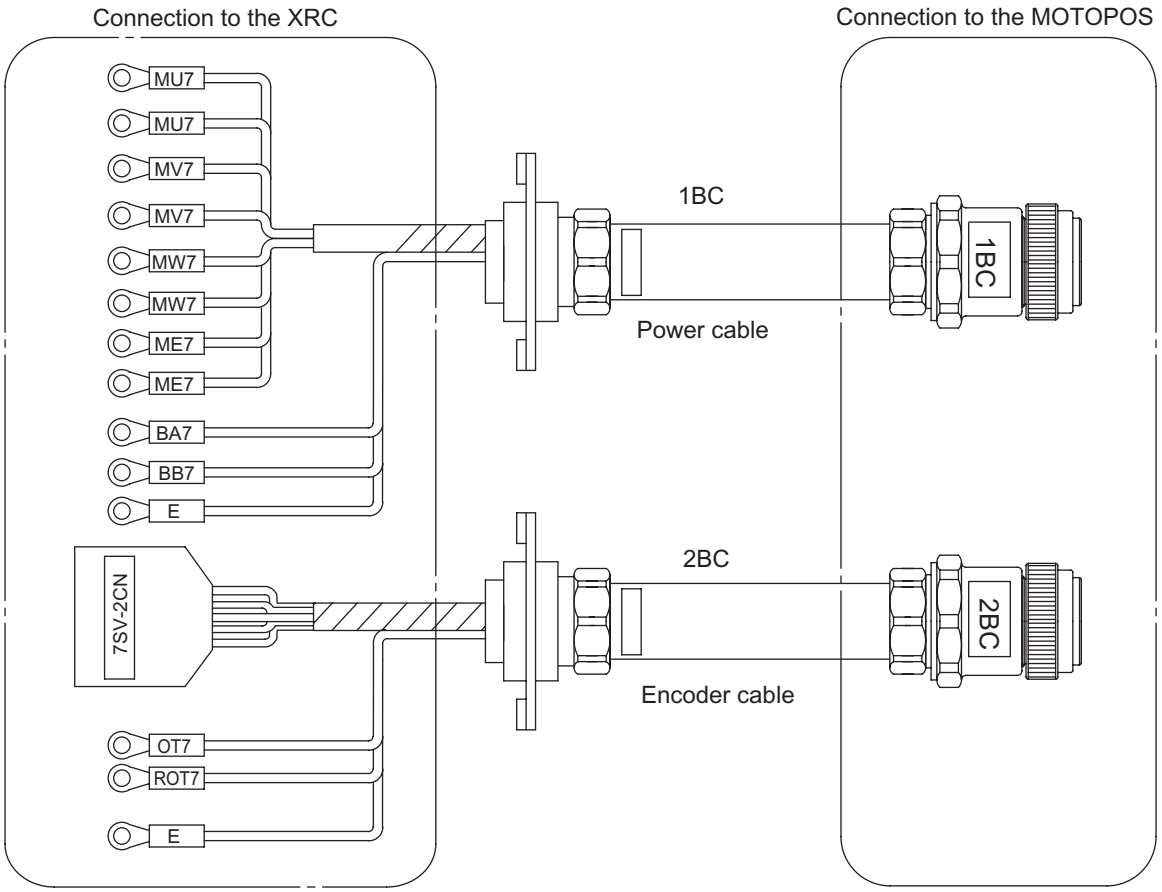


Fig. 6 (a) Connection of the MOTOPOS and the XRC (YR-MPT1000-A15,-F00)

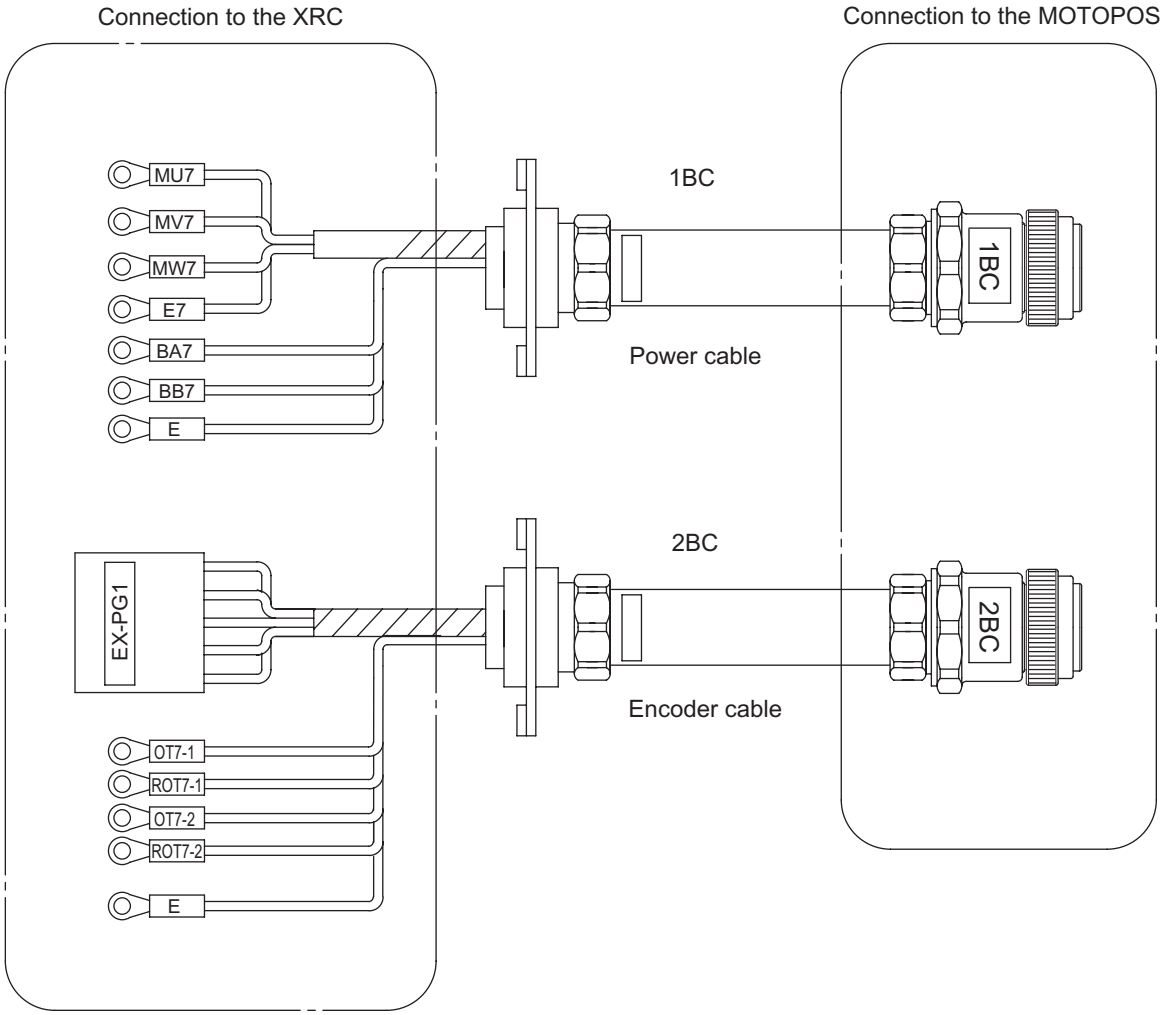


Fig. 6 (b) Connection of the MOTOPOS and the XRC (YR-MPT1000-A16,-F01,-F02,-F03)

