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Betriebsanleitung EFR4001IP

Stand: 2023-02-02 / oa
ab Firmware: 0-02

- Modbus TCP Kommunikationsprotokoll

Inhaltsverzeichnis

1 Wichtige Hinweise

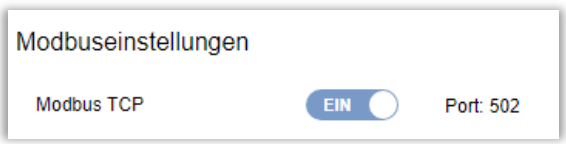
Bitte lesen Sie auch die allgemeine Betriebsanleitung des EFR4001IP sorgfältig durch und beachten Sie die Sicherheitshinweise.

2 Schnittstellenparameter

TCP Port: 502
Max. Anzahl TCP Verbindungen (max. TCP connections): 3

Das Modbus TCP Protokoll muss über den integrierten Webserver des EFR4001IP aktiviert werden:

- Im Webbrowser (an Computer im selben Netzwerk) die IP-Adresse des Gerätes eingeben
- Menüreiter „Netzwerk“ wählen
- Modbus TCP aktivieren



3 Telegramm Aufbau

Nach Modbus TCP Spezifikation.
Details entnehmen Sie bitte der Modbus Originaldokumentation, zu finden unter
http://www.modbus.org

4 Unterstützte Funktionscodes

Funktionscode	Bezeichnung	Verwendung
3 (03H)	Read Holding Registers	Daten aus den Registern lesen
16 (10H)	Write Multiple Registers	Daten in die Register schreiben

5 Datentypen

Folgende Datentypen werden in den Modbusregistern verwendet:

Datentyp	Größe	Zahlenbereich
signed int	16 Bit, Registerwert	-32768 … 32767
unsigned int	16 Bit, Registerwert	0 … 65535
signed long	32 Bit, aufgeteilt über zwei Register	-2147483648 … 2147483647
unsigned long	32 Bit, aufgeteilt über zwei Register	0 … 4294967296

6 Modbus Registertabellen

6.1 Messwerte, Statuswerte und Min.-/Max.-Messwerte auslesen (Stand: EFR4001IP)

- Modbus Funktioncode 0x03 (Read Holding Registers)

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

Adr. Hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x00CC 0x00CD	signed long *low high*	*Istwert Q - L1 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00CE 0x00CF	signed long *low high*	*Istwert Q - L2 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00D0 0x00D1	signed long *low high*	*Istwert Q - L3 [VAr]*	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x00D2 0x00D3	signed long *low high*	*Istwert Q - L123 [VAr]*	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x00D4 0x00D5	signed long *low high*	*Istwert cos φ - L1 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00D6 0x00D7	signed long *low high*	*Istwert cos φ - L2 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00D8 0x00D9	signed long *low high*	*Istwert cos φ - L3 [0,0001]*	-10000 …	10000	x	x	x	x	x	x	x	x	x	x
0x00DA 0x00DB	signed long *low high*	Istwert Frequenz [0,01 Hz]	4000 …	7000	x	x	x	x	x	x	x	x	x	x
0x00DC 0x00DD	signed long *low high*	*Istwert 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*	*Istwert 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*	*Istwert 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*	*Istwert 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*	*Istwert 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*	*Istwert Phi φ* ∠(I-L2, I-L3) [0,001 °]*	0 …	360000	x	x	x	x	x	x	x	x	x	x
0x00E8	signed int	Status Messwert I - L1	0 = Messwert in Ordnung 1 = Messbereich überschritten 2 = Messbereich unterschritten 3 = Simulation		x	x	x	x	x	x	x	x	x	x
0x00E9	signed int	Status Messwert I - L2			x	x	x	x	x	x	x	x	x	x
0x00EA	signed int	Status Messwert I - L3			x	x	x	x	x	x	x	x	x	x
0x00EB	signed int	Status Messwert U - L1			x	x	x	x	x	x	x	x	x	x
0x00EC	signed int	Status Messwert U - L2			x	x	x	x	x	x	x	x	x	x
0x00ED	signed int	Status Messwert U - L3			x	x	x	x	x	x	x	x	x	x
0x00EE	signed int	Status Messwert P - L1			x	x	x	x	x	x	x	x	x	x
0x00EF	signed int	Status Messwert P - L2			x	x	x	x	x	x	x	x	x	x
0x00F0	signed int	Status Messwert P - L3			x	x	x	x	x	x	x	x	x	x
0x00F1	signed int	Status Messwert P - L123			x	x	x	x	x	x	x	x	x	x
0x00F2 0x00F3	signed long *low high*	Einschaltzeit K1 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F4 0x00F5	signed long *low high*	Einschaltzeit K2 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F6 0x00F7	signed long *low high*	Einschaltzeit K3 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00F8	signed int	Aktueller Fehler (Error)	0 = aktuell kein Error 1 = Error liegt an		x	x	x	x	x	x	x	x	x	x
0x00F9	signed int	Error-Speicher (Limitfehler)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FA	signed int	Error-Speicher (Last Differenz)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FB	signed int	Error-Speicher (AD Wandler)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FC	signed int	Error-Speicher (Abgleichwerte)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FD	signed int	Error-Speicher (Parameter Bereichsüberschreitung)	0 …	99	x	x	x	x	x	x	x	x	x	x

