

EEM230-D-M

Electrical Energy Meter with integrated M-Bus interface

Electrical energy meter with an integrated M-Bus interface allow direct reading of all relevant data, such as energy (total and partial), current, voltage, active and reactive power.

MAIN FEATURES:

- Single-phase energy meter, 230 VAC 50 Hz
- Direct measurement up to 32 A
- Display of active power, voltage and current
- M-Bus interface to query the data
- Reactive power available through interface
- Up to 250 meter can be connected to the M-Bus interface
- 7-digit display
- Lead seal possible with cap as accessory
- Accuracy class B according to EN50470-3, accuracy class 1 according to IEC62053-21



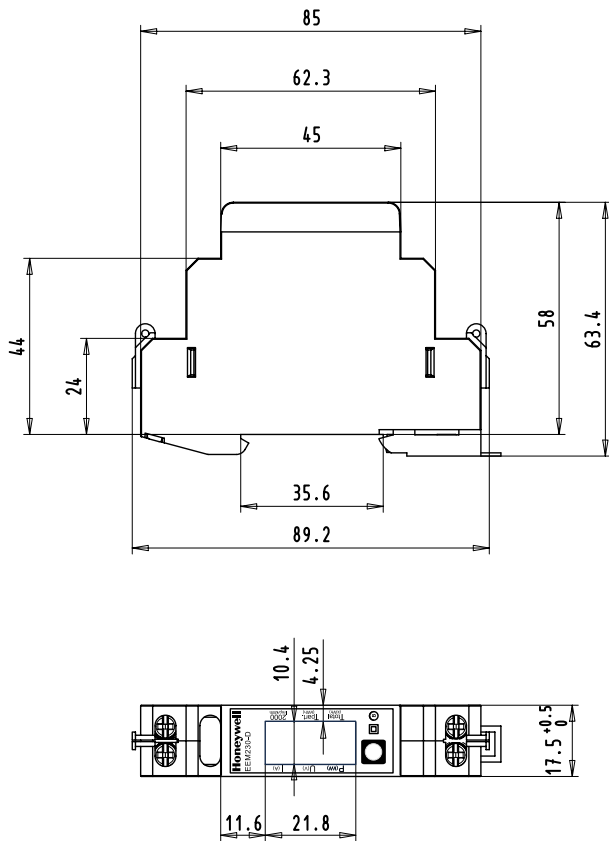
Order Number

Standard Version: **EEM230-D-M**
MID Version: **EEM230-D-M-MID**
Sealing caps: **EEM230-SEALCAP**
(Bulk with 20 units)

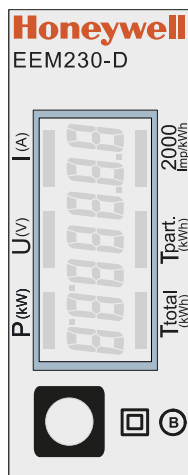
| TECHNICAL DATA | |
|-----------------------------------|---|
| PRECISION CLASS | B according to EN50470-3, 1 according to IEC62053-21 |
| OPERATING VOLTAGE | 230 VAC, 50 Hz Tolerance -20 % / +15 % |
| REFERENCE/ MEASUREMENT CURRENT | $I_{ref} = 5 \text{ A} / I_{max} = 32 \text{ A}$ |
| STARTING/MINIMUM CURRENT | $I_{st} = 20 \text{ mA} / I_{min} = 0.25 \text{ A}$ |
| POWER CONSUMPTION | Active 0.4 W per phase |
| COUNTING RANGE | 00000.00...99999.99 100000.0...999999.9 |
| DISPLAY | LCD backlit, digits 5 mm high |
| PULSES PER KWH | LC-Display 2000 Imp./kWh |

