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Operating manual EFR4001IP

updated: 2023-02-02 / oa
from firmware: 0-02

- Modbus TCP communication protocol

Table of Contents

1 Important Information

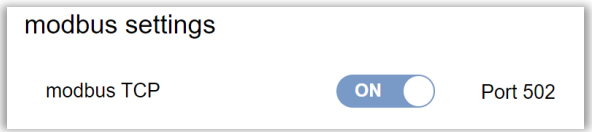
Please also read the general operating manual of the EFR4001IP carefully and observe the safety instructions.

2 Interface Parameters

TCP Port: 502
Max. TCP connections: 3

The Modbus TCP protocol must be activated via the integrated web server of the EFR4001IP:

- 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 Telegram Structure

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

4 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

5 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

6 Modbus Register Tables

6.1 Reading measured values, status values and min. / max. (state: EFR4001IP)

- Modbus function code 0x03 (Read Holding Registers)

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x00B0 0x00B1	signed long	*low* *high*	Actual value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x00B2 0x00B3	signed long	*low* *high*	Actual value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x00B4 0x00B5	signed long	*low* *high*	Actual value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x00B6 0x00B7	signed long	*low* *high*	Actual value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x00B8 0x00B9	signed long	*low* *high*	Actual value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x00BA 0x00BB	signed long	*low* *high*	Actual value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x00BC 0x00BD	signed long	*low* *high*	Actual value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00BE 0x00BF	signed long	*low* *high*	Actual value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00C0 0x00C1	signed long	*low* *high*	Actual value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00C2 0x00C3	signed long	*low* *high*	Actual value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x00C4 0x00C5	signed long	*low* *high*	*Actual value S - L1 [VA]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00C6 0x00C7	signed long	*low* *high*	*Actual value S - L2 [VA]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00C8 0x00C9	signed long	*low* *high*	*Actual value S - L3 [VA]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00CA 0x00CB	signed long	*low* *high*	*Actual value S - L123 [VA]*	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x00CC 0x00CD	signed long	*low* *high*	*Actual value Q - L1 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00CE 0x00CF	signed long	*low* *high*	*Actual value Q - L2 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00D0 0x00D1	signed long	*low* *high*	*Actual value Q - L3 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00D2 0x00D3	signed long	*low* *high*	*Actual value Q - L123 [VAr]*	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x00D4 0x00D5	signed long	*low* *high*	*Actual value cos φ - L1 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00D6 0x00D7	signed long	*low* *high*	*Actual value cos φ - L2 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00D8 0x00D9	signed long	*low* *high*	*Actual value cos φ - L3 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00DA 0x00DB	signed long	*low* *high*	Actual value frequency [0,01 Hz]	4000 …	7000	x	x	x	x	x	x	x	x	x	x
0x00DC 0x00DD	signed long	*low* *high*	*Actual value Phi φ*∠(U-L1,U-L2) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00DE 0x00DF	signed long	*low* *high*	*Actual value Phi φ*∠(U-L1,U-L3) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E0 0x00E1	signed long	*low* *high*	*Actual value Phi φ*∠(U-L2,U-L3) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E2 0x00E3	signed long	*low* *high*	*Actual value Phi φ* ∠(I-L1, I-L2) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E4 0x00E5	signed long	*low* *high*	*Actual value Phi φ* ∠(I-L1, I-L3) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E6 0x00E7	signed long	*low* *high*	*Actual value Phi φ* ∠(I-L2, I-L3) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E8	signed int		Status measured value I - L1	0 = measured value ok 1 = measuring range exceeded 2= measuring range below 3= simulation		x	x	x	x	x	x	x	x	x	x
0x00E9	signed int		Status measured value I - L2			x	x	x	x	x	x	x	x	x	x
0x00EA	signed int		Status measured value I - L3			x	x	x	x	x	x	x	x	x	x
0x00EB	signed int		Status measured value U - L1			x	x	x	x	x	x	x	x	x	x
0x00EC	signed int		Status measured value U - L2			x	x	x	x	x	x	x	x	x	x
0x00ED	signed int		Status measured value U - L3			x	x	x	x	x	x	x	x	x	x
0x00EE	signed int		Status measured value P - L1			x	x	x	x	x	x	x	x	x	x
0x00EF	signed int		Status measured value P - L2			x	x	x	x	x	x	x	x	x	x
0x00F0	signed int		Status measured value P - L3			x	x	x	x	x	x	x	x	x	x
0x00F1	signed int		Status measured value P-L123			x	x	x	x	x	x	x	x	x	x
0x00F2 0x00F3	signed long	*low* *high*	On time K1 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F4 0x00F5	signed long	*low* *high*	On time K2 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F6 0x00F7	signed long	*low* *high*	On time K3 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F8	signed int		Current error (error)	0 = currently no error 1 = error		x	x	x	x	x	x	x	x	x	x
0x00F9	signed int		Error memory (limit error)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FA	signed int		Error memory (load difference)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FB	signed int		Error memory (AD converter)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FC	signed int		Error memory (adjustment values)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FD	signed int		Error memory (parameter over range)	0 …	99	x	x	x	x	x	x	x	x	x	x

