Single-phase Digital Energy meters - Direct connection 125 A

IIST087-01   Stand 10-07-2012

active and reactive energy-meter with measurement of active and reactive instantaneous power - 2 tariff - 2 S0

Code	Description
DRM-125-1P	single-phase digital active and reactive energy-meter with active and reactive power indication direct connection 0.25-5 (125) A - **2 tariffs** - 2 S0 **(MID calibrated)**

active and reactive energy-meter with measurement of active and reactive instantaneous power, and inbuilt communication M-Bus - 2 tariff

Code	Description
DRM-125-1P-M	single-phase digital active and reactive energy-meter with active and reactive power indication direct connection 0.25-5 (125) A - **2 tariffs** - 2 S0 - and inbuilt communication **M-Bus (MID calibrated)**

active and reactive energy-meter with measurement of active and reactive instantaneous power, and inbuilt communication Modbus RTU - 2 tariff

| Code	Description
DRM-125-1P-MOD	single-phase digital active and reactive energy-meter with active and reactive power indication direct connection 0.25-5 (125) A - **2 tariffs** - 2 S0 - and inbuilt communication **Modbus RTU (MID calibrated)**

⚠ WARNING
Installation must be carried out and inspected by a specialist or under his supervision.
When working on the instrument, switch off the mains voltage!

- This family of devices provides a set of single phase energy meters designed to be directly connected to systems where high current is required. All the meters are equipped with an easy to read LCD on which all the active energy counters are displayed, with a red light LED which blinks in proportion to the measured active energy and with an optocoupler that allows the storage of energy on two different tariffs. Depending on the model, an insulated M-Bus communication interface or an insulated Modbus communication interface is built in, together with two solid state relays which generate pulses proportional to the measured energy. Both the M-Bus, and the Modbus, communication interface offers a set of 15 measurements.
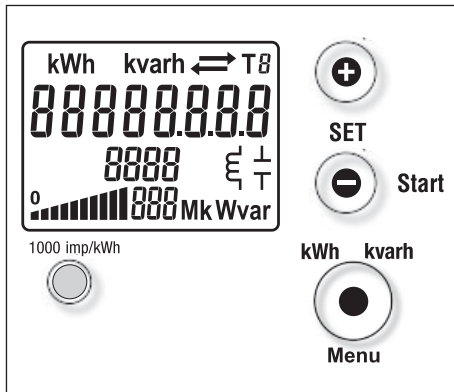
Display

- Energy value
- kWh / kvarh display
- Running tarif, called tarif
- Energy export (←)
- Energy import (→)
- Displays inductive, reactive power
- Displays capacitive, reactive power
- Full scale current indication
- Consumption Bar display (percentage of *Pmax*)
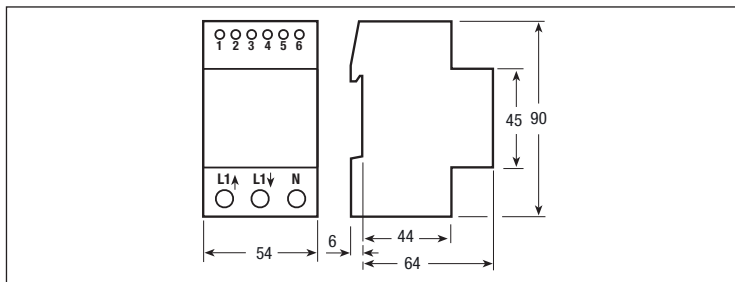- Precision control LED

Commands

- Parameters set
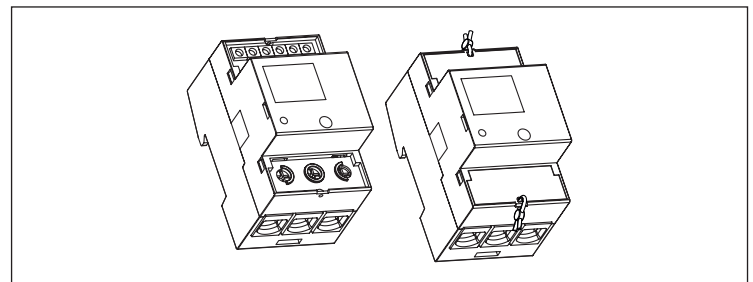- Menu key for reading selection
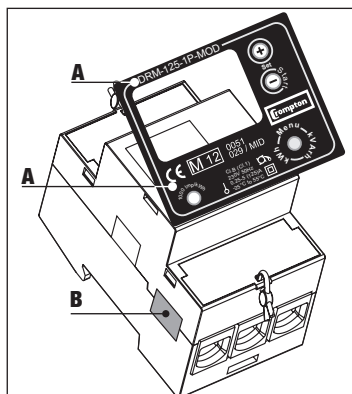
SET
Start
kWh kvarh
Menu

