KOMPETENZ VERBINDET. SCHRACK TECHNIK

DIZ Modbus Description

Index: 01

Modbus Description for DIZ gen. G
with firmware version 1.090000

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1 Introduction

If the DIZ generation G has the appropriate meter type and configuration, it supports the Modbus RTU (Remote Terminal Unit) protocol. Modbus RTU is an open master slave protocol, which has been designed by the company Modicon (today Schneider Electric). The master sends a telegram via the bus, which can be addressed to one special slave or to all slaves (broadcast). If the slave processes the telegram without any conflicts, the slave sends a special reply, depending on the received type of telegram. The initiation of data exchange is permitted only for the master. Within each group there is only one master but up to 247 slaves are possible.

The documents available at www.Modbus-IDA.org, like „Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev.J“ or „Modbus Application Protocol Specification V1.1b“, were used for reference for the development.

Note: Schneider Electric used for the amount of useful data the term “register”.
using the term “word” in order not to be confused with the actual registers.

2 Mode of transmission

The settings of the serial interface are named as mode of transmission. The following possibilities are available:

1. 1 Start-, 8 Data-, 1 Stop bit, even parity
2. 1 Start-, 8 Data-, 1 Stop bit, uneven parity
3. 1 Start-, 8 Data-, 2 Stop bit, none parity
4. 1 Start-, 8 Data-, 1 Stop bit, none parity

The mode of transmission can be changed via Modbus as well as via the operating menu using the call-up button.

3 Baud rates

Supported baud rates are 1200, 2400, 4800, 9600 19200 and 38400 baud.

4 Applications

4.1 Exception error

If, for example, a telegram with an improper register address has been received, the slave sends a telegram with the respective exception code to the master.

The syntax of the response is composed as follows:

Device address	Function	Subfunction	Data	CRC
***AA*$_{16}$**	***BB*$_{16}$**	***CC*$_{16}$**	(none)	***DDDD*$_{16}$**

Parameter

***AA*$_{16}$**: Contains the address of the slave.

***BB*$_{16}$**: Contains the original function plus the set MSB.

***CC*$_{16}$**: Contains the exception code
(Refer to *Table 4-1: Exception Codes*).

***DDDD*$_{16}$**: Checksum (CRC16) of the telegram.

Exception Code	Description
01_{16} → (Illegal Function)	The device does not support the code of the function.
02_{16} → (Illegal DATA ADDRESS)	The meter does not support this type of telegram in connection with one or several selected register addresses (e. g. read out of parts of a register or writing on non-supported register addresses) (refer to *Table 4-3: Troubleshooting*)).
03_{16} → (Illegal DATA VALUE)	A value of the telegram data is invalid (e. g. the requested number of data exceeds the maximum value).
04_{16} → (Slave Device Failure)	The telegram has been received, but the data to be written has not been accepted (e. g. invalid parameter).

Table 4-1: Exception Codes

Example for reading out a register address (0209_{16}) which is not supported from the device with the address 01:

→	01 03 02 09 00 02 15 B1
←	01 83 02 C0 F1

4.2 Functions

4.2.1 Function 03

To read the content of registers with Modbus, the value 03_{16} has to be entered into the function field. With this function, the content of different registers can be read out in one telegram.
Additionally, the register address and the number of the words to be read out (2 bytes) are required.

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
AA_{16}	03_{16}	***$BBBB_{16}$***	***$CCCC_{16}$***	***$DDDD_{16}$***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
AA_{16}	03_{16}	***EE_{16}***	***$FF……_{16}$***	***$DDDD_{16}$***

Parameter

AA_{16}: Contains the address of the slave/server.

$BBBB_{16}$: Contains the address of the register, whose values have to be send back first with the response.

$CCCC_{16}$: Contains the number of the data words (2 bytes), which have to be enclosed in the response.

$DDDD_{16}$: Contains the checksum (CRC16) of the telegram.

EE_{16}: Contains the number of data bytes in the response (number of data words * 2).

$FF……_{16}$: Contains the content of the registers.

Remark 1 : For the addresses of the register refer to the appendix.

Example for reading date and time (09.07.12 11:14:10) from the device with the address 01:

→	01 03 FE 34 00 09 F5 EA
←	01 03 12 00 01 00 0C 00 07 00 09 00 0B 00 0E 00 0A 00 00 00 1C 8F F4

4.2.2 Function 06

To set the content of a single register and with a width of 1 word (2 bytes), the value 06_{16} has to be entered into the function field. Additionally, the register address is required. The request 1:1 is send back to the master as an approval.

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
***AA*$_{16}$**	06_{16}	***BBBB*$_{16}$**	(none)	(none)	***CCCC*$_{16}$**	***DDDD*$_{16}$**

Parameter

***AA*$_{16}$**: Contains the address of the slave/server.

***BBBB*$_{16}$**: Contains the address of the register, which values have to be set.

***CCCC*$_{16}$**: Contains the value to be set.

***DDDD*$_{16}$**: Contains the checksum (CRC16) of the telegram.

Remark 1: If the function is part of a broadcast, the write attempt is carried out for all connected devices.

Example for setting the baud rate (19200 baud) of the device with the address 01:

→	01 06 FE 00 00 08 B9 E4
←	01 06 FE 00 00 08 B9 E4

4.2.3 Function 08

For the Modbus interface are several possibilities for diagnostics available. To perform a diagnosis the value 08_{16} has to be entered into the function field. With this function additional subfunctions can be send to the slave for diagnosing.

The syntax of the request is composed as follows:

Device address	Function	Subfunction	Data	CRC
***AA*$_{16}$**	08_{16}	***BBBB*$_{16}$**	***CCCC*$_{16}$**	***DDDD*$_{16}$**

The syntax of the response is composed as follows:

Device address	Function	Subfunction	Data	CRC
***AA*$_{16}$**	08_{16}	***BBBB*$_{16}$**	***CCCC*$_{16}$**	***DDDD*$_{16}$**

Parameter

***AA*$_{16}$**: Contains the address of the slave/server.

***BBBB*$_{16}$**: Contains the subfunction, which describes the type of diagnosis (refer to *Table 4-2: Subfunctions for diagnosis*).

***CCCC*$_{16}$**: Can contain data (e. g. data of an echo-function). These boxes are also placeholders for data, such as meters, like to be transferred from the slave to the master.

