

MEASUREMENT TEMPERATURE TRANSDUCER
 two-channel
 with MODBUS RTU output
MB-DS-2

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 directly with us. More information how to make a compliant can be found on the website: www.fif.com.pl/reklamacja



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

MB-DS-2 measurement transducer is designed to measure the temperature via DS1820 external temperature sensor and to transmit data via RS-485 port using MODBUS RTU protocol.

Features

- * two independent measurement channels
- * readout of the current temperature
- * readout of the recorded minimum and maximum temperature
- * setting the averaging measurement time
- * setting the value of standard adjustment

Operation

The module continuously measures the temperature using the external sensors. Readout of recorded temperatures, setting of all measurement parameters, communication and data transmission are all carried out through RS-485 port using the MODBUS RTU communication protocol. Power up is indicated by a green LED U. Valid data exchange between the unit and the second device is indicated by a yellow LED Tx. The unit cooperates with the three-wire DS1820 digital sensors. Dedicated temperature probe manufactured by F&F: RT-4 probe. The probe is sold separately.

Communication parameters of MODBUS RTU protocol

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: Readout of registers group (0x03 - Read Holding Register) 6: Single register value setting (0x06) - Write Single Register
Maximum frequency of queries	15Hz

Measurement parameters - factory settings

Temperature reading period	1s (register value: 1)
Value of standard adjustment	0°C (register value: 0)

Communication registers					
address	description	function	type	atr	
256	Readout of current one and recording of new base address: 1-245	03 06	int	read	write
257	Readout of current one and recording of new transmission rate: 0:1200 / 1:2400 / 2:4800 / 3:9600/4:19200 / 5:38400 / 6:57600 / 7:115200	03 06	int	read	write
258	Readout of current one and recording of new parity value: 0:NONE / 1:EVEN / 2:ODD	03 06	int	read	write
259	Readout of current one and recording of new stop bits quantity: 0:1 bit / 1:1.5 bit / 2:2bits	03 06	int	read	write
260	Restore factory settings. Enter value 1.	06	int	write	
Please note! Any change in communication parameters (transmission rate, quantity of stop bits, parity) will be applied only after power restart.					
1024-1025	Module operating time [s] R1024x256 ⁺ +R1024	03	int	read	
1026-1027	Serial number R1026x256 ⁺ +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 -2 DS	03	int	read	
1039	Configuration jumper: 0-open; 1-closed	03	int	read	
The transducer does not support broadcast commands (address 0).					

Measurement registers					
address	description	command	type	atr	
0+1	P1 sensor: Current temperature [°C]	03	float	read	
2	P1 sensor: Current temperature [°C] (x0,01)	03	int	read	
3	P1 sensor: temperature sensor operation: 0 - Sensor operates; 1 - No reading of the sensor (error)	03	int	read	
4	P1 sensor: reading quality 0-100%. The percentage of correct readings from the last 32 samples: 0 - no readings; 100 - all correct.	03	int	read	
5+6	P1 sensor: Minimum registered temperature [°C]	03	float	read	
7	P1 sensor: Minimum registered temperature [°C] (x0,01)	03	int	read	
8+9	P1 sensor: Maximum registered temperature [°C]	03	float	read	
10	P1 sensor: Maximum registered temperature [°C] (x0,01)	03	int	read	
16+17	P2 sensor: Current temperature [°C]	03	float	read	
18	P2 sensor: Current temperature [°C] (x0,01)	03	int	read	
19	P2 sensor: temperature sensor operation: 0 - Sensor operates; 1 - No reading of the sensor (error)	03	int	read	
20	P2 sensor: reading quality 0-100%. The percentage of correct readings from the last 32 samples: 0 - no readings; 100 - all correct.	03	int	read	
21+22	P2 sensor: Minimum registered temperature [°C]	03	float	read	
23	P2 sensor: Minimum registered temperature [°C] (x0,01)	03	int	read	

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24÷25	P2 sensor: Maximum registered temperature [°C]	03	float	read
26	P2 sensor: Maximum registered temperature [°C] ($\times 0,01$)	03	int	read
READING STATE (R3/R19): error flag will be set when the 32 consecutive attempts to read the sensor will fail, or when there wasn't even one successful reading of temperature after turning the power on.				
READING QUALITY (R4/R20): This parameter can be used for diagnostic of quality of the Transducer connection with the sensor. If this value holds below 50% it may indicate for example that a cord is damaged or the interference level is too high.				

