

MOD-IO9 Modbus Input / Output Modules, Wall Mounted

MOD-IO9 and MOD-IO9-AI have been designed to be a compact wall mounted Modbus RTU input and output module.

The module has 2 volt-free digital inputs for measurements e.g. for windows, occupancy sensors and so on. The module has 2 digital outputs, 24Vac triacs switching the plant items on/off.

The IO9 modules has 2 inputs for measuring NTC10 temperature, resistive measurements (suitable for light level measurements etc) or volt-free on/off signals. The IO9-AI models have 2 inputs for measuring 0..10Vdc signals.

The three analogue 0..10Vdc outputs complete the compact IO-modules. With the analogue outputs it is possible to control zone valves and other modulating plant equipment.

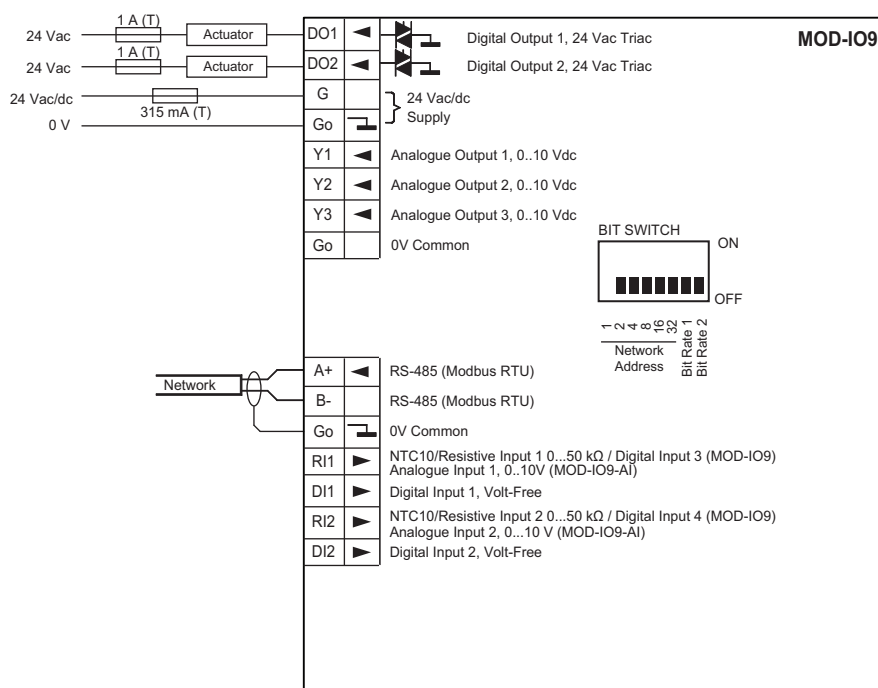
The modules support Modbus RTU communications with most commonly used baud rates and parity settings.



Model Type	Model	Description
	MOD-IO9	Modbus RTU Digital Input / Output Module, 2DI, 2DO, 2RI, 3AO
	MOD-IO9-AI	Modbus RTU Digital Input / Output Module, 2DI, 2DO, 2AI, 3AO
Technical Data		
Power Supply	Power supply	24 Vac/dc -10%/+15%
Signal Outputs	Analogue Outputs	3 x 0...10 V < 5 mA; 100k min impedance for 1% accuracy
	Digital Outputs	2 x 24 Vac max. 1 A Triac; requires 24 Vac Power Supply (DO1 & DO2) NOTE: Switching to 0 V
Signal Inputs	Resistive Inputs (MOD-IO9) ¹	2 x Universal NTC10/Resistive/Digital Inputs, 0..50kOhms (NTC10/Volt-Free Digital default, configurable via SW-DCT-USB tool to resistive mode)
	Voltage Inputs (MOD-IO9-AI)	2 x 0...10 Vdc Inputs
	Digital Inputs	2 x Volt-Free Contact, Impedance <1 kΩ Pulse Counting: Max 25Hz, Min Pulse Length 20mA (Volatile)
Communication	Modbus Communications	
	Protocol	Modbus RTU
	Interface	RS-485; maximum 63 devices
	Addressing	1...63 via a bit switch; 1...247 via tool / network
Connections	Terminal Connections	9k6/19k2/38k4/57k6 Baud; Parity None/Even/Odd, 1 or 2 Stop Bits (baud rate adjustable through bit switch or network)
		Solid and Stranded Cable; 55° Angle for Wiring Maximum Size: 0.05 to 1.5mm ² (EN ISO) / 14 to 30 AWG (UL) Rising Clamp: Size 2.5 x 1.9mm
Environmental Conditions	Operating	
	Temperature	0...+50 °C (32...122 °F)

