Pocket
Installation
Manual

pneumagiQ®
PQ180

Universal
Pneumatic EOAT
Interface

IMPAQT ROBOTICS

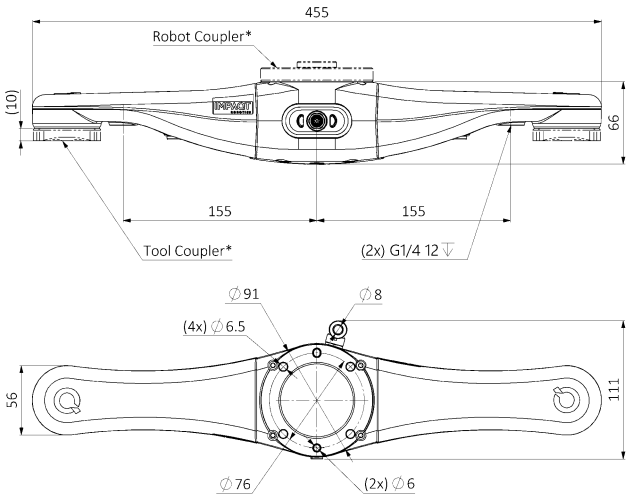

Figure 1: PQ180 Drawing; the phantom lines denote couplers. All dimensions in mm.

Dear customer,

At Impaqt Robotics, our mission is to make a significant impact with every robot deployed worldwide. Our products streamline robot deployment by simplifying it and positively enhancing our partners' profitability.

For any inquiries or product support, please contact us at:
support@impaqt-robotics.com.

Best Regards,
Impaqt Robotics team

Copyright:

Technical changes:

Only Impaqt Robotics holds the discretion to implement specific technical and structural adjustments aimed at enhancing the product's quality and functionality.

Document number: 9 101 0002
Edition: 03.02 | Nov. 8, 23 | En

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More information on the product and all documentation can be downloaded at https://www.impaqt-robotics.com

1) Variants

This operating manual applies to the following variants:

- pneumagiQ PQ180

2) Safety Considerations

2.1) Compressed Air

Ensure to use a FRL (Filter Regulator Lubricator) and follow the quality standards of ISO 8573-1:7:4:4 for compressed air.

2.2) Personnel Qualifications

Only authorized personnel with a working knowledge of handling pneumatic and electrical circuits should operate the product. Anyone handling the product should have understood the product manual.

2.3) Construction changes

One can not make constructional changes to the product without explicit permission from Impaqt Robotics. At this moment, only authorized personnel from Impaqt Robotics can implement constructional changes to our product.

2.4) Notes for assembly

One will need the following tools to complete the integration of the PQ180.

1. Hex Key – 1.5 mm
2. Hex Key – 3 mm
3. Hex Key – 6 mm

2.5) Notes for operation

Always switch-off product by disconnecting the I/O cable before adding or removing accessories. Before the product is switched off for handling, neutralise the pneumatic pressure inside the product.

3) Scope of supply

List of Parts	Quantity
pneumagiQ PQ180-2G4S	1
Protective Foam	1
Installation Manual	1

4) pneumagiQ PQ180

pneumagiQ PQ180 is a compact Universal Pneumatic EOAT Interface designed to seamlessly mount two pneumatic EOAT at a 180° offset from each other. Pneumatic EOAT can be grippers, dispensers, screwdrivers, sanders, polishers, deburring tool, etc. The compact design of PQ180 is ideal for tight-spaced machine tending applications.

5) Parts of PQ180

The following are the parts of pneumagiQ PQ180 as shown in Figure 2 & Figure 3:

5.1) Robot Mounting Face

As marked in Figure 2, here the robot coupler is mounted onto the PQ180.

5.2) Tool Mounting Face

As marked in Figure 3, here the pneumatic tooling is mounted onto the PQ180.

5.3) Compressed Air Inlet

As marked in Figure 2, PQ180 requires only a single compressed air inlet to actuate all EOATs and Air Blow-off port.

5.4) I/O Connector

All the communication and electrical power of the PQ180 is provided through this 8-pin M8 female connector.