| MOUNTING | |
|---|--|
| MOUNTING | On 35 mm rail, according to EN60715TH35 |
| TERMINAL CONNECTIONS MAIN CIRCUIT | Conductor cross-section max. 6 mm ² , screwdriver pozidrive no. 1, slot no.1 torque: 1.2 Nm |
| TERMINAL CONNECTIONS CONTROL CIRCUIT | Conductor cross-section max. 2.5 mm ² , screwdriver pozidrive no. 0, slot no.1 torque: 0.5 Nm |
| INSULATION CHARACTERISTICS | 4 kV/50 Hz test according to VDE 0435 for energy meter part 6 kV 1.2/50 μs surge voltage according to IEC255-4 2 kV / 50 Hz test according to VDE 0435 for Interface Device protection class II |
| AMBIENT TEMPERATURE | -25 °...+55 °C |
| STORAGE TEMPERATURE | -30 °...+85 °C |
| RELATIVE HUMIDITY | 95 % at 25°...+40 °C, without condensation |
| EMC/INTERFERENCE IMMUNITY | Surge voltage according to IEC61000-4-5 at main circuit, 4 kV at M-Bus interface, 1 kV Burst voltage according to IEC61000-4-4, at main circuit 4 kV at M-Bus interface 1 kV ESD according to IEC61000-4-2, contact 8 kV, air 15 kV |

