Aruna Motion Rotary
MRT-A18-0220B

User Manual

2st Issue
U.S. English

ARUNA ROBOTICS
a division of **3D INFOTECH**

PM21129-BUS
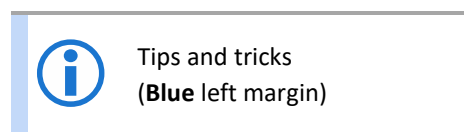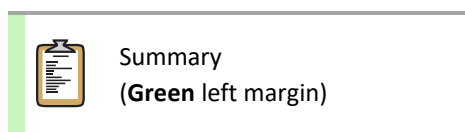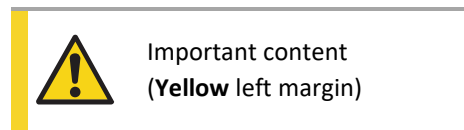
1   Table of Contents

2   Document Conventions

2.1   Highlighted Blocks of Information

STOP	Safety-related content (**Red** left margin)	⚠	Important content (**Yellow** left margin)
📋	Summary (**Green** left margin)	ⓘ	Tips and tricks (**Blue** left margin)

3   About this Document

3.1   Document Properties

Key	Value
Title:	Aruna Motion Rotary – User Manual
Part # Documented:	MRT-A18-0220B
Product Type:	Rotary Table
Maker of Product:	3D Infotech, Inc.
Type:	User Manual
Availability:	Public
This Issue Version:	2nd (B)
This Issue Released:	2022-04-20
First Issue Released:	2022-04-20
Language:	U.S. English
RegDoc ID:	PM21129-BUS

3.2   Disclaimer

> ⚠️ The information in this document was compiled with great care. We have included as much information as we could. However, 3D Infotech, Inc. assumes no responsibility for damages resulting from typos, omissions, ambiguities or any errors, which may be found in this document.
>
> If you have any questions or comments regarding this document, please, contact 3D Infotech, Inc.
>
> Content of this document is subject to change without notice.

3.3   Copyright

3.4   Trademarks

Universal Metrology Automation™ is a trademark of 3D Infotech, Inc.

Any company or product names mentioned herein may be trademarks of their respective owners.

3.5   Standards

This document has been prepared by following the guidelines described in these documents as applicable:

IEC/IEEE 82079-1:2019 International Standard

3.6   Terms and Definitions

- **Manual**
  This document.

- **Product**
  The MRT-A18-0220B rotary table presented in this Manual.

- **Customer**
  Individual or organization that purchases or receives the Product.

- **Supplier**
  The individual or organization that provides the Product.

- **Manufacturer**
  The individual or organization that created the Product.

- **Skilled Person**
  Human individual, who has acquired through education, training, qualifications or experience, the required knowledge and skills, enabling that person to perform a specified task.

- **Consumable**
  Any part or material that is necessary to be replaced or refilled for continuous use or maintenance of the Product.

4   Change History

Issue	Date	Changes	Pages Changed	Document ID
1st (A)	2021-11-04	None	All	PM21129-AUS
2nd (B)	2022-04-20	• Chapter headings placed on odd pages • Package details added • Calibration Kit added • Figure 14-2 changed • Figure 14-3 changed • Figure 14-4 converted to IEC 60617 • Figure 14-5 converted to IEC 60617	• 7-40 • 17 • 18, 31 • 36 • 37 • 37 • 38	PM21129-BUS

5   Product Description

Aruna Motion Rotary is an electromechanical automated positioning machine, with moving parts.

Its primary purpose is to rotate parts, which are placed on Product's rotary plate.

Product can be connected to and controlled by any Universal Robots E-Series articulated robot.

