



PRECAUTIONS FOR INDUSTRIAL ROBOTS

3rd edition

- Before attempting to operate the robot, please read through this operating manual carefully, and comply with all the safety-related items and instructions in the text.
- The installation, operation and maintenance of this robot should be undertaken only by those individuals who have attended one of our robot course.
- When using this robot, observe the law related with industrial robot and with safety issues in each country.
- This operating manual must be given without fail to the individual who will be actually operating the robot.
- Please direct any queries about parts of this operating manual which may not be completely clear or any inquiries concerning the after-sale service of this robot to any of the service centers listed on the back cover.





NACHI-FUJIKOSHI CORP.

Chapter 1 Introduction

In this document, precautions that must be known well before using NACHI ROBOT.

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1.1 Warning symbols

 DANGER	Cases where a mistake made in handling is likely to cause the user to be exposed to the danger of death or serious injury and where the degree of the urgency (imminence) of the warning given for the danger to occur is at the high end of the scale (including high-level danger).
 WARNING	Cases where a mistake made in handling is likely to cause the user to be exposed to the danger of death or serious injury.
 CAUTION	Cases where a mistake made in handling is likely to cause the user to be exposed to the danger of minor injuries or of property damage only.
 IMPORTANT	A particularly important checkpoint is shown.

1.2 About safety


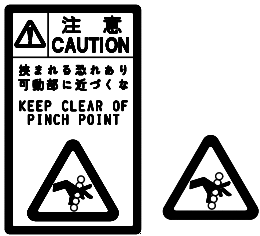





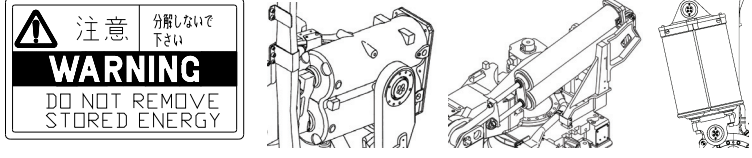

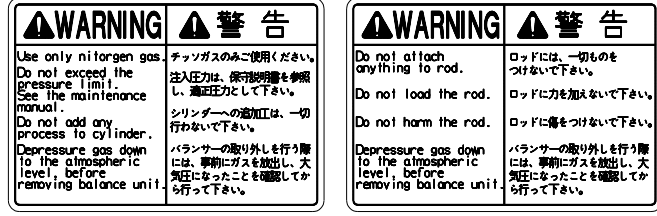


1.2.1 Points that must be abided


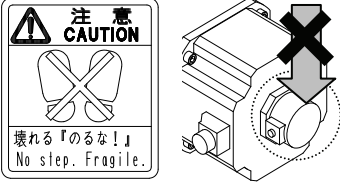

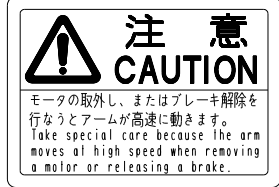
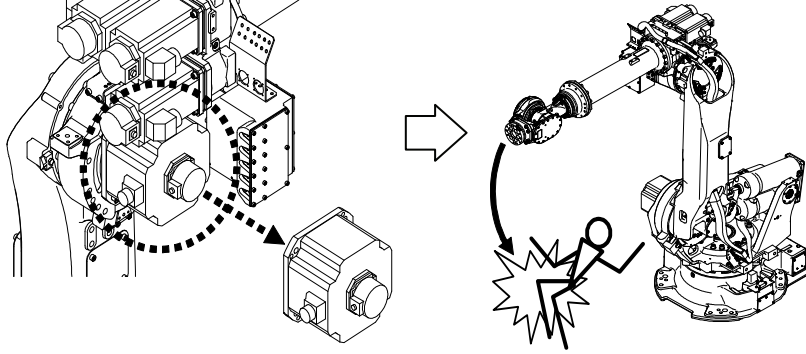

Our industrial robots has characteristics like wide motion range, fast motion etc. Therefore, special care must be taken when handling those robots. Please follow the respective domestic laws and safety regulations in your country/city when handling those industrial robots.

 IMPORTANT	This document describes general precautions and procedures on safety but does not show all of the safety measures. Therefore, it is necessary for customers to prepare yourself a safety control standard including your own operational regulations in accordance with the actual working environment and to conduct safety control in order to secure the workers' safety.
 IMPORTANT	In the factory where the industrial robots are to be used, designate persons to be full-time operator for the robot and persons to be safety manager. And give them enough training in order to establish a safety control system.
 IMPORTANT	This product (robot and controller) must be used by persons who received necessary training in advance. Concerning the training, please contact our sales persons or our service centers.
 IMPORTANT	To perform the works or operations in safe, and use the robots effectively, please read through this document and the other manuals carefully, and familiarize yourself with the knowledge of the machine, safety-related information, and precautions before using the robots. And, the all instruction manuals or maintenance manuals must be given without fail to the individuals who will actually be operating the robot. Concerning how to get those manuals, please contact our service centers.




1.3 Warning labels

1.3.1 Caution labels on the robots

 WARNING	 <p>When the servo power is ON, do not touch the moving parts like each joints of the robot. And, the robot pose may change suddenly not only in case where the servo power is ON, but also in case of brake release operation or motor replacement work. Therefore, even in case of maintenance work, please pay special attention for the moving parts. If these points are not kept, accidents like the operator's finger etc. are pinched etc. may happen.</p>
 DANGER	 <p>This shows portions with high voltage.</p> <p>Do not touch portions with this label (e.g. connectors or terminal blocks) directly or indirectly with conductive items with mains power supplied, as electric shock may occur. If connectors or terminal blocks are removed with mains power on, electric shock or malfunction of the robot may result. Turn OFF main power on the controller when performing any maintenance.</p>
 CAUTION	 <p>This shows portions with high temperature (e.g. motors etc.)</p> <p>Carelessly touching parts with this label (hot parts) may result in serious burns.</p>
 DANGER	 <p>Never disassemble the parts bearing this mark, even when disassembling the robot during robot maintenance. When disassembling/removing this part carelessly, the internal compressed spring will jump out and may cause fatal or serious accidents. If it is necessary to disassemble/remove this part, please contact our service center.</p>
 DANGER	 <p>When handling the parts (balancer units) with these labels, please follow the descriptions in these labels carefully.</p>
 DANGER	 <p>When changing the installation position of the mechanical stopper, please keep enough distance between the robot's maximum motion area and the peripheral equipments. Do not operate the robot without mechanical stoppers. Such operation may cause damage to the peripheral equipments or result serious injury or death.</p>