Dimension

Sealable terminal covers

MID calibrated

**DRM-125-1P / DRM-125-1P-M
DRM-125-1P-MOD**

A) Device code and certification data indications

B) Tamper proof seal between upper and lower housing part

Cable stripping length and max. terminal screw torque

125 A direct connection main terminals - Screw driver PZ2	15.5 — 2 Nm
Tariff and communication terminals Screw driver blade 0.8x3.5 mm	9 — 0.8 Nm
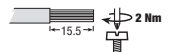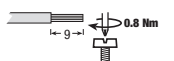
Symbols

- Measuring elements
- Reversal preventing device
- Protected by double insulation

Main Menu

Page 1:
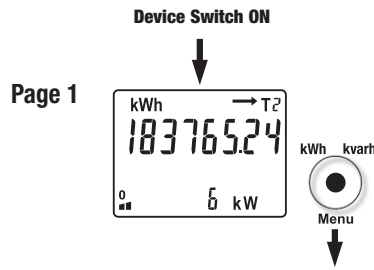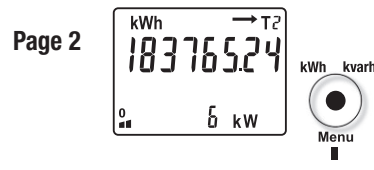In this page the value of the current Active Energy is represented (or the last one that has incremented). The energy may be Imported or Exported with Tariff T1 or T2.

Device Switch ON

Page 1

```
kWh        →T2
 18376524
0
         6  kW
```
kWh kvarh
Menu

Page 2:
By pushing any key the back light turns on

Page 2

```
kWh        →T2
 18376524
0
         6  kW
```
kWh kvarh
Menu

Page 3:
The next 8 **"Menu key"** presses allow the display of the 8 energy counters. The counters are:
- Active import energy on tariff 1 - Active export energy on tariff 1
- Reactive import energy on tariff 1 - Reactive export energy on tariff 1
- Active import energy on tariff 2 - Active export energy on tariff 2
- Reactive import energy on tariff 2 - Reactive export energy on tariff 2
When displaying the energy counter corresponding to the running tariff, the bottom row shows the instantaneous power consumption.
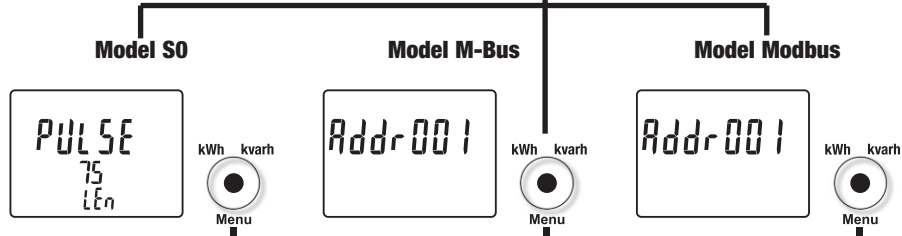
Page 3

```
kWh        →T2
 18376524
0
         6  kW
```
kWh kvarh
Menu
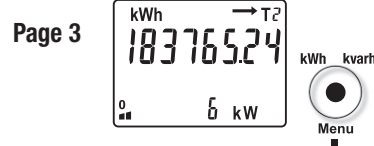
Page 4:
This page changes depending on the model
• **ON time page (PULSE LEn)**: In this page the time on in ms of the S0 pulse appears. This value can be altered, see the section Pulse Output.
• **Model equipped with M-Bus or Modbus**: In this page the Modbus address or the M-Bus primary address appears. This value can be altered, see the section Communication Address.

