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Operating Manual TR1200IP

updated: 2023-11-14 /Sc
from Firmware: 00-11

- Modbus TCP communication protocol

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1 Important Information

Please also read the general operating manual of the TR1200IP carefully and observe the safety instructions.

2 Interface Parameters

TCP Port: 502
From firmware 12390-1400-11 -> max. TCP connections: 3
Up to firmware 12390-1400-11 -> max. TCP connections: 1

The Modbus TCP protocol must be activated (default = active):

- Settings on the device: Menu tcP -> Mod = on

3 Supported Function Codes

Function code	Designation	Use
3 (03H)	Read Holding Registers	Read data from the registers
16 (10H)	Write Multiple Registers	Write data into registers
43 (2BH) *3	Read Device Identification	

*3 from Firmware 12390-1400-11

4 Data Types

The following data types are used in the Modbus registers:

Data type	Size	Range of numbers
signed int	16 Bit, register value	-32768 … 32767
unsigned int	16 Bit, register value	0 … 65535
signed long	32 Bit, divided over two registers	-2147483648 … 2147483647
unsigned long	32 Bit, divided over two registers	0 … 4294967296

5 Telegram Structure

According to Modbus TCP specification.
For details, refer to the Modbus original documentation, available at: https://modbus.org

5.1 MODBUS Application Protocol header (MBAP)

Byte No.		Value (hex)	Designation	Description
0 1	Hi Lo	00 00	Transaction Identifier	Identification number of a request (At multiple requests at the same time)
2 3	Hi Lo	00 00	Protocol Identifier	Always 0 (Modbus protocol)
4 5	Hi Lo	00 06	Length	Number of following bytes (High Byte is always 0)
6		FF	Unit Identifier	Identification of a remote device (value meaningless)

5.1.1 Modbus function code 0x03 (Read Holding Registers)

7		03	Function code	Modbus function code (0x03, Read Holding Registers)
8 9	Hi Lo	00 00	Start address	Address of the first (read) register
10 11	Hi Lo	00 06	Number of registers	High Byte always 0, Low Byte at Modbus: 1…125

5.1.2 Modbus function code 0x10 (Write Multiple Registers)

7		10	Function code	Modbus Function code (0x10, Write Multiple Registers)
8 9	Hi Lo	00 00	Start address	Address of the first (to write) register
10 11	Hi Lo	00 06	Number of registers	High Byte always 0, Low Byte at Modbus: 1…123
12		0C	Number of Bytes	Number of registers * 2
13 14 :	Hi Lo :		Register	To write register

6 Modbus Register Tables

6.1 Function code 0x03 - Read Holding Registers

Address		Data typ	Register	Range of values / Description
Dez	Hex			
1	0001	signed int 16	Temperature of Sensor 1	32767: Sensor short-circuit 32766: Sensor break 32750: Overflow 32749: Underflow 32748: Sensor nc
2	0002	signed int 16	Temperature of Sensor 2	
3	0003	signed int 16	Temperature of Sensor 3	
4	0004	signed int 16	Temperature of Sensor 4	
5	0005	signed int 16	Temperature of Sensor 5	
6	0006	signed int 16	Temperature of Sensor 6	
7	0007	signed int 16	Temperature of Sensor 7	
8	0008	signed int 16	Temperature of Sensor 8	
9	0009	signed int 16	Temperature of Sensor 9	
10	000A	signed int 16	Temperature of Sensor 10	
11	000B	signed int 16	Temperature of Sensor 11	
12	000C	signed int 16	Temperature of Sensor 12	
13	000D	signed int 16	Temperature of Max Sensor	
14	000E	signed int 16	Max. value of Sensor 1	
15	000F	signed int 16	Max. value of Sensor 2	
16	0010	signed int 16	Max. value of Sensor 3	
17	0011	signed int 16	Max. value of Sensor 4	
18	0012	signed int 16	Max. value of Sensor 5	
19	0013	signed int 16	Max. value of Sensor 6	
20	0014	signed int 16	Max. value of Sensor 7	
21	0015	signed int 16	Max. value of Sensor 8	
22	0016	signed int 16	Max. value of Sensor 9	
23	0017	signed int 16	Max. value of Sensor 10	
24	0018	signed int 16	Max. value of Sensor 11	
25	0019	signed int 16	Max. value of Sensor 12	
26	001A	signed int 16	Max. value of Max Sensor	
27	001B	signed int 16	Min. value of Sensor 1	
28	001C	signed int 16	Min. value of Sensor 2	
29	001D	signed int 16	Min. value of Sensor 3	
30	001E	signed int 16	Min. value of Sensor 4	
31	001F	signed int 16	Min. value of Sensor 5	
32	0020	signed int 16	Min. value of Sensor 6	
33	0021	signed int 16	Min. value of Sensor 7	
34	0022	signed int 16	Min. value of Sensor 8	
35	0023	signed int 16	Min. value of Sensor 9	
36	0024	signed int 16	Min. value of Sensor 10	
37	0025	signed int 16	Min. value of Sensor 11	
38	0026	signed int 16	Min. value of Sensor 12	
39	0027	signed int 16	Min. value of Min Sensor	
40	0028	signed int 16	Internal Error	0: no error, 2: parameter error, 3: error A/D converter, 4: sensor error
41	0029	signed int 16	Relay status	0: off, 1: on

