



User Manual

IO Converter

for RG2/6, VG10, Gecko grippers

Version 1.2

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1. Scope of Delivery

The contents of the OnRobot IO Converter Kit are the following:

1. I/O Converter
2. Power Supply (24V)
3. M8 cable with flying leads on one end (1 x 5m)
4. Robot side connection wires (9 x 0.3m)
5. Velcro Tape rolls (4 x 0.5m)

Type B/C/D/E/F/G/H/I/J/K Kits only:

6. Adapter flange
7. Screws and dowel pin for the adapter flange
8. Tool for tightening the screws

2. Robot integration

The OnRobot IO Converter Kits can be used to integrate the OnRobot tools to many industrial robot. The following table shows the list of compatible robot types:

Supported robot types		OnRobot tools			
		RG2	RG6	VG10	Gecko
DOOSAN	M0609 / 0617 / 1013 / 1509	✓	✓	✓	✓
FANUC	LR Mate 200	✓	✓	✓	✓
	CR-4iA /-7iA	✓	✓	✓	✓
Kawasaki	RS003N / 005L / 005N / 006L / 007L / 007N / 010N / 0010L / 020N / 015X / 030N / 050N / 080N	✓	✓	✓	✓
KUKA	KR 3 Agilus KR 6 R1820 / 1820 HP / 700(-2) / 900(-2) KR 8 R1620 / 1620 HP / R2010 KR 10 R1420 / 1420 HP / 900(-2) / 1100(-2) KR 12 R1810	✓	✓	✓	✓
	LBR iiwa 7 R800 / 14 R820	✓	✓	✓	✓
NACHI	MZ03EL / 04 / 07	✓	✓	✓	✓
	CZ10	✓	✓	✓	✓
Techman	TM5 / 12 / 14	✓	✓	✓	✓
YASKAWA	GP7 / 8 / 12	✓	✓	✓	✓
	HC-10	✓	✓	✓	✓

In the followings sections you can find detailed integration guide for the supported robots.

2.1. DOOSAN Robots

In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.1.1. Mounting

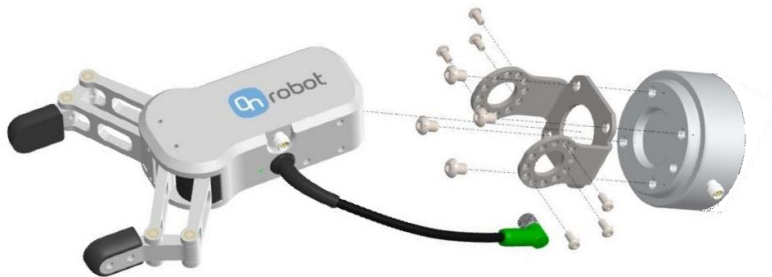
The tool flange of the robot is directly compatible with the OnRobot grippers.

1. Mount the gripper to the robot.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



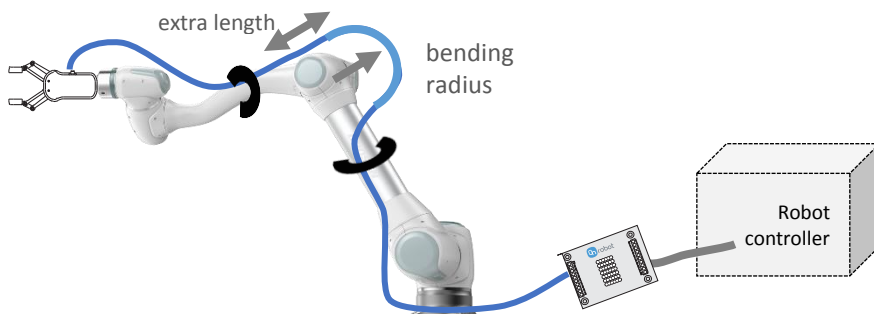
(For detailed mounting guide please refer to the gripper manuals.)

2.1.2. Cable routing

2. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
3. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

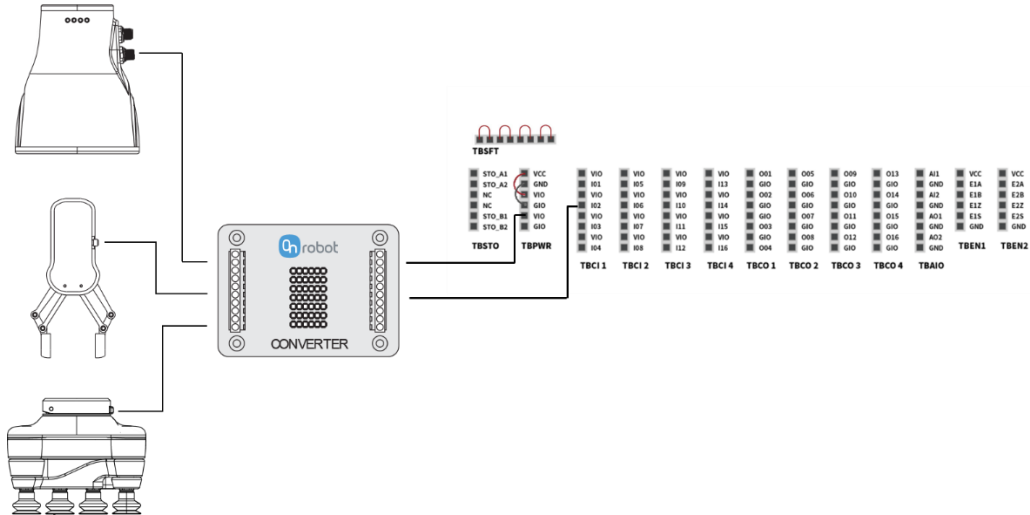
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

2.1.3. Electrical connection

For Doosan robots, the I/O interface (TBCI 1, TBC0 1, TBAIO) inside the control cabinet can be used to connect the OnRobot IO converter to the robot controller. The internal 24V power supply (TBPWR) can be used to power the converter and the gripper.

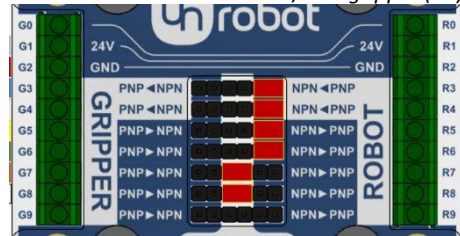


The following steps will guide you through the electrical setup of the OnRobot grippers:

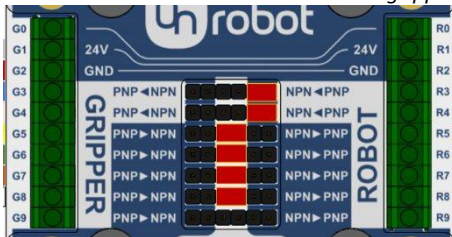
Ensure that the IO Converter is configured for the gripper, in accordance with the guidance below:

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

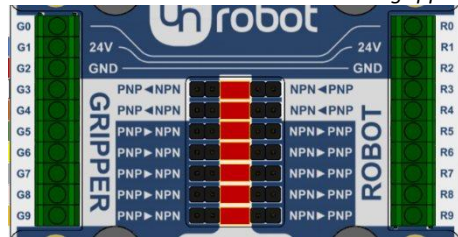
RG2/RG6 gripper (P1)



VG10 gripper

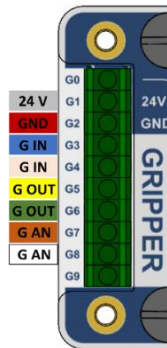


Gecko gripper



4. Wire the gripper cable to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper



I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

5. Make sure that the robot and controller is powered off completely.
6. Gain access to the inside of the robot controller cabinet, where the IO connectors are located.



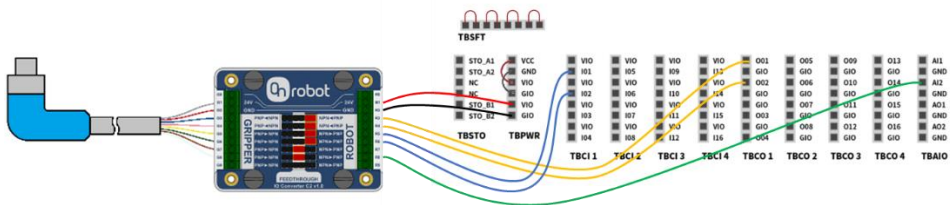
7. Connect the IO Converter with the controller cabinet, as described in the table below with the supplied 30cm wires.

DOOSAN Signal	IO Converter		
	RG2/RG6 (P1)	VG10	Gecko
VIO	R1 / 24V	R1 / 24V	R1 / 24V
GIO	R2 / GND	R2 / GND	R2 / GND
I01	R5	R5	R5
I02	R6	R6	R6
I03	Unused	Unused	R7
I04	Unused	Unused	R8
I05	Unused	Unused	R9
O01	R3	R3	R3
O02	R4	R4	R4
AI1	Unused	R7	Unused
AI2	R8	R8	Unused

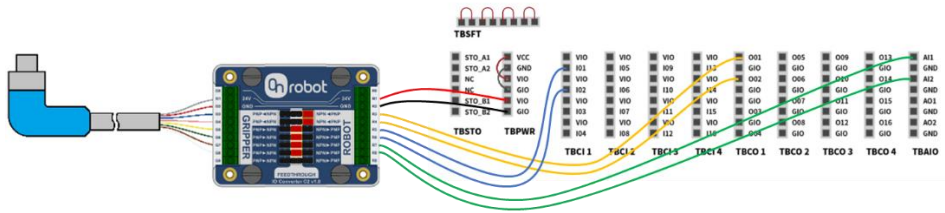
Other digital input/outputs can be used, if the listed digital input/outputs are used for other purposes. Please refer to the robot manual for further details.

8. Verify connection and configuration with the diagrams below:

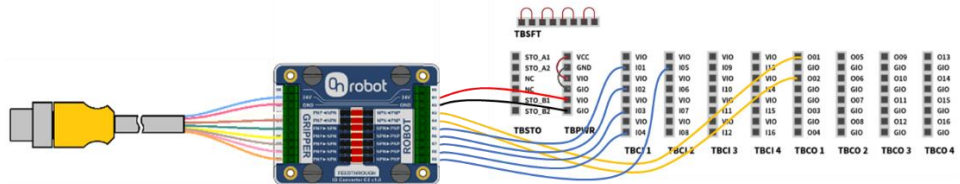
RG2/RG6 (P1) grippers:



VG10 gripper:



Gecko gripper:

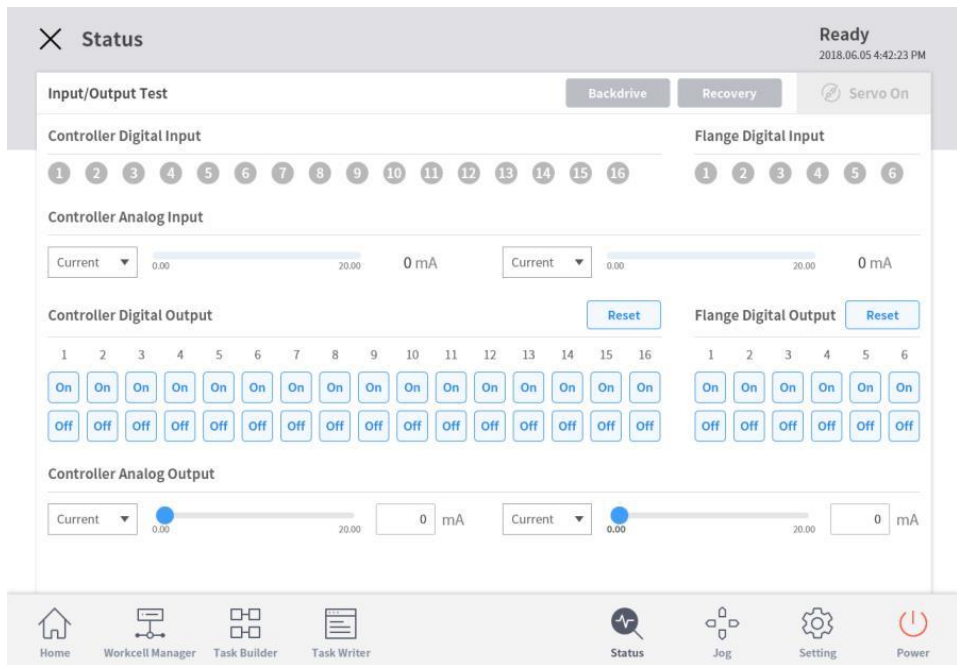


2.1.4. Robot software configuration

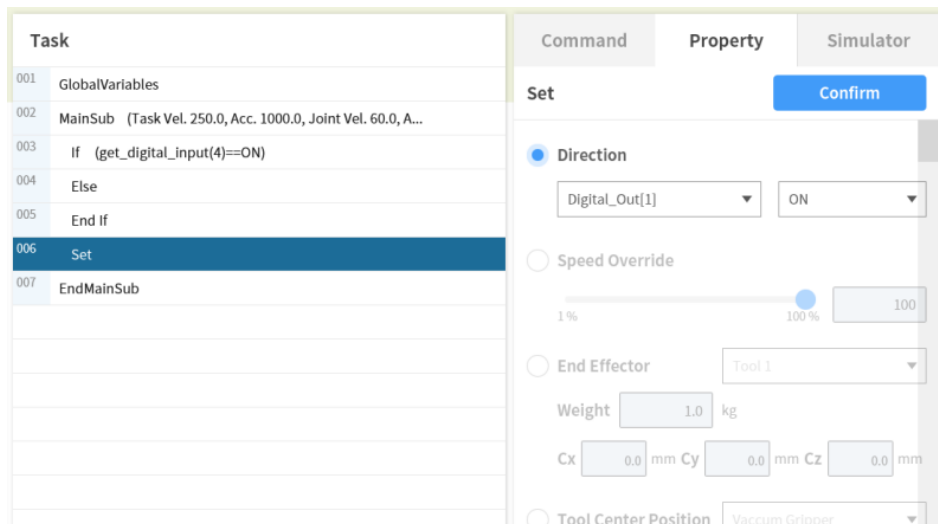
- After powering on the robot, the IO's can be used to control the gripper and get feedback, according to the table below:

I/O	Function		
	RG2/RG6 (P1)	VG10	Gecko
I01	No grip	CHA > 60%	Ultrasonic OK
I02	Busy	CHB > 60%	Part present
I03	Unused	Unused	Preload OK
I04	Unused	Unused	Pad needs service
I05	Unused	Unused	Error
O01	Low/high force	CHA grip/release	Engage pads
O02	Open/close	CHB grip/release	Disengage pads
AI1	Unused	CHA vacuum level	Unused
AI2	Gripper width	CHB vacuum level	Unused

Navigate to the Status screen to check the device is operating properly.



10. During programming select the **Set** command from the **Property** tab to control the OnRobot gripper.



Please refer to the robot's user manual for guidance.

11. Installation is finished, you are ready to use the gripper with your robot.

2.2. FANUC Robots

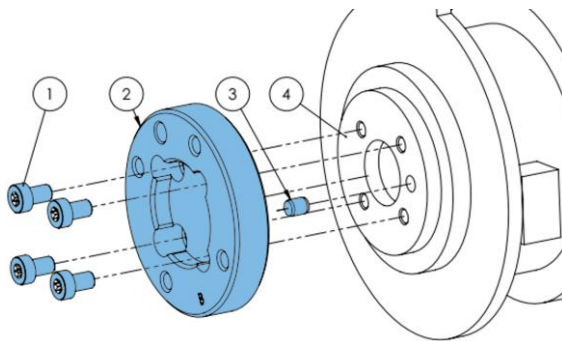
2.2.1. LR Mate 200 and CR Series Models

In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.2.1.1. Mounting

1. First mount the robot specific adapter flange:



Type B

- 1 M5x8 screws (ISO14580)
- 2 OnRobot adapter flange (ISO 9409-1-50-4-M6)
- 3 Dowel pin $\varnothing 5 \times 6$ (ISO2338)
- 4 Robot tool flange (ISO 9409-1-31.5-4-M5)

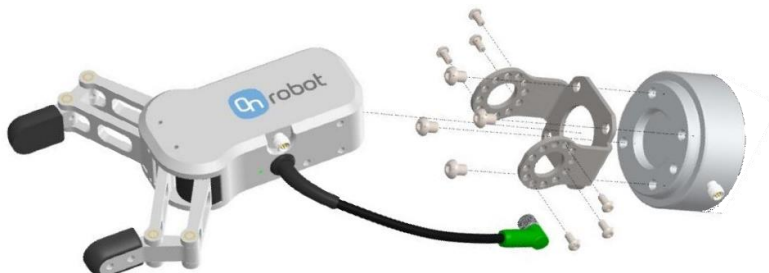
Use 5 Nm tightening torque.

2. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



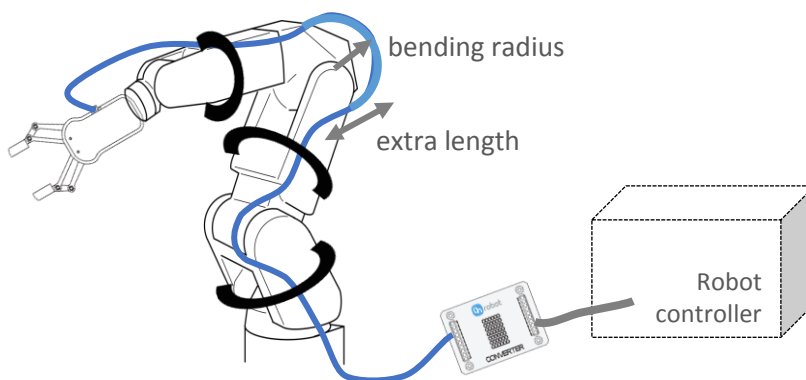
(For detailed mounting guide please refer to the gripper manuals.)

2.2.1.2. Cable routing

3. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
4. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

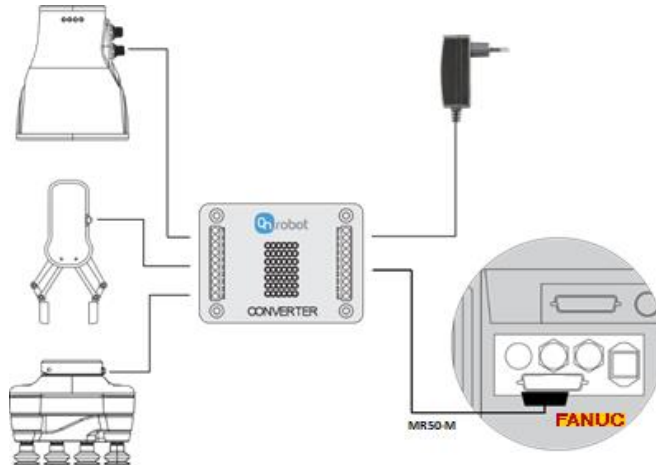
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

2.2.1.3. Electrical connection

For FANUC R-30iA/iB controllers, the CRMA58/CRMA59 connector on the conversion board can be used to connect the OnRobot IO converter to the robot controller. The supplied 24V power supply can be used to power the converter and the gripper.



NOTE: It is HIGHLY recommended to purchase the appropriate connector & harness parts before installing the gripper and I/O converter. There are no screw terminals for the I/O terminal in the controller. The I/O pins on the R-30iA/iB controller can be soldered, but the solder points are very small. The table below lists the required connector parts and a vendor to purchase the parts.

Fanuc I/O Connector Parts		
Description	Part Number	Vendor
Honda MR-50M Male Connector	MR-50M	Misumi
Honda MR Connector Casing	MR-50L+	Misumi

The following steps will guide you through the electrical setup of the OnRobot grippers:

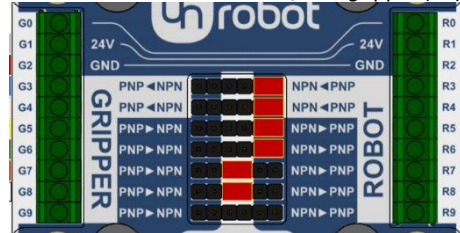
5. Make sure that the robot is powered off completely and disconnect the controller from wall power.
6. First locate the MR50-F connector on the front side of the door (labelled CRMA58/CRMA59). Prepare the MR50-M mating connector



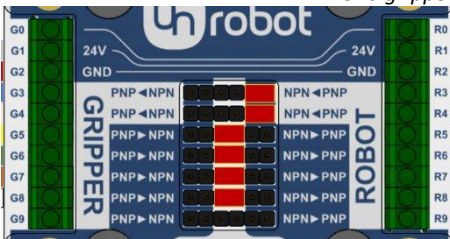
7. Check your digital I/O module installed in the control cabinet and configure the OnRobot IO Converter accordingly:

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

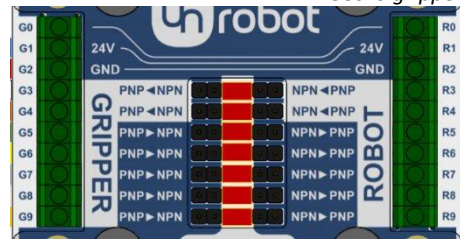
RG2/RG6 gripper (P1)



VG10 gripper

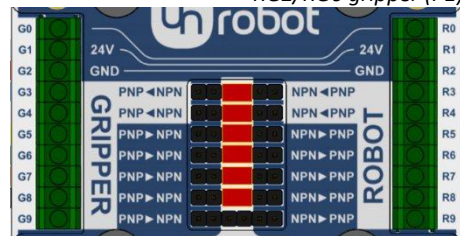


Gecko gripper

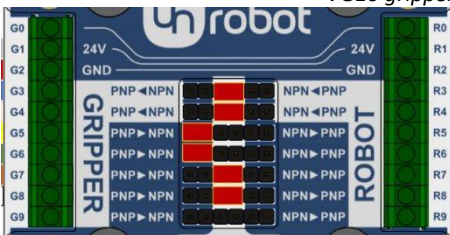


NPN configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

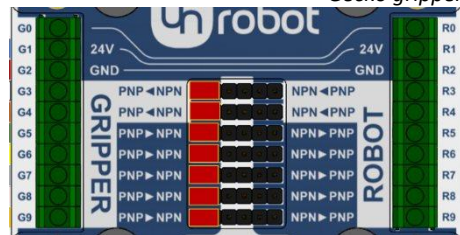
RG2/RG6 gripper (P1)



VG10 gripper



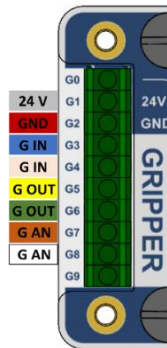
Gecko gripper



(Please refer to the FANUC manual to check whether it is an NPN or a PNP type)

8. Wire the gripper cable to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper



I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

9. Connect the IO Converter with the controller cabinet, as described in the table below with the supplied 30 cm wires.

I/O Converter	Fanuc Signal	MR-50M Pins	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
R0			Unused	Unused	Unused
R1	DOSRC1	31	Gripper 24V	Gripper 24V	Gripper 24V
R2	<i>see PNP/NPN below</i>		Gripper GND	Gripper GND	Gripper GND
R3	OUT_101	33	Force 5/40N	Channel A On/Off	Engage pads
R4	OUT_102	34	Close/open	Channel B On/Off	Disengage pads
R5	IN_101	1	Not gripped	CHA vacuum OK	Ultrasonic OK
R6	IN_102	2	Gripper busy	CHB vacuum OK	Part present
R7	IN_103	3	Unused	Vacuum level A	Preload OK
R8	IN_104	4	Gripper width	Vacuum level B	Pad needs service
R9	IN_105	5	Unused	Unused	Error

If the FANUC I/O is **PNP** type the following pins needs to be wired together:

MR-50M Pins	Fanuc Signal
19 to 30	SDICOM1 to 0V
R2 to 49	Gripper GND to 24F

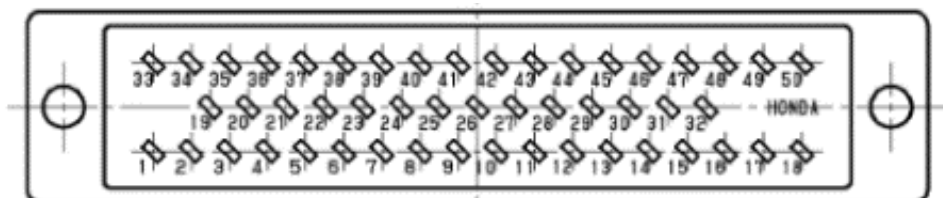
If the FANUC I/O is **NPN** type the following pins needs to be wired together:

MR-50M Pins	Fanuc Signal
19 to 49	SDICOM1 to 24F
R2 to 18	Gripper GND to 0V

NOTE: The standard Fanuc controller does not support robot analog inputs (i.e. RG2 gripper width, VG10 vacuum level).

