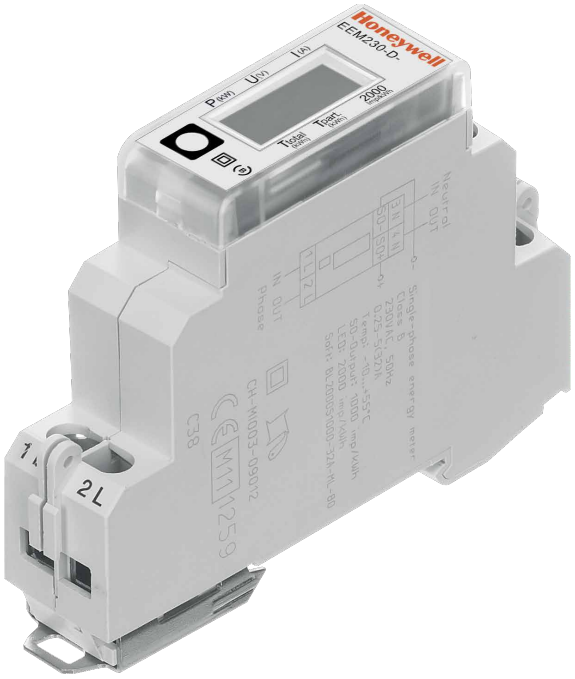
Honeywell

# Electrical Energy Meter with integrated Serial Modbus interface EEM230-D-MO

**Electrical energy meter with an integrated serial RS485 Modbus 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
- Modbus RTU interface to query the data
- Reactive power and cosφ available through interface
- Up to 247 meters can be connected to the Modbus interface
- 7-digits 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-MO**
**MID Version:** **EEM230-D-MO-MID**

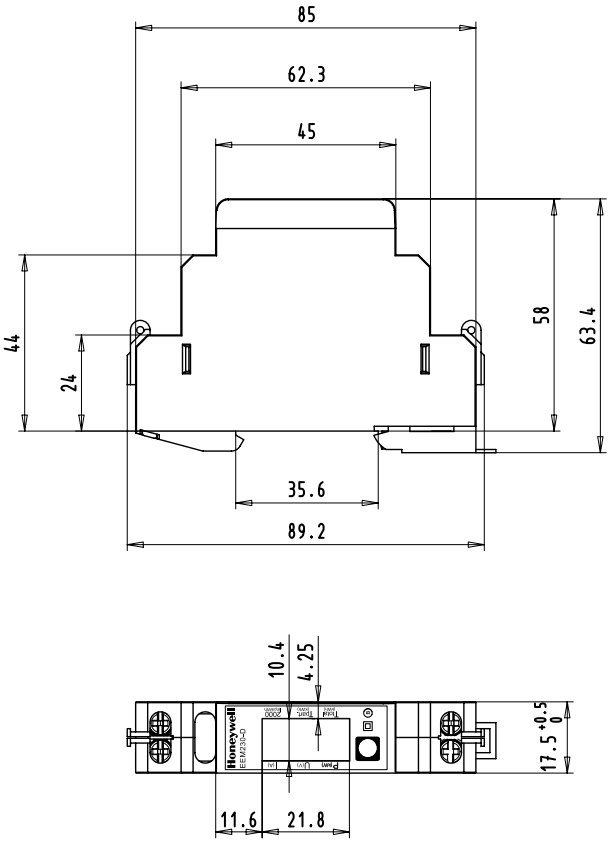
## Technical data

| | |
|---|---|
| Precision class | B according to EN50470-3<br>1 according to IEC62053-21 |
| Operating voltage | 230 VAC, 50 Hz |
| | Tolerance –20 % / +15 % |
| Reference/measurement current | $I_{ref}$ = 5 A, $I_{max}$ = 32 A |
| Starting/minimum current | $I_{st}$ = 20 mA, $I_{min}$ = 0.25 A |
| Power consumption | Active 0.4 W |
| Counting range | 00˙000.00…99˙999.99<br>100˙000.0…999˙999.9 |
| Pulses per kWh | LC-Display 2000 Imp./kWh |