DIMENSION DIAGRAM

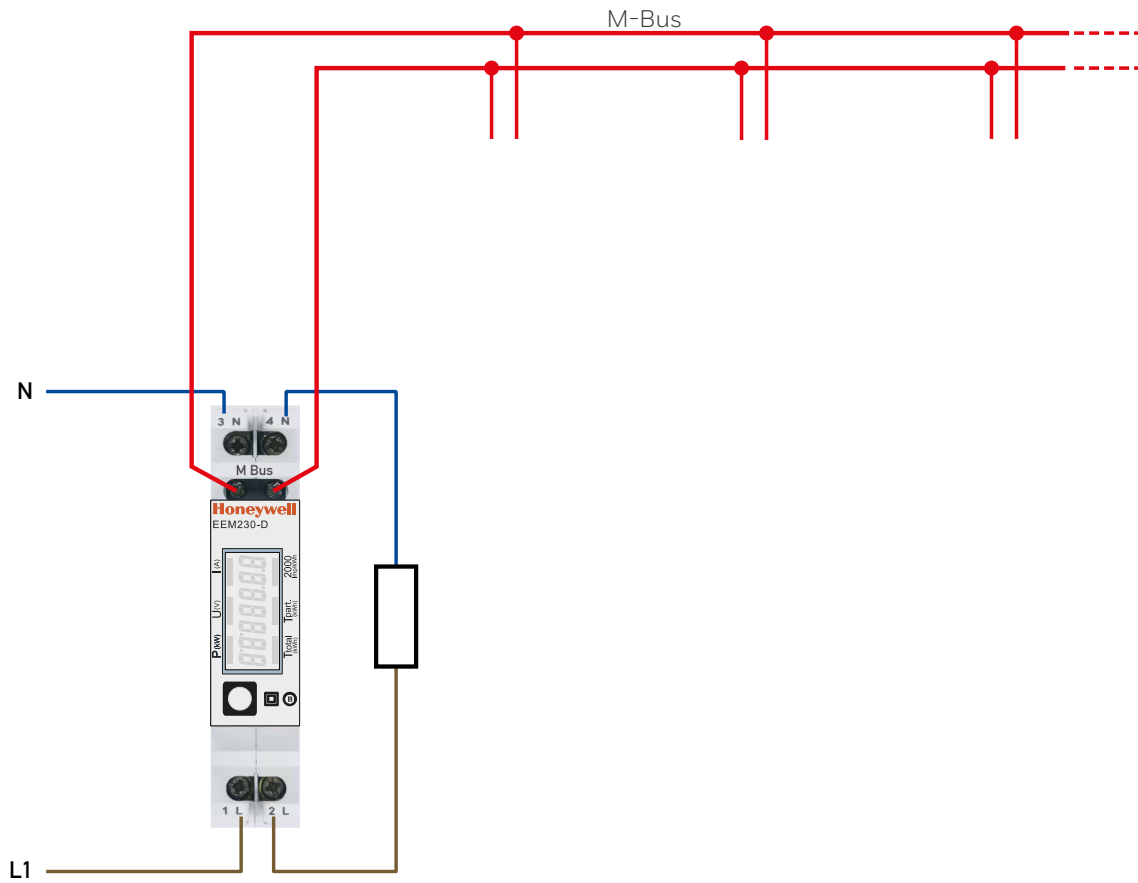


DISPLAY ELEMENTS, DIRECT MEASUREMENT



- **T total (kWh)** Indicates the total consumption
- **T part (kWh)** Indicates the partial consumption. This value can be reset
- **P (kW)** Indicates the instantaneous power
- **U (V)** Indicates the voltage
- **I (A)** Indicates the current
- **2000 pulses/kWh** Pulsates according to the amount of used power.
Error indication (Line 1L/2L inverted) pulsating with 600/600 ms

WIRINGS DIAGRAM



FW VERSIONS

In autumn 2016, a new FW version was launched. As of firmware version 1.3.3.6, the setting of the baud rate changes.

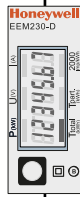
- The baud rate is no longer automatically detected, it has to be changed using the two keys and the LC display (see pages 5 and 7).
- The baud rate can be changed using a M-Bus telegram (see pages 7).

