

MP-Bus communication module for reading up to four elements and with two analogue outputs

- MP-Bus interface
- Active or passive sensors or switches
- up to 4 elements can be connected
- two analogue outputs controlled over the bus



### Technical data

<b>Electrical data</b>	Nominal voltage	AC 24 V, 50/60 Hz / DC 24 V
	Dimensioning	2 VA (without connected elements)
	Connection	Power supply MP-Bus Elements
	Note	lever clamps, 3-pole together with power supply lever clamps, 6 x 2-pole (4 x 2 for inputs, 2 x 2 for outputs) all terminals for wire max 2,5 mm <sup>2</sup>
<b>Functional data</b>	Supported inputs	active or passive sensor, switch
	Number of elements	max. 4 elements
	Outputs	2 x analog output 0..10 V max. 5 mA
	Communication	Belimo MP-Bus, master-slave 1200 Baud
<b>Safety</b>	Protection class	III low voltage
	Degree of protection	IP65
	EMC	CE according to 89/336
	Ambient temperature	-10 ... +70 °C
	Box material	polycarbonate PC
<b>Installation / dimensions / weight</b>	Installation	wall-mounted, construction-mounted
	Dimensions	see page 5
	Weight	ca. 255 g

### Notification regarding safety



- The device does not contain any user-replaceable or repairable components.
- Installation may only be carried out by qualified persons!
- Do not connect the voltage until all wires are fully connected.

### Product features

<b>Function</b>	Using the MP24-AIO, the values of the individual connected sensors or switches are read and their values are digitized and transmitted to the master system via MP-Bus. From the point of view of MP-Bus communication, the device behaves like 4 actuators in the MP-Bus network, with the exception that only the value of the selected connected sensor is used. At the same time, two analogue outputs of 0..10 V can be used, which can be controlled similarly to the connected actuator. Alternatively, all elements (inputs and outputs) can be read and written under only one MP address via DataPools.
<b>Connection of sensors</b>	One element can be connected to each one of the four inputs. This can be a passive resistor (Pt1000, Ni1000 or NTC), an active sensor (DC 0..10 V output) or a switching contact. In this way, the analog signal of the elements can be easily digitized and transmitted via the MP24-AIO module over the MP-Bus network.
<b>Analog outputs</b>	The MP24-AIO module has two analogue outputs OUT1 and OUT2. These can be controlled via MP-Bus communication in the same way as the actuators at the two individual MP addresses. The 0..100% command then corresponds to the 0..10 V output. Alternatively, these outputs can be controlled via DataPools commands.

Table of registers for control via DataPool or Peek/Poke

(Table Nr. 1)