 <p>CAUTION</p>	<div data-bbox="480 197 821 383">  </div> <p>Do not get on the part where this mark is attached, or put strong power. There is a possibility that the cover and the plug are damaged.</p>
 <p>DANGER</p>	<div data-bbox="480 472 759 658">  </div> <p>Before removing the motor of the robot, support the arm securely using cranes or hoists etc. (Do not rely on the zeroing pin alone to secure the arm since it may be inserted incorrectly or inserted only half way in) Unless the arm is supported properly, it will drop or move fast suddenly when the motor is removed. Never put yourself under the arm when removing the motor. If these are not kept, it may cause damage to the peripheral equipments or result serious injury or death.</p> <div data-bbox="480 853 1289 1205">  </div>
 <p>IMPORTANT</p>	<p>If the robot has other different labels on them, please refer to their respective maintenance manuals (manipulator manual).</p>

1.3.2 Caution labels on the controller

 <p>DANGER</p>	<div data-bbox="480 1467 919 1682">  </div> <div data-bbox="943 1585 1050 1682">  </div> <p>This shows portions with high voltage.</p> <p>- <u>Wait 5 minutes or more after turning OFF the mains power and the power distributor panel</u> before attempting the maintenance or the inspection of the controller.</p> <p>- If connectors or terminal blocks are removed with mains power on, electric shock or malfunction of the robot may result.</p> <p>- Do not work with wet hands, touch the portions with high voltage directly with hands, or touch the portions with conductive items etc. Otherwise electrocution may result.</p>
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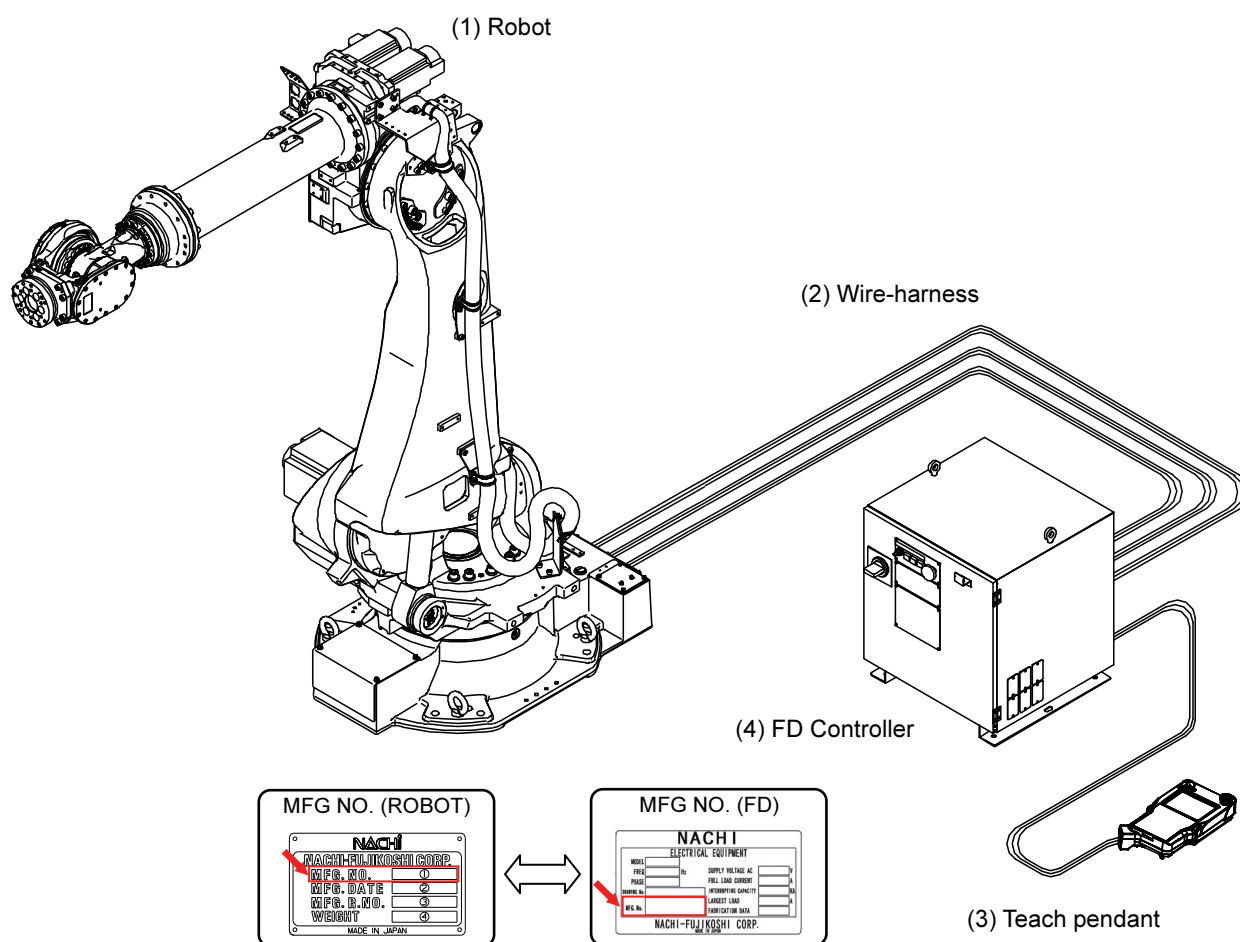
1.4 When the robot arrived at your factory

1.4.1 Confirmation of the package

Please check that the following items are included.