5.1   Parts of Aruna Motion Rotary

1. Rotary plate
2. Connections panel
3. Power IN port
4. Ethernet port
5. Reset button
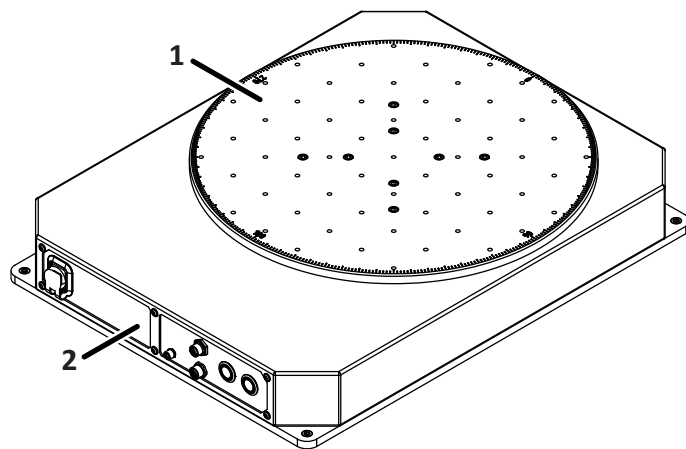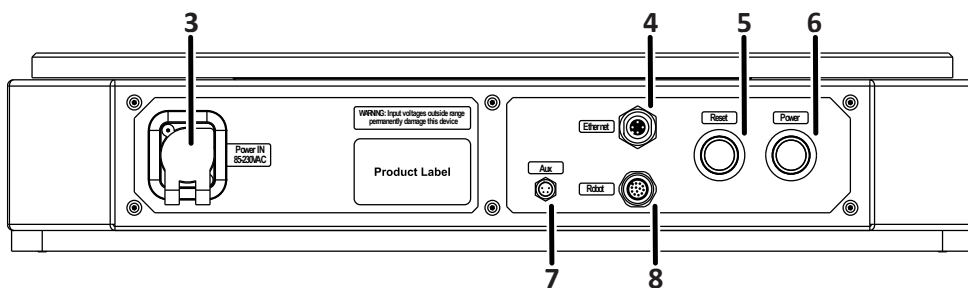6. Power button
7. AUX port
8. Robot port

Figure 5-1 Overview

Figure 5-2 Connections Panel

5.1.2   Rotary Plate

Rotary plate is holding fixtures and parts. It has 61 pieces of M6x8 mm threaded holes in 50x50 mm pattern to mount fixtures or parts.

Refer to Chapter 7 for safety-related details.

5.1.3   Connections Panel

Inputs and outputs of the Product can be found on this panel. Details are below.

5.1.4   Power IN port

The Product is power through this port. Depending on the country of installation, a suitable power cable might necessary be made.
Type of socket is: Neutrik NAC3MPX

5.1.5   Ethernet port

IP-rated industrial Ethernet socket for network connections with robot or other devices.

Type of socket is Amphenol RKS-12D04FM-LS8001

5.1.6   Reset button

This button has three functions:

1. Reset IP: To set the IP of Product to 192.168.25.51 default address, switch the Product OFF, press and hold the Reset button, switch the Product ON, then release the Reset button.

2. Reset Error: When Product goes into error state (E-Stop was activated for example), the LED on the Power button turns red. Press the Reset button to acknowledge that the error has been eliminated. LED on the Power button should turn green, if reset has been successfully performed and Product returned to normal operating mode.

3. Connected: LED of Reset button turns blue, if there is an active connection to an external controller on the Ethernet port.

5.1.7   Power button

This button has three functions:

1. Power ON/OFF: Pressing this button momentarily switches the Product ON or OFF.

2. Operational: LED in this button turns green when Product is in normal operating mode.

3. Error: LED in this button turns red, when Product is in error mode (E-Stop for example). Press the Reset button to go back to normal operating mode after the error has been eliminated.

5.1.8   AUX port

Communications port, reserved for future use. Leave this port unconnected.

Type of socket is: Degson SD-M8A-04P-FF-SH7B10-00A(H)

5.1.9   Robot port

This port is used to link the Product to various E-Stop chains (Robots, E-Stop buttons, etc.), remote power ON/OFF, and other connections for future use.

Type of socket is: Harting 21033532C00

6   Commissioning

6.1   Site Preparations

6.1.1   Location

1. Product must be placed on a horizontal level hard surface.

2. Product has a 621 x 474 mm footprint. This does not include the ports on the Connections Panel. Ensure that surface has enough room for the Product and extra space for connecting the cables.

3. Make sure that the holding structure will not slip or tip during operation.

6.1.2   Connections

Ensure that the following connections are available around the installation spot:

1. Power source: One-phase 85-230V / 50-60Hz outlet, grounded

2. Ethernet connection

3. Category 3 (EN ISO 13849-1) E-Stop chain entry point or standalone E-Stop button

6.1.3   Package details

Description	Measurements
Dimensions (W x D x H)	80 x 60 x 19 cm, 31.5 x 23.62 x 7.4 inches
Gross weight	64 kg, 141 lbs

6.1.4   Unpacking

- Remove all screws from the top plate and remove plate

- Remove the four nuts inside the package using a 13 mm wrench and remove the inner plate

> ⚠️ Product weighs 41 kg / 90 lbs. Two persons should unload the Product from packaging.

