

## DIGITAL INPUTS EXPANSION MODULE with MODBUS RTU output

## NPEIO-4DI-LO



Do not dispose of this device to a garbage bin with other unsorted waste!  
In accordance with the Waste Electrical and Electronic Equipment Act  
any household electro-waste can be turned in free of charge and in any  
quantity to a collection point established for this purpose, as well as to the  
store in the event of purchasing new equipment (as per the old for new rule,  
regardless of brand). Electro-waste thrown in the garbage bin or abandoned  
in the bosom of nature pose a threat to the environment and human health.

### Purpose

The NPEIO-4DI module is used as an external device that extends digital inputs of the PLC programmable controllers or other devices in which data is exchanged via the RS-485 port with MODBUS RTU protocol.

### Features

- \* four independent outputs
- \* input designed to work with AC/DC signals
- \* state 1 trigger selection: with high or low voltage
- \* state 1 trigger selection: with closing or opening of the circuit input
- \* time filter that allows you to set the minimum acceptable length of input signal (elimination of distortions at the input)

### Operation

The NPEIO-4DI module has four inputs. The module has configurable options for activating inputs (TRUE value) with low (0V) or high (V+) signal and with closing or opening the input signal circuit. Time filter is used for eliminating interference (false pulses) which may appear at the input. This is the setting of a minimum length of time of the input signal, which will be seen at the input and will be treated as a change of state. Shorter signals are ignored.

Reading of input states and adjustment of all communication and data exchange parameters is carried out via RS-485 port using MODBUS RTU communication protocol. Power is indicated by a green LED U light. Correct data exchange between the module and other device is indicated by the LED yellow Tx light.

Communication parameters	
Protocol	MODBUS RTU
Operation mode	SLAVE
Port settings (factory settings)	Bits/s: 1200 / 2400 / 4800 / <b>9600</b> / 19200 / 38400 / 57600 / 115200 Data bits: <b>8</b> Parity: <b>NONE</b> / EVEN / ODD Start bits: <b>1</b> Stop bits: 1 / 1.5 / <b>2</b>
Range of network addresses (factory settings)	1÷245 ( <b>1</b> )
Command code	1: Input state reading (0x01 - Read Coils) 3: Registers group reading (0x03 - Read Holding Register) 6: Single register value setting (0x06 - Write Single Register)
Maximum frequency of queries	15Hz

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Communication registers				
address	description	funct.	type	attrib.
256	Reading of current one and recording of new base address: 1÷245	03 06	int	read write
257	Reading of current one and recording of new transmission rate: 0:1200 / 1:2400 / 2:4800 / 3:9600 / 4:19200 / 5:38400 / 6:57600 / 115200	03 06	int	read write
258	Reading of current one and recording of new parity value: 0:NONE / 1:EVEN / 2:ODD	03 06	int	read write
259	Reading of current one and recording of new stop bits quantity: 0:1bit / 1:1.5bit / 2:2bits	03 06	int	read write
260	Factory settings: Enter 1.	06	int	write
<b>Please note!</b> Any change in communication parameters (transmission rate, quantity of stop bits, parity) will be applied only after power restart.				
1024-1025	Module operation time [s] R1024×256²+R1025	03	int	read
1026-1027	Serial number R1026×256²+R1027	03	int	read
1028	Production date: 5 bits/day; 4 bits/month; 7 bits/year (without 2000)	03	int	read
1029	Software version	03	int	read
1030	Completion: 0 - Lo; 1 - Hi.	03	int	read
1031-1035	Identifier: F&   F   MB   -4   DI	03	int	read
1039	Configuration jumper: 0-open; 1-closed; none	03	int	read
The transducer does not support broadcast commands (address 0).				

Digital inputs registers				
address	description	command	type	attrib.
0	Input states reading 0/1 - 4 bits (e.g. 1001) Order:   In4   In3   In2   In1	01	int	read
16	In1: input state 0/1	03	int	read
17	In2: input state 0/1	03	int	read
18	In3: input state 0/1	03	int	read
19	In4: input state 0/1	03	int	read

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Configuration registers				
address	description	command	type	attrib.
512	In1: time filter [ms]. Range 1÷15000	03/06	int	r/w
513	In1: triggering option (TRUE) 0: closed circuit; 1: open circuit.	03/06	int	r/w
528	In2: time filter [ms]. Range 1÷15000	03/06	int	r/w
529	In2: triggering option (TRUE) 0: closed circuit; 1: open circuit.	03/06	int	r/w
544	In3: time filter [ms]. Range 1÷15000	03/06	int	r/w
545	In3: triggering option (TRUE) 0: closed circuit; 1: open circuit.	03/06	int	r/w
560	In4: time filter [ms]. Range 1÷15000	03/06	int	r/w
561	In4: triggering option (TRUE) 0: closed circuit; 1: open circuit.	03/06	int	r/w
Time filter - the minimum length of time of the input signal, which will be seen at the input and will be treated as a change of state. Shorter signals are ignored.				
Please note! For the AC input signal set the filter to 0. Applied to registers: In1 - 512; In2 - 528; In3 - 544; In4 - 560.				
Default values: triggering option= 0, time of the time filter= 0 ms.				