In case of large robot (SRA166-FD)

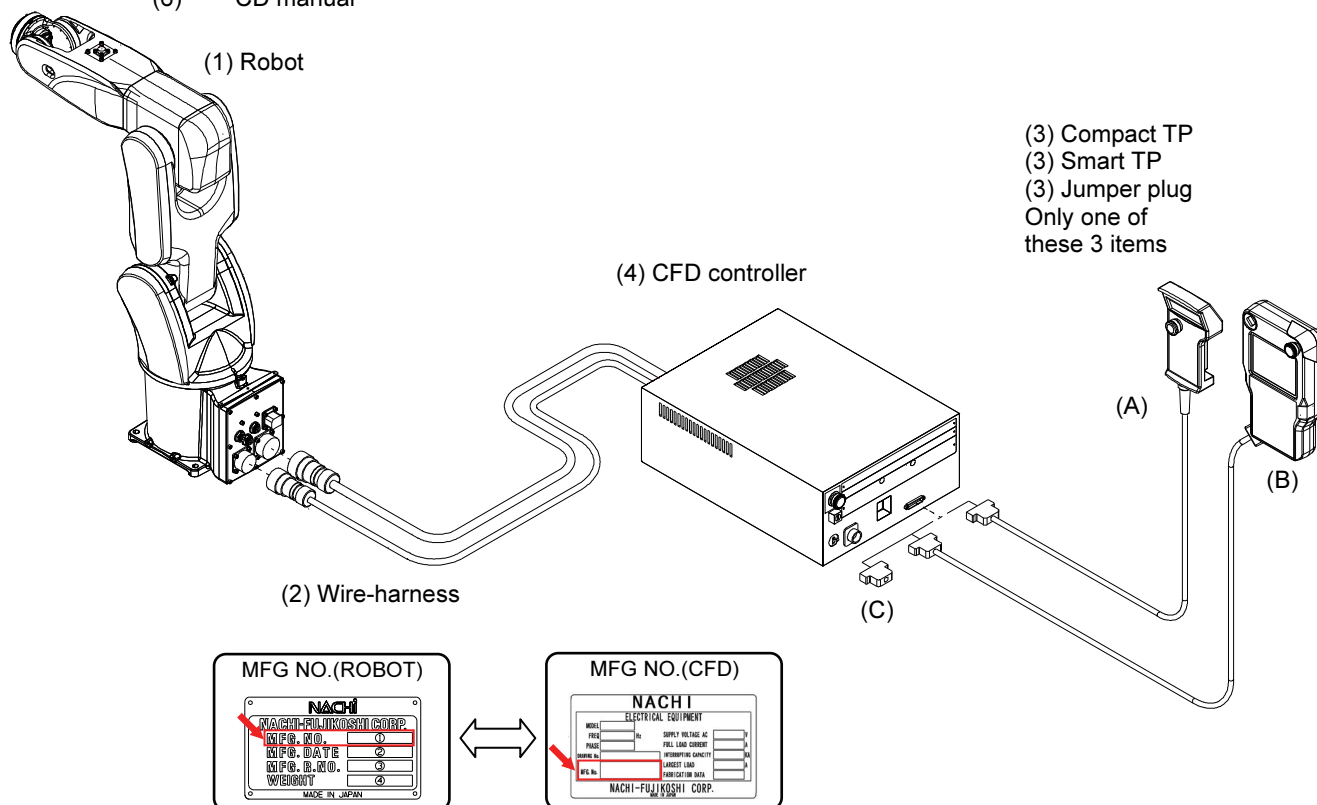
- (1) Robot
- (2) Wire-harness (control cables)
- (3) Teach pendant
- (4) Controller
- (5) Manuals (This document and robot maintenance manual (MANIPULATOR MANUAL))
- (6) CD manual



- (NOTE)
- The type, the number, or the length of the wire-harness differ from the robot type or specification.
 - When purchasing several optional products, some other products may be included.

In case of small robot (MZ07-FD)

- (1) Robot
- (2) Wire-harness (control cables)
- (3) Compact TP / Smart TP / Jumper plug (One of these 3)
- (4) CFD Controller
- (5) Manual (This document)
- (6) CD manual



- (NOTE) - The type, the number, or the length of the wire-harness differ from the robot type or specification.
 - When purchasing several optional products, some other products may be included.

1.4.2 Confirmation of the manufacturing number (serial number)

Please check if the manufacturing number of the robot and the controller are the same.







DANGER

In the internal memory of the controller, parameters (e.g. encoder offset values etc.) only for the robot are stored. If the manufacturing number of the controller and the robot do not match, the robot may move incorrectly and damage of the peripheral equipments, death or serious injury may be caused.