Model S0   **Model M-Bus**   **Model Modbus**

Page 4

```
PULSE
  75
 LEn
```
kWh kvarh
Menu

```
Addr001
```
kWh kvarh
Menu

```
Addr001
```
kWh kvarh
Menu

Page 5:
This page changes depending on the model
• **Pulse quantity page (PULSES)**: In this page the number of pulses per kWh, of the S0 output, appears. This value can be altered, see the section Pulse Output
• **Model equipped with M-Bus or Modbus**: In this page the communication baud rate appears. This value can be altered, see the section Communication Baudrate.

Page 5

```
kWh
PULSES
  560
```
kWh kvarh
Menu

```
br 9600
```
kWh kvarh
Menu

```
br 38400
```
kWh kvarh
Menu
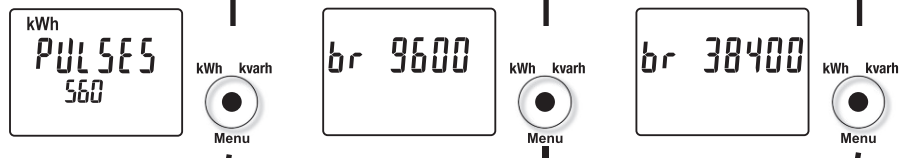
Page 6-7:
These pages are available only for the model equipped with M-Bus. In these pages the Secondary address appears. These address can range from 1 to 99999999, hence requires 2 pages (the 1st for the 4 highest digit, the 2nd for 4 lowest digit). In this example, its value is 68010643. See the section Communication Address.

Page 6

```
A2H 6801
```
kWh kvarh
Menu

Page 7

```
A2L 0643
```
kWh kvarh
Menu
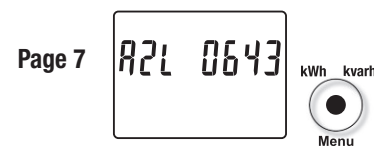
Whichever the page on the display, if no key is pushed for at least 20 sec., the main page appears again.

Communication Address

Modbus

In the Address page, by pressing the **"Start (-) key"** for 4 sec, the value of the Address will blink.
Press **"Start (-) key"** or **"(+)"** to change the value. Press the **"Menu key"** for 4 sec. to confirm change, otherwise after 5 seconds the changes will be lost.
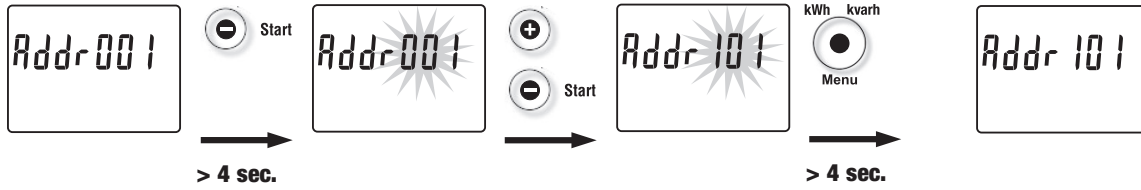
Main Menu: **Main Menu:**

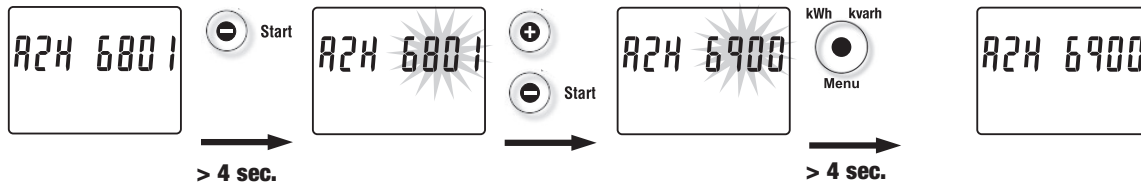Addr 001 → Start (> 4 sec.) → Addr 001 (blinking) → (+)/(-) Start → Addr 101 (blinking) → Menu (> 4 sec.) → Addr 101

