



USER MANUAL



MPM500 PNEUMATIC MODULE (FOR MECA500)

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Contents

1	Introduction	1
2	Warning messages, notes and emphasis	1
3	What's inside the box	2
4	Design and mounting of the module	2
5	Installing the module	3
6	Pneumatic circuits	6
7	Vacuum circuits	6
8	Safety	7

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1 Introduction

This user manual describes how to install the MPM500 pneumatic module onto the Meca500 industrial robot arm. You must read this manual thoroughly before installing or operating the MPM500 pneumatic module. You must, however, first read the User Manual of the Meca500.

The MPM500 is a custom pneumatic module developed by Mecademic, specifically for the Meca500 robot arm. The module is easy to install, connect and dismount, when needed. The module allows easy integration between the Meca500 and a large variety of pneumatic grippers, suction cups and other pneumatic devices.

Improper installation of this module could seriously damage the Meca500 and the module itself. This module should therefore be used only by technical personnel who are familiar with the Meca500.

2 Warning messages, notes and emphasis

Particular attention must be paid to the warning messages in this manual. There are only two types of warning messages, as shown below:



WARNING

This presents instructions that must be followed in order to prevent injuries and possibly damage to your robot cell (gripper, robot arm, power supply, workpiece and/or adjacent equipment).



CAUTION

This presents instructions that must be followed in order to prevent damage to your robot cell (gripper, robot arm, power supply, workpiece and/or adjacent equipment).

In addition, important notes and definitions are formatted as follows:



NOTICE

This highlights important suggestions or definitions, the purpose of which is to improve the understanding of this manual and of how the robot works.

Finally, occasionally, small portions of the text in this manual that are particularly important are underlined (as already done in the previous section).

3 What's inside the box

Your MPM500 module is supplied either individually or with the Meca500. In both cases, the module (Fig. 1) is delivered as a standard kit in an anti-static bag, the content of which is:

- 1 MPM500 module with a MGC-AA25 25 mm communication cable with 90° connector;
- 3 M5×0.8 pneumatic barb fittings (installed);
- 1 M5×0.8 pneumatic silencer (installed).

Note that Mecademic does not currently supply any pneumatic grippers, vacuum generators or suction cups. Based on the application, the design or the purchase of additional tooling might be needed.



Figure 1: MPM500 module with barb fittings and silencer installed

4 Design and mounting of the module

Figure 2 shows the dimensions of the MPM500. The module contains two 3/2 NC solenoid valves. Currently, the valves are interdependent, thus controlled in parallel. However, a future firmware update will allow the independent control of each valve. Finally, Table 1 lists the technical specifications for the module, which must be taken into account when operating it.

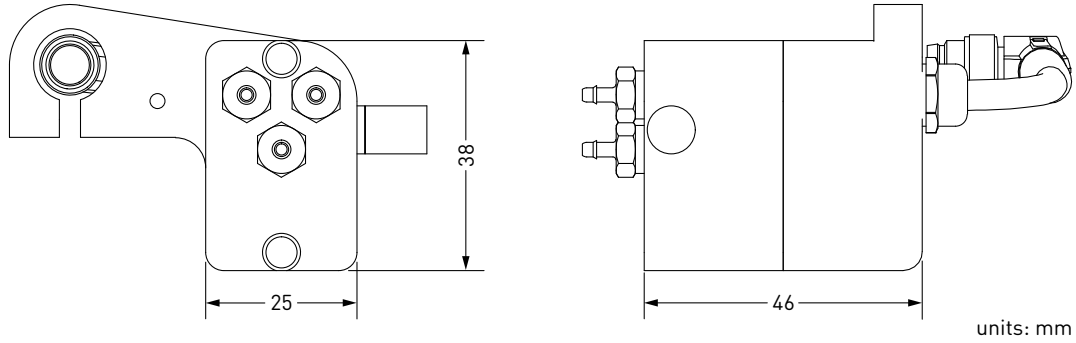


Figure 2: Dimensions of the MPM500 module

Operating data	Value
Pneumatic valve type	3/2 NC solenoid valves
Pneumatic valves action lines	Ports 1 & 2
Electrical connectors	6-pin SLDR cup connector
Pneumatic connector	port IN
Operating pressure	7 bar (102 psi)
Flow rate	29.74 LPM (1.05 CFM)
Response time	ON/OFF: 8/10 ms
Ports	Four M5 threaded orifices, of which ports 1, 2, and IN are with preinstalled barb fittings for 1/16 ID tubes and port OUT is with a preinstalled pneumatic muffler.

Table 1: Technical specifications for the MPM500 module



CAUTION

In order to avoid the malfunctioning of the valves, please ensure to supply compressed air within the required limits, as detailed in Table 1.