NOTE: Pay careful attention to the wiring of pin SDICOM1 (Connector pin 19) and Gripper GND (I/O Converter R2). The wiring changes depending if the Fanuc is configured for PNP (sourcing) or NPN (sinking).

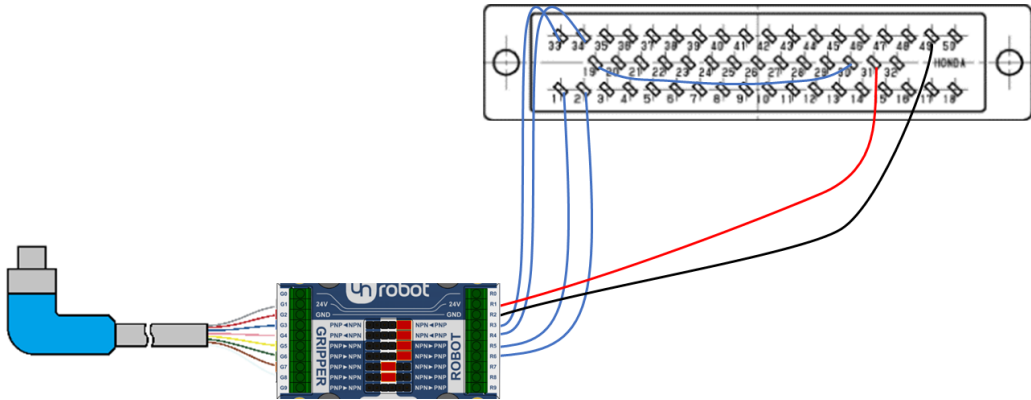
Wire the digital I/O lines (R3-R9) of the OnRobot IO Converter to the MR50-M connector. The pinout for the Honda MR50-M Connector for Fanuc I/O is shown below.



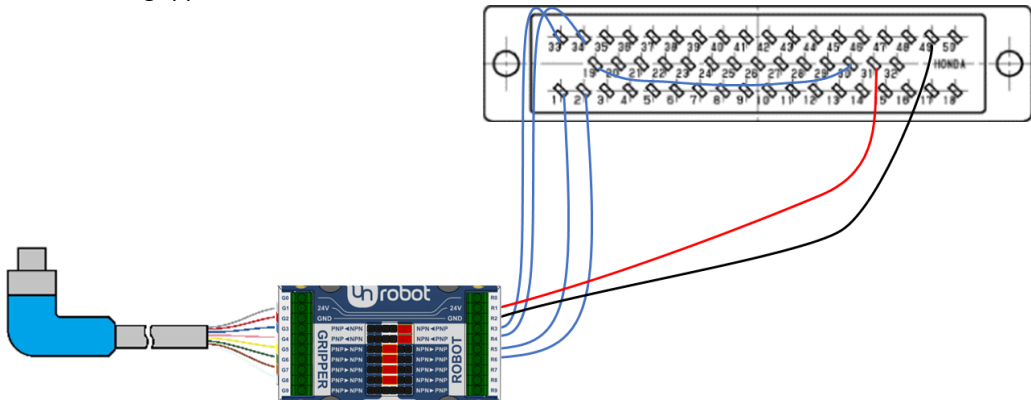
10. Verify connection and configuration with the diagrams below:

Fanuc Robot PNP Configuration

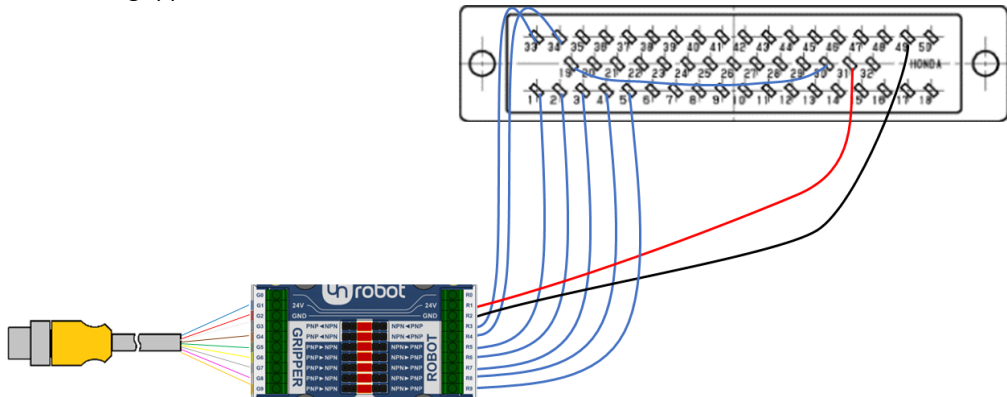
RG2/RG6 (P1) grippers:



VG10 gripper:

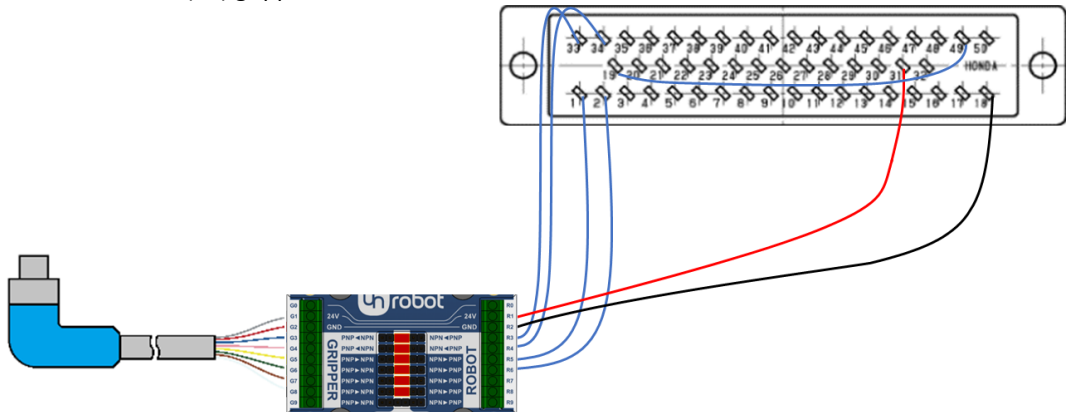


Gecko gripper:

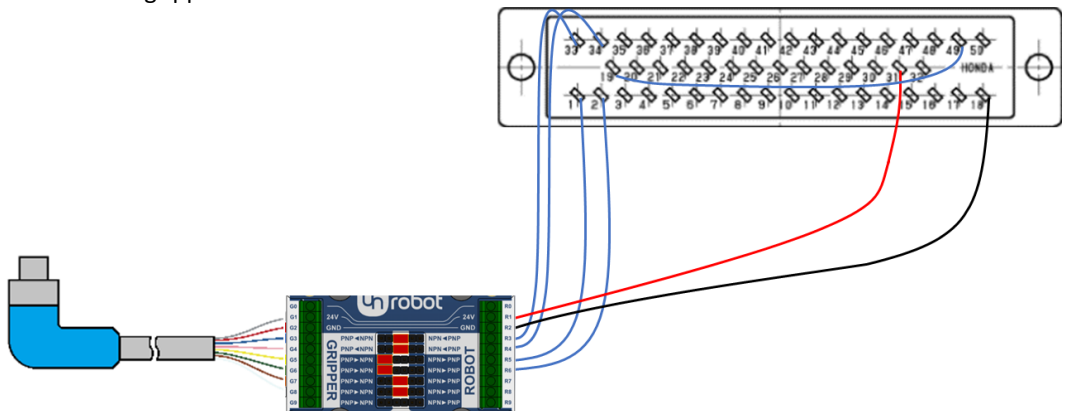


Fanuc Robot NPN Configuration

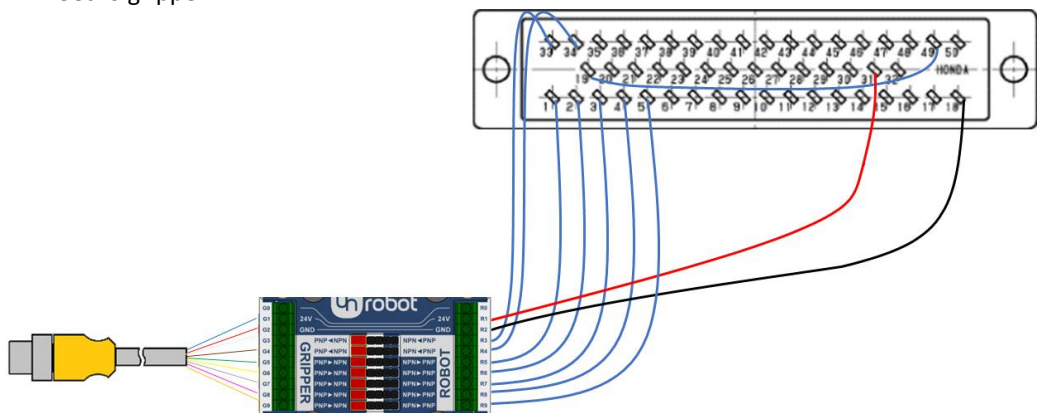
RG2/RG6 (P1) grippers:



VG10 gripper:

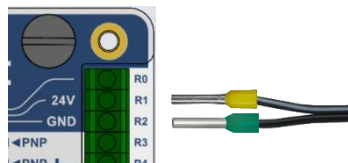


Gecko gripper:



11. Connect the OnRobot power supply to the power lines (R1,R2) of the OnRobot IO Converter:

Pin	Ferrule	Description
R1	yellow	24V (1A)
R2	cyan	GND



2.2.1.4. Robot software configuration

Controlling I/O Using the Fanuc Teach Pendant

Robot outputs constitute gripper inputs (commands) and gripper outputs constitute robot inputs (most of which correspond to gripper sensors). I/O digital outputs can be viewed on the robot teach pendant by following the steps below. Digital I/O assignment is determined through hard-wiring to the 50-pin Honda connector.

11. Press the **I/O** button near the bottom of the teach pendant to navigate to the I/O Cell Outputs screen.
12. Press the **Menu** button to pull up an on-screen menu and use the up/down arrows to navigate to **I/O** and the left arrows to select it and open a secondary menu. Select **Digital** from the secondary I/O menu and then hit the **Enter** button.

This will display the I/O digital outputs sorted by port number:



13. Toggle between viewing inputs and outputs by pressing **F3** (In/Out). Turn robot output signals on and off by scrolling to the output with the arrows and pressing **F4** (On) or **F5** (Off).
14. Use the gripper functionalities in the Fanuc program.
(Assuming gripper close function is mapped to OUT_102)

DO[102] = ON; *Close gripper*

15. Installation is finished, you are ready to use the gripper with your robot.

2.3. NACHI robots

2.3.1. CZ and MZ Models

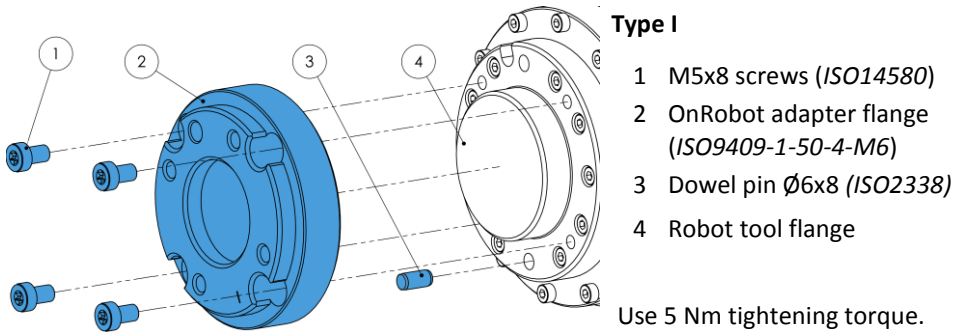
In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

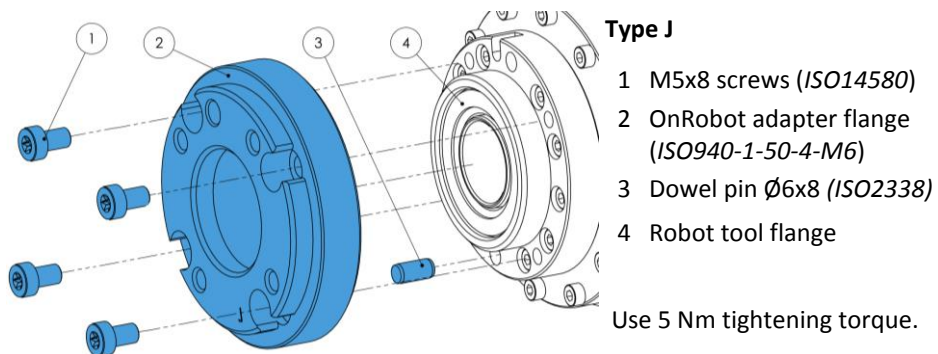
2.3.1.1. Mounting

1. First mount the robot specific adapter flange:

For CZ10, MZ03EL, MZ07 models



For MZ04 models

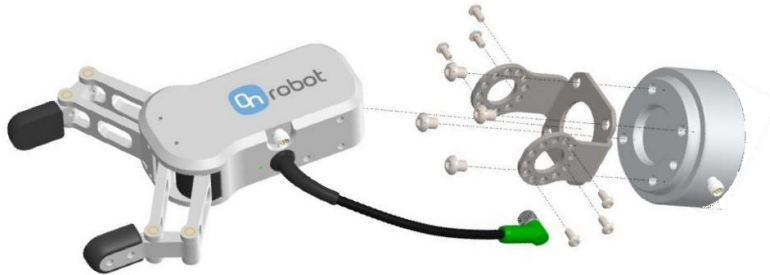


2. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



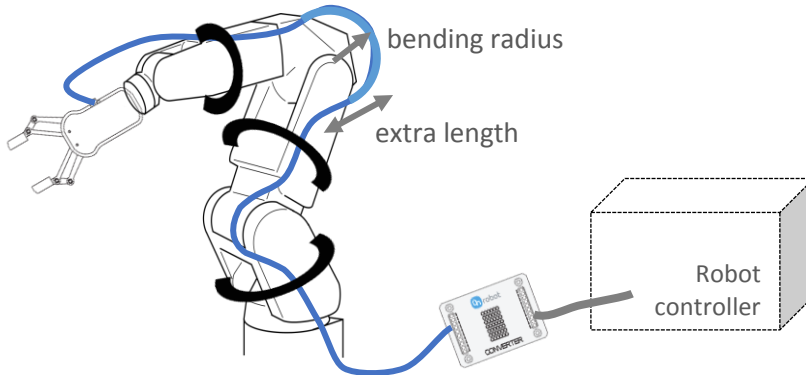
(For detailed mounting guide please refer to the gripper manuals.)

2.3.1.2. Cable routing

3. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
4. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

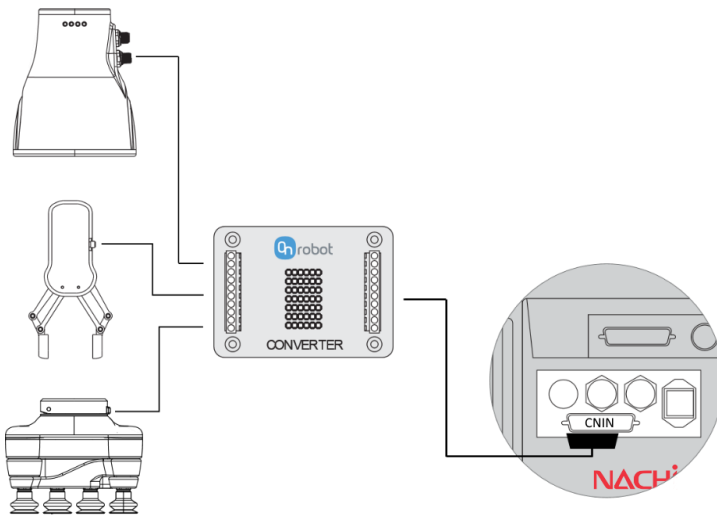
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

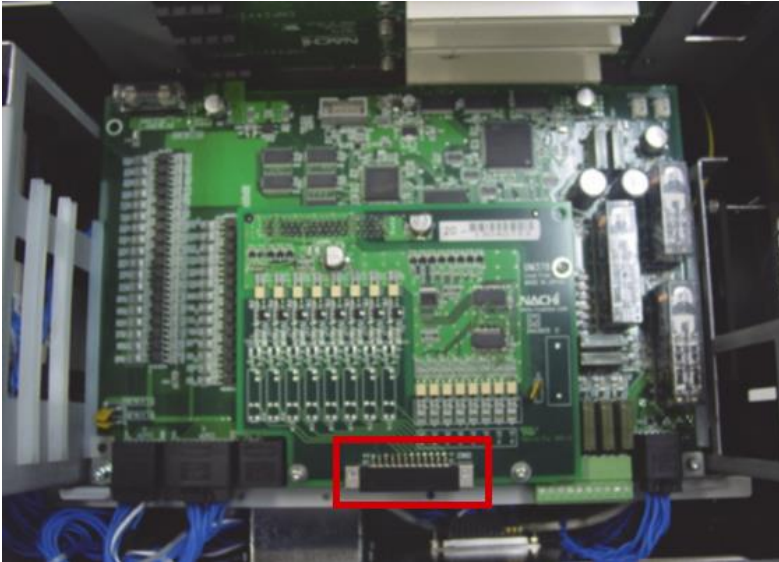
2.3.1.3. Electrical connection

Inside the control cabinet, the **CNIN** I/O interface on the Mini I/O board (most common I/O board) could be used to connect the OnRobot IO converter to the robot controller. The internal 24V power supply can be used to power the converter and the gripper.



The following steps will guide you through the electrical setup of the OnRobot grippers:

5. Make sure that the robot is powered off completely.
6. First locate the CNIN connector inside of the robot controller (requires a Mini I/O board).



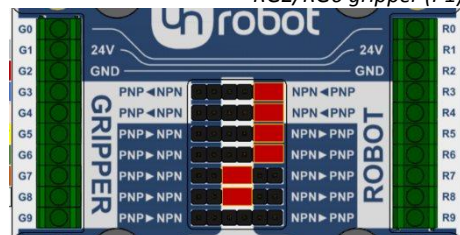
Then prepare the spare CNIN (FCN-36J024-AU Fujitsu Component) mating connector that was shipped with Mini I/O board.

7. Check your Mini I/O board installed in the control cabinet and configure the OnRobot IO Converter accordingly.

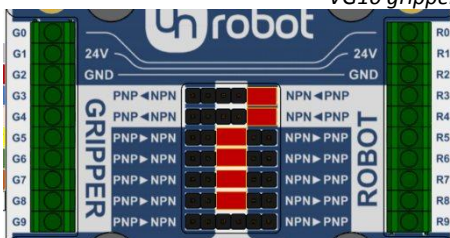
If the Mini I/O board is **PNP** Transistor type or the Mini I/O board is Relay type and configured as PNP type:

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

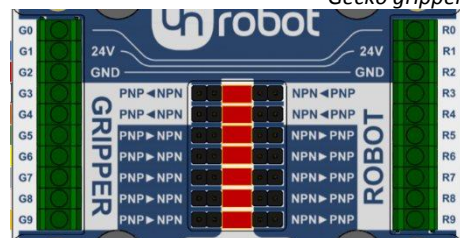
RG2/RG6 gripper (P1)



VG10 gripper



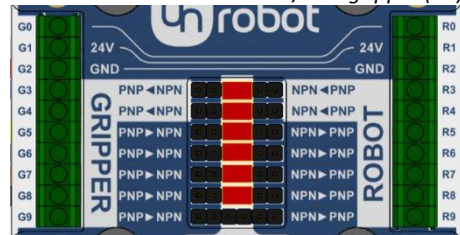
Gecko gripper



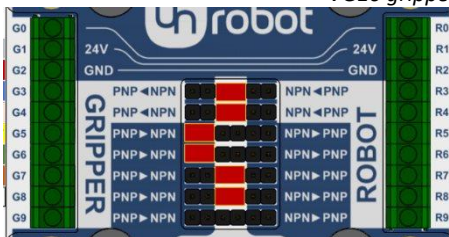
If the Mini I/O board is **NPN** Transistor type or the Mini I/O board is Relay type and configured as NPN type.

NPN configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

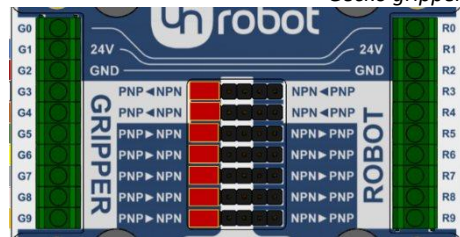
RG2/RG6 gripper (P1)



VG10 gripper



Gecko gripper

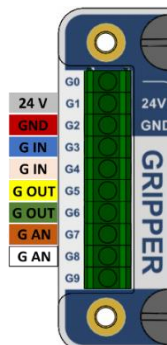


If other module is installed, please refer to the robot manual to check whether it is an NPN or a PNP type.

If unsure how the Relay type Mini I/O board is configured refer to the robot manual.

8. Wire the gripper connector to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper

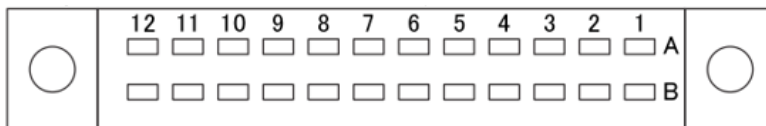


I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy(green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

9. Connect the IO Converter (R1-R9) with the controller cabinet via the CNIN connector, as described in the table below with the supplied 30 cm wires.