*All angles are counterclockwise.

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x00FE	signed int		Error memory (scaling analogue output)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FF	signed int		Error memory (check current transformer)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0100	signed int		Error memory (min. 2 same load values)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0101	signed int		Error memory (reserve)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0102	signed int		Relay status K1	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0103	signed int		Relay status K2	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0104	signed int		Relay status K3	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0105	signed int		Alarm status 0 (K1 / step 1)	0 = alarm off 1 = delay time on 2 = alarm on 3 = alarm delay 4 = alarm locked		x	x	x	x	x	x	x	x	x	x
0x0106	signed int		Alarm status 1 (K2 / step 2)			x	x	x	x	x	x	x	x	x	x
0x0107	signed int		Alarm status 2 (K3* / step 3)			x	x	x	x	x	x	x	x	x	x
0x0108	signed int		Alarm status 3 (step 4)					x							
0x0109	signed int		Alarm status 4 (step 5)					x							
0x010A	signed int		Alarm status 5 (step 6)					x							
0x010B	signed int		Alarm status 6 (step 7)					x							
0x010C 0x010D	signed long	*low* *high*	Device status	Only for internal service purposes		x	x	x	x	x	x	x	x	x	x
0x010E 0x010F	signed long	*low* *high*	Serial number			x	x	x	x	x	x	x	x	x	x
0x0110 0x0111	signed long	*low* *high*	Operating hours	hours [h]		x	x	x	x	x	x	x	x	x	x
0x0112	signed int		Firmware version, Application	e. g. 03EA (hex) =1002(dec) -> 12720-1410-02		x	x	x	x	x	x	x	x	x	x
0x0113	signed int		Firmware version, Bootloader			x	x	x	x	x	x	x	x	x	x
0x0114 0x0115	signed long	*low* *high*	Min. value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0116 0x0117	signed long	*low* *high*	Max. value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0118 0x0119	signed long	*low* *high*	Min. value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011A 0x011B	signed long	*low* *high*	Max. value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011C 0x011D	signed long	*low* *high*	Min. value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011E 0x011F	signed long	*low* *high*	Max. value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0120 0x0121	signed long	*low* *high*	Min. value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0122 0x0123	signed long	*low* *high*	Max. value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0124 0x0125	signed long	*low* *high*	Min. value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0126 0x0127	signed long	*low* *high*	Max. value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0128 0x0129	signed long	*low* *high*	Min. value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x012A 0x012B	signed long	*low* *high*	Max. value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x012C 0x012D	signed long	*low* *high*	Min. value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x012E 0x012F	signed long	*low* *high*	Max. value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0130 0x0131	signed long	*low* *high*	Min. value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x

* In the case of programs 7, 8, 9 and 10, the relay **K3** reacts in three steps successively according to VDE-AR-N 4105.