***DDDD*$_{16}$**: Contains the checksum (CRC16) of the telegram.

The following subfunctions are supported:

Subfunction	Description
0000_{16} → (Return Query Data)	Exact this telegram will be returned from the slave.
0001_{16} → (Restart Comm Option)	The data interface reinitialised completely (only function which can end the listen only mode). Before reinitialising the interface, the telegram is send back to the master (not in listen only mode).
0004_{16} → (Force Listen Only Mode)	The slave will except incoming data from the master. The received telegrams will be checked, but not processed. No responses are send.
$000A_{16}$ → (Clears Ctrs and Diagnostic Reg.)	All count and diagnostic registers of the data interface are reset.
$000B_{16}$ → (Return Bus Message Count)	The slave will response with the value of the meter for the number of all received telegrams (since last initialisation), whether these values have been correct or not.
$000C_{16}$ → (Return Bus Comm. Error Cnt)	The slave will return the number of the recognised checksum errors (since last re-initialisation) of the meter.
$000D_{16}$ → (Return Bus Exception Error Cnt)	The slave will return the number for the recognised exception errors (since the last initialisation).
$000E_{16}$ → (Return Slave Message Count)	The slave will response with the number of the processed messages (since the last initialisation).

Table 4-2: Subfunctions for diagnosis

Example for the request for resetting the data interface of the device with the address 01:

→	01 08 00 01 00 00 B1 CB
←	01 08 00 01 00 00 B1 CB

4.2.4 Function 16

To set the content of one or several registers with a length of 1 up to 123 words (≥ 2 bytes), the value 16 (10_{16}) has to be entered into the function field.
Additionally, the register address and the number of words (16 bit) are required.

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
AA_{16}	10_{16}	***$BBBB_{16}$***	***$CCCC_{16}$***	***EE_{16}***	***$FF...._{16}$***	***$DDDD_{16}$***

The syntax of the response is composed as follows:

Device	Function	Data		CRC
		Start	Words	
AA_{16}	10_{16}	***$BBBB_{16}$***	***$CCCC_{16}$***	***$DDDD_{16}$***

Parameter

AA_{16}: Contains the address of the slave/server.

$BBBB_{16}$: Contains the address of the register, of which values have to be set first.

$CCCC_{16}$: Contains the number of words of the payload (2 bytes).

$DDDD_{16}$: Contains the checksum (CRC16) of the telegram.

EE_{16}: Contains the number of bytes of the payload (number of data words * 2).

$FF....._{16}$: Contains the values to be set.

Example for setting date and time (09.07.12 11:14:10) of the device with the address 01:

→	01 10 FE 34 00 09 12 00 01 00 0C 00 07 00 09 00 0B 00 0E 00 0A 00 00 00 1C 42 92
←	01 10 FE 34 00 09 70 29

4.3 Registers

In this document, registers represent a logical unit, consisting of a fixed number of data words. Partial reading or writing of registers is not supported.
Many specifications use the term register for the amount of data. In this description, the terms byte and word (1 word is equivalent to 2 bytes) are used for information about the amount of data.

Depending on the configuration of the meter, it is possible that some of the registers stated in *Table 4-4: Register addresses* could not processed internally. In such cases, the affected registers are not supported by the Modbus interface. The request for such non-supported registers will be respond with zeroes. In case of a write access, an error message (exception: ILLEGAL DATA ADDRESS = 02) is returned.

The registers are divided in the following access groups:

- Read only data → These data can't be written. If applicable, the output format can be influenced (indirectly).
- Set data → These data can be written at any time.
- Edit data → These data can be written in edit mode only.
- Parameter data → These data can't be written (like read data).

4.4 Edit data

4.4.1 Locking the edit mode

Description : To lock the edit menu/edit mode

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……16	06_{16}	$FEDF_{16}$	(none)	(none)	***UUUU***$_{16}$	***……16***

Values of ***UUUU$_{16}$*** : 0001_{16}

Remark 1 : Please note, that the locking can be cancelled only by activating/setting the parameterization mode/status.

Remark 2 : A read of the address $FEDF_{16}$ returns the latest status of the locking (0000_{16} = edit mode open/0001_{16} = edit mode locked).

Example for locking the edit mode of the device with the address 01:

→	01 06 FE DF 00 01 48 18
←	01 06 FE DF 00 01 48 18

4.4.2 Pulse length of the output

Description : Set/read the pulse length for the pulse output

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FEE0_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FEE0_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : 0000_{16} 30 ms
0001_{16} 50 ms
0002_{16} 100 ms
0004_{16} 500 ms

Example for setting a pulse length of 50 ms:

→	01 06 FE E0 00 01 78 14
←	01 06 FE E0 00 01 78 14

4.4.3 Pulse constant at output

Description : Set/read the constant for the pulse output

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FEE1_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FEE1_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : 0000_{16} 1 Imp./kWh
0001_{16} 10 Imp./kWh
0002_{16} 50 Imp./kWh
0004_{16} 100 Imp./kWh
0008_{16} 500 Imp./kWh
0010_{16} 1.000 Imp./kWh
0020_{16} 5.000 Imp./kWh
0040_{6} 10.000 Imp./kWh
0080_{16} 50.000 Imp./kWh
0100_{16} 100.000 Imp./kWh

Example for setting the pulse constant to 500 Imp./kWh:

→	01 06 FE E1 00 08 E9 D2
←	01 06 FE E1 00 08 E9 D2

4.4.4 Transformer factor for current

Description : Set/read the transformer factor for current

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FEE2_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FEE1_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : Transformer factor in the range of 0001_{16} to $270F_{16}$ (1_{10} to 9.999_{10}).

Remark 1 : The product of the transformer factors for current and voltage must not exceed 999.999.

Remark 2 : The energy register values are reset to 0 after changing the transformer factors.

Example for setting the transformer factor $7B_{16}$ (123_{10}):

→	01 06 FE E2 00 7B 58 37
←	01 06 FE E2 00 7B 58 37

4.4.5 Transformer factor for voltage

Description : Set/read the transformer factor for voltage

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FEE3_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FEE3_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : Transformer factor in the range of 0001_{16} to $03E7_{16}$ (1_{10} to 999_{10}).

Remark 1 : The product of the transformer factors for current and voltage must not exceed 999.999.

Remark 2 : The energy register values are reset to 0 after changing the transformer factors.

Example for setting the transformer factor $7B_{16}$ (123_{10}):

→	01 06 FE E3 00 7B 09 F7
←	01 06 FE E3 00 7B 09 F7

4.4.6 Arity of energy register

Description : Set/read the arity of the energy register

Access group : Edit data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FEE4_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FEE4_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : 00_{16} = 4444.4444 kWh/ kvarh
01_{16} = 55555.333 kWh/ kvarh
02_{16} = 666666.22 kWh/ kvarh
04_{16} = 7777777.1 kWh/ kvarh
08_{16} = 88888888 kWh/ kvarh

Example for setting the arity of the energy register (55555.33 kWh).

→	01 06 FE E4 00 01 39 D5
←	01 06 FE E4 00 01 39 D5

4.5 Measured data

4.5.1 Energy register

Description : Read the value of the energy registers/register reading

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	***$BBBB_{16}$***	***$CCCC_{16}$***	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	***EE_{16}***	***FF……16***	***……16***

Parameter

$BBBB_{16}$: Set the address of the energy register to be read first. For the address refer to *Table 4-4: Register addresses*.

$CCCC_{16}$: Contains the number of the data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each energy register.

