



Robotiq Universal Controller Instruction Manual

Get the latest version of the manual at support.robotiq.com

Original Notice

©2021 Robotiq Inc.

Table of Contents

Table of Contents	2
Revisions	3
1. General Presentation	4
2. Safety	6
2.1 Warning	7
2.2 Intended Use	8
3. Installation	9
3.1 Scope of Delivery	9
3.2 Environmental and operating conditions	10
3.3 Mechanical connections	11
3.4 Power supply specifications	12
3.5 Wiring	13
3.5.1 Power connection	15
3.5.2 Communication connection	17
4. Control	26
4.1 Overview	26
4.2 Status LEDs	26
4.2.1 Supply LED	27
4.2.2 Communication LED	27
4.2.3 Fault LED	27
4.3 Controller register mapping	28
4.4 Robot output registers & functionalities	28
4.5 Robot input registers & status	29
5. User Interface	30
6. Specifications	31
6.1 Technical dimensions	31
6.2 Mechanical specifications	32
6.3 Moment of inertia and center of mass	32
6.4 Electrical ratings	33
7. Maintenance	34
8. Spare Parts, Kits and Accessories	35
9. Troubleshooting	36
10. Warranty	38
11. Contact	39

Revisions

Robotiq may modify this product without notice, when necessary, due to product improvements, modifications or changes in specifications. If such modification is made, the manual will also be revised, see revision information. See the latest version of this manual online at <http://support.robotiq.com/>.

Revision 2021/06/07

Section 3.5.1 Power Connections updated

Revision 140626

Manual release

Copyright

© 2008-2021 Robotiq Inc. All rights reserved.

This manual, and the product it describes, are protected by the Copyright Act of Canada, by laws of other countries, and by international treaties, and therefore may not be reproduced in whole or in part, whether for sale or not, without prior written consent from Robotiq. Under copyright law, copying includes translation into another language or format.

Information provided by Robotiq in this document is believed to be accurate and reliable. However, no responsibility is assumed by Robotiq for its use. There may be some differences between the manual and the product if the product has been modified after the edition date.

The information contained in this document is subject to change without notice.

1. General Presentation

The terms "Controller", "Universal Controller", "Robotiq Controller", "K-Model", and "Robotiq Universal Controller" used in the following manual all refer to the Robotiq Universal Controller. The Robotiq Universal Controller is a robotic peripheral controller for other Robotiq devices and communication with other robot controllers. The Universal Controller is designed for industrial applications with various communication protocols and is common to all Robotiq devices.

Note

The following manual uses the metric system, unless specified, **all dimensions are in millimeters.**

Note

The following section presents the key features of the Controller and must not be considered as related to Controller operation, each feature is detailed in an appropriate section of the manual. Safety guidelines must be read and understood before any operation is attempted with the Controller.

The Universal Controller has two panels as shown in Figure 1.1. The front panel is called the Communication Panel and covers standard and optional communication features. The side panel is called the Supply Panel and features the connector for supply of the Controller, setup of emergency stop and the Robotiq Device Connector.

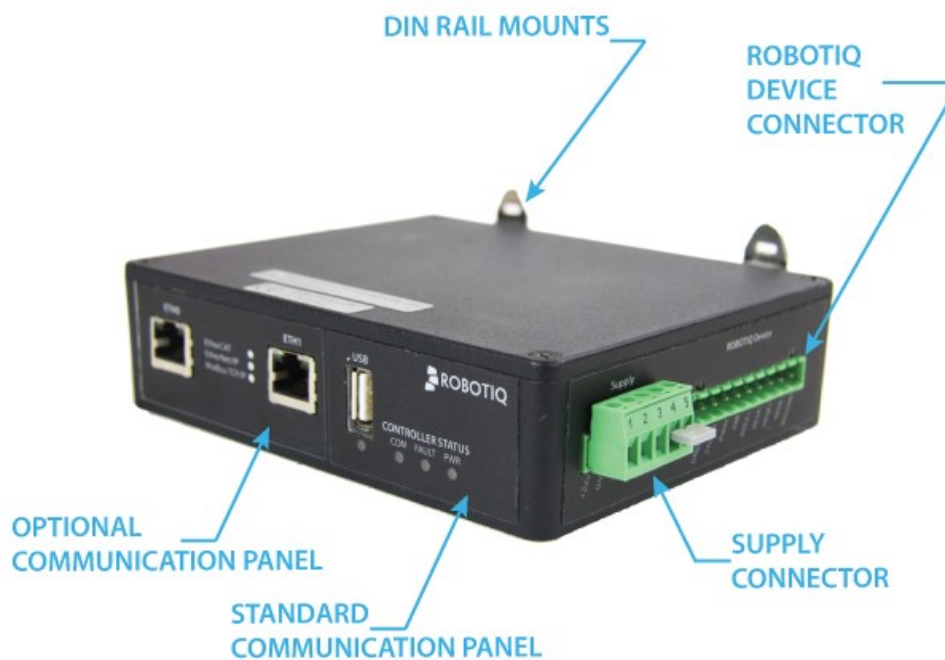


Figure 1.1 : The Robotiq Universal Controller.

All Robotiq Universal Controllers have a standard USB 2.0 port available for serial communication. Optional communication panel choices are :

- Ethernet family protocols
 - Ethernet / IP
 - Modbus TCP
 - EtherCAT
 - PROFINET
- DeviceNet
- CANopen
- Profibus

The Supply Panel is standard on all Controllers and includes a supply connector with an emergency stop feature and the Robotiq Device Connector for connection to the various Robotiq Grippers.

Info

See section 3.5.1 Power connection for details on the Supply Panel and section 3.5.2 Communication connection for details on the Communication Panel.

The Robotiq User Interface can be used via the standard USB 2.0 port to control or configure Robotiq devices. Visit <http://support.robotiq.com> to get the latest installer of the Robotiq User Interface along with appropriate documentation.

See the Robotiq User Interface Instruction Manual for details on usage of the RUI.

2. Safety

Warning

The operator must have read and understood all of the instructions in the following manual before handling the Robotiq Universal Controller and the associated Gripper device.

The term "operator" refers to anyone responsible for any of the following operations on the Universal Controller and associated Gripper device :

- Installation
- Control
- Maintenance
- Inspection
- Calibration
- Programming
- Decommissioning

This documentation explains the various components of the Universal Controller and its general operation. Read this documentation and the associated Robotiq Gripper device documentation and be sure to understand its contents before handling the Controller or Gripper.

The drawings and photos in this documentation are representative examples and differences may exist between them and the delivered product.

2.1 Warning

Note

Any use of the Controller in noncompliance of these warnings is inappropriate and may cause injury or damage.

