EXTENSION MODULE DIGITAL I/O with MODBUS RTU

MR-DIO-1

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CE

Do not dispose of this device in the trash along with other waste! According to the Law on Waste, electro coming from households free of charge and can give any amount to up to that end point of collection, as well as to store the occasion of the purchase of new equipment (in accordance with the principle of old-for-new, regardless of brand). Electro thrown in the trash or abandoned in nature, pose a threat to the environment and human health.

Purpose

Module MR-DIO-1 serves as an external expansion device digital inputs or outputs programmable logic controllers PLC or other devices in which data exchange is via RS485 port in accordance to the MODBUS RTU protocol.

Functioning

Module MR-DIO-1 has six universal contacts. Each of the contacts depending on how the connection can be a digital input or output. Digital input, treated as a "dry contact", is realized by closing the circuit the input to the "minus" power supply module. Digital output, described as "open collector", is realized by closing the circuit the output to the "plus" of power supply module
The module has a recording of output function in non-volatile local memory. After each power-output module will revert to a saved state.
Reading status of contacts, setting their status and communication parameters is realized through the RS-485 port using MODBUS RTU communication protocol.

Switching on of the power supply is indicated by lighting the green LED U Laws correct data exchange between the module and the second device is indicated by a yellow LED lighting Tx.

### Parameters of MODBUS RTU protocol

Communication parameters	
Protocol	MODBUS RTU
Work mode	SLAVE
Port settings (factory settings)	Bit numbers on s: 1200 / 2400 / 4800 / 9600 / 19200 / 3840 / 57600 /115200 Data bits: 8 Parity: NONE/EVEN/ODD Start bits: 1 Stop bits: 1 / 2
Range of network addresses (factory settings)	1÷247 (70)
Range of base addresses	1÷238
Range of residual addresses (switch code)	0÷9
Command codes	1: Read state of all outputs (0×01 - Read Coils) 2: Read state of all inputs (0×02 - Read Discrete Inputs) 3: Read value of outputs registry (0×03 - Read holding Register) 5: The setting of a single output (0×05 - Write Single Coil) 6: The setting of a single output (0×06 - Write Single Register) 15: The setting of multiple outputs (0×0F - Write Multiple Coil) 16: The setting of multiple outputs (0×10 - Write Multiple Registers) 17: Read ID (0x11 - Report Slave ID)
The maximum frequency of queries	15Hz

Registers

Communication parameters				
adress	description	code	type	atr.
0	read actual base sdress	03	int	read
0	save a new base adress: 1÷238	06, 16	int	write

Module can accept network addresses in the range 1 ÷ 247 The network address of the module is set in a complex way: using the MODBUS protocol to set the base address, the number in the range 1 to 238, and a multi-position switch to set address residual, ie the number from 0 to 9th The sum of these two values determines the network address (eg, 1 +6 = 7, 70 +3 = 73, 238 +9 = 247).

1	read a speed of transmission	03	int	read
1	save a new speed of transmission	06, 16	int	write

The speed value [bits/sec] is given in the form of an integer divided by 100, for example, 9600 bit/sec write in figures 96; 115200 bit/sec write in figures 1152.

2	read of actual parity value	03	int	read
2	save a new parity value	06, 16	int	write

Parity adopt appropriate meanings: NONE - 0; EVEN - 1, ODD - 2

3	read of actual number of stop bits	03	int	read
3	save the number of stop bits	06, 16	int	write

Number of stop bits accepts the importance of 1 or 2

I/O paramaters				
adress	description	code	type	atr.
4000÷4005	read state of outputs 1÷6	02	bool	read
4006÷4007	free (allways value 0)	02	bool	read
2000÷2005	read state of outputs1÷6	01	bool	read
2000÷2005	save state of outputs1÷6	05, 15	bool	write

State inputs and outputs assume the values of single bits of 0 or 1, with a value of 0 means the state "open" contact, and the value of a state of "closed" contact.

2006	free	01	bool	read
2006	free	05, 15	bool	write

It is used to maintain the continuity of the group reading registers from 2000 to 2007. Can be used to store the one bit.

2007	write command exit status to the local	05, 15	bool	write
2007	read (allways value 0)	01	bool	read

Writing of value 1 to the registry saves the state of the outputs. After the writing in local memory registry value is automatically set to 0.

