

# Motoman XRC Controller

# DR2C Conversion

# Instructions

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# **SECTION 1**

## **INTRODUCTION**

The Dual-Robot, 2-Controller (DR2C) is part of the Motoman family of robotic solutions and is fully supported by Motoman, Inc. The DR2C features two Motoman robots and two XRC controllers connected together by a series of cables. This configuration allows the two robots to operate as a fully functional dual system, taking full advantage of all the unique functions available only in a dual system configuration. Yet, unlike the traditional single controller dual system, the DR2C can be divided into two completely separate, stand alone units as necessary. **Reinitialization of the XRC controller after set-up or separation must be performed by a trained Motoman technician. Reinitialization of the XRC controller by a non-Motoman employee may void your warranty.**

### **1.1 About this Document**

This manual is intended as an introduction and overview for personnel who have received operator training from Motoman, and who are familiar with the operation of this Motoman robot model. For more detailed information, refer to the manuals listed in Section 1.3. This manual contains the following sections:

#### **SECTION 1 - INTRODUCTION**

Provides general information about the DR2C and its components, a list of reference documents, and customer service information.

#### **SECTION 2 - SAFETY**

Provides information regarding the safe use and operation of the DR2C system.

#### **SECTION 3 - SET-UP INSTRUCTIONS**

Provides detailed instructions for set-up of the DR2C.

#### **SECTION 4 - SEPARATION INSTRUCTIONS**

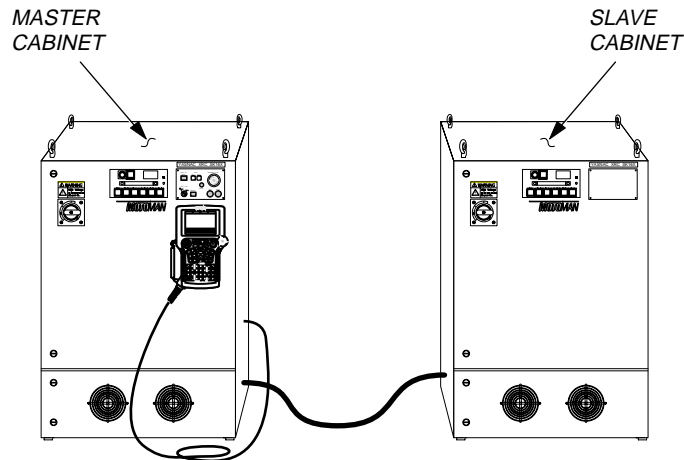
Provides detailed instructions for separation of the DR2C.

#### **APPENDIX**

The Appendix contains System Drawings.

## 1.2 System Overview

The DR2C is designed around two XRC controllers, the left being the master controller and the right the slave controller. A communication cable connects the two controllers, giving the master control over the slave. Figure 1-1 illustrates the system layout of the DR2C.



**Figure 1-1 DR2C System Layout**

The DR2C system includes the following major components:

- Two Motoman manipulators
- Two XRC controllers
- DR2C communication cable (P/N 143194)
- XSU01 24V power cable (P/N 143185)
- XSU01 I/O module (P/N 143093)
- XRC playback panel replacement cover (P/N 143164)
- XCP01 replacement cover (P/N 143192)
- XSU01 I/O module mounting plate (P/N 143165)

## 1.3 Reference to Other Documentation

For additional information refer to the following:

- Motoman UP6 Manipulator Manual (P/N 142104-1)
- Motoman SK16X Manipulator Manual (P/N 142105-1)

## 1.4 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 (UP6 or SK16X)
- Application Type (welding)
- System Type (DR2C)
- Software Version (5.101A)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

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# **SECTION 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. The address is as follows:

**Robotic Industries Association**  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: 313/994-6088  
FAX: 313/994-3338

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 Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

## 2.2 **Standard Conventions**

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



### ***DANGER!***

***Information appearing under the DANGER caption 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 under the WARNING caption 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 under the CAUTION caption 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 caption 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, section 6.13.4 and 6.13.5, 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 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 measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

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 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 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the XRC controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. 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.
- Back up all programs and jobs onto a floppy disk whenever 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.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- 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 operate the system.

- 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 the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

## **2.7 Operation 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- 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 operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- 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. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

## **2.8 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. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- 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 operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- 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. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- 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).

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## **SECTION 3**

# **SET-UP INSTRUCTIONS**

Two XRC controllers can be easily combined to create the DR2C in just a short time. Follow established safety procedures at all times throughout the set-up process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

**Reinitialization of the XRC controller after set-up must be performed by a trained Motoman technician. Reinitialization of the XRC controller by a non-Motoman employee may void your warranty.**



### **CAUTION!**

***It is the customer's responsibility to ensure that both XRC controllers use the same software version prior to initialization of system as DR2C. If there is a difference in software versions, call the Motoman Service Staff at (937) 847-3200.***

## **3.1 Materials Required**

All system hardware necessary for set-up of the DR2C is included with the system. Make certain you have all the following parts before beginning set-up procedures.