Warning

Concerning Controller use in a robot environment (with robot and/or Robotiq Grippers):

- Respect all robot safety recommendations.
- Respect all Gripper safety recommendations.
- Controller must be installed in a secured and clean environment.
- Make sure all cord sets are always secured at the Gripper, the Controller and at the robot.
- Respect power supplies according to the associated Robotiq device.
- Respect fusing according to the associated Robotiq device.
- Always respect the recommended keying for electrical connections.
- Never supply the Gripper with an alternative current source.

Any usage of the Controller beyond these definitions is inappropriate and may cause injury or damage.

Note

Usage of the Universal Controller with an emergency stop is strongly recommended.

2.2 Intended Use

The Controller unit is designed for control of Robotiq devices such as the Robotiq Adaptive Robot Gripper series.

Caution

The Controller is NOT intended for robot control.

The product is intended to be installed in parallel to a robot or other automated machinery or equipment.

Note

Always comply with local and/or national laws, regulations and directives on automation safety and general machine safety.

The unit may be used only within the range of its technical data. Any other use of the product is deemed improper and unintended use. Robotiq will not be liable for any damages resulting from improper use.

3. Installation

Warning

Be sure to read and understand the safety instructions related to the Universal Controller prior to installation.

Warning

Respect robot and Gripper safety measure and installation before operating or even turning on the power supply.

3.1 Scope of Delivery

Standard upon delivery :

- Robotiq Universal Controller (**UNI-CTR-001-XXXX**)
- Replace **XXXX** by one of the following communication options :
 - **ENIP** - Ethernet / IP
 - **MTCP** - Modbus TCP
 - **ECAT** - EtherCAT
 - **DNET** - DeviceNet
 - **CANO** - CANopen
 - **PNET** - PROFINET
- Controller Supply Connector with emergency stop jumper (CONN-COMB-2059)
- DIN rail #3 mounting clips

Note

The following are not included with the delivery of the Robotiq Universal Controller unless specified :

- Cables.
- Hardware required for any of the communication options, accessories, faceplates or fixtures.
- Power supply unit, power supply wiring or fuse.

See Spare Parts, Kits and Accessories section for a list of available parts and cables.

3.2 Environmental and operating conditions

The Controller is designed for industrial applications but requires clean conditions and is not water resistant. Always respect the conditions specified for storage and operating environments:

SPECIFICATION	VALUE
Minimum storage/transit temperature	-22°F [-30°C]
Maximum storage/transit temperature	158°F [70°C]
Minimum operating temperature	32°F [0°C]
Maximum operating temperature	158°F [70°C]
Humidity (non-condensing)	20-80% RH
Vibration	< 0.5G
Others	<ul style="list-style-type: none"> • Free from dust, soot or water • Free from corrosive gases, liquids or explosive gases • Free from powerful electromagnetic interference sources

Info

If environmental conditions present dust, dirt or water, additional protection of the Controller will be required.

3.3 Mechanical connections

Robotiq Universal Controller is meant to be mounted on #3 DIN rails (standard on all Controllers).

Here are the steps to follow for the installation of the Controller (see Figure 3.3.1).

1. Secure the DIN rail.
2. Clip mounting adapters onto the rails.

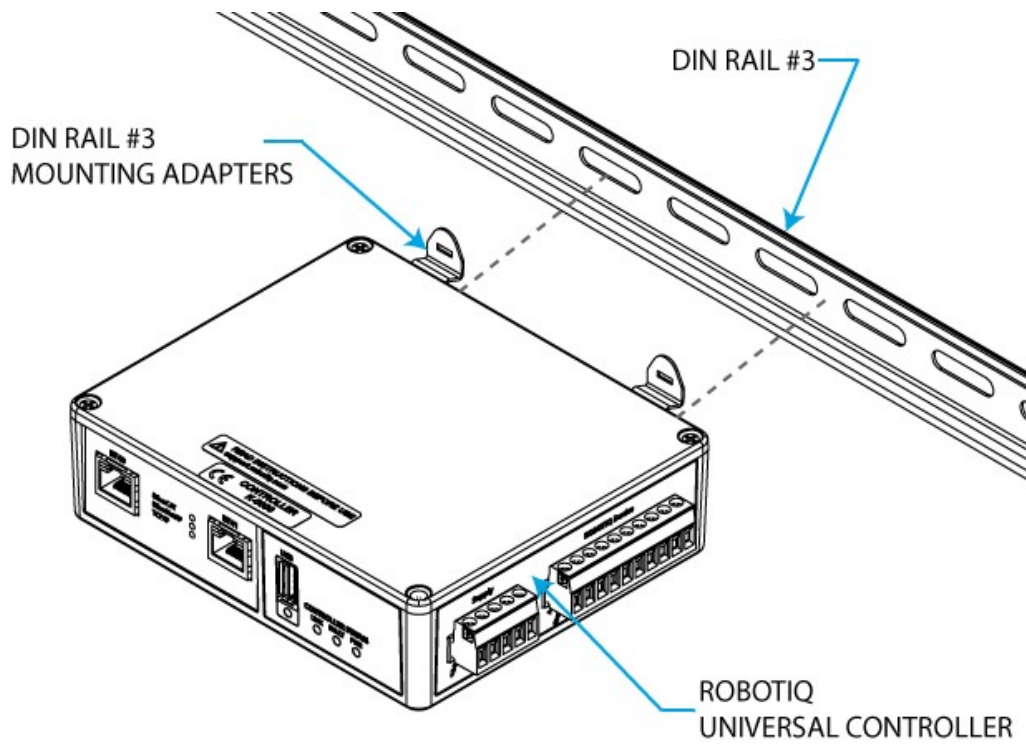


Figure 3.3.1 : Attaching the Universal Controller using the DIN rails.

3.4 Power supply specifications

The Controller needs to be supplied by a DC voltage source. This power supply is not included with the Controller. Required power supply will be chosen according to the associated Robotiq device. The following table shows the specifications regarding the power supply required to operate the Controller and Gripper properly.

POWER SUPPLY SPECIFICATION FOR VARIOUS ROBOTIQ DEVICES		
SPECIFICATION	VALUES FOR 2-FINGER-85 AND 3-FINGER GRIPPER	VALUES FOR 2-FINGER-200
Output voltage	24 V DC	24 V DC
Output current	2 A	20 A
Ripple	2-3 % peak-peak	2-3 % peak-peak
Output regulation	10% maximum	10% maximum
Overcurrent	4 A fuse at 77°F [25°C] ²	10 A thermomagnetic circuit breaker at 73°F [23°C] ³
Maximum fuse I ² t factor	100 A2s at 77°F [25°C]	N/A
Overvoltage protection	Not required ¹	Not required ¹

Warning

¹Always respect the ripple and output regulation tolerances on the output voltage, exceeding these limits could damage the Gripper. If your power supply could exceed the specified regulation, over-voltage protection is required.