Peek/Poke Address (hex)	Peek/Poke DEC	Id DataPool	Description	Format	Read/Write
0x000	0	29	AI.1 Hi Byte - Input value AI1	1 Byte	read / Get_Data
0x001	1		AI.1 Lo Byte	1 Byte	read / Get_Data
0x002	2	30	AI.2 Hi Byte - Input value AI2	1 Byte	read / Get_Data
0x003	3		AI.2 Lo Byte	1 Byte	read / Get_Data
0x004	4	31	AI.3 Hi Byte - Input value AI3	1 Byte	read / Get_Data
0x005	5		AI.3 Lo Byte	1 Byte	read / Get_Data
0x006	6	32	AI.4 Hi Byte - Input value AI4	1 Byte	read / Get_Data
0x007	7		AI.4 Lo Byte	1 Byte	read / Get_Data
...					
0x010	16	120	Definition AI1: 0 - None, 1 - U 0..10 V, 2 - R (800..1600ohm), 3 - R (0..60kohm), 4 - Switch	1 Byte	write / Set_Data
0x014	20	121	Definition AI2: 0 - None, 1 - U 0..10 V, 2 - R (800..1600ohm), 3 - R (0..60kohm), 4 - Switch	1 Byte	write / Set_Data
0x018	24	122	Definition AI3: 0 - None, 1 - U 0..10 V, 2 - R (800..1600ohm), 3 - R (0..60kohm), 4 - Switch	1 Byte	write / Set_Data
0x01C	28	123	Definition AI4: 0 - None, 1 - U 0..10 V, 2 - R (800..1600ohm), 3 - R (0..60kohm), 4 - Switch	1 Byte	write / Set_Data
...					
0x030	48	16	AO.1 Hi Byte: Setpoint for AO1 (0..10000 mV)	1 Byte	write / Set_Data
0x031			AO.1 Lo Byte	1 Byte	write / Set_Data
0x032	50	17	AO.2 Hi Byte: Setpoint for AO1 (0..10000 mV)	1 Byte	write / Set_Data
0x033			AO.2 Lo Byte	1 Byte	write / Set_Data
...					
0x006E	110	110	Malfunction & Service Information (1 Byte) Bit 0 - AI.1 Error (temperature outside the measured range) Bit 1 - AI.2 Error (temperature outside the measured range) Bit 2 - AI.3 Error (temperature outside the measured range) Bit 3 - AI.4 Error (temperature outside the measured range)	4 Bits	read / Get_Data
...			...		
0x0060	96	200	Serial number - Byte 1 (Prefix, Year, Week)	1Byte	read / Get_Data
0x0061	97		Serial number - Byte 2	1 Byte	read / Get_Data
0x0062	98		Serial number - Byte 3 (Day, Serial No.)	1 Byte	read / Get_Data
0x0063	99		Serial number - Byte 4	1 Byte	read / Get_Data
0x0064	100	202	Serial number - Byte 5 (Family suffix)	1 Byte	read / Get_Data
0x0065	101		Serial number - Byte 6 (Family code)	1 Byte	read / Get_Data
0x0066	102		Serial number - Byte 7 (Test machine, Input 1..4)	1 Byte	read / Get_Data
...					
0xFA48	64072	400	OEM - string		read / Get_Data
0xFA58	64088	500	Position - string		read / Get_Data
0xFA68	64104	600	BELIMO - string		read / Get_Data

## Installation and commissioning

### Installation and connection

The device is housed in an installation box and is designed for wall or construction mounting (self-tapping screws are included). The wiring is via lever terminals on the terminal block for MP-Bus communication and power supply connection, and another terminal block is used for the individual analogue inputs (for connection of temperature sensors, switches) and outputs.

### Commissioning and addressing

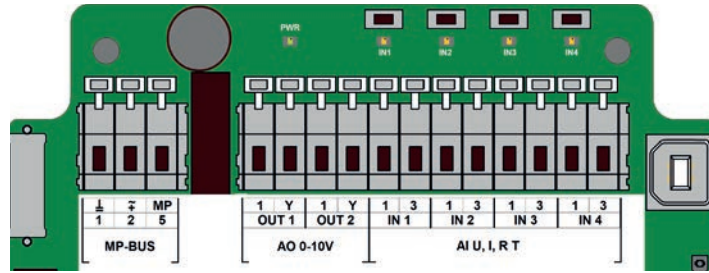
For commissioning of the application, the used individual elements must be addressed. The individual elements can be assigned addresses from the control system via a confirmation button on the MP24-AIO or by using a unique serial number. The application described below is available for free download for addressing and commissioning.

### Using the MP address

With the device it is possible to communicate in two ways. It is possible to specify an address only for the first input, or each input can have its own separate address. If the whole device has only one MP address, the Get\_Data command is used to get the measured values. The Set\_Data command sets the measurement type for each input and also the setpoint for the analog outputs. The addresses of the measured values and setting registers are further described in Table 1. If each input is addressed separately, it is possible to use the MP\_AD\_Convert command for the reading of the sensor and the MP\_Set\_Relative command for the desired value of the analog output (it is necessary that the analog outputs have MP addresses on the first two outputs).

### Functions and MP address assignment

Each of the inputs/outputs (4/2 in total) has its own serial number as in the case of actuators with MP-Bus communication. Based on this serial number, an individual MP address can be assigned to any input. For this purpose, each input also has its own addressing button and yellow LED IN1..IN4. MP addressing is then carried out in the standard way as for actuators. This means that if the operating unit starts sending an addressing request with the corresponding MP address, the MP address of the input to which the pressed button belongs is assigned when the button is pressed.



**The meaning of the serial number**

The serial number complies with MP-Bus communication standards. The last byte 7 represents the input number.