- Take out the contents of container box

- Take the Product out of the box.

6.1.5 Package Contents

The package contains these components:

Description	Part #	Quantity
Aruna Motion Rotary	MRT-A18-0220B	1
Power cable	EU: CSC-PO05-020, or US: CSC-PO08-020	1
Robot Port cable	CSC-EF11-040	1
Ethernet cable	CSC-ET03-020	1
Calibration Kit	CLK-ARN-URA	1

6.1.6 Place or Mount Product

Product must be placed on a horizontal level hard surface.
Make sure that the holding structure will not tip during operation.

- Use the leveling screws to level the Product (use a 4 mm Hex Allen key), or

- Remove the leveling screws and fix the Product using M8 or smaller screws onto the surface. (Refer to dimensional drawing towards the end of this manual for mounting pattern)

6.1.7 Establish E-Stop Chain

Refer to E-Stop Wiring Schemes for wiring, if Product needs to be linked to external E-Stop inputs.

If Product is not connected to external E-Stops, wire the Robot cable provided according to Wiring for E-Stop chapter.

> ⚠️ E-Stop wiring must be done, and wiring must be performed by a Skilled Person, otherwise the Product will be stuck in Error state when powered.

6.1.8 Install Robot if Applicable

1. Unpack and install the robot. Refer to Robot's user manual for the procedure

2. Establish Ethernet connection between the Robot and Product by using an Ethernet switch of direct connection

3. Connect the Robot Port Cable to Product and Robot.

6.1.9   Connect Main Power

	Never connect the Product to a power source outside of its supported range, which is: 85-230VAC, 50/60Hz, Grounded

1. Connect the power cable to the 'Power IN' socket, on the Connections Panel of Product.

2. Connect the other end of same power cable to a grounded power outlet (85-230VAC, 50/60Hz).

6.2   Acceptance Testing

Product considered to be ready to use (e.g.: Installing computer, ethernet switch, etc.), if the following criteria meet:

1. Pushing the Power button switches the Product ON and OFF

2. E-Stop chain is closed through Product

3. Rotary can be operated using the Control software (Streamline, Aruna Motion URCap, etc.)

4. If Robot is present in the setup: Robot can be operated using the robot's controller pendant

5. Pressing any E-Stop buttons in the E-Stop chain stops all linked devices immediately

6. When E-Stop chain has been disengaged (by releasing the E-Stop button, for example), Product can be reset by Control software or Reset button on Product.

	Depending on the installation, pressing the E-Stop on robot's controller might not stop the entire system, only the robot. Make sure that behavior meets the requirements.

7 Safety

7.1 General Information

The Product consists of the following major components, which affect safety:

1. Product (Covered in this manual)

2. Robot (if installed)

3. Streamline app or Aruna Motion URCap plug-in for Universal Robots' robots.

> **STOP** The Operator of Product must read, understand and follow all safety-related information contained in the manuals of these components.

7.2 Product

The Product and its installed components are freely programmable for a wide spectrum of applications. Therefore, some of the potential hazards cannot be predicted for each possible operation. Before any operation, the potential hazards must be analyzed.

Depending on the configuration, the E-Stop button on the robot's pendant might not stop the rotary table, thus should be treated as separate feature from the rest of the system.

Product may be connected to external E-Stop chains using the **Robot** socket at the Connections Panel.

The main sources of hazard of Product are the rotating surface, and the high voltage inside.

7.2.1 Rotary Plate

1. Any part placed on the rotary table must be secured by straps, screws, magnets or by other sufficient methods. The chosen method must ensure that part is not going to slip or tip on the rotary plate during rotation.

2. The rotation cycle consists of acceleration, constant speed rotation and deceleration. These parameters must be set in the control software to ensure that part is not going to move during the rotation.

7.3 Collaborativeness

The robot qualifies as 'collaborative' only, if the local requirements for collaborative operations can be fulfilled by setting the robot's related parameters on the robot's pendant. Please, refer to robot's manual for instructions.