*Alle Winkelangaben sind im Gegenuhrzeigersinn.

Adr. Hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x00FE	signed int	Error-Speicher (Skalierung Analogausgang)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x00FF	signed int	Error-Speicher (Stromwandler prüfen)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0100	signed int	Error-Speicher (min. 2 gleiche Lastgrößen)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0101	signed int	Error-Speicher (reserve)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0102	signed int	Relaisstatus K1	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0103	signed int	Relaisstatus K2	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0104	signed int	Relaisstatus K3	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0105	signed int	Alarmstatus 0 (K1 / Stufe 1)	0 = Alarm Aus 1 = Einschaltverz. läuft 2 = Alarm Ein 3 = Alarmverz. läuft 4 = Alarm verriegelt		x	x	x	x	x	x	x	x	x	x
0x0106	signed int	Alarmstatus 1 (K2 / Stufe 2)			x	x	x	x	x	x	x	x	x	x
0x0107	signed int	Alarmstatus 2 (K3* / Stufe 3)			x	x	x	x	x	x	x	x	x	x
0x0108	signed int	Alarmstatus 3 (Stufe 4)					x							
0x0109	signed int	Alarmstatus 4 (Stufe 5)					x							
0x010A	signed int	Alarmstatus 5 (Stufe 6)					x							
0x010B	signed int	Alarmstatus 6 (Stufe 7)					x							
0x010C 0x010D	signed long *low* *high*	Gerätestatus	nur für interne Service Zwecke		x	x	x	x	x	x	x	x	x	x
0x010E 0x010F	signed long *low* *high*	Seriennummer			x	x	x	x	x	x	x	x	x	x
0x0110 0x0111	signed long *low* *high*	Betriebsstundenzähler	in Stunden [h]		x	x	x	x	x	x	x	x	x	x
0x0112	signed int	Firmware-Version, App.	z.B. 03EA (hex) = 1002 (dez)		x	x	x	x	x	x	x	x	x	x
0x0113	signed int	Firmware-Version, Bootl.	-> 12720-1410-02		x	x	x	x	x	x	x	x	x	x
0x0114 0x0115	signed long *low* *high*	Minwert U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0116 0x0117	signed long *low* *high*	Maxwert U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0118 0x0119	signed long *low* *high*	Minwert U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011A 0x011B	signed long *low* *high*	Maxwert U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011C 0x011D	signed long *low* *high*	Minwert U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x011E 0x011F	signed long *low* *high*	Maxwert U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0120 0x0121	signed long *low* *high*	Minwert I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0122 0x0123	signed long *low* *high*	Maxwert I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0124 0x0125	signed long *low* *high*	Minwert I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0126 0x0127	signed long *low* *high*	Maxwert I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0128 0x0129	signed long *low* *high*	Minwert I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x012A 0x012B	signed long *low* *high*	Maxwert I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x012C 0x012D	signed long *low* *high*	Minwert P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x012E 0x012F	signed long *low* *high*	Maxwert P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x

*Im Fall von Programm 7, 8, 9 und 10 reagiert **K3** auf drei Stufen sukzessiv gemäß der VDE-AR-N 4105.