P/N 143194	DR2C communication cable
P/N 143185	XSU01 24V power cable
P/N 143093	XSU01 I/O module
P/N 143164	XRC playback panel replacement cover
P/N 143192	XCP01 replacement cover
P/N 143165	XSU01 I/O module mounting plate
P/N 130956-2	(4) M4 x 5 standoffs
P/N 137146	(2) M4 x 10 phillips, pan head screw
P/N 141494	Static bag
P/N 141068-1	(2) M2.5 x 6 phillips, pan head screw
P/N N/A	Programming pendant connector plug

**NOTE:** *Both controllers must use the same software version. If there is a difference in software versions, call the Motoman Service Staff at (937) 847-3200.*

### **3.1.1 Customer-Supplied Items**

- Incoming power supply
- Safety glasses
- Phillips and flat screwdrivers
- Nutdrivers
- Wire ties

## 3.2 Slave XRC Setup



### **DANGER!**

**All power must be removed from both XRC controllers before set-up begins. Failure to remove power before set-up will cause serious personal injury, loss of life, or equipment damage. Be sure to follow all Lockout/Tagout procedures.**



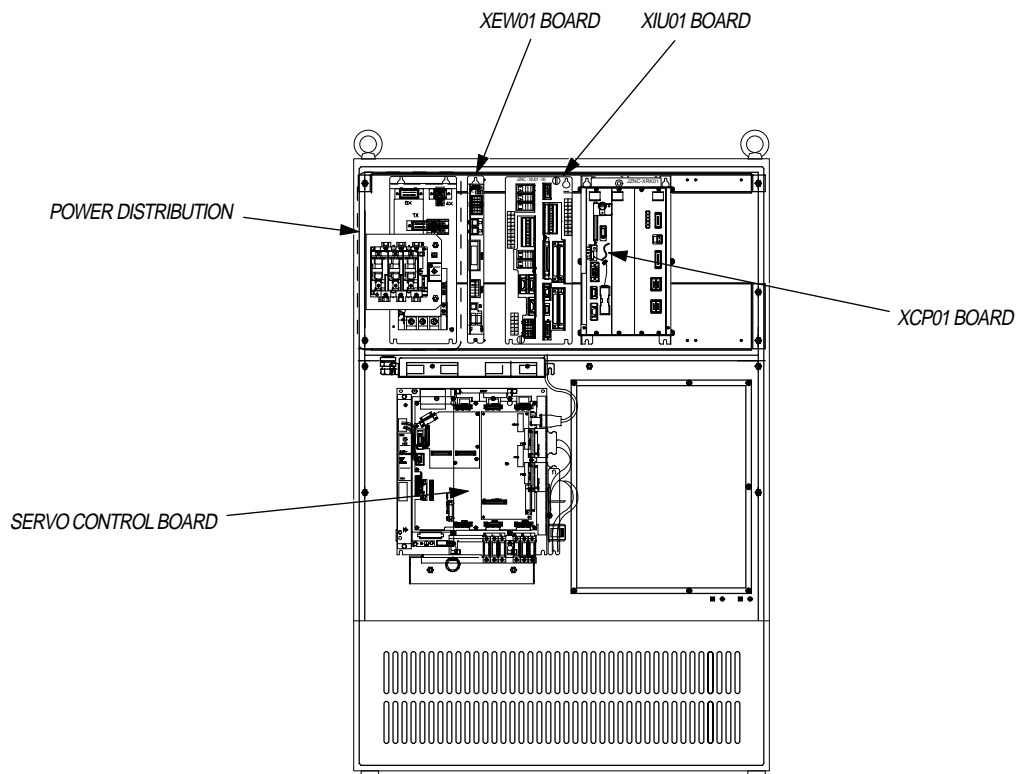
### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

Several modifications must be made to the slave controller. Some components must be removed from the slave controller and either properly stored, or placed in the master controller. To set up the Slave XRC controller for DR2C operation, proceed as follows:

### 3.2.1 Removing the XCP01 Board

1. Open Slave XRC cabinet and locate XCP01 board (see Figure 3-1).



**Figure 3-1 XCP01 Board**

2. Remove XCP01 board and place into anti-static bag.

**NOTE:**

*The XCP01 board should be stored in a safe and dry location for future use.*

3. Install replacement cover (P/N 143192-1) over XCP01 opening in CPU rack using two M2.5 x 6 (P/N 141068-1) screws provided.