Product is not collaborative.

7.4   Streamline App

Streamline is a complex motion control and metrology application. It is capable to instruct the Product to perform dangerous actions. Creating a safe program in Streamline requires proper training and knowledge. Please, refer to Streamline User Manual for further information.

7.5   Aruna Motion URCap Plug-in

Aruna Motion URCap is a plug-in for Universal Robot's robots, running on the robot controller (PolyScope), allowing to fully control the Product from the robot's controller. It is capable to instruct the Product to perform dangerous actions. Creating a safe program in Aruna Motion URCap requires proper training and knowledge. Please, refer to Aruna Motion URCap User Manual for further information.

7.6   Astaire

The Astaire firmware is a universal controller software. It has been developed for universal automated measuring cells. Astaire4 requires proper training and knowledge. Please, refer to Astaire4's User Manual for further information.

8   Operation

8.1   Power ON Sequence

1. Manual power ON: Press and hold the Power button on Product for about one second

2. Remote power ON: Send Power ON command from Aruna Motion URCap

8.2   Power OFF Sequence

1. Manual power OFF: Press the Power button on Product

2. Remote power OFF: Send Power OFF command from Aruna Motion URCap

8.3   Safe Operation

Product is a complex system. Understanding how its parts work together is essential for safe operation.

Product can be controlled by the Streamline app or Aruna Motion URCap plug-in.

Follow these instructions:

1. Any part placed on the rotary table must be secured by straps, screws, magnets or by other sufficient methods. The chosen method must ensure that part is not going to move on the rotary plate during rotation.

2. The rotation cycle consists of acceleration, constant speed rotation and deceleration. These parameters must be set to ensure that part is not going to move during the rotation.

8.3.1   Using Streamline App

Streamline software has its own user manual, which gives you all the necessary information and knowledge to operate Product from Streamline.

8.3.2   Using Aruna Motion URCap Plug-in

Aruna Motion URCap has its own user manual, which gives you all the necessary information and knowledge to operate Product with Aruna Motion plug-in.

8.3.3   Using Astaire

Astaire has its own user manual, which gives you all the necessary information and knowledge to control Product with Astaire.

8.3.4   Using the Robot

The robot has its own user manual, which gives you all the necessary information and knowledge to operate Product with the robot.

8.4   Workplace

Product is not a production-ready device by itself. It needs to be integrated in a system.

8.5   Incorrect Operation

It is prohibited to perform operations with Product, which would cause a safety hazard.

> **STOP**   It is prohibited to
>
> - operate Product without properly securing parts on rotary table.
> - operate the Product while people on top the Product, or in vicinity of moving components or parts placed on rotary plate
> - place or remove anything on the Product during rotary table or robot movements
> - block the access to or tamper with E-Stop buttons

9   Calibration

9.1   Rotary Table

Product has an absolute encoder installed, which is pre-calibrated. There is no need for further calibration.

9.2   Robot

Information about robot calibration can be found in the robot's manual.

10 Maintenance

10.1   General Warning

⚠	Disassembly of Product or removing the protective caps from the unconnected ports voids the IP rating. To restore IP rating, contact to a qualified service technician.

10.2   Cleaning

Task	Interval	Responsible
Outer surface The exterior should be cleaned with lightly wet soft cloth or pre-wetted industrial cleaning cloth. Be aware to not let liquid enter the connections or the inside of the cabinet.	On demand	Operator, Maintenance Person

11 Troubleshooting

Error	Possible Cause	Solution
Product does not turn on by pressing the Power button	No input power	Connect Product to power source.
Rotary Table does not rotate	E-Stop is active	Deactivate E-Stop, reset Product.
		Check E-Stop chain's integrity.
	Environmental conditions are out of range (Too cold or too hot environment)	Restore environmental conditions within range, wait until Product adapts.
Robot does not move (if installed)	Robot is powered off or not in idle state	Power on and initialize robot according to robot's user manual.
	Robot is in fault due to E-Stop event	Deactivate E-Stop and initialize robot according to robot's user manual.
	Robot is in protective stop	Initialize robot according to robot's user manual.
Streamline app or Aruna Motion URCap plug-in cannot connect to Product, robot or other network-enabled components.	Network connection is not operational	Check Ethernet cables, IP addresses and firewall settings.
	A component is unpowered	Product can be operated only when Rotary Table is operational. LED in the Power button must be green.
		Ensure that robot is powered and initialized.