Adr. hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0130 0x0131	signed long *low high*	Minwert P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0132 0x0133	signed long *low high*	Maxwert P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0134 0x0135	signed long *low high*	Minwert P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0136 0x0137	signed long *low high*	Maxwert P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0138 0x0139	signed long *low high*	Minwert P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x013A 0x013B	signed long *low*	Maxwert P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x013C 0x013D	signed long *low high*	Summe zugeschalteter Lasten per Relais [W]	0 …	150000	x	x	x	x	x	x	x	x	x	x
0x013E 0x013F	unsigned long *low high*	Angesteuerte Last per Analogausgang I [W]	0 …	50000	x	x	x	x	x	x	x	x	x	x
0x0140 0x0141	unsigned long *low high*	Angesteuerte Last per Analogausgang U [W]	0 …	50000	x	x	x	x	x	x	x	x	x	x
0x0142	signed int	Digitaleingang Y1	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0143	signed int	Digitaleingang Y2	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0144	signed int	Digitaleingang Y3	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0145	signed int	Digitaleingang 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-Funktion K1	0 = auto/aus 1 = ein für 2 = aus für 3 = manuell ein 4 = manuell aus		x	x	x							
0x0148	signed int	Status Timer-Funktion K2			x	x	x							
0x0149	signed int	Status Timer-Funktion K3			x	x	x							
0x014A	signed int	Status Timer-Funktion Out I			x	x	x							
0x014B	signed int	Status Timer-Funktion Out U			x	x	x							
0x014C 0x014D	unsigned long *low high*	Ist-Zeit von Timer-Funktion K1 [s]	0 …	86400	x	x	x							
0x014E 0x014F	unsigned long *low high*	Ist-Zeit von Timer-Funktion K2 [s]	0 …	86400	x	x	x							
0x0150 0x0151	unsigned long *low high*	Ist-Zeit von Timer-Funktion K3 [s]	0 …	86400	x	x	x							
0x0152 0x0153	unsigned long *low high*	Ist-Zeit von Timer-Funktion Out I [s]	0 …	86400	x	x	x							
0x0154 0x0155	unsigned long *low high*	Ist-Zeit von Timer-Funktion Out U [s]	0 …	86400	x	x	x							
0x0156 0x0157	signed long *low high*	Einspeisung L1 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x0158 0x0159	signed long *low high*	Einspeisung L2 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x015A 0x015B	signed long *low high*	Einspeisung L3 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x015C 0x015D	signed long *low high*	Einspeisung L123 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x015E 0x015F	signed long *low high*	Bezug L1 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0160 0x0161	signed long *low high*	Bezug L2 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0162 0x0163	signed long *low high*	Bezug L3 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x

Adr. hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0164 0x0165	signed long *low high*	Bezug L123 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0166 0x0167	signed long *low high*	Bezug - Einspeisung L123 [Wh]	-2147483648	2147483647	x	x	x	x	x	x	x	x	x	x
0x0168 0x0169	signed long *low high*	Eigenverbrauch an K1 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x016A 0x016B	signed long *low high*	Eigenverbrauch an K2 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x016C 0x016D	signed long *low high*	Eigenverbrauch an K3 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x016E 0x016F	signed long *low high*	Eigenverbrauch an Out I [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0170 0x0171	signed long *low high*	Eigenverbrauch an Out U [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0172 0x0173	signed long *low high*	Eigenverbrauch an K123 + Out I + U [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0174 0x0175	signed long *low high*	Istwert U - L1-L2 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x0176 0x0177	signed long *low high*	Istwert U - L1-L3 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x0178 0x0179	signed long *low high*	Istwert U - L2-L3 [0,1 V]	3 …	433013	x	x	x	x	x	x	x	x	x	x
0x017A 0x017B	signed long *low high*	Istwert U-10-Perioden- L1 [0,1 V]	1 …	250000							x	x	x	x
0x017C 0x017D	signed long *low high*	Istwert U-10-Perioden- L2 [0,1 V]	1 …	250000							x	x	x	x
0x017E 0x017F	signed long *low high*	Istwert U-10-Perioden- L3 [0,1 V]	1 …	250000							x	x	x	x
0x0180 0x0181	signed long *low high*	Istwert I-10-Perioden- L1 [mA]	1 …	2400000							x	x	x	x
0x0182 0x0183	signed long *low high*	Istwert I-10-Perioden- L2 [mA]	1 …	2400000							x	x	x	x
0x0184 0x0185	signed long *low high*	Istwert I-10-Perioden- L3 [mA]	1 …	2400000							x	x	x	x