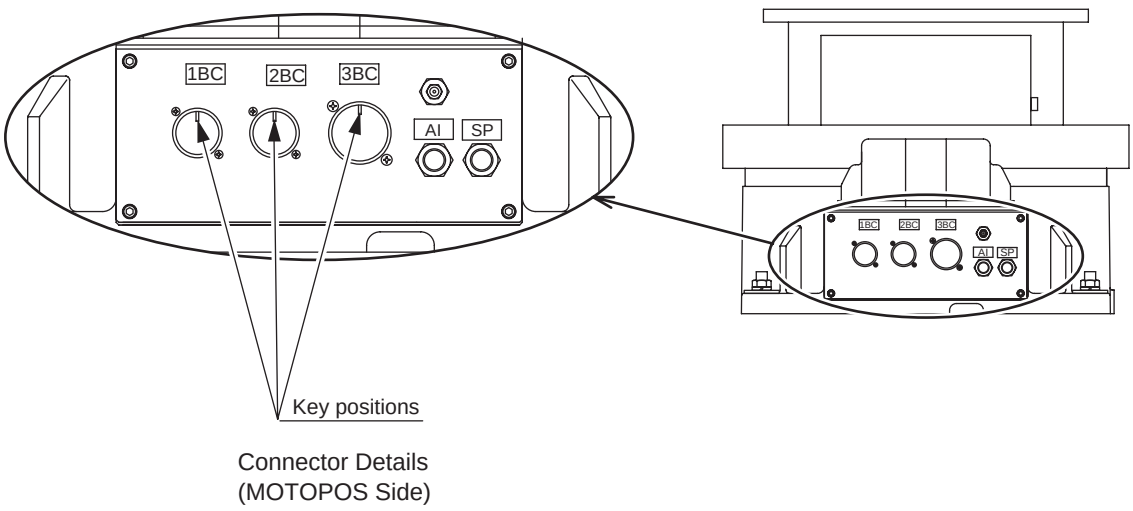


Fig. 6 (c) Connection of the MOTOPOS and the XRC

5 Basic Specifications

5.1 Basic Specifications List

Table 2 Basic Specifications*1

Item \ Model		YR-MPT1000B -A15	YR-MPT1000B -A16	YR-MPT1000B -F00,-F03	YR-MPT1000B -F01,-F02
Degree of Freedom		1			
Payload		2000 kg			
Repetitive Positioning Accuracy*2		±0.3 mm (R1000 mm)			
Motion Range		±140°	±150°	±130°	±160°
Maximum Speed		0.96 rad/s (55°/s)			
Allowable Moment*3		4900 N·m (500 kgf·m)			
Allowable Inertia ($GD^2/4$)		2275 kg·m^2			
Equipment Specifications	Signal	0.5 mm^2 x 6 pais + 0.75 mm^2 x 17			
	Air	3/8" x 2			
Standard Painted Color		Light gray			
Approximate Mass		300 kg			
Ambient Conditions	Temperature	0 to 45 C°			
	Humidity	20 to 80% RH (non-condensing)			
	Vibration	4.9 m/s^2 (0.5 G) or less			
	Others	• Free from corrosive gasses or liquids, or explosive gasses. • Clean and dry. • Free from excessive electrical noise (plasma).			
Power Capacity		3 kVA			

1 SI units are used in this table. However, gravitational unit is used in ().
2 Conformed to ISO9283.
3 Refer to 6.1 "Allowable Load" for details on the permissible moment of inertia.

5.2 Part Names and Working Axes

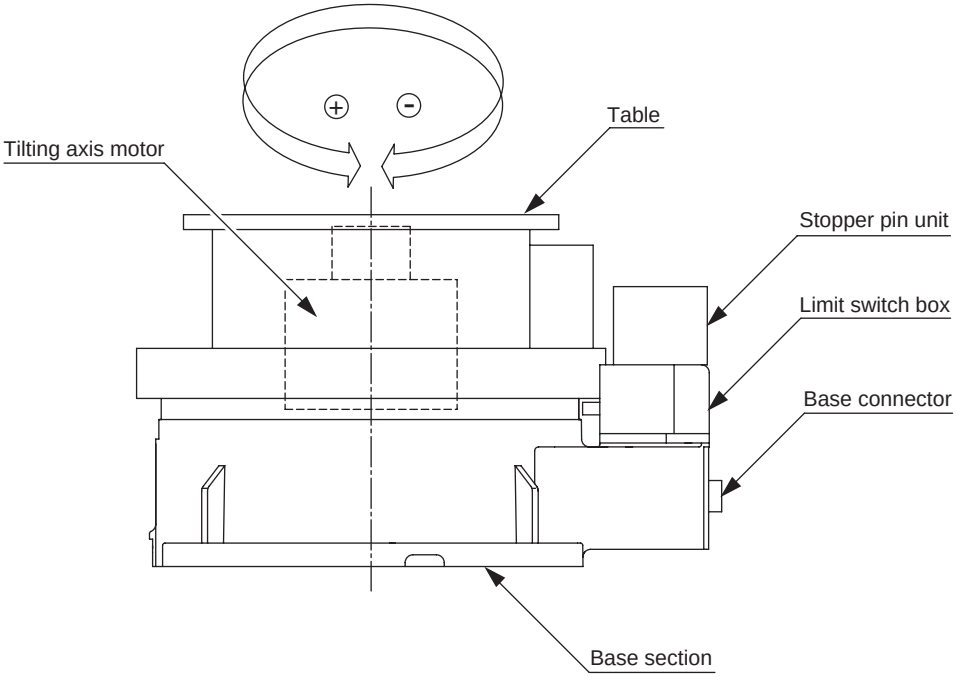


Fig. 7 Part Names and Working Axes

5.3 Baseplate Dimensions

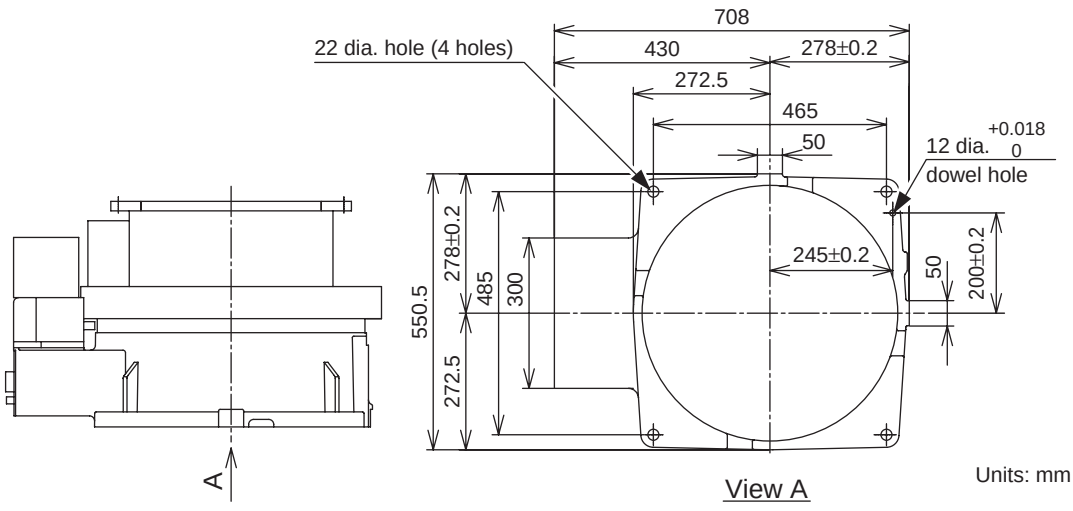
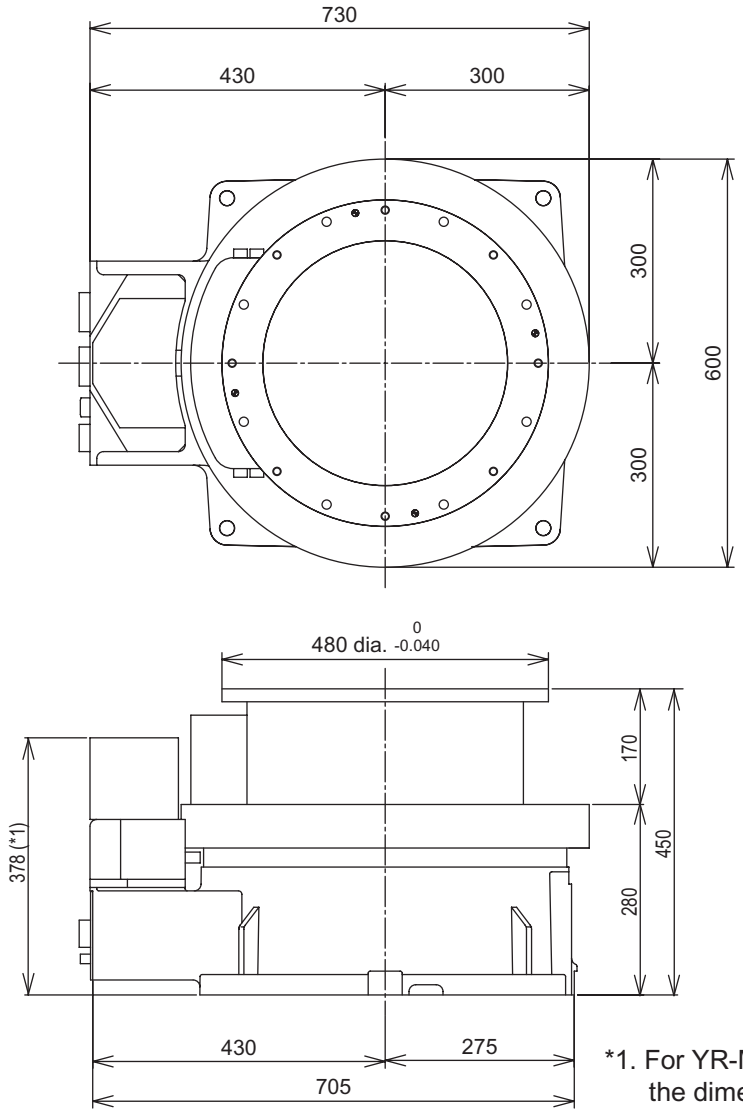