12 Spare Parts List

Spare parts are available from Supplier, Manufacturer, and third-party vendors.

Description	Brand	Part #
Power cable for EU	3D Infotech or other vendors	3D Infotech: CSC-PO05-020
Power cable for US	3D Infotech or other vendors	3D Infotech: CSC-PO08-020
UR port cable	3D Infotech or other vendors	3D Infotech: CSC-EF11-040
Ethernet cable	3D Infotech or other vendors	3D Infotech: CSC-ET03-020
Calibration Kit	3D Infotech or other vendors	3D Infotech: CLK-ARN-URA

13 Waste Product Disposal

The Manufacturer is following the EU Directive 2012/19/EC about waste management of electrical equipment.

Upon Costumer's request, the Manufacturer will take back the Product with no additional charges.

It's the Customer's responsibility to transport the Product back to Supplier, who will then transport the product back to the Manufacturer.

Manufacturer keeps records of disposal of waste Product for 4 years, which is available upon Costumer's request.

14 Reference

14.1   Technical Specifications

	Aruna Motion Rotary MRT-A18-0220B
Resolution:	0.044 deg
Accuracy:	0.044 deg
Repeatability:	0.132 deg
Max. Speed:	90° / s
Max. Acceleration:	90° / s^2
Max. Payload:	100 kg / 220 lbs
Drive:	AC Servo Motor
Power Transmission:	Timing belt
Plate Pattern:	61 pieces of M6x8 mm threaded holes in 50x50 mm grid pattern
Homing:	Not needed, pre-calibrated absolute encoder installed
Dimensions (W x D x H):	621 x 474 x 96.4 mm, 24.45 x 18.67 x 3.8 inches
Weight:	Approx. 41 kg / 91 lbs
Power Requirement:	Input Range: 85-230 VAC, 50/60 Hz, Max Current: 3A @ 120 VAC
Operating Conditions:	5…40°C / 41…104°F temperature, 10…90% relative humidity, non-condensing
IP Rating:	IP54
E-Stop Classification:	Category 3 (EN ISO 13849-1)
Connections:	Power IN, 10/100 Ethernet, Robot and AUX ports
Buttons:	Power and Reset button
Indicator LEDs:	Operational (Green), Connected (Blue), Error (Red)

14.2   Dimensional Drawings

Figure 14-1 Top View [mm]