EE_{16}: Contains the number of bytes of the payload (number of data words * 2).

FF……16: Contains the energy register value in kWh (resp. kvarh) or Wh (resp. varh).

Remark 1 : The energy register values in kWh (resp. kvarh) can be read as integer or floating-point values (in accordance with IEEE 754). The request differs only in the register address (see parameter ***$BBBB_{16}$***).

Example for reading the register value of positive active energy of tariff T1 to T4 (T1 = 44444444kWh, T2 = 33333333kWh, T3 = 22222222kWh, T4 = 11111111kWh).

→	01 03 02 08 00 08 C4 76
←	01 03 10 2A 62 2B 1C 01 FC A0 55 01 53 15 8E 00 A9 8A C7 A7 F8

4.5.2 Energy feeds

Description : Read the energy feeds

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	0316	***BBBB16***	***CCCC16***	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	0316	***EE16***	***FF……16***	……16

Parameter

BBBB16: Set the address of the energy feed to be read first. For the address refer to *Table 4-4: Register addresses*.

CCCC16: Contains the number of the data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each energy feed register.

EE16: Contains the number of bytes of the payload (number of data words * 2).

FF……16: Contains the energy feeds in Wh (resp. varh).

Remark 1 : The energy feeds are calculated periodically (period)., generally over 15-minute periods A power failure or setting the clock can lead to incomplete 15-minute periods. The DIZ provides energy feeds of the last and second last period.

Remark 2 : The energy feeds are not related to the rating.

Example for reading the energy feed of the last 15-min period for positive active energy (non-tariff)

→	01 03 03 10 00 02 C5 8A
←	01 03 04 00 00 02 11 3B 5F

4.5.3 Power factor

Description : Read the actual power factor

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	***$BBBB_{16}$***	***$CCCC_{16}$***	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	***EE_{16}***	***$FFFF_{16}$***	***……16***

Parameter

$BBBB_{16}$: Set the address of the power factor to be read out. For the address refer to *Table 4-4: Register addresses*.

$CCCC_{16}$: Contains the number of the data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each power factor.

EE_{16} : Contains the number of data bytes of the response (number of data words * 2).

$FFFF_{16}$: Contains the value of the power factor.

Remark 1 : For the transmission the value of the power factor is multiplied with10^3. Thus, for the evaluation the received value has to be divided by 10^3 (e. g. 950 divided by 1000 results in a power factor of 0,95).

Remark 2 : The power factors can be read as an integer or floating-point values (in accordance with IEEE 754). The request differs only in the register address (see parameter ***$BBBB_{16}$***).

Example for reading the power factor PF1 (PF1 = 0,95).

→	01 03 02 50 00 02 C5 A2
←	01 03 04 00 00 03 B6 7B 75

4.5.4 Power quadrant

Description : Read out the actual power quadrant

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	0258_{16}	0001_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	02_{16}	***FF******16*	******16*

Parameter

FF***16***: Contains the current power quadrant.
Quadrant 1 (P >= 0, Q >= 0) → 1
Quadrant 2 (P < 0, Q >= 0) → 2
Quadrant 3 (P < 0, Q < 0) → 3
Quadrant 4 (P >= 0, Q < 0) → 4

Example for reading the power quadrant (P >= 0, Q >= 0).

→	01 03 02 58 00 01 04 61
←	01 03 02 00 01 79 84

4.5.5 Power values

Description : Read the power values

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	***BBBB16***	***CCCC16***	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	***EE16***	***FF……16***	***……16***

Parameter

BBBB16: Set the address of the power value to be read out. For the address refer to *Table 4-4: Register addresses*.

CCCC16: Contains the number of the data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each power factor.

EE16: Contains the number of data bytes of the response (number of data words * 2).

FF……16: Contains the power values signed with a resolution of 10^{-2} kW (resp. 10^{-2} var or 10^{-2} VA).

Remark 1 : The power values can be read as an integer or floating-point values with sign (in accordance with IEEE 754). The request differs only in the register address (see parameter ***BBBB16***).

Example for reading the active power values P1 to P3 (P1 = 33333,33 kW, P2 = 22222,22 kW, P3 = 11111,11 kW) for a direct connected meter:

→	01 03 02 3E 00 06 A5 BC
←	01 03 0C 00 32 DC D5 00 21 E8 8E 00 10 F4 47 48 C9

4.5.6 Line frequency

Description : Read out the line frequency

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	0234_{16}	0002_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	02_{16}	***FFFFFFFF*****16**	……16

Parameter

FFFFFFFF**16**: Contains the line frequency in 10^{-3} Hz.

Remark 1 : The line frequency can be read as an integer or floating-point values (in accordance with IEEE 754). The request differs only in the register address. Use the address 0234_{16} for the integer value and the address $028D_{16}$ for the floating-point value.

Example for reading out the line frequency 50,000 Hz:

→	01 03 02 34 00 02 84 7D
←	01 03 04 00 00 C3 50 AA FF

4.5.7 Voltage values

Description : Read the voltage values

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	***BBBB16***	***CCCC16***	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	***EE16***	***FF……16***	***……16***

Parameter

BBBB16: Set the address of the voltage value to be read first. For the address refer to *Table 4-4: Register addresses*.

CCCC16: Contains the number of data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each power factor.

EE16 : Contains the number of data bytes in the response (number of data words * 2).

FF……16: Contains the voltage values without sign in 10^{-2} V.

Remark 1 : The voltage values can be read as an integer or floating-point values (in accordance with IEEE 754). The request differs only in the register address (see parameter ***BBBB16***).

Example for reading the voltage values U1N bis U3N (U1N = 233,33 V, U2N = 222,22 V, U3N = 211,11 V).

→	01 03 02 2E 00 06 A4 79
←	01 03 0C 00 00 5B 25 00 00 56 CE 00 00 52 77 5F E5

4.5.8 Current values

Description : Read out the current values

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03$_{16}$	***BBBB*$_{16}$**	***CCCC*$_{16}$**	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03$_{16}$	***EE*$_{16}$**	***FF******16*	******16*

Parameter

***BBBB*$_{16}$**: Set the address of the current value to be read first. For the address refer to *Table 4-4: Register addresses*.

***CCCC*$_{16}$**: Contains the number of data words (2 bytes), which have to be enclosed in the response. 2 data words (4 bytes) are required for each power factor.

***EE*$_{16}$** : Contains the number of data bytes of the response (number of data words * 2).

FF***16***: Contains the current values without sign in 10^{-3} A.

Remark 1 : The current values can be read as an integer or floating-point values (in accordance with IEEE 754). The request differs only in the register address (see parameter ***BBBB*$_{16}$**).