Fig. 8 Baseplate Dimensions

5.4 Dimensions and Working Envelope



*1. For YR-MPT-F00,-F01,-F02, and -F03, the dimension is 404.4 mm

Units: mm

Fig. 9 Dimensions and Working Envelope

6 Load Specifications and Jig Mounting Section

6.1 Allowable Load

This section describes the allowable values and various limitations.
The payload of the MOTOPOS is 2000 kg. The moment and moment of inertia are limited as shown in " Table 3 Moment and Total Inertia ".

Table 3 Moment and Total Inertia

Axis Name	Moment N·m (kgf·m) *1	$GD^2/4$ Total Inertia (kgf·m)
Rotary Axis	4900 (500)	2275

1 ( ): Gravitational unit

When the volume load is relatively small, refer to the moment rating shown in " Fig. 10 Moment Rating ".
The allowable total inertia is calculated when the moment is at the maximum. Contact your Yaskawa representative when only inertia moment, or load moment is small while inertia moment is large. Also, when the load is combined as a force but a mass, contact your Yaskawa representative.

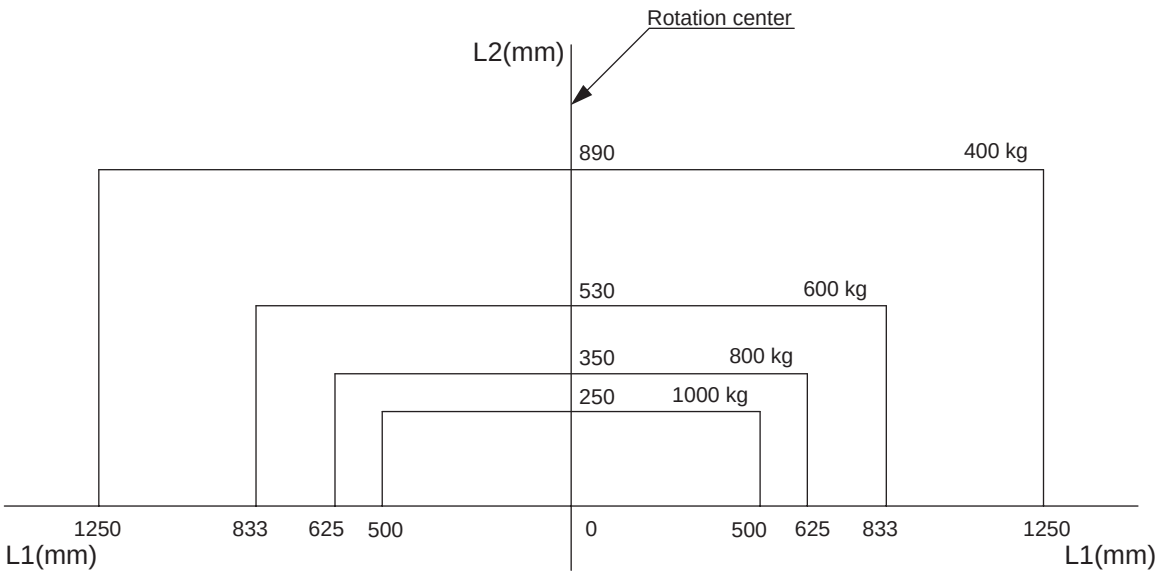
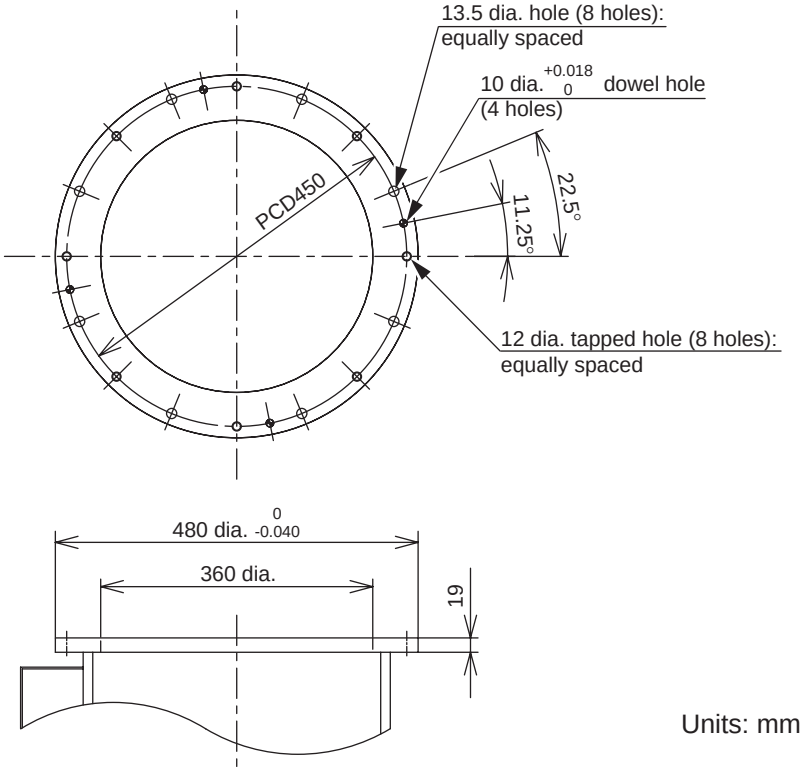


Fig. 10 Moment Rating

6.2 Details of Jig Mounting Face

The jig mounting dimensions are shown in " Fig. 11 Details of Jig Mounting Face ". It is recommended that the table and the jig be mounted using an inside dowel and dowel pin, or two dowel pins. The dowel pins are to be prepared by customers.



Units: mm

Fig. 11 Details of Jig Mounting Face

NOTE Wash OFF anti-corrosive paint (solid color) on the jig mounting surface with thinner or light oil before mounting the tools.

It is recommended that a hole of 300 mm dia. or more be made on the rotational center of the jig baseplate for maintenance of the positioner's motor. Be sure to mount a cover on the hole so that spatters and the like will not go inside the MOTOPOS.