Info

²Suggested fuse is Phoenix Contact # 0916605 2 A thermal, use AWG #20 wiring.

³Suggested fuse is Phoenix Contact # 0916610 10 A thermal, use AWG #12 wiring.

Robotiq recommends the use of the following power supplies:

- For 2A : TDK-Lambda DPP100 Series, 15-100W Single Output DIN Rail Mount Power Supply, **DDP100-24-1**
- For 20A : TDK-Lambda DPP480 Series, 480W Single Output DIN Rail Mount Power Supply, **DDP480-24-1**

3.5 Wiring

The Controller communication ports are shown in Figure 3.5.1 and supply port in Figure 3.5.2. The Universal Controller is supplied via the Supply Connector port, an optional emergency stop feature is present see section 3.5.1 Power connection for details on the supply pinout and emergency stop. Communication is established with either the standard USB 2.0 port (for testing and configuration of the Controller) or via the optional communication fieldbus port, see section 3.5.2 Communication connection for details. The Robotiq devices are connected to the Controller via a single Gripper signal cable which connects onto the Robotiq device port, the cable must be chosen according to the associated device, see the various Robotiq device manuals for details at support.robotiq.com.

Info

Note that the Communication Option Panel shown in Figure 3.5.1 will change according to the provided communication protocol. The Standard Panel, which include the Status LEDs and the USB 2.0 port is standard on every Robotiq Universal Controller unit. The schematics below are represented with the Ethernet family option.

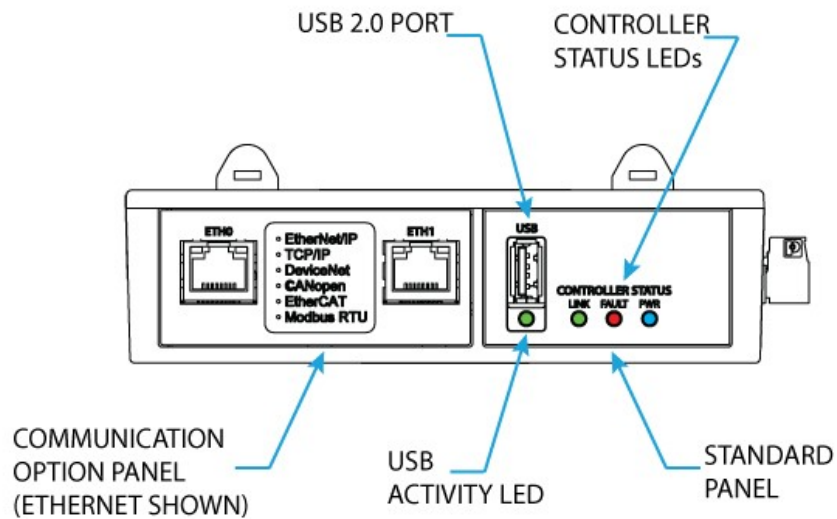


Figure 3.5.1 : The Robotiq Universal Controller Communication Panel.

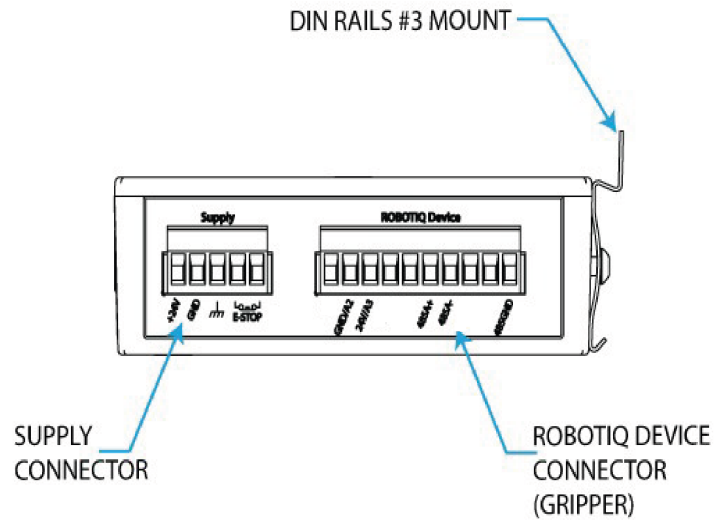


Figure 3.5.2 : Controller Supply Connector and Robotiq Device Connector for the Robotiq Universal Controller.

Info

Device (Gripper) signal cable is supplied by Robotiq, see your Robotiq Gripper Spare Parts, Kits and Accessories section.

Warning

Use proper cabling management. Be sure to have enough forgiveness in the cabling to allow movement of the Robotiq device along all axes without pulling out the connectors. Always protect the controller-side of the cable with a strain relief cable clamp.

3.5.1 Power connection

Figure 3.5.1.1 presents the general cabling schematics of the Robotiq Universal Controller showing the power supply, fusing, grounding, emergency stop and optional Robotiq device.

Note

Robotiq strongly advises the use of an emergency stop for all Robotiq devices. The emergency stop is normally closed. If an emergency stop is not used, a jumper must be placed on pins 4 & 5 of the Supply Connector to allow usage of the device.

Caution

The fuse is external to the Controller and Robotiq device. It is not provided by Robotiq and the user is responsible for proper installation.

Info

Fusing must be chosen according to your Robotiq device, see details in section 3.4 Power supply specifications.

