

## Frequently Asked Questions

### MAC Valves, MI/O-67

**1. What protocols does the MI/O-67 operate on?**

**Answer:** EtherNet I/P, ProfiNet, EtherCat, Modbus TCP, PowerLink

**2. Are the various protocols interchangeable?**

**Answer:** No, they are all based on the EtherNet Framework but vary such that they are not interchangeable. Thus, a EtherNet I//P controller will not operate properly using a ProfiNet MI/O..etc.

**3. Is the MI/O CE approved?**

**Answer:** Yes, the MI/O has passed all testing for the EMC Directive of the CE.

**4. Does the MI/O have protocol certifications?**

**Answer:** Yes, for EtherNet I/P –ODVA certification, ProfiNet – PTO certification, EtherCat – Beckhoff certification.

**5. Are User’s Manuals available for the MI/O?**

**Answer:** Yes [UI-173](#) (EtherNet I/P), [UI-177](#) (EtherCat), [UI-180](#) (ProfiNet), [UI-181](#) (PowerLink), [UI-182](#) (Modbus TCP), [UI-174](#) (WebConfig Tool), and [UI-183](#) (Current Calculator Tool).

**6. Can you “Daisy Chain” the communications on the MI/O-67 Comms Module?**

**Answer:** There are two communications ports on the Comms Module. They act like an EtherNet Switch and are not parallel ports where the wires are directly tied together (Daisy Chained). Thus, if you place the communications cable on Port 1 for example, the PLC will query the MI/O-67 for an IP Address and then be passed on to Port 2 to continue the EtherNet communications to the next device. Where the comms module is connected to port 2, you need to address the other comms separately, it does not continue in sequence.

**7. What is the response of the MI/O?**

**Answer:** The total response time is dependent on the cycle time of the network protocol plus a very short delay for the MI/O to respond. The valve speed by itself will not be changed by the network.

**8. Does the MI/O-67 have diagnostics for the communications?**

**Answer:** The Master reads the faults on the communications line directly. The MI/O does not send other fault codes for the network, these all originate from the Master. However, the MI/O can be set up so that if there is a network fault, the valves can go to either a closed or open position until the network recovers.

**9. How many valves can the MI/O operate per stack?**

**Answer:** The MI/O valve stack can operate any combination of double and single solenoid valves so long as the total number of solenoids is equal to or less than 32. Additional valves can be operated using either the Digital (output) module or Power Plus modules but these valves will not be on the main stack. They will be separate and must be individually wired.

**10. Does the MI/O-67 have valve diagnostics?**

**Answer:** Yes, the MI/O can be set up so that a diagnostics bit is toggled if there is an open load (valve) or a short on the valve driver. The shorted driver parameter is default and will toggle when a short is detected on a valve line. The open load must be set up ahead of time and will toggle when the valve channel in question is open and the driver is off. Depending on the module, they have over current, over voltage, and various backplane diagnostics. Refer to the user's manual for a complete description.

**11. How many modules can be connected onto the MI/O Stack?**

**Answer:** Up to and including 12 modules can be used at any time of any type (Analog, Digital, Power Plus). The Comms Module is not included in this number. Care must be taken toward the total **current calculator tool** for the Modules and their power requirements.

**12. How are the bytes arranged for control of the MI/O?**

**Answer:** The MI/O has 210 Output Bytes, 210 Input Bytes, and 190 Configuration Bytes. Some protocols load the Configuration Bytes automatically; some require the user to load in the stack features manually. Consult the various Users' Manuals for how these are used. In most cases, if this is not done correctly, the valves will not work even though the network connects without faults. For the Outputs, the first 18 Bytes are for the Comms Module (and stack valve operation), the other 192 Bytes are arranged in 16 Byte groups for each Module in order so that the first Module after the Comms Module has the next 16 Bytes and so on. The Inputs have a similar arrangement as the Outputs. However, the first two Input Bytes are used for network health and operation readouts. The Configuration Bytes are set up so that the first two call out the number of modules (Comms Module not included), the next 48 Bytes define each Module on the stack starting at the first one from the Comms Module, the next two groups of 10 Bytes are for the Comms Module diagnostics, then each Module has a slot of 10 Bytes for diagnostics setting (this varies from Module type to type0. The only time all 210/210/190 bytes will be used is when there all 12 modules on the stack.

**13. What do I need to set up the MI/O on a PLC network?**

**Answer:** The first thing you will need is the EDS, GDS..etc (electronic ID file for the MI/O on a particular protocol). This file can be loaded into the PLC Master so it understands the byte layout for the MI/O. Next step would be to set the desired IP Address for the MI/O, and finally set the configuration for the modules, diagnostics, etc inside the PLC for this particular device. Each protocol will vary slightly but they all have the same elements.