Byte 1, 2			Byte 3, 4		Byte 5	Byte 6	Byte 7
Zero prefix	Year	Week	Day	Serial No.	Manufacturer	Device family	Test station
0	14	30	2	0001	255	247	1-4

**Supported MP-Bus commands**

MP_Get_SeriesNo	50	reading the serial number, required for addressing
MP_Set_MP_Address	38	writing the MP address
MP_Get_MP_Address	13	reading the MP address
MP_Set_Relative	37	setting the requested value for the analog output
MP_AD_Convert	4	reading AD converters
MP_Get_Forced_Control	75	reading an external contact
MP_Peek	1	reading elements from memory
MP_Poke	2	writing to memory
MP_Get_Data	111	reading data from DataPool
MP_Set_Data	110	writing data to DataPool

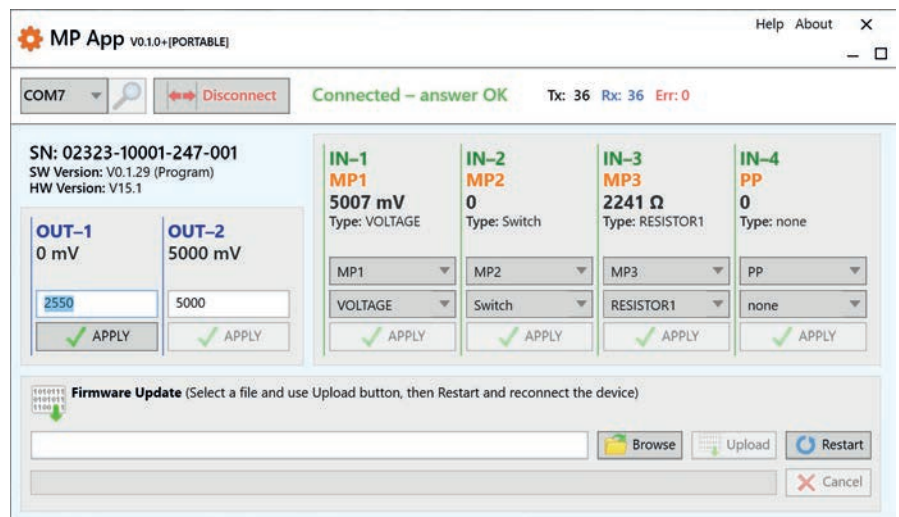
**Application MP App**

An application for setting and addressing MP24-AIO devices is also available. It can perform basic diagnostics and assign MP addresses to individual inputs and outputs. It is also possible to update the FW of the module in the application window. Connection to a PC via the included USB cable. The application is free to download via the following link or via QR code.

<https://www.firvena.cz/UserFiles/File/MP-App.zip>

**QR code with a download link for the application**

<https://www.firvena.cz/UserFiles/File/MP-App.zip>



Electical installation

MP-Bus and power supply terminals

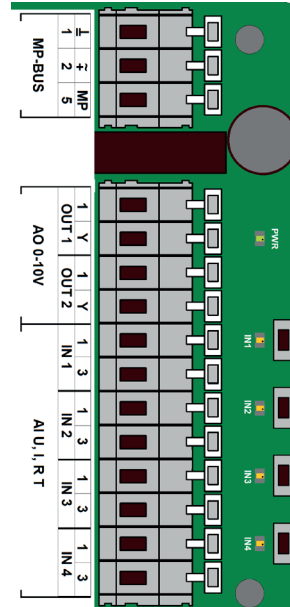
Terminal	Meaning	Description
1	- ⊥	GND MP-Bus
2	24 V AC/DC	Power supply
5	MP	MP-Bus

Terminals for analog outputs

Terminal	Meaning	
OUT1	1	Output 1 - GND
	Y	Output 1 - 0..10 V
OUT2	1	Output 2 - GND
	Y	Output 2 - 0..10 V

Terminals for sensors and switches

Terminal	Meaning	
IN1	1	Input 1 - GND
	3	Input 1 - signal (U, R, switch)
IN2	1	Input 2 - GND
	3	Input 2 - signal (U, R, switch)
IN3	1	Input 3 - GND
	3	Input 3 - signal (U, R, switch)
IN4	1	Input 4 - GND
	3	Input 4 - signal (U, R, switch)



