

MiniModbus 2I2O

Expansion Module – 2 digital inputs, 2 digital outputs

version 1.8

User Manual



Manufactured for

CE

ASPAR

Thank you for choosing our product.

This manual will help you with proper support and proper operation of the device.

The information contained in this manual have been prepared with utmost care by our professionals and serve as a description of the product without incurring any liability for the purposes of commercial law.

This information does not release you from the obligation of own judgment and verification.

We reserve the right to change product specifications without notice.

Please read the instructions carefully and follow the recommendations contained therein.



WARNING!

Failure to follow instructions can result in equipment damage or impede the use of the hardware or software.

1. Safety rules

- Before first use, refer to this manual
- Before first use, make sure that all cables are connected properly
- Please ensure proper working conditions, according to the device specifications (eg: supply voltage, temperature, maximum power consumption)
- Before making any modifications to wiring connections, turn off the power supply

2. Module Features

2.1. Purpose and description of the module

2I2O Module is an innovative device that provides a simple and cost-effective extension of the number of lines of input and output in popular PLCs.

The module has 2 digital inputs with configurable timer/counter option, which allow to connect one encoder. All inputs are isolated from the logic by optocouplers. Each channel can be individually configured in one of several modes.

This module is connected to the RS485 bus with twisted-pair wire. Communication is via MODBUS RTU or MODBUS ASCII. The use of 32-bit ARM core processor provides fast processing and quick communication. The baud rate is configurable from 2400 to 115200.

The module is designed for mounting on a DIN rail in accordance with DIN EN 5002.

The module is equipped with a set of LEDs used to indicate the status of inputs and outputs useful for diagnostic purposes and helping to find errors.

Module configuration is done via USB by using a dedicated computer program. You can also change the parameters using the MODBUS protocol.

2.2. Technical Specifications

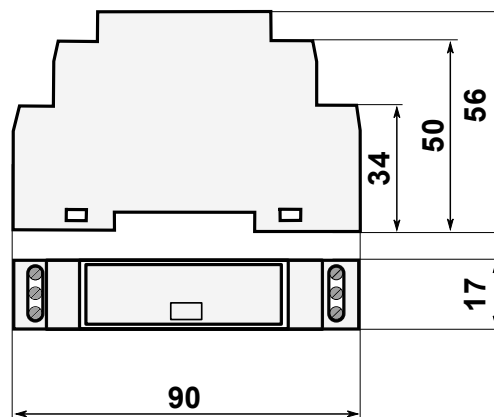
Power Supply	Voltage	10-38VDC; 20-28VAC
	Maximum Current*	62 mA @ 12V / 35 mA @ 24V
Digital Inputs	No of inputs	2
	Voltage range	0 – 36V
	Low State „0”	0 – 3V
	High State „1”	6 – 36V
	Input impedance	4kΩ
	Isolation	1500 Vrms
	Input Type	PNP or NPN
Digital Outputs	No of outputs	2
	Max current and voltage	250mA / 55V
	Isolation	1500 Vrms
	Output Type	PNP
Counters	No	2
	Resolution	32 bits
	Frequency	1kHz (max)
	Impulse Width	500 μs (min)
Environmental conditions	Operating temperature	-10 °C - +50 °C
	Storage temperature	-40 °C - +85 °C
	Relative humidity	5 – 95% RH (without condensation)
	Ingress protection	IP40
Connectors	Power Supply	2 x screw connector
	RS485	3 x screw connector
	Inputs	3 x screw connector
	Outputs	3 x screw connector
	Configuration	Mini USB, type B
	Max. cable size	2,5 mm ² (18...12 AWG)
Housing	Material	Self-extinguishing plastic (PC/ABS)
	Mounting	DIN rail (DIN norma EN 50022)
Dimensions	Height / Depth / Width	90 mm / 56 mm / 17 mm
Interface	RS485	Up to 128 devices
	Communication protocol	Modbus RTU/ASCII, slave

* Maximum current with active Modbus transmission, all outputs on and high state on all inputs

Expansion Module– 2 digital inputs, 2 digital outputs

2.3. Dimensions of the product

Look and dimensions of the module are shown below. The module is mounted directly to the rail in the DIN industry standard. Power connectors, communication and IOs are at the bottom and top of the module. USB connector configuration and indicators located on the front of the module.