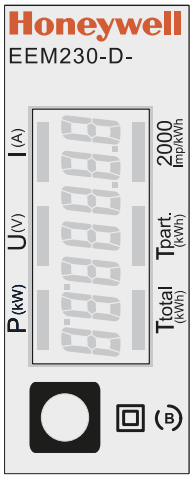
## Mounting

| | |
|---|---|
| Mounting | On 35 mm rail, according to EN60715TH35 |
| Terminal connections main circuit | Conductor cross-section max. 6 mm². screwdriver pozidrive no. 1, Slot no. 1 torque: 1.2 Nm |
| Terminal connections control circuit | Conductor cross-section max. 2.5 mm². screwdriver pozidrive no. 0, Slot no. 1 torque: 0.5 Nm |
| Insulation characteristics | 4 kV / 50 Hz test according to VDE0435 for energy meter part |
| | 6 kV 1.2 / 50 µs surge voltage according to IEC255-4 |
| | 2 kV / 50 Hz test according to VDE0435 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 Modbus interface, 1 kV |
| | Burst voltage according to IEC61000-4-4 at main circuit 4 kV, at Modbus interface 1 kV |
| | ESD according to IEC61000-4-2, contact 8 kV, air 15 kV |

## Dimension diagram

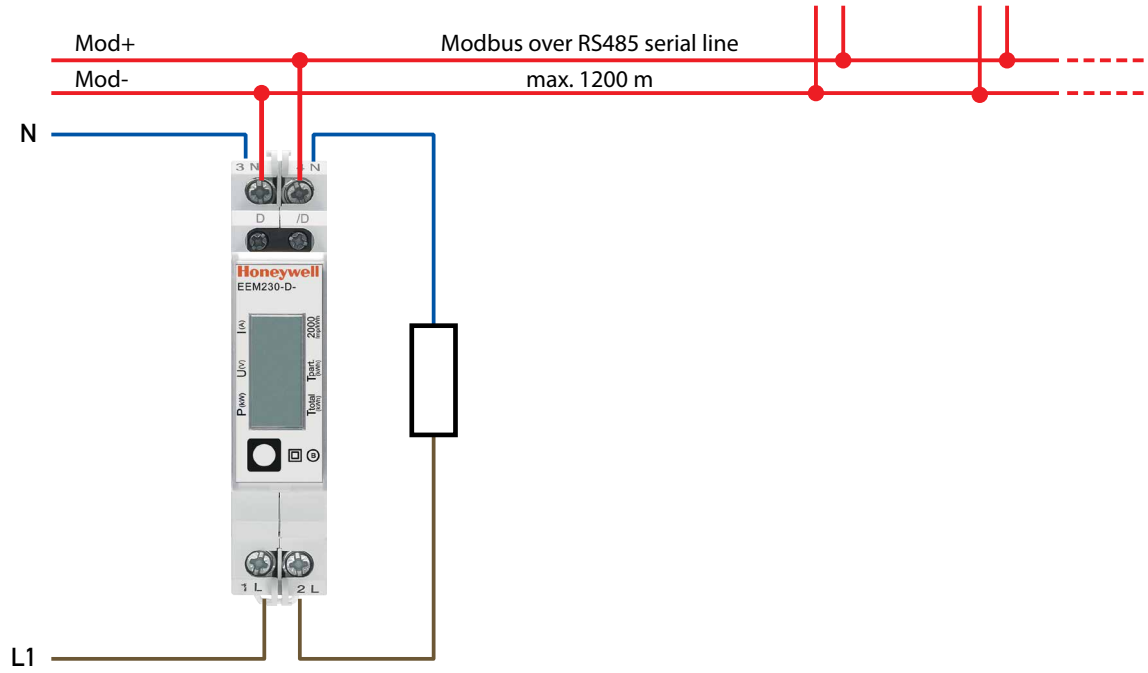



## Display elements, direct measurement

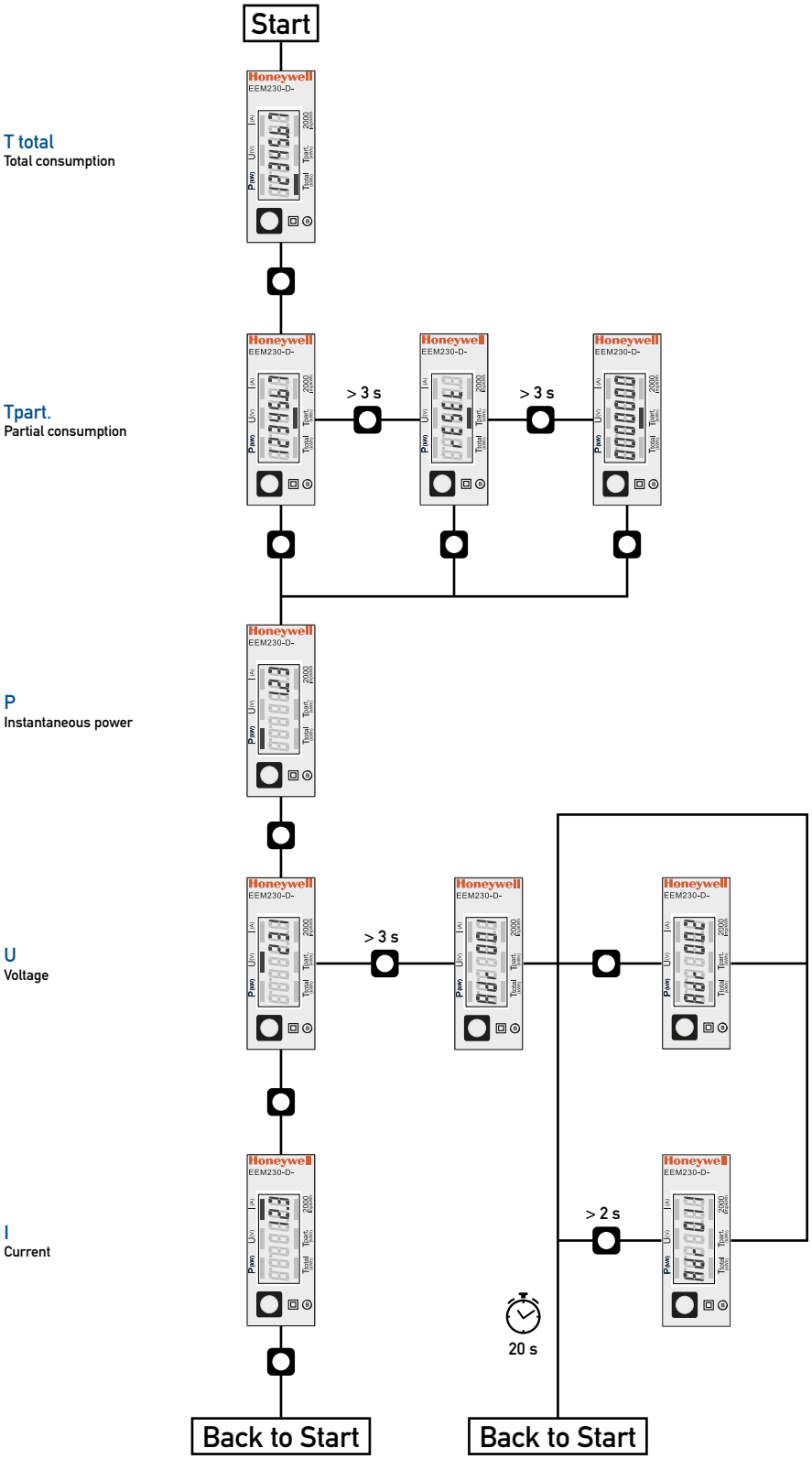



- T total (kWh) — Indicates the total consumption
- T part (kWh) — Indicates the partial consumption. This value can be reset
- P (kW) — Indicates the instantaneous power
- U (V) — Indicates the voltage
- I (A) — Indicates the current
- 2000 pulses/kWh — Pulsates according to the amount of used power.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

## Wiring Diagram



## Menu to display the value on LC



## Technical data Modbus

| | |
|---|---|