Menu to display the values on the LCD

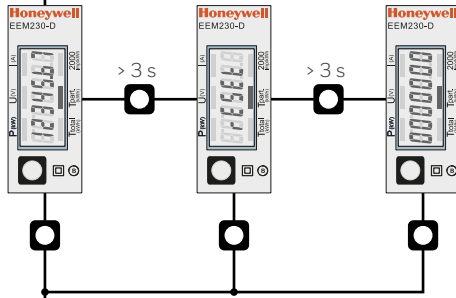
Up to versions FW1.3.3.5

T total
Total consumption

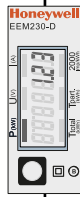
Start



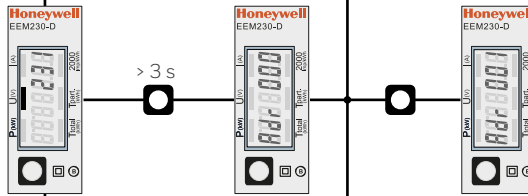
Tpart.
Partial consumption



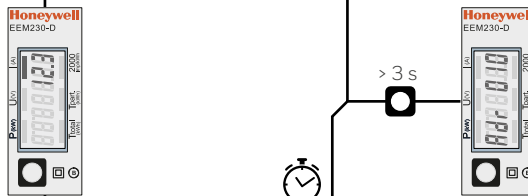
P
Instantaneous power



U
Voltage



I
Current

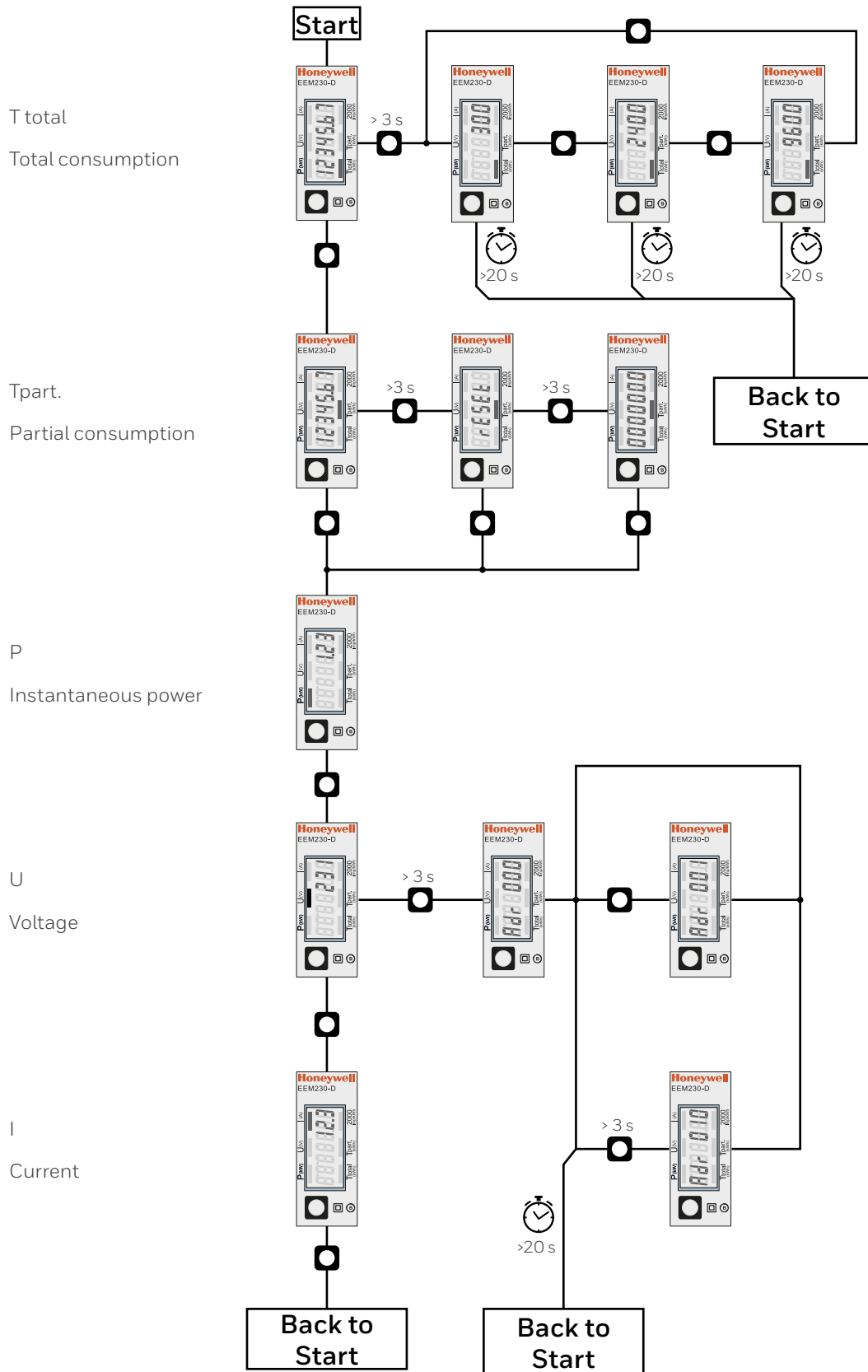


Back to Start

Back to Start

Menu to display the values on the LCD

Starting with version FW1.3.3.6



Data M-Bus

Up to versions FW1.3.3.5

| TECHNICAL DATA M-BUS | |
|-------------------------------------|--|
| BUS SYSTEM | M-Bus |
| BUS LENGTH | According to M-Bus specification |
| TRANSMISSION RATES | 300, 2400, 9600 Bd. The transmission rate is automatically detected |
| RESPONSE TIME: (SYSTEM RESPONSE) | Write up to 60 ms Read up to 60 ms |

Data transfer

- ▶ When reading out the values, all values are transferred in a telegram
- ▶ It supports the following telegrams (see p.6 for more detailed information):
 - Initialisation SND_NKE Response: 0xE5
 - Reading meter REQ_UD2 Response: RSP_UD
 - Changing primary address SND_UD Response: 0xE5
 - Reset T_{part} SND_UD Response: 0xE5
- ▶ The device does not respond to unknown queries
- ▶ The transmission rate is automatically detected
- ▶ The device has a voltage monitor. In the case of a power failure, all the registers are saved in the EEPROM.

Change the M-Bus address direct on device

- ▶ In the menu, go for «U»
- ▶ Push long (≥ 3 sec) “MBUS-ADR”
- ▶ Push short M-Bus address +1, push long M-Bus address +10
- ▶ Once the desired address is selected wait, to validate, till the root menu to come back

Secondary addressing

- ▶ It is possible to communicate with the energy meter using the secondary address, according to EN13757
- ▶ The use of Wild Cards is possible