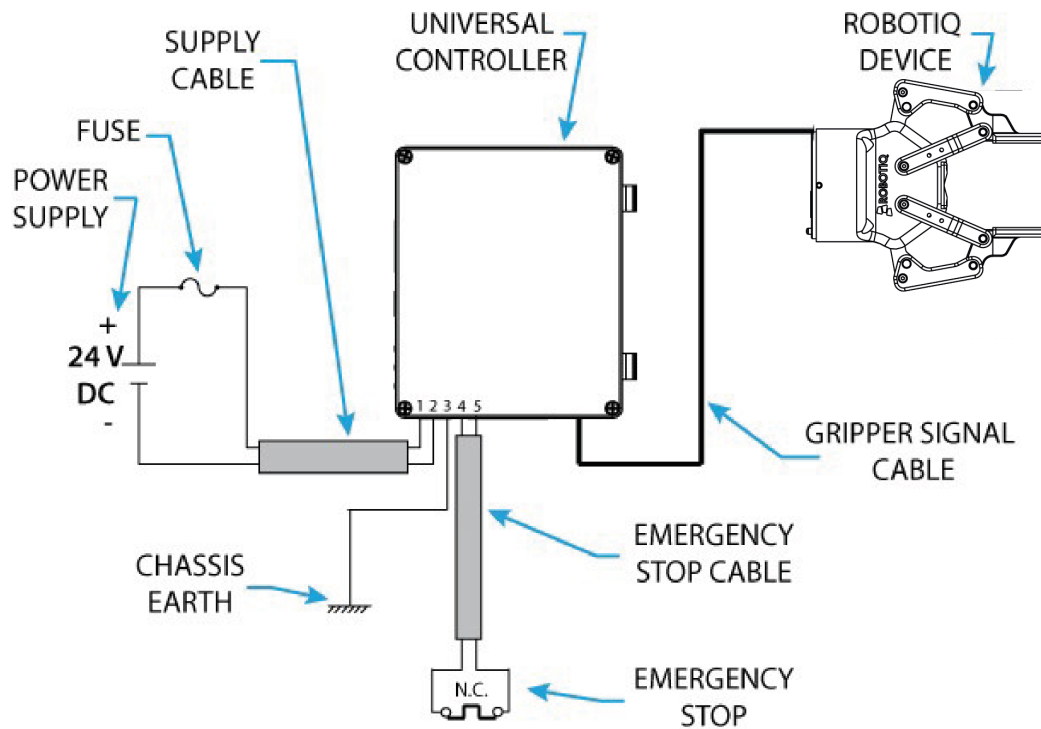


Figure 3.5.1.1 : Power connection diagram of the Robotiq Universal Controller.

The pin-out of the Supply Connector and the Robotiq Device Connector, as well as the matching device pinout are detailed in Figure 3.5.1.2.

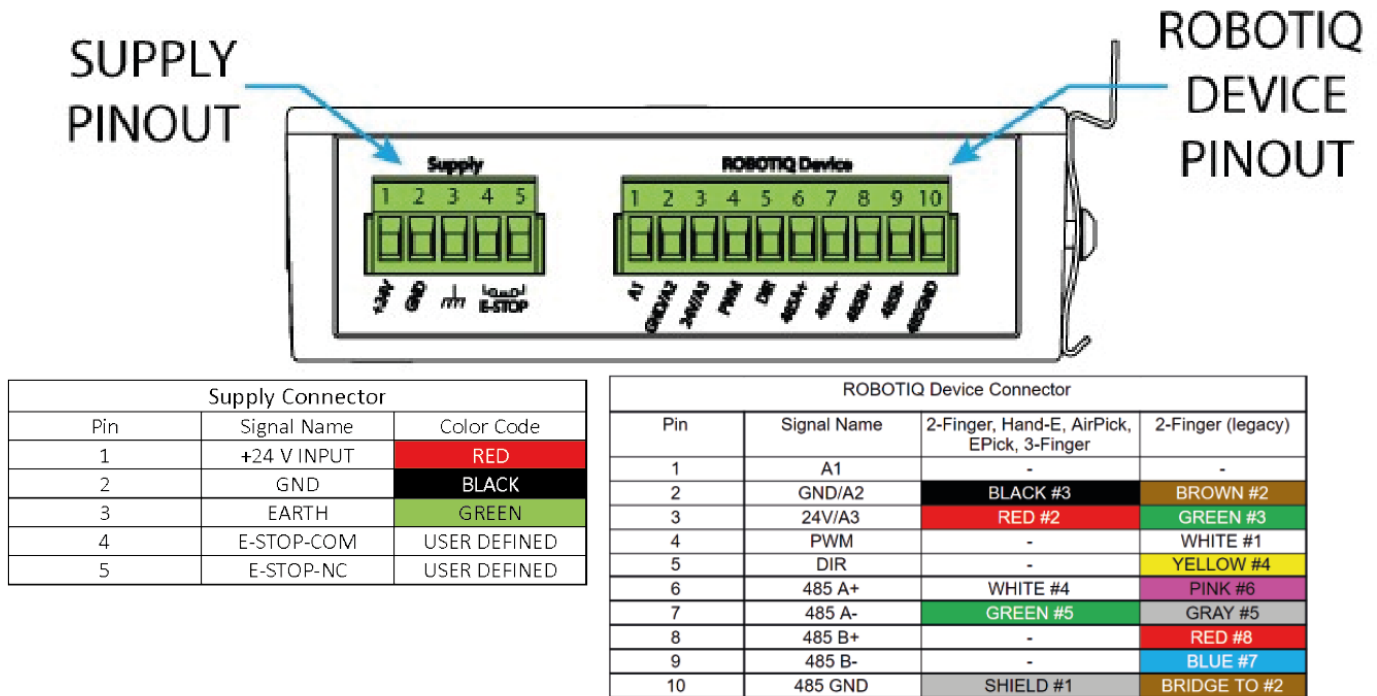


Figure 3.5.1.2 : Universal Controller Supply Connector and Robotiq Device Connector with matching pinout.

Supply cable should have the following specifications :

- For 2A supply (3-Finger Gripper and 2-Finger-85)
 - minimum #22 AWG TEW, 300 V or 600 V.
- For 20A supply (2-Finger-200)
 - Minimum #16 AWG TEW, 300 V or 600 V.

The emergency stop cable should have the following specifications :

- Minimum 22 AWG TEW (recommended, current is 500 mA), 300 V or 600V.
- Using a "normally closed" emergency stop button.
- Installed in compliance with the Machinery Directive or compliance to national standards derived from the directive used in your country.

Earth grounding cable should have the following specifications :

- Same as supply.

Gripper signal cable is supplied by Robotiq, see the appropriate Spare Parts, Kits and Accessories section in your Robotiq device manual.

3.5.2 Communication connection

The following table summarizes the communication protocols available for the Controller. A USB connection is standard on all Controllers, while the optional communication panel will be setup for your options with a single communication protocol. See the following subsection for details on the communication parameters of each communication option.

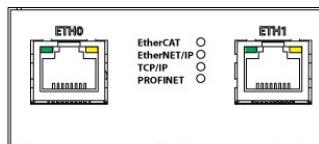
Info

Only one protocol option is available for a given Controller unit.

Family	Protocol
Real-Time ethernet	<ul style="list-style-type: none"> Ethernet / IP Modbus TCP/IP EtherCAT ProfiNET
Fieldbus	<ul style="list-style-type: none"> DeviceNET CANopen ProfiBUS
USB	Modbus RTU

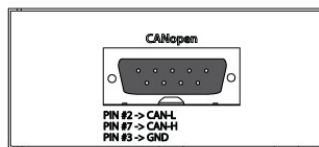
The Figure 3.5.2.1 shows the Communication Panel of the Robotiq Universal Controller. The communication port will vary depending on the communication protocol chosen. Real-Time Ethernet family protocols (Ethernet IP, EtherCAT, Modbus TCP) will come with two (2) RJ45 standard ports. DeviceNet protocol will come with a 5-pin Combicon connector, CANopen with a standard male DB-9 connector, finally ProfiBUS will come with a standard female DB-9 connector.

