

READ FIRST!! SAFETY REQUIREMENTS YRC1000 CONTROLLER

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

Part Number: 179526-1CD
Revision: 0

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WELCOME...

...to the Yaskawa Motoman family of robotics. We take pride in the work we do and would like to take this opportunity to thank you for your business. This **READ FIRST!!** Safety Requirements for the YRC1000 Manual Assembly is to familiarize you with your new Motoman robotic system. Please review all the information contained in this document before operating or installing your system.

We continually strive to provide the highest quality systems and service available. If you have any questions or comments, please call us. We appreciate your business and want Yaskawa to continue to be the best solution for your automation needs.

ADDITIONAL INFORMATION

For additional information, refer to the following:

- READ FIRST, YRC1000 (p/n 179208-1)
- READ FIRST, Requirements & Controller Instructions (p/n 179531-1CD)
- YRC1000 Instructions Manual (p/n 178642-1CD)
- Concurrent I/O Parameter Manual (p/n 178648-1CD)
- YRC1000 Maintenance Manual (p/n 178643-1CD)
- YRC1000 Alarm Codes (p/n 178644-1CD)
- Manipulator Manual for your robot model
- YRC1000 General Operators Manual (p/n 178645-1CD)
- YRC1000 Operator's Manual for your application
- OSHA's Lockout/Tagout Procedures 1910.147
- ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012)
- Equipment mounting guidelines refer to the installation section of the manipulator manual and if applicable, ArcWorld system manual. The installation section of the manipulator manual contains the robot repulsion forces. Contact your local concrete and masonry supplier in order to meet equipment mounting and anchoring requirements.

CUSTOMER SERVICE INFORMATION

If needing technical assistance, contact the Yaskawa service staff at 937.847.3200. Please have the following information ready before calling.

- Robot type (*GP7/AR900, GP8/AR700, etc.*)
- Application type (*arc and spot welding, handling, etc.*)
- System type (*ArcWorld[®], etc.*)
- Software version (*access using MAIN MENU, SYSTEM INFO, VERSION on programming pendant*)
- Robot serial number (*located on the back side of robot arm*)
- Robot sales order number (*located on front of the YRC1000 controller*)

NATIONAL SAFETY STANDARD INFORMATION

We suggest obtaining and reviewing a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). This document is obtainable from the Robotic Industries Association (RIA) at:

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

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment. **NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!**

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Notes for Safe Operation**DANGER**

- The included manuals describe setup, diagnosis, maintenance, hardware, etc. of the YRC1000 system. Read the manuals carefully and be sure to understand its contents before handling the YRC1000. Any matter, including operation, usage, measures, and an item to use, not described in these manuals must be regarded as “prohibited” or “improper”.
- General information related to safety are described in “Chapter 1. Safety” of “YRC1000 INSTRUCTIONS”. To ensure correct and safe operation, carefully read all manuals included.

**CAUTION**

- In some drawings in these manuals, protective covers or shields are removed to show details. Make sure that all the covers or shields are installed in place before operating this product.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modifications void the product warranty.

NOTICE

- The drawings and photos in these manuals 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 a 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.

Read the included manuals carefully before installing, operating, maintaining, or inspecting the included equipment.

In the included manuals, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”.



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.



WARNING

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.



CAUTION

Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

NOTICE

NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident. Make 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 “DANGER”, “WARNING” and “CAUTION”.



DANGER

- 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, and do not release the brake.

Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the manipulator's arm.

- Any person who programs, teaches, operates, maintains or repairs the included system **MUST** be trained and can demonstrate competence to safely perform the assign tasks.

Failure to observe these safety precautions may result in death or serious injury from unexpected movements.



CAUTION

When installing the robot system, avoid interference with buildings, structures, utilities, other machines and equipment that may create trapping or pinch points.



- If supplying a supplementary audible means for robot operation, it shall exceed the ambient noise at the end-use of the application.
- Any changes or additions to the applicable information as provided by the manufacturer is to be provided by the party that makes the change or addition to the robot system



CAUTION

Robot Cells have Collaborative Motion functionality:

Collaboration is a special type of operation between a person and robot sharing a common workspace. The following are the guidelines for collaborative operation.

1. Used for pre-determined tasks.
2. Possible when all protective measures are active.
3. For robots with features specifically designed for collaborative operation.