**14. Can the MI/O communicate with a PC through an EtherNet card?**

**Answer:** It depends on the protocol utilized. For example, the Modbus TCP protocol is just a transport layer and needs further instructions to operate. This can be done on a PC. For EtherCat, the PC card must be EtherCat compatible. The same with ProfiNet. Remember also, that in most cases, the connection is a Class 1 type. Meaning all inputs must be individually acknowledged and each output must be individually executed. For reference a standard PLC is a Class 3 device whereas it runs a program that handles all the housekeeping of executing and acknowledging.

**15. How do I change an IP Address in the MI/O?**

**Answer:** There are a number of ways to set the slave address for the MI/O. The easiest way is to use the **IPConfig tool** available from MAC. What this tool does is to scan a network from a PC, then tags it using the MAC ID and current IP Address. From there you select it, and re-set the IP Address as desired. The next way is to use the **WebConfig Tool**. The first thing you must know is the MI/O's current IP Address which is noted in the IPConfig tool. From there, scan for it using the tool and you can re-set it from there. Refer to the **WebConfig Tool User's Manual** for complete instructions. Lastly, some of the protocols have the ability to set a slave IP Address inside its software. Refer to each protocol manual for these instructions.

**16. What do the LED's on the MI/O and its modules mean?**

**Answer:** Refer to the User's Manuals for each protocol for definition of the led states.

**17. Can I hot swap Module on the MI/O?**

**Answer:** No, turn off all power and air before servicing the MI/O.

**18. How is power supplied?**

**Answer:** There are two power systems in the MI/O. Each one is rated for 24VDC, 8A. The first one operates the electronics, the module backplanes, and the I/O for both the Analog Modules and Digital Modules. The backplane for the Power Plus module is also operated from this line. The other power supply line is for the valve power It is isolated from the electronics power. Due to the possibility of interference on the EtherNet/electronics power line, it is not advisable to have a common power line for both the electronics and valves. There is a **current calcluator tool** available to calculate current draw from the stack and to check to see if the power budget is met.

**19. Does the MI/O have fuses?**

**Answer:** Yes, there are two 8A fuses in the Comms Module; one for the electronics power, one for the valve power. They are field replaceable if you use the same fuse which is Littelfuse p/n 453008.0 (8A)

**20. Which side of the power is switched for the stack valves?**

**Answer:** The stack valve power is set up to be Negative Common. What that means is the positive side of the power is switched on and off for a given valve channel.

**21. Does the MI/O have blocking and suppression diodes?**

**Answer:** The MI/O is reverse polarity protected and had suppression built in for the valve de-energize spikes.

**22. Where does the Power Plus Module get its power?**

**Answer:** The Power Plus Module's backplane power comes from the electronics line which also feeds the Comms Module and any other module on the stack. The power which actually operates the outputs from this module (the connections on the 6 M12s) comes from the power supplied through the Mini Connector on the module. These two lines are isolated from one another. The module can operate up to 12x 0.5A (at 24VDC) loads.

**23. How is the Analog Module set up?**

**Answer:** There are two configurations of Analog Modules along with two types of I/O from/to these modules. The two types of modules are 0-10VDC (Input/Output) and 4-20mA (Input/Output). The set uses 4 dip switches on the top of the module (one for each Port) to set whether the Port is an input or an output. Each Port also has 24VDC available. The two types (0-10V and 4-20mA) are available with this feature.

**24. How is the Digital Module set up?**

**Answer:** The Digital Module is a 16-point device that can be 16 input points, 16 output points, or half and half. For the inputs, either NPN or PNP sensors can be used but they must be the same type on a particular module (no mixing and matching). The outputs can each operate up to a 0.5A load (at 24VDC). Care must be taken not to drag down the electronics power with these outputs, reference the [current calculator tool](#).

**25. What type of sensors can be connected to the Digital Module?**

**Answer:** Sensors can range from laser prox to hard contact type. Care must be taken to ensure the most up to date firmware is loaded onto the module. Historically, laser type sensors have a very high current spike during start up (significantly higher than steady state) and can cause module high current drop out if the latest firmware is not install on the module.

**26. Can I manually operate the valves or view the sensors without using a PLC?**

**Answer:** Using the [WebConfig Tool](#), all inputs and outputs are available as a Class 1 device. There are also menus to view the network information along with the stack parameters and the firmware versions for each module within the tool. Refer to the User's Manual for a complete description.