For convenience here is the pinout of the cable side CNIN mating connector layout viewed from the soldered surface:



Connector type: FCN-361J024-AU soldering type female (Fujitsu component)

I/O Converter	NACHI Signal	CNIN Pins	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
R0			Unused	Unused	Unused
R1	P1 (Internal power 24V)	A10 or B10	Gripper 24V	Gripper 24V	Gripper 24V
R2	M1 (Internal power 0V)	A11 or B11	Gripper GND	Gripper GND	Gripper GND
R3	O97	A1	Force 5/40N	Channel A On/Off	Engage pads
R4	O99	A2	Close/open	Channel B On/Off	Disengage pads
R5	I98	B5	Not gripped	CHA vacuum OK	Ultrasonic OK
R6	I103	B4	Gripper busy	CHB vacuum OK	Part present
R7	I101	B3	Unused	Vacuum level A	Preload OK
R8	I99	B2	Gripper width	Vacuum level B	Pad needs service
R9	I97	B1	Unused	Unused	Error

NOTE: Any unused input pin can be used for gripper status information, and any unused output can be used for controlling the gripper.

Please note which pin you used during the wiring, in a later step it is going to be needed during the mapping.

In case of a **Relay type** Mini I/O board the following CNIN pins needs to be wired together to power the relays:

CNIN Pins	NACHI Signal
B12 to A10 (or B10)	PR (Relay power +) to P1 (Internal power 24V)
A12 to A11 (or B11)	MR (Relay power -) to M1 (Internal power 0V)

In addition, in order to set the Relay type Mini I/O board to NPN or PNP configuration the following CNIN pins needs to be wired together:

For **NPN** configuration

CNIN Pins	NACHI Signal
A9 to A11 (or B11)	Output common to M1 (Internal power 0V)
B9 to A10 (or B10)	Input common to P1 (Internal power 24V)

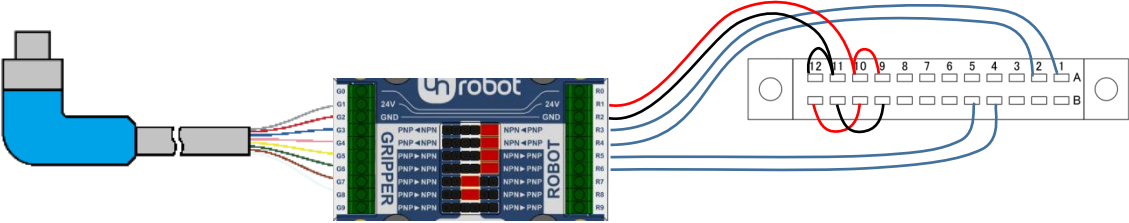
For **PNP** configuration

CNIN Pins	NACHI Signal
A9 to A10 (or B10)	Output common to P1 (Internal power 24V)
B9 to A11 (or B11)	Input common to M1 (Internal power 0V)

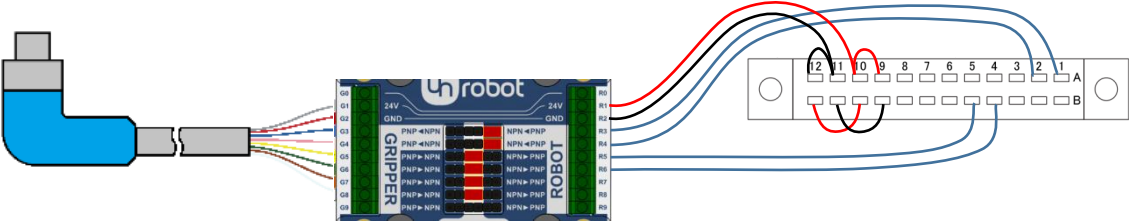
10. Verify connection and configuration with the diagrams below:

Relay Type Mini I/O board configured as PNP

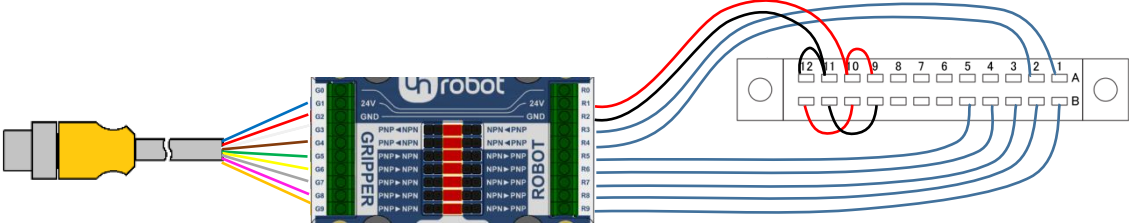
RG2/RG6 (P1) grippers:



VG10 gripper:

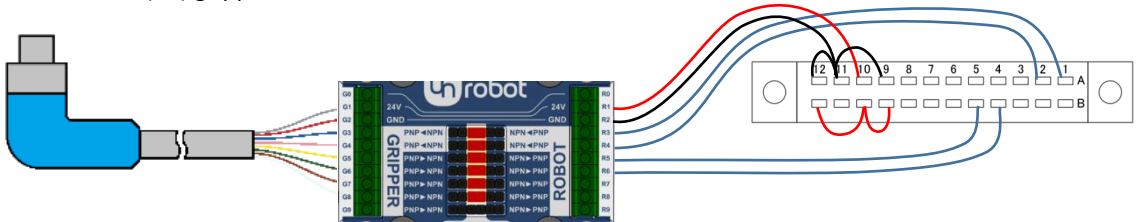


Gecko gripper:

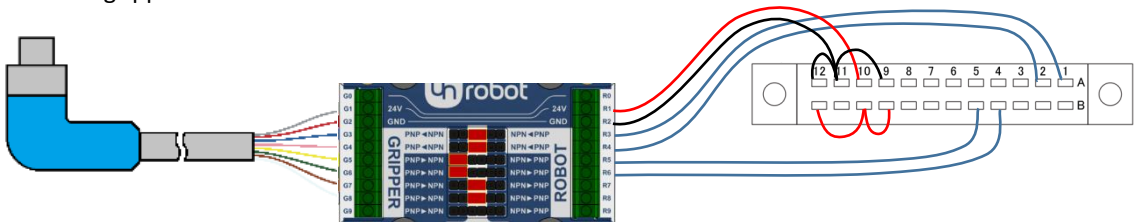


Relay Type Mini I/O board configured as NPN

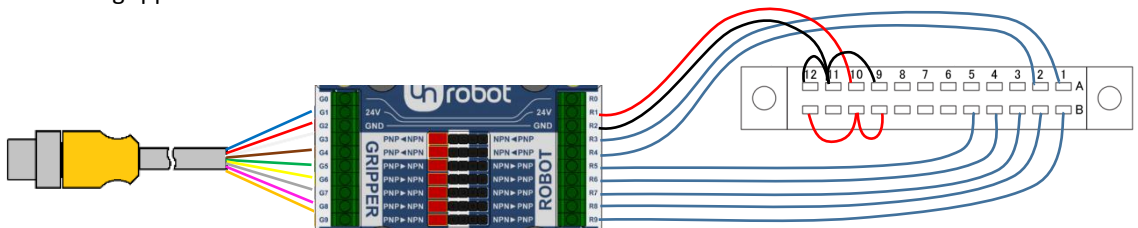
RG2/RG6 (P1) grippers:



VG10 gripper:

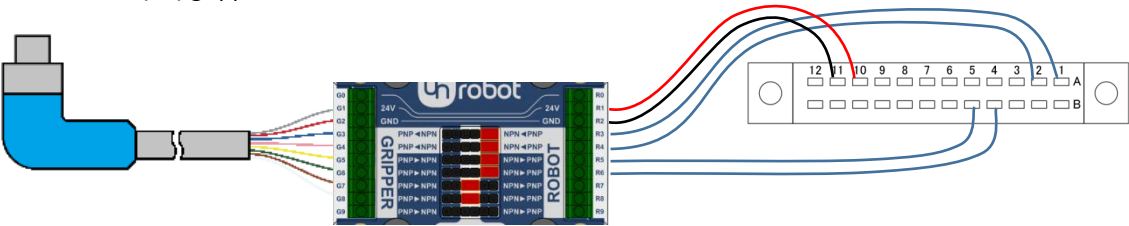


Gecko gripper:

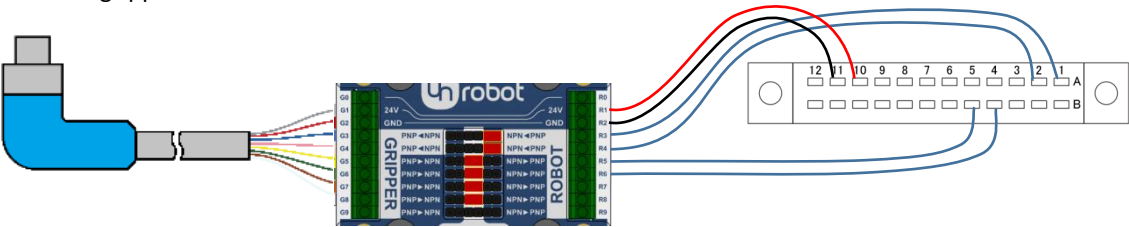


Transistor Type Mini I/O board PNP

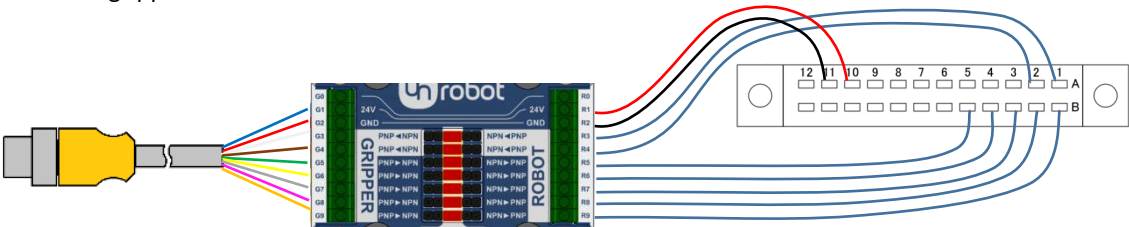
RG2/RG6 (P1) grippers:



VG10 gripper:

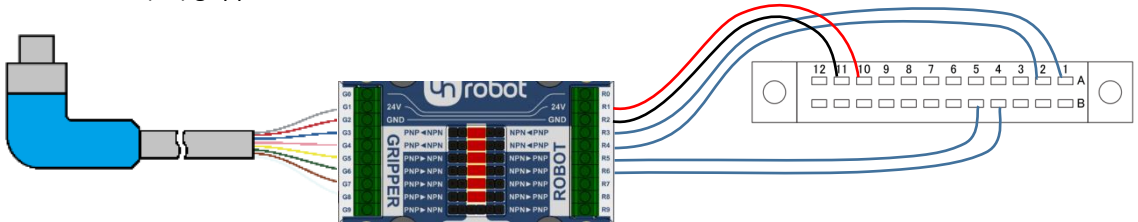


Gecko gripper:

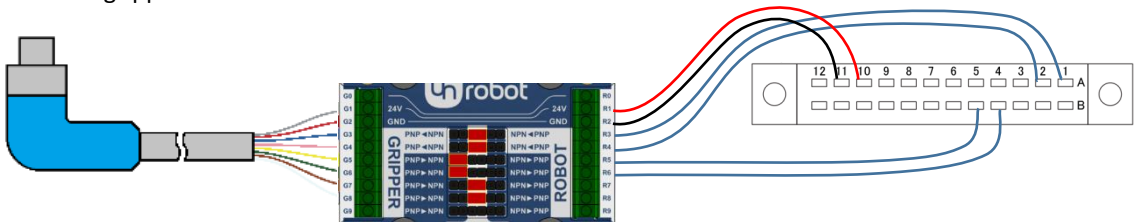


Transistor Type Mini I/O board NPN

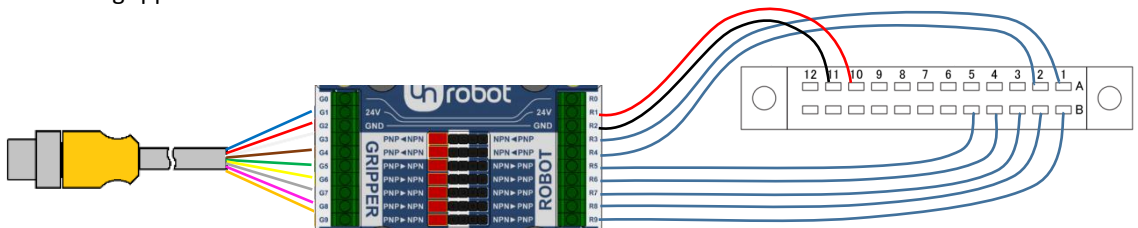
RG2/RG6 (P1) grippers:



VG10 gripper:



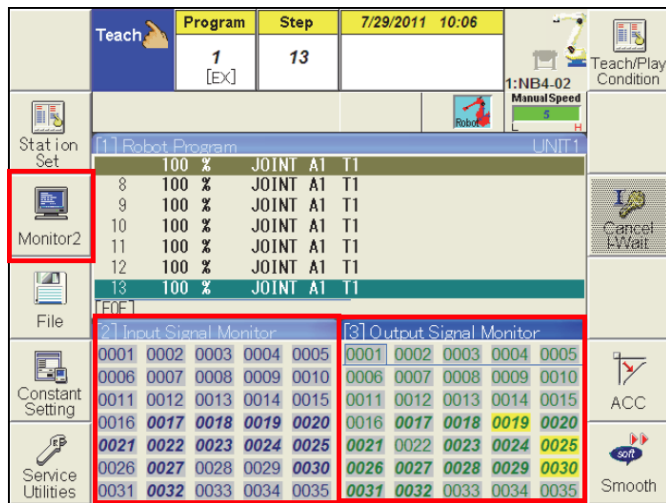
Gecko gripper:



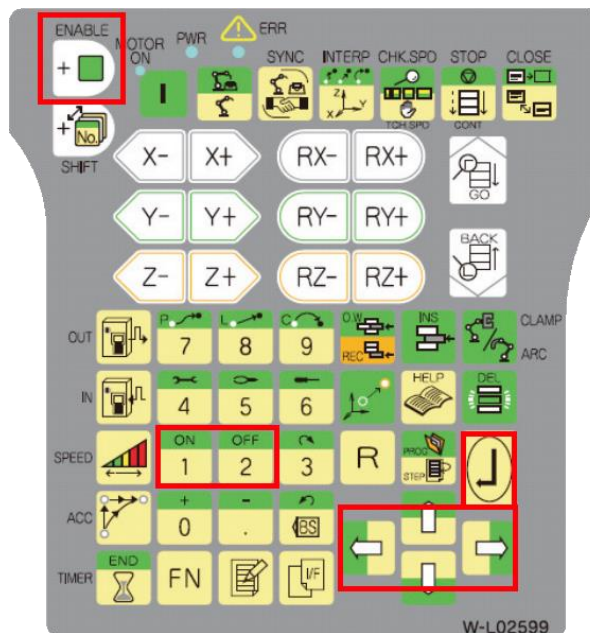
2.3.1.4. Robot software configuration

11. Use the NACHI teach pendant to test the installation:

- Tap on the **Monitor2** button on the touch screen



- Navigate to your mapped output signal (e.g. O97) with the arrow keys
- Press and hold the **Enable** button on the top left of the teach pendant, and press **1(ON)** or **2(OFF)** on the keypad



12. Use the gripper functionalities in the robot program.

To control the gripper:

- Press the **OUT** key at the desired program line
- Select **Set output**

NACHI robots

- Type in output number (e.g. O97) and press **Enter**
- Type in value (0 or 1) and press **Enter**

To get status from the gripper:

- Press the **IN** key at the desired program line
- Select **Wait for input**
- Type in input number (e.g. I104) and press **Enter**

13. Installation is finished, you are ready to use the gripper with your robot.

2.4. KAWASAKI Robots

2.4.1. R Series Models

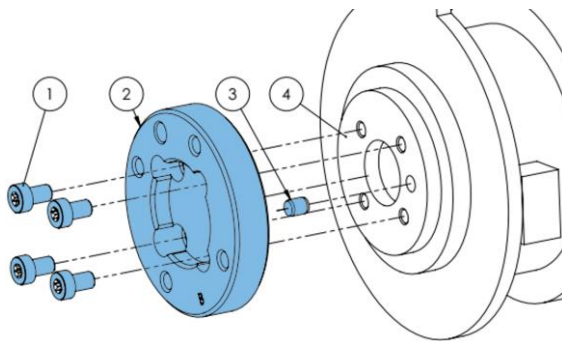
In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.4.1.1. Mounting

1. First mount the robot specific adapter flange:

For RS003N, RS005L, RS005N, RS007L, RS007N models

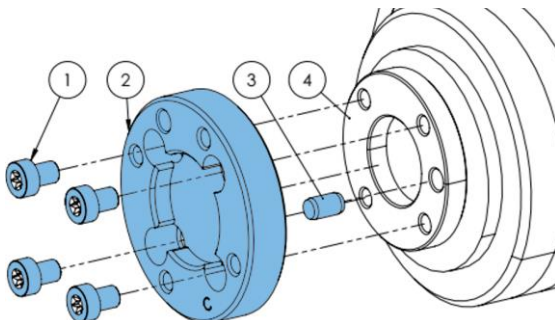


Type B

- 1 M5x8 screws (ISO14580)
- 2 OnRobot adapter flange (ISO 9409-1-50-4-M6)
- 3 Dowel pin Ø5x6 (ISO2338)
- 4 Robot tool flange (ISO 9409-1-31.5-4-M5)

Use 5 Nm tightening torque.

For RS006L, RS010N models

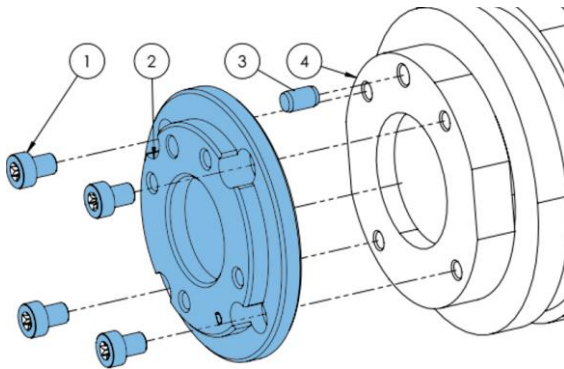


Type C

- 1 M6x8 screws (ISO14580)
- 2 OnRobot adapter flange (ISO 9409-1-50-4-M6)
- 3 Dowel pin Ø6x10 (ISO2338)
- 4 Robot tool flange (ISO 9409-1-40-4-M6)

Use 6 Nm tightening torque.

For RS0010L, RS020N, RS015X models

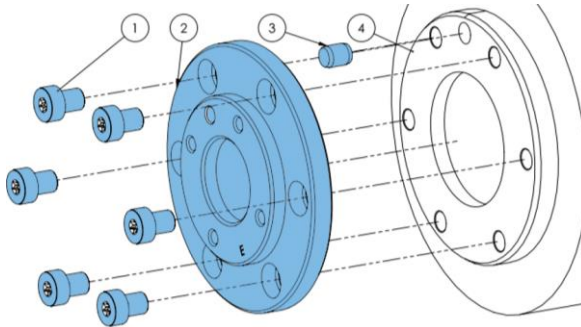


Type D

- 1 M6x8 screws (*ISO14580*)
- 2 OnRobot adapter flange (*ISO 9409-1-50-4-M6*)
- 3 Dowel pin $\varnothing 6 \times 10$ (*ISO2338*)
- 4 Robot tool flange (*ISO 9409-1-63-4-M6*)

Use 6 Nm tightening torque.

For RS030N, RS050N, RS080N models



Type E

- 1 M8x10 screws (*ISO14580*)
- 2 OnRobot adapter flange (*ISO 9409-1-50-4-M6*)
- 3 Dowel pin $\varnothing 8 \times 10$ (*ISO2338*)
- 4 Robot tool flange (*ISO 9409-1-80-6-M8*)

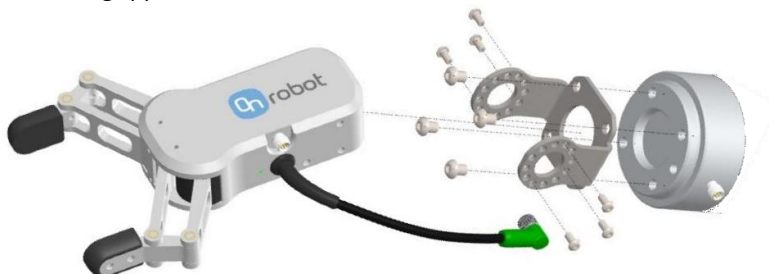
Use 8 Nm tightening torque.

2. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



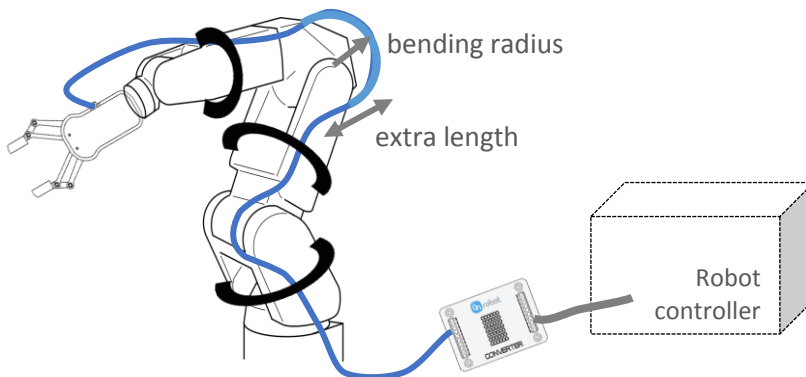
(For detailed mounting guide please refer to the gripper manuals.)

2.4.1.2. Cable routing

3. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
4. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

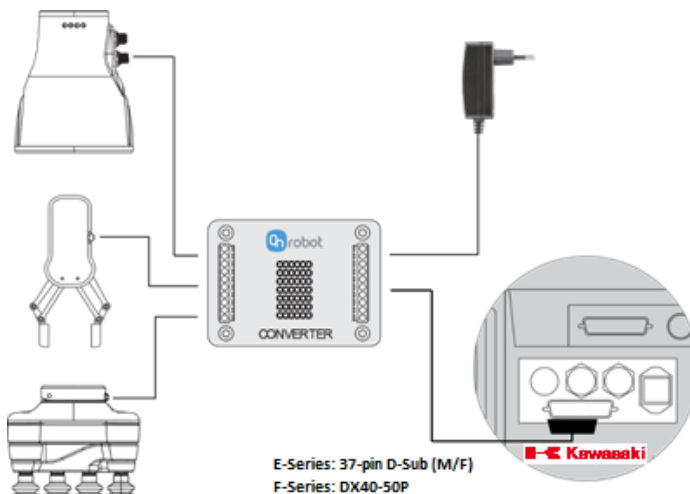
2.4.1.3. Electrical connection

For KAWASAKI robots the two most recent controllers are: the F-Series which uses a DX40-50P connector for I/O interface, and E-Series which uses a 37-pin D-Sub (M/F) connector. GPIO board in the control cabinet can be used to connect the OnRobot IO converter to the robot controller. The supplied 24V power supply can be used to power the converter and the gripper.

