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DATA SHEET
3-349-867-03
9/11.24

GOSSEN METRAWATT
GMC-INSTRUMENTS GROUP

ENERGYMID

MULTIFUNCTIONAL ENERGY METERS
EM2281 / EM2289 / EM2381 / EM2387 / EM2389

LoRaWAN
Ethernet
M-Bus
Modbus
BACnet
LONWORKS®



Eichung PTB-A 50.7 Zählerausgang
Eichung MID 2014/32/EU
EBY 8 (when calibrated)
3 YEARS WARRANTY

- Professional energy meter for 2, 3 and 4-wire systems with 5 (80) A direct connection or 1 (6) A transformer connection (also includes 5(6) A)
- Accuracy class B for industrial and commercial use, as well as for household use with highly demanding requirements
- MID approval (conformity assessment procedure, modules B and D)
- Configurable, multifunctional variants for acquiring reactive energy and grid state variables
- 4 quadrant measurement (import and export)
- Universal pulse output (double) with adjustable pulse rate and pulse duration, as well as selectable voltage range
- Communication via integrated interfaces: LON, M-Bus, Modbus RTU, TCP/IP (BACnet / Modbus TCP / HTTP), LPWAN (wireless interface supporting the LoRaWAN® protocol)
- 4 tariffs (hardware-controlled as standard feature), plus 4 additional tariffs (software controlled) with bus (features W1 / W2 / W4 / W7)
- Certified load profile in accordance with PTB-A 50.7 and PTB-A 50.7-1 (feature Z2)
- Indicates installation errors: phase sequence phase failure, reversed transformer polarity, overload
- Tamper-proof cover, configuration disabling
- Quality product made in Germany

(Product characteristics are model and feature-dependent. See this document.)

APPLICATIONS

The MID[1] certified energy meters included in the ENERGYMID product range are used to acquire and bill active energy in industrial, household, commercial and building management applications.

Integrated 4-quadrant measurement permits measurement of energy import and export. 4 tariffs (hardware-controlled as standard feature) and, depending on model or version, 4 additional tariffs (software-controlled) can be selected.

In combination with national approval of the integrated load profile (Z2) in accordance with PTB-A 50.7, this energy meter is also suitable for fulfilling legal energy requirements.

Energy data are transmitted to superordinate management systems via various communication interfaces, e.g. for acquisition and optimization, as well as for building automation and control technology.

Thanks to simple installation including detection of connection errors and flexible configuration options, it performs all measuring tasks highly proficiently.

1. Measuring Instruments Directive 2004/22/EG

Simply and conveniently specify the technical characteristics and other functions (e.g. pulse output, bus connection type and load profile) for your ENERGYMID energy meter via configurable features when placing your order – you get an individualized, device-specific variant which is perfectly matched to your needs.

MULTIFUNCTIONAL VERSION

Depending on the type of multifunctional variant, the meter is also capable of acquiring reactive power and indicating up to 33 additional measured quantities directly at the display.

Voltage level, utilization of individual phases, reactive power component and the functioning of compensation systems can thus be evaluated at any time by simply pressing a button without any additional measuring equipment. Refer to the table below for details.

Measuring Function		Accuracy	Display (feature)			
Measured Quantity		(at ref. cond.)	M0	M1	M2[1]	M3[2]
Active energy (kWh)[3]	EP_1 … EP_8, EP_{tot}	±1%	•	•	•	•
Reactive energy (kVArh)[4]	EQ_{tot}	±2%	—	—	•	•
Star voltage (V)	U_{1N}, U_{2N}, U_{3N}	0.5% ±1 d	—	•	—	•
Delta voltage (V)	U_{12}, U_{23}, U_{13}	0.5% ±1 d	—	•	—	•
Current per phase (A)	I_1, I_2, I_3	0.5% ±1 d	—	•	—	•
Neutral conductor current (A)	I_N[5]	1% **±1 d, typical**	—	•	—	•
Active power (kW)	P_1, P_2, P_3, P_{tot}	1% ±1 d	—	•	—	•
Reactive power (kVAr)	Q_1, Q_2, Q_3, Q_{tot}	1% ±1 d	—	•	—	•
Apparent power (kVA)	S1, S2, S3, S_{tot}	1% ±1 d	—	•	—	•
Power factor (cosφ)	PF_1, PF_2, PF_3, PF_{tot}	1% ±1 d	—	•	—	•
Frequency (Hz)	f	0.05% ±1 d	—	•	—	•
RMS distortion value	THD U_1, U_2, U_3		—	•	—	•
	THD I_1, I_2, I_3		—	•	—	•

1. Not approved for billing purposes in Switzerland
2. The greatest current value per phase is used as a reference value for accuracy.
3. Total power (kW/kVAr) appears at auxiliary display 2 with plus or minus sign
4. Total power (kW/kVAr) appears at auxiliary display 2 with plus or minus sign
5. The greatest current value per phase is used as a reference value for accuracy.