Example for reading the current values I1 to I3 (I1 = 33,333 A, I2 = 22,222 A, I3 = 11,111 A):

→	01 03 02 20 00 06 C5 BA
←	01 03 0C 00 00 82 35 00 00 56 CE 00 00 2B 67 64 FF

4.6 Parameter data

4.6.1 Serial number

Description : Read the serial number

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……16	03_{16}	$FD45_{16}$	0006_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……16	03_{16}	$0B_{16}$	***UUUU……16***	***……16***

Values of ***UUUU……16*** : 12-place ASCII-string

Example for reading the serial number (12345678)

→	01 03 FD 45 00 06 E5 B1
←	01 03 0C 30 30 30 30 38 37 36 35 34 33 32 31 9F

4.6.2 Hardware configuration

Description : Read the hardware configuration

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	$FD24_{16}$	0004_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	08_{16}	***AABBCCDD EEFFGGHH16***	******16*

Values of ***AA16***: RTC
00 = no RTC
01 = RTC with Goldcap buffering

Values of ***BB16***: always 00_{16}

Values of ***CC16***: Data interface
00 = none
04 = LON
10 = M-Bus (serial)
11 = Modbus (serial)
12 = SML (serial)
20 = M-Bus (Ethernet)
21 = Modbus (Ethernet)
22 = SML (Ethernet)

Values of ***DD16***: always 00
Values of ***EE16***: always 00
Values of ***FF16***: always 00
Values of ***GG16***: always 00
Values of ***HH16***: always 00

Example for reading the hardware configuration of a meter with RTC and Modbus:

→	01 03 FD 24 00 04 35 AE
←	01 03 08 01 00 11 00 00 00 00 00 57 5A

4.6.3 Manufacturer identifier

Description : Read the manufacturer identifier

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FD28_{16}$	0001_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	02_{16}	***$UUUU_{16}$***	***……16***

Values of ***$UUUU_{16}$*** : Manufacturer identifier as a 16-bit integer value (coded according to EN 61107).

Remark 1 : Make sure that the correct address of the manufacturer identifier is used, because the address can vary depending on the version.

Example for reading the manufacturer identifier:

→	01 03 FD 28 00 01 35 AE
←	01 03 02 A8 15 06 4B

4.6.4 Configuration of the outputs

Description : Read the configuration of the outputs

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FD41_{16}$	0004_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	08_{16}	***ABCDEFGHIJKLM NOP*$_{16}$**	……16

Values of :
- ***A*$_{16}$** Pulse output -P
- ***B*$_{16}$** Pulse output +P
- ***C*$_{16}$** Pulse output -Q
- ***D*$_{16}$** Pulse output +Q
- ***E*$_{16}$** Reserved
- ***F*$_{16}$** Reserved
- ***G*$_{16}$** Reserved
- ***H*$_{16}$** Reserved
- ***I*$_{16}$** Reserved
- ***J*$_{16}$** Reserved
- ***K*$_{16}$** Reserved
- ***L*$_{16}$** Reserved
- ***M*$_{16}$** Reserved
- ***N*$_{16}$** Reserved
- ***O*$_{16}$** Reserved
- ***P*$_{16}$** Activating the primary reference (if set output is referenced to the primary side of a connected instrument transformer)

Remark 1 : There are the paragraphs 1 and 2. Paragraph 1 represents the output 1 and paragraph 2 the output 2. Both paragraphs can be combined (OR operation), i. e. the value 3 means, that the function is used for output 1 and output 2.

Example for reading the configuration of the outputs
(output 1→ P-, output 2 → P+, no primary reference):

→	01 03 FD 41 00 04 25 B1
←	01 03 08 12 00 00 00 00 00 00 00 15 02

4.6.5 Parameter data

Description : Read the parameter data
Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FD29_{16}$	0002_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	04_{16}	***AABBCCDD 16***	……16

Values of ***AA_{16}***:
- 00 = One directional meter with reverse stop (import) and without reactive energy measurement
- 01 = One directional meter with reverse stop (export) and without reactive energy measurement
- 02 = Bidirectional meter without reactive energy measurement
- 04 = Bidirectional meter with always positive register and without reactive energy measurement
- 10 = One directional meter with reverse stop (import) and reactive energy measurement
- 11 = One directional meter with reverse stop (export) and reactive energy measurement
- 12 = Bidirectional meter with reactive energy measurement
- 14 = Bidirectional meter with always positive register and reactive energy measurement
- 20_{16} = Combi meter (import)
- 21_{16} = Combi meter (export)

Values of ***BB_{16}***:
- Bit7..Bit3 : Always 0_2
- Bit2..Bit0 : Number of available tariffs (non-tariff, 1..4)
- 000_2 : Non-tariff meter
- 001_2 : 1-Tariff meter
- 010_2 : 2- Tariff meter
- 011_2 : 3- Tariff meter
- 100_2 : 4- Tariff meter

Values of ***CC_{16}***: Always 00
Values of ***DD_{16}***: Always 00

Example for reading the parameter data of a bidirectional meter with 2 tariffs:

→	01 03 FD 29 00 02 24 6F
←	01 03 04 02 02 00 00 5A 4B

4.6.6 Parameter data (extension)

Description : Read the extension of the parameter data
Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FD2B_{16}$	0002_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	04_{16}	***AABBCCDD16***	……16

Values of ***AA16***:

00	=	100V (2L)
01	=	230V (2L)
20	=	3x100V (3L)
21	=	3x110V (3L)
22	=	3x230V (3L)
24	=	3x400V (3L)
28	=	3x500V (3L)
40	=	3x58/100V (4L)
41	=	3x63/110V (4L)
42	=	3x230/400V (4L)
44	=	3x254/440V (4L)
48	=	3x290/500V (4L)

Values of ***BB16***:

00	=	1A
01	=	1(2)A
02	=	1(6)A
04	=	5||1A
08	=	5A
20	=	5(65)A
21	=	10(65)A
22	=	5(80)A

Values of ***CC16***: 00 – FF (00_{10} - 255_{10}) = Time frame for the synchronisation in seconds (if the time difference between old and new time value does not exceed the value given under CC, the amendment is considered as a synchronisation).

Values of ***DD16***: always 00

Example for reading the extension of the parameter data of a meter with 3 x 230/400 V and 5(80) A, without a synchronisation time frame:

→	01 03 FD 2B 00 02 85 AF
←	01 03 04 42 22 00 00 4E 41

4.6.1 Parameter set number (Parameter data)

Description : Read the parameter set number

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	$FD2D_{16}$	0004_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	08_{16}	***UUUUUUUU UUUUUUUU16***	******16*

Values of ***UUUUUUUUUUUUUUUU16*** : 8-place ASCII-string

Example for reading the parameter set number (12345678)

→	01 03 FD 2D 00 04 E5 AC
←	01 03 08 31 32 33 34 35 36 37 38 08 EB

4.6.1 Type code system

Description : Read the type code system

Access group : Parameter data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FD31_{16}$	0010_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	20_{16}	***UUUU……..16***	***……16***

Values of ***UUUU……..16*** : 32-place ASCII-string

Example for reading the type code system:

→	01 03 FD 31 00 10 24 65
←	01 03 20 44 49 5a 2d 57 31 45 4C 2d 30 30 2d 4b 4d 30 2d 30 33 2d 30 30 30 30 30 30 2d 46 35 30 2f 4b 28 CE

4.7 Set data

4.7.1 Baud rate

Description : Set/read the baud rate

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……..16	06_{16}	$FE25_{16}$	(none)	(none)	***UUUU*$_{16}$**	……16

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FE25_{16}$	0001_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	02_{16}	***UUUU*$_{16}$**	……16

Values of ***UUUU*$_{16}$** :

0000_{16}	→ 1200 baud
0001_{16}	→ 2400 baud
0002_{16}	→ 4800 baud
0004_{16}	→ 9600 baud
0008_{16}	→ 19200 baud
0010_{16}	→ 38400 baud

Example for setting the baud rate (19200 baud) of the device with the address 01:

→	01 06 FE 25 00 08 A8 2F
←	01 06 FE 25 00 08 A8 2F

4.7.2 Device address

Description : Set/read the device address

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……..16	06_{16}	$FE26_{16}$	(none)	(none)	$UUUU_{16}$	……16

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FE26_{16}$	0001_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	02_{16}	$UUUU_{16}$	……16

Values of $UUUU_{16}$: 01_{10} to 247_{10} (0001_{16} to $00F7_{16}$)

Remark 1 : The address 00_{10} initiates a broadcast.
The addresses 248_{10} to 255_{10} are reserved for special purposes.

Example for setting the device address (01_{10} resp. 01_{16})

→	01 06 FE 26 00 01 98 29
←	01 06 FE 26 00 01 98 29

4.7.3 Configuration of the RTC

Description : Set/read the configuration of the RTC

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……16	06_{16}	$FE55_{16}$	(none)	(none)	***$CCBB_{16}$***	***……16***

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……16	03_{16}	$FE55_{16}$	0001_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……16	03_{16}	02_{16}	***$CCBB_{16}$***	***……16***

Values of :

BB_{16}	Season
00_{16}	Always in standard time (with offset to UTC time acc. to parameter ***CC_{16}***)
01_{16}	Standard time with switch to summer or wintertime.
02_{16}	Always UTC time.
CC_{16}	UTC offset 00_{10} – 255_{10} (00_{16} – FF_{16})

Remark 1 : The UTC offset is indicated as a 2's complement in 0,5 hour steps. E. g. the value 02_{16} indicates a positive offset of 1 hour and the value FA_{16} indicates a negative offset of 3 hours.

Example for setting the configuration of the RTC (always standard time, no UTC offset) on the device with the address 01:

→	01 06 FE 55 00 00 A8 32
←	01 06 FE 55 00 00 A8 32

4.7.4 Test mode

Description : Activate (deactivate)/status request for the test mode

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……..16	06_{16}	$FE27_{16}$	(none)	(none)	$UUUU_{16}$	……16

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$018E_{16}$	0001_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	02_{16}	$UUUU_{16}$	……16

Values of $UUUU_{16}$: 0004_{16} → Test mode for active energy measurement
0008_{16} → Test mode for reactive energy measurement
0002_{16} → Deactivate test mode

Example for setting the test mode (active energy measurement):

→	01 06 FE 27 00 04 09 EA
←	01 06 FE 27 00 04 09 EA

4.7.5 Time switch program number

Description : Set/read out the time switch program number

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16*	10_{16}	FE2816	0004_{16}	08_{16}	***UUUUUUUU UUUUUUUU*$_{16}$	******16*

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	$FE28_{16}$	0004_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	08_{16}	***UUUUUUUU UUUUUUUU*$_{16}$	******16*

Values of ***UUUUUUUUUUUUUUUU*$_{16}$: 8-place ASCII-string

Example for setting the time switch program number (12345678)

→	01 10 FE 28 00 04 08 31 32 33 34 35 36 37 38 1D 59
←	01 10 FE 28 00 04 70 2A

4.7.6 Summertime definition

Description : Set/read the time for switching between summer and wintertime or winter and summertime

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	10_{16}	$FE30_{16}$	0004_{16}	08_{16}	***MMDDHHFF mmddhhff*$_{16}$	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FE30_{16}$	0004_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	08_{16}	***MMDDHHFF mmddhhff*$_{16}$	******16**

Values of:

MM Starting month (standard time)

00_{16}	Do not switch to summertime.
01_{16} .. $0C_{16}$	A specified month (01_{16}=January, ...,$0C_{16}$=December).

DD Starting day (standard time)

00_{16}	Do not switch to summertime.
01_{16} .. $1F_{16}$	A specified day of the month.
40_{16}	First Monday of the month.
....	.....
46_{16}	First Sunday of the month.
50_{16}	Second Monday of the month.
....	.....
56_{16}	Second Sunday of the month.
60_{16}	Third Monday of the month.
....	.....
66_{16}	Third Sunday of the month.
80_{16}	Last Monday of the month.
....	.....
86_{16}	Last Sunday of the month.

HH Starting hour (standard time)
00_{16} .. 17_{16} A specified hour.

FF Earliest starting day for DD = 40_{16} .. 66_{16}
00_{16} .. $1A_{16}$ 1th to 26th of the month.

mm End month (standard time)
00_{16} Do not switch to summertime.
01_{16} .. $0C_{16}$ A specified month.

dd End day (standard time)
00_{16} Do not switch to summertime.
01_{16} .. $1F_{16}$ A specified day of the month.
40_{16} First Monday of the month.
....
86_{16} Last Sunday of the month.

hh End hour (standard time)
00_{16} .. 17_{16} A specified hour.

ff Earliest end day for dd = 40_{16} .. 66_{16}
00_{16} .. $1A_{16}$ 1th to 26th of the month.

Example for setting the summertime definition. Switching to summertime last Sunday in March and switching back to standard time last Sunday in October.

→	01 10 FE 30 00 04 08 03 86 02 00 0A 86 02 00 E5 2B
←	01 10 FE 30 00 04 F0 2D

4.7.7 Tariff switching times

Description : Set/read the tariff switching times.