M-Bus

Both Primary and Secondary Address can be set. For setting the Primary Address follow the instructions above, the Modbus Address. The Secondary address can range from 1 to 99999999, hence requires 2 pages. In the **"Secondary Address Page 1"** the 4 most significant digits of the Address are set by pressing the **"Start (-) key"** for 4 sec. The value of the Address blinks on the display. Push **"Start (-) key"** or **"(+)"** to change the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the change will be lost.
In the **"Secondary Address Page 2"** the 4 least significant digits of the Address are set. Follow the instruction as for the **"Secondary Address Page 1"**

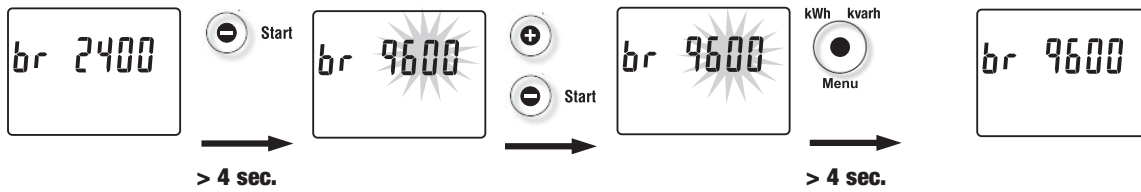**Main Menu:**   **Main Menu:**

A2H 6801 → Start (> 4 sec.) → A2H 6801 (blinking) → (+)/(-) Start → A2H 6900 (blinking) → Menu (> 4 sec.) → A2H 6900

Communication Baudrate

In the Baud rate page, by pressing the **"Start (-) key"** for 4 sec, the value of the Baudrate will blink.
Press **"Start (-) key"** or **"(+)"** to change the value. Press the **"Menu key"** for 4 sec. to confirm change, otherwise after 5 seconds the changes will be lost.

Main Menu: **Main Menu:**

br 2400 → Start (> 4 sec.) → br 9600 (blinking) → (+)/(-) Start → br 9600 (blinking) → Menu (> 4 sec.) → br 9600

Pulse Output

Pulse output quantity setting

The number of pulse per kWh (Pulse constant) that the meter can generate is a function of the ON time of the pulse. The relationship is: $\text{Pulse Constant} \leq \dfrac{50.000}{\text{ON time [ms]}}$

For example, a time ON pulse of 90 ms, the maximum Pulse constant that you can select is: $\text{Pulse Constant} = \dfrac{50.000}{90} = 555.5 = 550 \text{ pulse for kWh}$ (the number must be to tens truncated)
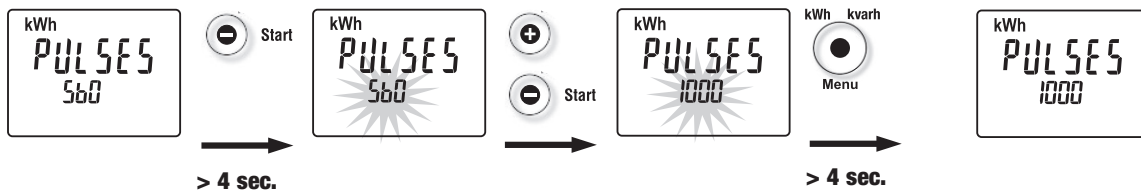
If the Pulse constant or the ON time of the pulse setted implies that the relationship is not respected, the setting is rejected.

Pulse constant setting

In the Pulse constant page, by pressing the **"Start (-) key"** for 4 sec, the value of the constant will blink.
Push **"Start (-) key"** or **"(+)"** to change the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the modification will be lost.

Main Menu: **Main Menu:**

PULSES 560 → Start (> 4 sec.) → PULSES 560 (blinking) → (+)/(-) Start → PULSES 1000 (blinking) → Menu (> 4 sec.) → PULSES 1000

Pulse length (ms) setting

In the PULSE ON time page, by pressing the **"Start (-) key"** for 4 sec, the value of the pulse length will blink.
Push **"Start (-) key"** or **"(+)"** to change the value. Push the **"Menu key"** for 4 sec. to confirm, otherwise within 5 seconds the modification will be lost.