APPLICABLE REGULATIONS AND STANDARDS

Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (recast) Text with EEA relevance	
DIN 43856	Electricity meters, tariff time switches and ripple control receivers; connection diagrams, terminal marking, circuit diagrams
DIN 43880	Built-in equipment for electrical installations; overall dimensions and related mounting dimensions
DIN 46200	Current carrying connection bolts up to 1600 A; design and assignment of current intensities
EN 50470-1	Electricity metering equipment (a.c.) – Part 1: General requirements, tests and test conditions – Metering equipment (class indexes A, B and C)
EN 50470-3	Electricity metering equipment (a.c.) – Part 3: Particular requirements – Static meters for AC active energy (class indexes A, B and C)
EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
EN 60529	Test instruments and test procedures – Degrees of protection provided by enclosures (IP code)
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
EN 62052-1	Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment
EN 62053-23	Electricity metering equipment (a.c.) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)
EN 62053-31	Electricity metering equipment (a.c.) – Particular requirements – Pulse output devices for electromechanical and electronic meters (two wires only)
EN 62056-61	Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: Object identification system (OBIS)
PTB-A 50.7	Requirements for electronic and software-controlled measuring instruments and ancillary equipment for electricity, gas, water and heat
PTB-A 50.7-1	Software requirements for measuring instruments and ancillary equipment according to PTB-A 50.7 equipment class 1: Simple instrument

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TECHNICAL DATA

Some of the technical data are model and feature-dependent: Device type and (optional) order features are selected when ordering ⇨ “Order Information” 8.
All options are listed with corresponding identification in the following tables.

DEVICE CHARACTERISTICS

Connection	EM2281 / EM2289: direct EM2381 / EM2387 / EM2389: via transformer
Measurement type	4-quadrant measurement
Multifunctional version	Optional: U, I, P, Q, S, PF, f, THD, I_N (M1) / reactive energy (M2) / U, I, P, Q, S, PF, f, THD, I_N THD, I_N, reactive energy (M3) [1]
Load profile	Optional: Load profile (Z1) / certified load profile per PTB-A 50.7 (Z2)
Approval	MID (conformity assessment procedure, modules B and D)
Accuracy class	B for industrial and commercial use, as well as for household use with highly demanding requirements

1. Not approved in Switzerland

MEASURING RANGES

Voltage		
Reference voltage U_n AC	U3:	100 … 110 V L–L
	U5	230 V L–N
	U6:	400 V L–L
Allowable deviation	-20% … +15%	

Current	**Direct Connection**	**Transformer Connection**
I_{ref}	5 A	1 A
Starting current	20 mA	2 mA
I_{min}	0.1 A	0.01 A
I_{max}	80 A	6 A

Frequency range	
Nominal frequency	50 Hz
Cutoff frequency	45 Hz … 65 Hz

Accuracy	
Active energy	Class B per EN 50470-3
Reactive energy	Class 2 per EN 62053-23

Sampling Rate	Continuous, 32 per period

CURRENT AND VOLTAGE RANGES

Input voltage (reference voltage U_n AC)	EM2281: 230 V L–N (U5) EM2289: 400 V L–L (U6) EM2381: 230 V L–N (U5)) EM2387: 100 … 110 V L–L (U3) / 400 V L–L (U6) EM2389: 100 … 110 V L–L (U3) / 400 V L–L (U6)
Nominal current (limiting current intensity)	EM2281 / EM2289: 5 (80) A EM2381 / EM2387 / EM2389: 1(6) A (including 5(6) A)

Meter parameters and meter readings are retained in the event of power failure.

POWER CONSUMPTION AND POWER SUPPLY

Total	Single-phase: < 2 W (at nominal voltage) 3-phase: < 2 W (at nominal voltage) (where line frequency = 45 … 65 Hz)
Internal power supply	From measuring voltage U_r: 80% … 115% U_r 3.3 V / 100 mA With W4: 3.3 V / 200 mA (plus 100 mA for Ethernet)
Per voltage path (including power supply)	< 2 VA
Per current path	At I_{max}: < 1 VA for direct meter / < 0.2 VA for transformer meter At I_{ref}: < 0.02 VA for direct meter / < 0.005 VA for transformer meter
Starting current	Direct meter: approx. 17 mA at 0.1 … 5(80) A Transformer meter: approx. 1.5 mA at 0.01 … 1(6) A

AMBIENT CONDITIONS

Operating temperature	-25 ... +55 °C
Storage temperature	-25 ... +70 °C
Relative humidity	Max. 95%, no condensation allowed Max. 75% annual average and non-condensing
Elevation	Up to 2000 m
Place of use	Indoors