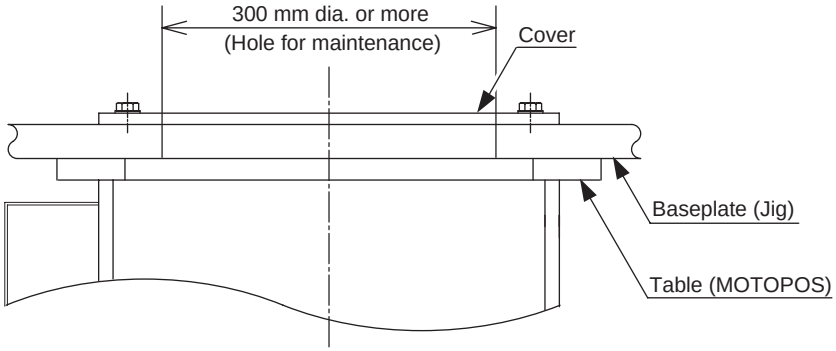


Fig. 12 Cover Mounting Example

7 System Application

7.1 Internal User I/O Wiring Harness and Air Lines

For driving devices such as a jig, internal user I/O wires and air lines are built into the MOTO-POS as shown in " Fig. 13 Internal User I/O Wiring Harness and Air Lines ".

YR-MPT1000-A15:	Cables:	(0.5 $mm^2 \times 12$ wires (6 pairs) + 0.75 $mm^2 \times 17$ wires)
-A16	Air lines:	(inner diameter 8 mm $\times$ 2)
-F00		
-F01		
-F02		
-F03		

Connector pins are assigned as shown in " Fig. 13 Internal User I/O Wiring Harness and Air Lines ". Wiring must be performed by user.

- The allowable current for internal user I/O wiring harness: 3 A or less for each wire (30 A or less in total)
- The maximum pressure for the air line: 490 kPa (5 kgf/cm^2) or less

There are "AI" and "SP" indications at the inlets/outlets of the air lines. In case of using only one line, be sure to connect it to the air inlet/outlet "AI", which provides air for driving the stopper pin.

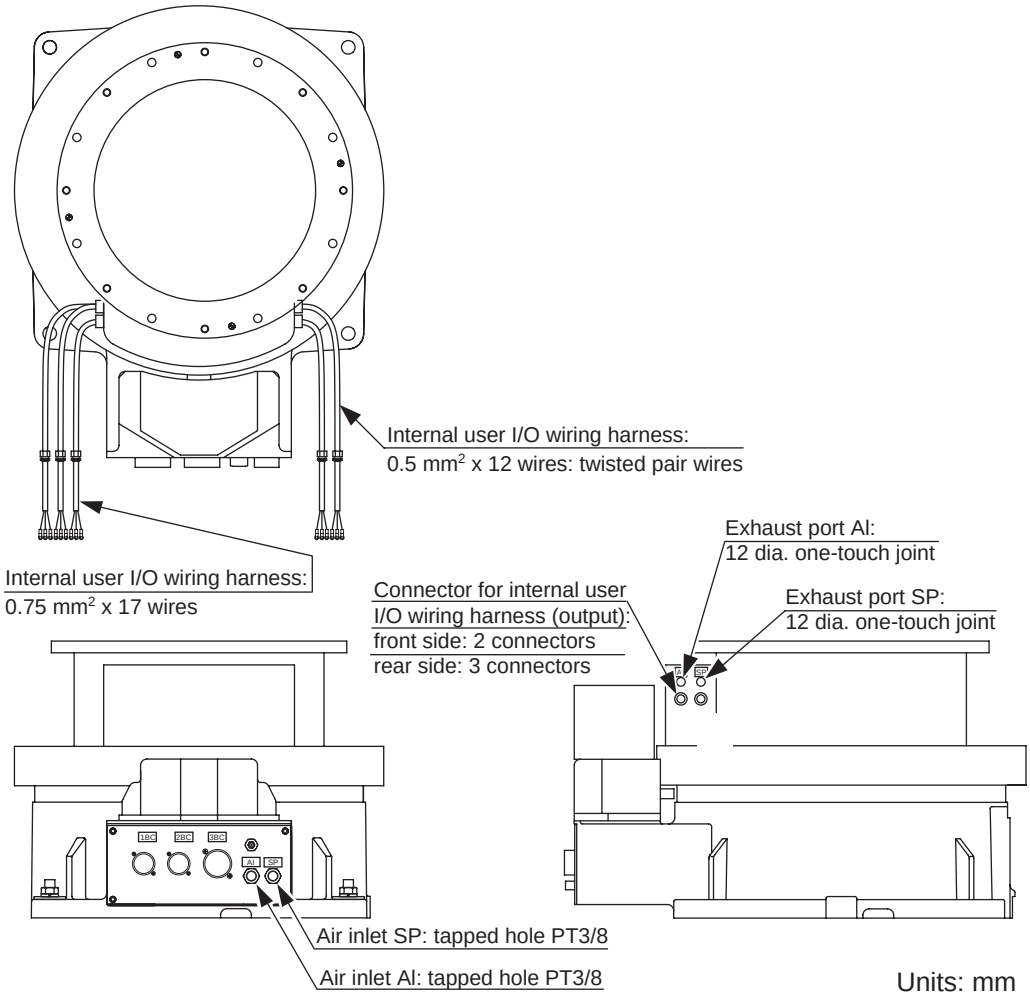


Fig. 13 Internal User I/O Wiring Harness and Air Lines

Table 4 List of Connector Types

Positioner	Name	Connector Type	Applicable Pin No.
YR-MPT1000-A15, -A16 -F00	Base Connector for Internal User I/O Wiring Harness	JL05-2A28-21PCW (JL05-6A28-21SCW: Optional)	1 to 29
	Table Connector for Internal User I/O Wiring Harness	Terminal A 1.25-3	1 to 29
YR-MPT1000-F01, -F02 -F03	Base Connector for Internal User I/O Wiring Harness	JL05-2A28-21PC (JL05-6A28-21SC: Optional)	1 to 36
	Table Connector for Internal User I/O Wiring Harness	Terminal A 1.25-3	1 to 36

7.2 Stopper Pin

In the operation of the MOTOPOS-1000, operators may directly set/remove workpieces in/ from the jig on the table.
To prevent injury in such occasions, the table can be mechanically locked with a stopper pin to stop its rotation. Using an air cylinder, insert the stopper pin into the hole on the rotary side with the rotary axis positioned at +90° and -90°.
Note that they cannot be used for positioning since there is a 3-mm gap between the pin and the hole. Refer to " 8.2 Internal Connections " for the wiring.

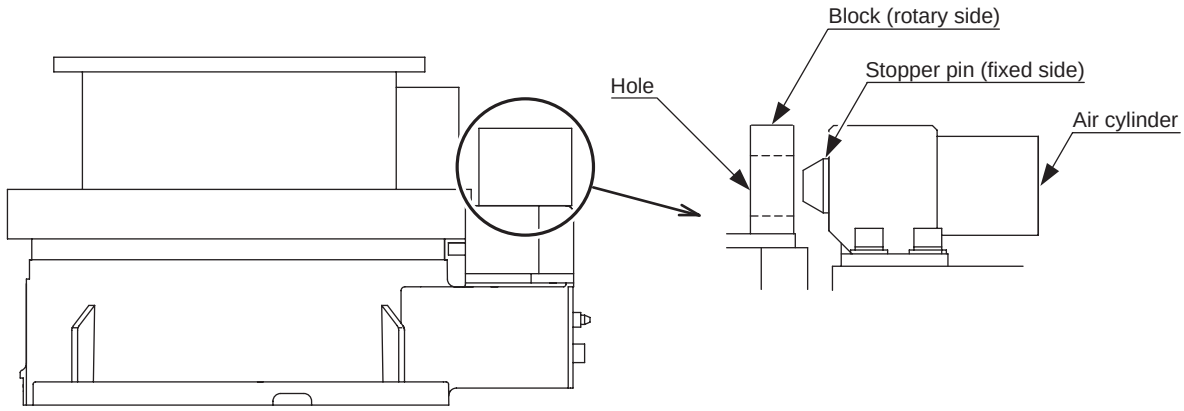


Fig. 14 Minus Cable Connection

8 Electrical Equipment Specification

8.1 Position of Limit Switch

One limit switch is provided inside the MOTOPOS. For the location, refer to " Fig. 15 Location of Limit Switch ".