5.5) Sensor Connectors

Feedback on the state of the pneumatic EOATs can be provided to PQ180 using 4 units of 3-pin M8 female sensor connectors.

5.6) Air Blow-off Port

The PQ180 comes with two built-in air blow-off port of G 1/4 female thread. It is for cleaning the workpiece and workpiece holder.

5.7) Status Indicator

The status of the PQ180 is communicated to the operator using the Status Indicator.

5.8) Exhaust Port

PQ180 has two built-in silencers on its exhaust ports to reduce the overall noise level.

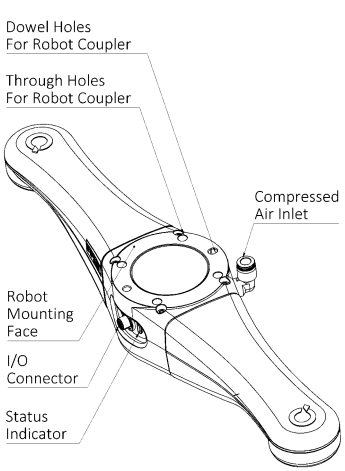

Figure 2: Parts of PQ180

5.9) Side Indication Mark

Side 1 & 2 can be identified using the side indication marks in the front and the back of the product as marked in Figure 2.

5.10) Air Outlet Ports

The Air Outlet Ports A & B in each of the Tool Mounting Faces provide compressed air to the Tool Couplers.

6) Selection of Accessories

The following are the pneumagiQ PQ180 accessories:

6.1) Robot Coupler

pneumagiQ PQ180 is coupled to the robot tool flange using Robot Couplers. We provide Robot Couplers in both ISO and non-ISO standards. To know more visit our website.

6.2) Tool Coupler

Pneumatic tooling are coupled to PQ180 using Tool Couplers. The standard tool couplers have the capability to provide air through the compressed air outlets at the top face of the Tool Coupler.

For EOAT brands and models that do not have inline air inlets at the bottom and instead have air inlets on their sides, use the 'Universal Tool Couplers (UTC)' along with Tool Mounting Blanks for UTC. To know more visit our website.

6.3) Pneumatic tubing

PQ180 needs one 8 mm pneumatic tube to provide compressed air. The tube can be any industry standard nylon or polyurethane tube (not sold by Impaqt Robotics).

6.4) I/O Cable

This cable is used for connecting to the I/O Connector of PQ180. There are two variants:
- I/O Cable (0.2 m) is for the Tool I/O Port of the robot. It has 8 pin M8 Male connector on one end and 8 pin M8 Female connector on the other end. This cable is ideal for cobots like Universal Robots, Fanuc, etc.
- I/O Cable (5 m) has an 8 pin M8 Male connector on one end and free leads on the other end. This is ideal for connecting pneumagiQ directly to the controller for any brand of robots.

6.5) EOAT Sensors

For pneumatic tooling, sensors such as reed switches are ideal to get feedback on the jaw state (Not sold by Impaqt Robotics).

6.6) Air blow-off Nozzle

The nozzle directs the compressed air from the air blow-off port into a specific pattern depending on the workpiece and the nature of the application such as spot, fan, etc. (Not sold by Impaqt Robotics).

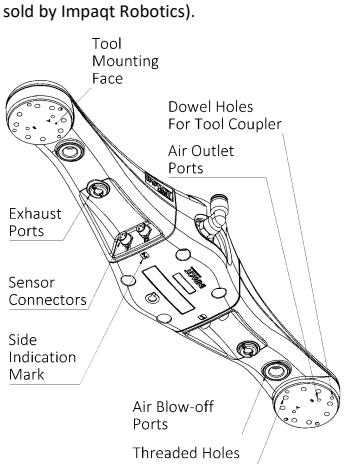

Figure 3: Parts of PQ180

7) Technical details

7.1) Specifications

Model	PQ180
Part Number	**6 102 0224**
Weight	870 g/ 1.9 lbs
Payload	
Max. Payload per Tool Mounting Face**	3.5 kg/ 7.7 lbs
Overall payload	5 kg/ 11 lbs
Pneumatics	
Airflow rate for EOAT	85 slpm/ 3 scfm
Airflow rate at Auxiliary port (Air Blow-off)	230 slpm/ 8.1 scfm
Max. operating pressure	6 bar/ 87 psi
Connectors	
I/O Connector	8pin M8 female connector
Air inlet	Ø8 mm tube quick connector
Sensor Connector	3pin M8 female connector (PNP)
Air blow-off	G 1/4 female thread
Interface - Robot / EOAT	
Robot mounting face	pneumagiQ Robot Coupler
Tool mounting face	pneumagiQ Tool Coupler
Power	
Operating voltage	24V DC
Operating current	600 mA
Environment	
Ingress Protection	IP66