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ELECTRICAL SAFETY

Pollution degree	2
Protection class	II
Insulating group	II
Utilization category (electrical switchgear)	(only for meters with direct connection) UC-2 (per EN 60947)
Nominal insulation voltage	Inputs: 300 V_{AC} Output: 50 V_{DC} (bus/S0) with V0 / V1 / V2 / V7 / V8 / V9 230 V_{AC} (pulse) with V3 / V4
Insulation test voltage	Input ↔ output/housing: 4 kV_{AC} Output ↔ housing: 500 V (bus/S0) with V0 / V1 / V2 / V7 / V8 / V9 4 kV (pulse) with V3 / V4
Overload capacity	All meters: continuous 1.15 U_r and I_{max} Direct connection: 5 × 3 s, U_r and 100 A (5 min. interval) Direct connection: 1 × 1 s, U_r and 250 A, 10 ms 2400 A Current transformer connection: 0.5 s and 20 × I_{max}
Overvoltage category	III (per EN 62052-31) 230 (400) V_{AC}, 289 (500) V_{AC}
Rated impulse voltage	4 kV with basic insulation and 6 kV with reinforced insulation

ELECTROMAGNETIC COMPATIBILITY (EMC)

Interference emission	EN 55022 class B
Interference immunity	EN 61326-1
Electromagnetic classification	E2

WIRELESS TRANSMISSION CHARACTERISTICS (W8)

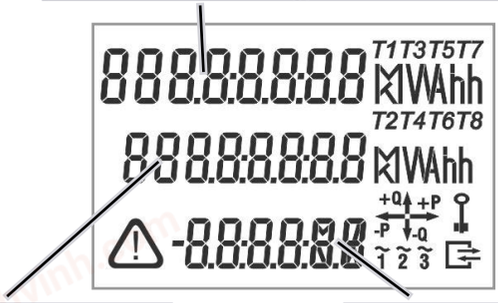
Interface	LPWAN supporting the LoRaWAN® protocol
Frequency range	868 MHz ISM
Channel bandwidth	125 kHz
Transmission intensity	14 dBm at max. permissible antenna gain of 2 dBi

MECHANICAL DESIGN

Mechanical classification	M1
Protection	Front (panel-mount instrument): IP 51 (protection against ingress of solid foreign objects: protected against harmful amounts of dust, protection against ingress of water: protection against dripping water) Terminals: IP 20 (protection against ingress of solid foreign objects: ≥ 12.5 mm diameter, protection against ingress of water: not protected) (per EN 60529 / IEC 60529)
Housing (W × H × D)	4 standard width units, approx. 72 × ≤ 90 × ≤ 70 mm
Housing material	Lexan polycarbonate per UL94 V0
Weight	< 0.3 kg
Mounting	Top-hat rail per EN 50022 (35 × 15 or 35 × 7.5 mm), snap-on C rail
Screw terminals	Slotted screws, 16 mm^2 cross-section
Display	LCD, approx. 28 × 42 mm, 7-segment characters (0 to 99,999,999 digits) 1 main display: max. 8-place, height: 5.6 mm, 2 auxiliary displays: 8-place, height: 5 mm Refresh: approx. 6 times per second
Protection against tampering	Tamper-proof cover, configuration disabling

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DISPLAY LAYOUT



Main display
(active energy* in kWh or MWh)
(M2/M3: reactive energy* in kVArh or MVArh)

Auxiliary display 1
(active power* in kW or MW)
(M2/M3: reactive energy* or reactive power* in kVAr(h) or MVAr(h))

Auxiliary display 2
(e.g. IN, OUT for import or export)

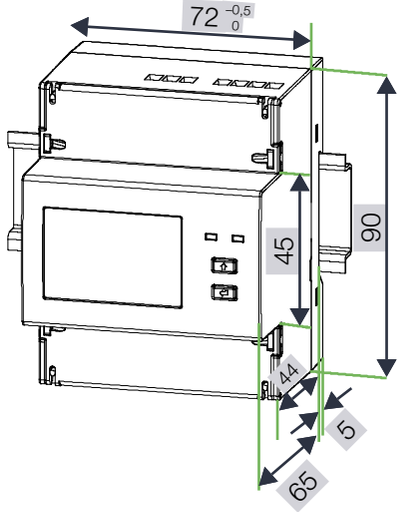
In case of error: error code alternates with momentary display

* Transformer meter EM238x: CT and VT are taken into account / power: negative sign for export

DIMENSIONAL DRAWING / INSTALLATION

Top-hat rail per EN 50022 or snap-on rail with C profile

Dimensions each:
35 × 15 mm or
35 × 7.5 mm



INTERFACES

The energy meters are equipped with two pulse outputs or one bus output as a standard feature.

