

DIGITAL INPUTS EXPANSION MODULE
 with MODBUS RTU output

MR-DI-4
 Lo

WARRANTY. The F&F products are covered by a warranty of the 24 months from the date of purchase. Effective only with proof of purchase. Contact your dealer or directly with us. More information how to make a complaint can be found on the website: www.fif.com.pl/reklamacje



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 MR-DI-4 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 MR-DI-4 module has four inputs. The module has configurable options for activating inputs (TRUE value) with low (OV) 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.

MODBUS RTU protocol parameters

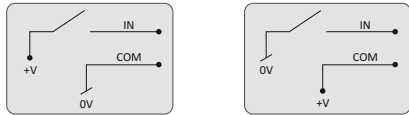
Communication parameters	
Protocol	MODBUS RTU
Operation mode	SLAVE
Port settings (factory settings)	bit/s: 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 Data bits: 8 Parity: NONE / EVEN / ODD Start bits: 1 Stop bits: 1 / 1.5 / 2
Range of network addresses (factory settings)	1÷245 (1)
Command codes	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

Communication registers					
address	description	func	type	atr	
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 / 1:1.5bits / 2:2bit	03 06	int	read	write
260	Factory settings: Enter 1.	06	int	write	
NOTE! 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] R1024×256 ² +R1024	03	int	read	
1026-1027	Serial number R1026×256 ² +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	03	int	read	
The transducer does not support broadcast commands (address 0).					

Digital inputs registers					
address	description	command	type	atr	
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	

Configuration registers					
address	description	command	type	atr	
512	In1: time filter [ms]. Zakres 1÷15000	03/06	int	r/w	
513	In1: triggering option (TRUE) 0: open circuit; 1: closed 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: open circuit; 1: closed 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: open circuit; 1: closed 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: open circuit; 1: closed 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.					
Default values: triggering option = 1; time of the time filter = 10 ms.					

Implementation of connection of counting and digital inputs

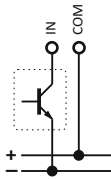


Triggering with high voltage level Triggering with low voltage level

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

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

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

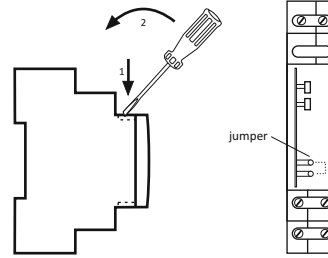


Registry setting: 0
 OC ON -> IN = TRUE (1)
 OC OFF -> IN = FALSE (0)

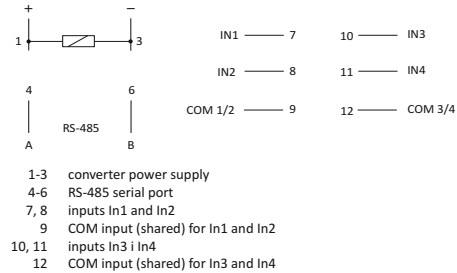
Registry setting: 1
 OC ON -> IN = FALSE (1)
 OC OFF -> IN = TRUE (0)

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 of in/out



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.

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.

Specifications

supply voltage	9÷30V DC
number of DI inputs	4
input voltage	6÷30V AC/DC
max. counting frequency	100Hz
circuit input impedance	≥300kΩ
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
working temperature	-20÷50°C
terminal	2,5mm ² screw terminals
tightening torque	0,4Nm
dimensions	1 module (18 mm)
mounitng	onTH-35 rail
protection level	IP20