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Operating Manual UFR1002IP

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from Firmware: 20-02

- Modbus TCP communication protocol

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1 Important Information

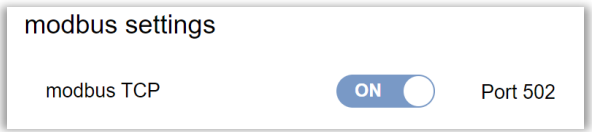
Please also read the general operating manual of the UFR1002IP carefully and observe the safety instructions.

2 Interface Parameters

TCP Port: 502
Max. TCP connections: 3

The Modbus TCP protocol must be activated via the integrated web server of the UFR1002IP:

- Enter the IP address of the device in the web browser (on computers in the same networks)
- Select the menu tab „network“
- Activate Modbus TCP



3 Supported Function Codes

Function code	Designation	Use
3 (03H)	Read Holding Registers	Read data from the registers

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

6 Modbus Register Tables

6.1 Reading measured values, status values and min. / max.

- Modbus function code 0x03 (Read Holding Registers)

Addr. hex	Data type		Register	Range of values / Description
0000	unsigned int 16		Voltage L1-N	without VG1200: 0 … 5200 [0,1 V] with VG1200: 0 … 1500 [V]
0001	unsigned int 16		Voltage L2-N	
0002	unsigned int 16		Voltage L3-N	
0003	unsigned int 16		Voltage L1-L2	
0004	unsigned int 16		Voltage L2-L3	
0005	unsigned int 16		Voltage L3-L1	
0006	unsigned int 16		Frequency	0 … 5000 [0,01 Hz]
0007	unsigned int 16		Vector shift L1	0 … 900 [0,1 °]
0008	unsigned int 16		Vector shift L2	
0009	unsigned int 16		Vector shift L3	
000A	unsigned int 16		10-minutes mean value L1-N	without VG1200: 0 … 5200 [0,1 V] with VG1200: 0 … 1500 [V]
000B	unsigned int 16		10 minutes mean value L2-N	
000C	unsigned int 16		10 minutes mean value L3-N	
000D	unsigned int 16		10 minutes mean value L1-L2	
000E	unsigned int 16		10 minutes mean value L2-L3	
000F	unsigned int 16		10 minutes mean value L3-L1	
0010	unsigned int 16		Rocof	[0,1 Hz/s]
0011	unsigned int 16		Relay status	bit 0 = K1, bit 1 = K2, bit 3 = K2
0012	unsigned int 16		Status of digital inputs	bit 0 = Y1, bit 1 = Y2, bit 2 = E1E2, bit 3 = In1, bit 4 = In2, bit 5 = In3
0013	unsigned int 16		Function of Relay K3 (channel 1)	<u>virtual state of function:</u> bit 0 = permanent on, bit 1 = impulse on, bit 2 = with K1/K2, bit 3 = on at error, bit 4 = life-contact, bit 5 = start signal, bit 6 = enable signal, bit 7 = status of Relay K3
0014	unsigned int 16		Function of Relay K3 (channel 2)	
0015	unsigned int 16		Error state	<u>error on feedback contacts:</u> bit 6 = at switch on, bit 7 = at switch off, other bits = internal error
0016	unsigned int 16		device protection	bit 0 = status of code lock, bit 1 = status of sealing
0017	unsigned int 16		alarm status U>> from L1-N	0 = alarm off 1 = delay alarm on 2 = alarm on 3 = delay alarm off
0018	unsigned int 16		alarm status U>> from L2-N	
0019	unsigned int 16		alarm status U>> from L3-N	
001A	unsigned int 16		alarm status U>> from L1-L2	
001B	unsigned int 16		alarm status U>> from L1-L3	
001C	unsigned int 16		alarm status U>> from L2-L3	
001D	unsigned int 16		alarm status U> from L1-N	
001E	unsigned int 16		alarm status U> from L2-N	
001F	unsigned int 16		alarm status U> from L3-N	
0020	unsigned int 16		alarm status U> from L1-L2	
0021	unsigned int 16		alarm status U> from L1-L3	
0022	unsigned int 16		alarm status U> from L2-L3	
0023	unsigned int 16		alarm status U< from L1-N	
0024	unsigned int 16		alarm status U< from L2-N	
0025	unsigned int 16		alarm status U< from L3-N	