COMMUNICATION PORT WITH :



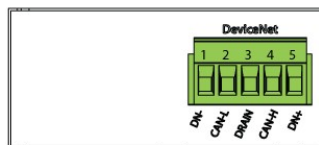
Real-Time Ethernet (standard RJ-45 Jack)

- EtherNet IP option
- EtherCAT option
- Modbus TCP option
- PROFINET option



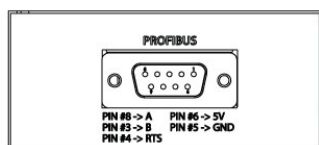
CANopen (DB-9 male connector)

Pin	Signal Name	Pin	Signal Name
1	NC	6	NC
2	CAN-L	7	CAN-H
3	CAN-GND	8	NC
4	NC	9	NC
5	NC		



DeviceNet (Combicon 5 pins connector)

Pin	Signal Name	Color Code
1	DN-	BLACK
2	CAN_L	BLUE
3	DN_DRAIN	GRAY
4	CAN_H	WHITE
5	DN+	RED



PROFIBUS (DB-9 female connector)

Pin	Signal Name	Pin	Signal Name
1	NC	6	5V
2	NC	7	NC
3	B	8	A
4	RTS	9	NC
5	GND		

Figure 3.5.2.1 : Representation of the Communication Panel options for the Robotiq Universal Controller.

It is the users responsibility to setup the appropriate cable between the Controller unit and the master controller. Robotiq can provide you with appropriate cables available on demand from its Spare Parts, Kits and Accessories section.

Warning

Be sure to use the appropriate cables and pinouts for your communication protocol as any other setup may damage the Controller.

Real-time Ethernet communication protocols

Real-time Ethernet communication includes Ethernet/IP, EtherCAT, ProfiNET and Modbus TCP/IP protocols.

Factory settings for each Ethernet protocol:

IDENTIFICATION SETTINGS						
EtherCAT		Ethernet/IP		ProfiNET		Modbus TCP/IP
Vendor ID	0x0000FFFF	Vendor ID	0x0000011B	Vendor ID	0x0000011E	N/A
Product Code	0x0000000B	Product Code	0x0000010D	Device ID	0x0000010A	
Serial Number	0x00000000	Product Type	0x0000000C	Device Type		
Revision Number	0x00000000	Major Revision	1	Order ID	1541.110	
		Minor Revision	1	Name of station	nic50repns	
		Device Name	AG-EIS	Type of station	Default.Station.Type	
				Device Access Point	1	

IDENTIFICATION SETTINGS						
EtherCAT	Ethernet/IP		ProfiNET		Modbus TCP/IP	
N / A (see info note)	IP Address	192.168.1.11	Bus Startup	Automatic	IP Address	192.168.1.11
	Netmask	255.255.255.0	Watchdog Time	1000ms	Netmask	255.255.255.0
	Gateway	Disabled			Gateway	Disabled
	BootP	Disabled			BootP	Disabled
	DHCP	Disabled			DHCP	Disabled
	100Mbit	Enabled				
	Full Duplex	Enabled				
	Auto-neg	Enabled				
	Assembly Instance (input)	101				
	Assembly Instance (output)	100				
	Configuration Instance	1				
	Connection Type	Run/Idle Header				

IDENTIFICATION SETTINGS						
EtherCAT		Ethernet/IP		ProfiNET		Modbus TCP/IP
Input Data Bytes	16	Prod. Data Length	20	Output Data Bytes (16)		N/A
Output Data Bytes	16	Cons. Data Length	20	Module	1	N/A
				Type	Byte	
				Count	16	
				Input Data Bytes (16)		
				Module	5	
				Type	Byte	
				Count	16	

Info

EtherCAT protocol uses inherent dynamic addressing, thus bus settings cannot be customized.

Info

Ethernet/IP uses 4 bytes of header which may be visible or not depending on the master.

DeviceNet communication protocol

The DeviceNet communication and the Controller use a 24 V power supply. Robotiq suggests to separate power supplies as shown in Figure 3.5.2.2.

Caution

- There is no terminating resistor mounted in the Gripper.
- The shield of the cable must be grounded in the robot controller.
- Fusing must be respected.

Tip

DeviceNet standard requires a 120 Ohms resistor to be mounted at the beginning and at the end of the line. If the Gripper is the end of line, then a 120 Ohms resistor must be mounted between pin 4 and 5.

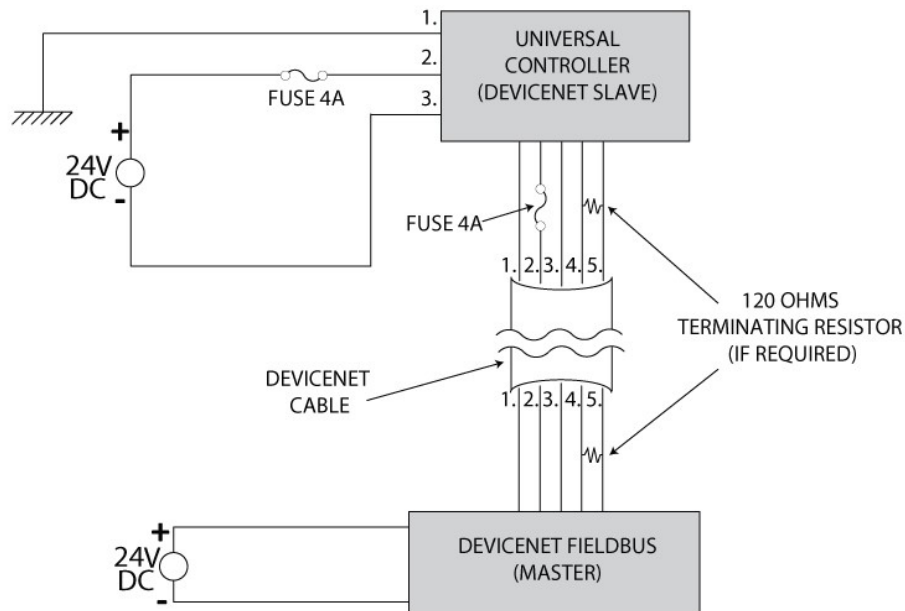


Figure 3.5.2.2 : Power connection diagram for the 3-Finger Gripper using DeviceNet Fieldbus.