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0132 0x0133	signed long	*low* *high*	Max. value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0134 0x0135	signed long	*low* *high*	Min. value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0136 0x0137	signed long	*low* *high*	Max. value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0138 0x0139	signed long	*low* *high*	Min. value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x013A 0x013B	signed long	*low* *high*	Max. value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x013C 0x013D	signed long	*low* *high*	Sum of connected loads via relay [W]	0…	150000	x	x	x	x	x	x	x	x	x	x
0x013E 0x013F	unsigned long	*low* *high*	Controlled load via analogue output I [W]	0…	50000	x	x	x	x	x	x	x	x	x	x
0x0140 0x0141	unsigned long	*low* *high*	Controlled load via analogue output U [W]	0…	50000	x	x	x	x	x	x	x	x	x	x
0x0142	signed int		Digital input Y1	0…	1	x	x	x	x	x	x	x	x	x	x
0x0143	signed int		Digital input Y2	0…	1	x	x	x	x	x	x	x	x	x	x
0x0144	signed int		Digital input Y3	0…	1	x	x	x	x	x	x	x	x	x	x
0x0145	signed int		Digital input Y4	0…	1	x	x	x	x	x	x	x	x	x	x
0x0146	signed int		Hardware Version	00...		x	x	x	x	x	x	x	x	x	x
0x0147	signed int		Status timer function K1	0=auto/off, 1=on for, 2=off for, 3=manually on, 4=manually off		x	x	x							
0x0148	signed int		Status timer function K2			x	x	x							
0x0149	signed int		Status timer function K3			x	x	x							
0x014A	signed int		Status timer function Out I			x	x	x							
0x014B	signed int		Status timer function Out U			x	x	x							
0x014C 0x014D	unsigned long	*low* *high*	Actual time of Timer function K1 [s]	0…	86400	x	x	x							
0x014E 0x014F	unsigned long	*low* *high*	Actual time of Timer function K2 [s]	0…	86400	x	x	x							
0x0150 0x0151	unsigned long	*low* *high*	Actual time of Timer function K3 [s]	0…	86400	x	x	x							
0x0152 0x0153	unsigned long	*low* *high*	Actual time of Timer function Out I [s]	0…	86400	x	x	x							
0x0154 0x0155	unsigned long	*low* *high*	Actual time of Timer function Out U [s]	0…	86400	x	x	x							
0x0156 0x0157	signed long	*low* *high*	Feed-in L1 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x0158 0x0159	signed long	*low* *high*	Feed-in L2 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x015A 0x015B	signed long	*low* *high*	Feed-in L3 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x015C 0x015D	signed long	*low* *high*	Feed-in L123 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x015E 0x015F	signed long	*low* *high*	Draw L1 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0160 0x0161	signed long	*low* *high*	Draw L2 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0162 0x0163	signed long	*low* *high*	Draw L3 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0164 0x0165	signed long	*low* *high*	Draw L123 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0166 0x0167	signed long	*low* *high*	Draw – feed-in L123 [Wh]	-2147483648	2147483647	x	x	x	x	x	x	x	x	x	x
0x0168 0x0169	signed long	*low* *high*	Own consumption at K1 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x016A 0x016B	signed long	*low* *high*	Own consumption at K2 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x016C 0x016D	signed long	*low* *high*	Own consumption at K3 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x016E 0x016F	signed long	*low* *high*	Own consumption at Out I [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0170 0x0171	signed long	*low* *high*	Own consumption at Out U [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0172 0x0173	signed long	*low* *high*	Own consumption at K123 + Out I + U [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0174 0x0175	signed long	*low* *high*	Actual value U - L1-L2 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x0176 0x0177	signed long	*low* *high*	Actual value U - L1-L3 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x0178 0x0179	signed long	*low* *high*	Actual value U - L2-L3 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x017A 0x017B	signed long	*low* *high*	Actual value U-10-Cycles - L1 [0,1 V]	1 …	250000							x	x	x	x
0x017C 0x017D	signed long	*low* *high*	Actual value U-10-Cycles - L2 [0,1 V]	1 …	250000							x	x	x	x
0x017E 0x017F	signed long	*low* *high*	Actual value U-10-Cycles - L3 [0,1 V]	1 …	250000							x x	x x	x x	x x
0x0180 0x0181	signed long	*low* *high*	Actual value I-10-Cycles- L1 [mA]	1 …	2400000							x	x	x	x
0x0182 0x0183	signed long	*low* *high*	Actual value I-10-Cycles- L2 [mA]	1 …	2400000							x	x	x	x
0x0184 0x0185	signed long	*low* *high*	Actual value I-10-Cycles- L3 [mA]	1 …	2400000							x	x	x	x