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16*	10_{16}	****16*	0008_{16}	10_{16}	***BBCCDDEEFF GGHHIIJJKKLL MMNOPQRSTU 16***	******16*

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	****16*	0008_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	10_{16}	***BBCCDDEEFF GGHHIIJJKKLL MMNOPQRSTU 16***	******16*

Values of: ****16*** $FE3D_{16}$ Season 1: Monday to Friday
$FE45_{16}$ Season 1: Saturday
$FE4D_{16}$ Season 1: Sunday

BB 1st switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
CC 2nd switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
DD 3rd switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
EE 4th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
FF 5th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
GG 6th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
HH 7th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
II 8th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
JJ 9th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
KK 10th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
LL 11th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)
MM 12th switching time (00_{16}... $5F_{16}$ = 00 .. 95 = ¼-hour-index)

N$_{16}$ $hhll_2$ with : hh = Tariff to be activated with switching time BB (00_2 ... 11_2 = 0..3)
ll = Tariff to be activated with switching time CC (00_2 ... 11_2 = 0..3)

O$_{16}$ hhll$_2$ with	:	hh =	Tariff to be activated with switching time DD (00_2 … 11_2 = 0..3)
		ll =	Tariff to be activated with switching time EE (00_2 … 11_2 = 0..3)
P$_{16}$ hhll$_2$ with	:	hh =	Tariff to be activated with switching time FF (00_2 … 11_2 = 0..3)
		ll =	Tariff to be activated with switching time GG (00_2 … 11_2 = 0..3)
Q$_{16}$ hhll$_2$ with	:	hh =	Tariff to be activated with switching time HH (00_2 … 11_2 = 0..3)
		ll =	Tariff to be activated with switching time II (00_2 … 11_2 = 0..3)
R$_{16}$ hhll$_2$ with	:	hh =	Tariff to be activated with switching time JJ (00_2 … 11_2 = 0..3)
		ll =	Tariff to be activated with switching time KK (00_2 … 11_2 = 0..3)
S$_{16}$ hhll$_2$ with	:	hh =	Tariff to be activated with switching time LL (00_2 … 11_2 = 0..3)
		ll =	Tariff to be activated with switching time MM (00_2 … 11_2 = 0..3)
T	:	always 00_{16}	
U	:	always 00_{16}	

Remark 1 : The values ***BB … MM*** have to be specified in ascending order.

Remark 2 : Unneeded switching times have to be specified as 00 (starting at ***BB***).

Remark 3 : Between 12:00 pm and the first switching time tariff 1 is active.

Remark 4 : If a tariff is set, which the meter does not support (e. g. tariff 3 for a two-tariff meter), the standard tariff (T1) is automatically activated during this time period.

Example for setting the tariff switching times between Monday and Friday:
→ 00:00 – 02:00 = Tariff 1 (**1#**$_{16}$ = **00**##$_2$ = 00_2)
→ 02:00 – 08:00 = Tariff 2 (**1#**$_{16}$ = ##**01**$_2$ = 01_2)
→ 08:00 – 18:00 = Tariff 3 (**#B**$_{16}$ = **10**##$_2$ = 10_2)
→ 18:00 – 24:00 = Tariff 4 (**#B**$_{16}$ = ##**11**$_2$ = 11_2)

→	01 10 FE 3D 00 08 10 00 00 00 00 00 00 00 00 00 08 20 48 00 00 1B 00 1E AA
←	01 10 FE 3D 00 08 61 EB

4.7.8 Parameter set number (set data)

Description : Set/read the parameter set number

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16*	10_{16}	$FE2C_{16}$	0004_{16}	08_{16}	***UUUUUUUU UUUUUUUU*$_{16}$	******16*

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16*	03_{16}	$FE2C_{16}$	0004_{16}	******16*

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16*	03_{16}	08_{16}	***UUUUUUUU UUUUUUUU*$_{16}$	******16*

Values of ***UUUUUUUUUUUUUUUU*$_{16}$: 8-place ASCII-string

Example for setting the parameter set number (12345678)

→	01 10 FE 2C 00 04 08 31 32 33 34 35 36 37 38 EC 96
←	01 10 FE 2C 00 04 31 EB

4.7.9 Transmission mode

Description : Set/read out the transmission mode

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
********16**	06_{16}	$FE24_{16}$	(none)	(none)	***UUUU*$_{16}$**	******16**

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	$FE24_{16}$	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***UUUU*$_{16}$**	******16**

Values of ***UUUU*$_{16}$** : 0001_{16} → 1 Start-, 8 Data-, 1 Stop bit, even parity
0002_{16} → 1 Start-, 8 Data-, 1 Stop bit, uneven parity
0004_{16} → 1 Start-, 8 Data-, 2 Stop bit, none parity
0008_{16} → 1 Start-, 8 Data-, 1 Stop bit, none parity

Example for setting the interface mode (1 Start-, 8 Data-, 1 Stop bit, even parity):

→	01 06 FE 24 00 01 39 E9
←	01 06 FE 24 00 01 39 E9

4.7.10 Time and date

Description : Set/read time and date

Access group : Set data

The syntax of the setting is composed as follows:

Device	Function	Data				CRC
		Start	Words	Bytes	Value	
……..16	10_{16}	$FE34_{16}$	0009_{16}	12_{16}	***AABBCCDDEEFF GGHHII 16***	……16

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……..16	03_{16}	$FE34_{16}$	0009_{16}	……16

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……..16	03_{16}	12_{16}	***AABBCCDDEEFF GGHHII 16***	……16

Values of AA_{16} : Season
00 = Standard time
01 = Summertime
02 = UTC time

Values of BB_{16} : Year from 00 to 63 (99_{10})

Values of CC_{16} : Month from 01 to 0C (12_{10})

Values of DD_{16} : Day of the month from 01 to 1F (31_{10})

Values of EE_{16} : Hour from 00 to 17 (23_{10})

Values of FF_{16} : Minute from 00 to 3B (59_{10})

Values of GG_{16} : Second from 00 to 3B (59_{10})

Values of HH_{16} : Day of the week from 00 to 06

Values of II_{16} : Calendar week from 01 to 53

Remark 1 : In standard mode, time and date can only be set once via the data interface. If the edit mode is open, time and date can be set as often as desired. Synchronisation is possible at any time (the time frame for synchronisation is defined by the basic configuration of the meter).

Example for setting time and date:

→	01 10 FE 34 00 09 12 00 01 00 0C 00 07 00 09 00 0B 00 0E 00 0A 00 00 00 1C 42 92
←	01 10 FE 34 00 09 70 29

4.8 Other data

4.8.1 Operating hours

Description : Read the operating hours

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……16	03_{16}	0190_{16}	0002_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……16	03_{16}	04_{16}	***FF……16***	***……16***

Parameter

FF……16: Contains the number of completed operating hours.

Example for reading out the operating hours (8 hours):

→	01 03 01 90 00 02 C5 DA
←	01 03 04 00 00 00 08 FB F5

4.8.2 Error status

Description : Read out the error status

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	0199_{16}	0001_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	02_{16}	***FF……16***	******16**

Parameter

FF……16: Contains the error status.

- 01 → Error checksum program memory
- 02 → Error checksum parameter data
- 04 → Error checksum edit data
- 08 → Error checksum measured data
- 10 → Error checksum calibration data measuring system

Example for reading the error status 0010:

→	01 03 01 99 00 01 55 D9
←	01 03 02 00 01 79 84

4.8.3 Firmware version

Description : Read the version ID of the firmware

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
********16**	03_{16}	0192_{16}	0004_{16}	******16**

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
********16**	03_{16}	08_{16}	***FF……16***	******16**

Parameter

FF……16: Contains the version id of the firmware.