Figure 14-2 Front View [mm]
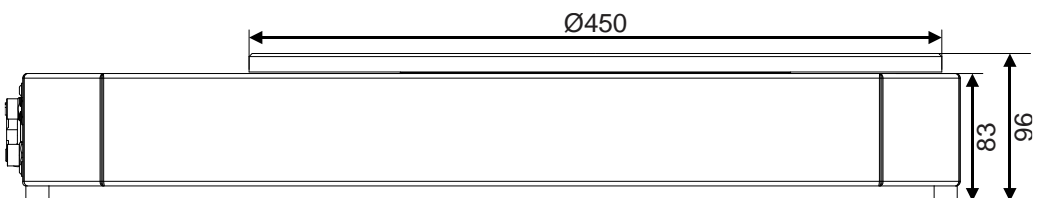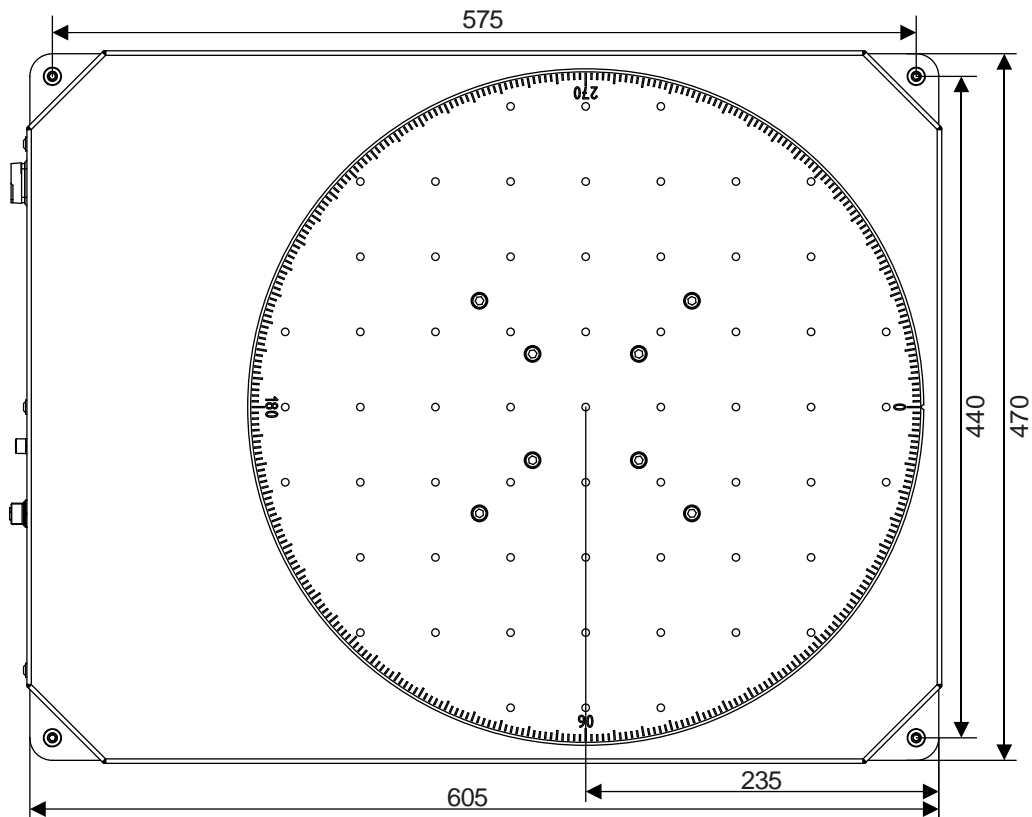
14.3   E-Stop Wiring Schemes (Class-III)
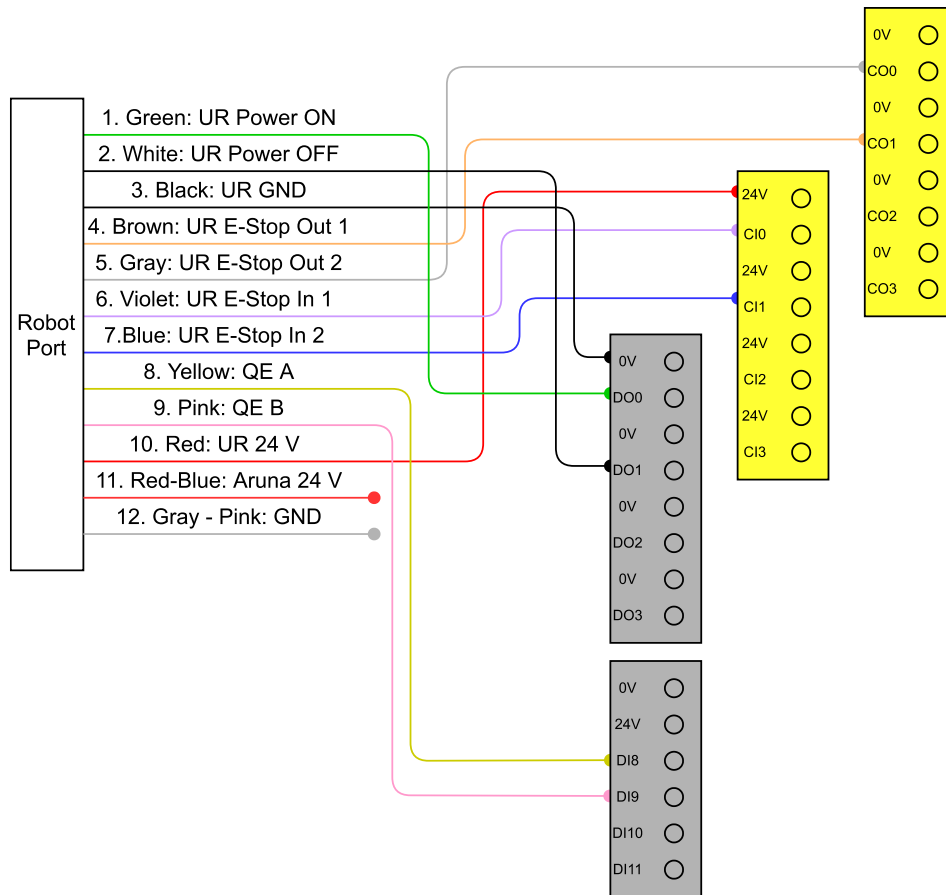
14.3.1 Wiring for UR Robot

