



OPERATIONS MANUAL

USING MODBUS RTU INTERFACE FOR ANY ROBOTS

Abstract

This manual is for operating the pneumagiQ, pneuvaQ, casemagiQ and vaQgrip Click series using the MODBUS RTU interface for any Robots.

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Dear customer,

At Impaqt Robotics, we aim to deliver an impact with every robot deployed globally. This is how we enable simple & faster deployment of robots and impact our partners' bottom line in deploying Robots.

If you have any questions or need assistance with the product, please email us at support@impaqtrobotics.com.

Best Regards,
Impaqt Robotics team

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Technical changes:

We reserve the right to make alterations for technical and structural improvement.

Impaqt Robotics Private Limited
pneumagiQ, pneuvaQ, casemagiQ & vaQgrip Click Operations Manual

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1 Revision

1.1 Revision 30 November 2023

- Beta Release

1.2 Revision 20 March 2024

- Modbus addresses additional information.

1.3 Revision 10 April 2024

- Added pneumagiQ PQ0-1G2S to compatibility.

1.4 Revision 18 July 2024

- Added casemagiQ CM100 & pneuvaQ PV21 to compatibility.

1.5 Revision 14 November 2024

- Updated Input Register table for casemagiQ.
- Updated Input Register table for pneuvaQ.

1.6 Revision 7 January 2025

- Updated wiring diagrams for I/O connection and Free lead to USB Connection.

1.7 Revision 24 November 2025

- Added vaQgrip Click to compatibility.

2 General Inputs

Download more information and documentation of the products at <https://www.impact-robotics.com>.

2.1 Variants

This operations manual applies to the following product series:

- pneumagiQ
- pneuvaQ
- casemagiQ
- vaQgrip Click

2.2 Compatible Machinery

pneumagiQ, pneuvaQ, casemagiQ & vaQgrip Click are compatible with all models of mechanical linkage systems such as robots, gantries, special purpose machinery, and many more if they have an industry-standard communication interface such as MODBUS RTU or the like. For communication interfaces that are not MODBUS RTU, such as Profibus, Ethernet IP, and others like it, any industry standard communication converters from MODBUS RTU to corresponding protocols are needed.

2.3 Applicable Documents

- Catalog of the products
- Manuals of the products
- Manuals of the accessories

2.4 Safety Considerations

2.4.1 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 manuals.

2.4.2 Notes for Operation

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

3. Installation

Products can be operated by Modbus RTU protocol using a RS 485 signal. In the Figure 1, the I/O connector's pin configuration for all the products is given. To use the Modbus RTU with any controller, use the I/O Cable (5 m) [8 pin M8 male to 8 pin free leads] as shown in Figure 1. Pins 1 and 2 of the I/O Connector correspond to Data A and B of the RS485 communication protocol.

Note: The installation section is common for all the products.

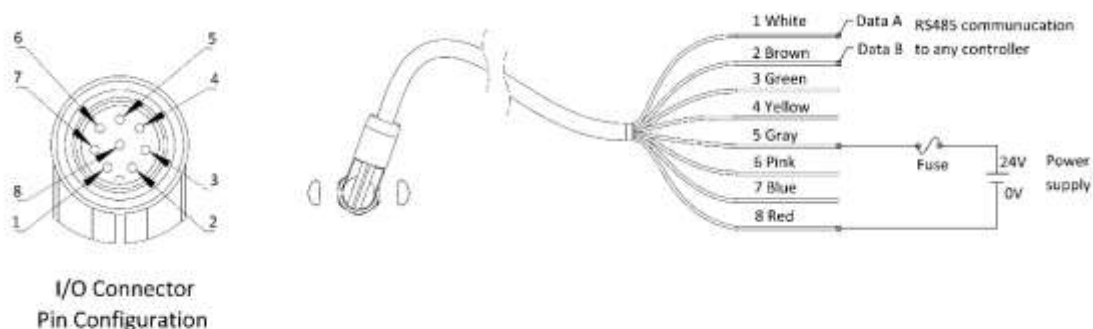


Figure 1: I/O Cable Connection

If the controller supports a USB port, use any industry-standard free leads to a USB converter available globally. Use the connection diagram as shown in Figure 2. The RS485+ (Data A) is connected to the free leads white wire of the I/O Cable (5m), and the RS485- (Data B) is connected to the free leads brown wire of the I/O Cable (5 m). The 24V DC will be provided to the gray wire, and the 0V DC will be supplied to the red wire.