Example for reading out the version number 10400000:

→	01 03 01 92 00 04 E4 18
←	01 03 08 31 30 34 30 30 30 30 30 38 67

4.8.4 Total transformer factor

Description : Read the total transformer factor (CTxVT)

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……16	03_{16}	0256_{16}	0002_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……16	03_{16}	04_{16}	***FF……16***	***……16***

Parameter

FF……16: Contains the product of the transformer factor of the voltage and the transformer factor of the current.

Example for reading the total transformer factor $7B_{16}$ (123_{10}):

→	01 03 02 56 00 02 25 A3
←	01 03 04 00 00 00 7B BA 10

4.8.5 Checksums

Description : Read the checksums

Access group : Read data

The syntax of the request is composed as follows:

Device address	Function	Data		CRC
		Start address	Number of words	
……16	03_{16}	***BBBB16***	0001_{16}	***……16***

The syntax of the response is composed as follows:

Device address	Function	Data		CRC
		Number of bytes	Register content	
……16	03_{16}	02_{16}	***FF……16***	***……16***

Parameter

BBBB16: Set the address of the checksum to be read. For the address refer to *Table 4-4: Register addresses*.

FF……16: Contains the value of the checksum.

Example for reading the checksum of the program memory 1234_{16}:

→	01 03 01 98 00 01 04 19
←	01 03 02 12 34 B5 33

4.9 Appendix

4.9.1 Troubleshooting

Error	Potential causes	Action
Meter does not response, no communication symbol indicated	Interface cabling error	Correct the cabling: (**+** at terminal 14 and **-** at terminal 16)
	Configuration of the baud rate	Adjust the baud rate of the meter to the baud rate of the bus master
	Configuration of the transmission mode	Adjust the transmission mode of the meter to the transmission mode of the bus master (parity and number of stop bits)
Meter does not response, communication symbol indicated on the display	Configuration of the device address	Adjust the address
	Listen only mode active	Reset the interface (function 08, subfunction 1)
Meter does not response sporadically	Time interval between different telegrams too short	Set longer time interval for the bus master

Table 4-3: Troubleshooting

4.9.2 Register addresses

No.	Address	Register	Words	Unit	Access
1.	0190_{16}	Operating hours	2	h	L
2.	0192_{16}	Firmware	4	-	L
3.	0196_{16}	Checksum parameter data	1	-	L
4.	0197_{16}	Checksum edit data	1	-	L
5.	0198_{16}	Checksum program memory	1	-	L
6.	0199_{16}	Error status	1	-	L
7.	0200_{16}	Active energy positive non-tariff	2	10^3Wh	L
8.	0202_{16}	Active energy negative non-tariff	2	10^3Wh	L
9.	0204_{16}	Reactive energy positive non-tariff	2	10^3varh	L
10.	0206_{16}	Reactive energy negative non-tariff	2	10^3varh	L
11.	0208_{16}	Active energy positive tariff 1	2	10^3Wh	L
12.	$020A_{16}$	Active energy positive tariff 2	2	10^3Wh	L
13.	$020C_{16}$	Active energy positive tariff 3	2	10^3Wh	L
14.	$020E_{16}$	Active energy positive tariff 4	2	10^3Wh	L
15.	0210_{16}	Active energy negative tariff 1	2	10^3Wh	L
16.	0212_{16}	Active energy negative tariff 2	2	10^3Wh	L
17.	0214_{16}	Active energy negative tariff 3	2	10^3Wh	L
18.	0216_{16}	Active energy negative tariff 4	2	10^3Wh	L
19.	0218_{16}	Reactive energy positive tariff 1	2	10^3varh	L
20.	$021A_{16}$	Reactive energy positive tariff 2	2	10^3varh	L
21.	$021C_{16}$	Reactive energy negative tariff 1	2	10^3varh	L
22.	$021E_{16}$	Reactive energy negative tariff 2	2	10^3varh	L
23.	0220_{16}	Current I1	2	10^{-3}A	L

24.	0222_{16}	Current I2	2	10^{-3}A	L
25.	0224_{16}	Current I3	2	10^{-3}A	L
26.	0226_{16}	Current IN	2	10^{-3}A	L
27.	0228_{16}	Line voltage U12	2	10^{-2}V	L
28.	$022A_{16}$	Line voltage U23	2	10^{-2}V	L
29.	$022C_{16}$	Line voltage U31	2	10^{-2}V	L
30.	$022E_{16}$	Phase voltage U1N	2	10^{-2}V	L
31.	0230_{16}	Phase voltage U2N	2	10^{-2}V	L
32.	0232_{16}	Phase voltage U3N	2	10^{-2}V	L
33.	0234_{16}	Line frequency	2	10^{-3}Hz	L
34.	0236_{16}	Total active power	2	10^{1}W	L
35.	0238_{16}	Total reactive power	2	10^{1}var	L
36.	$023A_{16}$	Total apparent power	2	10^{1}VA	L
37.	$023C_{16}$	Total power factor	2	-	L
38.	$023E_{16}$	Active power P1	2	10^{1}W	L
39.	0240_{16}	Active power P2	2	10^{1}W	L
40.	0242_{16}	Active power P3	2	10^{1}W	L
41.	0244_{16}	Reactive power Q1	2	10^{1}var	L
42.	0246_{16}	Reactive power Q2	2	10^{1}var	L
43.	0248_{16}	Reactive power Q3	2	10^{1}var	L
44.	$024A_{16}$	Apparent power S1	2	10^{1}VA	L
45.	$024C_{16}$	Apparent power S2	2	10^{1}VA	L
46.	$024E_{16}$	Apparent power S3	2	10^{1}VA	L
47.	0250_{16}	Power factor PF1	2	-	L
48.	0252_{16}	Power factor PF2	2	-	L
49.	0254_{16}	Power factor PF3	2	-	L
50.	0256_{16}	Total transformer factor	2	-	L
51.	0258_{16}	Power quadrant	1	-	L
52.	0259_{16}	(Floating-point value) active energy positive non-tariff	2	10^{3}Wh	L
53.	$025B_{16}$	(Floating-point value) active energy negative non-tariff	2	10^{3}Wh	L
54.	$025D_{16}$	(Floating-point value) reactive energy positive non-tariff	2	10^{3}varh	L
55.	$025F_{16}$	(Floating-point value) reactive energy negative non-tariff	2	10^{3}varh	L
56.	0261_{16}	(Floating-point value) active energy positive tariff 1	2	10^{3}Wh	L
57.	0263_{16}	(Floating-point value) active energy positive tariff 2	2	10^{3}Wh	L
58.	0265_{16}	(Floating-point value) active energy positive tariff 3	2	10^{3}Wh	L
59.	0267_{16}	(Floating-point value) active energy positive tariff 4	2	10^{3}Wh	L
60.	0269_{16}	(Floating-point value) active energy negative tariff 1	2	10^{3}Wh	L
61.	$026B_{16}$	(Floating-point value) active energy negative tariff 2	2	10^{3}Wh	L
62.	$026D_{16}$	(Floating-point value) active energy negative tariff 3	2	10^{3}Wh	L
63.	$026F_{16}$	(Floating-point value) active energy negative tariff 4	2	10^{3}Wh	L
64.	0271_{16}	(Floating-point value) reactive energy positive tariff 1	2	10^{3}varh	L
65.	0273_{16}	(Floating-point value) reactive energy positive tariff 2	2	10^{3}varh	L