NOTE: It is HIGHLY recommended to purchase the appropriate connector & harness parts before installing the gripper and I/O converter. There are no screw terminals for the I/O terminal in the controller. The I/O connections for the F-Series controller can be soldered, but the solder points are very small. The I/O connections for the E-Series controller **cannot** be soldered and require using a DB37 connector.

Kawasaki I/O Connector Parts

Controller	Description	Sample Vendor
F-Series (2AB/AE Board)	HIROSE DX40-50P Connector	Digikey, Mouser
	DX-50-CV Connector Backshell	
E-Series (1TW Board)	DB37 (M & F) Connector	Amazon, Digikey



The following steps will guide you through the electrical setup of the OnRobot grippers:

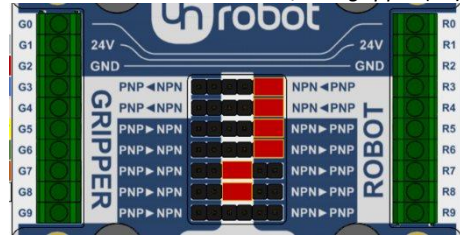
5. Make sure that the robot is powered off completely and disconnect the controller from wall power.
6. First locate the DB37 connector for E-Series on the back side of the cabinet or the DX40-50P connector for the F-Series on the side of the cabinet. Prepare the mating connectors.

- Check your digital I/O module installed in the control cabinet and configure the OnRobot IO Converter accordingly:

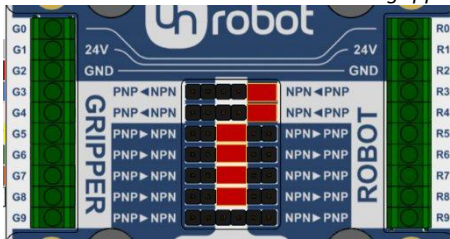
NOTE: The Kawasaki robot controller has an XGPIO board that determines whether the robot is configured for PNP or NPN. For the F-Series, the XGPIO board (2AB/AE) is in PNP configuration by default, and can be changed by setting jumper JP8 on the board (refer to the F Controller External IO Manual for more information). For the E-Series, robot PNP/NPN is determined by the XGPIO board (1TW); to change configurations, the controller's XGPIO board must be swapped out.

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

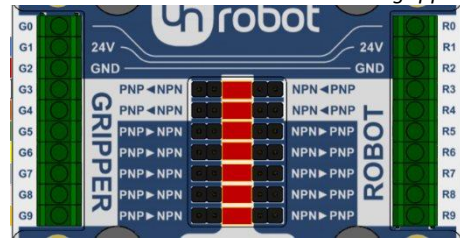
RG2/RG6 gripper (P1)



VG10 gripper

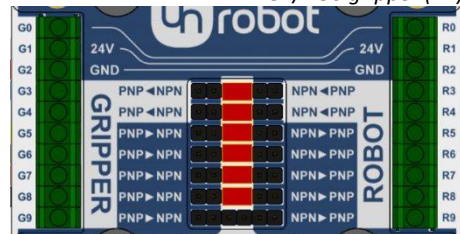


Gecko gripper

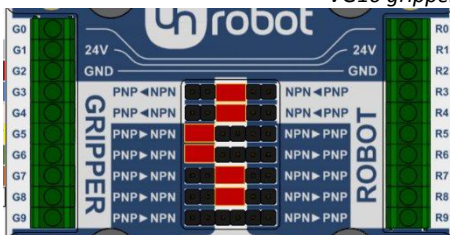


NPN configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

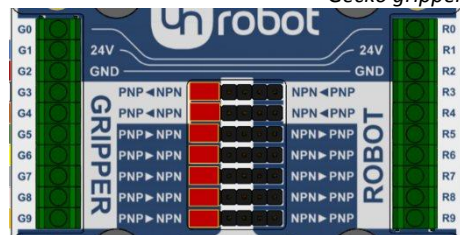
RG2/RG6 gripper (P1)



VG10 gripper



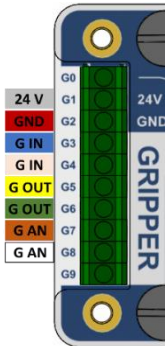
Gecko gripper



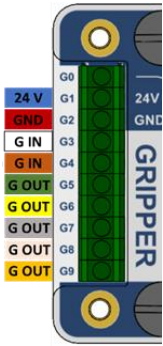
Please refer to the Kawasaki manual to check whether it is an NPN or a PNP type.

8. Wire the gripper cable to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper



I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

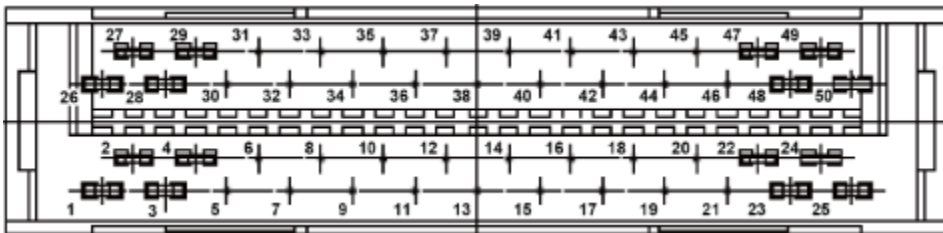
9. Connect the IO Converter with the controller cabinet, as described in the table below with the supplied 30 cm wires.

I/O Converter	Kawasaki Signal	F-Series Pin (DX40-50P)	E-Series Pin (DB37)	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
R0				Unused	Unused	Unused
R1	VIN (E-Series only)		CN2 - 18	Gripper 24V	Gripper 24V	Gripper 24V
R2	OUT-COM1 & IN-COM1	30 & 6	CN2 - 36 CN4 - 18	Gripper GND	Gripper GND	Gripper GND
R3	OUT_1	31	CN2 - 1	Force 5/40N	Channel A On/Off	Engage pads
R4	OUT_2	32	CN2 - 2	Close/open	Channel B On/Off	Disengage pads
R5	IN_1	7	CN4 - 1	Not gripped	CHA vacuum OK	Ultrasonic OK
R6	IN_2	8	CN4 - 2	Gripper busy	CHB vacuum OK	Part present
R7	IN_3	9	CN4 - 3	Unused	Vacuum level A	Preload OK
R8	IN_4	10	CN4 - 4	Gripper width	Vacuum level B	Pad needs
R9	IN_5	11	CN4 - 5	Unused	Unused	Error

NOTE: The standard Kawasaki controller does not support robot analog inputs (i.e. RG2 gripper width, VG10 vacuum level).

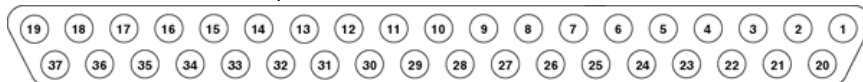
- Wired the digital I/O lines (R3-R9) of the OnRobot IO Converter to the DX40-50P connector for F-Series or the DB37 connector for E-Series.

The pinout for the for the DX40-50P connector for F-Series is shown below:

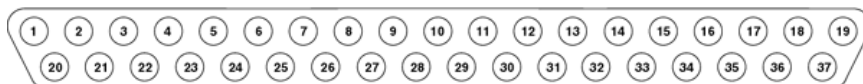


The pinout for the for the DB37 connector for E-Series is shown below.

Rear view of the male 37 pin sub-d connector:



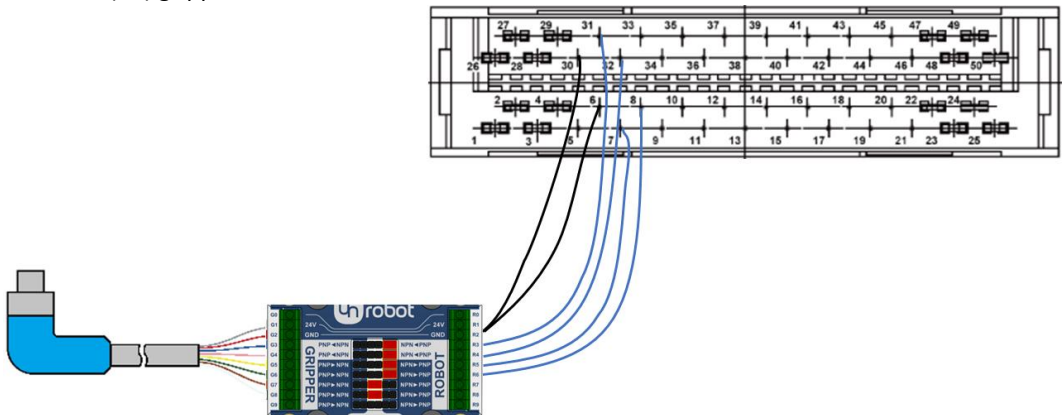
Rear view of the female 37 pin sub-d connector:



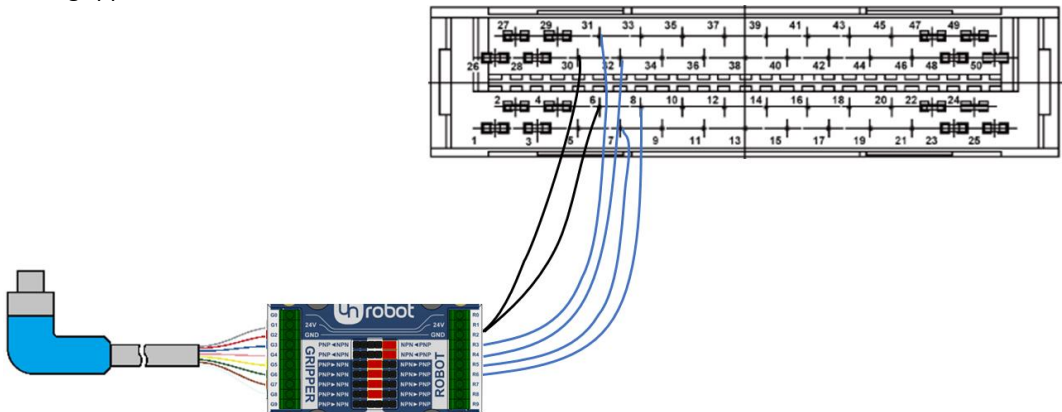
11. Verify connection and configuration with the diagrams below.

Kawasaki F-Series PNP

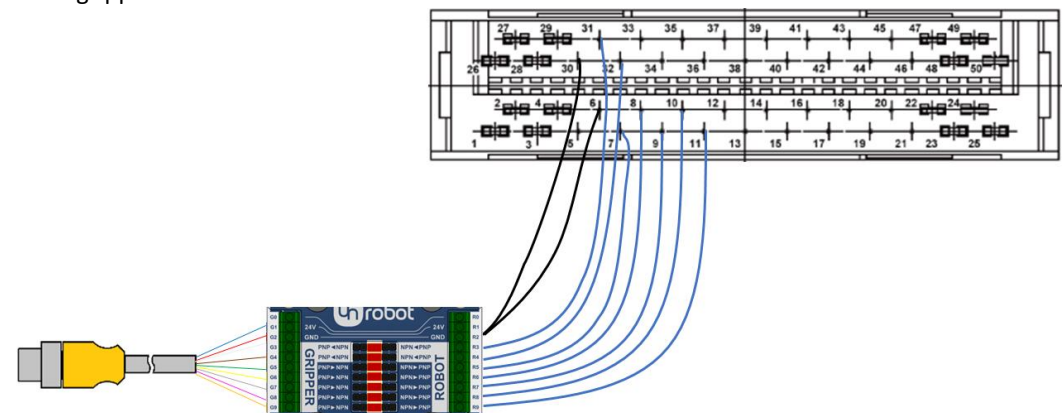
RG2/RG6 (P1) grippers:



VG10 gripper:

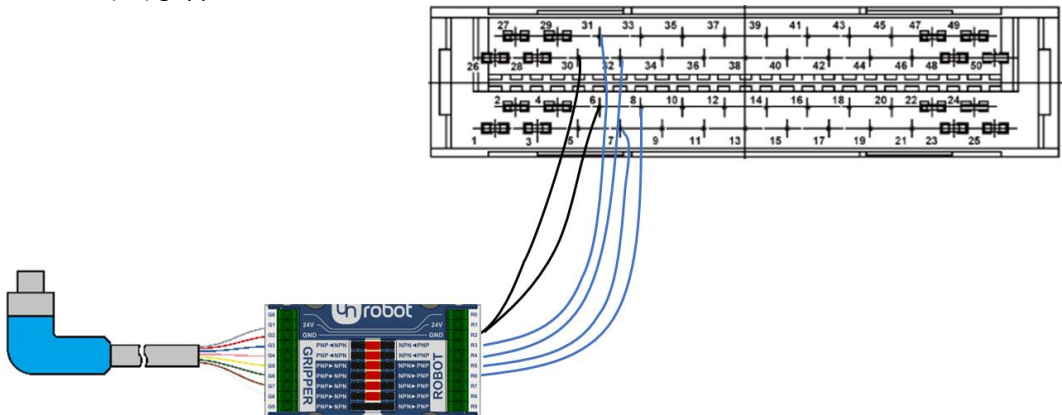


Gecko gripper:

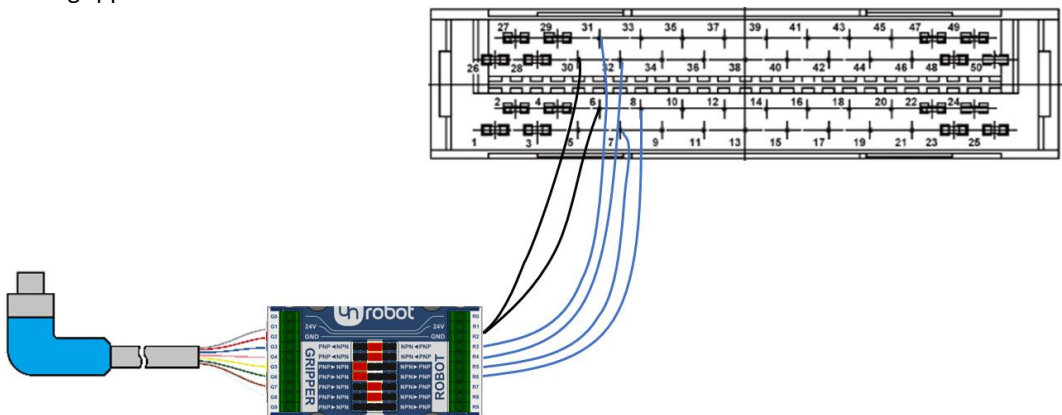


Kawasaki F-Series NPN

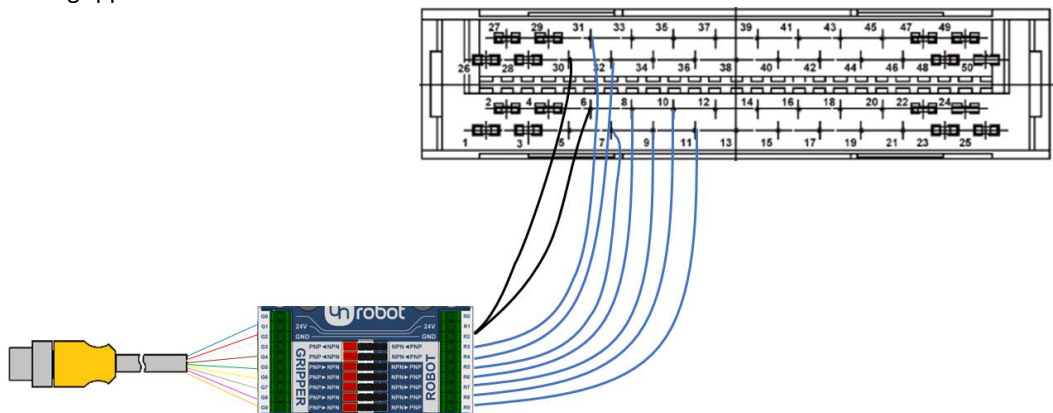
RG2/RG6 (P1) grippers:



VG10 gripper:

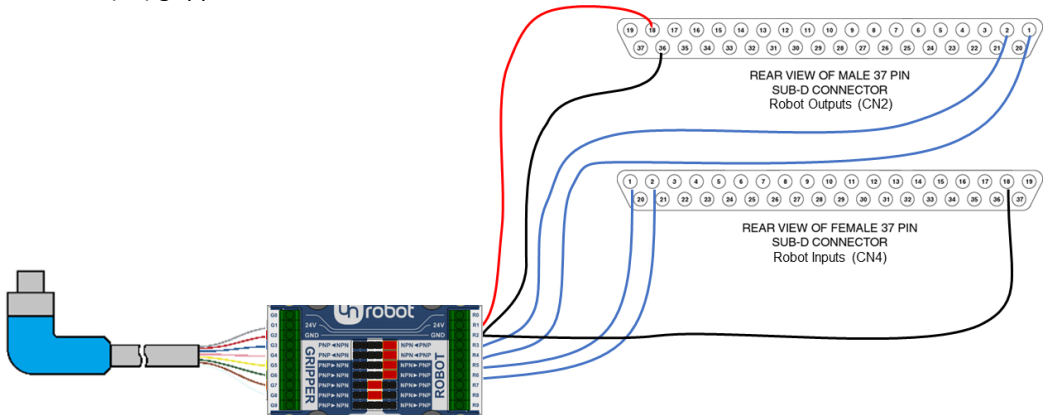


Gecko gripper:

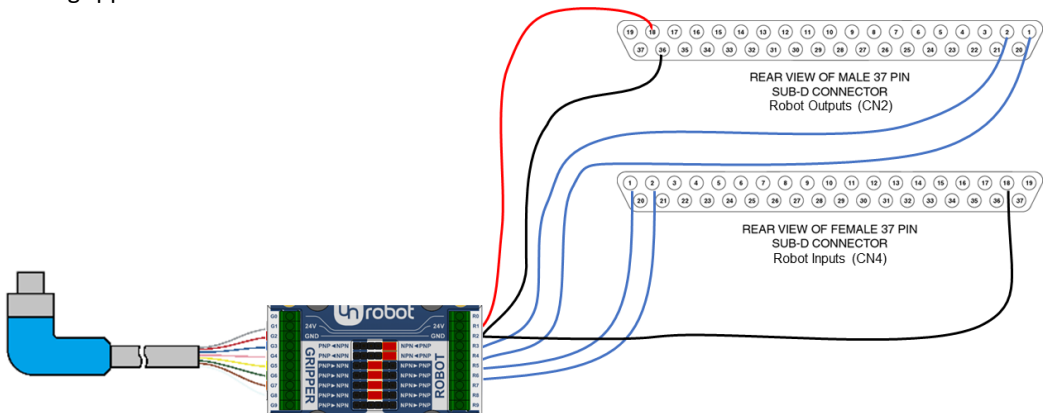


Kawasaki E-Series PNP

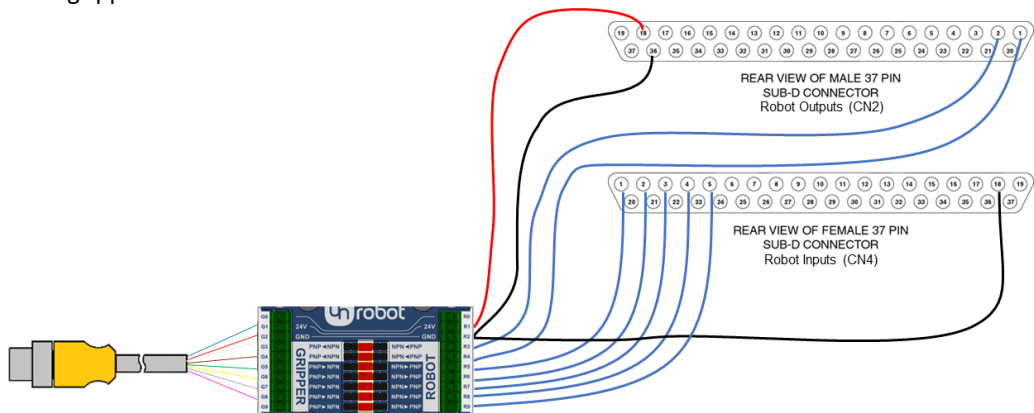
RG2/RG6 (P1) grippers:



VG10 gripper:

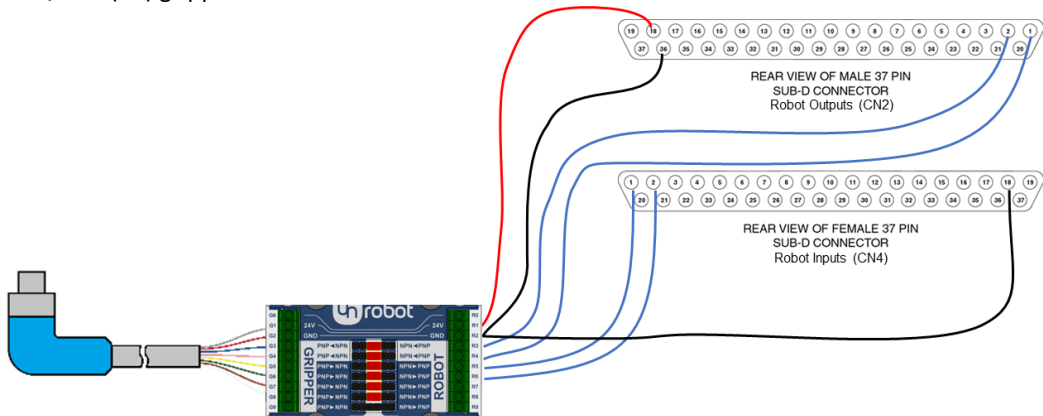


Gecko gripper:

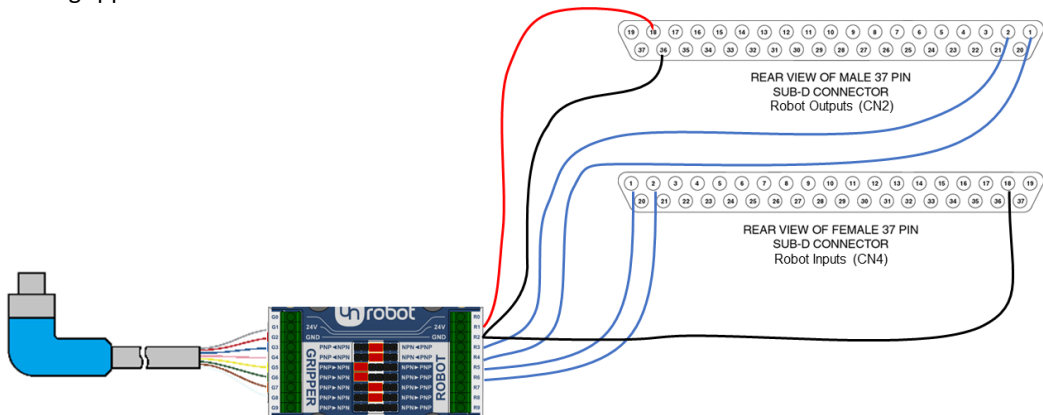


Kawasaki E-Series NPN

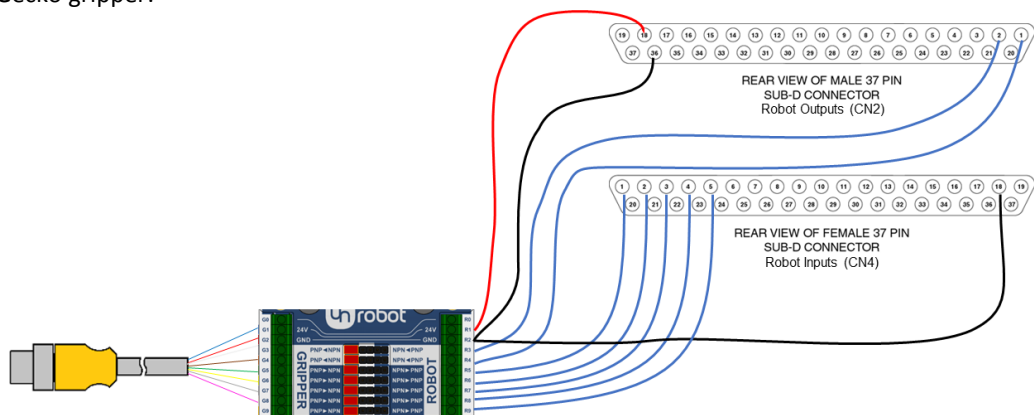
RG2/RG6 (P1) grippers:



VG10 gripper:

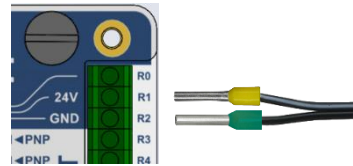


Gecko gripper:



12. Connect the OnRobot power supply to the power lines (R1,R2) of the OnRobot IO Converter:

Pin	Ferrule	Description
R1	yellow	24V (1A)
R2	cyan	GND

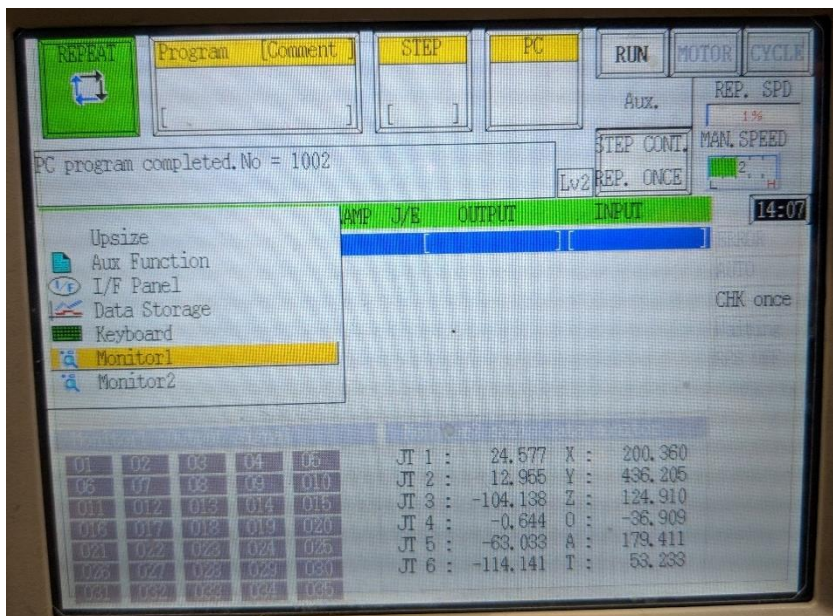


2.4.1.4. Robot software configuration

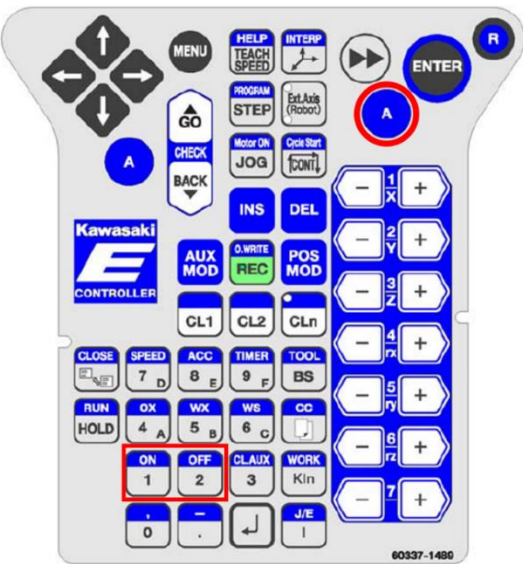
Controlling I/O Using the Kawasaki Teach Pendant

After the external I/O harness is installed, the gripper's I/O can be viewed on the Kawasaki teach pendant by following the steps below. Digital I/O assignment is determined by how the harness has been hard-wired to the GPIO board.

13. Touch the middle of the teach pendant touch-screen, then press the **Menu** button on the teach pendant and select a monitor (Monitor1 or Monitor2) and hit **Enter**

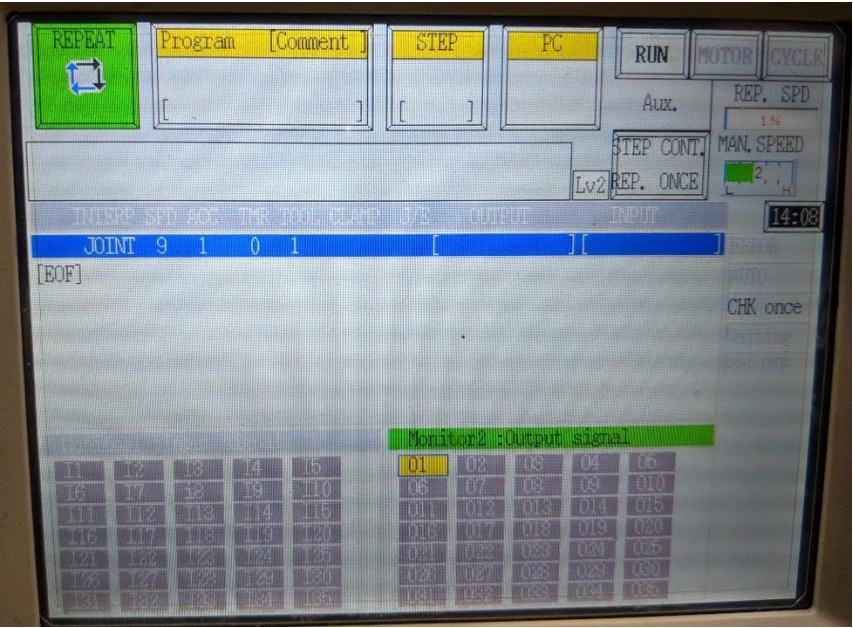


14. Select **Output Signal** and hit **Enter**. This will display a list of robot outputs in the monitor at the bottom of the screen.
15. Test robot outputs by turning the signals ON/OFF. To do this, hold A + ON/OFF.



Locations of **A** and **ON** and **OFF** buttons on the teach pendant.

16. To display robot inputs, repeat steps 1-3, but select **Digital Inputs**. You can also put outputs and inputs on separate monitors to see them side-by-side.



Teach pendant display with Monitor1 showing input signals (I1-I35) and Monitor2 showing output signals (O1-O35).

KAWASAKI Robots

17. Use the gripper functionalities in the Kawasaki program.
(Assuming gripper close function is mapped to OUT_102)

SIG 2; Close gripper by turning signal O2 on
SIG -2; Open gripper by turning signal O2 off

18. Installation is finished, you are ready to use the gripper with your robot.

2.5. KUKA robots

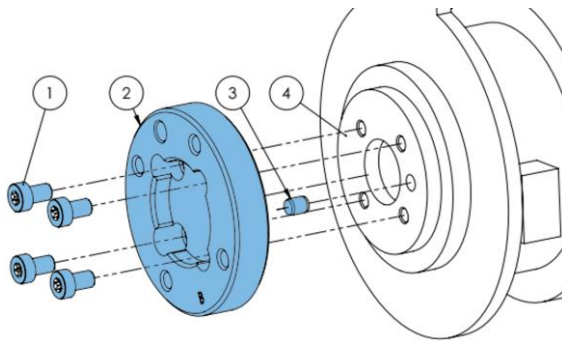
2.5.1. Models with KR C4 compact cabinet

In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.5.1.1. Mounting

14. First mount the robot specific adapter flange:
(For Type A, no adapter flange is required.)



Type B

- 1 M5x8 screws (ISO14580)
- 2 OnRobot adapter flange (ISO 9409-1-50-4-M6)
- 3 Dowel pin Ø5x6 (ISO2338)
- 4 Robot tool flange (ISO 9409-1-31.5-4-M5)

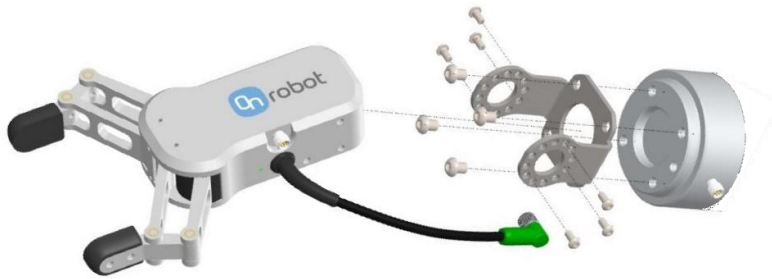
Use 5 Nm tightening torque.

15. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



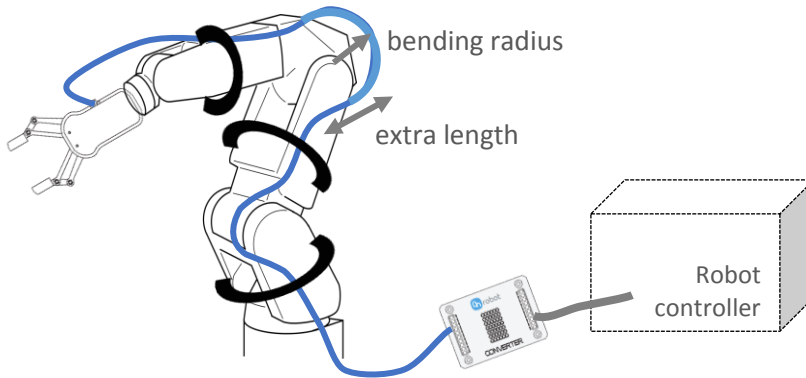
(For detailed mounting guide please refer to the gripper manuals.)

2.5.1.2. Cable routing

16. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
17. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

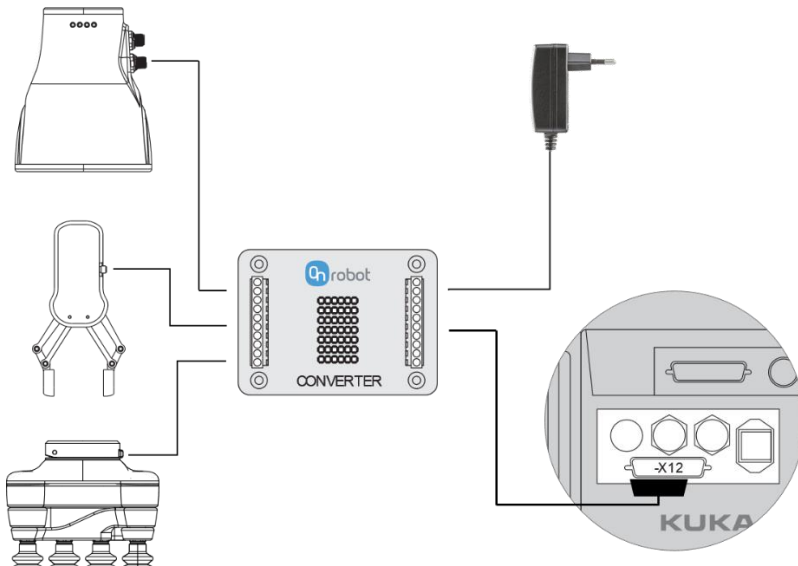
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

2.5.1.3. Electrical connection

For Agilus robots the **X12** optional I/O interface in the control cabinet can be used to connect the OnRobot IO converter to the robot controller. The supplied 24V power supply can be used to power the converter and the gripper.



The following steps will guide you through the electrical setup of the OnRobot grippers:

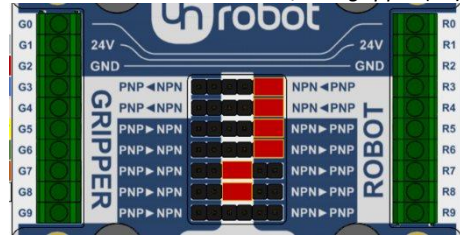
18. Make sure that the robot is powered off completely.
19. First locate the X12 connector on the back side of the KRC4 compact cabinet. Prepare the spare X12 (D-SUB 50) mating connectors that was shipped with the robot.

20. Check your digital I/O module installed in the control cabinet and configure the OnRobot IO Converter accordingly:

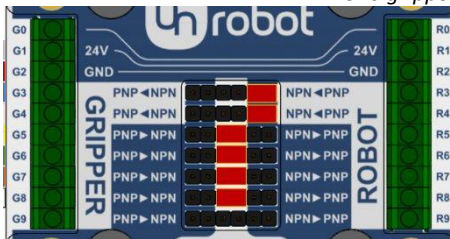
The Beckhoff EL1809 and EL2809 modules are **PNP type**.

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

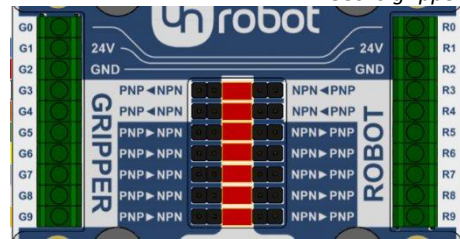
RG2/RG6 gripper (P1)



VG10 gripper



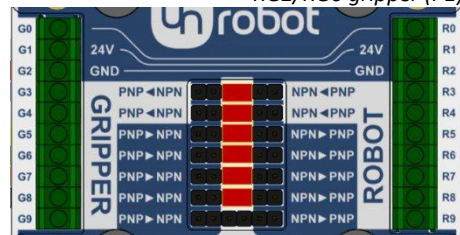
Gecko gripper



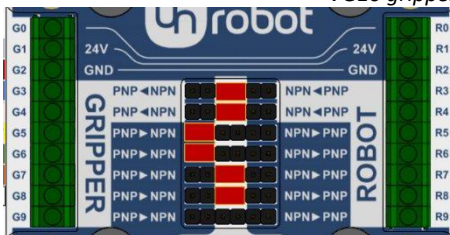
The Beckhoff EL1889 and EL2889 modules are **NPN type**.

NPN configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

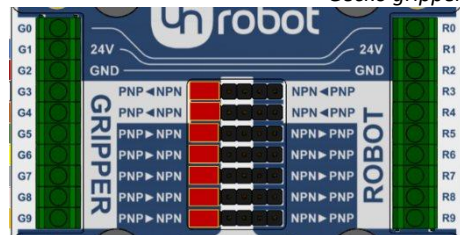
RG2/RG6 gripper (P1)



VG10 gripper



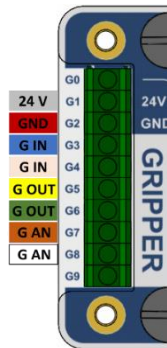
Gecko gripper



If other module is installed, please refer to the manual to check whether it is an NPN or a PNP type.

21. Wire the gripper connector to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper

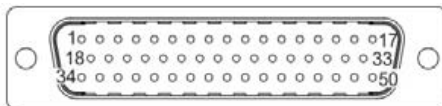


I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

22. Wire the digital I/O lines (R3-R9) of the OnRobot IO Converter to the X12 connector.

List of the important pins of the X12 connector: (viewed from connection side)



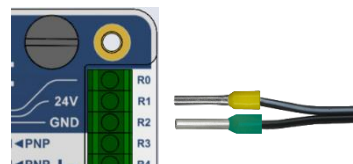
Pin	Description	Pin	Description
1	Digital input 1	17	Digital output 1
2	Digital input 2	18	Digital output 2
3	Digital input 3	19	Digital output 3
4	Digital input 4	20	Digital output 4
5	Digital input 5	21	Digital output 5
6	Digital input 6	22	Digital output 6
7	Digital input 7	23	Digital output 7
8	Digital input 8	24	Digital output 8
9	Digital input 9	25	Digital output 9
10	Digital input 10	26	Digital output 10
11	Digital input 11	27	Digital output 11
12	Digital input 12	28	Digital output 12
13	Digital input 13	29	Digital output 13
14	Digital input 14	30	Digital output 14
15	Digital input 15	31	Digital output 15
16	Digital input 16	32	Digital output 16

Any unused input pin can be used for gripper status information, and any unused output can be used for controlling the gripper.

Please note which pin you used during the wiring, in a later step it is going to be needed during the mapping.

23. Connect the OnRobot power supply to the power lines (R1,R2) of the OnRobot IO Converter:

Pin	Ferrule	Description
R1	yellow	24V (1A)
R2	cyan	GND

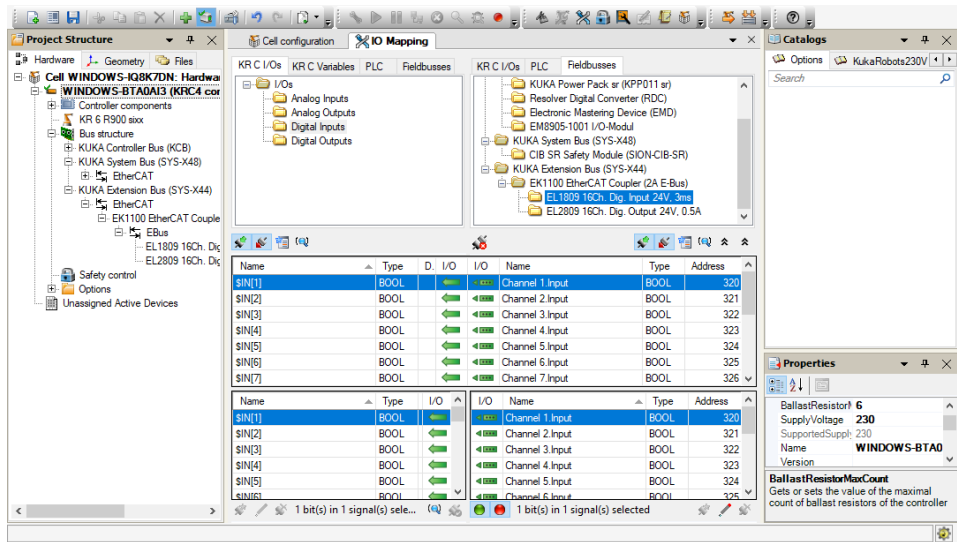


2.5.1.4. Robot software configuration

24. Power on the robot and change the robot configuration in the WorkVisual through the KLI interface. (For detailed steps please refer to the manuals.)

In order to use the digital I/O's of the robot the physical pins of the interface must be mapped to variables in WorkVisual.

The X12 pin numbering follows the channel numbers listed in WorkVisual (IO Mapping fieldbus tab: EL1809 Input and EL2809 Output).



25. Once the configuration is finished and applied to the robot, use the KUKA smartPAD to test the installation:

In the main menu, select **Display > Inputs/outputs > Digital I/O**

To display a specific input/output that the gripper is mapped to:

- Tap on the **Go to** button.
- Enter the number and confirm with the **Enter** key.



26. Use the gripper functionalities in the KRL program.
(Assuming gripper close function is mapped to \$OUT[2])

\$OUT[2]=TRUE ; Close gripper

27. Installation is finished, you are ready to use the gripper with your robot.

2.5.2. LBR iiwa models with Sunrise cabinet

In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.5.2.1. Mounting

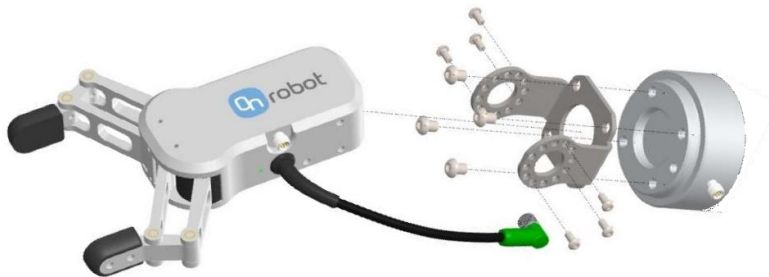
The tool flange of the robot is directly compatible with the OnRobot grippers.

1. Mount the gripper to the robot.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



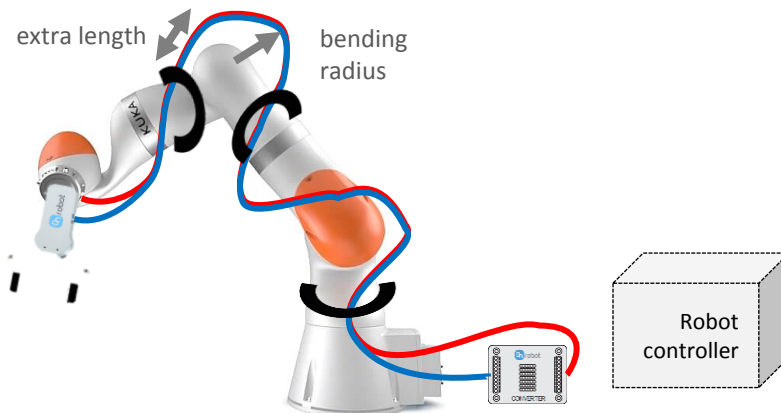
(For detailed mounting guide please refer to the gripper manuals.)

2.5.2.2. Cable routing

2. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
3. Connect the M12-17 pin Media Flange connector (supplied by KUKA) to the Media Flange of the robot (make sure that the cable is long enough).
4. Route the gripper cable (blue line) and the Media Flange cable (red line) to the IO Converter.
5. Use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

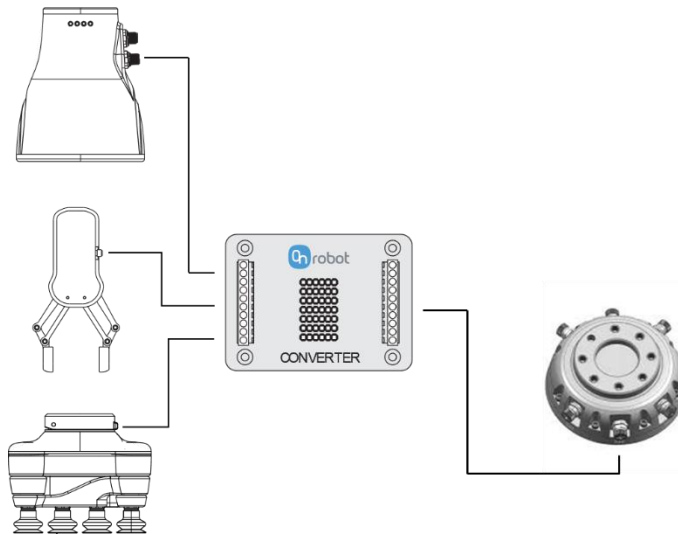
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

2.5.2.3. Electrical connection

For KUKA LBR iiwa robots the Media Flange I/O interface on the robot arm can be used to connect the OnRobot IO converter to the robot controller. The Media Flange also powers the attached gripper. The robot's Media Flange must have one of the following connections: X11, X12, X13, X3, X41, X42, X43, X91, X92, X93. If your specific model of Media Flange doesn't have one of these interfaces, you need to contact your KUKA supplier.