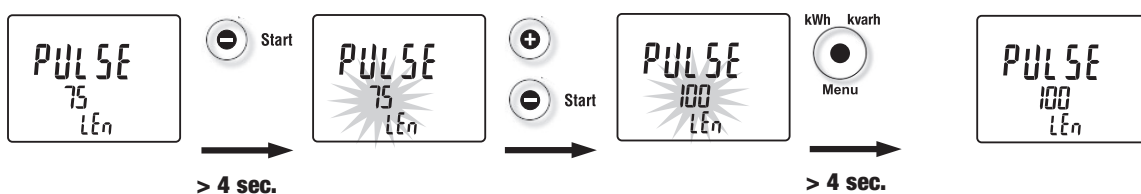**Main Menu:**   **Main Menu:**

PULSE 75 LEn → Start (> 4 sec.) → PULSE 75 LEn (blinking) → (+)/(-) Start → PULSE 100 LEn (blinking) → Menu (> 4 sec.) → PULSE 100 LEn

Note

TE connectivity ENERGY

Firmware Information
Diagnostic Page of the Display

In any page of the Main Menu by pressing the **"Menu key"** for 10 sec. the diagnostic page of the display appears. If the **"Menu key"** is held down for another 4 sec. the display shows information about the firmware release and the firmware checksum.

Main Menu: **Main Menu:**

> 10 sec.   > 4 sec.   > 6 sec.
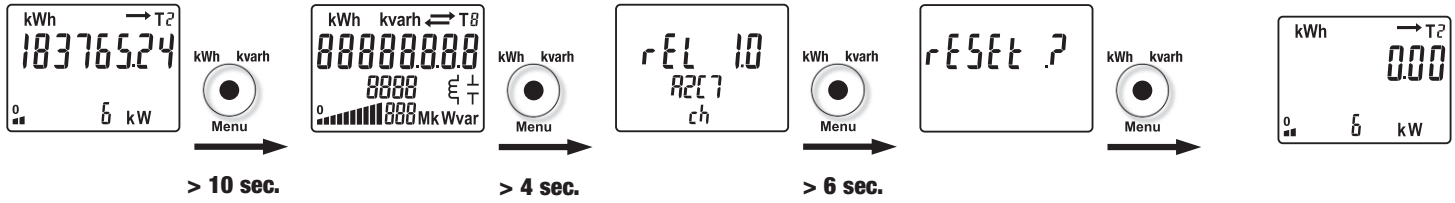
Diagnostic Message

Error Condition
When the display show these messages, the meters has got a malfunction and must be replaced..