The integrator shall include in the information for use the safeguards and mode selection required for collaborative operation.



DANGER

- Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.
 - Press the emergency stop buttons on the front door of the YRC1000, on the programming pendant, on the external control device, etc.
 - Disconnect the safety plug of the safety fence. (when in the play mode or in the remote mode)

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

Fig. : Emergency Stop Button



- Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

Fig. : Release of Emergency Stop



- Observe the following precautions when performing a teaching operation within the manipulator's operating range:
 - Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
 - View the manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Always keep in mind emergency response measures against the manipulator's unexpected movement toward a person.
 - Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

- Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
 - Turning ON the YRC1000 power
 - Moving the manipulator by using the programming pendant
 - Running the system in the check mode
 - Performing automatic operations

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop buttons are located on the front panel of the YRC1000 and on the right of the programming pendant.

- Read and understand the Explanation of the Warning Labels before operating the manipulator.

SAFEGUARDING TIPS

All operators, programmers, maintenance personnel, supervisors, and anyone working near the system 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:

When installing the robot system, avoid interference with building structures, utilities, other machines and equipment that may create trapping or pinch points.

Supplementary audible means of robot operation is provided, the supplementary audible shall exceed the ambient noise at the end-use application if adding.

If providing more than one emergency stop button, each button shall be marked to indicate its designated safety function if it does not stop all robot workcell motion.

Making changes or additions to the applicable information provided by manufacturer are to be provided by the party making the changes or additions.

Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this equipment, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this equipment.

Improper connections can damage the equipment. All connections must be made within the standard voltage and current ratings of the equipment.

The system must be placed in Emergency Stop (E-Stop) mode whenever it is not in use.

In accordance with ANSI/RIA R15.06-2012, 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).

MECHANICAL SAFETY DEVICES

The safe operation of this equipment is ultimately the users 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 R15.06-2012 safety standards, and other local codes that may pertain to the installation and use of this equipment.

Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location.

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

PROGRAMMING, OPERATION, AND MAINTENANCE SAFETY

All operators, programmers, maintenance personnel, supervisors, and anyone working near the system 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 equipment should be permitted to program, or maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the equipment 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.
- Check the E-Stop button on the operator station for proper operation before programming. The equipment 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 the controller unit can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the controller unit. Making any changes without the written permission from Yaskawa will void the warranty.
- Some operations require standard passwords and some require special passwords.
- The equipment allows modifications of the software for maximum performance. Care must be taken when making these modifications. All modifications made to the software will change the way the equipment operates and can cause severe personal injury or death, as well as damage parts of the system. Double check all modifications under every mode of operation to ensure that the changes have not created hazards or dangerous situations.
- 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 equipment. All connections must be made within the standard voltage and current ratings of the equipment.
- Turn the power OFF and disconnect and lockout/tagout all electrical circuits before making any modifications or connections. Perform only the maintenance described in the manuals. Maintenance other than specified in the manuals should be performed only by Yaskawa-trained, qualified personnel.

SUMMARY OF WARNING INFORMATION

This manual is provided to help users establish safe conditions for operating the equipment. Specific considerations and precautions are also described in the manual, but appear in the form of Dangers, Warnings, Cautions, and Notes.

It is important that users operate the equipment in accordance with this instruction manual and any additional information which may be provided by Yaskawa. Address any questions regarding the safe and proper operation of the equipment to Yaskawa Customer Support.

ALARM ERROR INFORMATION

We make every effort to ensure safe delivery of the robotic system. However, occasionally a robotic system will encounter problems with data loss and physical movement caused during the shipping process. Therefore, when turning on the system and a Minor Alarms occurs they are probably ALARM:4692 and ALARM:4107. The following is a description of each cause and remedy.

Alarm 4311 Encoder Backup Error

Should you receive a 4311 alarm, please contact the Yaskawa Service Department. While not a major cause for concern, there are several remedies for this error. A Yaskawa service representative can help determine the best solution for your system.

Alarm 4107 Out of Range (ABSO DATA)

A 4107 Out of Range alarm occurs at power ON if the robot's position has changed during shipment or since last shutdown. The out of range axes will highlight in the alarm display. After resetting the alarm and turning servo power ON, a "Check Position" prompt occurs. The "Check Position" procedure involves jogging the robot to a known pulse count position (a specified point) and verifying that the robot is physically at the proper position. This position called the "Second Home."