| Protocol | Modbus RTU according to IDA specification |
| Bus system | RS485 Serial line |
| Transmission rate (bps) | 2400-4800-9600-19 200-38 400-57 600-115 200.<br>The transmission Baud rate is automatically detected |
| Bit settings | 8 data bits, even parity, 1 Stop bit |
| Bus cable | Twisted, shielded, 2 × 0.5 $mm^2$, 1200 m max. |
| Response time<br>(to system response) | typ. 5 character times<br>max. 60 ms |

- The communication is ready 30 s after the 'Power On'.
- Refresh time for the data is 5 s. Therefore the delay between reads of the same data should be at least 5 s.
- The use of energy meters in bus with intensive communication can increase the data refresh time.
- 247 devices can be connected to the Modbus. Over 128 devices, a repeater should be used.
- The interface don't have a terminal resistor, this should be provided external.
- For the following transmission rate change a restart of the counter is necessary: 2400 ➞ 115 200.
- For a description of the used registers please look at the 'Register Page'.

### Data transmission

- Only «Read Holding Registers [03]/ Write Multiple Registers [16]» instructions are recognized.
- Up to 20 registers can be read at a time.
- The device supports broadcast messages.
- In accordance with the Modbus protocol, a register R is numbered as R - 1 when transmitted.
- The device has a voltage monitoring system. In case of voltage loss, registers are stored in EEPROM (transmission rate, etc.)