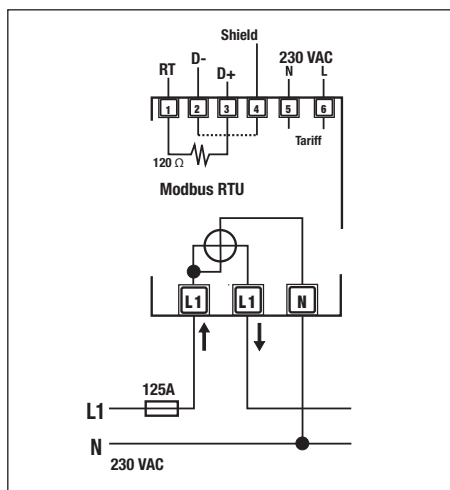   Error 02   Error 03

Service and Maintenance

It should not be necessary to recalibrate device during its lifetime as it is an electronic meter with no moving parts with electronics and voltage and current sensors that do not naturally degrade or change with time under specified environmental conditions. If a degradation in the performance is observed the device has probably been partly damaged and should be sent for repair or exchanged. If the meter is dirty and needs to be cleaned, use lightly moistened tissue with a water based mild detergent. Make sure no liquid goes into the meter as this could damage the meter.
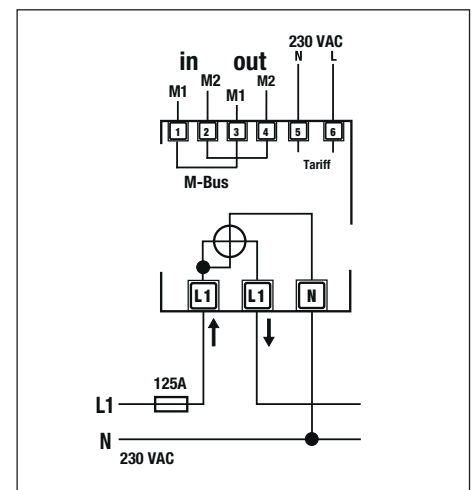
Wiring diagram
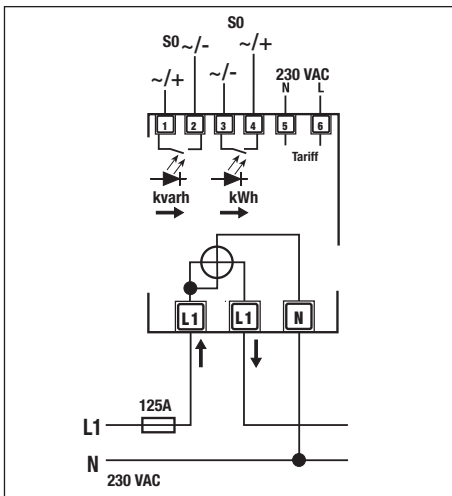
DRM-125-1P	DRM-125-1P-MOD	DRM-125-1P-M

A fuse of 125 A is recommended for the line protection.

Terminal Description

DRM-125-1P

1-2: Pulse output of reactive energy imported, isolated by a OptoMOS Relay.
3-4: Pulse output of active energy imported, isolated by a OptoMOS Relay
5-6: Tariff signal, isolated by a Opto Coupler. When there is a voltage of 230 VAC connected the device store energies on the Tariff 2 registers, otherwise on the Tariff 1 registers.
L1 ↑: Input for the phase conductor.
L1 ↓: Output for the phase conductor.
N: Measuring input of neutral.

DRM-125-1P-MOD

1: Modbus network. For the termination of the For the termination of the network short this terminal with terminal 3.
2: Modbus network. Data -
3: Modbus network. Data +
4: Modbus network. Shield
5-6: Tariff signal, isolated by a Opto Coupler. When there is a voltage of 230 VAC connected the device store energies on the Tariff 2 registers, otherwise on the Tariff 1 registers.
L1 ↑: Input for the phase conductor.
L1 ↓: Output for the phase conductor.
N: Measuring input of neutral.

DRM-125-1P-M

1-3: M-Bus network. These terminals are internally connected.
2-4: M-Bus network. These terminals are internally connected.
5-6: Tariff signal, isolated by a Opto Coupler. When there is a voltage of 230 VAC connected the device store energies on the Tariff 2 registers, otherwise on the Tariff 1 registers.
L1 ↑: Input for the phase conductor.
L1 ↓: Output for the phase conductor.
N: Measuring input of neutral.