Figure 14-3 Wiring for UR Robot
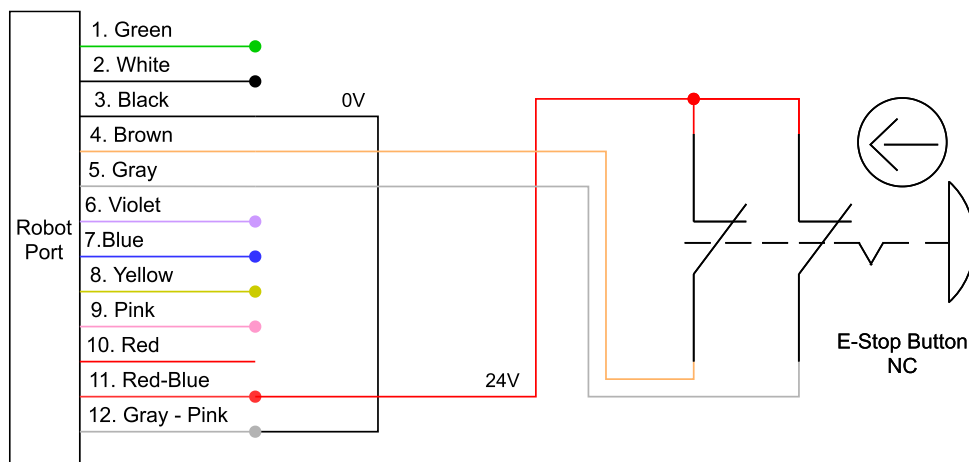
14.3.2 Wiring for External E-Stop Button

Figure 14-4 Wiring for External E-Stop Button (IEC 60617)

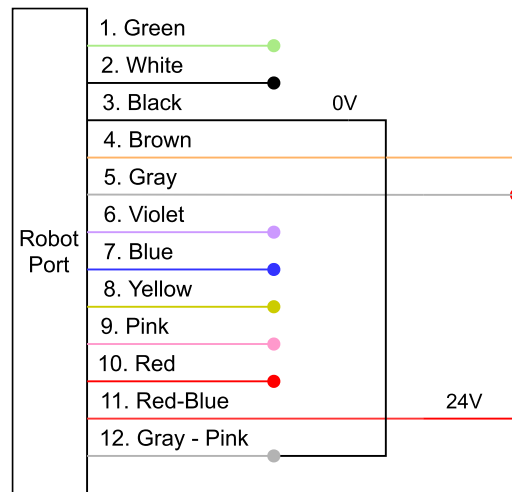### 14.3.3 Wiring for No E-Stop

Figure 14-5 Wiring for No E-Stop (IEC 60617)

14.3.4 Default IP Address

The following IP address is set on the Product by default: 192.168.25.51, port: 9794

14.4   Regulatory CE Compliance

According to European directive 2006/42/EC (Machinery Directive)

The Manufacturer

Entity Name:	3D Infotech Kft
Address:	Méhész köz 5, Gödöllő, 2100, Hungary
Phone:	+36 (28) 532-564

hereby declares that the following Product:

Product Name	Part #
Aruna Motion Rotary	MRT-A18-0220B

Is in conformity with the applicable requirements of the following documents:

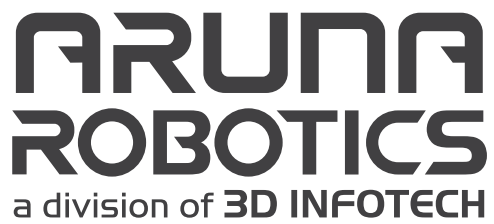| |
|---|
| EN ISO 60204-1:2010 |
| EN ISO 13849-1:2015 |
| EN ISO 12100:2010 |
| EN 614-1:2006+A1:2009 |
| EN 894-1:1997+A1:2009 |

The undersigned declares, on behalf of **3D Infotech Kft** that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all the applicable Essential Health and Safety Requirements of the Directive.

2022-04-20

14.5   Warranty Information

Warranty terms and conditions are regulated by the purchase contract.

14.6   Contact Information

www.arunarobotics.com