5 Installing the module

The MPM500 pneumatic module is designed for only one type of installation (Fig. 3). The module can be used with a variety of pneumatic grippers, suction cups, pneumatic tool changers or other pneumatic devices.

**NOTICE**

It is important to note that because of the interdependent operation of the valves, any pneumatic grippers can currently have only two positions: open and closed. These positions are activated with the GripperOpen and GripperClose commands, sent directly to the Meca500. However, a future firmware update will allow the independent control of the valves, thus potentially modifying the commands.

**CAUTION**

Install the MPM500 module before powering, activating or homing the Meca500 industrial robot.

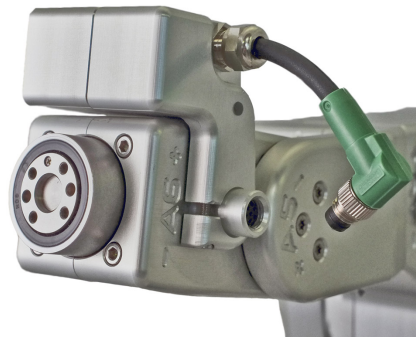
To install the module, it is very important to switch the robot off. Then, simply follow these steps:

1. Slide the MPM500 module on top of the Meca500's wrist, aligning it with the robot's female electrical connector (Fig. 3a).
2. Tighten the screw of the clamp with an Allen key in order to secure it in place as shown in Fig. 3b.
3. Connect the 6-pin SDLR cable to the Meca500's electrical connector (Fig. 3c).
4. To complete the set-up, install the provided barb fittings and the pneumatic silencer, if needed (Fig. 3d).
5. Power the Meca500 (see its User Manual for more information).
6. After activation of the Meca500, the green LED on the module should emit steady light, indicating that the electrical connection is functional (Fig. 4).

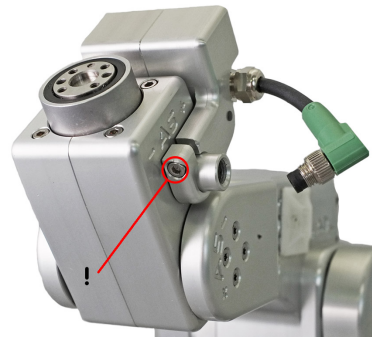
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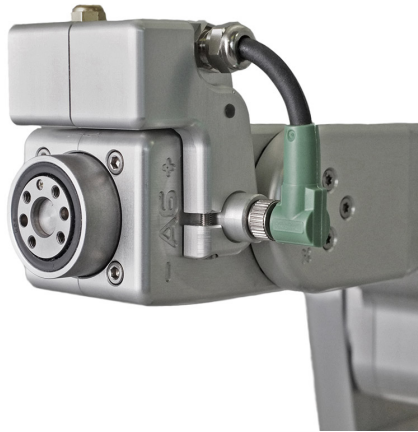
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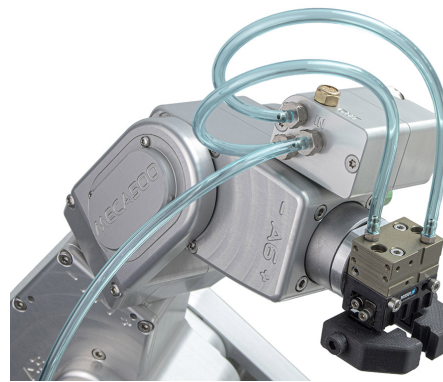
(a) Positioning the module



(b) Securing the module



(c) Connecting the electric cable



(d) Set-up complete

Figure 3: Installing Mecademic's MPM500 module

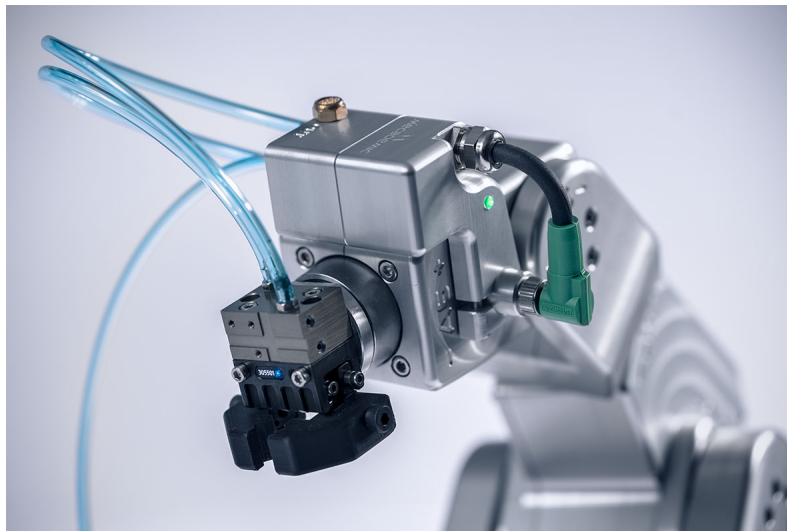


Figure 4: Pneumatic module connected to the Meca500 and to a double-action pneumatic gripper (not provided by Mecademic)