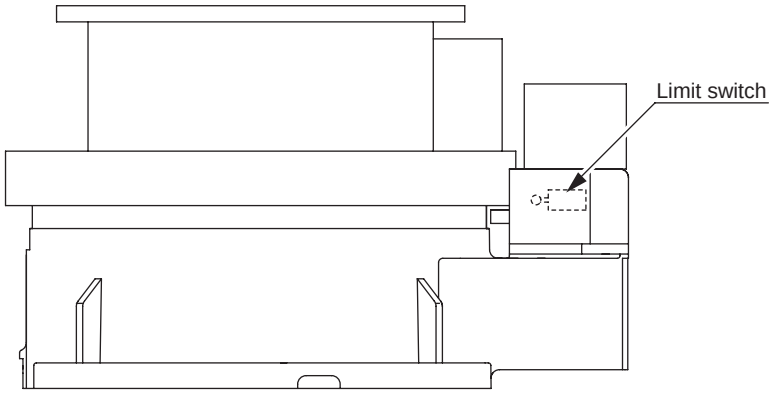


Fig. 15 Location of Limit Switch

8.2 Internal Connections

High reliability connectors which can be easily put on and removed are used in each connector part.

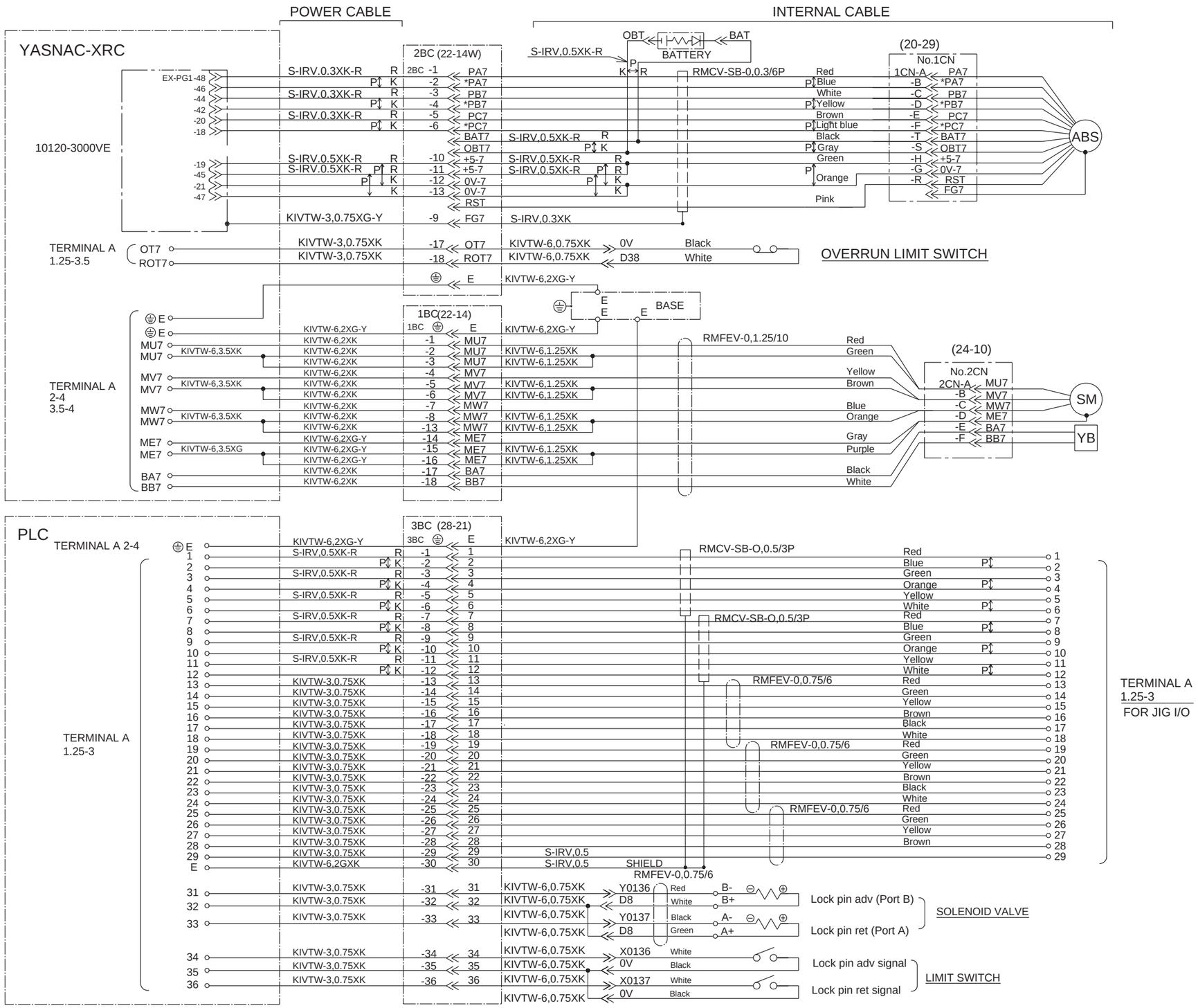


Fig. 16 (a) Internal Connection Diagram (YR-MPT1000-A15,-F00)