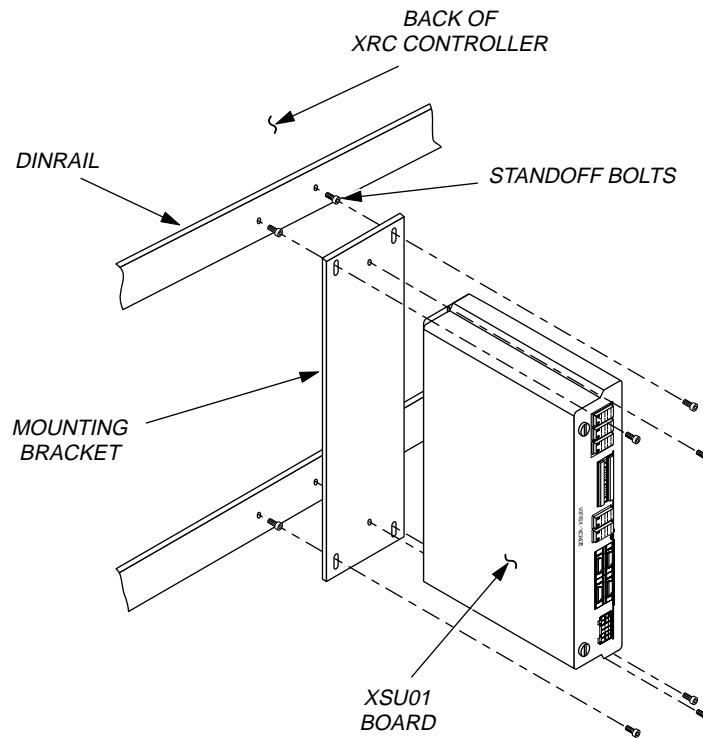
### 3.2.2 Replacing the XIU01 Board with XSU01

1. Locate XIU01 module, and disconnect all cables (see Figure 3-1).
2. Remove four M4 bolts holding XIU01 board in place.
3. Remove XIU01 module and place into anti-static bag.

**NOTE:**

*The XIU01 board should be stored in a safe and dry location for future use.*

4. Insert four M4 x5 standoffs (P/N 130956-2) into din rail located in back of XRC cabinet (see Figure 3-2).
5. Attach mounting plate (P/N 143165) to standoffs using four M4 bolts removed from XIU01 board.
6. Attach XSU01 board to mounting plate using two M4 x 14 bolts provided.



**Figure 3-2 Installing XSU01 board**

7. Reconnect XIU01 cable connectors to XSU01 board according to Table 3-1.

**Table 3-1 XSU01 Cable Designations**

<b>XIU01 Connector</b>	<b>XSU01 Connection</b>
XIU01-CN21	XSU01-CN2
XIU01-CN24	XSU01-CN6
XIU01-CN25	XSU01-CN7
XIU01-CN28	XSU01-CN10
XIU01-CN29	XSU01-CN11
XIU01-CN30	XSU01-CN12

### **3.2.3 Removing the XEW01 board**

If your system is set up for welding applications, the XEW01 board must be removed from the slave controller and placed in the master. To remove the XEW01 board, proceed as follows:

1. Locate XEW01 board (see Figure 3-1).
2. Locate cable connecting XEW01- CN04 to XIU01- CN20 and disconnect from XIU01- CN20.
3. Locate cable connecting XEW01- CN01 to XIU01- CN02 and disconnect from XIU01- CN02.
4. Loosen two M4 screws and remove XEW01 board.
5. Place XEW01 board, cables and hardware in anti-static bag until ready for placement in Master controller.

### **3.2.4 Removing the Playback Panel**

1. Locate playback panel on door and disconnect all cables.
2. Wire-tie loose connectors safely out of way.
3. Unbolt playback panel by removing four bolts and place into anti-static bag.

*NOTE:*

*The playback panel should be stored in a safe and dry location for future use should the DR2C need to be separated in the future.*

4. Install playback panel cover plate (P/N 143164-1) over opening left in door using four bolts removed in Step 3.
5. Disconnect programming pendant and pack safely away.
6. Cover programming pendant connector with plug provided.

### **3.2.5 Wiring the Slave Controller**

#### **Connecting the DR2C Communication Cable**

The DR2C communication cable enables communication between the master and slave servo control boards and I/O units. To begin connecting the DR2C communication cable to the slave controller, proceed as follows:

1. Remove one cable plate from right side of slave controller.
2. Insert DR2C communication cable (P/N 143194) through opening and attach cable plate to controller with screws provided.
3. Disconnect cable from CN10 connection on servo control board and wire tie safely out of way.
4. Attach CN10 connector from communication cable to CN10 connection on servo control board.
5. Attach CN4 connector from communication cable to CN4 connection on XSU01 board.
6. Locate rotary switch on servo control board and set to “1.”



### **Connecting the CPS-150F Power Supply**

1. Remove all cable connections except CN05 from CPS-150F power supply.
2. Unpack XSU01 24V power cable (P/N 143185-1) and attach one end to CN01 connection on CPS-150F power supply.
3. Connect other end of XSU01 24V power cable to CN01 connection on XSU01 board.