### Exception Responses

- ILLEGAL FUNCTION [01]: The function code is not implemented.
- ILLEGAL DATA ADDRESS [02]: The address of some requested registers is out of range or more than 20 registers have been requested.
- ILLEGAL DATA VALUE [03]: The value in the data field is invalid for the referenced register.

### Change the Modbus address direct on device

- In the menu, go for «U»
- Push long (≥ 3 sec) ➞ «Adr»
- Push short ➞ address +1, push long ➞ address +10
- Once the desired address is selected wait, to validate, till the root menu to come back

## Registers

For double registers (4 – 5, 16 – 17, 28 – 29, 30 – 31) the high register is sent first (big-Endian).
Partial counter (30 – 31) can be reset by writing 0 in both registers in the same message.

| R | Read | Write | Description | Unit |
|---|---|---|---|---|
| 1 | X | | Firmware-Version | Ex: 11 = FW 1.1 |
| 2 | X | | Modbus com. number of supported registers | Will give 40 |
| 3 | X | | Modbus com. number of supported flags | Will give 0 |
| 4–5 | X | | Baudrate | Ex: Baudrate High = 1 Baudrate Low = 49664<br>1 × 65536 + 49664 = 115'200 bps |
| 6 | X | | Not Used | Will give 0 |
| 7 | X | | Type / ASN function | Will give «EE» |
| 8 | X | | Type / ASN function | Will give «M2» |
| 9 | X | | Type / ASN function | Will give «30» |
| 10 | X | | Type / ASN function | Will give «␣-» |
| 11 | X | | Type / ASN function | Will give «D-» |
| 12 | X | | Type / ASN function | Will give «MO» |
| 13 | X | | Type / ASN function | Will give « » |
| 14 | X | | Type / ASN function | Will give « » |
| 15 | X | | HW vers. Modif. | Ex: 11 = HW 1.1 |
| 16–17 | X | | Serial number Low | Ex: «12AB» |
| 18 | X | | Serial number High | Ex: «HK» |
| 19 | X | | Not Used | Will give 0 |
| 20 | X | | Not Used | Will give 0 |
| 21 | X | | Not Used | Will give 0 |
| 22 | X | | Status / Protect | 0 = no problem<br>1 = problem with last communication request |
| 23 | X | | Modbus Timeout | ms |
| 24 | X | X[1)] | Modbus Address | Range 1–247 |
| 25 | X | | Error register | 0 : No error 1 : Error |
| 26 | X | | Not Used | Will give 0 |
| 27 | X | | Not Used | Will give 0 |
| 28–29 | X | | WT1 total<br>Counter Energy Total Tariff 1 | $10^{-2}$ kWh (multiplier 0,01)<br>Ex: WT1 total High = 13 WT1 total Low = 60383<br>13 × 65536 + 60383 = 912351 = 9123.51 kWh |
| 30–31 | X | X | WT1 partial<br>Counter Energy Partial Tariff 1 | $10^{-2}$ kWh (multiplier 0,01)<br>Ex: WT1 partial High = 13 WT1 partial Low = 60383<br>13 × 65536 + 60383 = 912351 = 9123.51 kWh |
| 32 | X | | Not Used | Will give 0 |
| 33 | X | | Not Used | Will give 0 |
| 34 | X | | Not Used | Will give 0 |
| 35 | X | | Not Used | Will give 0 |
| 36 | X | | URMS<br>Effective Voltage | V<br>Ex: 230 = 230 V |
| 37 | X | | IRMS<br>Effective Current | $10^{-1}$ A (multiplier 0,1)<br>Ex: 314 = 31.4 A |
| 38 | X | | PRMS<br>Effective active Power | $10^{-2}$ kW (multiplier 0,01)<br>Ex: 1545 = 15,45 kW |
| 39 | X | | QRMS<br>Effective reactive Power | $10^{-2}$ kvar (multiplier 0,01)<br>Ex: 1545 = 15,45 kvar |
| 40 | X | | cos phi | $10^{-2}$ (multiplier 0,01)<br>Ex: 67 = 0,67 |

[1)] The Modbus Address register is not writable with a broadcast message.

Honeywell

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:

**Saia-Burgess Controls Ltd**
Bahnhofstrasse 18
CH-3280 Murten / Schweiz

Phone +41 (0)26 672 72 72
Fax +41 (0)26 672 74 99

Subject to change without notice. Printed in Switzerland
P+P26/593EN01 / 05. 2013