6 Pneumatic circuits

To connect your MPM500 to a double-action pneumatic gripper, follow the circuit of Fig. 5. The compressed air should be introduced in the MPM500's IN port. It will be distributed to both 3/2 NC valves. The solenoid switch activates one valve which allows for the gripper to open/close its fingers, depending on which valve is activated. The gripper's pneumatic connectors should go in the MPM500's Port 1 and Port 2.

Finally, note that if you operate the valves in a continuous manner, the module can heat up. The module's integrated temperature sensor monitors the heat level. However, bear in mind that the module must be used within its technical specifications' limits.

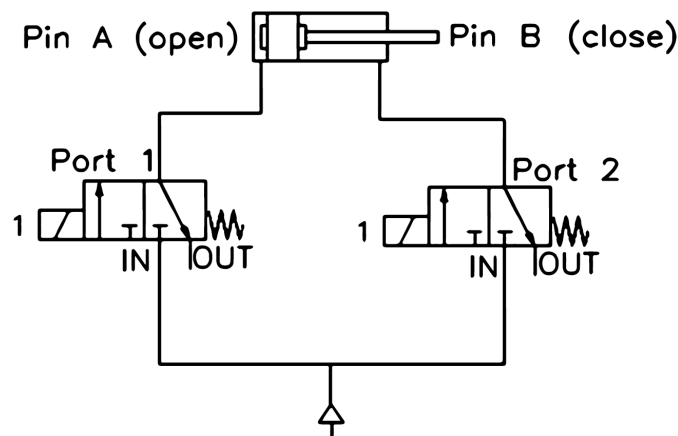


Figure 5: Open/Close pneumatic circuit for the MPM500 module

7 Vacuum circuits

To connect the MPM500 to vacuum suction cups, follow the circuits on Fig. 6 or Fig. 7. In each of these two cases, only one valve is used at a time.

With the first circuit (Fig. 6), the compressed air must enter the MPM500's IN port. When the valve is activated the air flows towards a venturi vacuum pump and connects to its P+ port. The suction cup, and additional air filter if necessary, are connected to the venturi vacuum pump's negative pressure (P-) port. The vacuum is toggled with the activation and release of the valve.

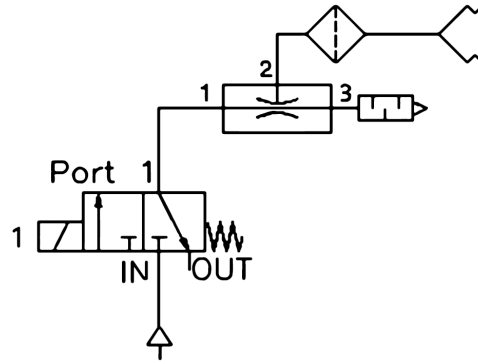


Figure 6: Hold/Release vacuum circuit (1)

A more efficient way to connect the vacuum circuit is presented on Fig. 7. The compressed air is sent directly to the venturi vacuum pump on its positive pressure (P+) port. The negative pressure (P-) port of the venturi is then connected to the OUT port of the MPM500 module. Here, it is important to connect to the OUT port and not the IN port, otherwise there is a risk for valve blockage. When the valve is activated, vacuum is generated directly on the suction cup.

This circuit should also be used when working with a direct vacuum line. The vacuum line is connected to the OUT port of the MPM500, while the end-of-arm tooling is connected either to port 1 or port 2 of the pneumatic module. If both ports of the MPM500 are used, their vacuum action will be the same, as both valves operate in parallel.

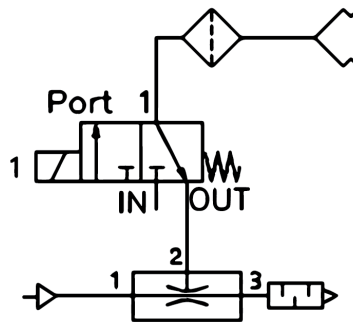


Figure 7: Hold/Release vacuum circuit (2)

8 Safety

While the MPM500 module itself is safe by design, the chosen end-of-arm tooling might be dangerous. You must perform a thorough risk assessment of your complete robot cell to determine the necessary precautions that must be taken in order to assure a safe operation.

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