## **3.3 Master XRC Setup**



### **CAUTION!**

***Be sure to follow proper anti-static procedures to avoid damage to system components.***

### **3.3.1 Connecting the DR2C Communication Cable**

The DR2C communication cable enables communication between the master and slave servo control boards and I/O units. To begin connecting the DR2C communication cable to the master controller, proceed as follows:

1. Remove one cable plate from left side of master controller.
2. Insert DR2C communication cable (P/N 143194) through opening and attach cable plate to controller with screws provided.
3. Locate servo control board.
4. Remove terminator from CN10 connection on servo control panel.
5. Attach CN10 connector from communication cable to CN10 connection on servo control board.
6. Connect CN22 connector from communication cable to CN22 connection on XIU01 board.
7. Locate rotary switch on servo control board and set switch to '0'.

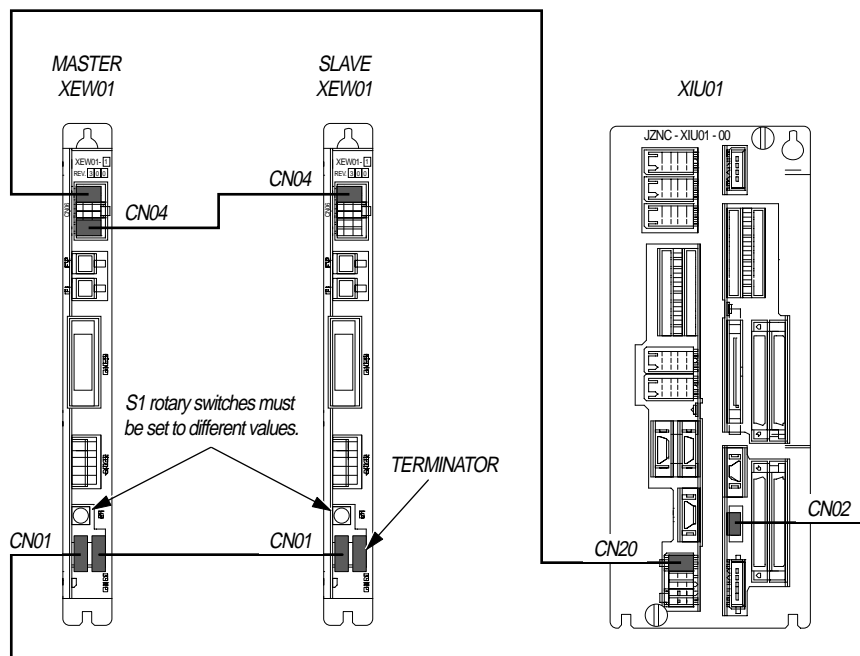
### **3.3.2 Installing the Slave XEW01 Board**

If the DR2C is to be set up for welding applications, the XEW01 board removed from the slave controller must be installed into the master XRC. To install the XEW01 board, proceed as follows:

1. Open Master XRC cabinet.
2. Locate XEW01 board removed from Slave controller.
3. Insert Slave XEW01 board to right of Master XEW01 board.
4. Attach XEW01 board to din rail on back of master controller using M4 hardware provided.

**Wiring the Slave XEW01 Board**

1. Locate CN01 connector on Master XEW01 board (see Figure 3-3).
2. Remove terminator from right side of Master CN01 connector.
3. Locate cable connected to CN01 on Slave XEW01 board.
4. Connect other end of Slave CN01 cable to right side of Master CN01 connector.
5. Insert terminator removed from Master CN01 connector and insert into right side of Slave CN01 connector.
6. Locate cable connected to CN04 on Slave XEW01 board.
7. Connect other end of Slave CN04 cable to bottom of Master CN04 connector.
8. Locate S1 rotary dials on Master and Slave XEW01 boards and set dials to correct numbers (Master R1=1, Slave R2=2).