Factory settings for DeviceNet protocol:

Identification Settings		
Info	Decimal Value (base 10)	Hexadecimal Value (base 16)
Vendor ID	283	0x0000011B
Product Code	35	0x00000023
Serial Number	0	0x00000000
Product Type	12	0x0000000C
Major Revision	1	
Minor Revision	1	
Product Name	AG-DNS	

BUS SETTINGS	
MAC ID	11
Baud Rate	250 KBaud

DATA SETTINGS	
Prod. Data Length	16
Cons. Data Length	16

CANopen communication protocol

Caution

- There is no terminating resistor mounted in the Gripper.
- The shield of the cable must be grounded in the robot controller.
- Fusing must be respected.

Tip

CANopen standard requires a 120 Ohms resistor to be mounted at the beginning and at the end of the line. If Gripper is the end of line, then a 120 Ohms resistor must be mounted between pin 4 and 5.

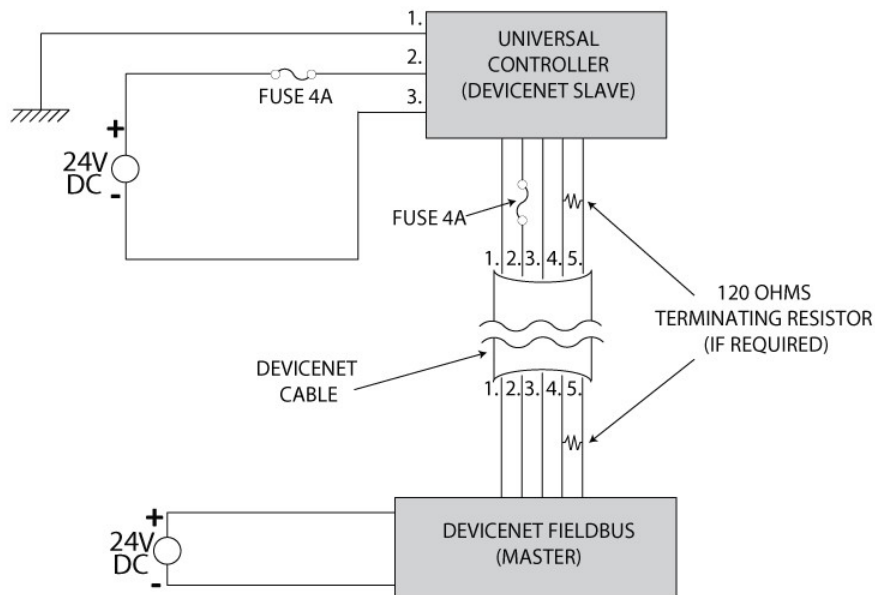


Figure 3.5.2.3 : Power connection diagram for the 3-Finger Gripper using CANopen Fieldbus.

Identification Settings		
Info	Decimal Value (base 10)	Hexadecimal Value (base 16)
Vendor ID	68	0x00000044
Product Code	1541540	0x001785A4
Revision Number	131072	0x00020000
Serial Number	0	0x00000000

BUS SETTINGS	
MAC ID	11
Baud Rate	1 MBaud

DATA SETTINGS		
	Index	Size
Send Object	0x2000	128
Receive Object	0x2200	128
Output Databytes		512
Input Databytes		512

Hint

The CANopen communication interface supports SDO (Service Data Object) and PDO (Process Data Object) protocols.

PROFIBUS communication protocol

PROFIBUS DP (Decentralized Peripheral) is an available option for the Robotiq Universal Controller.

Factory settings for PROFIBUS protocol:

IDENTIFICATION SETTINGS	
Model Name	NIC 50-DPS
Identification Number	0x0C10
Station Address ¹	2

¹Station address, the address of the device can be set anywhere between 0 and 126.

BUS SETTINGS	
Bus startup	Automatic
Watchdog Time	1000 ms
Baud rate	Auto-detect
Sync supported	Enable

DATA SETTINGS			
Output			
Module	1	Size	16 Bytes
Input			
Module	5	Size	16 Bytes

4. Control

Info

Unless specified, all values in section 4 are hexadecimal values.

Info

Register format is Little Endian (Intel format), namely from LSB (Less Significant Bit) to MSB (Most Significant Bit). Meaning that bytes are written with the least significant byte in the smallest address. If Big-endian it would be writing from left to right, Little-endian would be writing from right to left.

4.1 Overview

The Robotiq Universal Controller is accessed from the robot controller using an industrial protocol (Ethernet/IP, DeviceNet, CANopen, EtherCAT, etc.) and used to operate a Robotiq device. The programming of the Robotiq device can be done with the Teach Pendant of the robot or by offline programming. To have more information on your Robotiq device controls see the appropriate section in your device manual at support.robotiq.com.

Info

When accessing the Universal Controller with no Robotiq devices, no command can be sent and only fault status can be read. See the input registers & status section for details.

4.2 Status LEDs

Four LED lights provide general information about the Controller and associated device status on the Controller Communication Panel. Figure 4.4.1 shows the LEDs and their locations.

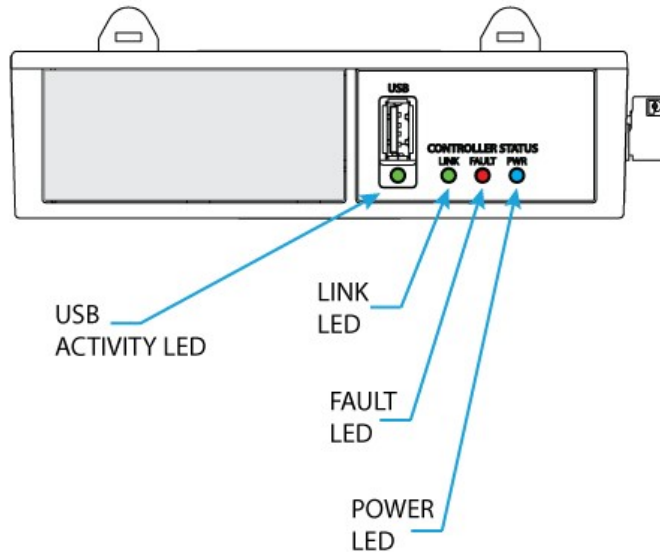


Figure 4.4.1 : Controller status LEDs.

There is an additional LED on the Robotiq device, see device manual for details.

4.2.1 Supply LED

The following applies to the power LED on the Controller.

Color	State	Information
--	Off	No power supplied
Blue	On	Correctly supplied and the control board is running (for the control board LED)

4.2.2 Communication LED

The following applies to the communication LED on the Controller.

Color	State	Information
--	Off	No network detected
Green	Blinking	A network has been detected, but no connection has been established
Green	On	A network has been detected and at least one connection is established

4.2.3 Fault LED

The following applies to the fault LED on the Controller.