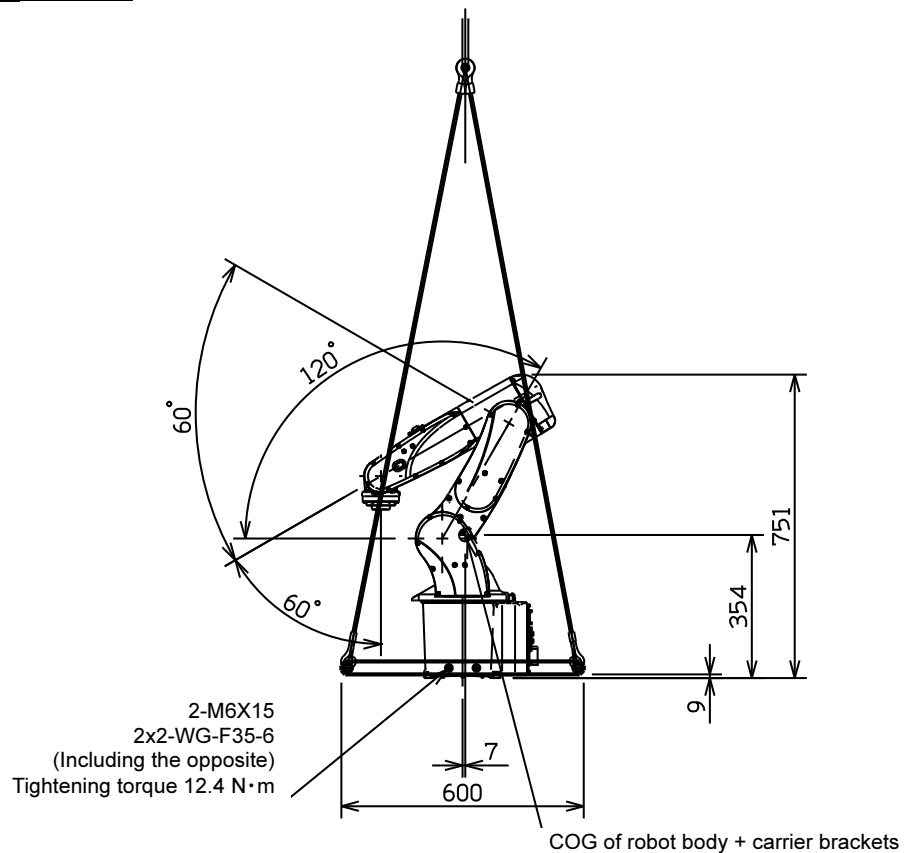
1.5 Handling the robot

1.5.1 Precautions for transportation

 WARNING	<p>Basically, use a crane for robot transportation (there are some cases where lifting jigs are available as optional parts). And, those transporting work should be performed by personnel who have licenses and/or qualifications required for such a work based on the respective country's domestic laws. Transporting robots without people like that will cause the robot to topple over or drop during transport, thus resulting in accidents.</p>
 WARNING	<p>During transportation work of the robot, please check the procedures shown in the maintenance manuals ("MANIPULATOR" MANUAL) and follow them carefully. And, if large tool is installed on the robot or the robot is attached on a shelf, the center of gravity of the machine may be placed in high position or be shifted from the center point of the machine. In such a case, please pay special attention so that the machine does not topple or fall down. If necessary, for example, modify the robot posture so that the center of gravity becomes the center point or fix the machine using nylon slings or chains before starting the transportation work. If these are not kept, the robot may topple or fall down during the transportation and result in serious accidents.</p>
 WARNING	<p>When working, put on protective gears such as a helmet, safety shoes etc., and carry out the work while wearing safe working clothes appropriate for the work. If this is not kept, injury or serious injury may result.</p>
 CAUTION	<p>During transportation work of the robot, pay utmost care not to cause damage to wirings and piping. (For example, attach protective rubber covers etc.) Furthermore, do not add excessive vibrations or shocks to the robot. Such a vibration or shock may damage the robot parts.</p>


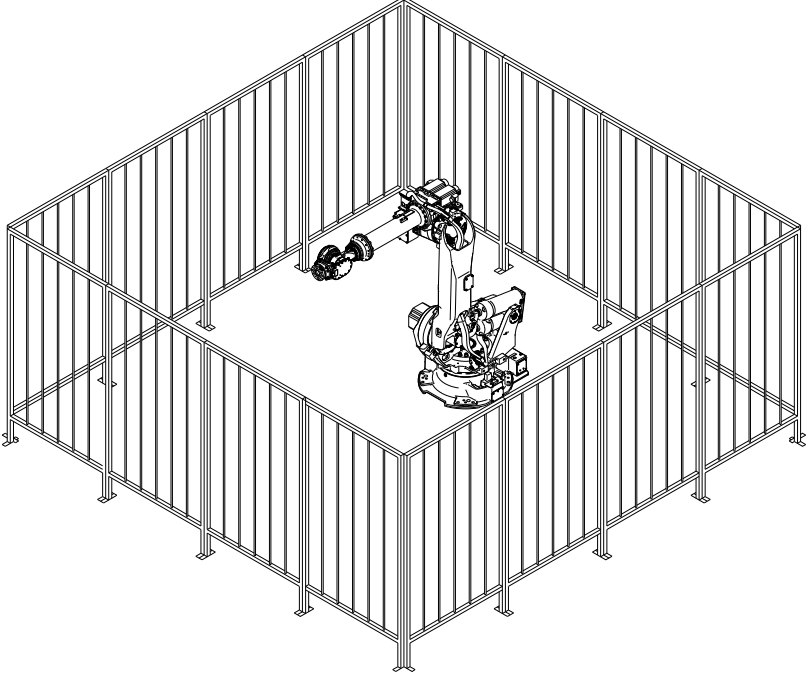


MZ07 transportation posture



To transport the robot, make it a rule to use a crane. Make the robot posture shown right and mount two carrier brackets to both sides of the robot frame. Then, lift the robot using four hanging wires.



After the installation work, remove the carrier bracket.
For details, refer to the instruction manual "MANIPULATOR".

1.5.2 Precautions for installation




 DANGER	<p>Install a guarding fence (safety protection fence) to ensure that the operators will be kept at a distance from the robot. If guarding fence like this is not installed, accidents may occur if operators or other individuals enter inside the operating area of the robot by mistake.</p> 
 DANGER	<p>Please follow the items shown as below also.</p> <ol style="list-style-type: none"> (1) The guarding fence must be constructed in such a way that it cannot be easily climbed over or easily moved. If the guarding fence is too low, individuals may climb over it and enter inside the operating range of the robot, leading to accidents. (2) Provide a door in the entrance of the guarding fence, and install a safety plug in the door, and construct the door in such a way that it will not open unless the plug is removed (This is an interlock structure). Furthermore, connect the safety plug to the safety plug connection terminals inside the robot controller. This connection makes it possible to stop the robot when the plug is pulled out (that means an individual is trying to enter the area), when the robot is operating. (3) If it is not possible to install a guarding fence, install photoelectric switches, mat switches, etc. in every location where individuals can enter inside the operating range of the robot in place of the safety plug. And make connections so that those devices can turn OFF the servo power of the robot when an individual is trying to enter inside the operating range of the robot. (4) Although the maximum distance that the wrist center point can reach is shown in the motion range figure in the specification sheet, please do not forget to consider the size of the tool and the work-piece in the actual application when designing/installing a guarding fence. (5) For details of the guarding fence, refer to "ISO13857:Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs". (6) Color-code the floor so that the danger area (operating range of the robot) can be easily identified visually. (e.g. Paint the floor with a different color from other area)
 WARNING	<p>When performing the installation work, please make sure to follow the instructions in the maintenance manual of the robot ("MANIPULATOR" manual). And, the installation bolts designated in the manual must be used. If this is not kept, the robot may not move correctly (e.g. topple or fall down during operation etc.) and cause serious accidents etc.</p>