6.2 Messwerte, Statuswerte und Min.-/Max.-Messwerte auslesen (Stand: EFR4000IP)

- Modbus Funktioncode 0x03 (Read Holding Registers)

Adr. hex	Datentyp		Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0000 0x0001	signed long	*low* *high*	Istwert U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0002 0x0003	signed long	*low* *high*	Istwert U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0004 0x0005	signed long	*low* *high*	Istwert U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0006 0x0007	signed long	*low* *high*	Istwert I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0008 0x0009	signed long	*low* *high*	Istwert I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x000A 0x000B	signed long	*low* *high*	Istwert I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x000C 0x000D	signed long	*low* *high*	Istwert P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x000E 0x000F	signed long	*low* *high*	Istwert P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0010 0x0011	signed long	*low* *high*	Istwert P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0012 0x0013	signed long	*low* *high*	Istwert P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x0014 0x0015	signed long	*low* *high*	Istwert Frequenz [0,01 Hz]	4000 …	7000	x	x	x	x	x	x	x	x	x	x
0x0016	signed int		Status Messwert I - L1	0 = Messwert in Ordnung 1 = Messbereich überschritten 2 = Messbereich unterschritten 3 = Simulation		x	x	x	x	x	x	x	x	x	x
0x0017	signed int		Status Messwert I - L2			x	x	x	x	x	x	x	x	x	x
0x0018	signed int		Status Messwert I - L3			x	x	x	x	x	x	x	x	x	x
0x0019	signed int		Status Messwert U - L1			x	x	x	x	x	x	x	x	x	x
0x001A	signed int		Status Messwert U - L2			x	x	x	x	x	x	x	x	x	x
0x001B	signed int		Status Messwert U - L3			x	x	x	x	x	x	x	x	x	x
0x001C	signed int		Status Messwert P - L1			x	x	x	x	x	x	x	x	x	x
0x001D	signed int		Status Messwert P - L2			x	x	x	x	x	x	x	x	x	x
0x001E	signed int		Status Messwert P - L3			x	x	x	x	x	x	x	x	x	x
0x001F	signed int		Status Messwert P - L123			x	x	x	x	x	x	x	x	x	x
0x0020 0x0021	signed long	*low* *high*	Einschaltzeit K1 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0022 0x0023	signed long	*low* *high*	Einschaltzeit K2 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0024 0x0025	signed long	*low* *high*	Einschaltzeit K3 [Min.]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0026	signed int		Aktueller Fehler (Error)	0 = aktuell kein Error 1 = Error liegt an		x	x	x	x	x	x	x	x	x	x
0x0027	signed int		Error-Speicher (Limitfehler)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0028	signed int		Error-Speicher (Last Differenz)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0029	signed int		Error-Speicher (AD Wandler)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002A	signed int		Error-Speicher (Abgleichwerte)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002B	signed int		Error-Speicher (Parameter Bereichsüberschreitung)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002C	signed int		Error-Speicher (Skalierung Analogausgang)	0 …	99	x	x	x	x	x	x	x	x	x	x