6.2 Reading measured values, status values and min. / max. (state: EFR4000IP)

- Modbus function code 0x03 (Read Holding Registers)

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x0000 0x0001	signed long	*low* *high*	Actual value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0002 0x0003	signed long	*low* *high*	Actual value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0004 0x0005	signed long	*low* *high*	Actual value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0006 0x0007	signed long	*low* *high*	Actual value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0008 0x0009	signed long	*low* *high*	Actual value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x000A 0x000B	signed long	*low* *high*	Actual value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x000C 0x000D	signed long	*low* *high*	Actual value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x000E 0x000F	signed long	*low* *high*	Actual value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0010 0x0011	signed long	*low* *high*	Actual value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0012 0x0013	signed long	*low* *high*	Actual value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x0014 0x0015	signed long	*low* *high*	Actual value frequency [0,01 Hz]	4000 …	7000	x	x	x	x	x	x	x	x	x	x
0x0016	signed int		Status measured value I - L1	0 = measured value ok 1 = measuring range exceeded 2= measuring range below 3= simulation		x	x	x	x	x	x	x	x	x	x
0x0017	signed int		Status measured value I - L2			x	x	x	x	x	x	x	x	x	x
0x0018	signed int		Status measured value I - L3			x	x	x	x	x	x	x	x	x	x
0x0019	signed int		Status measured value U - L1			x	x	x	x	x	x	x	x	x	x
0x001A	signed int		Status measured value U - L2			x	x	x	x	x	x	x	x	x	x
0x001B	signed int		Status measured value U - L3			x	x	x	x	x	x	x	x	x	x
0x001C	signed int		Status measured value P - L1			x	x	x	x	x	x	x	x	x	x
0x001D	signed int		Status measured value P - L2			x	x	x	x	x	x	x	x	x	x
0x001E	signed int		Status measured value P - L3			x	x	x	x	x	x	x	x	x	x
0x001F	signed int		Status measured value P - L123			x	x	x	x	x	x	x	x	x	x
0x0020 0x0021	signed long	*low* *high*	On time K1 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0022 0x0023	signed long	*low* *high*	On time K2 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0024 0x0025	signed long	*low* *high*	On time K3 [min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0026	signed int		Current error (error)	0 = currently no error 1 = error		x	x	x	x	x	x	x	x	x	x
0x0027	signed int		Error memory (limit error)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0028	signed int		Error memory (load difference)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0029	signed int		Error memory (AD converter)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002A	signed int		Error memory (adjustment values)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002B	signed int		Error memory (parameter over range)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002C	signed int		Error memory (scaling analogue output)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002D	signed int		Error memory (check current transformer)	0 …	99	x	x	x	x	x	x	x	x	x	x