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#### Implementation of connection of counting and digital inputs

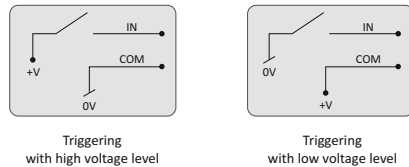
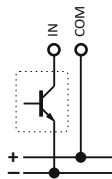


Table of input triggering options and logical states assigned to them  
TRUE (1) i FALSE (0)

option	registry setting	closed	setting	open
level +V	0	TRUE	0	FALSE
	1	FALSE	1	TRUE
level 0V	0	TRUE	0	FALSE
	1	FALSE	1	TRUE

#### Example of OC (open collector) type connection to the module input



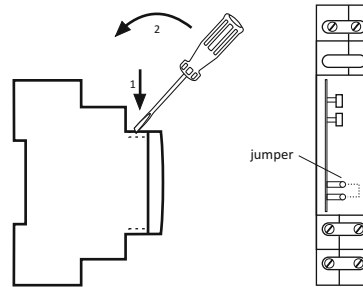
Registry setting: 0  
OC ON -> IN = TRUE (1)  
OC OFF -> IN = FALSE (0)

Registry setting: 1  
OC ON -> IN = FALSE (1)  
OC OFF -> IN = TRUE (0)

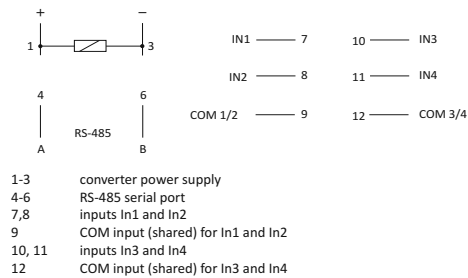
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#### Reset of communication settings

The configuration jumper is located under the front casing of the module. Activating the controller with jumper closed will restore factory settings of the communication parameters. To do this, remove the front casing of the module and put the jumper cap on both pins. When the reset is done, remove the jumper.



#### Description IN/OUT



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#### Installation

##### General guidelines:

- \* Use of surge protectors and interference filters is recommended (e.g. OP-230).
- \* Use of shielded twisted wires is recommended for connecting the unit to another device.
- \* If using shielded cables, ground the shield on one side only and as close to the device as possible.
- \* Do not run signal cables parallel and in direct proximity to high- and medium-voltage line.
- \* Do not install the module in direct proximity to high power receivers, electromagnetic measuring devices, appliances with phase power adjustment and any other devices that can create interference.

##### Installation:

1. Set the selected MODBUS communication parameters and counting options prior to unit installation.
2. Disconnect the power to the distribution box.
3. Install the module on the rail.
4. Connect the module power supply to terminals 1-3 as indicated.
5. Connect signal output 4-6 (RS-485 port) to the MASTER output of another device.
6. Connect the signal wires to counting inputs in accordance with selected triggering option (with low or high signal).

#### Protection

1. Galvanic isolation between IN... and COM... contacts and the rest of the system (min. 2.5 kV).
2. No galvanic isolation between power supply and RS-485 lines.
3. Overcurrent protection of power supply inputs and communication inputs (up to a maximum of 60V DC) with automatic return feature.

##### Please note!

External control voltage is needed in each case to trigger input. If the module power supply is used to this end, it results in the loss of galvanic separation between control inputs, power supply and communication.

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#### Specifications

supply voltage	9÷30V DC
number of DI inputs	4
input voltage	6÷30V AC/DC
max. counting frequency	100Hz
circuit input impedance	≥10kΩ
port	RS-485
communication protocol	Modbus RTU
operation mode	SLAVE
communication parameters	
rate - to set	1200÷115200 bit/s
data bits	8
stop bits	1 / 1.5 / 2
parity bits	EVEN / ODD / NONE
address	1÷247
power consumption	0,1W
operating temperature	-20÷50°C
terminal	2,5mm² screw terminals
tightening torque	0,4Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
protection level	IP20

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