Adr. Hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x002D	signed int	Error-Speicher (Stromwandler prüfen)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002E	signed int	Error-Speicher (min. 2 gleiche Lastgrößen)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x002F	signed int	Error-Speicher (reserve)	0 …	99	x	x	x	x	x	x	x	x	x	x
0x0030	signed int	Relaisstatus K1	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0031	signed int	Relaisstatus K2	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0032	signed int	Relaisstatus K3	0 (abgefallen)	1 (angezogen)	x	x	x	x	x	x	x	x	x	x
0x0033	signed int	Alarmstatus 0 (K1 / Stufe 1)	0 = Alarm Aus 1 = Einschaltverz. läuft 2 = Alarm Ein 3 = Alarmverz. läuft 4 = Alarm verriegelt		x	x	x	x	x	x	x	x	x	x
0x0034	signed int	Alarmstatus 1 (K2 / Stufe 2)			x	x	x	x	x	x	x	x	x	x
0x0035	signed int	Alarmstatus 2 (K3* / Stufe 3)			x	x	x	x	x	x	x	x	x	x
0x0036	signed int	Alarmstatus 3 (Stufe 4)					x							
0x0037	signed int	Alarmstatus 4 (Stufe 5)					x							
0x0038	signed int	Alarmstatus 5 (Stufe 6)					x							
0x0039	signed int	Alarmstatus 6 (Stufe 7)					x							
0x003A 0x003B	signed long *low* *high*	Gerätestatus	nur für interne Service Zwecke		x	x	x	x	x	x	x	x	x	x
0x003C 0x003D	signed long *low* *high*	Seriennummer			x	x	x	x	x	x	x	x	x	x
0x003E 0x003F	signed long *low* *high*	Betriebsstundenzähler	in Stunden [h]		x	x	x	x	x	x	x	x	x	x
0x0040	signed int	Firmware-Version, App.	z.B. 03EA (hex) = 1002 (dez) -> 12720-1410-02		x	x	x	x	x	x	x	x	x	x
0x0041	signed int	Firmware-Version, Bootl.			x	x	x	x	x	x	x	x	x	x
0x0042 0x0043	signed long *low* *high*	Minwert U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0044 0x0045	signed long *low* *high*	Maxwert U - L1 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0046 0x0047	signed long *low* *high*	Minwert U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x0048 0x0049	signed long *low* *high*	Maxwert U - L2 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004A 0x004B	signed long *low* *high*	Minwert U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004C 0x004D	signed long *low* *high*	Maxwert U - L3 [0,1 V]	1 …	250000	x	x	x	x	x	x	x	x	x	x
0x004E 0x004F	signed long *low* *high*	Minwert I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0050 0x0051	signed long *low* *high*	Maxwert I - L1 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0052 0x0053	signed long *low* *high*	Minwert I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0054 0x0055	signed long *low* *high*	Maxwert I - L2 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0056 0x0057	signed long *low* *high*	Minwert I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x0058 0x0059	signed long *low* *high*	Maxwert I - L3 [mA]	1 …	2400000	x	x	x	x	x	x	x	x	x	x
0x005A 0x005B	signed long *low* *high*	Minwert P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x005C 0x005D	signed long *low* *high*	Maxwert P - L1 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x

*Im Fall von Programm 7, 8, 9 und 10 reagiert **K3** auf drei Stufen sukzessiv gemäß der VDE-AR-N 4105.

Adr. Hex	Datentyp		Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x005E 0x005F	signed long	*low* *high*	Minwert P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0060 0x0061	signed long	*low* *high*	Maxwert P - L2 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0062 0x0063	signed long	*low* *high*	Minwert P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0064 0x0065	signed long	*low* *high*	Maxwert P - L3 [W]	-30000000…	30000000	x	x	x	x	x	x	x	x	x	x
0x0066 0x0067	signed long	*low* *high*	Minwert P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x0068 0x0069	signed long	*low* *high*	Maxwert P - L123 [W]	-90000000…	90000000	x	x	x	x	x	x	x	x	x	x
0x006A 0x006B	signed long	*low* *high*	Summe zugeschalteter Lasten per Relais [W]	0 …	150000	x	x	x	x	x	x	x	x	x	x
0x006C 0x006D	unsigned long	*low* *high*	Angesteuerte Last per Analogausgang I [W]	0 …	50000	x	x	x	x	x	x	x	x	x	x
0x006E 0x006F	unsigned long	*low* *high*	Angesteuerte Last per Analogausgang U [W]	0 …	50000	x	x	x	x	x	x	x	x	x	x
0x0070	signed int		Digitaleingang Y1	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0071	signed int		Digitaleingang Y2	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0072	signed int		Digitaleingang Y3	0 …	1	x	x	x	x	x	x	x	x	x	x
0x0073	signed int		Digitaleingang 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-Funktion K1	0 = auto/aus 1 = ein für 2 = aus für 3 = manuell ein 4 = manuell aus		x	x	x							
0x0076	signed int		Status Timer-Funktion K2			x	x	x							
0x0077	signed int		Status Timer-Funktion K3			x	x	x							
0x0078	signed int		Status Timer-Funktion Out I			x	x	x							
0x0079	signed int		Status Timer-Funktion Out U			x	x	x							
0x007A 0x007B	unsigned long	*low* *high*	Ist-Zeit von Timer-Funktion K1 [s]	0 …	86400	x	x	x							
0x007C 0x007D	unsigned long	*low* *high*	Ist-Zeit von Timer-Funktion K2 [s]	0 …	86400	x	x	x							
0x007E 0x007F	unsigned long	*low* *high*	Ist-Zeit von Timer-Funktion K3 [s]	0 …	86400	x	x	x							
0x0080 0x0081	unsigned long	*low* *high*	Ist-Zeit von Timer-Funktion Out I [s]	0 …	86400	x	x	x							
0x0082 0x0083	unsigned long	*low* *high*	Ist-Zeit von Timer-Funktion Out U [s]	0 …	86400	x	x	x							
0x0084 0x0085	signed long	*low* *high*	Einspeisung L1 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x0086 0x0087	signed long	*low* *high*	Einspeisung L2 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x0088 0x0089	signed long	*low* *high*	Einspeisung L3 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x008A 0x008B	signed long	*low* *high*	Einspeisung L123 [Wh]	-2147483648	… 0	x	x	x	x	x	x	x	x	x	x
0x008C 0x008D	signed long	*low* *high*	Bezug L1 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x008E 0x008F	signed long	*low* *high*	Bezug L2 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0090 0x0091	signed long	*low* *high*	Bezug L3 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x