Data M-Bus

Starting with version FW1.3.3.6

| TECHNICAL DATA M-BUS | |
|-------------------------------------|--|
| BUS SYSTEM | M-Bus |
| STANDARD | EN13757 |
| BUS LENGTH | According to M-Bus specification |
| TRANSMISSION RATES | 300, 2400, 9600 Bd. (factory setting: 2400 Bd). The transmission rate can be changed via display/M-Bus. |
| RESPONSE TIME: (SYSTEM RESPONSE) | Write up to 60 ms Read up to 60 ms |

Data transfer

- ▶ When reading out the values, all values are transferred in a telegram
- ▶ It supports the following telegrams (see p.6 for more detailed information):
 - Initialisation SND_NKE Response: 0xE5 (ACK)
 - Reading meter REQ_UD2 Response: RSP_UD
 - Changing primary address SND_UD Response: 0xE5 (ACK)
 - Reset T_{part} SND_UD Response: 0xE5 (ACK)
 - Slave selection for secondary addressing SND_UD Response: 0xE5 (ACK)
 - The transmission rate is changeable SND_UD Response: 0xE5 (ACK)
- ▶ The device does not respond to unknown queries
- ▶ The device has a voltage monitor. In the case of a power failure, all the registers are saved in the EEPROM.

Change the M-Bus address direct on device

- ▶ In the menu, go for «U»
- ▶ Push long (≥ 3 sec) «Adr ...»
- ▶ In the following menu: push short M-Bus address +1,
push long M-Bus address +10
- ▶ When the desired address is set, wait until the main display appears again.

Secondary addressing

- ▶ It is possible to communicate with the energy meter using the secondary address, according to EN13757
- ▶ The use of Wild Cards is possible

Changing the baud rate

Variant 1 (local keys and LCD):

- ▶ In order to change the M-Bus baud rate, hold down touch for 3 sec
- ▶ In the following menu, changes the baud rate from 300 to 9600 baud and 2400
- ▶ When the desired M-Bus baud rate is set, wait until the main display appears again

Variant 2 (using M-Bus):

- ▶ Send: 9600 → Telegram: 0x68 0x03 0x03 0x68 0x43 <addr> 0xBD <cs> 0x16
2400 → Telegram: 0x68 0x03 0x03 0x68 0x43 <addr> 0xBB <cs> 0x16
300 → Telegram: 0x68 0x03 0x03 0x68 0x43 <addr> 0xB8 <cs> 0x16
- ▶ Response: 0xE5 (sent with the former baud rate)
- ▶ A M-Bus master must communicate within 10 minutes to the M-Bus slave on the new baud rate to validate and save the baud rate change permanent (EN13757-3).

Value information field (VIF)

Provides information on multiplier and the unit of the following data block

Value information field extension (VIFE)

Detailed information on multiplier and the unit of the following data block

Data information field (DIF)

Specifies how the data should be interpreted by the master in terms of length and encoding

Data information field extension (DIFE)

Provides information on the tariff or subunits of the following data block

Reading meter

Query: REQ_UD2

Response: RSP_UD (see Telegram structure)

| TELEGRAM STRUCTURE | | | | | | | | | | |
|--------------------|------|--------------------|------|------|---------------------|------|------|---------------------|------|------|
| 0x68 | 0x38 | 0x38 | 0x68 | 0x08 | PAdr | 0x72 | ID | 0xEE | 0x21 | DEV |
| 02 | ACC | STAT | 0 | 0 | 0x8C | 0x10 | 0x04 | Eto | 0x8C | 0x11 |
| 0x04 | Epa | 0x02 | 0xFD | 0xC9 | 0xFF | 0x01 | V | 0x02 | 0xFD | 0xDB |
| 0xFF | 0x01 | I | 0x02 | 0xAC | 0xFF | 0x01 | P | 0x82 | 0x40 | 0xAC |
| 0xFF | 0x01 | Pr | Csum | 0x16 | | | | | | |
| Constantes | | Variable à 1 octet | | | Variable à 2 octets | | | Variable à 4 octets | | |

| BYTE | CONTENT | TYPE | DESCRIPTION |
|---------|---------|-------------|----------------|
| 23 - 26 | Eto=x | 4 b. BCD | Energy total |
| 30 - 33 | Epa=x | 4 b. BCD | Energy partial |
| 39 - 40 | V=x | 2b. Integer | Voltage |
| 46 - 47 | I=x | 2b. Integer | Current |
| 52 - 53 | P=x | 2b. Integer | Power |
| 59 - 60 | Pr=x | 2b. Integer | Reactive Power |