 WARNING	<p>Do not turn ON the servo power before fixing the robot on the floor securely. If the servo power is turned ON before fixing the robot, the robot may topple or fall down and cause accidents etc.</p>
 IMPORTANT	<p>In some cases, the motion range of the robot can be changed using optional parts. If necessary, please prepare those parts when installing the guarding fence.</p>

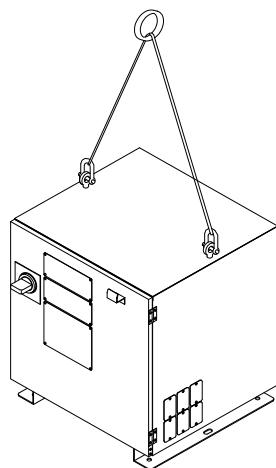
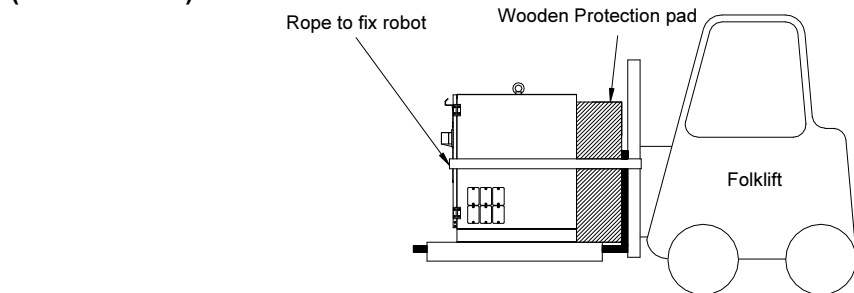
Concerning the operation range of the respective robot type, please refer to the respective maintenance manuals ("MANIPULATOR" manuals)

1.6 Handling the robot controller

1.6.1 Precautions for transportation

 WARNING	<p>(FD Controller) When transporting the FD controller, use cranes, forklift trucks, or hand-lifters etc. And, ensure that those transportation works must be performed by individuals who have acquired the appropriate permits or licenses needed for carrying out slinging work, operating cranes, driving forklift trucks, etc. (Based on each country's domestic laws)</p> <p>(CFD Controller) When transporting the CFD controller, please pay special attention not to drop or hit the controller. (NOTE) The standard CFD controller is approximately 17kg.</p>
 WARNING	<p>When working, put on protective gears such as a helmet, safety shoes etc., and carry out the work while wearing safe working clothes appropriate for the work. If this is not kept, injury or serious injury may result.</p>
 WARNING	<p>(FD controller) When transporting the controller, please refer to the following figures. When lifting the controller using a crane, do not forget to confirm that the lifting jig (eyebolts) are fixed securely so that the controller will not fall down or topple when making lifting works. When using forklift trucks or hand-lifter etc., fix the controller using wire-ropes etc. in advance to prevent the controller from falling down or toppling. If these are not kept, the controller may fall down or topple and results in accidents.</p>

(FD controller)



Use the wires which satisfy the following strength.

Withstand load : 450kg or more

Length : 1.5m or more

Use the following eyebolts or equivalent product.

Manufacturer : TAKIGEN

Model number : B-130-16


Withstand load : 450kgf

Use the following shackles or equivalent product.