3. Communication configuration

3.1. Grounding and shielding

In most cases, IO modules will be installed in an enclosure along with other devices which generate electromagnetic radiation. Examples of these devices are relays and contactors, transformers, motor controllers etc. This electromagnetic radiation can induce electrical noise into both power and signal lines, as well as direct radiation into the module causing negative effects on the system. Appropriate grounding, shielding and other protective steps should be taken at the installation stage to prevent these effects. These protective steps include control cabinet grounding, module grounding, cable shield grounding, protective elements for electromagnetic switching devices, correct wiring as well as consideration of cable types and their cross sections.

3.2. Network Termination

Transmission line effects often present a problem on data communication networks. These problems include reflections and signal attenuation.

To eliminate the presence of reflections from the end of the cable, the cable must be terminated at both ends with a resistor across the line equal to its characteristic impedance. Both ends must be terminated since the direction of propagation is bi-directional. In the case of an RS485 twisted pair cable this termination is typically 120 Ω .

3.3. Types of Modbus Registers

There are 4 types of variables available in the module

Type	Beginning address	Variable	Access	Modbus Command
1	00001	Digital Outputs	Bit Read & Write	1, 5, 15
2	10001	Digital Inputs	Bit Read	2
3	30001	Input Registers	Registered Read	3
4	40001	Output Registers	Registered Read & Write	4, 6, 16

3.4. Communication settings

The data stored in the modules memory are in 16-bit registers. Access to registers is via MODBUS RTU or MODBUS ASCII.

3.4.1. Default settings

Parameter name	Value
Address	1
Baud rate	19200
Parity	No
Data bits	8
Stop bits	1
Reply Delay [ms]	0
Modbus Type	RTU

3.4.2. Configuration registers

Address	Name	Values
40003	Baud rate	0 – 2400 1 – 4800 2 – 9600 3 – 19200 4 – 38400 5 – 57600 6 – 115200 other – value * 10
40005	Parity	0 – none 1 – odd 2 – even 3 – always 1 4 – always 0
40004	Stop Bits LSB	1 – one stop bit 2 – two stop bits
40004	Data Bits MSB	7 – 7 data bits 8 – 8 data bits
40006	Response delay	Time in ms
40007	Modbus Mode	0 – RTU 1 – ASCII

3.4.3. Watchdog function

This 16-bit register specifies the time in milliseconds to watchdog reset. If module does not receive any valid message within that time, all Digital and Analog Outputs will be set to the default state.

This feature is useful if there is an interruption in data transmission and for security reasons. Output states must be set to the appropriate state in order to assure the safety of persons or property.

The default value is 0 milliseconds which means the watchdog function is disabled.

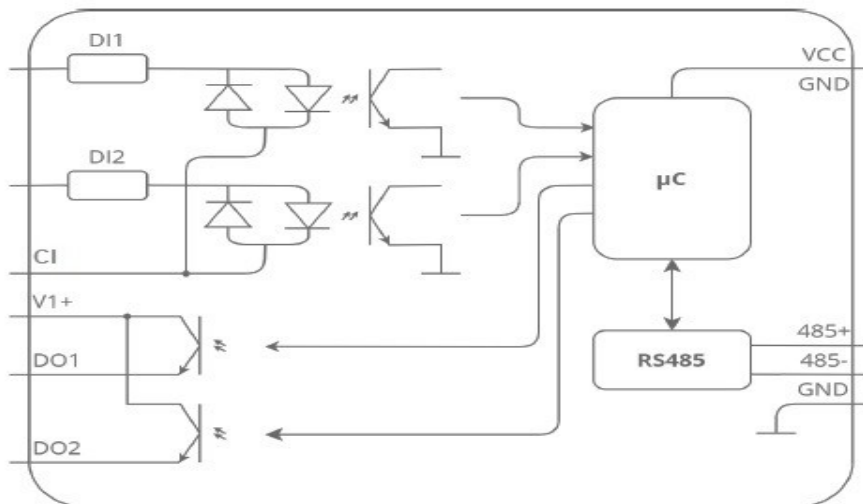
Range: 0-65535 ms

4. Indicators



Indicator	Description
ON	LED indicates that the module is correctly powered.
TX	The LED lights up when the unit received the correct packet and sends the answer.
DI1, DI2	LED indicates that on the input is high state.
DO1, DO2	LED indicates that on the output is high state.