Address		Data typ	Register	Range of values / Description
Dez	Hex			
42	002A	signed int 16	Connection type Sensor 1	
43	002B	signed int 16	Connection type Sensor 2	
44	002C	signed int 16	Connection type Sensor 3	
45	002D	signed int 16	Connection type Sensor 4	
46	002E	signed int 16	Connection type Sensor 5	
47	002F	signed int 16	Connection type Sensor 6	
48	0030	signed int 16	Connection type Sensor 7	
49	0031	signed int 16	Connection type Sensor 8	
50	0032	signed int 16	Connection type Sensor 9	
51	0033	signed int 16	Connection type Sensor 10	
52	0034	signed int 16	Connection type Sensor 11	
53	0035	signed int 16	Connection type Sensor 12	
54	0036	signed int 16	Relay function	-2: operating current mode, -1: closed-circuit current mode
55	0037	signed int 16	Firmware version	

6.2 Function code 0x10 - Write Multiple Register

Address		Data typ	Register	Range of values / Description
Dez	Hex			
1	0001	signed int 16	Connection type Sensor 1	-2: nc, -1: 3-L, 0: 0 Ohm (2-L) … 999: 99,9 Ohm (2-L)
2	0002	signed int 16	Connection type Sensor 2	
3	0003	signed int 16	Connection type Sensor 3	
4	0004	signed int 16	Connection type Sensor 4	
5	0005	signed int 16	Connection type Sensor 5	
6	0006	signed int 16	Connection type Sensor 6	
7	0007	signed int 16	Connection type Sensor 7	
8	0008	signed int 16	Connection type Sensor 8	
9	0009	signed int 16	Connection type Sensor 9	
10	000A	signed int 16	Connection type Sensor 10	
11	000B	signed int 16	Connection type Sensor 11	
12	000C	signed int 16	Connection type Sensor 12	
13	000D	signed int 16	Relay function	-2: operating current mode, -1: closed-circuit current mode

7 Function code 0x2B – Read device information

Byte No.		Value (hex)	Designation	Description
0 1	Hi Lo	00 00	Transaction Identifier	Identification number of a request (At multiple requests at the same time)
2 3	Hi Lo	00 00	Protocol Identifier	Always 0 (Modbus protocol)
4 5	Hi Lo	00 06	Length	Number of following bytes (High Byte is always 0)
6		FF	Unit Identifier	Identification of a remote device (value meaningless)
7		03	Function code	Modbus function code (0x2B, Read device information)
8		0E	MEI Type	Always 0x0E *1
9		01	Read Device ID code *2	
10		00	Object ID	See function code 0x2B - Objects

*1 MEI = MODBUS Encapsulated Interface (see Modbus documentation, http://www.modbus.org)

*2 0x01: Query of “Basic” device information (stream access)
0x02: Query of “Regular” device information (stream access)
0x03: Query of “Extended” device information (stream access)
0x04: Querying individual device information (individual access)

7.1 Function code 0x2B - Objects

Object Id	Object-name / description	content	type	category
0x00	Manufacturer name	ZIEHL industrie-elektronik GmbH + Co KG	ASCII String	Basic
0x01	Product- (article-) number	T224078 *4		
0x02	Revision Firmware	12390-1400-xx		
0x03	Manufacturer URL	www.ziehl.com	ASCII String	Regular
0x04	Product Name	Pt100 Temperature Relay		
0x05	Product designation	TR1200IP		
0x80	Serial number	xxxxxxxx	ASCII String	Extended
0x81	Revision Hardware	xx (e. g. “203”)		
0x82	Revision Bootloader	No Bootloader		

*4 After customer firmware update, display T2240xx at devices with other part number as T224078