Configuration registers				
address	description	command	type	atr
15	P1 sensor: Reset maximum and minimum temperatures. Value 0 deletes the temperatures	03	int	read
31	P1 sensor: Reset maximum and minimum temperatures. Value 0 deletes the temperatures	03	int	read
512	P1 sensor: standard correction. Value added to the measured temperature. Range: -3000÷3000 for -30.00÷30.00°C). Default value: 0	03 06	int	read write
513	P1 sensor: duration of the temperature measurement [×1 s] Range: 1÷3600 s. Default value: 1	03 06	int	read write
528	P2 sensor: standard correction. Value added to the measured temperature. Range: -3000÷3000 for -30.00÷30.00°C). Default value: 0	03 06	int	read write
529	P2 sensor: duration of the temperature measurement [×1 s] Range: 1÷3600 s. Default value: 1	03 06	int	read write

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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 unit in direct proximity to high power receivers, electromagnetic measuring devices, appliances with phase power adjustment and any other devices that can create interferences.

Installation:

1. Set the selected MODBUS communication parameters prior to unit installation.
2. Disconnect the power to the distribution box.
3. Install the unit on the rail.
4. Connect the unit 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 measurement probes in accordance with the color markings.

RT4 probe cable length:

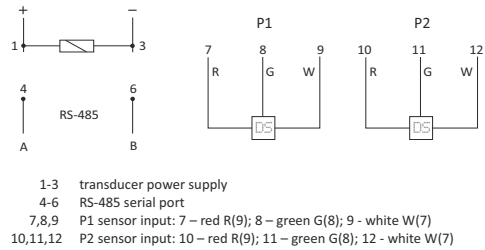
The standard probe cable is 2.5 m.

Notes:

1. If you need an extension, you must use only three-core cable with a minimum diameter of 0.5 mm² and with an additional screen. Screen of the extension cable must be connected to PE from one end.
2. The sensor wires should be carried out away from power cables and sources of strong electrical and electromagnetic interference.
3. The maximum length of the cable from the sensor to the transducer depends on the presence of interference and the way the installation is conducted. In best case scenarios you can achieve the correct readings on the cable length exceeding 250 m. The typical „safe“ ranges are approx. 10 times lower.

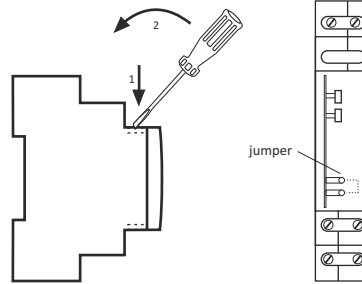
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Description of in/out



Reset of communication settings

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



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Specifications

supply voltage	9÷30V DC
temperature sensor type	DS1820
range of measurement	-55÷125°C
sampling frequency	10Hz
reading accuracy	0.25°C
port	RS-485
power consumption	0.3W
working temperature	-20÷50°C
terminal	2.5mm ² screw terminals
tightening torque	0.4Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
ingress protection	IP20

Measurement error for RT4 probe

-55°C ≤ Temperature ≤ -35°C	-max. +5°C/-1°C
-35°C ≤ Temperature ≤ 0°C	-max. +3°C/-1°C
0°C ≤ Temperature ≤ 65°C	-max. ±0.5°C
65°C ≤ Temperature ≤ 85°C	-max. ±1.0°C
85°C ≤ Temperature ≤ 125°C	-max. +1°C/-3°C

Protection

1. No galvanic isolation between power supply, RS-485 lines and sensor inputs
2. Overcurrent protection of sensor inputs, power supply inputs and communication inputs (up to a maximum of 60 V DC) with automatic return feature.

D160621/160621

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