**Figure 3-3 XEW01 Wiring**

## 3.4 Connecting the Power

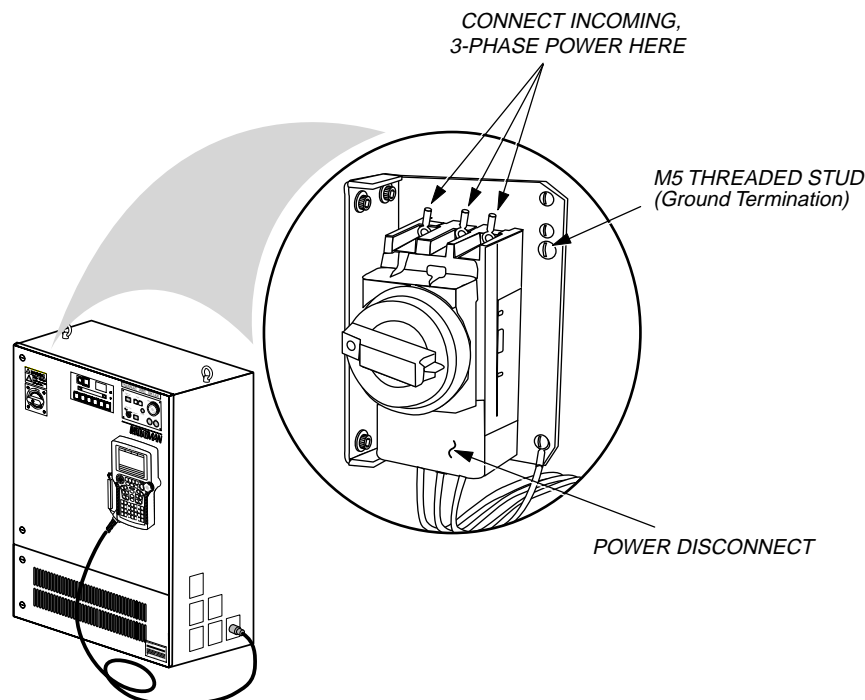
After all of the system components have been properly installed, three-phase AC power must be connected to both controllers. To connect incoming power to the DR2C, proceed as follows:



### **DANGER!**

**Power should be connected only by a qualified electrician. Electrical and grounding connections must comply with applicable portions of the national electrical code and/or local electrical codes.**

1. Install 3-phase power wiring to circuit breaker located inside XRC cabinet (see Figure 3-4). Table 3-2 shows size and type of wire needed.
2. Tighten screws to specified torque indicated in Table 3-2.



**Figure 3-4 Incoming Power Connections**

3. Install an M5 lug on incoming ground wire.
4. Terminate ground wire to frame ground stud with M5 hardware provided.

**NOTE:**

*The DR2C is configured for three-phase 460/480V AC, unless other voltage was requested. If other voltage is required for your plant, you must make the necessary modifications to the transformer. For more information, refer to the manipulator manual that came with your system.*

**Table 3-2 Incoming Power Specifications (Decal)**

Lug Data	60/75° C wire
Catalog No.	TCAL14
Wire Size	#14-7 Copper #12-8 Aluminum
Torque	#14-7, 4.0 N•m (35 lb-in.)

## **3.5 Power up Instructions**



### **WARNING!**

***The Master XRC controller must first be configured as a dual before any external axes can be added. Failure to do so will cause the DR2C system to not operate correctly.***

1. Turn on power to Slave controller first.
2. Turn power on to Master controller.

## **3.6 Initialization of the Controller**

Reinitialization of the XRC controller after set-up must be performed by a trained Motoman technician. Reinitialization of the XRC controller by a non-Motoman employee may void your warranty. For more information, please contact the Motoman service staff at (937) 847-3200.

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## **SECTION 4**

# **SEPARATION INSTRUCTIONS**



### ***DANGER!***

***All power must be removed from both XRC controllers before beginning the separation process. Failure to remove power before separation can cause serious personal injury, loss of life, or equipment damage. Be sure to follow all Lockout/Tagout procedures.***

The DR2C system can be easily separated to create two completely separate robotic units. Follow established safety procedures **at all times** throughout the separation process. Failure to use safe work practices can result in damage to the equipment and injury to the workers.

**Reinitialization of the XRC controller after separation must be performed by a trained Motoman technician. Reinitialization of the XRC controller by a non-Motoman employee may void your warranty.**

## **4.1 *Materials Required***

All system hardware necessary for separating the DR2C is included with the system. This section identifies customer-supplied items and tools required to complete separation.