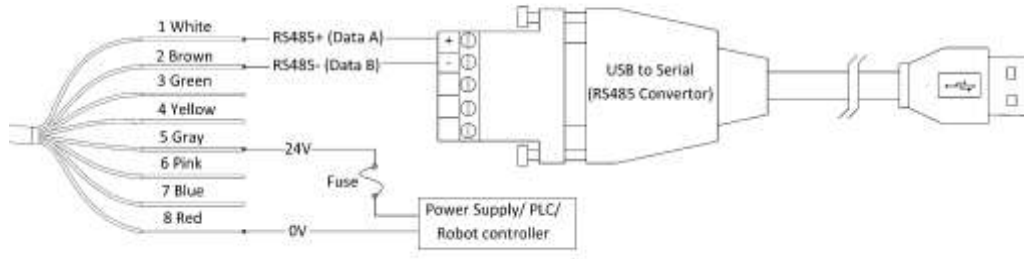


Figure 2: Free Leads to USB connection

3.1 Serial Communication Parameters

The correct serial communication parameters will be applied to communicate with the products, control the tools and air blow-off, control the compressed air & vacuum outputs, and get inputs from the sensor ports. Set the following parameters as given in Table 1 to enable the serial communication for Modbus RTU.

Mode	RS485
Protocol	Modbus RTU
Baud Rate	115200
Parity	None
Start/ Stop Bit	1

Table 1: Serial Communication Parameters

4. pneumagiQ

pneumagiQ is a compact Universal Pneumatic EOAT Interface designed to mount two pneumatic EOATs seamlessly. The compact design of pneumagiQ makes it ideal for tight-spaced material handling applications such as machine tending and material handling. The lightweight design maximizes the payload of the robot for handling heavier parts, which is especially important for collaborative robots.

There are multiple variants of pneumagiQ:

- pneumagiQ PQ0-1G2S
- pneumagiQ PQ90-2G2S
- pneumagiQ PQ180-2G4S
- pneumagiQ PQ9020-2G4S

4.1 Controls

pneumagiQ's built-in control unit with the operations and sensor states mapped with Modbus registers.

4.1.1 Controlling pneumagiQ using Modbus Registers

pneumagiQ operations are mapped with the Modbus memory registers (Holding and Input Register), which any controller can control. The 'Holding Register' controls pneumatic tooling mounted on the pneumagiQ and the air blow-off ports, while the 'Input Register' reads the sensor port status.

4.1.2 pneumagiQ Modbus Register Mapping.

pneumagiQ is controlled by writing the corresponding integer value in the Holding Register type 40001 register address. The following table lists the control actions with corresponding Integer values. Example: Write Integer value “1” on the register address 40001 to perform the “Close” action on the “Gripper 1”.

In some cases, the Holding Register address of the connected device may start from 40000 instead of 40001.

Note: The number of EOATs, air blow-offs, and sensor ports varies depending on the pneumagiQ variant. Hence, refer to the corresponding pneumagiQ installation manual to understand more about each variant of pneumagiQ.

Register Type	Register Address	Value (Integer)	pneumagiQ Control Actions			
			EOAT	EOAT	Air Blow Off	Air Blow Off
			1	2*	1	2*
Holding Register	40001	1	Close	-	-	-
		2	Open	-	-	-
		3	-	Close	-	-
		4	-	Open	-	-
		5	-	-	ON	-
		6	-	-	OFF	-
		12	-	-	-	ON
		13	-	-	-	OFF
		14	Reset			

Table 2: Modbus Holding Register Mapping

Note: In some devices, the Holding Register starts at 40000 instead of 40001. Hence, refer to your device manual before assigning the address.

Register Type	Register Address	Sensor 1P	Sensor 1Q	Sensor 2P	Sensor 2Q	Unused
Input Register	30001	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4 to 15

Table 3: Modbus Input Register Mapping

5. pneuvaQ

pneuvaQ is an Integrated Pneumatic & Vacuum Interface designed to seamlessly provide multiple controllable compressed air and vacuum outputs in a single device. The compact design of pneuvaQ makes it ideal for designing custom EOATs for automation applications for Injection Moulding and Press Brake. The lightweight design maximizes the robot's payload, which is especially important for collaborative robots.

The variants of pneuvaQ:

- pneuvaQ PV21

5.1 Controls

pneuvaQ's built-in control unit, which includes the operations and sensor states, is mapped with Modbus registers.

5.1.1 Controlling pneuvaQ using Modbus Registers

pneuvaQ operations are mapped with the Modbus memory registers (Holding Register and Input Register), which any controller can control. The 'Holding Register' controls compressed air & vacuum outlets, while the 'Input Register' reads the sensor port status.

5.1.2 pneuvaQ Modbus Register Mapping.

pneuvaQ is controlled by writing the corresponding integer value in the Holding Register type 40001 register address. The following table lists the control actions with corresponding Integer values. Example: Write Integer value "1" on the registered address 40001 to perform an "ON" action on the "Compressed Air" or "Vacuum." In some cases, the Holding Register address of the connected device may start from 40000 instead of 40001.