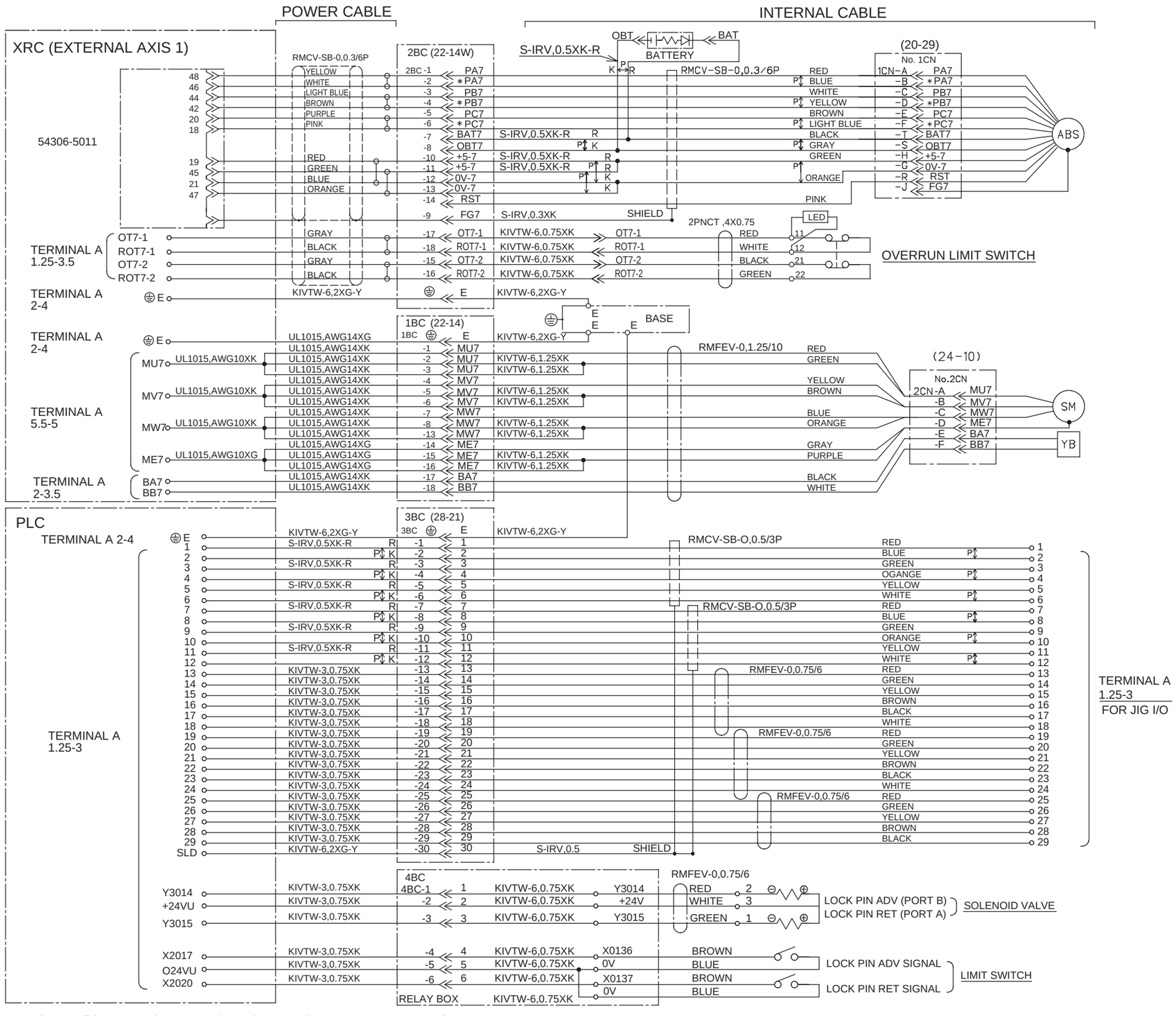


Fig. 16 (b) Internal Connection Diagram (YR-MPT1000-A16-1)

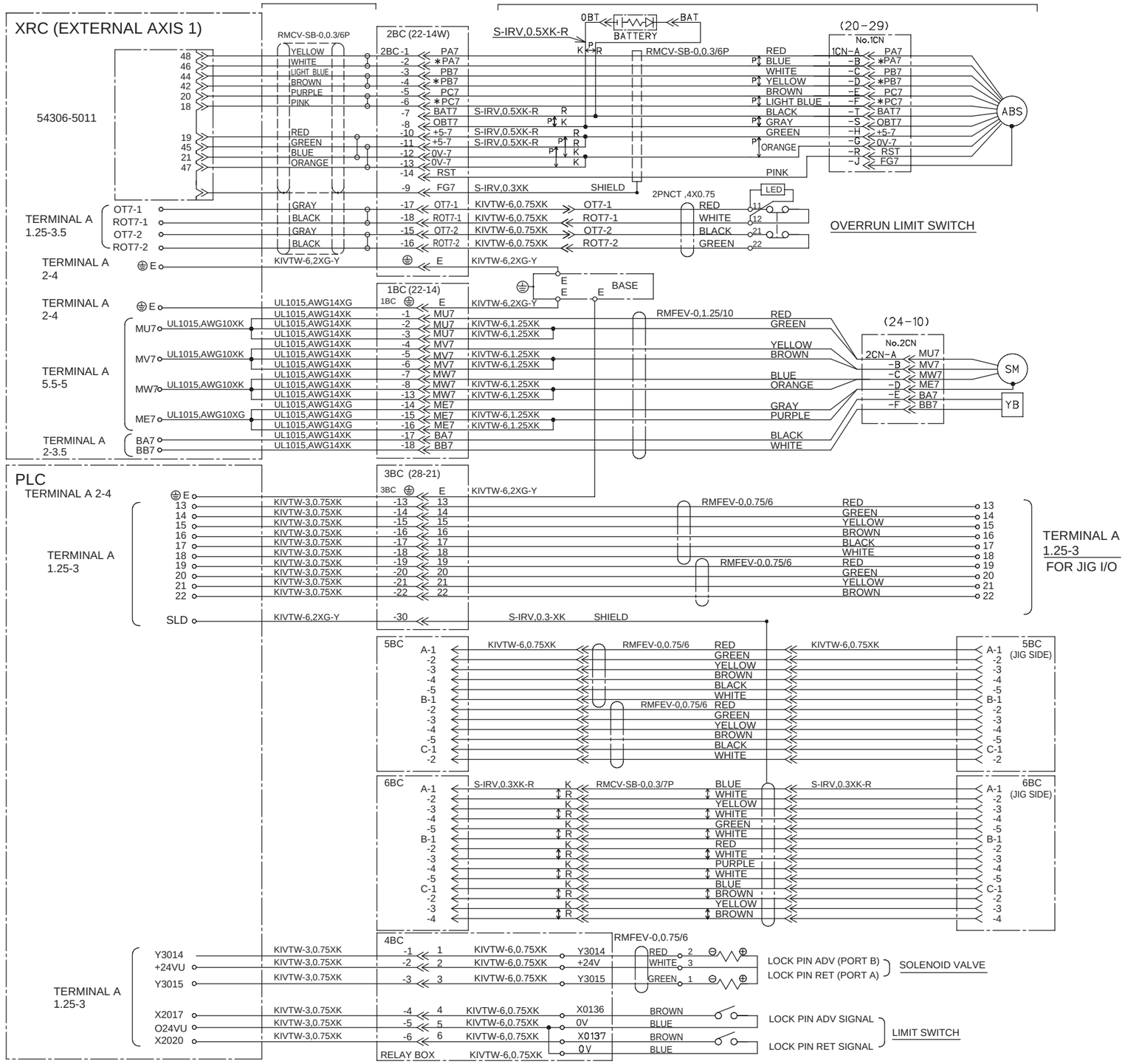


Fig. 16 (c) Internal Connection Diagram (YR-MPT1000-A16-2)