66.	0275_{16}	(Floating-point value) reactive energy negative tariff 1	2	10^{3}varh	L
67.	0277_{16}	(Floating-point value) reactive energy negative tariff 2	2	10^{3}varh	L
68.	0279_{16}	(Floating-point value) current I1	2	10^{-3}A	L
69.	$027B_{16}$	(Floating-point value) current I2	2	10^{-3}A	L
70.	$027D_{16}$	(Floating-point value) current I3	2	10^{-3}A	L
71.	$027F_{16}$	(Floating-point value) current IN	2	10^{-3}A	L
72.	0281_{16}	(Floating-point value) line voltage U12	2	10^{-2}V	L
73.	0283_{16}	(Floating-point value) line voltage U23	2	10^{-2}V	L
74.	0285_{16}	(Floating-point value) line voltage U31	2	10^{-2}V	L
75.	0287_{16}	(Floating-point value) phase voltage U1N	2	10^{-2}V	L
76.	0289_{16}	(Floating-point value) phase voltage U2N	2	10^{-2}V	L
77.	$028B_{16}$	(Floating-point value) phase voltage U3N	2	10^{-2}V	L
78.	$028D_{16}$	(Floating-point value) line frequency	2	10^{-3}Hz	L
79.	$028F_{16}$	(Floating-point value) total active power	2	10^{1}W	L
80.	0291_{16}	(Floating-point value) total reactive power	2	10^{1}var	L
81.	0293_{16}	(Floating-point value) total apparent power	2	10^{1}VA	L
82.	0295_{16}	(Floating-point value) total power factor	2	-	L
83.	0297_{16}	(Floating-point value) active power P1	2	10^{1}W	L
84.	0299_{16}	(Floating-point value) active power P2	2	10^{1}W	L
85.	$029B_{16}$	(Floating-point value) active power P3	2	10^{1}W	L
86.	$029D_{16}$	(Floating-point value) reactive power Q1	2	10^{1}var	L
87.	$029F_{16}$	(Floating-point value) reactive power Q2	2	10^{1}var	L
88.	$02A1_{16}$	(Floating-point value) reactive power Q3	2	10^{1}var	L
89.	$02A3_{16}$	(Floating-point value) apparent power S1	2	10^{1}VA	L
90.	$02A5_{16}$	(Floating-point value) apparent power S2	2	10^{1}VA	L
91.	$02A7_{16}$	(Floating-point value) apparent power S3	2	10^{1}VA	L
92.	$02A9_{16}$	(Floating-point value) power factor PF1	2	-	L
93.	$02AB_{16}$	(Floating-point value) power factor PF2	2	-	L
94.	$02AD_{16}$	(Floating-point value) power factor PF3	2	-	L
95.	$02AF_{16}$	Reserved	2	-	L
96.	$02B1_{16}$	Reserved	1	-	L
97.	0300_{16}	Active energy P+ (most significant 32 Bit)	2	10^{1}Wh	L
98.	0302_{16}	Active energy P+ (least significant 32 Bit)	2	10^{1}Wh	L
99.	0304_{16}	Active energy P- (most significant 32 Bit)	2	10^{1}Wh	L
100.	0306_{16}	Active energy P- (least significant 32 Bit)	2	10^{1}Wh	L
101.	0308_{16}	Reactive energy Q+ (most significant 32 Bit)	2	10^{1}varh	L
102.	$030A_{16}$	Reactive energy Q+ (least significant 32 Bit)	2	10^{1}varh	L
103.	$030C_{16}$	Reactive energy Q- (most significant 32 Bit)	2	10^{1}varh	L
104.	$030E_{16}$	Reactive energy Q- (least significant 32 Bit)	2	10^{1}varh	L
105.	0310_{16}	Active energy P+; feed of the last 15-min period	2	10^{1}Wh	L
106.	0312_{16}	Active energy P-; feed of the last 15-min period	2	10^{1}Wh	L

107.	0314_{16}	Reactive energy Q+; feed of the last 15-min period	2	10^1varh	L
108.	0316_{16}	Reactive energy Q-; feed of the last 15-min period	2	10^1varh	L
109.	0318_{16}	Active energy P+; feed of the second last period (pre-value)	2	10^1Wh	L
110.	$031A_{16}$	Active energy P-; feed of the second last period (pre-value)	2	10^1Wh	L
111.	$031C_{16}$	Reactive energy Q+; feed of the second last period (pre-value)	2	10^1varh	L
112.	$031E_{16}$	Reactive energy Q-; feed of the second last period (pre-value)	2	10^1varh	L
113.	$FD24_{16}$	Hardware configuration	4	-	L
114.	$FD28_{16}$	Manufacturer identifier	1	-	L
115.	$FD29_{16}$	Parameter data	2	-	L
116.	$FD2B_{16}$	Parameter data (extension)	2	-	L
117.	$FD2D_{16}$	Parameter set number (parameter data)	4	-	L
118.	$FD31_{16}$	Type code system	16	-	L
119.	$FD41_{16}$	Configuration of the outputs	4	-	L
120.	$FD45_{16}$	Serial number	6	-	L
121.	$FE24_{16}$	Transmission mode	1	-	S
122.	$FE25_{16}$	Baud rate	1	-	S
123.	$FE26_{16}$	Device address	1	-	S
124.	$FE27_{16}$	Test mode	1	-	S
125.	$FE28_{16}$	Time switch program number	4	-	S
126.	$FE2C_{16}$	Parameter set number (Set data)	4	-	S
127.	$FE30_{16}$	Summertime definition	4	-	S
128.	$FE34_{16}$	Time and date	9	-	S
129.	$FE3D_{16}$	Tariff switching times (Mon.-Fri.)	8	-	S
130.	$FE45_{16}$	Tariff switching times (Sat.)	8	-	S
131.	$FE4D_{16}$	Tariff switching times (Sun.)	8	-	S
132.	$FE55_{16}$	Configuration of the clock	1	-	S
133.	$FEDE_{16}$	End the edit mode	1	-	E
134.	$FEDF_{16}$	Locking the edit mode	1	-	E
135.	$FEE0_{16}$	Pulse length output	1	-	E
136.	$FEE1_{16}$	Pulse constant output	1	-	E
137.	$FEE2_{16}$	Transformer factor current	1	-	E
138.	$FEE3_{16}$	Transformer factor voltage	1	-	E
139.	$FEE4_{16}$	Arity energy register	1	-	E

Table 4-4: Register addresses