PULSE OUTPUT

Model and feature-dependent, as well as optional:

- S0 standard, 1000 pls/kWh (V1) /
- S0 programmable, 1 … 1000 pls/kWh sec. (V2 with EM2281 / EM2289) /
- S0 programmable, 1 … 50,000 pls/kWh sec. (V2 with EM2381 / EM2387 / EM2389) /
- Switching output up to 230 V, 1000 pls/kWh (V3)/
- Switching output up to 230 V, programmable, 1 … 1000 pls/kWh (V4 with EM2281 / EM2289) /
- Switching output up to 230 V, programmable, 1 … 50,000 pls/kWh (V4 with EM2381 / EM2387 / EM2389) /
- S0 130 ms, 100 pls/kWh (V7 with EM2281 / EM2289) /
- S0 130 ms,100 pls/kWh, in combination with Q9 depending on CT × VT (V7 with EM2381 / EM2387 / EM2389) /
- S0 130 ms,1000 pls/kWh (V8)
- Customer-specific S0 (V9)

Pulse duration: 30 ms (adjustable up to 3 s with V2 / V4)

Interpulse period > 30 ms

U_{ext}: max. 40 V (375 V with V3 / V4)

Switching current: max. 27 mA (100 mA with V3 / V4)

1 of 4 pulse sources can be selected for each output: active energy import, active energy export, reactive energy import or reactive energy export.

The pulse outputs are electrically isolated from the measuring circuit by means of an optocoupler.

BUS CONNECTION

Optional:

- LON (W1) /
- M-Bus (W2) /
- Modbus RTU (W7) /
- TCP/IP (BACnet / Modbus / TCP / HTTP) (W4)
- LPWAN wireless interface supporting the LoRaWAN® protocol (W8)

Refer to the interface description for detailed information, which is available at https://www.gmc-instruments.de/services/download-center/.

TARIFF INTERFACE

4 tariffs (hardware controlled) and 4 additional tariffs with bus feature W1 / W2 / W4 / W7[1]

Power utility pulse

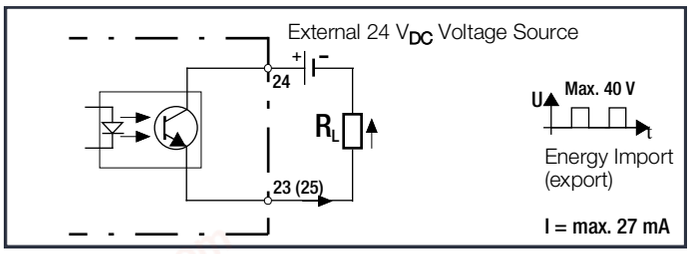
1. The 4 additional tariffs via bus are not included in the scope of MID approval.

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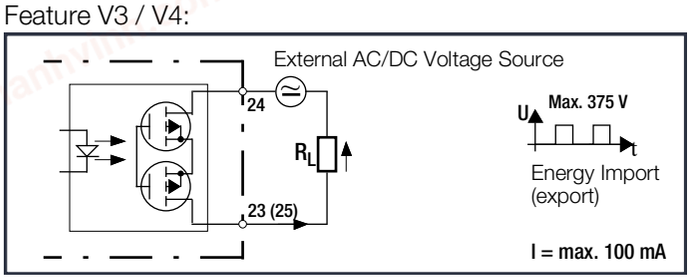
CONNECTIONS

CIRCUIT DIAGRAMS – PULSE OUTPUT

Feature V1 / V2 / V7 / V8 / V9:



Feature V3 / V4:



Type of energy can also be selected with features V2 / V4. The default setting is active energy import (23) / export (25).

MECHANICAL CHARACTERISTICS

All connection components are laid out as self-locking screw terminals, except for the TCP/IP interface which is equipped with an RJ-45 connector and the LPWAN interface which has an SMA antenna connector.