In response to the command "odzczyt ID" (code 17), we obtain a packet of information about the module: in the "Slave ID" code 0xEC; in the "Run Status Indicator" code 0xFF; in the "Additional Data" text "DIO-1Mv1. 0 "

Setting the Network Address

Module MR-DIO-1 can accept network addresses in the range 1 ÷ 247. The network address of the module is set in a complex way: using the MODBUS protocol to set the base address, the number in the range 1 to 238, and a multi-position switch to set address residual, ie the number from 0 to 9th The sum of these two values determines the network address (eg, 1 +6 = 7, 70 +3 = 73, 238 +9 = 247). Multi-position code switch is located under the front elevation. Cladding removed using flat-head screwdriver 3mm elevation gently undermining hooks on the sides of the enclosure. 3mm flat screwdriver to switch the rotary switch to the desired number, as a sub-address (range 0 to 9). Set a new module address is the sum of the values and partial base address, after setting the front elevation set up with special attention to the proper fitting of LEDs in the holes.
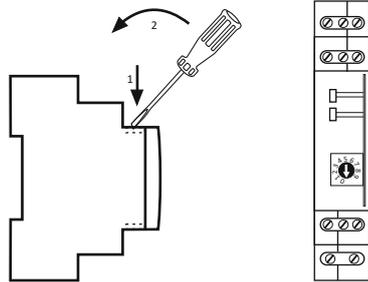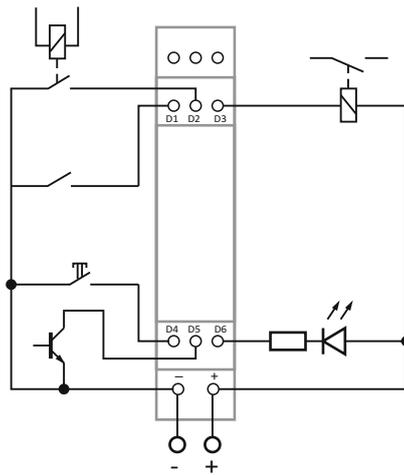
Assembly

General assumptions:

* Recommend the use of filters and surge suppression (eg, OP-230 F&F).
* Recommended use of shielded twisted pair signal cables for connecting the module to another device.
* Communication lines must be completed by termination module LT-04 (F&F).
* When using shielded cables grounded screens performed only on one side and as close to the device.
* Do not lay signal cables in parallel in close proximity to the line of high and medium voltage.

* Do not install the module in close proximity to high power electrical loads, electromagnetic measurement devices, devices with phase power regulation, and other devices that may introduce noise.
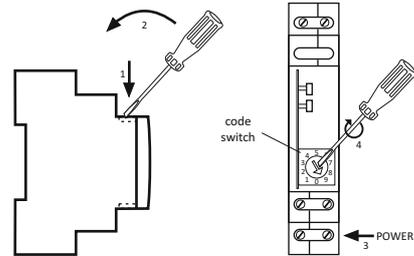
Installation

1. Set the address and communication parameters of module.
2. Take OFF the power
3. Put on the module on the rail..
4. Power connect to joints10-12 accordance to marks.
5. Signal outputs 1-3 (port RS-485) connect with outputs of device type MASTER.
6. Circuits contact close to the points of power module in accordance to their purpose: Dx - "minus" for the work of the contact as an input (DI), Dx - "plus" for a job as a contact output (DO).
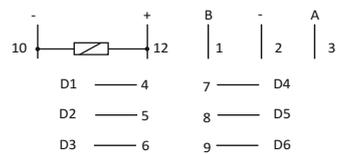
Reset communication settings

Under cover is available code switch.
1. Take OFF the power.
2. Remove front panel.
3. Set "9" on the switch.
4. Take ON the power and within 3 sec switch to "0".

Wiring diagram, depending on the selected function of contact DI/DO

Digital inputs (DI): D1, D2, D4, D5.
Digital outputs (DO): D3, D6.

Inputs/outputs description

D1 — 4	7 — D4	
D2 — 5	8 — D5	
D3 — 6	9 — D6	

1-3   serial port RS-485
4÷9   contacts DI/DO
2   galvanic connection to p.10
10-12 module supply

RS-485 port is not galvanically isolated from power supply module.

TECHNICAL DATA

power supply	9÷30V DC
max current load	25mA
contact number DI/DO	6
voltage contact	<50V
work current contact: constant / pulse(20%)	100mA/200mA
port	RS-485
communication protocol	MODBUS RTU
working temerature (without condensation)	-40°C÷50°C
storage temperature	-40°C÷70°C
relative humidity	85% dla 30°C
fixing	1.5mm² screw terminals
torque	0.4Nm
dimensions	1 moduł (18mm)
protection	IP20

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