Adr. Hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0092 0x0093	signed long *low* *high*	Bezug L123 [Wh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0094 0x0095	signed long *low* *high*	Bezug - Einspeisung L123 [Wh]	-2147483648	2147483647	x	x	x	x	x	x	x	x	x	x
0x0096 0x0097	signed long *low* *high*	Eigenverbrauch an K1 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x0098 0x0099	signed long *low* *high*	Eigenverbrauch an K2 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x009A 0x009B	signed long *low* *high*	Eigenverbrauch an K3 [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x009C 0x009D	signed long *low* *high*	Eigenverbrauch an Out I [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x009E 0x009F	signed long *low* *high*	Eigenverbrauch an Out U [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x
0x00A0 0x00A1	signed long *low* *high*	Eigenverbrauch an K123 + Out I + U [kWh]	0 …	2147483647	x	x	x	x	x	x	x	x	x	x

6.3 Parameter auslesen und schreiben

- Modbus Funktioncode 0x03 (Read Holding Registers)
- Modbus Funktioncode 0x10 (Write Multiple registers)

Adr. hex	Datentyp		Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0200	signed int		Programmnummer	1…	10	x	x	x	x	x	x	x	x	x	x
0x0201	signed int		Stromwandler-Primär [A]	1…	1000	x	x	x	x	x	x	x	x	x	x
0x0202	signed int		Stromwandler-Sekundär [0,1 A]	1…	50	x	x	x	x	x	x	x	x	x	x
0x0203	signed long	*low*	Leistung an K1 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0204		*high*													
0x0205	signed long	*low*	Leistung an K2 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0206		*high*													
0x0207	signed long	*low*	Leistung an K3 (step 10 W) [W]	0…	500000	x	x	x	x						
0x0208		*high*													
0x0209	signed int		Phase an Relais K1	-5 = L123, -4 = L3, -3 = L2, -2 = L1, -1 = aus		x	x	x	x		x				
0x020A	signed int		Phase an Relais K2			x	x	x	x		x				
0x020B	signed int		Phase an Relais K3			x	x	x	x		x				
0x020C	signed int		Relaisfunktion K1	-2 = 11-12	-1 = 11-14	x	x	x	x						
0x020D	signed int		Relaisfunktion K2	-2 = 21-22	-1 = 21-24	x	x	x	x						
0x020E	signed int		Relaisfunktion K3	-2 = 31-32	-1 = 31-34	x	x	x	x						
0x020F	signed long	*low*	Verz. ein K1 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0210		*high*	Verz. ein [s]					x							
0x0211	signed long	*low*	Verz. ein K2 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0212		*high*													
0x0213	signed long	*low*	Verz. ein K3 [s]	0…	86399	x	x		x	x	x	x	x	x	x
0x0214		*high*													
0x0215	signed long	*low*	Min ein K1 [s]	10…	86399	x	x		x						
0x0216		*high*	Min ein					x							
0x0217	signed long	*low*	Min ein K2 [s]	10…	86399	x	x		x						
0x0218		*high*													
0x0219	signed long	*low*	Min ein K3 [s]	10…	86399	x	x		x						
0x021A		*high*													
0x021B	signed long	*low*	Verz. aus K1 [s]	10…	86399	x	x		x						
0x021C		*high*	Verz. aus					x							
			Verz. aus K1 [0,01s]	0…	359999					x	x	x	x	x	x
0x021D	signed long	*low*	Verz. aus K2 [s]	10…	86399	x	x		x						
0x021E		*high*	Verz. aus K2 [0,01s]	0…	359999					x	x	x	x	x	x
0x021F	signed long	*low*	Verz. aus K3 [s]	10…	86399	x	x		x						
0x0220		*high*	Verz. aus K3 [0,01s]	0…	359999					x	x				
0x0221	signed long	*low*	Laständ K1 [s]	10…	86399	x	x		x						
0x0222		*high*													
0x0223	signed long	*low*	Laständ K2 [s]	10…	86399	x	x		x						
0x0224		*high*													
0x0225	signed long	*low*	Laständ K3 [s]	10…	86399	x	x		x						
0x0226		*high*													
0x0227	signed long	*low*	Leistung K1 ein (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x0228		*high*	Abschaltwert (step 10 W) [W]					x							
0x0229	signed long	*low*	Leistung K2 ein (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022A		*high*													
0x022B	signed long	*low*	Leistung K3 ein (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022C		*high*													