Technical data

Data in compliance with EN 50470-1, EN 50470-3, EN 62053-23 and EN 62053-31			DRM-125-1P direct connection 125 A Pulse output S0	DRM-125-1P-M DRM-125-1P-MOD direct connection 125 A inbuilt commun. Modbus - M-Bus
General characteristics				
• Housing	DIN 43880	DIN	3 modules	3 modules
• Mounting	EN 60715	35 mm	DIN rail	DIN rail
• Depth		mm	70	70
Operating features				
• Connectivity	to single-phase network	n° wires	2	2
• Storage of energy values and configuration	digital display (EEPROM)	-	yes	yes
• Display tariffs identifier	for active and reactive energy	n° 2	T1 and T2	T1 and T2
Supply				
• Certified voltage range *Un*		VAC	230 ±20%	230 ±20%
• Operating voltage range		VAC	110 ... 276	110 ... 276
• Certified frequency *fn*		Hz	50 ±2%	50 ±2%
• Operating frequency range		Hz	48 ... 62	48 ... 62
• Rated power dissipation (max.) *Pv*		VA (W)	⩽8 (0.6)	⩽8 (0.6)
Overload capability				
• Voltage *Un*	continuous	VAC	276	276
	momentary (1 s)	VAC	300	300
• Current *Imax*	continuous	A	125	125
	momentary (10 ms)	A	3750	3750
Display				
• Display type	LCD	n° digits	8 (2 decimal)	8 (2 decimal)
	digit dimensions	mm x mm	6.00 x 3	6.00 x 3
• Active energy: 1 display, 7-digit	tariffs 2	kWh	0.01	0.01
+ display import or export (arrow)	overflow	kWh	999999.99	999999.99
• Reactive energy: 1 display, 7-digit	tariffs 2	kvarh	0.01	0.01
+ display import or export (arrow)	overflow	kvarh	999999.99	999999.99
• Instantaneous active power: 1 display, 3-digit		W, kW or MW	000 ... 999	000 ... 999
• Instantaneous reactive power: 1 display, 3-digit		var, kvar or Mvar	000 ... 999	000 ... 999
• Instantaneous tariff measurement		-	1	1
	1 display, 1-digit	-	T1 or T2	T1 or T2
• Display period refresh		s	1	1
Measuring accuracy	at 23 ±1°C, referred to nominal values			
• Active energy and power	acc.to EN 50470-3	class	B	B
• Reactive energy and power	acc.to EN 62053-23	class	2	2
Measuring input				
• Type of connection	phase/N	-	direct	direct
• Operating range voltage	phase/N	VAC	110 ... 276	110 ... 276
• Current *Iref*		A	5	5
• Current *Imin*		A	0.25	0.25
• Operating range current *(Ist ... Imax)*	direct connection	A	0.020 ... 125	0.020 ... 125
• Operating frequency		Hz	48 ... 62	48 ... 62
• Certified frequency		Hz	50 ±2%	50 ±2%
• Starting current for energy measurement *(Ist)*		mA	20	20
Pulse output S0	acc.to EN 62053-31			
• Pulse output	for active and reactive energy T1 and T2	-	yes	-
• Pulse quantity		imp/kWh	1000	-
• Pulse duration		ms	100 ms (lower on request)	-
• Required voltage	min. (max.)	VAC (DC)	5 ... 230 ±5% (5 ... 300)	-
• Permissible current	pulse ON (max. 230 V AC/DC)	mA	90	-
• Permissible current	Impuls OFF (leakage cur. max. 230 V AC/DC)	µA	1	-
Optical interfaces				
• Front side *(accuracy control)*	LED	imp/kWh	1000	1000
Safety acc. to EN 50470-1				
• Indoor meter		-	yes	yes
• Degree of pollution		-	2	2
• Operational voltage		VAC	300	300
• AC voltage test (EN 50470-3, 7.2)		kV	4	4
• Impulse voltage test		1.2/50 µs-kV	6	6
• Protection class (EN 50470)		class	II	II
• Housing material flame resistance	UL 94	class	V0	V0
• Safety-sealing between upper and lower housing part		-	yes	yes
Embedded communication				
• Modbus RTU	RS-485 - 3 wires	-	-	up to 38.400 bps
• M-Bus	2 wires	-	-	up to 9.600 bps
• M-Bus unit load	2 wires	-	-	1
Lateral IR interfaces				
• For communication moduls connection **(DRM-M / DRM-MOD / DRM-KNX / DRM-LOG)**		-	yes	yes
Connection terminals				
• Type cage main current paths	screw head Z +/-	POZIDRIV	PZ2	PZ2
• Type cage pulse output	blade for slotted screw	mm	0.8 x 3.5	0.8 x 3.5
• Terminal capacity main current paths	solid wire min. (max.)	mm²	1.5 (50)	1.5 (50)
	stranded wire with sleeve min. (max.)	mm²	1.5 (50)	1.5 (50)
• Terminal capacity pulse output	solid wire min. (max.)	mm²	1 (4)	1 (4)
	stranded wire with sleeve min. (max.)	mm²	1 (2.5)	1 (2.5)
Environmental conditions				
• Mechanical environment		-	M1	M1
• Electromagnetic environment		-	E2	E2
• Operating temperature		°C	-25 ... +55	-25 ... +55
• Limit temperature of transportation and storage		°C	-25 ... +70	-25 ... +70
• Relative humidity (not condensation)		%	⩽80	⩽80
• Vibrations	50 Hz sinusoidal vibration amplitude	mm	±0.075	±0.075
• Degree protection	housing when mounted in front (terminal)	-	IP51(∗)/IP20	IP51(∗)/IP20

(∗) **For the installation in a cabinet at least with IP51 protection.**