** The combined payload of the tool mounting face 1 & 2 must not exceed the overall payload. For detailed specifications, refer to our website.

7.2) Tool Center Point & Center of Gravity

The reference for the Tool Center Point and the Center of Gravity calculation is from the Robot Mounting Face and up to the Tool Mounting Face as shown in Figure 5.

TCP of Mounting Face 1:
X: -200; Y: 0, Z: 37.5;
R_x: 0; R_y: 0; R_z: 0;

TCP of Mounting Face 2:
X: 200; Y: 0, Z: 37.5;
R_x: 0; R_y: 0; R_z: 180;

Center of Gravity:
Weight: 0.87 Kg
C_x: 0; C_y: -1.2; C_z: 30.3;

WARNING
Once the Tool Coupler, EOATs & its peripherals are mounted to PQ180, ensure to recalculate the TCP & COG beyond the tool mounting face.

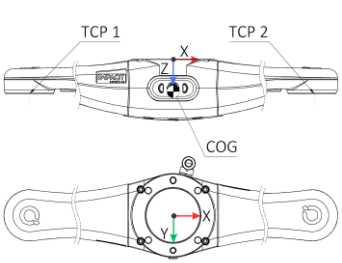

Figure 5: TCP & COG

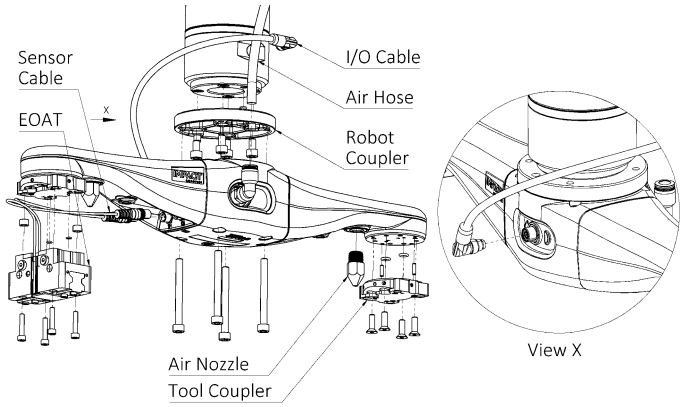

Figure 4: Assembly of PQ180

8) Assembly

The assembly order of PQ180 is dependent on the application purview of the integrator.

8.1) Tool Couplers to PQ180

Every pneumagiQ PQ180 has two tool mounting faces and each of them requires a tool coupler (sold separately). Make sure to use the correct fasteners and O-rings while assembling the tool coupler and follow the tightening torques as given in the Figure 6.

8.2) EOAT to Tool Coupler

Align the EOAT to the tool coupler mounted on to PQ180 as shown in Figure 4. Make sure to use the correct fasteners and O-rings while assembling the EOAT.

Mount the EOAT using fasteners to the mounting provisions provided in the tool coupler (These fasteners are not provided along with the tool coupler). Now, repeat the process for the second EOAT.

WARNING
While mounting the pneumatic EOAT to the tool coupler or while mounting the robot coupler to pneumagiQ PQ180, always take into consideration the maximum screw engagement and tightening torque as given in Figure 6.

8.3) Robot coupler to robot

Now, time to mount the robot coupler to the robot. The robot coupler comes with fasteners and dowel pins based on specific robot's tool flange.

Now, add the dowel pin to the robot coupler and align it to the robot's tool flange. Mount the robot coupler using the fasteners to the mounting provisions provided in the robot.