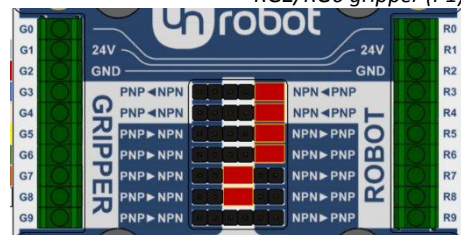


The following steps will guide you through the electrical setup of the OnRobot grippers for the X3 (M12 - 17 pin) connector type (the steps are the same for all interface types, but the connector types and pin numbering will vary):

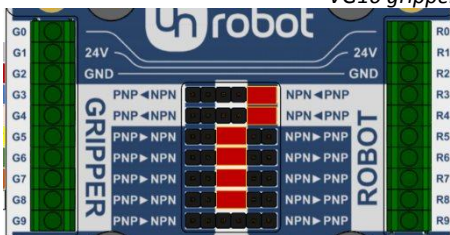
6. Make sure that the robot is powered off completely.
7. First locate the X3 connector on the side of the Media Flange. Prepare the spare X3 (M12 – 17 pin) mating connectors that was shipped with the robot.
8. For all Media Flange types configure the converter as follows (X11, X12, X13, X3, X41, X42, X43, X91, X92, X93 are **PNP type**).

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

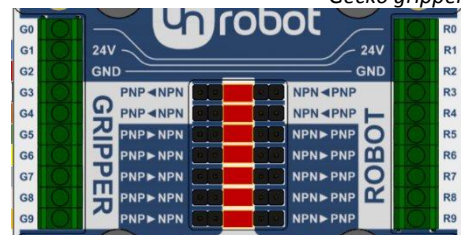
RG2/RG6 gripper (P1)



VG10 gripper

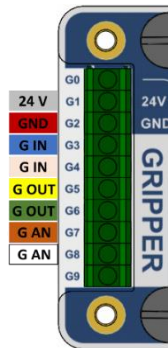


Gecko gripper

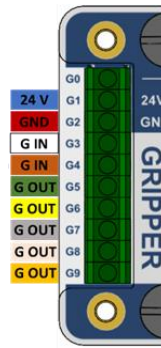


9. Wire the gripper connector to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper

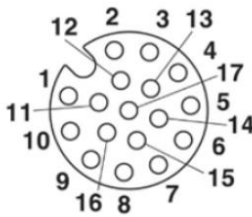


I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

10. Wire the digital I/O lines (R3-R9) of the OnRobot IO Converter to the X3 connector.

List of the important pins of the X3 connector: (viewed from robot side)



Pin	Description	Pin	Description
1	MF Output 0	9	VCC 24V
2	MF Output 3	10	MF Input 0
3	MF Input 3	11	MF Output 1
4	MF Input 4	12	MF Output 2
5	GND 24V	13	MF Input 2
6	GND 24V	14	GND 24V
7	VCC 24V	15	VCC 24V
8	VCC 24V	16	MF Input 1

Any unused input pin can be used for gripper status information, and any unused output can be used for controlling the gripper.

Please note which pin you used during the wiring, in a later step it is going to be needed during the mapping.

11. Connect any of the X3 power outputs to the power lines (R1,R2) of the OnRobot IO Converter:

Pin	X3 pin	Description
R1	7,8,9,15	24V (1A)
R2	5,6,14,17	GND

2.5.2.4. Robot software configuration

Your KUKA Media Flange is factory configured to I/O groups and your KUKA Sunrise Workbench project should have these I/O groups exported. If this is not the case consult the KUKA Sunrise OS 1.xx KUKA Sunrise Workbench 1.xx Manual, Section 11.

12. Use the gripper functionalities in the Java program. For more details see: KUKA Sunrise OS 1.xx KUKA Sunrise Workbench 1.xx Manual, Section 15.11
13. Installation is finished, you are ready to use the gripper with your robot

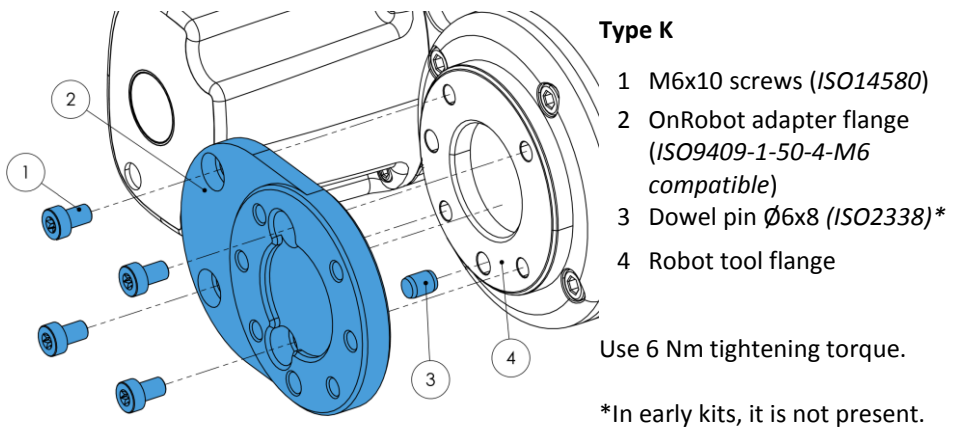
2.6. TECHMAN robots

In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.6.1. Mounting

12. First mount the robot specific adapter flange:

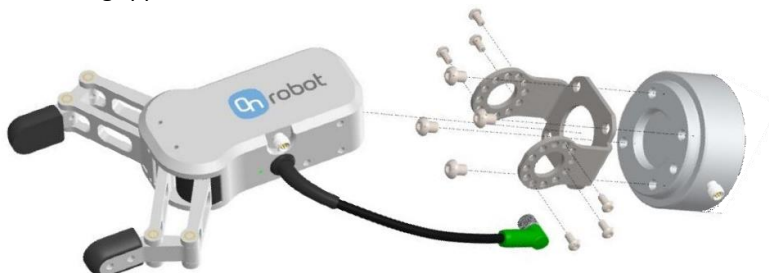


13. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



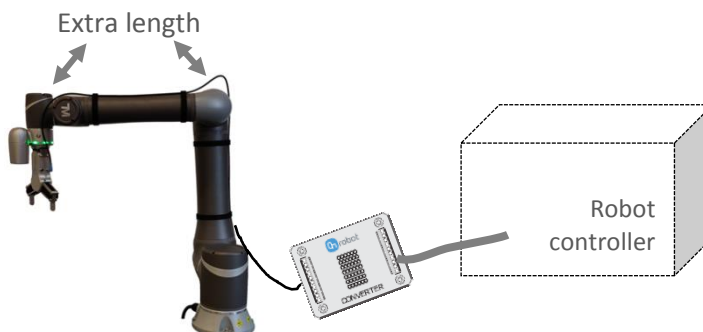
(For detailed mounting guide please refer to the gripper manuals.)

2.6.2. Cable routing

2. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
3. Route the cable to the IO Converter and use the supplied Velcro tape to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

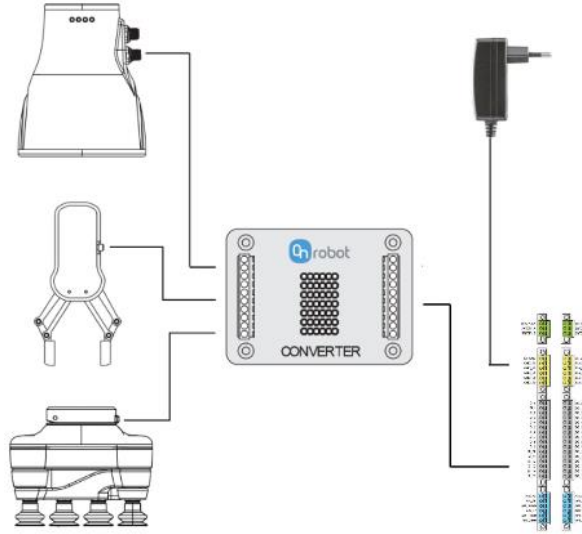
Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



Place the OnRobot IO Converter close to the Robot controller.

2.6.3. Electrical connection

For Techman robots, the I/O interface on the bottom side of the control cabinet can be used to connect the OnRobot IO converter to the robot controller. The supplied 24V power supply can be used - connected to the power inputs on the controller - to power the converter and the gripper.

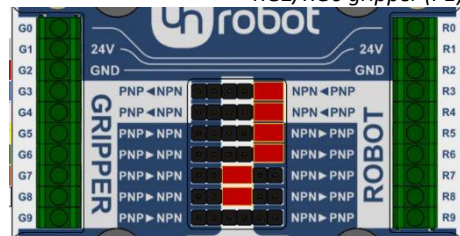


The following steps will guide you through the electrical setup of the OnRobot grippers:

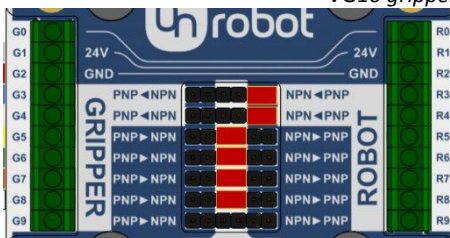
4. Ensure that the IO Converter is configured for the gripper, in accordance with the guidance below:

PNP configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

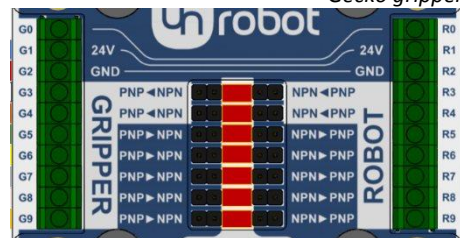
RG2/RG6 gripper (P1)



VG10 gripper

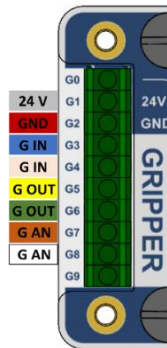


Gecko gripper



5. Wire the gripper cable to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper



I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy (green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

- Make sure that the robot and controller is powered off completely.
- Gain access to the bottom of the robot controller cabinet, where the IO connectors are located.
- Connect the IO Converter with the controller cabinet, as described in the table below with the supplied 30cm wires.

TECHMAN Signal	IO Converter		
	RG2/RG6 (P1)	VG10	Gecko
EXT_GND	Unused	Unused	PSU GND
EXT_24V	Unused	Unused	PSU 24V
GND_EX	R2 / GND	R2 / GND	R2 / GND
24V_EX	R1 / 24V	R1 / 24V	R1 / 24V
DI_0	R5	R5	R5
DI_1	R6	R6	R6
DI_2	Unused	Unused	R7
DI_3	Unused	Unused	R8
DI_4	Unused	Unused	R9
DO_0	R3	R3	R3
DO_1	R4	R4	R4
AIN_OP	R7	R7	Unused
AIN_0GND	R2 / GND	R2 / GND	Unused
AIN_1P	R8	R8	Unused
AIN_1GND	R2 / GND	R2 / GND	Unused
ADC_GND	R2 / GND	R2 / GND	Unused

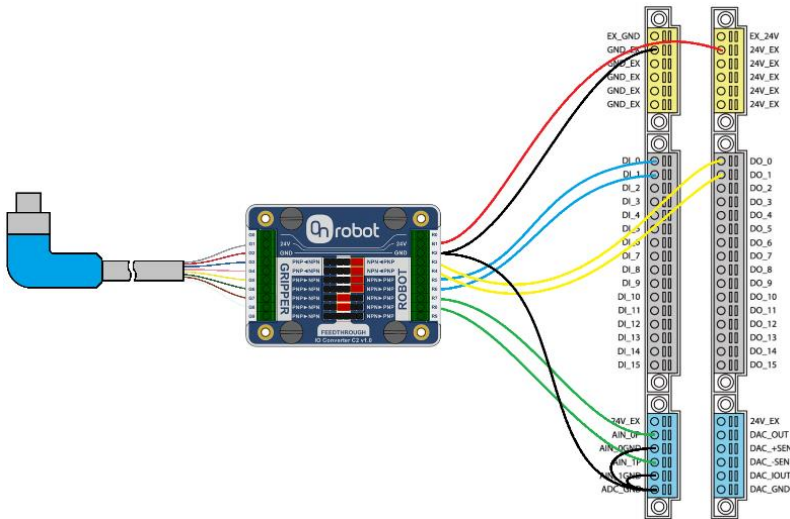
Other digital input/outputs can be used, if the listed digital input/outputs are used for other purposes. Note that AIN_0GND, AIN_1GND and ADC_GND should all be connected to common ground (R2 on the IO Converter or GND_EX on the robot) for the robots input circuitry to operate. Please refer to the robot manual for further details.

9. Connect the supplied OnRobot power supply to the external power lines on controller (24V_EX and GND_EX respectively), when using the Gecko.

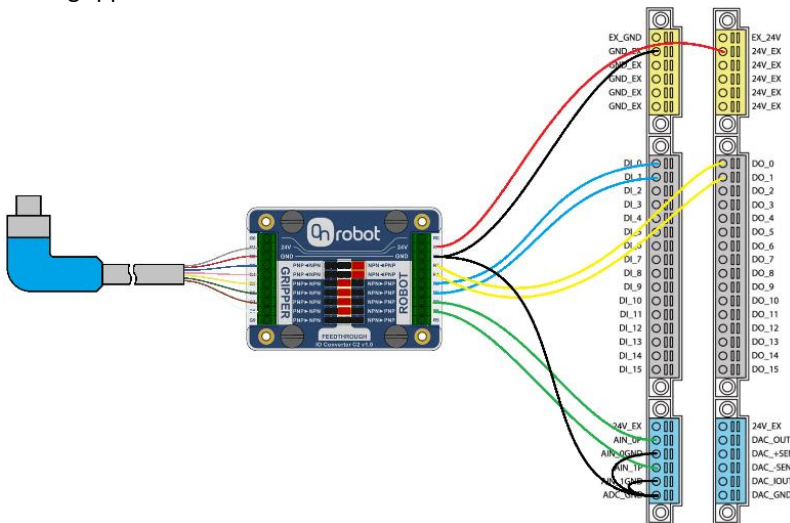
Pin	Ferrule	Description
EX_24V	yellow	24V (1A)
EX_GND	cyan	GND

10. Verify connection and configuration with the diagrams below:

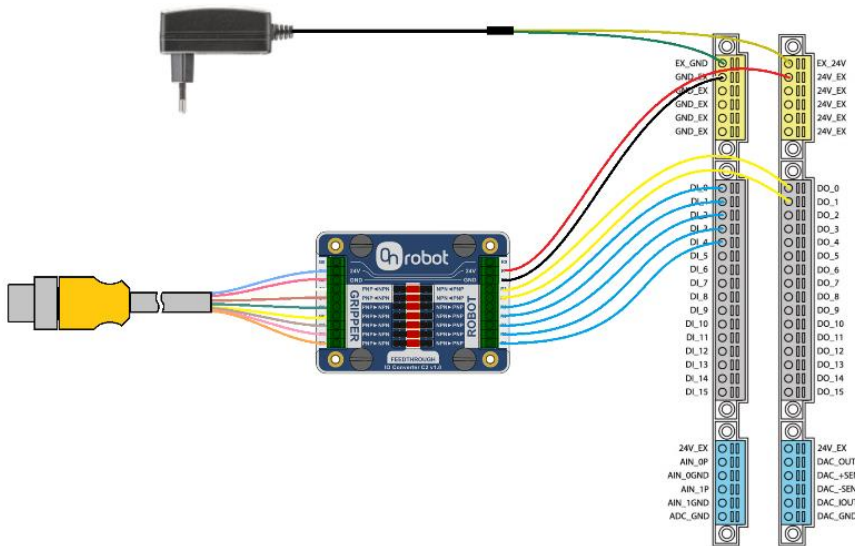
RG2/RG6 (P1) grippers:



VG10 gripper:



Gecko gripper:



2.6.4. Robot software configuration

11. After powering on the robot, the IO's can be used to control the gripper and get feedback, according to the table below:

TECHMAN Signal	Function		
	RG2/RG6 (P1)	VG10	Gecko
DI 0	No grip	CHA > 60%	Ultrasonic OK
DI 1	Busy	CHB > 60%	Part present
DI 2	Unused	Unused	Preload OK
DI 3	Unused	Unused	Pad needs service
DI 4	Unused	Unused	Error
DO 0	Low/high force	CHA grip/release	Engage pads
DO 1	Open/close	CHB grip/release	Disengage pads
AIN 0	Unused	CHA vacuum level	Unused
AIN 1	Gripper width	CHB vacuum level	Unused

12. It is advised to configure the robots GRIPPER button to toggle the relevant I/Os, in order to easy teaching by demonstration. Please refer to the robot's user manual for guidance.
13. Installation is finished, you are ready to use the gripper with your robot.

2.7. YASKAWA Robots

2.7.1. Models GP12, GP8, GP7, HC10/DT

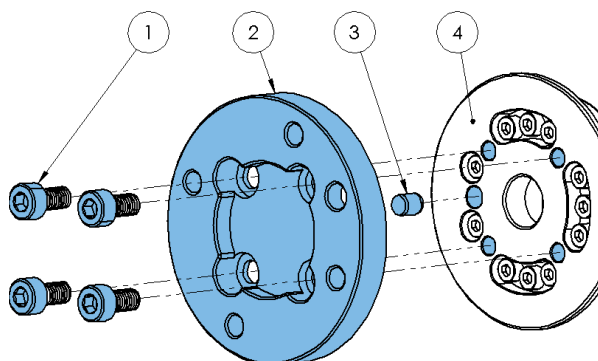
In the following guide - via four installation steps – we will show you how to get ready to use the OnRobot grippers with your robot. The installation steps are:

- I. mount the gripper
- II. route the cable
- III. connect the wires
- IV. and setup the robot.

2.7.1.1. Mounting

1. First mount the robot specific adapter flange:

For GP7, GP8 models

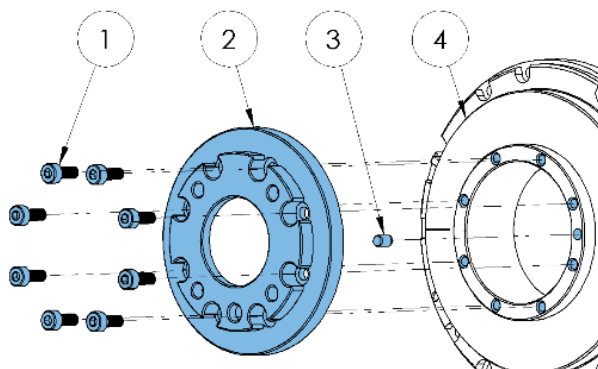


Type F

- 1 M5x10 screws (ISO14580)
- 2 OnRobot adapter flange (ISO9409-1-31.5-4-M6)
- 3 Dowel pin $\varnothing 5 \times 6$ (ISO2338)
- 4 Robot tool flange (ISO 9409-1-60-4-M5)

Use 5 Nm tightening torque.

For GP12 models

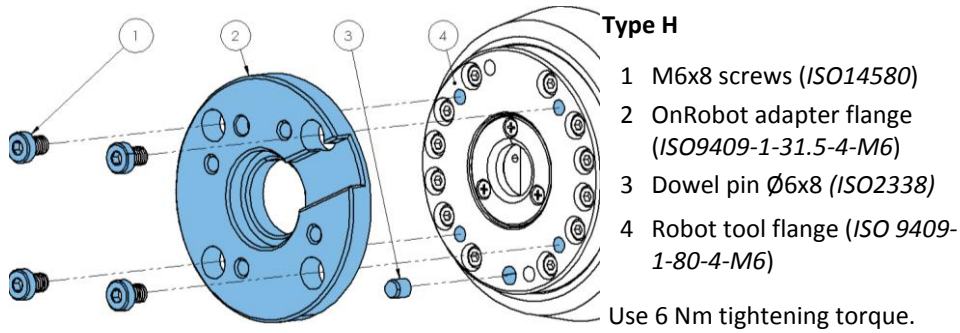


Type G

- 1 M4x10 screws (ISO14580)
- 2 OnRobot adapter flange (ISO9409-1-31.5-8-M4)
- 3 Dowel pin $\varnothing 4 \times 6$ (ISO2338)
- 4 Robot tool flange (ISO9409-1-62-8-M4)

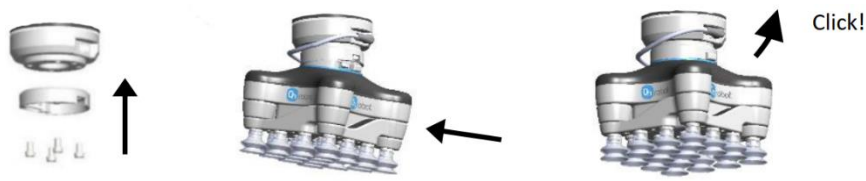
Use 3 Nm tightening torque.

For HC10/DT models

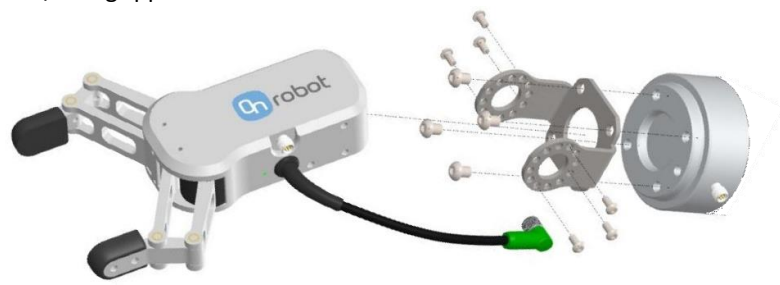


2. Now the robot flange is compatible with the grippers and the grippers could be directly mounted on.

VG10 gripper:



RG2/RG6 grippers:



Gecko gripper:



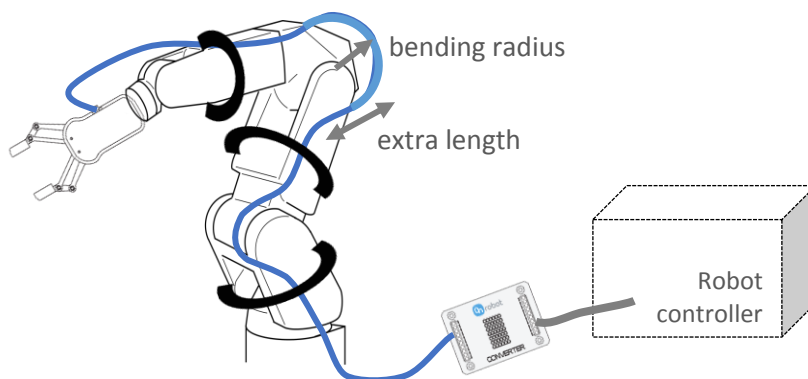
(For detailed mounting guide please refer to the gripper manuals.)