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x002E	signed int		Error memory (min. 2 same load values)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002F	signed int		Error memory (reserve)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0030	signed int		Relay status K1	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0031	signed int		Relay status K2	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0032	signed int		Relay status K3	0 (off)…	1 (on)	x	x	x	x	x	x	x	x	x	x
0x0033	signed int		Alarm status 0 (K1 / step 1)	0 = alarm off 1 = delay time on 2 = alarm on 3 = alarm delay 4 = alarm locked		x	x	x	x	x	x	x	x	x	x
0x0034	signed int		Alarm status 1 (K2 / step 2)			x	x	x	x	x	x	x	x	x	x
0x0035	signed int		Alarm status 2 (K3* / step 3)			x	x	x	x	x	x	x	x	x	x
0x0036	signed int		Alarm status 3 (step 4)					x							
0x0037	signed int		Alarm status 4 (step 5)					x							
0x0038	signed int		Alarm status 5 (step 6)					x							
0x0039	signed int		Alarm status 6 (step 7)					x							
0x003A 0x003B	signed long	*low* *high*	Device status	Only for internal service purposes		x	x	x	x	x	x	x	x	x	x
0x003C 0x003D	signed long	*low* *high*	Serial number			x	x	x	x	x	x	x	x	x	x
0x003E 0x003F	signed long	*low* *high*	Operating hours	hours [h]		x	x	x	x	x	x	x	x	x	x
0x0040	signed int		Firmware version, Application	e. g. 03EA (hex) =1002(dec) -> 12720-1410-02		x	x	x	x	x	x	x	x	x	x
0x0041	signed int		Firmware version, Bootloader			x	x	x	x	x	x	x	x	x	x
0x0042 0x0043	signed long	*low* *high*	Min. value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0044 0x0045	signed long	*low* *high*	Max. value U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0046 0x0047	signed long	*low* *high*	Min. value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0048 0x0049	signed long	*low* *high*	Max. value U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004A 0x004B	signed long	*low* *high*	Min. value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004C 0x004D	signed long	*low* *high*	Max. value U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004E 0x004F	signed long	*low* *high*	Min. value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0050 0x0051	signed long	*low* *high*	Max. value I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0052 0x0053	signed long	*low* *high*	Min. value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0054 0x0055	signed long	*low* *high*	Max. value I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0056 0x0057	signed long	*low* *high*	Min. value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0058 0x0059	signed long	*low* *high*	Max. value I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x005A 0x005B	signed long	*low* *high*	Min. value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x005C 0x005D	signed long	*low* *high*	Max. value P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x005E 0x005F	signed long	*low* *high*	Min. value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x

* In the case of programs 7, 8, 9 and 10, the relay **K3** reacts in three steps successively according to VDE-AR-N 4105.