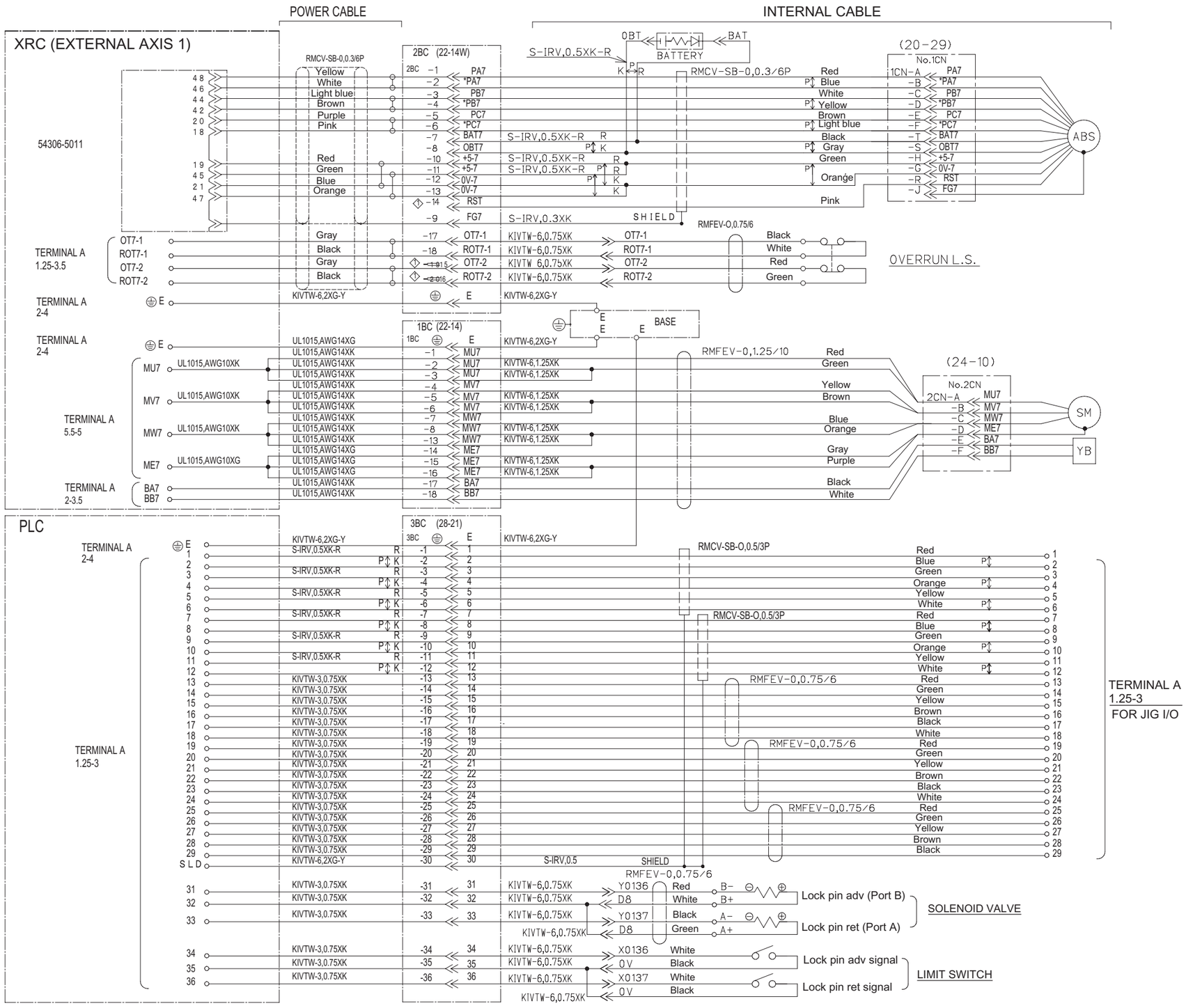


Fig. 16 (d) Internal Connection Diagram (YR-MPT1000-F01,-F02,-F03)

9 Maintenance and Inspection

WARNING

- Before maintenance or inspection, be sure to turn OFF the main power supply, and put up a warning sign. (ex. DO NOT TURN ON THE POWER.)

  Failure to observe this warning may result in electric shock or injury.

CAUTION

- Maintenance and inspection must be performed by specified personnel.

  Failure to observe this caution may result in electric shock or injury.

- For disassembly or repair, contact your Yaskawa representative.

- Do not remove the motor, or release the brake.

  Failure to observe this caution may result in injury from unexpected turning of the table.

9.1 Inspection Interval

Proper inspections are essential not only to assure that the mechanism will be able to function for a long period, but also to prevent malfunctions and assure safe operation. Inspection intervals are classified into six levels as shown in Table 5. Conduct periodical inspections according to the inspection interval in " Table 1 Inspection Items ".
In " Table 1 Inspection Items ", the inspection items are categorized by 3 types of operation: operations which can be performed by personnel authorized by the user, operations which can be performed by trained personnel, and operations which can be performed by service company personnel. Only specified personnel are to do inspection work.

NOTE
- The inspection interval depends on the total servo operation time.
- For axes which are used very frequently other than arc welding, it is recommended that inspections be conducted at shorter intervals. Contact your Yaskawa representative.

9.1 Inspection Interval

Table 1 Inspection Items

	Items*4	Inspection Interval						Method	Operation	Inspection Charge		
		Daily	1000 H Cycle	6000 H Cycle	12000 H Cycle	24000 H	36000 H			Specified Person	Licensee	Service Company
1	Alignment mark	○						Visual	Check tram mark accordance and damage at the home position.	○	○	○
2	External lead	○						Visual	Check for damage and deterioration of leads.	○	○	○
3	Working area and whole exterior of MOTOPOS	○						Visual	Clean the area where dust or spatter is present. Check for damage and outside cracks.	○	○	○
4	Stopper pin, cylinder, and valve	○						Visual	Clean the area where dust or spatter is present. Check for damage and outside cracks.	○	○	○
5	Baseplate mounting bolts		○					Spanner Wrench	Tighten loose bolts. Replace if necessary.	○	○	○
6	Cover mounting screws		○					Screwdriver	Tighten loose bolts. Replace if necessary.	○	○	○
7	Connectors		○					Manual	Check for loose connectors and tighten if necessary.	○	○	○
8	Air line		○					Auditory	Check for air leakage.	○	○	○
9	Limit switch, dog				○			Wrench, tester	Tighten loose bolts. Replace if necessary. (Perform operation check)			
10	Wire harness in MOTOPOS				○			Multimeter	Check for conduction between the main connector of base and end connector with manually shaking the wire. Check for wear of protective spring.*1		○	○
						○			Replace.*2			○
12	Battery pack in MOTOPOS						○		Replace the battery pack when the battery alarm occurs, or the MOTOPOS has been driven for 36000H.*1		○	○

Table 1 Inspection Items

	Items*4	Inspection Interval						Method	Operation	Inspection Charge		
		Daily	1000 H Cycle	6000 H Cycle	12000 H Cycle	24000 H	36000 H			Specified Person	Licensee	Service Company
13	Speed reducer			○	○			Grease Gun	Check for malfunction. (Replace if necessary.) Supply grease*3 (6000H cycle). See Par. 9.2.2 Replace grease*3 (12000H cycle). See Par. 9.2.2		○	○
14	Overhaul						○					○

1 When checking for conduction with multimeter, remove connectors on encoder side of each axis from the motor.

2 Wire harness in MOTOPOS is to be replaced at 24000H inspection.

3 For the grease, refer to " Table 2 Inspection Parts and Grease Used ".

4 Inspection No. correspond to the numbers in " Fig. 17 Inspection Parts and Inspection Numbers ".

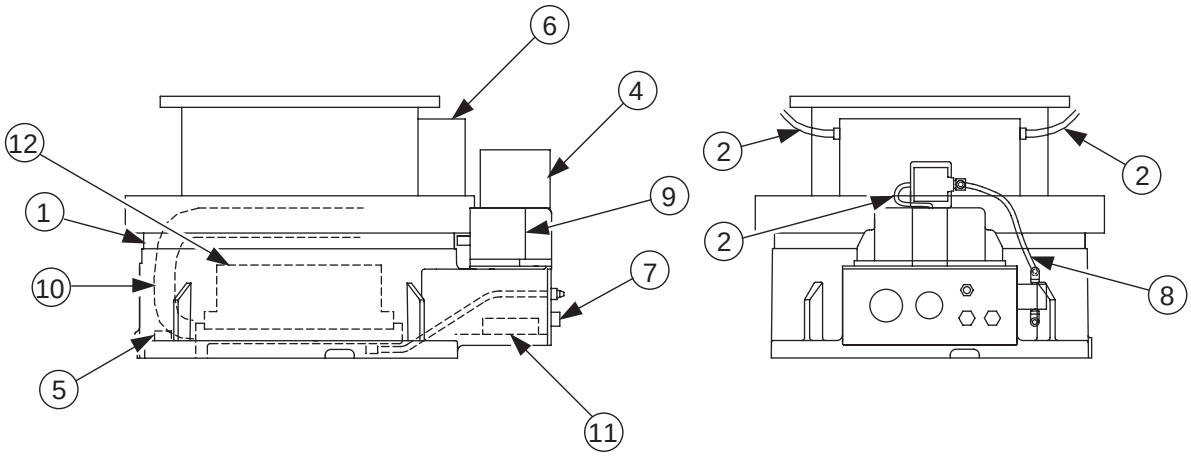


Fig. 17 Inspection Parts and Inspection Numbers

Table 2 Inspection Parts and Grease Used

No.	Grease Used	Inspected Parts
12	Molywhite RE No. 00	Speed reducer

The numbers in the above table correspond to the numbers in " Table 1 Inspection Items ".