- XIU01 I/O module
- XCP01 board
- Playback panel
- Programming pendant

### **4.1.1 *Customer-Supplied Items***

- Safety glasses
- Phillips and flat screwdrivers
- Nutdrivers

## 4.2 Master XRC Separation



### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

#### 4.2.1 Disconnecting the DR2C Communication Cable

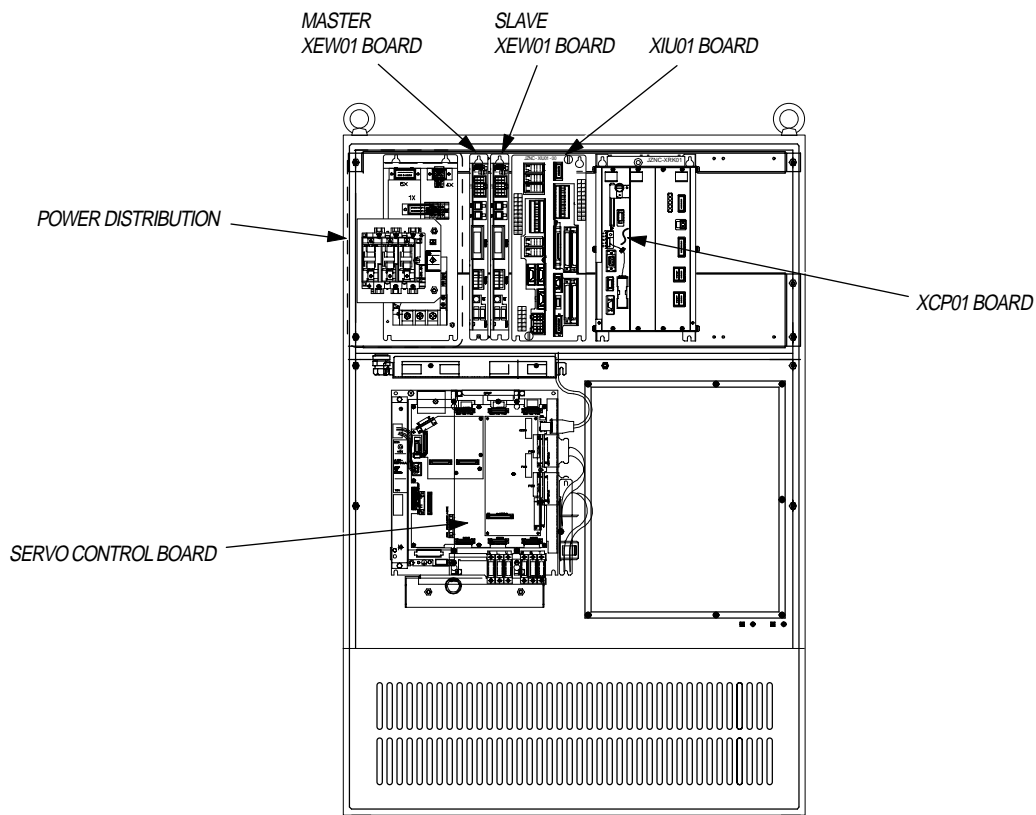
To begin disconnecting the DR2C communication cable from the master controller, proceed as follows:

3. Disconnect CN22 connector from CN22 connection on XIU01 board.
4. Disconnect CN10 connector from CN10 connection on servo control board.
5. Remove cable plate from right side of master controller and remove cable.
6. Cover slot with cable plate using screws provided.

#### 4.2.2 Removing the Slave XEW01 Board

If the DR2C was set up for welding application, the XEW01 board must be removed from the master controller and installed into the slave XRC. To remove the slave XEW01 board from the master controller, proceed as follows:

1. Locate slave XEW01 board (see Figure 4-1).



**Figure 4-1 Slave XEW01 Board**

2. Disconnect CN01 cable from right side of CN01 connector on Master XEW01 board.

3. Disconnect CN04 cable from bottom of CN04 connector on Master XEW01 board.
4. Loosen two M4 screws and remove slave XEW01 board.
5. Place slave XEW01 board, cables, and hardware in anti-static bag until ready for placement in slave controller.