Hint

Error code can be obtained reading the Fault Status byte described in section 4.5 Robot Input registers & status or using the Robotiq User Interface menu option "Input Registers".

For the Controller fault LED:

Color	State	Code	Information
--	Off	0x00	No fault detected
			<u>Warning</u>
		0x04	24V not detected (reconfiguration through USB is possible)
		0x05	No device detected
Red	On		<u>Minor fault occurred</u>
		0x09	The main communication protocol is ready (may be booting)
Red	Blinking		<u>Major fault occurred</u>
		0x0C	Emergency stop triggered
		0x0E	Overcurrent protection triggered (controller)

4.3 Controller register mapping

For details on Robot Output / Functionalities see your Robotiq device instruction manual.

Info

Register format is Little Endian (Intel format), namely from LSB (Less Significant Bit) to MSB (Most Significant Bit).

Register mapping:

Caution

Byte **numeration starts at zero** and not at 1 for the functionalities and status registers.

Only Byte 2 of Robot Input / Status can be read when no Robotiq devices are present, if one is present, consult the appropriate instruction manual.

Register	Robot Input / Status
Byte 2	FAULT STATUS

4.4 Robot output registers & functionalities

See your Robotiq device instruction manual.

4.5 Robot input registers & status

Info

Register format is Little Endian (Intel format), namely from LSB (Less Significant Bit) to MSB (Most Significant Bit).

Register: FAULT STATUS

Address: Byte 2

Bit	Name	Description
0 -- 3	gFLT	See Robotiq device instruction manual
4 -- 7	kFLT	0x00 – No Fault <u>Warning</u> 0x04 – 24V not detected (reconfiguration through USB is possible) 0x05 – No device detected <u>Minor Fault (red LED continuous)</u> 0x09 - Communication is not ready <u>Major Fault (red LED blinking) – Reset is required</u> 0x0C – Emergency stop triggered 0x0E – Overcurrent protection triggered (Gripper)

5. User Interface

Visit <http://support.robotiq.com> to get the latest installer for the Robotiq User Interface along with appropriate documentation.

See the Robotiq User Interface Instruction Manual for details on usage of the RUI.

6. Specifications

6.1 Technical dimensions

Figure 6.1.1 presents the main technical dimensions of the Robotiq Universal Controller, axis system shown in red represents the coordinate system used to calculate the center of mass and inertia values available in the follow sections.

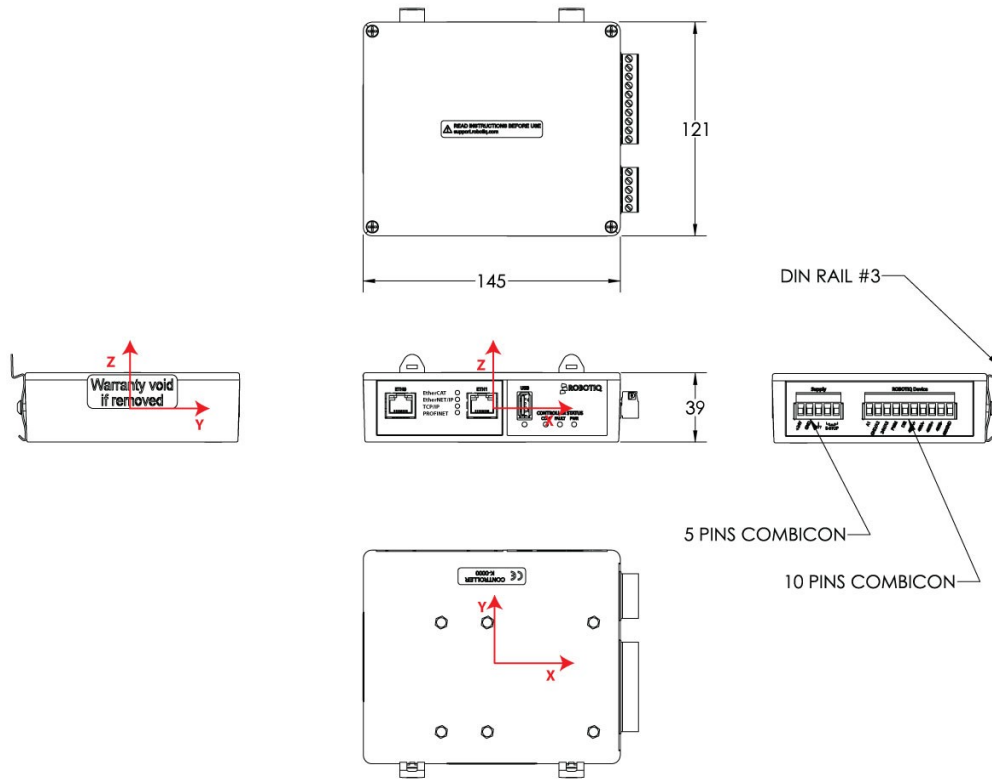


Figure 6.1.1 : Robotiq Universal Controller technical dimensions shown with Ethernet family option.

6.2 Mechanical specifications

Specification	Imperial units	Metric units
Controller Approximate Weight	1 lb	[0.475 kg]
Volume	12 in ³	[200 cm ³]

6.3 Moment of inertia and center of mass

The coordinate system used for calculating the moment of inertia and center of mass for the Controller is shown in Figure 6.3.1. The center of mass and moment of inertia are calculated for a configuration with an Ethernet family option and may vary slightly for other options.

Info

All values are approximate.

Moment of inertia matrix :

$$I = \begin{bmatrix} I_{xx} & I_{xy} & I_{xz} \\ I_{yx} & I_{yy} & I_{yz} \\ I_{zx} & I_{zy} & I_{zz} \end{bmatrix} = \begin{bmatrix} 825 & 5 & 57 \\ 5 & 1486 & -23 \\ 57 & -23 & 1078 \end{bmatrix} = \begin{bmatrix} 2.8 & 0.02 & 0.2 \\ 0.02 & 5 & -0.08 \\ 0.2 & -0.08 & 3.6 \end{bmatrix}$$

$\text{kg} * \text{mm}^2$
 $\text{lb} * \text{in}^2$

Position for the center of mass :

$$I = \begin{bmatrix} G_x \\ G_y \\ G_z \end{bmatrix} = \begin{bmatrix} 0 \\ -16 \\ 3 \end{bmatrix} = \begin{bmatrix} 0.00 \\ 0.63 \\ 0.12 \end{bmatrix}$$

mm
 in

Figure 6.3.1 : Approximate value for the moment of inertia and the center of mass for the Universal Controller.

6.4 Electrical ratings

Below are the Electrical ratings for the Robotiq Universal Controller.