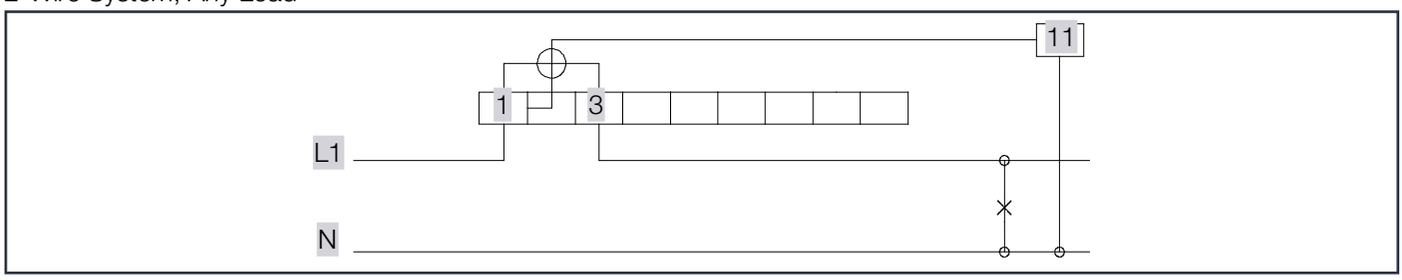
Connection	Direct	Transformer
Current input	Fine wire: 6 to 16 mm^2 Solid wire: 6 to 25 mm^2 With wire end ferrule: 6 to 16 mm^2 Torque: 3 Nm	Fine wire: 0.5 to 4 mm^2 Solid wire: 0.5 to 6 mm^2 With wire end ferrule: 0.5 to 2.5 mm^2 Torque: 0.5 Nm
Voltage input	–	Fine wire: 0.5 to 4 mm^2 Solid wire: 0.5 to 6 mm^2 With wire end ferrule: 0.5 to 2.5 mm^2 Torque: 0.5 Nm
S0 pulse output, bus output, tariff input (power utility pulse)	Fine wire: 0.2 to 2.5 mm^2 Solid wire: 0.2 to 2.5 mm^2 With wire end ferrules: 0.25 to 1.5 mm^2 Torque: 0.4 Nm	
LON (W1)*	Twisted pair copper cable, recommended: JY (ST) Y 2 × 2 × 0.8 mm with twisted wire pairs (where 0.8 mm = wire diameter, wire cross-section = 0.5 mm^2), maximum cable length of 900 m with bus topology (bus terminator at both ends), 500 m with free topology (bus terminator at one end) or 320 m from device to device	
M-Bus (W2) *	2-wire twisted-pair	
TCP/IP (W4) *	RJ-45 (8P8C)	
Modbus (W7) *	2-wire twisted-pair, shielded if possible, maximum length of 1000 m (depending on cable thickness and transmission speed), cross-section of at least 0.22 mm^2, wave impedance: approx. 100 to 150 Ω, terminating resistors at both ends (the following applies: resistance value = line impedance)	
LPWAN (W8) *	Antenna connection (SMA plug) (SMA adapter, socket to socket, included in scope of delivery, torque: 57 Ncm)	

* Refer to the interface description for further details, which is available at https://www.gmc-instruments.de/services/download-center/.

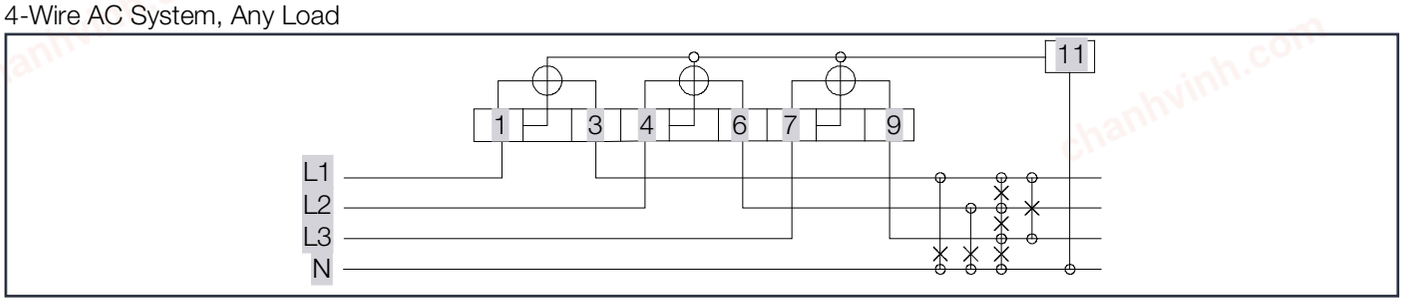
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WIRING DIAGRAMS – CURRENT AND VOLTAGE

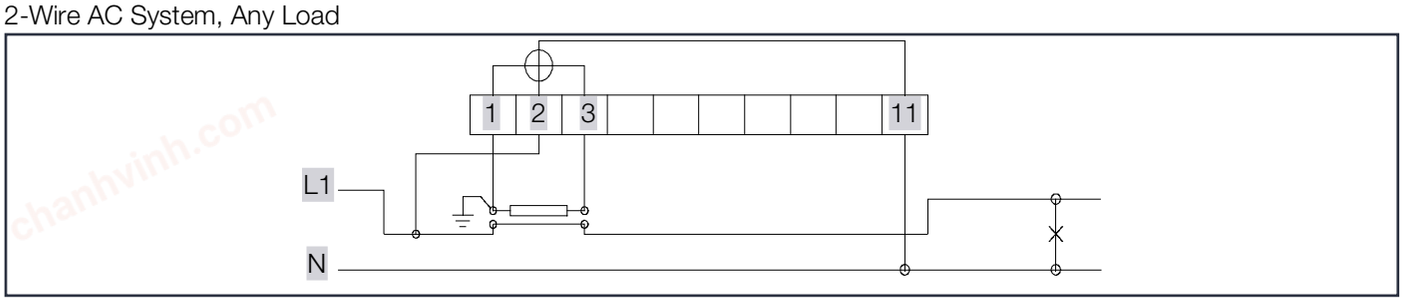
EM2281 – Direct Connection
2-Wire System, Any Load