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0060 0x0061	signed long	*low* *high*	Max. value P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0062 0x0063	signed long	*low* *high*	Min. value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0064 0x0065	signed long	*low* *high*	Max. value P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0066 0x0067	signed long	*low* *high*	Min. value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x0068 0x0069	signed long	*low* *high*	Max. value P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x006A 0x006B	signed long	*low* *high*	Sum of connected loads via relay [W]	0…	150000	x	x	x	x	x	x	x	x	x	x
0x006C 0x006D	unsigned long	*low* *high*	Controlled load via analogue output I [W]	0…	50000	x	x	x	x	x	x	x	x	x	x
0x006E 0x006F	unsigned long	*low* *high*	Controlled load via analogue output U [W]	0…	50000	x	x	x	x	x	x	x	x	x	x
0x0070	signed int		Digital input Y1	0…	1	x	x	x	x	x	x	x	x	x	x
0x0071	signed int		Digital input Y2	0…	1	x	x	x	x	x	x	x	x	x	x
0x0072	signed int		Digital input Y3	0…	1	x	x	x	x	x	x	x	x	x	x
0x0073	signed int		Digital input Y4	0…	1	x	x	x	x	x	x	x	x	x	x
0x0074	signed int		Hardware Version	00...		x	x	x	x	x	x	x	x	x	x
0x0075	signed int		Status timer function K1	0=auto/off, 1=on for, 2=off for, 3=manually on, 4=manually off		x	x	x							
0x0076	signed int		Status timer function K2			x	x	x							
0x0077	signed int		Status timer function K3			x	x	x							
0x0078	signed int		Status timer function Out I			x	x	x							
0x0079	signed int		Status timer function Out U			x	x	x							
0x007A 0x007B	unsigned long	*low* *high*	Actual time of Timer function K1 [s]	0…	86400	x	x	x							
0x007C 0x007D	unsigned long	*low* *high*	Actual time of Timer function K2 [s]	0…	86400	x	x	x							
0x007E 0x007F	unsigned long	*low* *high*	Actual time of Timer function K3 [s]	0…	86400	x	x	x							
0x0080 0x0081	unsigned long	*low* *high*	Actual time of Timer function Out I [s]	0…	86400	x	x	x							
0x0082 0x0083	unsigned long	*low* *high*	Actual time of Timer function Out U [s]	0…	86400	x	x	x							
0x0084 0x0085	signed long	*low* *high*	Feed-in L1 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x0086 0x0087	signed long	*low* *high*	Feed-in L2 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x0088 0x0089	signed long	*low* *high*	Feed-in L3 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x008A 0x008B	signed long	*low* *high*	Feed-in L123 [Wh]	-2147483648	…0	x	x	x	x	x	x	x	x	x	x
0x008C 0x008D	signed long	*low* *high*	Draw L1 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x008E 0x008F	signed long	*low* *high*	Draw L2 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0090 0x0091	signed long	*low* *high*	Draw L3 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0092 0x0093	signed long	*low* *high*	Draw L123 [Wh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0094 0x0095	signed long	*low* *high*	Draw – feed-in L123 [Wh]	-2147483648	2147483647	x	x	x	x	x	x	x	x	x	x
0x0096 0x0097	signed long	*low* *high*	Own consumption at K1 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x0098 0x0099	signed long	*low* *high*	Own consumption at K2 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x009A 0x009B	signed long	*low* *high*	Own consumption at K3 [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x009C 0x009D	signed long	*low* *high*	Own consumption at Out I [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x009E 0x009F	signed long	*low* *high*	Own consumption at Out U [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x
0x00A0 0x00A1	signed long	*low* *high*	Own consumption at K123 + Out I + U [kWh]	0…	2147483647	x	x	x	x	x	x	x	x	x	x

6.3 Parameter read and write

- Modbus function code 0x03 (Read Holding Registers)
- Modbus function code 0x10 (Write Multiple Registers)

Adr. hex	Data type	Register	Range of values Min.	Max.	Prog. -Nr. 1	2	3	4	5	6	7	8	9	10
0x0200	signed int	Program number	1…	10	x	x	x	x	x	x	x	x	x	x
0x0201	signed int	Current transformer-Primary [A]	1…	1000	x	x	x	x	x	x	x	x	x	x
0x0202	signed int	Current transformer - Secondary [0,1 A]	1…	50	x	x	x	x	x	x	x	x	x	x
0x0203	signed long *low*	Power at K1 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0204	*high*													
0x0205	signed long *low*	Power at K2 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0206	*high*													
0x0207	signed long *low*	Power at K3 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0208	*high*													
0x0209	signed int	Phase on relay K1	-5=L123, -4=L3, -3=L2, -2=L1, -1=off		x	x	x	x		x				
0x020A	signed int	Phase on relay K2			x	x	x	x		x				
0x020B	signed int	Phase on relay K3			x	x	x	x		x				
0x020C	signed int	Relay function K1	-2 = 11-12	-1 = 11-14	x	x	x	x						
0x020D	signed int	Relay function K2	-2 = 21-22	-1 = 21-24	x	x	x	x						
0x020E	signed int	Relay function K3	-2 = 31-32	-1 = 31-34	x	x	x	x						
0x020F	signed long *low*	Delay on K1 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0210	*high*	Delay on [s]					x							
0x0211	signed long *low*	Delay on K2 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0212	*high*													
0x0213	signed long *low*	Delay on K3 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0214	*high*													
0x0215	signed long *low*	Min. on K1 [s]	10…	86399	x	x		x						
0x0216	*high*	Min. on [s]	10…	86399			x							
0x0217	signed long *low*	Min. on K2 [s]	10…	86399	x	x		x						
0x0218	*high*													
0x0219	signed long *low*	Min. on K3 [s]	10…	86399	x	x		x						
0x021A	*high*													
0x021B	signed long *low*	Delay off K1 [s]	10…	86399	x	x		x						
0x021C	*high*	Delay off [s]	10…	86399			x							
		Delay off K1 [0,01s]	0…	359999					x	x	x	x	x	x
0x021D	signed long *low*	Delay off K2 [s]	10…	86399	x	x		x						
0x021E	*high*	Delay off K2 [0,01s]	0…	359999					x	x	x	x	x	x
0x021F	signed long *low*	Delay off K3 [s]	10…	86399	x	x		x						
0x0220	*high*	Delay off K3 [0,01s]	0…	359999					x	x				
0x0221	signed long *low*	Load regulation K1 [s]	10…	86399	x	x		x						
0x0222	*high*													
0x0223	signed long *low*	Load regulation K2 [s]	10…	86399	x	x		x						
0x0224	*high*													
0x0225	signed long *low*	Load regulation K3 [s]	10…	86399	x	x		x						
0x0226	*high*													
0x0227	signed long *low*	Power K1 on (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x0228	*high*	Switch off value (step 10 W) [W]					x							
0x0229	signed long *low*	Power K2 on (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022A	*high*													
0x022B	signed long *low*	Power K3 on (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022C	*high*													