### 4.3 **Slave XRC Separation**



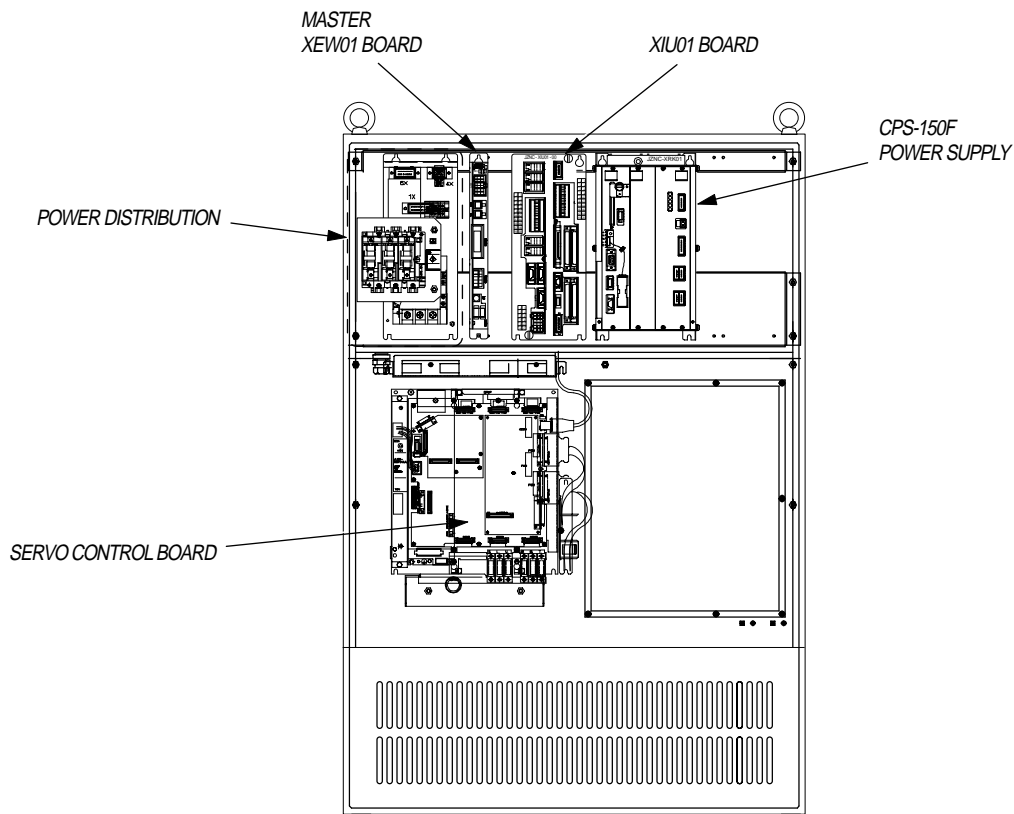
#### **CAUTION!**

**Be sure to follow proper anti-static procedures to avoid damage to system components.**

Several modifications must be made to the slave controller before wiring can begin. Some components removed from the master controller must be placed in the slave controller. To separate the slave controller, proceed as follows:

#### **Disconnecting the CPS-150F Power Supply**

1. Open slave controller and locate CPS-150F power supply (see Figure 4-2).



**Figure 4-2 XSU01 Board**

2. Disconnect and remove XSU01 24V power cable from CN01 connection on CPS-150F power supply.
3. Disconnect other end of XSU01 24V power cable from CN01 connection on XSU01 board.
4. Locate CPS-150F power supply cables wire tied to inside cabinet and connect to CPS-150F power supply as marked.

### **4.3.1 Disconnecting DR2C Communication Cable**

To begin disconnecting the DR2C communication cable from the slave controller, proceed as follows:

1. Locate rotary switch on servo control board and set to '0'.
2. Disconnect CN4 connector from CN4 connection on XSU01 board.
3. Disconnect CN10 connector from CN10 connection on servo control panel.
4. Locate CN10 connector wire tied to inside of cabinet and connect to CN10 connection on servo control panel.
5. Remove communication cable plate from right side of master controller and remove cable.
6. Cover slot with cable plate using screws provided.

### **4.3.2 Installing the Programming Pendant**

1. Remove plug from programming pendant connector on right side of slave cabinet.
2. Unpack programming pendant and plug connector into receptacle.

### **4.3.3 Installing the Playback Panel**

1. Unbolt playback panel cover plate by removing four bolts.
2. Unpack playback panel and insert into hole in door.
3. Bolt playback panel to door using hardware provided.
4. Locate playback panel cables wire tied inside cabinet and connect to playback panel as marked.

### **4.3.4 Installing XCP01 Board**

1. Remove XCP01 replacement cover from CPU rack.
2. Unpack XCP01 board and install into CPU rack.

### **4.3.5 Replacing the XSU01 Board with XIU01**

1. Locate XSU01 board, and disconnect all cables
2. Remove two M4 bolts holding XSU01 board in place.
3. Remove XSU01 board and place into anti-static bag.

*NOTE:*

*The XSU01 board should be stored in a safe and dry location for future use should the two controllers need to be combined again into a DR2C.*

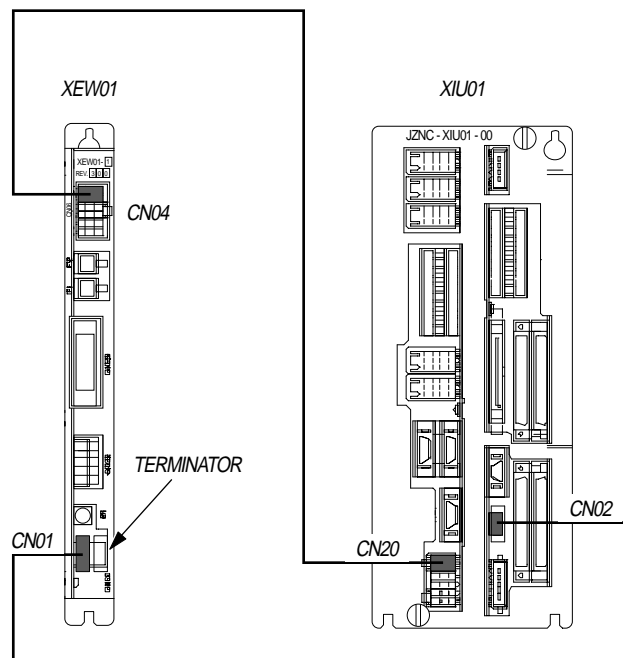
4. Remove mounting plate by unbolting four M4 bolts.
5. Remove four M4 x 5 standoffs from din rail located in back of XRC cabinet.
6. Unpack XIU01 board and mount to din rail using four M4 x 5 bolts.
7. Connect XIU01 cables to XIU01 board as marked.