Register Type	Register Address	Value (Integer)	pneuvaQ Control Actions		
			Compressed Air		Vacuum
			1*	2*	1
Holding Register	40001	21	ON		-
		22	OFF		
		23	-	ON	
		24	-	OFF	
		25	-		ON
		26	-		OFF
		37	OFF	OFF	
		14	Reset		

Table 4: Modbus Holding Register Mapping

Note: In some devices, the Holding Register starts at 40000 instead of 40001. Hence, refer to your device manual before assigning the address.

Register Type	Register Address	Sensor 1P	Sensor 1Q	Unused
Input Register	30001	Bit 0	Bit 1	Bit 2 to 15

Table 5: Modbus Input Register Mapping

6. casemagiQ

casemagiQ is a Universal Case Forming EOAT designed to form cases / erect cartons seamlessly. The compact design of casemagiQ with a built-in extension makes it ideal for forming cases of a wide range of sizes. The lightweight design maximizes the robot's payload, which is especially important for collaborative robots.

There are multiple variants of casemagiQ:

- casemagiQ CM100
- casemagiQ CM50

6.1 Controls

casemagiQ's built-in control unit with the operations and sensor states mapped with Modbus registers.

6.1.1 Controlling casemagiQ using Modbus Registers

casemagiQ operations are mapped with the Modbus memory registers (Holding Register and Input Register), which any controller can control. 'Holding Register' controls vacuum on the casemagiQ, while the 'Input Register' reads the sensors status.

6.1.2 casemagiQ Modbus Register Mapping.

casemagiQ is controlled by writing the corresponding integer value in the Holding Register type 40001 register address. The following table lists the control actions with corresponding Integer values. Example: Write Integer value "1" on the registered address 40001 to perform the "on" action on the "Flap."

In some cases, the Holding Register address of the connected device may start from 40000 instead of 40001.

Note: The number of EOATs, and sensor ports vary depending on the casemagiQ variant. Hence, refer to the corresponding casemagiQ installation manual to understand more about each variant of casemagiQ.

Register Type	Register Address	Value (Integer)	casemagiQ Control Actions			
			Flap	Laser	Main Vacuum	Flap Vacuum
Holding Register	40001	1	ON	-	-	-
		2	OFF	-	-	-
		3	-	ON	-	-
		4	-	OFF	-	-
		5	-	-	ON	-
		6	-	-	OFF	-
		12	-	-	-	ON
		13	-	-	-	OFF
		14	Reset			

Table 6: Modbus Holding Register Mapping

Note: In some devices, the Holding Register starts at 40000 instead of 40001. Hence, refer to your device manual before assigning the address.

Register Type	Register Address	Flap ON	Flap OFF	Unused
Input Register	30001	Bit 0	Bit 1	Bit 2 to 15

Table 7: Modbus Input Register Mapping

7. vaQgrip Click

vaQgrip Click is the first fully modular vacuum gripper system designed for flexible, fast-changing automation environments. Built from standardized components that twist and lock together without external tubing or special tools, vaQgrip Click allows automation teams to build, adapt, and scale gripping systems with ease. Whether for small part handling or large load palletizing, vaQgrip Click delivers clean integration, rapid deployment, and the flexibility to evolve with production demands.

There are multiple variants of vaQgrip Click:

- vaQgrip Click Active with Controls Dock 65
- vaQgrip Click Active with Controls Dock 80

7.1 Controls

vaQgrip Click's built-in control unit with the operations and sensor states mapped with Modbus registers.

7.1.1 Controlling vaQgrip Click using Modbus Registers

vaQgrip Click operations are mapped with the Modbus memory registers (Holding Register), which any controller can control. 'Holding Register' controls vacuum on the vaQgrip Click.

7.1.2 vaQgrip Click Modbus Register Mapping.

vaQgrip Click is controlled by writing the corresponding integer value in the Holding Register type 40001 register address. The following table lists the control actions with corresponding Integer values. Example: Write Integer value "1" on the registered address 40001 to perform the "on" action on the "vacuum."

In some cases, the Holding Register address of the connected device may start from 40000 instead of 40001.

Note: Refer to the corresponding vaQgrip Click installation manual to understand more about each variant of vaQgrip.

Register Type	Register Address	Value (Integer)	vaQgrip Click Control Actions
Holding Register	40001	1	Vacuum Generator 1 ON
		5	Vacuum Generator 2 ON
		14	Reset

Table 8: Modbus Holding Register Mapping

Note: In some devices, the Holding Register starts at 40000 instead of 40001. Hence, refer to your device manual before assigning the address.