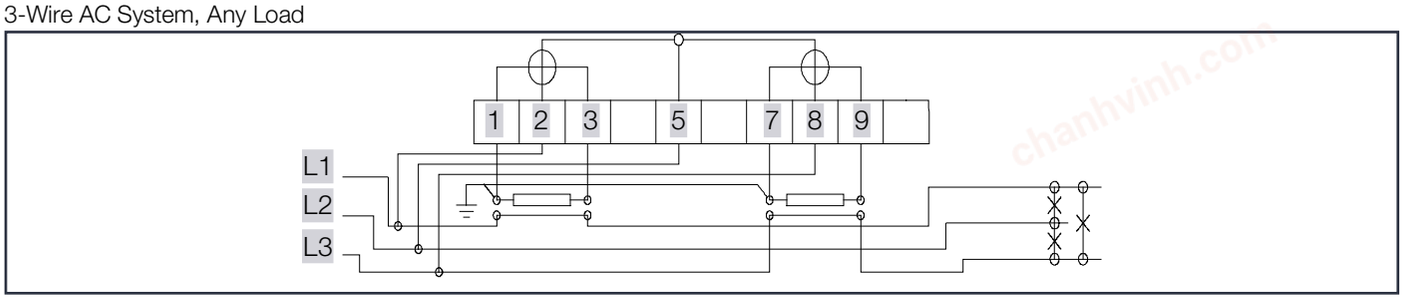
EM2289 – Direct Connection
4-Wire AC System, Any Load



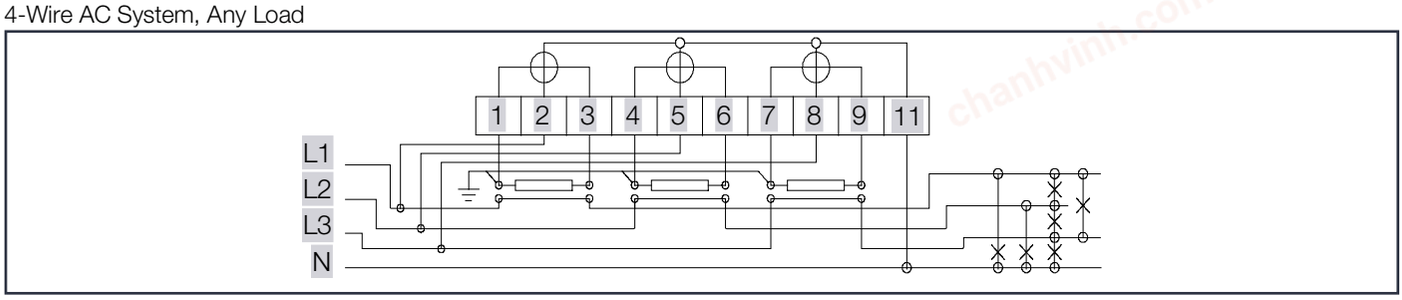
EM2381 – Transformer Connection
2-Wire AC System, Any Load