| UNIT WITH MULTIPLIER | | | |
|-----------------------|------------------|------|----------|
| I | (Current) | 0.1 | [A] |
| U | (Voltage) | 1 | [V] |
| P _{ACTIVE} | (Power) | 0.01 | [kW] |
| P _{REACTIVE} | (Reactive Power) | 0.01 | [kVAr] |
| E | (Consumption) | 0.01 | [kWh] |

Telegram structure (detailed)

| BYTE | VALUE | DESCRIPTION |
|------|---------------|---------------------|
| 1 | 0x68 | Start |
| 2 | 0x38 | L_Read |
| 3 | 0x38 | L_Read |
| 4 | 0x68 | Start |
| 5 | 0x08 | C |
| 6 | x | Primary address |
| 7 | 0x72 | CI |
| 8 | x | ID1 (LSB) |
| 9 | x | ID2 |
| 10 | x | ID3 |
| 11 | x | ID4 (MSB) |
| 12 | 0xEE | MAN1 |
| 13 | 0x21 | MAN2 |
| 14 | x | DEV (Typ - Version) |
| 15 | 02 | MED (Electric) |
| 16 | x | ACC |
| 17 | see footnote* | STAT |
| 18 | 0 | SIG1 |
| 19 | 0 | SIG2 |
| 20 | 0x8C | DIF |
| 21 | 0x10 | DIFE |
| 22 | 0x04 | VIF = 0.01 kWh |
| 23 | Eto_4 | T1 total |
| 24 | Eto_3 | |
| 25 | Eto_2 | |
| 26 | Eto_1 | |
| 27 | 0x8C | DIF |
| 28 | 0x11 | DIFE |
| 29 | 0x04 | VIF = 0.01 kWh |

| BYTE | VALUE | DESCRIPTION |
|------|-------|----------------|
| 30 | Epa_4 | T1 Partial |
| 31 | Epa_3 | |
| 32 | Epa_2 | |
| 33 | Epa_1 | |
| 34 | 0x02 | DIF |
| 35 | 0xFD | VIF |
| 36 | 0xC9 | VIFE = 1V |
| 37 | 0xFF | VIFE |
| 38 | 0x01 | VIFE |
| 39 | V_2 | Voltage |
| 40 | V_1 | |
| 41 | 0x02 | DIF |
| 42 | 0xFD | VIF |
| 43 | 0xDB | VIFE = 0.1 A |
| 44 | 0xFF | VIFE |
| 45 | 0x01 | VIFE |
| 46 | L_2 | Current |
| 47 | L_1 | |
| 48 | 0x02 | DIF |
| 49 | 0xAC | VIF = 0.01kW |
| 50 | 0xFF | VIFE |
| 51 | 0x01 | VIFE |
| 52 | P_2 | Power |
| 53 | P_1 | |
| 54 | 0x82 | DIF |
| 55 | 0x40 | DIFE |
| 56 | 0xAC | VIF = 0.01kVAr |
| 57 | 0xFF | VIFE |
| 58 | 0x01 | VIFE |
| 59 | Pr_2 | Reactive power |
| 60 | Pr_1 | |
| 61 | CS | Checksum |
| 62 | 0x16 | Stop |

* footnote

| BYTE | BIT | VALUE | NAME | DESCRIPTION | STANDARD |
|---------|-----|--------------|---------------------------------|--|----------------|
| 17 | | | STAT | Status register | |
| | 0 | b'xxxx xxx0' | Application_busy | Unused, is always 0 | M-Bus |
| | 1 | b'xxxx xx1x' | Any_Application_Error | This bit is set when the internal communication is not working | M-Bus |
| | 2 | b'xxxx x0xx' | Power_low | Unused, is always 0 | M-Bus |
| | 3 | b'xxxx 1xxx' | Permanent_Error | This bit is set when the counter type could not be found in the frame of the initialization | M-Bus |
| | 4 | b'xxx1 xxxx' | Temporary_Error | This bit is set during initialization phase and will be reset when all values have been read out once successfully | M-Bus |
| | 5 | b'xx1x xxxx' | Internal data refresh not ready | This bit is set as long as the internal communication is interrupted by other process | Defined by SBC |
| 6 and 7 | | b'00xx xxxx' | not defined | Unused, they are always 0 | Unused |