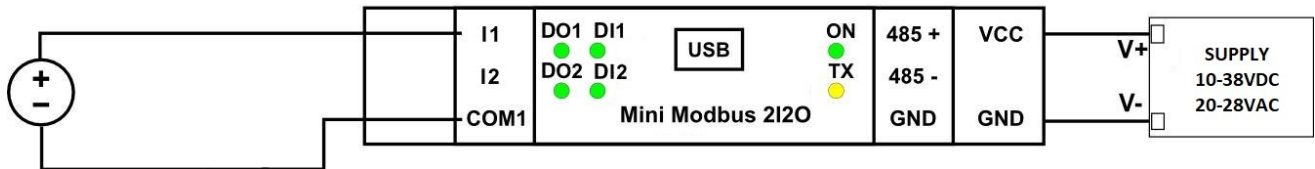
5. Block diagram



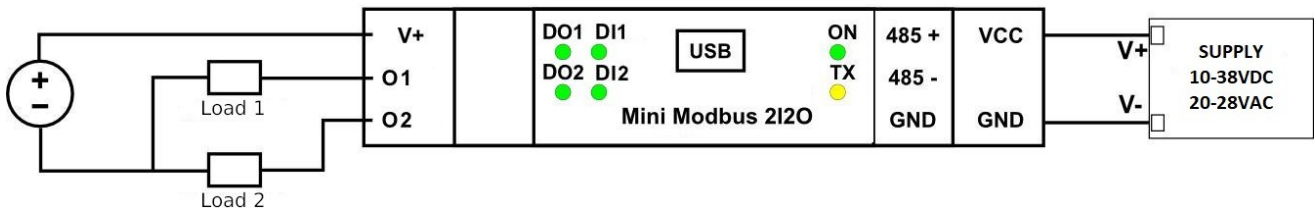
6. Module Connection

6.1. Digital inputs, digital outputs

Input connection



Output connection PNP type



6.2. Communication, power supply

Communication	Power supply, DC Voltage 24VDC	Power supply, AC Voltage 24VAC

7. Modules Registers

7.1. Registered access

Modbus	Dec	Hex	Register Name	Access	Description
30001	0	0x00	Version/Type	Read	Version and Type of the device
40002	1	0x01	Address	Read & Write	Module Address
40003	2	0x02	Baud rate	Read & Write	RS485 baud rate
40004	3	0x03	Stop Bits	Read & Write	No of Stop bits
40005	4	0x04	Parity	Read & Write	Parity bit
40006	5	0x05	Response Delay	Read & Write	Response delay in ms
40007	6	0x06	TModbus Mode	Read & Write	Modbus Mode (ASCII or RTU)
40009	8	0x08	Watchdog	Read & Write	Watchdog
40013	12	0x0C	Default Output State	Read & Write	Default output state (after power on or watchdog reset)
40033	32	0x20	Received packets LSB	Read & Write	No of received packets
40034	33	0x21	Received packets MSB	Read & Write	
40035	34	0x22	Incorrect packets LSB	Read & Write	No of received packets with error
40036	35	0x23	ncorrect packets MSB	Read & Write	
40037	36	0x24	Sent packets LSB	Read & Write	No of sent packets
40038	37	0x25	Sent packets MSB	Read & Write	
40051	50	0x32	Inputs	Read	Inputs state
40052	51	0x33	Outputs	Read & Write	Outputs state
40053	52	0x34	Counter 1 LSB	Read & Write	32-bit counter 1
40054	53	0x35	Counter 1 MSB	Read & Write	
40055	54	0x36	Counter 2 LSB	Read & Write	32-bit counter 2
40056	55	0x37	Counter 2 MSB	Read & Write	
40057	56	0x38	CCounter 1 LSB	Read & Write	32-bit value of captured counter 1
40058	57	0x39	CCounter 1 MSB	Read & Write	
40059	58	0x3A	CCounter 2 LSB	Read & Write	32-bit value of captured counter 2
40060	59	0x3B	CCounter 2 MSB	Read & Write	
40061	60	0x3C	Counter Config 1	Read & Write	Counter Configuration +1 – time measurement (if 0 counting impulses) +2 – autocatch counter every 1 sec +4 – catch value when input low +8 – reset counter after catch +16 – reset counter if input low +32 – encoder
40062	61	0x3D	Counter Config 2	Read & Write	
40063	62	0x3E	Catch	Read & Write	Catch counter
40064	63	0x3F	Status	Read & Write	Captured counter