EM2387 – Transformer Connection
3-Wire AC System, Any Load



EM2389 – Transformer Connection
4-Wire AC System, Any Load



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ORDER INFORMATION

Designation		Article Number / Feature				
EM2281 energy meter for 2 wire system, 230 V, direct connection, 5(80) A		**U2281**				
EM2289 energy meter for 4-wire system, any load, direct connection, 5(80) A			**U2289**			
EM2381 energy meter for 2-wire system, 230 V, transformer connection,1(6) A (incl. 5(6) A)				**U2381**		
EM2387 energy meter for 3-wire system, any load, transformer connection, 1(6) A (incl. 5 (6) A					**U2387**	
EM2389 energy meter for 4-wire system, any load, transformer connection, 1(6) A (incl. 5 (6) A						**U2389**
Multifunctional version / display	None	M0	M0	M0	M0	M0
	With U, I, P, Q, S, PF, f, THD, I_N	M1	M1	M1	M1	M1
	With reactive energy [1]	M2	M2	M2	M2	M2
	With U, I, P, Q, S, PF, f, THD, I_N, reactive energy [1]	M3	M3	M3	M3	M3
Reference voltage U_n	100 … 110 V L–L	—	—	—	U3	U3
	230 V L–N	U5	—	U5	—	—
	400 V L–L	—	U6	—	U6	U6
MID approval with declaration of conformity	MID approval	P0	P0	P0	P0	P0
Pulse output	None (only with bus connection)	V0	V0	V0	V0	V0
1000 pulses per kWh [2]	S0 standard [3]	V1	V1	V1	V1	V1
Programmable rate: 1 … 1000 pulses per kWh sec.	S0, programmable [3]	V2	V2	—	—	—
Programmable rate: 1 … 50,000 pulses per kWh sec.	S0, programmable [3]	—	—	V2	V2	V2
Switching output up to 230 V, 1000 pulses per kWh [2]	230 V standard [3]	V3	V3	V3	V3	V3
Switching output up to 230 V, progr. rate: 1 … 1000	230 V, programmable [3]	V4	V4	—	—	—
Switching output up to 230 V, progr. rate:[2] 1 … 50,000	230 V, programmable [3]	—	—	V4	V4	V4
100 pulses per kWh	S0, 130 ms, 100 pulses per kWh [3]	V7	V7	—	—	—
100 pulses per kWh, depends on CT x VT with Q9	S0, 130 ms, 100 pulses per kWh [3]	—	—	V7	V7	V7
1000 pulses per kWh (not with Q9)	S0, 130 ms, 1000 pulses per kWh [3]	—	—	V8	V8	V8
2000, 5000, 10,000 pulses per kWh VTA: entry for S0 100 … 20,000 (with U6) VTB: entry for S0 100 … 50,000 (with U5) VTC: entry for S0 100 … 50,000 (with U3)	Customer-specific S0 [3] (not with Q9)	—	—	V9 – VTB = ____ –	V9 VTA = ____ – VTC = ____	V9 VTA = ____ – VTC = ____
Bus connection	None (only with pulse output)	W0	W0	W0	W0	W0
	LON [4]	W1	W1	W1	W1	W1
	M-Bus [4]	W2	W2	W2	W2	W2
	TCP/IP [4] (BACnet [4] / Modbus TCP / HTTP)	W4	W4	W4	W4	W4
	Modbus RTU [4]	W7	W7	W7	W7	W7
Antenna connection (SMA)	LPWAN supporting the LoRaWAN® protocol	W8	W8	W8	W8	W8
Transformer ratios						
Fixed current/voltage	CT = VT = 1	—	—	Q0	Q0	Q0
Programmable current/voltage: secondary display approved for billing	Programmable CT and VT (CT × VT ≤ **100,000)**	—	—	Q1	Q1	Q1
Fixed current/voltage, QCT = 1 … 10,000, QVT = 1 … 1000, CT × VT ≤ **1 million**	Fixed CT, VT	—	—	Q9 QCT = ____ QVT = ____	Q9 QCT = ____ QVT = ____	Q9 QCT = ____ QVT = ____
Load profile	None	Z0	Z0	Z0	Z0	Z0
	With (not with W0 or W8)	Z1	Z1	Z1	Z1	Z1
	With certification per PTB-A 50.7 (only in combination with W4, not possible in combination with U3)	Z2	Z2	Z2	Z2	Z2

1 Not approved in Switzerland

2 For U238x with Q9: pulse rates are read out with ref. to primary side:

Pulse Rate Table CT × VT	V1 / V3 Fixed	V7 Fixed	V2 / V4 Programmable
2 … 10	1000 pls/kWh	100	1 … 1000 pls/kWh
11 … 100	100 pls/kWh	10	0.1 … 100 pls/kWh
101 … 1000	10 pls/kWh	1	0.01 … 10 pls/kWh
1001 … 10,000	1000 pl/MWh	100	1 … 1000 pls/MWh
10,001 … 100,000	100 pls/MWh	10	0.1 … 100 pls/MWh
100,001 … 1,000,000	10 pls/MWh	1	

3 Cannot be ordered in combination with W1 … W8

4 Cannot be ordered in combination with V1 … V9

Feature Q1 (only secondary display approved)

Only secondary values (menu selection) may be used for billing purposes.

Sample Order

4-wire system, any load, with reactive energy measurement, with MID approval, programmable transformation ratio, input voltage: 400 V, with standard S0 pulse output, without bus connection, without load profile

Designation: U2389 M2 P0 Q1 U6 V1 W0 Z0

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STANDARD METERS WITH MID APPROVAL (AVAILABLE FROM STOCK)

Direct Connection, 5(80) A, Class B, MID for 4-Wire System, 3 × 230 / 400 V with	Feature	Standard (M0)	Multifunctional Variant (M1)	Multifunctional Variant (M3)
Programmable S0 pulse rate	V2, P0, U6	U2289-V012	U2289-V022	—
LON	W1, P0, U6	U2289-V013	U2289-V023	—
M-Bus	W2, P0, U6	U2289-V014	U2289-V024	—
TCP/IP (BACnet / Modbus TCP / HTTP)	W4, P0, U6	U2289-V017	U2289-V027	—
TCP/IP with certified load profile	W4, P0, U6, Z2	—	U2289-V047	—
Modbus RTU	W7, P0, U6	U2289-V018	U2289-V028	—
LPWAN supporting the LoRaWAN® protocol	W8, P0, U6	—	—	U2289-V039