8.4) PQ180 to Robot coupler

Insert the dowel pins to the robot coupler and then use the fasteners to fasten the robot coupler to PQ180. Every robot coupler comes with a fastener kit with all the necessary fasteners to mount to PQ180 and the robot. Ensure to follow the tightening torques as given in the Figure 6.

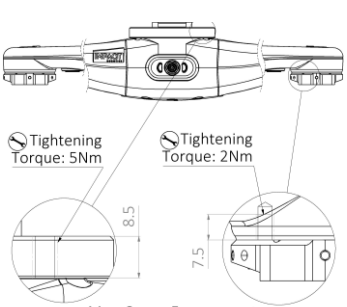

Figure 6: Maximum screw engagement for PQ180's robot and tool couplers

8.5) I/O Cable to the robot

To power up and communicate with pneumagiQ PQ180, use the I/O Cable (0.2 m) or I/O Cable (5 m) depending on the application. 8 pin male connector connects to the pneumagiQ PQ180's front cover.

The female connector of the I/O Cable (0.2 m) goes to the communication port at the end of robot. If using I/O cable (5 m), then use the free leads to connect to the robot controller or use any standard converters to USB.

8.6) Pneumatic tube to PQ180

pneumagiQ PQ180 requires an 8 mm pneumatic tube to supply the compressed air. Connect it to the pneumagiQ PQ180 back cover.

WARNING
While mounting the pneumatic tube or the I/O Cable, ensure that the tube or the cable have enough leeway for robot joint rotation such that it does not damage the I/O connector and compressed air inlet.

9) Operations

Now that the assembly is completed, time to switch-on pneumagiQ.

9.1) For Universal Robots

For Universal Robots, URCap must be installed to operate the pneumagiQ PQ180. Refer to the "pneumagiQ Operations Manual for Universal Robots" to know more.

9.2) For Other Robots

For other robots, use the MODBUS RTU (RS485) communication to control the pneumagiQ PQ180. Refer to the "pneumagiQ Operations Manual for MODBUS" to know more.

9.3) Operational Precautions

When installing and operating the pneumagiQ PQ180, the following points need to be considered:

1. Ensure to handle the cable connectors with care during installation & dismantling to prevent damaging the connector pins.
2. While routing, ensure that the robot joints do not pinch or stretch the cable and the pneumatic tube.
3. Ensure a backup power supply is provided for the robot.
4. Ensure that the air pressure does not drop even during power failure.

9.4) Electrical Precautions

1. Ensure the circuit is not live when connecting or disconnecting the I/O cables or the sensors.
2. Each sensor connected must not exceed a maximum operating current of 40 mA.

9.5) Mechanical Precautions

1. The maximum screw engagement for the robot and tool coupler is given in Figure 6.
2. The tightening torque of the robot and tool coupler is ±5% of the value given in Figure 6.

10) Maintenance

10.1) General Information

1. Make sure to use the suitable fasteners provided with the product.
2. When fastening the pneumatic EOAT to the tool coupler, use the fasteners of the right length. If one uses longer fasteners, they can pierce through the body of the product and dislodge the tool coupler. Thus, leaking compressed air under the tool coupler.
3. Use the correct O-ring for ports A & B. If one uses incorrect O-rings, it can leak compressed air between the tool coupler and the EOAT.

10.2) Periodic Maintenance

1. Weekly, remove the pneumatic tube from the inlet and look for moisture or dust build-up. If there is a noticeable deposition of dust or moisture, then do maintenance for the air compressor.
2. Depending on the environment, ensure periodic maintenance of the FRL unit.
3. Weekly, burrs and oil must be cleaned off the product exterior.
4. Monthly, check the Silencer and Air Blow-off nozzle for material build up and clear it or replace them if need be.
5. Quarterly, check all O-rings for wear and tear and replace them if need be.
6. Quarterly, check the tool coupler for foreign material build-up. Make sure to clean these parts as and when needed.
7. Every 6 months remove the EOAT and the tool coupler. Actuate the A & B ports of the PQ180 individually for 5 minutes. Thus, pushing out foreign material built up in the pneumatic circuit, if any.

Note: Based on the application and the environment, the duration of periodic maintenance must be determined.