SPECIFICATION	VALUE
Operating Supply Voltage	24V
Absolute Maximum Supply Voltage	28V
Quiescent Power (minimum power consumption)	3.6W
Peak Power	See your Robotiq device instruction manual
Maximum RMS Supply Current (supply voltage at 24V)	12 A
Emergency stop entry current	50 mA
Emergency stop voltage	24V

7. Maintenance

No maintenance is required on the Universal Controller.

Note

Controller must be kept away from dirty, dust, scraps, chemicals, etc.
Always respect the operating conditions.

Tip

It is a good practice to test emergency stop functionality when doing Robotiq devicemaintenance.

8. Spare Parts, Kits and Accessories

Spare parts, kits and accessories list :

The following list is up to date at print time and is subject to change, check online for updates.

Item	Description	Ordering Number
Standard Universal Controller	External Controller for Robotiq devices, includes Supply Connector with emergency stop jumper. Replace XXXX by one of the following communication protocol option : <ul style="list-style-type: none"> • ENIP - Ethernet IP • MTCP - Modbus TCP/IP • ECAT - EtherCAT • DNET - Device Net • CANO - CANopen • PNET - ProfiNET • DPS - ProfiBUS 	UNI-CTR-001-XXXX
USB cable	5 m USB 2.0 cable, USB A - A male. Meant for configuration of the Robotiq Universal Controller communication parameters and control of Robotiq devices via the Robotiq User Interface.	CBL-USB-2057
Fieldbus cable	Available on demand	

9. Troubleshooting

If your Controller is not working, check the following:

1. **Check the blue LED on the Controller:**
 - a. It's ON : Check communication (step 2)
 - b. It's OFF : Controller not supplied, check power supply cable integrity and check power supply (see specification in section 3.4)
2. **Check the green LED on the Controller:**
 - a. It's OFF : No network detected, check communication cables and network infrastructure (see specific protocol in section 3.5.2 and step 4 below).
 - b. It's BLINKING : Network detected, no communication established, go to step 4.

Ethernet family protocol must be connected via RJ45 while CanOpen, DeviceNet and ProfiBUS must be connected via their own connectors.

- c. It's ON : Network detected and communication is established, go to step 3.
3. **Check the red LED on the Controller:**
 - a. It's OFF : No fault, go to step 5.
 - b. It's BLINKING : Major fault occurred, reset (activate) the Controller (see section 4.5 for details on fault).
 - c. It's ON : Communication is not ready, wait until it's off, if blinking, reset is needed.
4. **Communication & Networking issues:**
 - a. Only use one connection at a time, either USB or the industrial protocol.
 - b. Ethernet family : Use the proper Ethernet options, Modbus TCP/IP and Ethernet IP require fixed IP, EtherCAT requires DHCP.
 - c. DeviceNet:
 - i. Requires a separate power supply (see DeviceNet section).
 - ii. May require a 120 Ohms terminating resistor.
 - d. CANopen:
 - i. Does not requires a separate power supply.
 - ii. May require a 120 Ohms terminating resistor.
 - e. After reprogramming communication options, wait until the red LED stops blinking to update the configuration.

Master communication device must use the same protocol and the same option settings as the Controller for the Gripper.

5. **Other problems:**
 - a. If the system shuts down (blue LED goes off) when the Robotiq device activates or grasps an object, check the power supply, the power supply must meet the requirement of your Robotiq device.

Possible troubleshooting issues:

1. Controller shuts down or does not power up.
2. Cannot establish a connection (Ethernet family).
3. Cannot establish a connection (CANbus family).

Q: Controller and/or associated Robotiq device shuts down when working or does not power up when connected.

A: Check the power supply specifications in section 3.3. Your power supply must meet the minimum requirements (according to the associated Robotiq device) and the maximum operational voltage must not exceed 26 V.

Q: Cannot establish a connection under Ethernet / IP or Modbus TCP/IP.

A: Default settings for Ethernet / IP and Modbus TCP/IP use fixed addresses, you must:

1. Check device address using the Robotiq User Interface via USB. Communication protocol panel will show current address, default IP address for Robotiq devices are IP 192.168.1.11 with Gateway 255.255.255.0.
2. Use the same protocol options (fixed IP, auto-neg, full duplex, etc.) shown in the Communication protocol panel. Set your Ethernet network card to use fixed addresses other than the device address.
3. Set your master Ethernet network card to use fixed addresses other than the device address (for example use 192.168.1.10 if device address is 192.168.1.11).

Q: Cannot establish a connection under DeviceNet or CANopen.

A: Both protocols will use the CANbus, but make sure that DeviceNet is supplied with the adequate 24v power supply as specified in the DeviceNet communication protocol. Both protocols will use default address node 11. CANopen default baud rate is set to 1 Mbaud while DeviceNet is set to 250 kBaud.

10. Warranty

Robotiq warrants the Universal Controller against defects in material and workmanship for a period of one year from the date of reception when utilized as intended with the specified maintenance. Robotiq also warrants that this equipment will meet applicable specifications under normal use.

Warranty applies under the following conditions:

- Usage respects the operating and storage conditions specified in section 3.2
- Usage under normal one-shift operation (40h a week)
- Usage respect maintenance specified in section 7.

During the warranty period, Robotiq will repair or replace any defective product, as well as verify and adjust the product free of charge if the equipment should need to be repaired or if the original adjustment is erroneous. If the equipment is sent back for verification during the warranty period and found to meet all published specifications, Robotiq will charge standard verification fees.

The unit is considered defective when at least one of the following conditions occurs:

- The Controller standard USB communication is not accessible;
- The Controller optional communication is not accessible;
- The Robotiq device feedback necessary for the robot program is not accessible.

Caution

The warranty will become null and void if the:

- Unit has been tampered with, repaired or worked on by unauthorized individuals.
- Warranty sticker has been removed.
- Screws, other than as explained in this guide, have been removed.
- Unit has been opened other than as explained in this guide.
- Unit serial number has been altered, erased, or removed.
- Unit has been misused, neglected, or damaged by accident.

This warranty is in lieu of all other warranties expressed, implied, or statutory, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. In no event shall Robotiq be liable for special, incidental, or consequential damages.

Robotiq shall not be liable for damages resulting from the use of the product, nor shall Robotiq be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

Exclusion

Robotiq reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units already purchased.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond Robotiq's control.

11. Contact

www.robotiq.com

Contact Us

Phone

1-888-ROBOTIQ (762-6847)
(01) 418-380-2788 Outside US and Canada

Fax

1-418-800-0046

Technical support and Engineering

extension 207

Sales

extension 122

Head office

Robotiq:
966, chemin Olivier
Suite 325
St-Nicolas, Québec
G7A 2N1
Canada

Where automation Pros come to share their know-how and get answers.

dof.robotiq.com