Initialisation

Query: SND-NKE Response: 0xE5

Telegram structure (brief)

| | | | | |
|------|------|------|------|------|
| 0x10 | 0x40 | Padr | CSum | 0x16 |
|------|------|------|------|------|

Telegram structure (detailed)

| BYTE | VALUE | DESCRIPTION |
|------|-------|----------------------|
| 1 | 0x10 | Start |
| 2 | 0x40 | Send or reply, reset |
| 3 | | Primary address |
| 4 | | Checksum |
| 5 | 0x16 | Stop |

Changing primary address

Query: SND-UD
(Byte 6 = actual M-Bus address; Byte 10 = new address)

Response: 0xE5

Telegram structure (brief)

| | | | | | |
|------|------|------|-------|------|------|
| 0x68 | 0x06 | 0x06 | 0x68 | 0x53 | Padr |
| 0x51 | 0x01 | 0x7A | New A | CSum | 0x16 |

Telegram structure (detailed)

| BYTE | VALUE | DESCRIPTION |
|------|-------|-----------------|
| 1 | 0x68 | Start |
| 2 | 0x06 | Field length |
| 3 | 0x06 | Field length |
| 4 | 0x68 | Start |
| 5 | 0x53 | C |
| 6 | | Primary address |
| 7 | 0x51 | CI |
| 8 | 0x01 | DIF |
| 9 | 0x7A | VIF |
| 10 | | New address |
| 11 | | Checksum |
| 12 | 0x16 | Stop |

Reset ACC (application reset)

Query: SND-UD Response: 0xE5

Telegram structure (brief)

| | | | | | |
|------|------|------|------|------|------|
| 0x68 | 0x03 | 0x03 | 0x68 | 0x53 | Padr |
| 0x50 | Csum | 0x16 | | | |

Telegram structure (detailed)

| BYTE | VALUE | DESCRIPTION |
|------|-------|-----------------|
| 1 | 0x68 | Start |
| 2 | 0x03 | Field length |
| 3 | 0x03 | Field length |
| 4 | 0x68 | Start |
| 5 | 0x53 | C |
| 6 | | Primary address |
| 7 | 0x50 | CI |
| 8 | | Checksum |
| 9 | 0x16 | Stop |

Reset T_{part}

(Application reset with subcode)

Query: SND-UD
(Reset Counter: 0x01 = T_{1Part})

Response: 0xE5

Telegram structure (brief)

| | | | | | |
|------|------|------|------|------|------|
| 0x68 | 0x04 | 0x04 | 0x68 | 0x53 | Padr |
| 0x50 | 0x01 | Csum | 0x16 | | |

Telegram structure (detailed)

| BYTE | VALUE | DESCRIPTION |
|------|-------|-------------------------------------|
| 1 | 0x68 | Start |
| 2 | 0x04 | Field length |
| 3 | 0x04 | Field length |
| 4 | 0x68 | Start |
| 5 | 0x53 | C |
| 6 | | Primary address |
| 7 | 0x50 | CI |
| 8 | 0x01 | Reset Counter T _{1Part} |
| 11 | | Checksum |
| 12 | 0x16 | Stop |

ACCESSORIES

ORDER NO.

Sealing cover for single-phase Saia PCD® energy meter EEM230

EEM230-SEALCAP

2 units are recommended for contact protection.



EEM230 with assembled sealing cover



EAC Mark of Conformity for Machinery Exports to Russia, Kazakhstan or Belarus.

Manufactured for and on behalf of the Environmental and Combustion Controls Division of Honeywell Technologies Sàrl, Rolle, Z.A. La Pièce 16, Switzerland by its Authorized Representative

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