2.7.1.2. Cable routing

3. Connect the 5m length M8 gripper cable (for the Gecko gripper the cable is M12) to the gripper.
4. Route the cable (blue line) to the IO Converter and use the supplied Velcro tape (black) to fix it.

Make sure that during the routing some extra length is used at the joints to make sure that the cable is not pulled when the robot moves.

Also make sure that the cable bending radius is minimum 40mm (for the Gecko gripper it is 70mm)



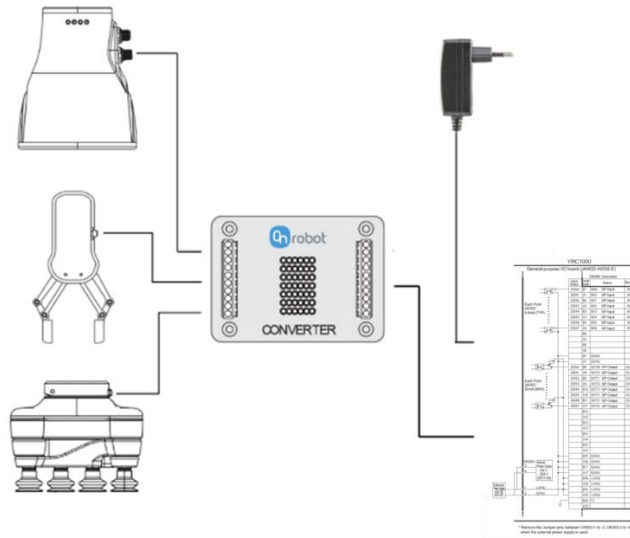
Note: If using the HC10 Yaskawa arm with tool I/O functionality, the connectors at the end-of-arm can be used to connect directly with the gripper, instead of routing the M8/M12 cable along the robot arm.

Place the OnRobot IO Converter close to the Robot controller.

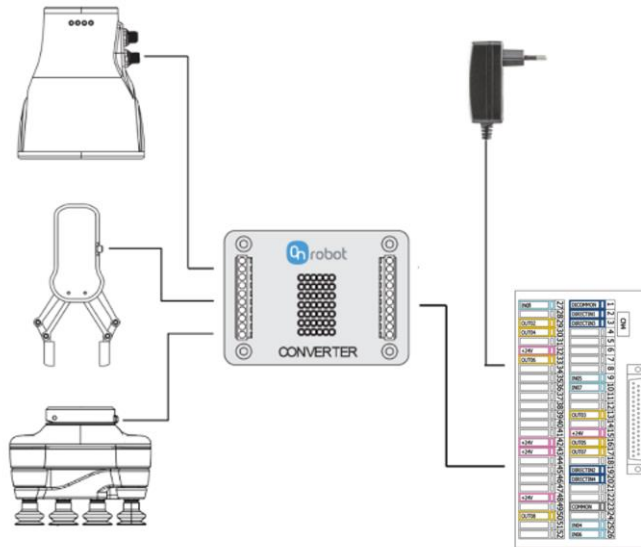
2.7.1.3. Electrical connection

The most common Yaskawa controllers are the standard YRC1000 controller and the YRC1000micro controller. For the YRC1000, the I/O breakout board CN308 (Part No. 178669-1) inside the control cabinet can be used to connect the OnRobot IO converter to the robot controller. For the YRC1000micro controller, use the I/O breakout board CN4 connector to connect the OnRobot IO converter to the robot controller. The supplied 24V power supply can be used to power the converter and the gripper.

YRC1000:



YRC1000micro:



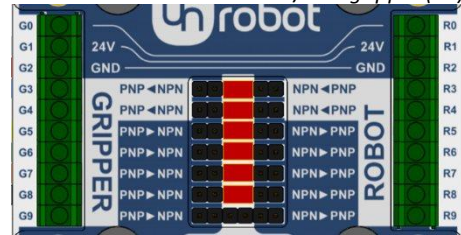
The following steps will guide you through the electrical setup of the OnRobot grippers:

5. Make sure that the robot is powered off completely and disconnect the controller from wall power.
6. Check your digital I/O module installed in the control cabinet and configure the OnRobot IO Converter accordingly:

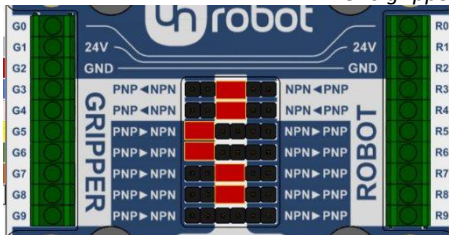
Most Yaskawa controllers are in **NPN configuration**.

NPN configurations of the OnRobot IO converter requires the following jumper (marked as red) settings for the different grippers:

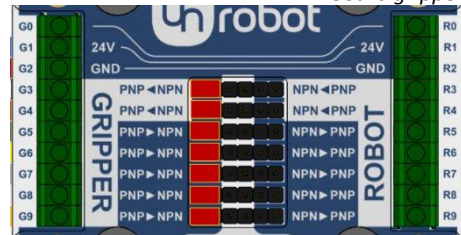
RG2/RG6 gripper (P1)



VG10 gripper



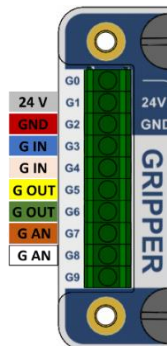
Gecko gripper



Please refer to the Kawasaki manual to check whether it is an NPN or a PNP type.

7. Wire the gripper connector to the IO Converter (G1-G9).

RG2/RG6 and VG10 grippers



Gecko gripper



I/O Converter	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
G0	Unused	Unused	Unused
G1	Gripper 24V (grey)	Gripper 24V (grey)	Gripper 24V (blue)
G2	Gripper GND (red)	Gripper GND (red)	Gripper GND (red)
G3	Force 5/40N (blue)	Channel A On/Off (blue)	Engage pads (white)
G4	Close/open (pink)	Channel B On/Off (pink)	Disengage pads (brown)
G5	Not gripped (yellow)	CHA vacuum OK (yellow)	Ultrasonic OK (green)
G6	Gripper busy(green)	CHB vacuum OK (green)	Part present (yellow)
G7	Unused	Vacuum level A (brown)	Preload OK (grey)
G8	Gripper width (white)	Vacuum level B (white)	Pad needs service (pink)
G9	Unused	Unused	Error (orange)

For the Gecko gripper the M12 cable, which was shipped with the gripper, needs to be cut and wire stripping is required to be done. For the other grippers a prepared M8 cable with a wire end with ferrule is available.

NOTE: The standard Yaskawa controller does not support robot analog inputs (i.e. RG2 gripper width, VG10 vacuum level).

- Connect the IO converter with the controller cabinet, as described in the table below with the supplied 30 cm wires.

YRC1000 pin assignment:

I/O Converter	Yaskawa Signal	Breakout Board CN306 Pin	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
R0			Unused	Unused	Unused
R1		B18	Gripper 24V	Gripper 24V	Gripper 24V
R2		A16	Gripper GND	Gripper GND	Gripper GND
R3	OUT_09	B8	Force 5/40N	Channel A On/Off	Engage pads
R4	OUT_10	A8	Close/open	Channel B On/Off	Disengage pads
R5	IN_09	B1	Not gripped	CHA vacuum OK	Ultrasonic OK
R6	IN_10	A1	Gripper busy	CHB vacuum OK	Part present
R7	IN_11	B2	Unused	Vacuum level A	Preload OK
R8	IN_12	A2	Gripper width	Vacuum level B	Pad needs service
R9	IN_13	B3	Unused	Unused	Error

YRC1000micro pin assignment:

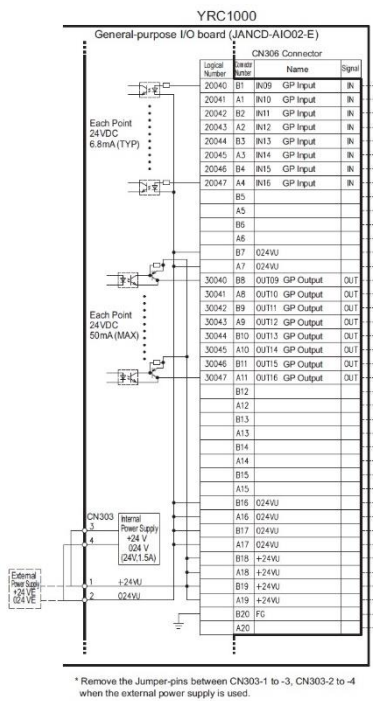
I/O Converter	Yaskawa Signal	S Connector Pin	Breakout Board CN4 Pin	RG2/RG6 (P1) gripper	VG10 gripper	Gecko gripper
R0				Unused	Unused	Unused
R1		12	15	Gripper 24V	Gripper 24V	Gripper 24V
R2		11	23	Gripper GND	Gripper GND	Gripper GND
R3	OUT_05	10	16	Force 5/40N	Channel A On/Off	Engage pads
R4	OUT_07	9	17	Close/open	Channel B On/Off	Disengage pads
R5	IN_04	1	25	Not gripped	CHA vacuum OK	Ultrasonic OK
R6	IN_05	2	26	Gripper busy	CHB vacuum OK	Part present
R7	IN_06	3	9	Unused	Vacuum level A	Preload OK
R8	IN_07	4	10	Gripper width	Vacuum level B	Pad needs service
R9	IN_08	5	27	Unused	Unused	Error

Additionally, the table below lists the color codes for the Yaskawa YRC1000micro tool I/O that goes from the tool flange to the gripper. S1 refers to robot inputs and covers S Connector pins 1-8, and S2 refers to robot outputs and spans S Connector pins 9-16.

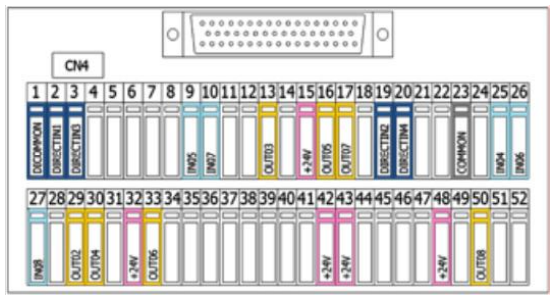
HC10 Tool I/O Connector Color Codes								
Cable	1	2	3	4	5	6	7	8
S1	Yellow	White	Orange	Blue	Green	Brown	Gray	Black
S2	White	Orange	Green	Black	Blue	Yellow	Orange	Brown

- Wire the digital I/O lines (R3-R9) of the OnRobot IO Converter to the Yaskawa I/O module. Note that the YRC1000 I/O interface is inside the controller, and the YRC1000micro I/O interface is a breakout board outside the controller (CN4). Here is the pinout for the I/O breakout board for the YRC1000micro controller.

YRC1000micro

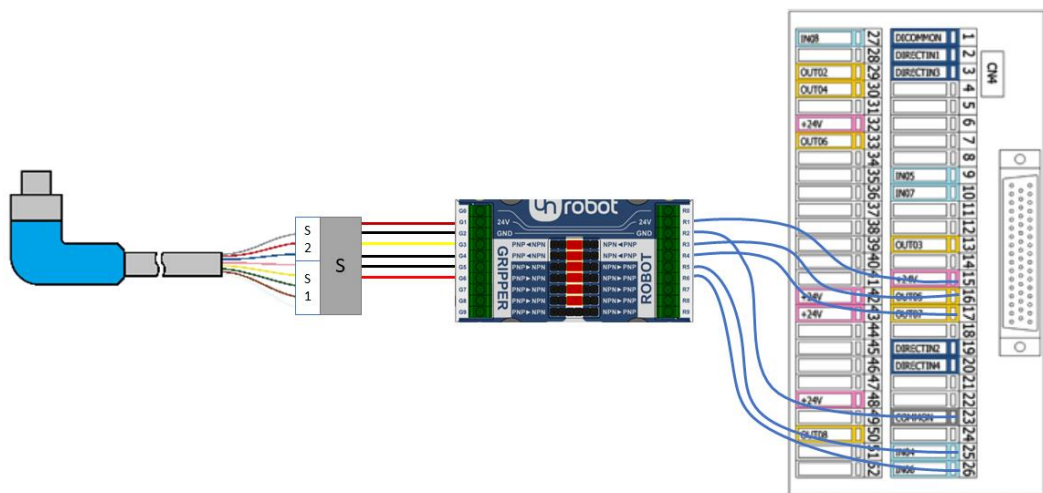
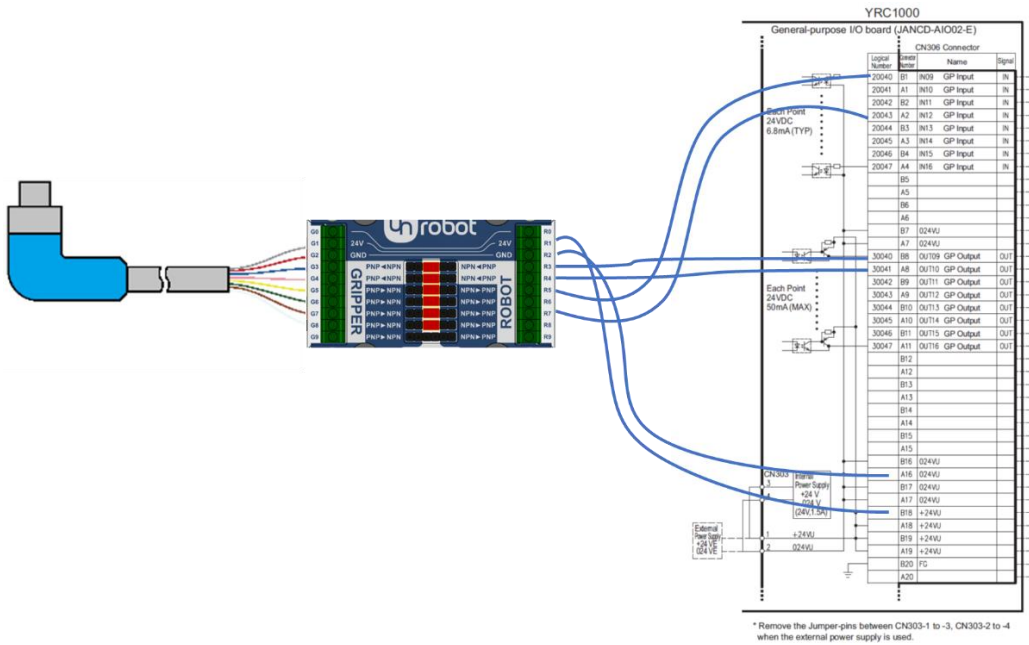


YRC1000micro

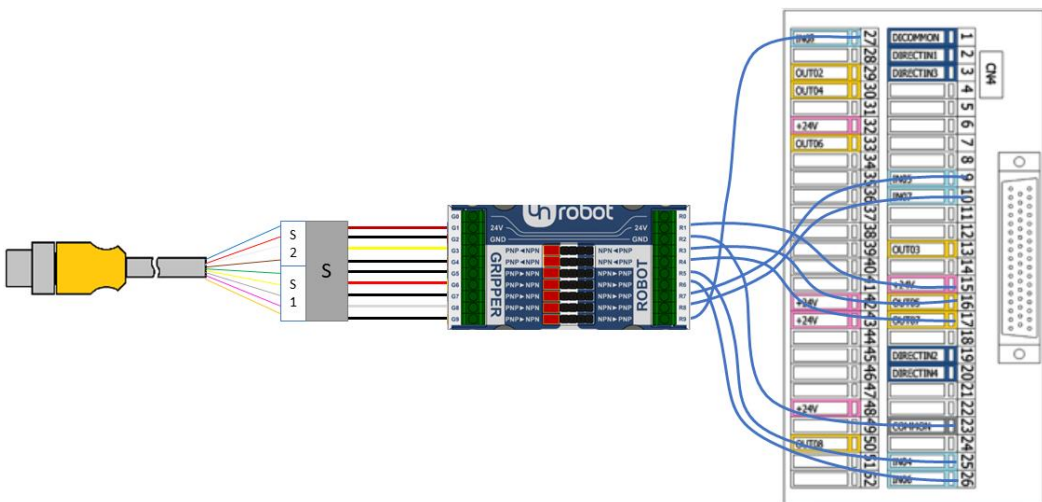
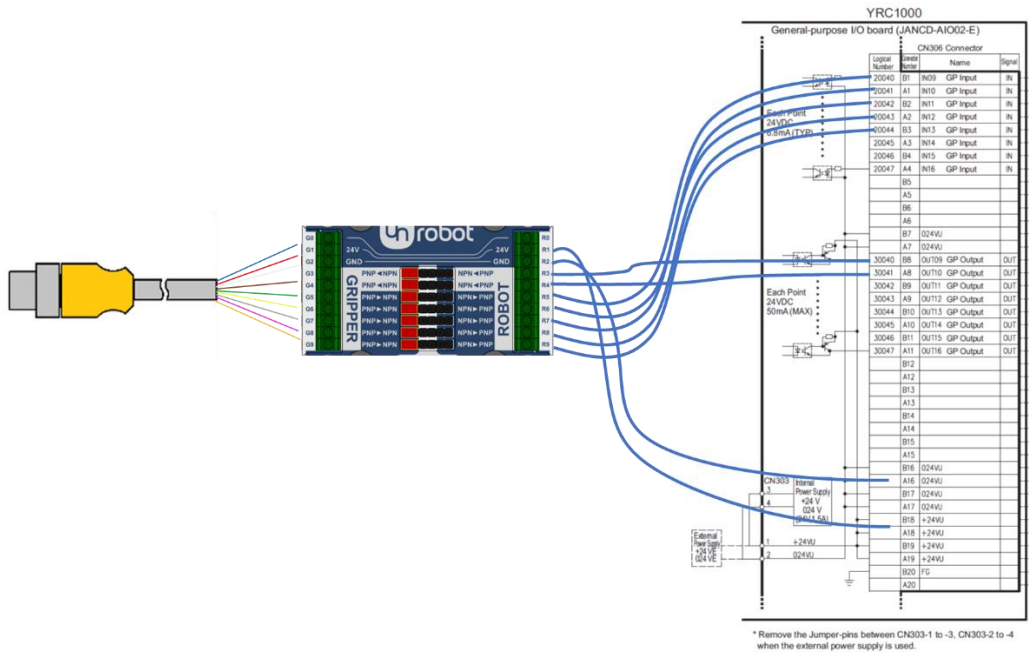


10. Verify connection and configuration with the diagrams below:

RG2/RG6 (P1) grippers:

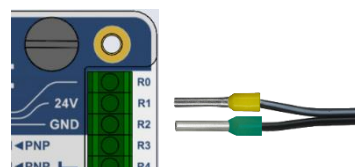


Gecko gripper:



11. Connect the OnRobot power supply to the power lines (R1,R2) of the OnRobot IO Converter:

Pin	Ferrule	Description
R1	yellow	24V (1A)
R2	cyan	GND



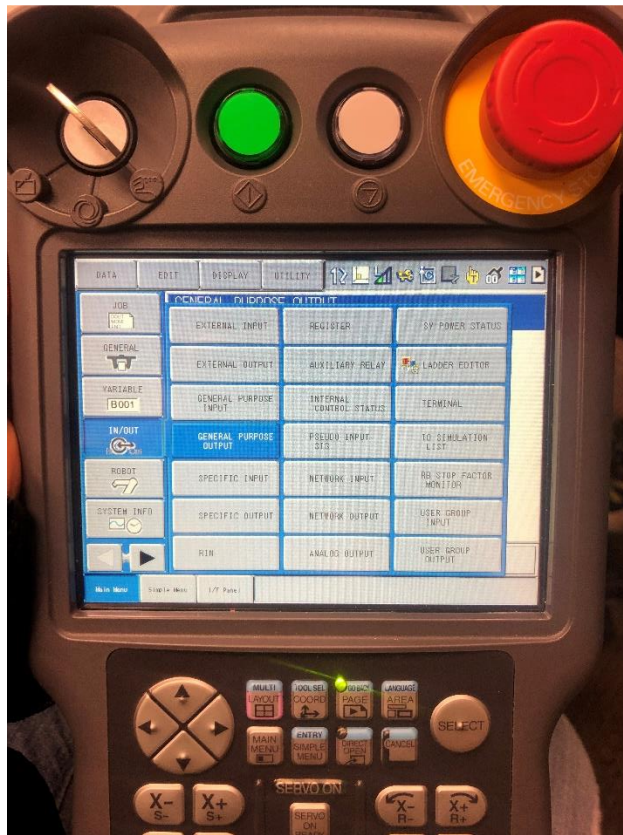
NOTE: Do not connect the 24V yellow ferrule directly to the Yaskawa I/O module. Connect to the IO Converter at R1 (like the picture above) or to G1.

2.7.1.4. Robot software configuration

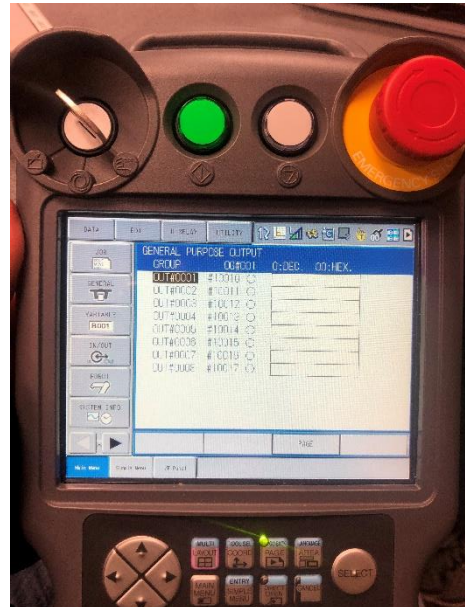
The gripper's I/O can be viewed on the Yaskawa smart pendant by following the steps below. Digital I/O assignment is determined by how the gripper's connector has been hard-wired to the Yaskawa I/O module.