	Humidity	0...95 %rh (non-cond.)
Storage	Temperature	-30...+70°C (-22...158 °F)
	Humidity	0...95 %rh (non-cond.)
Standards	CE Conformity	CE Directive 2004/108/EY EN61000-6-3: 2001 (Generic Emission) EN61000-6-1: 2001 (Generic Immunity).
	Degree of Protection	IP20
Housing	Housing Material	ABS Plastics, Self Extinguishing
	Mounting	Wall or Junction Box Mounting, RAL9010 Pure White
	Dimensions	W86 x H120 x D29mm
	Weight	180g

Wiring Terminals



DO1	Digital Output; 24 Vac Triac Switching to 0 V; max. 1 A Warning: Add external fuse (1 A (T)) for the actuator connected to the output. The fuse or correct wiring accessories are not included in the product delivery.
DO2	Digital Output; 24 Vac Triac Switching to 0 V; max. 1 A Warning: Add external fuse (1 A (T)) for the actuator connected to the output. The fuse or correct wiring accessories are not included in the product delivery.
G	24 Vac/dc Power Supply Warning: Add an external fuse (315 mA (T)) for the power supply. The fuse and correct wiring accessories are included in the product delivery.
G0	0 V Common
Y1	0...10 Vdc Analogue Output
Y2	0...10 Vdc Analogue Output
Y3	0...10 Vdc Analogue Output
G0	0 V Common
A+	RS-485 A+ Connection (Modbus)
B-	RS-485 B- Connection (Modbus)
G0	0 V Common
RI1	IO9: NTC10/Resistive Input 0...50 kΩ / Volt-Free Digital IO9-AI: 0...10 Vdc
DI1	Digital Input; Volt-Free, Max 25Hz, Min Pulse Length 20mS

RI2	IO9: NTC10/Resistive Input 0...50 kΩ / Volt-Free Digital IO9-AI: 0...10 Vdc
DI2	Digital Input; Volt-Free, Max 25Hz, Min Pulse Length 20mS

Digital Input Pulse Counting

Digital Inputs can be used for pulse counting up to 25Hz, minimum pulse length 20mS. The pulse count is stored in a dedicated register and can be read over the network. It is possible to write to this register to reset the value.

NOTE: The pulse count value is not battery backed, and therefore the network master is required to manage the data synchronisation in case of power failure.

**Universal NTC10/
Resistive/Digital Inputs
(MOD-IO9)**

The universal inputs can be configured to operate as NCT10/Digital Volt-Free inputs or Resistive Inputs. As default the inputs are configured as NTC10/Digital Volt-Free. The maximum measurement range is -10°C to 100°C (-40°F to 212°F). The NTC10/resistive configuration is changed via the Configuration Software using the USB to IO-Module cable. The digital volt-free mode is automatically activated, and separate Modbus registers are available to read the status.

**Analogue Inputs
(MOD-IO9-AI)**

The MOD-IO9-AI has 2 x 0..10Vdc inputs. The current status can be read over the Modbus communication network.

**Setting Up Modbus Address
and Baud Rate**

The Modbus address and the baud rate is normally set through the bit switch. It is also possible to set the address and baud rate over the Modbus communication network.

NOTE: The new settings are activated automatically after approx 5 seconds if the bit switch positions have not been moved. In this case the controller reset is applied to activate the new settings.

SETTING TRANSMITTER BAUD RATE

Note: When the baud rate set 9600 via the bit switch it is possible to configure the baud rate via network / tool.
Note: To activate the change the transmitter requires power cycle, or software reset via the tool.

SETTING TRANSMITTER MODBUS ADDRESS

The Modbus address is set by using bith switches 1 to 6 using binary decoding. Each bitswitch represents the binary value and the address is set by the combination of bit switches. Few examples:

Note: If all address bit switches are set OFF, then the Modbus address can be set over the Modbus or through configuration tool.

Modbus Registers

The IO-module supports the following Modbus registers and function codes. The default communication speed is 9600 bps, 8 data bits, Parity None and 1 Stop Bit. The default Modbus Slave address is 1. The device Parity can be changed between Odd, None and Even. The baud rate is selectable between 9600, 19200, 38400 and 57600 bps. The baud rate speeds can be selected using the built-in bit switch, or over the network if BR1 and BR2 are set to OFF. The sensor addresses 1 to 63 can be set using the local bit switch, and over the Modbus the adjustable address range is 1 to 247.

Please note that Modbus register space is specified from the Modbus master perspective as in the Modbus Application Protocol specification. The Modbus registers for Function Codes 02, 03, 06 and 16 have presentation for both Modbus "address blocks" and for actual Modbus register offsets. For example, the Temperature is read from Modbus register 1 using Function Code 04. Some Modbus masters will require Function Code 04, register 1 to be entered, whereas the others will require register 30001 and Function Code 04. The Modbus addressing starts from the zero Base address. (Some Modbus masters start addressing from 1, in this case add one to the listed register values).