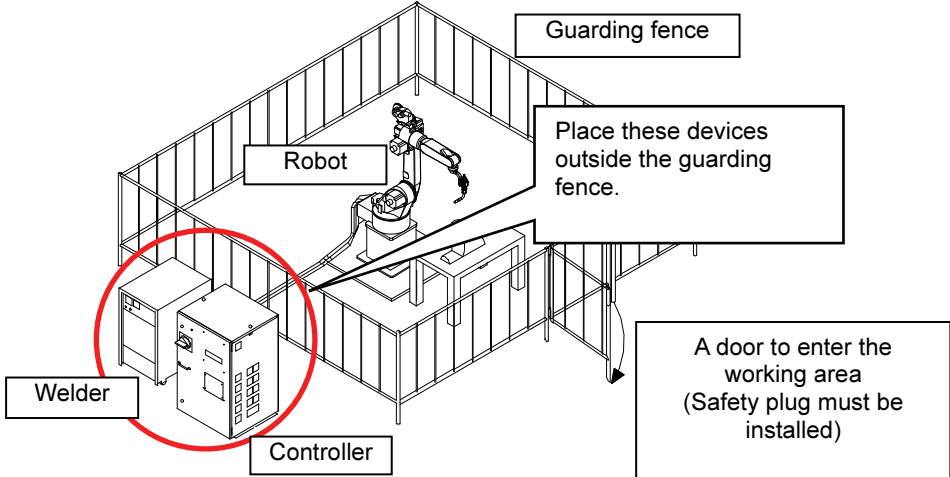


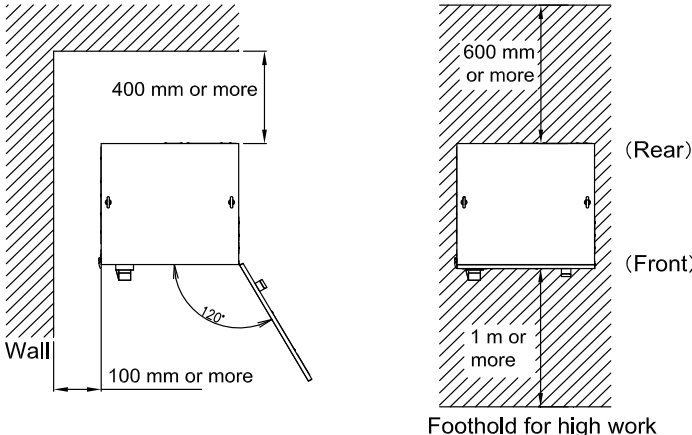

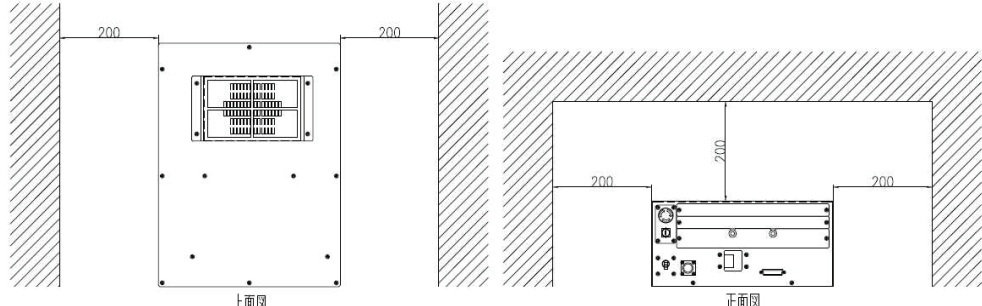
Model number : SC-10


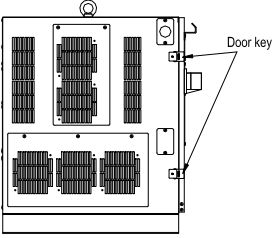
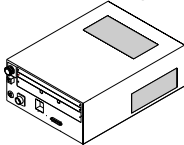

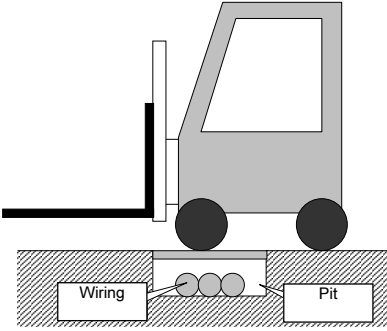


Withstand load : 0.8t

JIS B2801





 WARNING	<p>Printed circuit boards and other precision devices are used in the controller; therefore do not give any impact during transfer. When hoisting the controller using a crane, take care that none of the parts on the controller will be damaged by the wires.</p>
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1.6.2 Precautions for installation

 WARNING	<p>Robot controller, interlock panel, operation stand etc. must be placed outside the guarding fence. If devices like those are placed inside the fence, injury or serious accidents may occur.</p> 
 WARNING	<p>Place each device so that the robot operation can be performed from the outside of the guarding fence area. And, do not place the robot controller, interlock panel, or operation stand etc. to a position where the operator cannot see the robot motion. If the operator cannot see the robot motion, it will take long time to notice the robot failure and serious accident may be caused. Or, the operator cannot find a person in the area and accident may occur.</p>
 WARNING	<p>(FD controller) Leave enough clearance between the controller and the peripheral devices (or wall behind it) in order to ensure proper ventilation inside the robot controller. And, it is also necessary to keep enough clearance to open the front door. When the robot controller is to be installed on a rack or some other high position, install an adequate work floor to enable the adjustments, maintenance, inspections and other work to be performed. If the work area is narrow, it may results in accidents.</p> 
 WARNING	<p>(CFD controller) When installing the controller, leave a clearance of at least 200 mm between the controller and the wall behind it in order to ensure proper ventilation inside the robot controller.</p> 

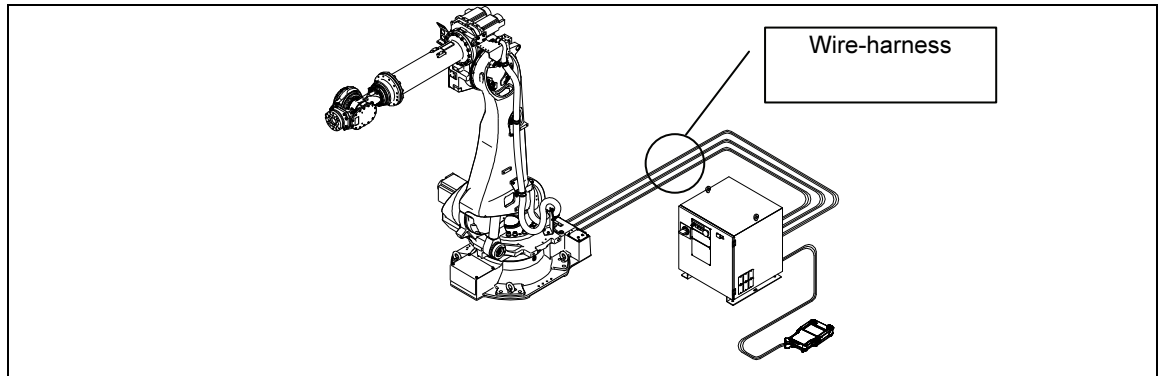
 CAUTION	<p>(FD controller) Lock the door key to prevent dusts etc. from getting into the controller inside. If the door is not shut completely, spatter, dusts, etc. may get into the controller inside and results in Incorrect robot motion, parts malfunction etc.</p>  <p>(CFD controller) When using the CFD controller, do not remove the filters on the top panel and the side panel. If the controller is used with the filter are not attached, the particles or dust around the controller may get into the controller and cause short circuit of the electric circuits etc. and result in robot's wrong motion or parts breakage, etc.</p> 
 WARNING	<p>Place the wirings or piping in a pit or ducts. If those wirings or piping are exposed on the passages etc., accidents like e.g. the workers may topple, the robot operate incorrectly because of the wiring damages may occur.</p>  <p>And, please keep distance of 200mm or more at least between the robot cables and the power cable for the welding machine. When placing those cables in the same area, if possible, put a separating plate to separate those cables obviously. And, power-lines that have high-frequency noise (e.g. TIG welder, plasma-cutting machine etc.) must be placed in different duct and please place them as far as possible each other.</p>
 CAUTION	<p>(FD controller) The robot controller should be installed in a place that satisfies the following conditions; (1) A location not exposed to direct sunlight, with an ambient temperature of 0 to 45 degrees Celsius throughout the year. (2) A location with an ambient relative humidity of 20 to 85% and no condensation. (3) A location with minimal amounts of dust, dirt, oily vapors, water, etc. (4) A location with no flammable or corrosive liquids or gases, etc. (5) A location where the maximum shock or vibration transmitted to the controller by the operation of other machines in the area is 0.5 G (4.9 m/sec²) or less. (6) A location with no major sources of electrical noise (plasma, high frequency power sources, etc.).</p>
 CAUTION	<p>(CFD controller) The robot controller should be installed in a place that satisfies the following conditions; (1) A location not exposed to direct sunlight, with an ambient temperature of 0 to 40 degrees Celsius throughout the year. (2) A location with an ambient relative humidity of 20 to 85% and no condensation. (3) A location with minimal amounts of dust, dirt, oily vapors, water, etc. (4) A location with no flammable or corrosive liquids or gases, etc. (5) A location where the maximum shock or vibration transmitted to the controller by the operation of other machines in the area is 0.5 G (4.9 m/sec²) or less. (6) A location with no major sources of electrical noise (plasma, high frequency power sources, etc.).</p>