Adr. hex	Datentyp		Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x022D 0x022E	signed long	*low* *high*	Leistung K1 aus (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x022F 0x0230	signed long	*low* *high*	Leistung K2 aus (step 10 W) [W]	-999990…	999990	x	x		x	x	x	x	x	x	x
0x0231 0x0232	signed long	*low* *high*	Leistung K3 aus (step 10 W) [W]	-999990…	999990	x	x		x	x	x				
0x0233	signed int		Auto Reset K1	-1 = an	-2 = aus					x	x	x	x	x	x
0x0234	signed int		Auto Reset K2	-1 = an	-2 = aus					x	x	x	x	x	x
0x0235	signed int		Auto Reset K3	-1 = an	-2 = aus					x	x	x	x	x	x
0x0236	signed int		Funktion Input Y1	-13 = Aout-U 100%, -12 = Aout-U 0%, -11 = Aout-I 100%, -10 = Aout-I 0%, -9 = K3 aus, -8 = K2 aus, -7 = K1 aus, -6 = K3 an, -5 = K2 an, -4 = K1 an, -3 = K1-3 an,-2 = K1-3 aus, -1 = aus		x	x	x	x					
0x0237	signed int		Funktion Input Y2			x	x	x	x						
0x0238	signed int		Funktion Input Y3			x	x	x	x						
0x0239	signed int		Funktion Input Y4			x	x	x	x						
0x023A	signed int		Analogausgang I, Funktion	-9 = Last-L3, -8 = Last-L2, -7 = Last-L1, -6 = Last-L123, -5 = kW-L3, -4 = kW-L2, -3 = kW-L1, -2 = kW-L123, -1 = aus		x	x	x	x	x	x	x	x	x	x
0x023B	signed int		Analogausgang I, 0-20mA / 4-20 mA / Individuell	-3 = Ind, -2 = 4-20 mA, -1 = 0-20 mA		x	x	x	x	x	x	x	x	x	x
0x023C	signed int		Analogausgang I, individueller Nullpkt. [0,01 mA]	0 …	1000	x	x	x	x	x	x	x	x	x	x
0x023D 0x023E	signed long	*low* *high*	Analogausgang I, Nullpunkt (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x023F 0x0240	signed long	*low* *high*	Analogausgang I, Fullscale (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x0241 0x0242	signed long	low high	Analogausgang I, Sollwert (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x0243 0x0244	signed long	low high	Analogausgang I, max. Leistung (step 10 W) [W]	0…	500000	x	x	x	x	x	x	x	x	x	x
0x0245	signed int		Analogausgang I, Regel-Geschwindigkeit [%]	20…	90	x	x	x	x	x	x	x	x	x	x
0x0246	signed int		Analogausgang I, Regel-Intervall [0,1 s]	5…	600	x	x	x	x	x	x	x	x	x	x
0x0247	signed int		Analogausgang I, Regel-Toleranz. [%]	5…	50	x	x	x	x	x	x	x	x	x	x
0x0248	signed int		Analogausgang U, Funktion	-9 = Last-L3, -8 = Last-L2, -7 = Last-L1, -6 = Last-L123, -5 = kW-L3, -4 = kW-L2, -3 = kW-L1, -2 = kW-L123, -1 = aus		x	x	x	x	x	x	x	x	x	x
0x0249	signed int		Analogausgang U, 0-10V / 2-10V / Individuell	-3=Ind, -2=2-10 V, -1=0-10 V		x	x	x	x	x	x	x	x	x	x
0x024A	signed int		Analogausgang U, individueller Nullpkt. [0,01 V]	0 …	500	x	x	x	x	x	x	x	x	x	x
0x024B 0x024C	signed long	*low* *high*	Analogausgang U, Nullpunkt (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x024D 0x024E	signed long	*low* *high*	Analogausgang U, Fullscale (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x
0x024F 0x0250	signed long	low high	Analogausgang U, Sollwert (step 10 W) [W]	-999990…	999990	x	x	x	x	x	x	x	x	x	x