### 4.3.6 Installing the XEW01 board

If the XRC is to be set up for welding application, the XEW01 board removed from the master controller must be installed into the slave cabinet. To install the XEW01 board, proceed as follows:

1. Locate XEW01 board removed from master controller.
2. Insert XEW01 board into empty slot in slave cabinet.
3. Attach XEW01 board to din rail on back of slave controller using M4 hardware provided.
4. Locate cable connected to CN01 on Slave XEW01 board.
5. Connect other end of CN01 cable to CN02 connection on XIU01 board.
6. Locate cable connected to CN04 on Slave XEW01 board.
7. Connect other end of CN04 cable to CN20 connection on XIU01 board.



**Figure 4-3 XEW01 Wiring**

## 4.4 Connecting the Power

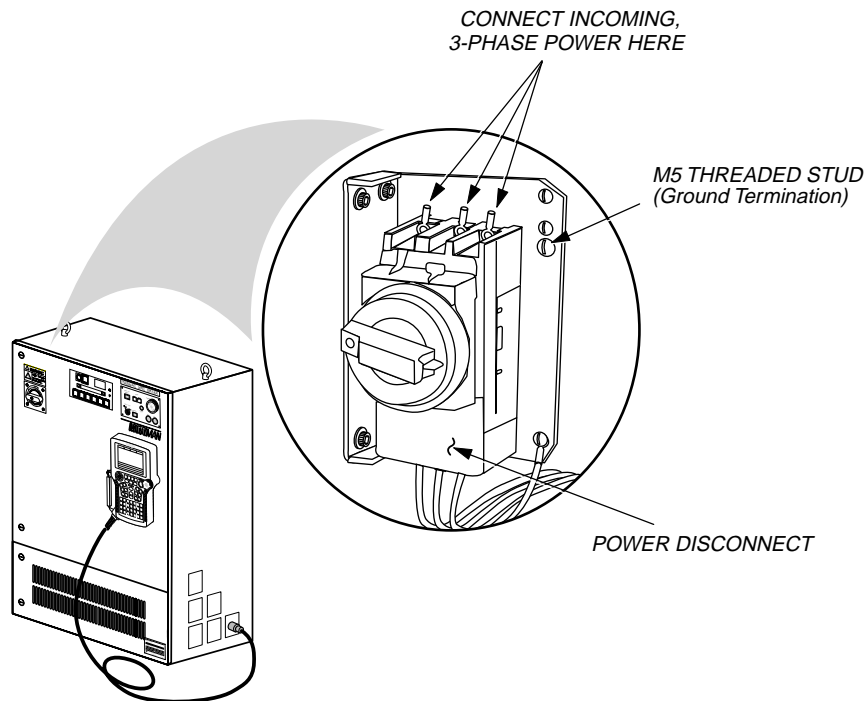
After all of the system components have been properly installed, connect power to each controller as follows:



### **DANGER!**

**Power should be connected only by a qualified electrician. Electrical and grounding connections must comply with applicable portions of the national electrical code and/or local electrical codes.**

1. Install 3-phase power wiring to circuit breaker located inside XRC cabinet (see Figure 4-4). Table 4-1 shows size and type of wire needed.
2. Tighten screws to the torque indicated in Table 4-1.



**Figure 4-4 Incoming Power Connections**

3. Install an M5 lug on incoming ground wire.
4. Terminate ground wire to frame ground M5 threaded stud with M5 hardware provided.

**NOTE:**

*The DR2C is configured for three-phase 460/480V AC, unless other voltage was requested. If other voltage is required for your plant, you must make the necessary modifications to the transformer. For more information, refer to the manipulator manual that came with your system.*

**Table 4-1 Incoming Power Specifications (Decal)**

Lug Data	60/75° C wire
Catalog No.	TCAL14
Wire Size	#14-7 Copper #12-8 Aluminum
Torque	#14-7, 4.0 N•m (35 lb-in.)

## **4.5 Initialization of the Controllers**

**Reinitialization of the XRC controllers after separation must be performed by a trained Motoman technician. Reinitialization of the XRC controllers by a non-Motoman employee may void your warranty.**

After all of the system components have been separated and power has been connected, both XRC controllers must be configured as single robot systems. Configuration of the XRC controllers must be performed by a Motoman technician. For more information, please contact the Motoman service staff at (937) 847-3200.

## **NOTES**

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# ***APPENDIX A***

## ***SYSTEM DRAWINGS***

This section contains system drawings for the DR2C system. For information on specific part numbers, call the Motoman service staff at (937) 847-3200.

<b><u>Drawing Number</u></b>	<b><u>Title</u></b>	<b><u>Sheet Number</u></b>
143195	Controller Kit, DR2C, XRC NAS	1
143195	Controller Kit, DR2C, XRC NAS	2
143195	Controller Kit, DR2C, XRC NAS	3

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