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 01 - READ COILS FUNCTION CODE 05 - WRITE SINGLE COIL FUNCTION CODE 15 - WRITE MULTIPLE COILS			
0	Digital Output 1 Override (Network Write)		0..1	Off - On
1	Digital Output 2 Override (Network Write)		0..1	Off - On
	FUNCTION CODE 02 - READ DISCRETE INPUTS			
10000	Digital Input 1 Status		0..1	Off - On
10001	Digital Input 2 Status		0..1	Off - On
10002	Digital Output 1 Status		0..1	Off - On
10003	Digital Output 2 Status		0..1	Off - On
10009	Digital Input 3 Status (MOD-IO9: RI1)		0..1	Off - On
10010	Digital Input 4 Status (MOD-IO9: RI2)		0..1	Off - On

Register	Parameter Description	Data Type	Raw Data	Range
FUNCTION CODE 04 - READ INPUT REGISTERS				
30004	MOD-IO9: Resistive Input 1	Unsigned 16	0...50000	0..50000 Ohms
30005	MOD-IO9: Resistive Input 2	Unsigned 16	0...50000	0..50000 Ohms
30007	Analogue Output Y1	Unsigned 16	0..1000	0..100.0 %
30008	Analogue Output Y2	Unsigned 16	0..1000	0..100.0 %
30009	Analogue Output Y3	Unsigned 16	0..1000	0..100.0 %
30012	MOD-IO9: NTC10 Input 1 (RI1 in NTC mode; default)	Signed 16	-400...3020	-40.0..302.0 °F -40.0..150.0 °C
30013	MOD-IO9: NTC10 Input 2 (RI2 in NTC mode; default)	Signed 16	-400...3020	-40.0..302.0 °F -40.0..150.0 °C
30014	MOD-IO9-AI: Analogue Input 1	Unsigned 16	0...1000	0..100.0 % (0..10V)
30015	MOD-IO9-AI: Analogue Input 2	Unsigned 16	0...1000	0..100.0 % (0..10V)
30100	Firmware Version	Unsigned 16	n/a	n/a
FUNCTION CODE 03 - READ HOLDING REGISTERS FUNCTION CODE 06 - WRITE SINGLE HOLDING REGISTER FUNCTION CODE 16 - WRITE MULTIPLE HOLDING REGISTERS				
40000	Analogue Output Y1 Override Value	Unsigned 16	0..1000	0..10.0 V Default 0
40001	Analogue Output Y2 Override Value	Unsigned 16	0..1000	0..10.0 V Default 0
40002	Analogue Output Y3 Override Value	Unsigned 16	0..1000	0..10.0 V Default 0
40039	MOD-IO9: Temperature Unit Selection for RI1 and RI2 in NTC10 Mode	Unsigned 16	0..1	0 = Celsius (Default) 1 = Fahrenheit
40050	Modbus Address	Unsigned 16	0..247 See Note 1	0..247 (Default 1)
40051	Modbus Baud Rate	Unsigned 16	0...3 See Note 2	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600
40052	Modbus Parity	Unsigned 16	0...2	0 = None (Default) 1 = Odd 2 = Even
40053	Stop Bits	Unsigned 16	0...1	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
40067	Hold On Delay Setting for Digital Input 1	Unsigned 16	1..7200	1..7200 Seconds (Default 10s)
40068	Hold On Delay Setting for Digital Input 2	Unsigned 16	1..7200	1..7200 Seconds (Default 10s)
40070	MOD-IO9: RI1 Single Point Calibration	Signed 16	-10,000..10,000	-1,000..1,000 °C, °F or Ohms
40071	MOD-IO9: RI2 Single Point Calibration	Signed 16	-10,000..10,000	-1,000..1,000 °C, °F or Ohms
40072	DI1 Pulse Count Most Significant 16 Bits	Unsigned 16	0..65280	0..65280
40073	DI1 Pulse Count Least Significant 16 Bits	Unsigned 16	0..65535	0..655350
40074	DI2 Pulse Count Most Significant 16 Bits	Unsigned 16	0..65280	0..65280
40075	DI2 Pulse Count Least Significant 16 Bits	Unsigned 16	0..65535	0..655350
40100	Force Reset	Unsigned 16	0..1	0 = Normal 1 = Force Reset
40101	Non Volatile Memory Update	Unsigned 16	0..1 Note 3	0 = Normal 1 = Update
40103	Force Factory Defaults	Unsigned 16	0..1	0 = Normal 1 = Force Defaults
40104	Force 0..10V Output Calibration Routine	Unsigned 16	0..1	0 = Normal 1 = Force Calibration

Note 1. Modbus address can be configured via network only if the bit switches 1-6 are switched off.
Please note if changed over the Modbus, the Non Volatile Memory Updated parameter MUST BE exercised before power cycle or reset.

Note 2. Modbus Baud Rate can be configured over the Modbus if bit switches 7 & 8 are in off state (9600). Please note if changed over the Modbus, the Non Volatile Memory Updated parameter MUST BE exercised before power cycle or reset.

Note 3. When the settings are changed over the communication bus, the changes for the configuration parameters are not stored in the non-volatile memory automatically. In order to store the changes "Non Volatile Memory Update" is required to be set true.

Dimensions