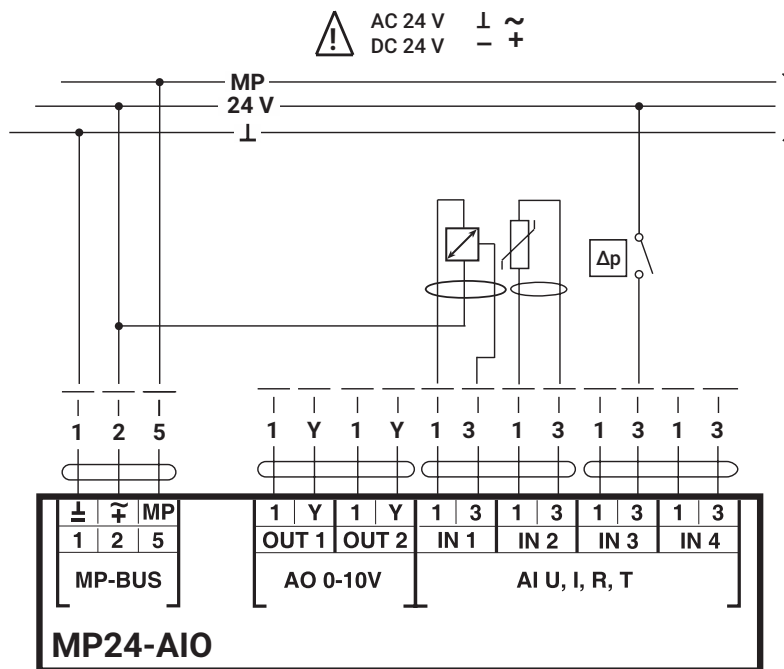
Wiring diagram of the inputs (sensors)

1. connection of active sensors
  - AC/DC 24V power supply
  - output signal DC 0...10 V (max. DC 0...32 V)
  - resolution 1 mV

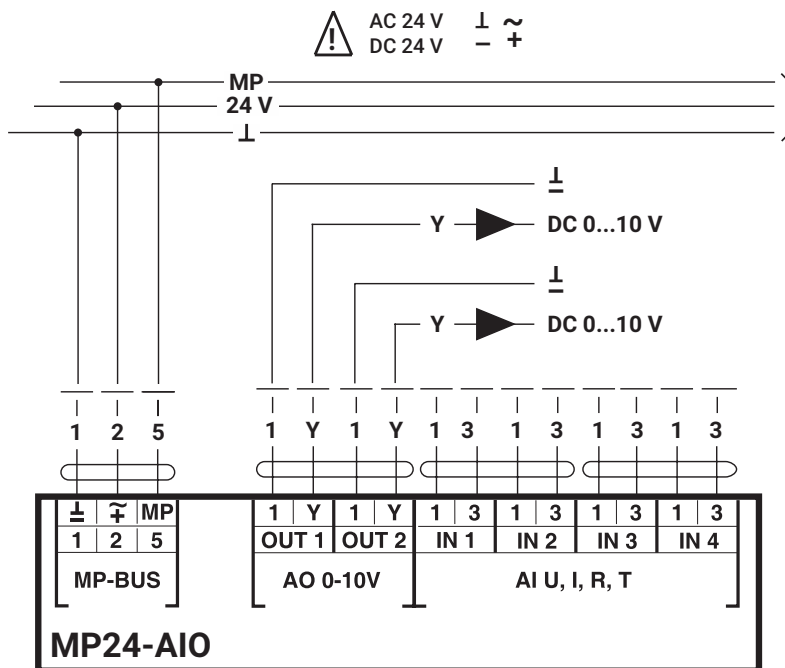
2. connection of passive sensors (Pt1000, Ni1000, NTC)

Sensor	Temperature range	Resist range	Resolution
Ni1000	-28 ... +98°C	850 ... 1600 Ω	1 Ω
Pt1000	-35 ... +155°C	850 ... 1600 Ω	1 Ω
NTC	-10 ... +160°C (by type)	200 Ω ... 60 kΩ	1 Ω

3. connection of external switch (e.g. overpressure monitor)
  - switching current 10 mA 24 V



Wiring diagram of analog outputs



Dimensions [mm]

Dimensional diagram