Transformer Connection, 5(6) A and 1(6) A, Class B, MID for 3-Wire System, 3 × 230 / 400 V, Programmable CT / VT, with	Feature	Standard (M0)	Multifunctional Variant (M1)
Programmable S0 pulse rate	V2, P0, U6, Q1	U2387-V012	U2387-V022

Transformer Connection, 5 (6) A and 1 (6) A, Class B, MID for 4-Wire System, 3 × 230 / 400 V, Programmable CT / VT, with	Feature	Standard (M0)	Multifunctional Variant (M1)	Multifunctional Variant (M3)
Programmable S0 pulse rate	V2, P0, U6, Q1	U2389-V011	U2389-V021	—
LON	W1, P0, U6, Q1	U2389-V016	U2389-V026	—
M-Bus	W2, P0, U6, Q1	U2389-V015	U2389-V025	—
TCP/IP (BACnet / Modbus TCP / HTTP)	W4, P0, U6, Q1	U2389-V017	U2389-V027	—
TCP/IP with certified load profile	W4, P0, U6, Z2	—	U2389-V047	—
Modbus RTU	W7, P0, U6, Q1	U2389-V018	U2389-V028	—
LPWAN supporting the LoRaWAN® protocol	W8, U6, V0, Q1	—	—	U2389-V039

SCOPE OF DELIVERY

1 Energy meter
1 Condensed operating instructions
1 SMA adapter, socket to socket (only with feature W8, LPWAN)
1 Supplementaty sheet (only with feature W8, LPWAN)

OPTIONAL ACCESSORIES

Type	Description	Article Number
Energy meter door mounting set	Energy meter door mounting set, 4 and 7 standard width units, for ENERGYMID and Compact Line energy meters	U270B
Antenna cable, SMA plug to SMA socket	LMR/CFD300 antenna cable, SMA plug to SMA socket, low loss, 10 meters long	Z309A
ISM stub antenna (868 MHz)	Highly efficient stub antenna optimized for LPWAN applications (868 MHz), SMA connector	Z309B
External magnetic antenna (868 MHz)	Magnetic antenna for 868 MHz frequency, SMA connector, cable length: 3 m	Z309C

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ABBREVIATIONS AND THEIR MEANINGS

Abbreviation	Meaning
CT	Current transformation ratio
CT × VT	Product of CT times VT
EP_1…EP_8, EP_{tot}	Active energy per tariff and total (all phases)
EQ_1 … EQ_8, EQ_{tot}	Reactive energy per tariff and total (all phases)
f	Frequency
I_1, I_2, I_3	Current per phase (TRMS value)
I_N	Neutral conductor current (calculated)
I_{max}	Limit current
I_{min}	Minimum current value
I_{ref}	Reference current (value)
M0 (feature)	Without multifunctional variant
M1 (feature)	Multifunctional variant: measurement of U, I, P, Q, S, PF, f, THD, I_N
M2 (feature)	Measurement of reactive energy
M3 (feature)	Multifunctional variant: measurement of U, I, P, Q, S, PF, f, THD, I_N, reactive energy
P_1, P_2, P_3, P_{tot}	Active power, per phase and total
PF_1, PF_2, PF_3, PF_{tot}	Power factor (cosφ) per phase and total
P0 (feature)	MID approval
Q_1, Q_2, Q_3, Q_{tot}	Reactive power, per phase and total
Q0 (feature)	Fixed current/voltage, CT = VT = 1
Q1 (feature)	Programmable transformation ratios
Q9 (feature)	Fixed transformation ratios
S_1, S_2, S_3, S_{tot}	Apparent power, per phase and total
S0	Pulse rate, S0 output

Abbreviation	Meaning
THD I_1, I_2, I_3	Current distortion component per phase (TRMS value), THD – total harmonic distortion
THD U_1, U_2, U_3	Voltage distortion component per phase (TRMS value), THD – total harmonic distortion
U_n	Reference voltage
U_{1N}, U_{2N}, U_{3N}	Star voltage (TRMS)
U_{12}, U_{23}, U_{13}	Delta voltage (TRMS)
U3 (feature)	Reference voltage: 100 … 110 V L–L
U5 (feature)	Reference voltage: 230 V L–N
U6 (feature)	Reference voltage: 400 V L–L
V0 (feature)	Without pulse output
V1 (feature)	Pulse output
V2/V4 (feature)	Programmable S0
V9 (feature)	Customer-specific S0 rate
VT	Voltage transformation ratio
W0 (feature)	Pulse output only (without bus connection)
W1 (feature)	LON-Bus
W2 (feature)	M-Bus
W4 (feature)	TCP/IP (BACnet / Modbus TCP / HTTP)
W7 (feature)	MODBUS RTU
W8 (feature)	LPWAN supporting the LoRaWAN® protocol
Z0 (feature)	Without load profile
Z1 (feature)	Load profile (only possible with bus connection)
Z2 (feature)	Certified load profile per PTB-A 50.7 (only in combination with W4, not possible in combination with U3)

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