1.6.3 Connecting the primary power source

 DANGER	<p>Turn OFF the controller's main power switch and the breaker switch of the power distributor without fail in advance of the power source connecting work. If those switches are not OFF, electric shock accidents may occur.</p>
 WARNING	<p>Before starting the connection, please check that the specification voltage of the controller and the voltage of the primary power source from the power distributor are the same. The specification voltage of the controller is shown on the label of the front door. When different voltage is supplied, the controller may be damaged.</p> <p>(NOTE) Concerning the consuming power, please refer to the respective specification sheet of the controller or robot.</p>
 WARNING	<p>For safety, apply "Type D ground (100Ω or less)".</p> <p>Use an exclusive grounding wire to provide a dedicated ground where the wires from the installation position are made as short as possible. In order to establish the same potential as that for the peripheral jigs and other devices, ground the peripheral jigs and other devices also. The effect that establishes the same potential will be lost if the wiring connections are too long. Therefore, make the connections as short as possible. Also take steps to ensure that the same potential is established for the nearby operation panels, cable conduits, etc.</p> <p>In order to safeguard against electric shocks and combat noise, it is essential that the same potential be established as far as possible within a certain amount of space which is grounded. If only specific objects are connected to a ground installed far away, a potential difference will arise between those objects and the nearby objects, and the grounding effect may be lost.</p> <p>(FD controller) The power supply cable of the robot controller must be 5.5mm² or more. And the grounding wire must be 5.5mm² or more.</p> <p>(CFD controller) The power supply cable of the robot controller must be 1.25mm² or more. And the grounding wire must be 1.25mm² or more.</p> <p>(Supplement 1) "Type D ground" is applied for Japanese domestic law. In other countries, please make appropriate grounding connection according to the specification of the devices by following the respective country's domestic laws.</p> <p>(Supplement 2) When using welding machines etc., please make grounding connection by following the instructions of the manufacture.</p>
 CAUTION	<p>(FD controller) When installing a leakage circuit breaker (If the transformer is not installed) In the robot controller, a leakage circuit breaker (with a current sensitivity 100mA) is installed. When installing the leakage circuit breaker for the primary power source side, use one with a medium current sensitivity (100 mA or more). When 2 or more robot controllers are used, use the one per 1 robot controller.</p> <p>(CFD controller)</p> <ol style="list-style-type: none"> 1. An inverter circuit for controlling the AC servo motor is used in this robot controller. In order to prevent the earth leakage circuit breaker from being tripped in error by the high-frequency leakage current generated from the inverter circuit, the earth leakage circuit breaker must be designated for inverter use when one is to be used. 2. When installing the earth leakage circuit breaker, use one with rated current 30A or more and a medium current sensitivity(100 mA or more).





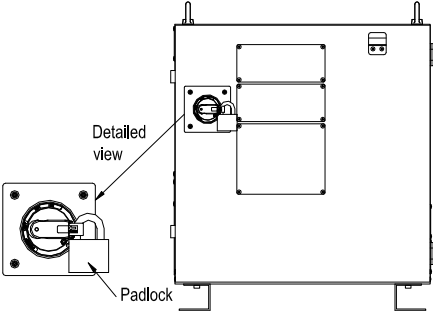




1.6.4 Connecting the wire-harness (control cable)

The installation positions (connectors) for the manipulator and robot controller, and wire harnesses have the connector names written on. Connect each connector and harness correctly with the connectors/harnesses of the same name. There are "male" and "female" cable connectors, which have different key shapes. This structure is used to prevent mistaken connections, so forcing connectors together will cause damage. Be careful when making connections.