Adr. hex	Data type		Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x022D 0x022E	signed long	*low* *high*	Power K1 off (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022F 0x0230	signed long	*low* *high*	Power K2 off (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x0231 0x0232	signed long	*low* *high*	Power K3 off (step 10 W) [W]	-999990…	999990	x	x		x	x	x				
0x0233	signed int		Auto reset K1	-1 = on	-2 = off					x	x	x	x	x	x
0x0234	signed int		Auto reset K2	-1 = on	-2 = off					x	x	x	x	x	x
0x0235	signed int		Auto reset K3	-1 = on	-2 = off					x	x	x	x	x	x
0x0236	signed int		Function input Y1	-13=Aout-U 100%, -12=Aout-U 0%, -11=Aout-I 100%, -10=Aout-I 0%, -9=K3 off, -8=K2 off, -7=K1 off, -6=K3 on, -5=K2 on, -4=K1 on, -3=K1-3 on, -2=K1-3 off, -1=off		x	x	x	x					
0x0237	signed int		Function input Y2			x	x	x	x						
0x0238	signed int		Function input Y3			x	x	x	x						
0x0239	signed int		Function input Y4			x	x	x	x						
0x023A	signed int		Analog output I, Function	-9= load-L3, -8=load-L2, -7=load-L1, -6=load-L123, -5=kW-L3, -4=kW L2, -3=kW-L1, -2=kW-L123, -1=off		x	x	x	x	x	x	x	x	x	x
0x023B	signed int		Analog output I, 0-20mA / 4-20 mA / Individually	-3=Ind, -2=4-20 mA, -1=0-20 mA		x	x	x	x	x	x	x	x	x	x
0x023C	signed int		Analog output I, individual zero point [0,01 mA]	0 …	1000	x	x	x	x	x	x	x	x	x	x
0x023D 0x023E	signed long	*low* *high*	Analog output I, Zero point (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x023F 0x0240	signed long	*low* *high*	Analog output I, Full scale (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x0241 0x0242	signed long	low high	Analog output I, Setpoint (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x0243 0x0244	signed long	low high	Analog output I, max. power (step 10 W) [W]	0…	500000	x	x	x	x	x	x	x	x	x	x
0x0245	signed int		Analog output I, Regulation speed [%]	20…	90	x	x	x	x	x	x	x	x	x	x
0x0246	signed int		Analog output I, Regulation interval [0,1 s]	5…	600	x	x	x	x	x	x	x	x	x	x
0x0247	signed int		Analog output I, Regulation tolerance [%]	5…	50	x	x	x	x	x	x	x	x	x	x
0x0248	signed int		Analog output U, Function	-9=load-L3, -8=load-L2, -7=load-L1, -6=load-L123, -5=kW-L3, -4=kW L2, -3=kW-L1, -2=kW-L123, -1=off		x	x	x	x	x	x	x	x	x	x
0x0249	signed int		Analog output U, 0-10V / 2-10V / Individually	-3=Ind, -2=2-10 V, -1=0-10V		x	x	x	x	x	x	x	x	x	x
0x024A	signed int		Analog output U, individual zero point [0,01 V]	0 …	500	x	x	x	x	x	x	x	x	x	x
0x024B 0x024C	signed long	*low* *high*	Analog output U, Zero point (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x024D 0x024E	signed long	*low* *high*	Analog output U, Full scale (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x024F 0x0250	signed long	*low* *high*	Analog output U, Setpoint (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x

