MIDAM
CONTROL SYSTEM

MIDAM BAIO1601

16 analog inputs/outputs module

Microprocessor controlled module featuring 8 analog inputs with variable measuring range (voltage, resistance, temperature, current loop) and 8 analog outputs 0...10V. The serial line communication is based on Modbus RTU (RS485) protocol. Native modbus map grants seamless integration into variety of PLC/SCADA systems.

IO MODULES

Application

- 8 analog inputs / 8 analog outputs module
- Analog signal acquisition/control
- Integration into PLC topology
- General use

Function

The BAIO1601 module monitors/controls up to 8 analog inputs and 8 analog outputs. The input signals are processed and multiplexed into a 16 bit A/D converter. Each input is rangeable separately (see Technical data), and inputs can also be used as 0 to 20 mA current measurement inputs if the corresponding DIP switch is activated. The device has factory-set values to ensure the correct default function and allows direct reading and writing of values to the Modbus map, which is available in a separate document. All settings are also stored in the Modbus map directly in the device. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 R resistor may be switched on by short-circuiting of the BUS END DIP switch. Three LEDs located inside of the housing enable fast diagnostics – power, communication and system circle indication. The communication circuits are protected against overvoltage and galvanically isolated from other parts of the module. The module is equipped with a watchdog. The module features removable connectors available for all signals as well as for data and power line. This makes its installation and maintenance fast and easy. The module has a DIN rail clip (snap on).

PLC system integration

The module can be integrated via the Modbus RTU (RS485).

Addressing

The Modbus address can be set in two ways. Using DIP switches, they increase their bit weight from right to left, see image with example where address of 98 is set by activation of switches 2, 3, and 7 with bit weight of 64, 32, and 2 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT (factory settings) mode, where Modbus address is 1 and communication parameters are set to 9600, 8, N, 1. Software addressing is available using appropriate software tool delivered by the device manufacturer. The software addressing feature is active provided the hardware addressing switch is set to 0 only. All changes apply after the module is switched off and on again.

Configuration

The device is configured using the manufacturer's tool or with a standard modbus tool, modifying the appropriate registers. The different operation modes and user access can be configured in this way. Modifications to the controller configuration can be made afterwards without the need for any special tools.

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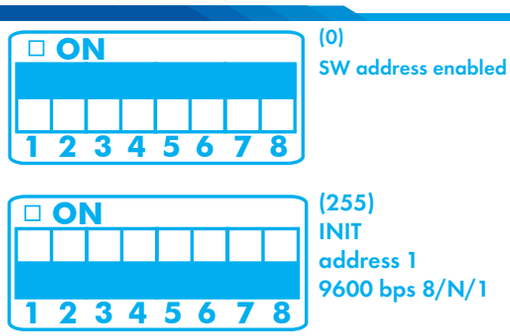
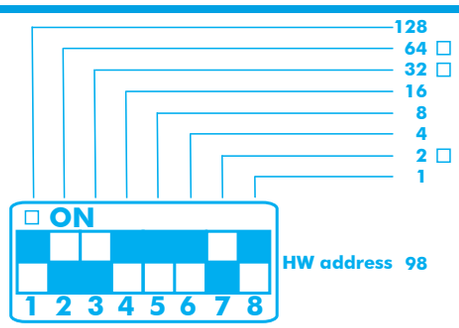
Technical data

Power supply	24 V AC/DC ± 20 %
Consumption	4 W
Communication	**RS485, Modbus RTU (K+, K-)** baud rates 300 ... 115 200 bit/s, parity and bits are set over Modbus RTU, default 9600/8/N/1 maximal bus length 1200 m, galvanic isolation 1 kV
Protocol	Modbus RTU, 256 node (RS485)
Indication	PWR (green, power supply), RUN (yellow, device active), TX (red, RS485 communication)
Inputs	8x analog input (16 bit, 10 sps - multiplex, 0.25%, 0-10 V, 0-20 mA, 20-1600 Ohm, 20-5000 Ohm, Pt1000 - 50 / + 150 °C, Ni1000 / Pt100 SW), galvanic isolation 1 kV
Outputs	8x analog output 0 -10 VDC, load impedance >10 kOhm, short - circuit proof, galvanic isolation 1 kV
Mechanical and dimensions	105.6 x 98.7 x 64 mm (l x w x h) Polycarbonate enclosure (UL94V0) IP20, 3x DIP switch blocks - ADR (AUTO - all in OFF position, INIT – all in ON position), BUS END, 125R (current measurement 0 - 20 mA)
Terminals	5 x M3 screw terminals (Power, K+, K-), 22 x M2 screw terminals (inputs/outputs) Recommended wire diameter 0.35 to 1.5 mm^2
Ambient conditions	-5 to +45 °C, 5 % to 95 % rH (EN 60721-3-3 class 3K5)

Addressing (example)





IO MODULES

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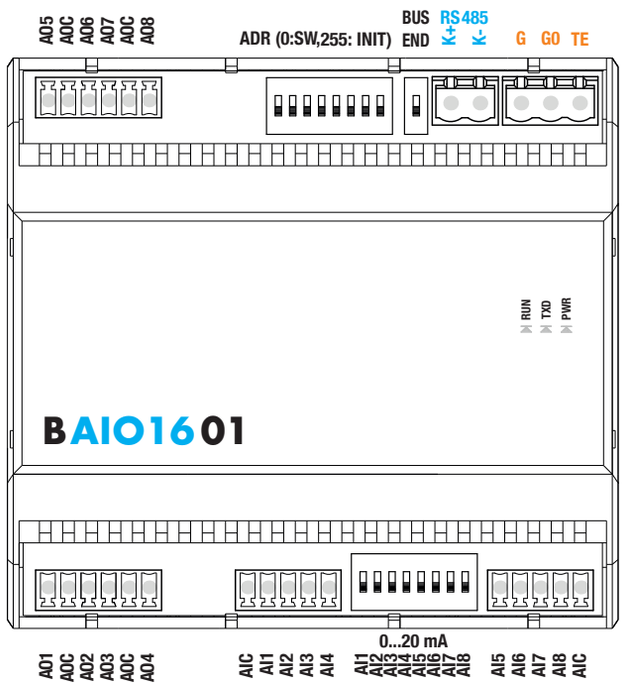
Terminals and connection

AO 1	Output 1
AO C	Common terminal
AO 2 - 3	Output 2 - 3
AO C	Common terminal
AO 4	Output 4
AI C	Common terminal
AI 1 - 8	Input 1 - 8
AI C	Common terminal
AO 5	Output 5
AO C	Common terminal
AO 6 - 7	Output 6 - 7
AO C	Common terminal
AO 8	Output 8
K+	Serial line RS485 +
K–	Serial line RS485 -
G	Power
G0	Power
TE	Technical ground



LED indication and DIP switches

ADR (INIT)	If ON at power-up, configuration parameters are brought to defaults (address 1, communication parameters 9600/8/N/1).
BUS END	In ON position; the first and last devices on bus should have bus end ON.
0...20 mA	For current measurement (0...20 mA) on individual channels switch the particular DIP switch to ON position. The 0...20 mA range must be also set over Modbus (e.g. using appropriate SW tools provided by the manufacturer of the module).
RUN	Yellow LED – system cycle (OK: LED flashes periodically 1s ON, 1s OFF; ERROR: LED flashes in other pattern, LED is still ON or OFF).
TXD	Red LED – RS485 transmitting data to the field bus (flashing: transmitting data; OFF: no data traffic).
PWR	Green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, ...).

Changes in versions

04/2019	New datasheet version (v19/01).
12/2020	Layout changed (v20/12).