Addr. hex	Data type		Register	Range of values / Description
0026	unsigned int 16		alarm status U< from L1-L2	0 = alarm off 1 = delay alarm on 2 = alarm on 3 = delay alarm off
0027	unsigned int 16		alarm status U< from L1-L3	
0028	unsigned int 16		alarm status U< from L2-L3	
0029	unsigned int 16		alarm status U<< from L1-N	
002A	unsigned int 16		alarm status U<< from L2-N	
002B	unsigned int 16		alarm status U<< from L3-N	
002C	unsigned int 16		alarm status U<< from L1-L2	
002D	unsigned int 16		alarm status U<< from L1-L3	
002E	unsigned int 16		alarm status U<< from L2-L3	
002F	unsigned int 16		alarm status F>>	
0030	unsigned int 16		alarm status F>	
0031	unsigned int 16		alarm status F<	
0032	unsigned int 16		alarm status F<<	
0033	unsigned int 16		alarm status 10 minutes mean value L-N	
0034	unsigned int 16		alarm status 10 minutes mean value L-L	
0035	unsigned int 16		alarm status vector shift L1	
0036	unsigned int 16		alarm status vector shift L2	
0037	unsigned int 16		alarm status vector shift L3	
0038	unsigned int 16		alarm status Rocof	
0039	unsigned int 16		min measured value from Voltage L1-N	without VG1200: 0 … 5200 [0,1 V] with VG1200: 0 … 1500 [V]
003A	unsigned int 16		max measured value from voltage L1-N	
003B	unsigned int 16		min measured value from Voltage L2-N	
003C	unsigned int 16		max measured value from voltage L2-N	
003D	unsigned int 16		min measured value from Voltage L3-N	
003E	unsigned int 16		max measured value from voltage L3-N	
003F	unsigned int 16		min measured value from Voltage L1-L2	
0040	unsigned int 16		max measured value from voltage L1-L2	
0041	unsigned int 16		min measured value from Voltage L2-L3	
0042	unsigned int 16		max measured value from voltage L2-L3	
0043	unsigned int 16		min measured value from Voltage L3-L1	
0044	unsigned int 16		max measured value from voltage L3-L1	
0045	unsigned int 16		min measured value from frequency	0 … 5000 [0,01 Hz]
0046	unsigned int 16		max measured value from frequency	
0047	unsigned int 32	*low*	Operating hours	[h]
0048		*high*		
0049	unsigned int 32	*low*	Serial number	
004A		*high*		
004B	unsigned int 16		hardware version	0 …
004C	unsigned int 16		firmware version	e. g. 0x07D2(hex) = 2002 (dez) Firmware -> 12690-1420-02
004D	unsigned int 16		bootloader version	

6.2 Read parameter

- Modbus function code 0x03 (Read Holding Registers)

Information: Not every parameter in this list is active in every program.