1.6.5 Other precautions



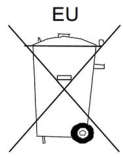


 WARNING	<p>Do not enter the working area of the robot (inside of the guarding fence) carelessly. If it is necessary to enter the area, do not forget to make the robot's servo power OFF by means of "Pressing the emergency stop button", "Turn the controller power OFF", etc. Especially, in case of automatic operation (playback), even if it seems that the robot is stopping, the servo power of the robot is still ON (This means that the robot can restart its operation anytime). When getting close to the robot that is in such a condition, the robot may restart suddenly and the person may be pinched or sandwiched and result in serious injury. (To avoid accidents like that, connect a safety-plug to the entrance door of the guarding fence and make appropriate electrical connection).</p>
 WARNING	<p>In cases like the following, be sure to check if there is no one in the robot's motion range.</p> <ul style="list-style-type: none"> - When turning ON the robot controller's power - When turning the motor power ON - When operating the robot manually - When making CHECK GO/BACK operation - When making automatic operation of the robot (Playback operation) <p>When there is a person in the robot's motion range, if the robot moves in wrong way and catches or sandwiches the person, it may result in injury or serious injury.</p>
 WARNING	<p>If the robot moves in wrong way, stop the robot using the "emergency stop button".</p> <p>It is also possible to connect an additional (external) emergency stop button to the terminal of "External emergency stop button". For details, refer to the following manuals. FD controller: "SETUP MANUAL". Chapter 3 CFD controller: "STARTUP" Chapter 1</p>
 DANGER	<p>Only robot body stops (peripheral equipment never stops) when stop or emergency stop button is pressed and when stop or emergency stop signal is inputted from external. Peripheral equipment needs to be controlled (stopped) by customer's logic.</p>


 DANGER	<p>Before starting operations, please check that the emergency stop buttons work normally (This means that the motor power is turned OFF when the button is pressed). If the emergency stop button cannot work normally and the robot cannot stop in case of emergency, it may results in damage of the peripheral devices, death, or serious injury etc.</p>
 WARNING	<p>Do not touch the switches or buttons on the operation panel, operation keys or switches on the teach pendant carelessly. When unexpected motion of the robot may results in damage of the peripheral devices or injury.</p>
 WARNING	<p>When working, put on protective gears such as a helmet, safety shoes etc., and carry out the work while wearing safe working clothes appropriate for the work. If this is not kept, injury or serious injury may result.</p>
 WARNING	<p>(FD controller) (LOCK OUT) When turning OFF the breaker switch (main power switch) of the controller, be sure to lock the switch using padlock so that any other person cannot turn ON the power.</p>  <p>(TAG OUT) Furthermore, put a display like "DO NOT POWER ON" around the breaker switch to show that the power of the controller should not be turned ON.</p> <p>Be absolutely sure to entrust the safekeeping of the key for the LOCKOUT to a specially designated person or the person in charge of safety management.</p> <p>(Supplement) The padlock is to be provided by the customer.</p>
 WARNING	<p>(FD controller) Do not open the door or the cover of the controller with its power is ON. If these points are not kept, electric shocks may occur.</p> <p>(CFD controller) Do not remove the covers with its power is ON. If these points are not kept, electric shocks may occur.</p>
 WARNING	<p>Basically, inspection or maintenance work has to be done with the power source is OFF. However, if it is necessary to make those works with the power ON, perform the work in pairs. One person must stand guard and be able to press an emergency stop button at any time. The other person must work quickly while being very careful of the robot operating range. Always allocate, confirm and know an escape route prior to beginning work. If these points are not kept, accidents may occur due to e.g. unexpected motion of the robot etc.</p>
 WARNING	<ul style="list-style-type: none"> - If it is necessary to change the robot posture forcibly, use "Brake release switch". For details, refer to the following manuals. <ul style="list-style-type: none"> - FD CONTROLLER: Instruction manual "CONTROLLER MAINTENANCE". - CFD CONTROLLER: Instruction manual "MANIPULATOR". - If the robot joint exceeds its motion limit range, enter <Constant Setting> - [3 Machine Constant] - [5 Software limit] to release the error and then turn ON the motors to return into the motion limit range. (In case of CFD, the Smart TP or the FD on DESK Light is necessary.)
 IMPORTANT	<p>It is strongly recommended to make backup data of the internal memory before starting the setup works by following the instructions in the manuals of "BASIC OPERATIONS".</p>

1.7 Movement, alienation and selling of robot

 IMPORTANT	When the robot is moved, transferred or sold (either in the country or overseas) by the user, whatever was agreed upon at the time of the robot's initial sale inclusive of the safety-related items is not transferable to the new owner unless a special agreement has been concluded. The user must conclude a new agreement with the new owner.
 IMPORTANT	This product may be liable for the subject of export restriction stipulated in the Foreign Exchange and Foreign Trade Control Law. When exporting this product overseas, please go through careful investigation and necessary formalities for export.
 WARNING	Hand over all manuals and documents received when purchasing the robot to the new owner when moving, alienating or selling a robot. In particular, if the robot is to be moved, transferred or sold overseas, the user is responsible for preparing and supplying the operating and maintenance manuals in the appropriate language, amending the language used for the labels and displays and complying with the laws of the country concerned. Accidents may occur if the new robot owner (operator) operates the robot incorrectly or performs unsafe work tasks due to not receiving and reading the Operating Instructions. If the necessary manuals or documents are lost, please contact our sales persons or our service centers.
 WARNING	When the caution labels on the robot controllers or robot body are damaged or get dirty, clean or replace them with new ones. If new labels are necessary, please contact our sales persons or our service centers. If the robot or the controller is used without the caution labels, the possibility of injury or accidents may increase.
 WARNING	When moving a robot to another place, it is recommended to ask our service engineers to make inspections for those machines. When the robot or controller is used without inspections, there may be possibilities of machine troubles, injury, or accidents due to wrong settings, incorrect operations, or wrong connections etc.

1.8 Disposition

 CAUTION	Robot controller and robot body should be disposed as general industrial wastes.
 CAUTION	 <p>When discarding the batteries that are used in the robot controller or the robot body, follow the respective trash separation rules in your local district and discard them separately as "Used lithium batteries".</p> <p>Do not disassemble, heat, or burn batteries as they may catch fire, burst or burn.</p>
 CAUTION	Do not disassemble the controller in detail smaller than PCBs or units. Sharp edges or electric wire of small disassembled pieces may cause injury. Also, do not disassemble wire harnesses or robot external wiring further than disconnecting wiring from connectors or terminal blocks. Disassembled pieces, e.g. Semiconductors etc., may cause injury to hands or eyes.
 WARNING	When placing a robot temporarily before scrapping, use extreme care so as to avoid accidents such as falling down etc. If the robot falls down, it may results in injury or other accidents.

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