9.2 Notes on Maintenance Procedures

9.2.1 Battery Pack Replacement

The battery pack is mounted in the location indicated in " Fig. 18 Battery Pack Location ".
If a battery alarm occurs in the XRC, replace the battery pack according to the following procedure:

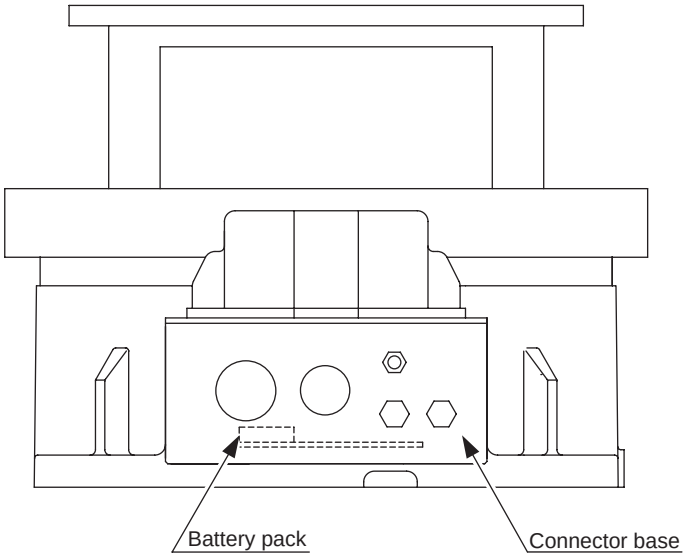


Fig. 18 Battery Pack Location

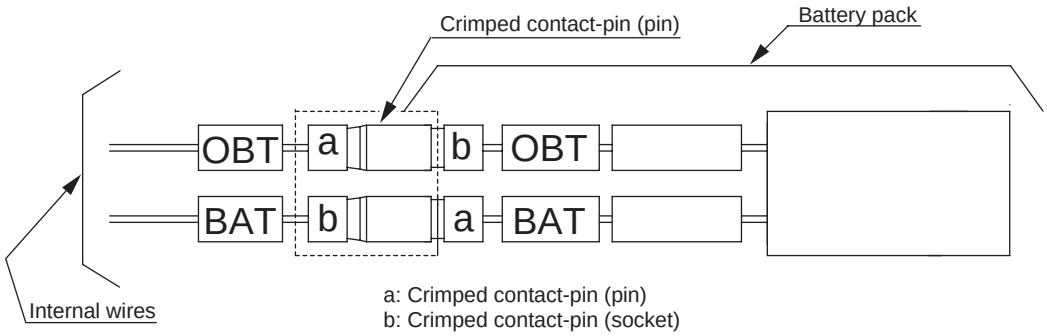


Fig. 19 Battery Connection

1. Turn OFF the XRC main power supply.
2. Remove the connector base.
3. Remove the battery pack mounting screw.
4. Remove the old battery pack and connect the new battery pack.
5. Fix the new battery pack with the screws, and reinstall the connector base to complete the replacement.

NOTE Be sure not to pinch the cable in reinstalling the connector base.

9.2.2 Grease Replenishment/Exchange for Tilting Axis Speed Reducer

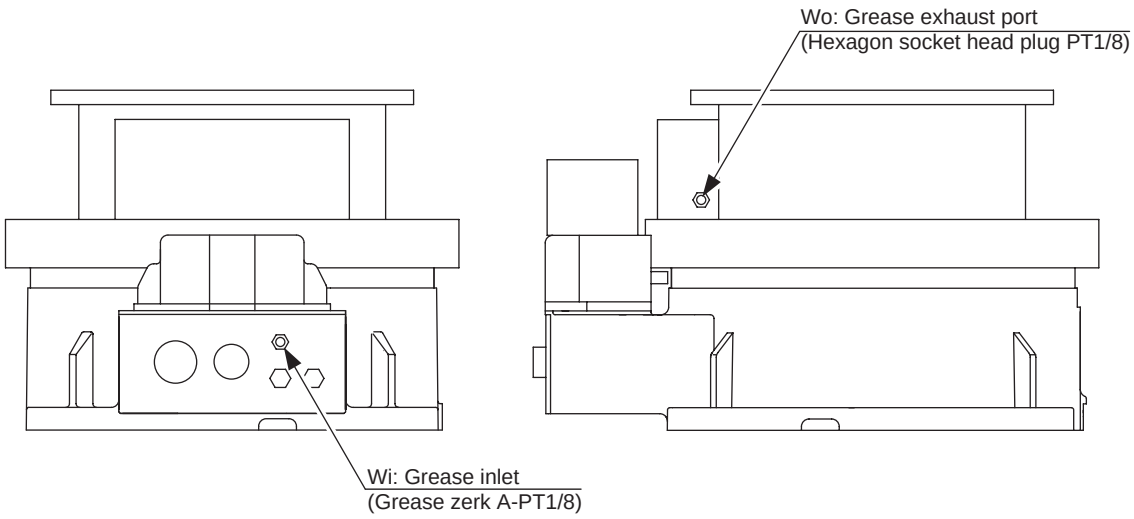


Fig. 20 Speed Reducer Diagram

■ Grease Replenishment (Refer to " Fig. 20 Speed Reducer Diagram ".)

1. Remove the hexagon socket head plug PT1/8 from the Wo grease exhaust port.

NOTE If grease is added with the plug on, the grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.

2. Inject the grease into the Wi grease inlet using a grease gun.

Grease type: Molywhite RE No.00 Amount of grease: 700 cc (1400 cc for 1st supply)

3. Move the rotary axis for a few minutes to discharge the excess grease.
4. Wipe the Wo grease exhaust port with a cloth and reinstall the hexagon socket head plug PT1/8. (Apply the modifier silicon caulk on the thread part of the plug.)

■ Grease Exchange (Refer to " Fig. 20 Speed Reducer Diagram ".)

1. Remove the hexagon socket head plug PT1/8 from the Wo grease exhaust port.

NOTE If grease is added with the plug on, the grease will go inside the motor and may damage it. Never fail to remove the plug before the grease injection.

2. Inject the grease into the Bi grease inlet using a grease gun.

Grease type: Molywhite RE No.00 Amount of grease: 3400 cc

3. The grease replacement is completed when new grease appears in the Wo grease exhaust port. The new grease can be distinguished from the old grease by color.
4. Move the rotary axis for a few minutes to discharge the excess grease.
5. Wipe the Wo grease exhaust port with a cloth and reinstall the hexagon socket head plug PT1/8. (Apply the modifier silicon caulk on the thread part of the plug.)

10 Recommended Spare Parts

It is recommended to keep the parts and components in the following table in stock as spare parts for the MOTOPOS. Product performance can not be guaranteed when using spare parts from any company other than Yaskawa. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts
- Rank B: Parts for which replacement may be necessary as a result of frequent operation
- Rank C: Drive Unit

NOTE To replace parts in Rank B or Rank C, contact your Yaskawa representative.

Table 7 Spare Parts for the MOTOPOS

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	Molywhite RE No. 00	Yaskawa Electric Corporation	16 kg	-	For speed reducers
A	2	Silicon Rubber Compound Tube	Modifier Silicon Caulk	Konishi Co., Ltd.	1	1	
A	3	Battery Pack	HW8471030-A	Yaskawa Electric Corporation	1	1	
B	4	Air Cylinder	CQ2B50-25DM-J79W	SMC	1	1	For YR-MPT1000-A15,-A16
			CDQ2B50-50DCM-J79W		1	1	For YR-MPT1000-F00,-F01, -F02,-F03
B	5	Solenoid Valve	VFS2200-5FZ-01	SMC	1	1	For YR-MPT1000-A15,-F00 -F01,-F02, -F03
			VS7-6-FG-D-3N		1	1	For YR-MPT1000-A16
B	6	Speed Reducer	HW9380736-A	Yaskawa Electric Corporation	1	1	
C	7	Gear	HS9381203-A	Yaskawa Electric Corporation	1	1	
C	8	AC Servomotor	HW9380963-A	Yaskawa Electric Corporation	1	1	
C	9	Wire Harness in MOTOPOS	HS9270852-B	Yaskawa Electric Corporation	1	1	For YR-MPT1000-A15,-F01, -F02,-F03
			HS0270184-A		1	1	For YR-MPT1000-A16
			HS0270192-A		1	1	
			HS9270852-A		1	1	For YR-MPT1000-F00

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