Addr. hex	Data type		Register	Range of values / Description
0200	unsigned int 16		Program number	only number without dot
0201	int 16		Voltage measurement, Measuring input - Measuring principle	-1 = 3Ph with N, -2= 3Ph with N and 3Ph without N, -3 = 3Ph without N, -4 = 1Ph with N, -5 = 2Ph with N
0202	unsigned int 16		Measuring input, Rated voltage	[0,1 V]
0203	unsigned int 16		Measuring input, Rated voltage with VG1200	[V]
0204	int 16		Operation with coupling device VG1200	-1 = yes, -2 = no
0205	int 16		Switch on conditions voltage active	-1 = yes, -2 = no
0206	unsigned int 16		Switch on condi. max. voltage	[0,1 V]
0207	unsigned int 16		Switch on condi. max. voltage with VG1200	[V]
0208	unsigned int 16		Switch on condi. min. voltage	[0,1 V]
0209	unsigned int 16		Switch on condi. min. voltage with VG1200	[V]
020A	int 16		Switch on conditions frequency active	-1 = yes, -2 = no
020B	unsigned int 16		Switch on condi. max. frequency	[0,01 Hz]
020C	unsigned int 16		Switch on condi. min. frequency	[0,01 Hz]
020D	unsigned int 16		Switch on delay	[s]
020E	int 16		Switch back conditions	-1 = all f & U< & U<< off, -2 = tripped alarms off
020F	int 16		Short alarm active	-1 = yes, -2 = no
0210	int 16		Alarm voltage U>> active	-1 = yes, -2 = no
0211	unsigned int 16		Alarm on U>>	[0,1 V]
0212	unsigned int 16		Alarm off U>>	[0,1 V]
0213	unsigned int 16		Alarm on U>> (with VG1200)	[V]
0214	unsigned int 16		Alarm off U>> (with VG1200)	[V]
0215	unsigned int 16		Delay alarm on U>>	[0,01 s]
0216	unsigned int 16		Delay alarm off U>>	[s]
0217	int 16		Alarm voltage U> active	-1 = yes, -2 = no
0218	unsigned int 16		Alarm on U>	[0,1 V]
0219	unsigned int 16		Alarm off U>	[0,1 V]
021A	unsigned int 16		Alarm on U> (with VG1200)	[V]
021B	unsigned int 16		Alarm off U> (with VG1200)	[V]
021C	unsigned int 16		Delay alarm on U>	[0,01 s]
021D	unsigned int 16		Delay alarm off U>	[s]
021E	int 16		Alarm voltage U 10 Min. average active	-1 = yes, -2 = no
021F	unsigned int 16		Alarm on U 10 Min. average	[0,1 V]
0220	unsigned int 16		Alarm off U 10 Min. average	[0,1 V]
0221	unsigned int 16		Alarm on U 10 Min. average (with VG1200)	[V]
0222	unsigned int 16		Alarm off U 10 Min. average (with VG1200)	[V]
0223	unsigned int 16		Delay alarm on U 10 Min. average	[0,01 s]
0224	unsigned int 16		Delay alarm off U 10 Min. average	[s]
0225	int 16		Alarm voltage U< active	-1 = yes, -2 = no
0226	unsigned int 16		Alarm on U<	[0,1 V]
0227	unsigned int 16		Alarm off U<	[0,1 V]
0228	unsigned int 16		Alarm on U< (with VG1200)	[V]
0229	unsigned int 16		Alarm off U< (with VG1200)	[V]
022A	unsigned int 16		Delay alarm on U<	[0,01 s]
022B	unsigned int 16		Delay alarm off U<	[s]

Addr. hex	Data type		Register	Range of values / Description
022C	int 16		Alarm voltage U<< active	-1 = yes, -2 = no
022D	unsigned int 16		Alarm on U<<	[0,1 V]
022E	unsigned int 16		Alarm off U<<	[0,1 V]
022F	unsigned int 16		Alarm on U<< (with VG1200)	[V]
0230	unsigned int 16		Alarm off U<< (with VG1200)	[V]
0231	unsigned int 16		Delay alarm on U<<	[0,01 s]
0232	unsigned int 16		Delay alarm off U<<	[s]
0233	int 16		Alarm voltage U0 active	-1 = yes, -2 = no
0234	unsigned int 16		Alarm on U0	[0,1 V]
0235	unsigned int 16		Alarm off U0	[0,1 V]
0236	unsigned int 16		Alarm on U0 (with VG1200)	[V]
0237	unsigned int 16		Alarm off U0 (with VG1200)	[V]
0238	unsigned int 16		Delay alarm on U0	[0,01 s]
0239	unsigned int 16		Delay alarm off U0	[s]
023A	int 16		Alarm frequency f>> active	-1 = yes, -2 = no
023B	unsigned int 16		Alarm on f>>	[0,01 Hz]
023C	unsigned int 16		Alarm off f>>	[0,01 Hz]
023D	unsigned int 16		Delay alarm on f>>	[0,01 s]
023E	unsigned int 16		Delay alarm off f>>	[s]
023F	int 16		Alarm frequency f> active	-1 = yes, -2 = no
0240	unsigned int 16		Alarm on f>	[0,01 Hz]
0241	unsigned int 16		Alarm off f>	[0,01 Hz]
0242	unsigned int 16		Delay alarm on f>	[0,01 s]
0243	unsigned int 16		Delay alarm off f>	[s]
0244	int 16		Alarm frequency f< active	-1 = yes, -2 = no
0245	unsigned int 16		Alarm on f<	[0,01 Hz]
0246	unsigned int 16		Alarm off f<	[0,01 Hz]
0247	unsigned int 16		Delay alarm on f<	[0,01 s]
0248	unsigned int 16		Delay alarm off f<	[s]
0249	int 16		Alarm frequency f<< active	-1 = yes, -2 = no
024A	unsigned int 16		Alarm on f<<	[0,01 Hz]
024B	unsigned int 16		Alarm off f<<	[0,01 Hz]
024C	unsigned int 16		Delay alarm on f<<	[0,01 s]
024D	unsigned int 16		Delay alarm off f<<	[s]
024E	int 16		f/U-Schutz active	-1 = yes, -2 = no
024F	unsigned int 16		f/U- protection limit U<	[0,1 V]
0250	unsigned int 16		f/U- protection limit U< (with VG1200)	[V]
0251	int 16		Narrow frequency active	-1 = yes, -2 = no
0252	unsigned int 16		Narrow frequency alarm on U<	[0,1 V]
0253	unsigned int 16		Narrow frequency alarm on U< (with VG1200)	[V]
0254	unsigned int 16		Narrow frequency alarm off U<	[0,1 V]
0255	unsigned int 16		Narrow frequency alarm off U< (with VG1200)	[V]
0256	unsigned int 16		Narrow frequency alarm on 3U0	[0,1 V]
0257	unsigned int 16		Narrow frequency alarm on 3U0 (with VG1200)	[V]
0258	unsigned int 16		Narrow frequency alarm off 3U0	[0,1 V]
0259	unsigned int 16		Narrow frequency alarm off 3U0 (m. VG1200)	[V]
025A	unsigned int 16		Narrow frequency delay alarm on	[0,01 s]
025B	unsigned int 16		Narrow frequency delay alarm off	[s]