Adr. hex	Data type	Register	Range of values Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0251 0x0252	signed long *low* *high*	Analog output U, max. power (step 10 W) [W]	0…	500000	x	x	x	x	x	x	x	x	x	x
0x0253	signed int	Analog output U, Regulation speed [%]	20…	90	x	x	x	x	x	x	x	x	x	x
0x0254	signed int	Analog output U, Regulation interval [0,1 s]	5…	600	x	x	x	x	x	x	x	x	x	x
0x0255	signed int	Analog output U, Regulation tolerance [%]	5…	50	x	x	x	x	x	x	x	x	x	x
0x0256	signed int	Language	-2=English, -1=German		x	x	x	x	x	x	x	x	x	x
0x0257	signed int	TFT brightness [%]	20…	100	x	x	x	x	x	x	x	x	x	x
0x0258	signed int	TFT, time to dim … [s]	10…	3600	x	x	x	x	x	x	x	x	x	x
0x0259	signed int	Display interval [0,1 s]	1…	20	x	x	x	x	x	x	x	x	x	x
0x025A	signed int	Timer function K1	0=auto, 1=on for, 2=off for, 3=manually on, 4=manually off		x	x	x	x						
0x025B	signed int	Timer function K2			x	x	x	x						
0x025C	signed int	Timer function K3			x	x	x	x						
0x025D	signed int	Timer function Out I			x	x	x	x						
0x025E	signed int	Timer function Out U			x	x	x	x						
0x025F	signed int	Timer function K1, Time of "on for / off for" [min.]	1…	1440	x	x	x	x						
0x0260	signed int	Timer function K2, Time of "on for / off for" [min.]	1…	1440	x	x	x	x						
0x0261	signed int	Timer function K3, Time of "on for / off for" [min.]	1…	1440	x	x	x	x						
0x0262	signed int	Timer function I, Time of "on for / off for" [min.]	1…	1440	x	x	x	x						
0x0263	signed int	Timer function U, Time of "on for / off for" [min.]	1…	1440	x	x	x	x						
0x0264	signed int	Timer function, Load at Out I [%]	0…	100	x	x	x	x						
0x0265	signed int	Timer function, Load at Out U [%]	0…	100	x	x	x	x						

6.4 Trigger reset function

- Modbus function code 0x10 (Write Multiple Registers)

Adr. hex	Data type	Register	*Value*	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0100	signed int	Reset min/max U	*write 1 -> reset all U*	x	x	x	x	x	x	x	x	x	x
0x0101	signed int	Reset min/max I	*write 1 -> reset all I*	x	x	x	x	x	x	x	x	x	x
0x0102	signed int	Reset min/max P	*write 1 -> reset all P*	x	x	x	x	x	x	x	x	x	x
0x0103	signed int	On time K1…K3	*write 1 -> reset all times*	x	x	x	x	x	x	x	x	x	x
0x0104	signed int	Error memory	*write 1 -> reset all errors*	x	x	x	x	x	x	x	x	x	x
0x0105	signed int	Locked relays	*write 1 -> reset locked relays*					x	x	x	x	x	x
0x0106	signed int	Reset energy meter	*write 1 -> reset*	x	x	x	x	x	x	x	x	x	x