To check position:

1. Select ROBOT from the Main Menu.
2. Select SECOND HOME POS, the Second Home Position window appears.
3. Press the {Page} key. The group axes by which the second home position is set when there are two or more group axes.
4. Press FWD, and observe the robot moves to the second home position. Robot speed is set as selected manual operation speed.
5. Select DATA.
6. Select CONFIRM POSITION. The "Home position checked" message appears.

A comparison of the current pulse data and second home position to ensure allowable ranges, and resumes playback operations. However, if outside the allowable range, the alarm occurs again. Contact a Yaskawa Service representative if this occurs

LITHIUM BATTERY SAFETY INFORMATION

This section contains basic information regarding safe storage, disposal, installation, and transportation of lithium batteries used in the robotic system.

Safety

To ensure proper battery operation and to reduce personal hazards:

- Use only for intended operation;
- Dispose of cells only in according to recommended procedures;
- Only ship using aircraft freight.



DANGER

Excessive heat may cause batteries to burn or explode, therefore:

- Do not charge batteries;
- Do not incinerate, solder or expose to high temperatures;
- Do not short positive and negative terminals together.

Storage

Always store the lithium batteries in a cool and dry place, typically 20°C to 25°C (68.5 to 77°F) at 40% to 60% relative humidity. Place batteries and a copy of these instructions away from flammable materials.

Transportation

Each battery contains 0.23 grams of lithium. Two batteries can ship together within the United States without restriction. Transportation procedures for transferring three or more batteries within the United States are in the Department of Transportation (DOT), Code of Federal Regulations, CFR49, "Transportation." An exemption to these regulations, DOT-E7052, covers transportation of certain hazardous materials classified as flammable solids. This exemption authorizes transport of lithium batteries by motor vehicle, rail freight, cargo vessel and cargo-only aircraft, providing meeting certain conditions. Regulations governing shipment to or within other countries may differ from those of the U.S.A special provision of DOT-E7052 (11th Rev., October 21, 1982, par. 8-a) provides that: Persons who receive cells and batteries covered by this exemption may reship them pursuant to the provisions received.

The Code of Federal Regulations, 49 CFR 173.22a, relates to the use of packaging authorized under exemptions. In part, you must maintain a copy of the exemption at each facility where the packaging is in connection with shipment under the exemption. Shipment of depleted batteries intended for disposal may be subject to specific regulations under the IATA Restricted Articles of the International Air Transport Association, Geneva, Switzerland.

NOTICE

Periodically Regulations for transportation of lithium batteries are changed.

BATTERY REPLACEMENT INFORMATION

Disposal

For disposal, batteries must be packaged and shipped in accordance with transportation regulations to a disposal site. For more information contact:

U. S. Department of Transportation
Research and Special Programs Administration
400 Seventh Street, S.W.
Washington, D.C. 20590



WARNING

Do not incinerate or dispose of lithium batteries in general trash collection. Explosion or violent rupture is possible. Collect batteries for disposal in a manner to prevent against short-circuiting, compacting, or destruction of integrity and hermetic seal. Although the Environmental Protection Agency has no specific lithium battery regulations at this time, lithium may be considered toxic, reactive, or corrosive. Persons disposing of the material are responsible for any hazard created in doing so. State and local regulations may exist regarding the disposal of these materials.

BATTERY REPLACEMENT INFORMATION

Your lithium batteries provide memory backup for approximately five years. Batteries are located in the robot base and controller.



DANGER

Only qualified electricians familiar with high voltage locations within the controller should replace the battery.

Controller

A “Memory battery weak” error message appears on the pendant screen, indicating battery replacement must occur within 30 days after message appears. If this message occurs within 30 minutes of power-up following an extended power-off period of more than two days, replace battery immediately by referring to section 5.1.1.3 “Replacing the Battery” in the YRC1000 MAINTENANCE MANUAL.

Robot

An “Encoder Battery Weak” error message appears on the pendant screen, indicating battery replacement must occur within 40 hours as follows. Refer to the section “Battery Pack Replacement” in the Robot Maintenance Manual.

READ FIRST!!

SAFETY REQUIREMENTS

YRC1000

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Specifications are subject to change without notice
for ongoing product modifications and improvements.

YASKAWA

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