The following steps describe how to control I/O from the Yaskawa standard pendant:

12. Navigate to **Main Menu** and then select **IN/OUT**

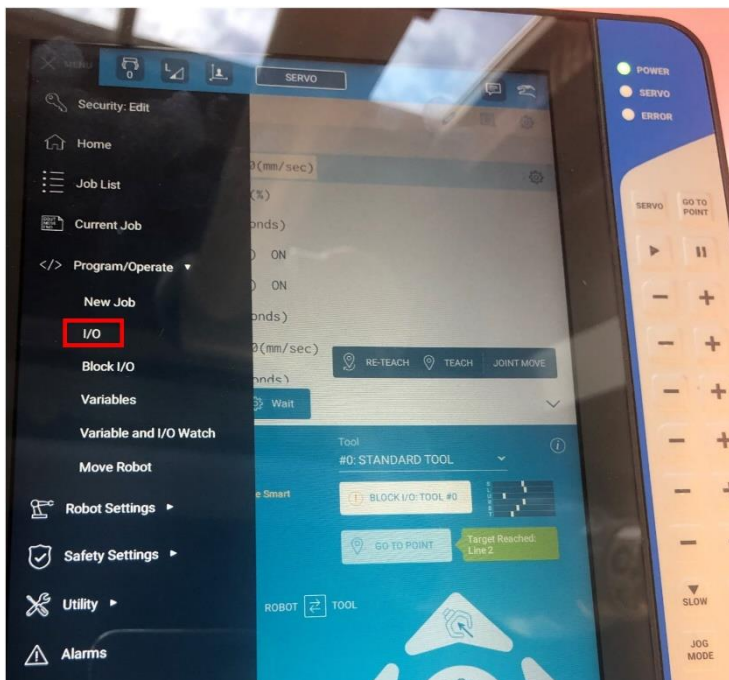


13. Here you can select to view robot inputs or outputs. Outputs can be easily toggled by clicking on the **Enable toggle** button.

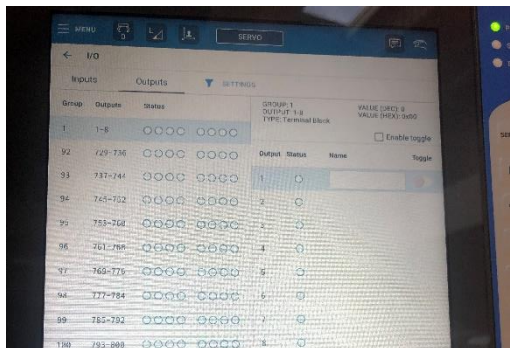
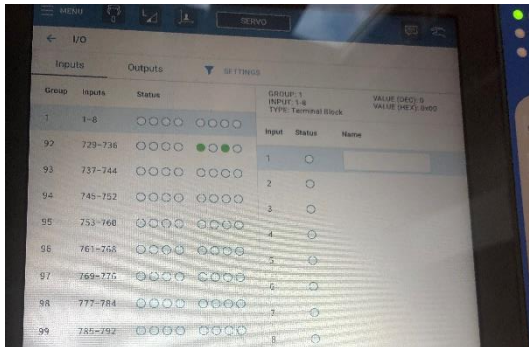


The following steps describe how to control I/O from the Yaskawa smart pendant:

14. Navigate to **Menu** and then select **I/O**



15. Here you can select to view robot inputs or outputs. Outputs can be easily toggled by clicking on the **Enable toggle** button.



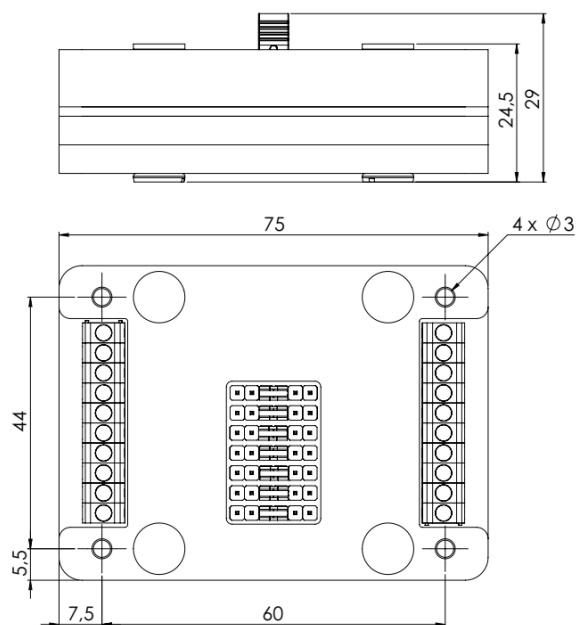
16. Use the gripper functionalities in the Yaskawa program.
(Assuming gripper close function is mapped to [2])

*DOUT[2]=ON ; Close gripper by turning signal O2 on
DOUT[2]=OFF ; Open gripper by turning signal O2 off*

17. Installation is finished, you are ready to use the gripper with your robot

3. Appendix - Mechanical Drawings

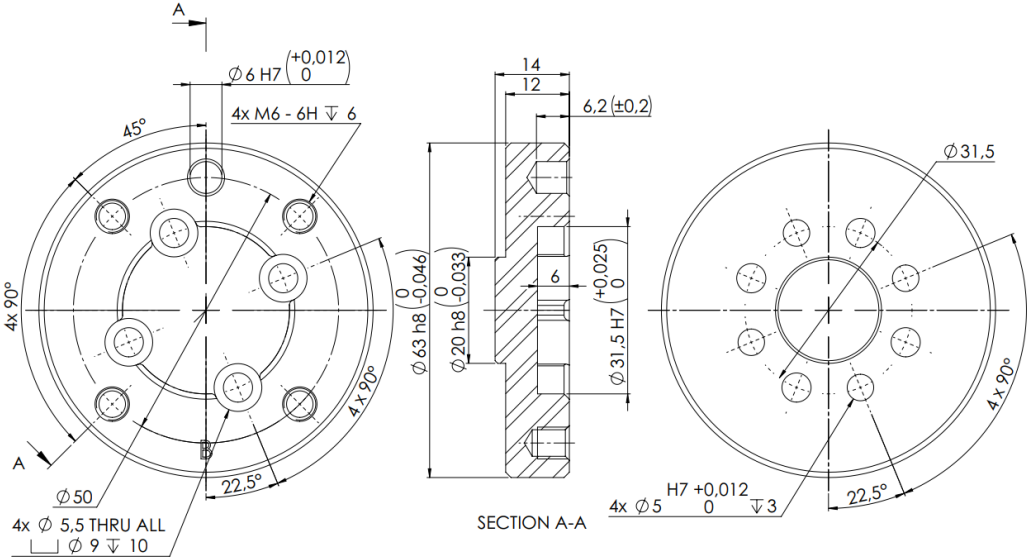
3.1. IO Converter



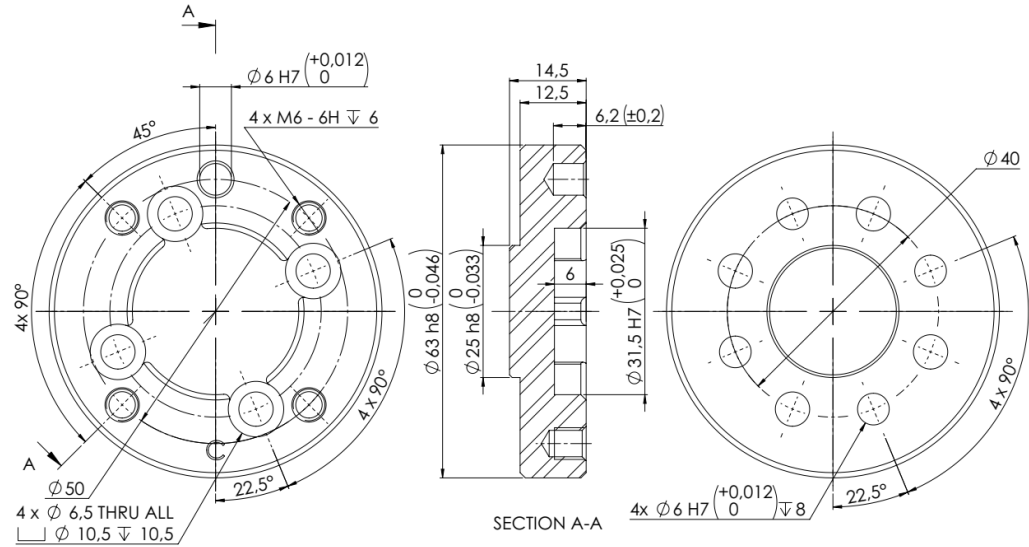
All dimensions are in mm.

3.2. Adapter flanges

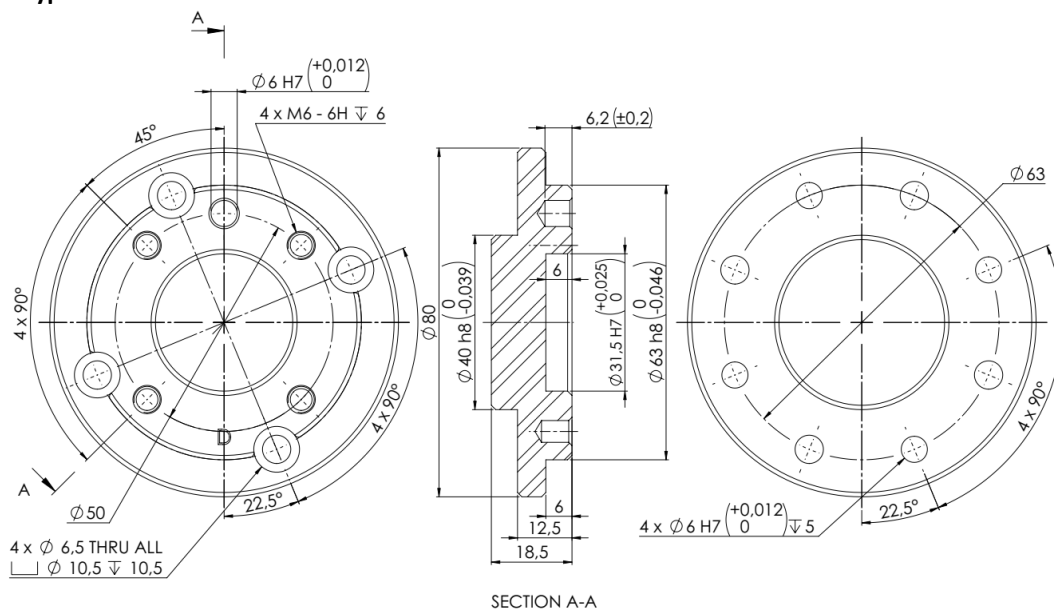
Type B



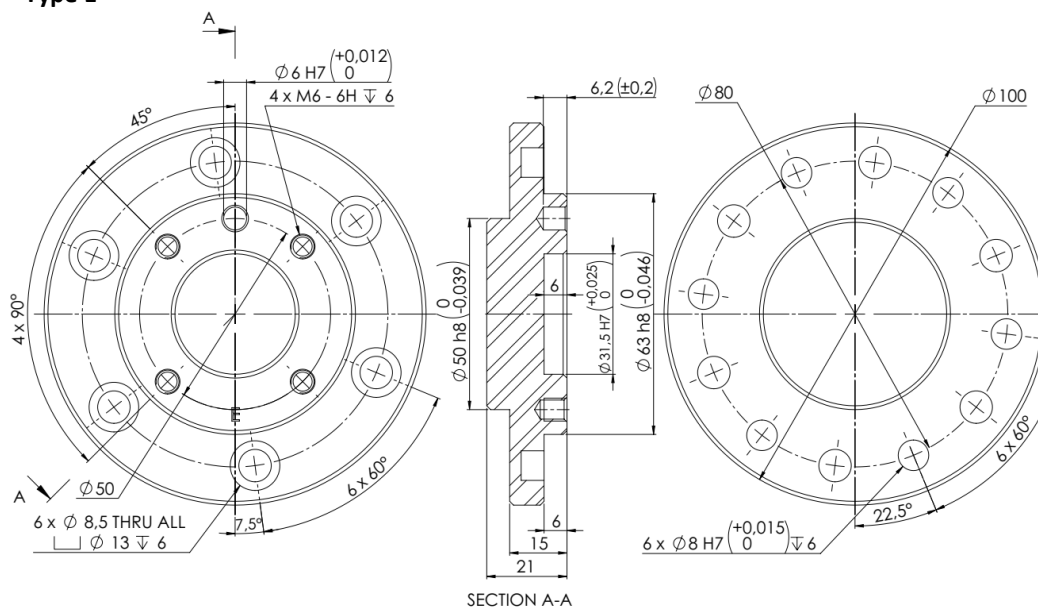
Type C



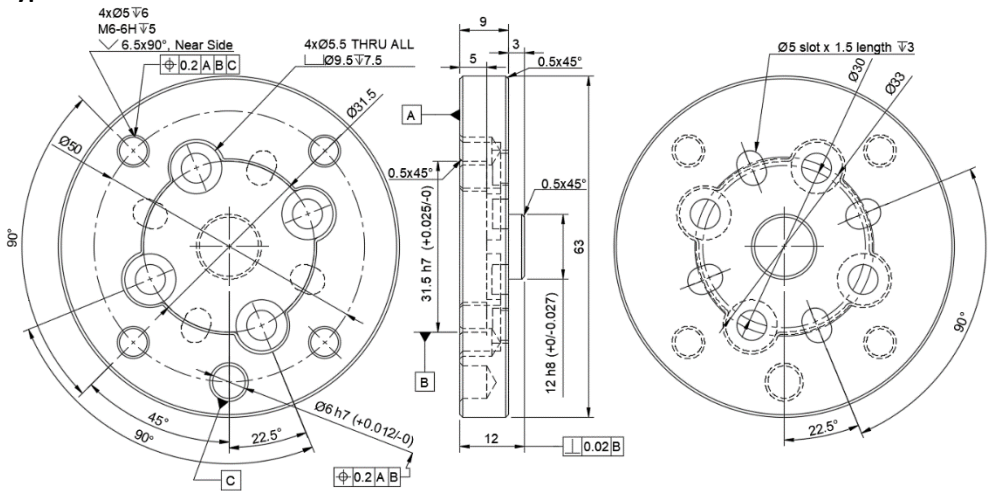
Type D



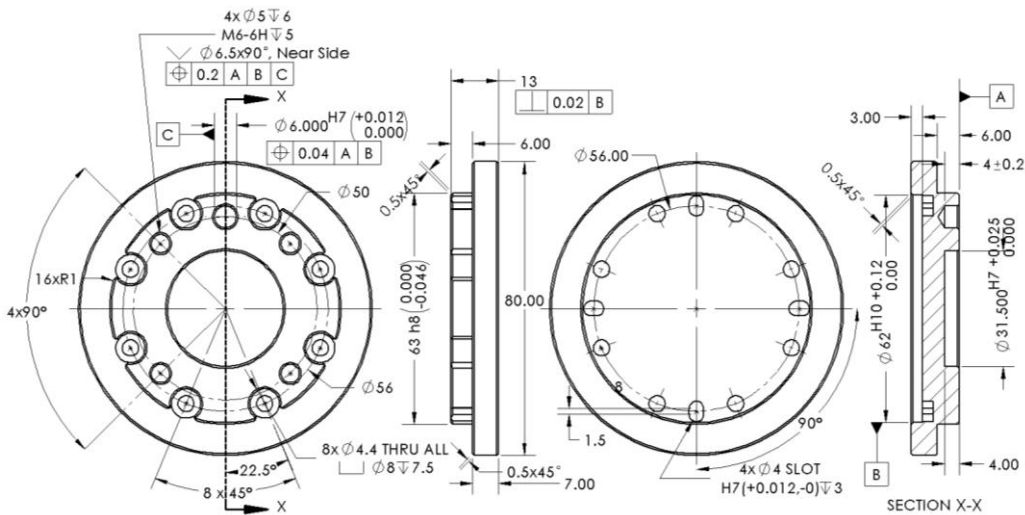
Type E



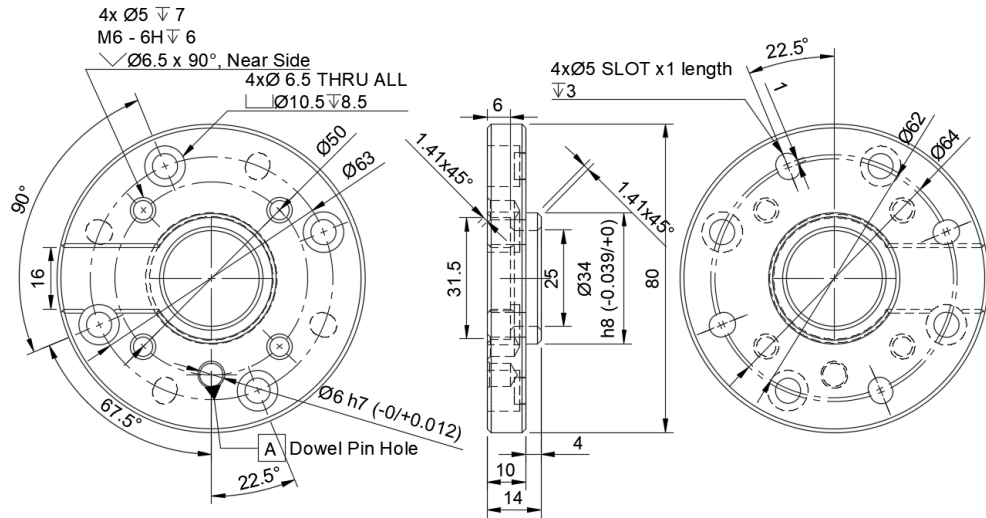
Type F



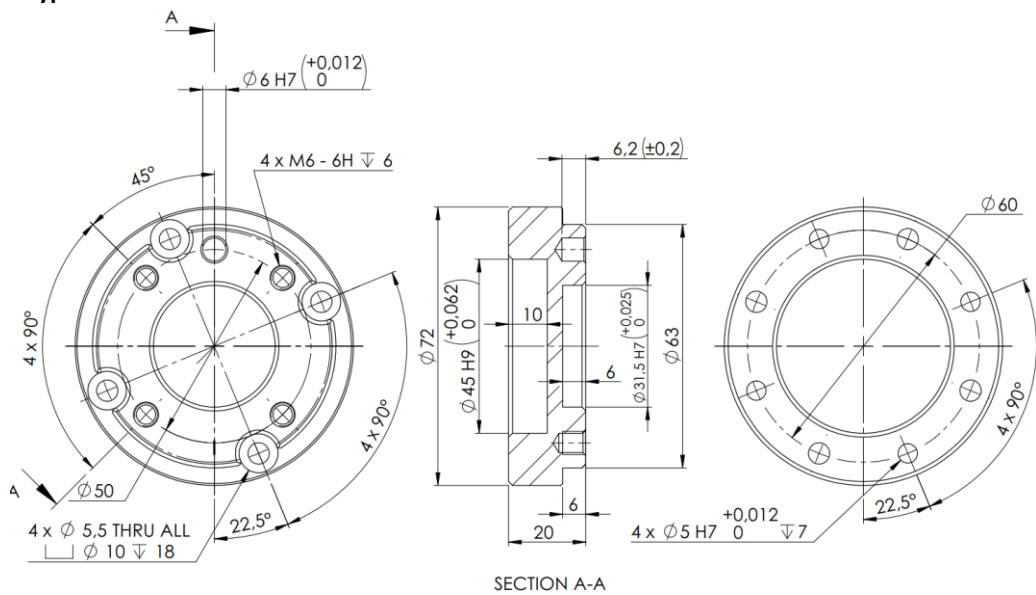
Type G



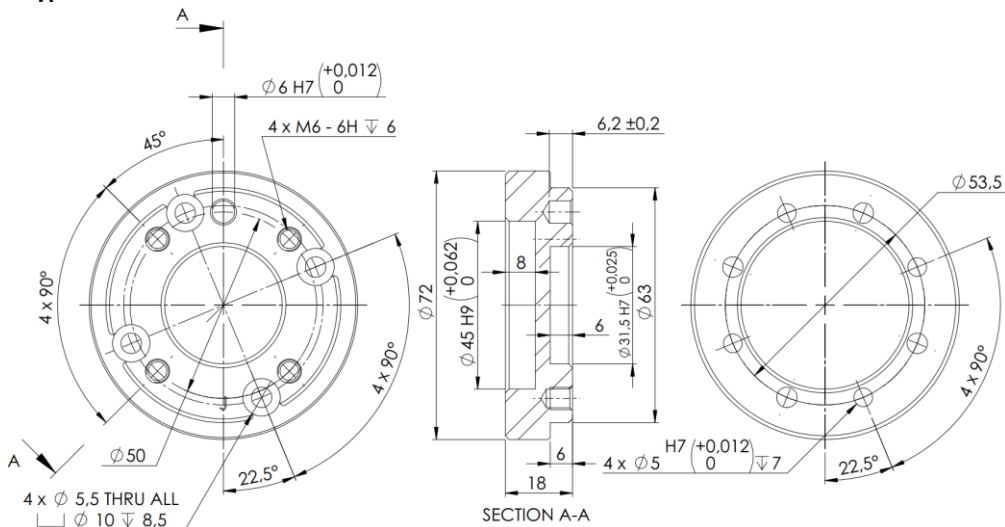
Type H



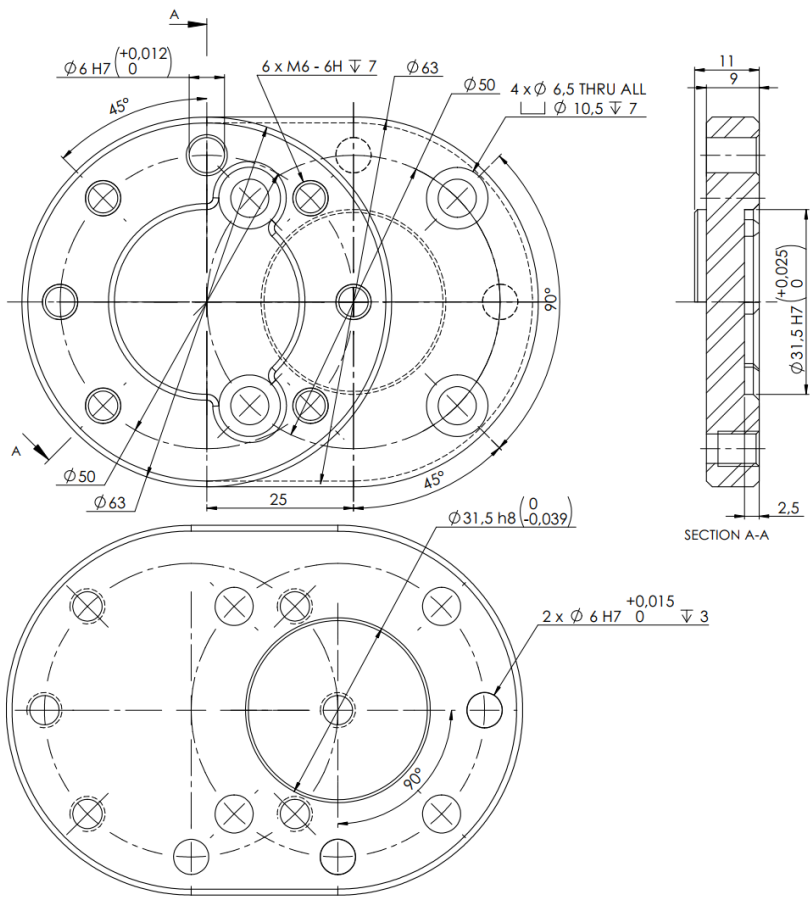
Type I



Type J



Type K



All dimensions are in mm.