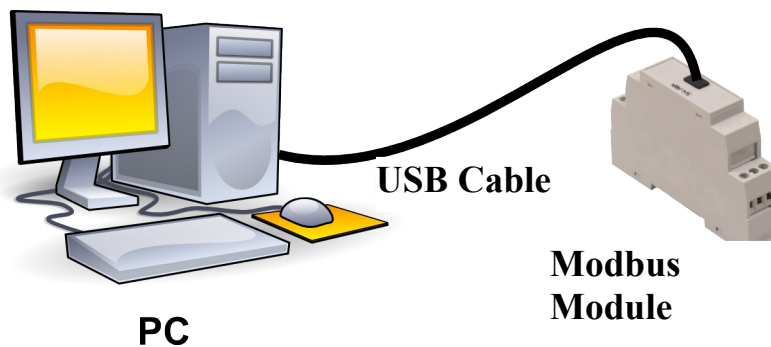
7.2. Bit access

Modbus Address	Dec Address	Hex Address	Register name	Access	Description
193	192	0x0C0	Default state of output 1	Read & Write	Default state of output 1
194	193	0x0C1	Default state of output 2	Read & Write	Default state of output 2
10801	800	0x320	Input 1	Read	Input 1 state
10802	801	0x321	Input 2	Read	Input 2 state
817	816	0x330	Output 1	Read & Write	Output 1 state
818	817	0x331	Output 2	Read & Write	Output 2 state
1153	1152	0x480	Capture 1	Read & Write	Default state of output 1
1154	1153	0x481	Capture 2	Read & Write	Default state of output 2
1169	1168	0x490	Captured 1	Read & Write	Captured value of counter 1
1170	1169	0x491	Captured 2	Read & Write	Captured value of counter 2

8. Configuration software

Modbus Configurator is software that is designed to set the module registers responsible for communication over Modbus network as well as to read and write the current value of other registers of the module. This program can be a convenient way to test the system as well as to observe real-time changes in the registers.

Communication with the module is done via the USB cable. The module does not require any drivers.



Configurator is a universal program, whereby it is possible to configure all available modules.

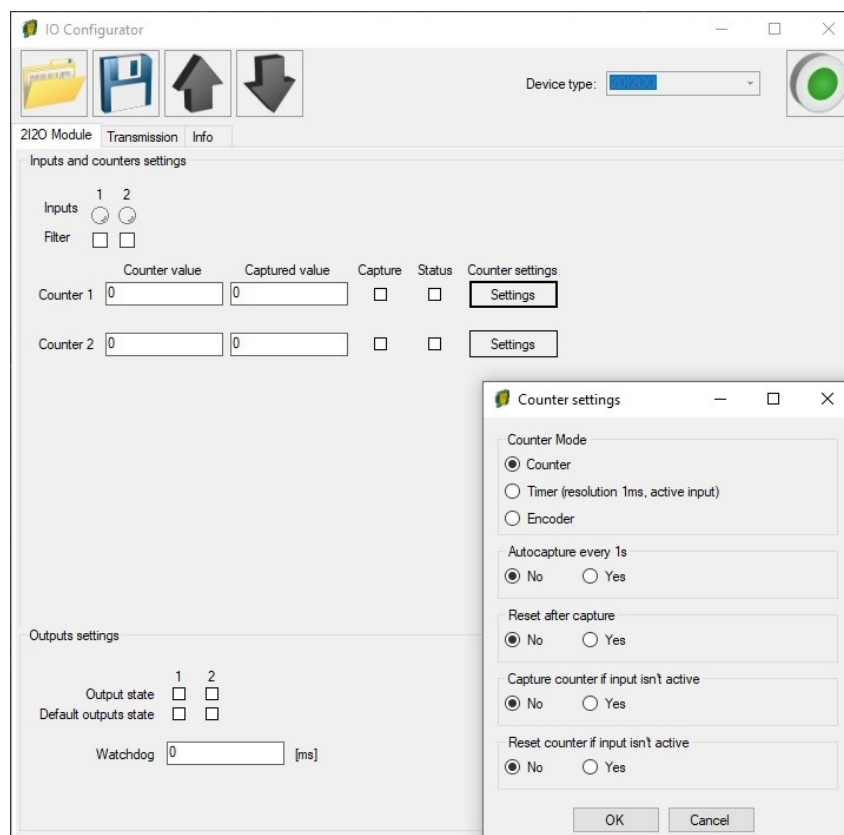


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