Addr. hex	Data type		Register	Range of values / Description
025C	int 16		Vector shift active	-1 = yes, -2 = no
025D	unsigned int 16		Vector shift angle	[0,1 °]
025E	unsigned int 16		Vector shift delay alarm off	[s]
025F	unsigned int 16		Vector shift suppression time	[s]
0260	int 16		Rocof active	-1 = yes, -2 = no
0261	unsigned int 16		Rocof alteration df / dt	[0,001 Hz/s]
0262	unsigned int 16		Rocof number of periods	[periods]
0263	unsigned int 16		Rocof delay alarm on	[0,01 s]
0264	unsigned int 16		Rocof delay alarm off	[s]
0265	int 16		feedback contacts	ATTENTIONE: Evaluate low byte only. -1 = off, -2 = Y1 + Y2, -3 = Y1, -4 = Y2
0266	unsigned int 16		Reclosing attempts	[Qty]
0267	int 16		Time for feedback	-1 = monitor switch-off only [0,1 s]
0268	unsigned int 16		Time between reclosing attempts	[s]
0269	int 16		Function of relay K3	-1 = permanent on -2 =impulse on -3 = on/off with K1/K2 -4 = on in case of error -5 = Life-contact -6 = start signal / pre-warning -7 = enable signal
026A	unsigned int 16		Relay K3 impulse period	[0,1 s]
026B	unsigned int 16		Relay K3 time K3 after K1 and K2	[0,1 s]
026C	int 16		Digital input E1-E2	-1 = norm. closed; -2 = norm. open
026D	int 16		Digital input In1	-1 = norm. closed; -2 = norm. open
026E	int 16		Function of digital input In1	-1 = off, -2 = Y1 inactive, -3 = Y2 inactive, -4 = Y1 + Y2 inactive, -5 = VSR inactive, -6 = reset enable signal
026F	int 16		Digital input In2	-1 = norm. closed; -2 = norm. open
0270	int 16		Function of digital input In2	-1 = off, -2 = Y1 inactive, -3 = Y2 inactive, -4 = Y1 + Y2 inactive, -5 = VSR inactive, -6 = reset enable signal
0271	int 16		Digital input In3	-1 = norm. closed; -2 = norm. open
0272	int 16		Function of digital input In3	-1 = off, -2 = Y1 inactive, -3 = Y2 inactive, -4 = Y1 + Y2 inactive, -5 = VSR inactive, -6 = reset enable signal

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	S222301		
0x02	Revision Firmware	12690-1420-xx		
0x03	Manufacturer URL	www.ziehl.com	ASCII String	Regular
0x04	Product Name	Voltage and Frequency Relay		
0x05	Product designation	UFR1002IP		
0x80	Serial number	xxxxxxxx	ASCII String	Extended
0x81	Revision Hardware	xx (e. g. “04”)		
0x82	Revision Bootloader	12750-1400-xx		