Adr. hex	Datentyp	Register	Wertebereich Min.	Max.	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0251 0x0252	signed long low high	Analogausgang U, max. Leistung (step 10 W) [W]	0…	500000	x	x	x	x	x	x	x	x	x	x
0x0253	signed int	Analogausgang U, Regel-Geschwindigkeit [%]	20…	90	x	x	x	x	x	x	x	x	x	x
0x0254	signed int	Analogausgang U, Regel-Intervall [0,1 s]	5…	600	x	x	x	x	x	x	x	x	x	x
0x0255	signed int	Analogausgang U, Regel-Toleranz. [%]	5…	50	x	x	x	x	x	x	x	x	x	x
0x0256	signed int	Sprache	-2 = englisch, -1 = deutsch		x	x	x	x	x	x	x	x	x	x
0x0257	signed int	TFT-Helligkeit [%]	20…	100	x	x	x	x	x	x	x	x	x	x
0x0258	signed int	TFT, dimmen nach … [s]	10…	3600	x	x	x	x	x	x	x	x	x	x
0x0259	signed int	Displayverzögerung [0,1 s]	1…	20	x	x	x	x	x	x	x	x	x	x
0x025A	signed int	Timer-Funktion K1	0 = auto, 1 = ein für, 2 = aus für, 3 = manuell ein, 4 = manuell aus		x	x	x	x						
0x025B	signed int	Timer-Funktion K2			x	x	x	x						
0x025C	signed int	Timer-Funktion K3			x	x	x	x						
0x025D	signed int	Timer-Funktion Out I			x	x	x	x						
0x025E	signed int	Timer-Funktion Out U			x	x	x	x						
0x025F	signed int	Timer-Funktion K1, Zeit von "ein für /aus für" [Min.]	1…	1440	x	x	x	x						
0x0260	signed int	Timer-Funktion K2, Zeit von "ein für / aus für" [Min.]	1…	1440	x	x	x	x						
0x0261	signed int	Timer-Funktion K3, Zeit von "ein für / aus für" [Min.]	1…	1440	x	x	x	x						
0x0262	signed int	Timer-Funktion I, Zeit von "ein für / aus für" [Min.]	1…	1440	x	x	x	x						
0x0263	signed int	Timer-Funktion U, Zeit von "ein für / aus für" [Min.]	1…	1440	x	x	x	x						
0x0264	signed int	Timer-Funktion, Last an Out I [%]	0…	100	x	x	x	x						
0x0265	signed int	Timer-Funktion, Last an Out U [%]	0…	100	x	x	x	x						

6.4 Reset-Funktionen auslösen

- Modbus Funktioncode 0x10 (Write Multiple registers)

Adr. hex	Datentyp	Register	*Wert*	Prog.-Nr. 1	2	3	4	5	6	7	8	9	10
0x0100	signed int	Reset Min/Max U	*write 1 -> Reset alle U*	x	x	x	x	x	x	x	x	x	x
0x0101	signed int	Reset Min/Max I	*write 1 -> Reset alle I*	x	x	x	x	x	x	x	x	x	x
0x0102	signed int	Reset Min/Max P	*write 1 -> Reset alle P*	x	x	x	x	x	x	x	x	x	x
0x0103	signed int	Einschaltzeit K1…K3	*write 1 -> Reset alle Zeiten*	x	x	x	x	x	x	x	x	x	x
0x0104	signed int	Error-Speicher	*write 1 -> Reset alle Errors*	x	x	x	x	x	x	x	x	x	x
0x0105	signed int	Verriegelte Relais	*write 1 -> Reset locked Rel.*					x	x	x	x	x	x
0x0106	signed int	Reset Energiezähler	write 1 -> Reset	x	x	x	x	x	x	x	x	x	x