

U181, U187, U189

Energy Meters for 4 Quadrants, 2 Tariffs, Calibrated

3-349-669-03
2/5.14

- Compact, double-tariff energy meter for 4 quadrants, import and export, partial and aggregate meters and up to 30 measured values for real-time quantities
- Variants for 2, 3 and 4-wire-systems with 80 A direct-connection, or 1 A, 5 A transformer connection
- Programmable current transformer ratio of 1 to 10000 and additionally displayable secondary value for energy
- Double-tariff measurement with input for tariff switching
- Partial meter can be started, stopped and reset
- Active energy measurement per EN50470-3, class B, for industrial, commercial and demanding household applications
- Cost savings thanks to initial calibration at the factory in accordance with MID, conformity assessment procedure modules B and D
- Reactive energy measurement per EN 62053-23, class 2
- Phase sequence indicator and error detection for violation of voltage, current and frequency measuring ranges
- 2 programmable pulse outputs for energy values
- Flexible communication via infrared interface and optional interface modules for M-Bus, Modbus and Ethernet
- Large LCD panel with background illumination
- Tamper-proof covers, configuration disabling
- 3 years warranty
- Made in EU



MODBUS

M-Bus

ETHERNET

Two SO Pulse Outputs

3
YEARS
WARRANTY

Applications

The calibrated, compact energy meters included in our **Compact Line** product range can be used to acquire and bill active energy in industrial, household, commercial and building management applications. Relevant values are transmitted to data logging, billing and optimizing systems, as well as to building automation and control technology applications, by means of 2 pulse outputs or the integrated infrared interface and an external interface module. Modbus, M-Bus and Ethernet are currently supported. In addition to energy, the meter also measures all of the electrical system's essential parameters and makes them available via the infrared interface. Energy and instantaneous power values appear directly at the display.

Applicable Regulations and Standards

DIN EN 60529 VDE 0470-1	Test instruments and test procedures – degrees of protection provided by enclosures (IP code)
DIN EN 62053-31 VDE 0418-3-31	Pulse output devices for electromechanical and electronic meters
DIN EN 50470-1 VDE 418-0-1	Electricity metering equipment (a.c.) Part 1: General requirements, tests and test conditions – Metering equipment – EMC requirements
DIN EN 50470-3 VDE 418-0-3	Part 3: Particular requirements – Static meters for active energy (class indexes A, B and C)
DIN EN 62053-23	Electricity metering equipment (a.c.) – Particular requirements, part 23: Static meters for reactive energy (classes 2 and 3)
DIN 43880	Built-in equipment for electrical installations; overall dimensions and related mounting dimensions
DIN EN 60999	Connecting devices – Electrical copper conductors; Safety requirements for screw-type and screwless-type clamping units

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Measuring Functions

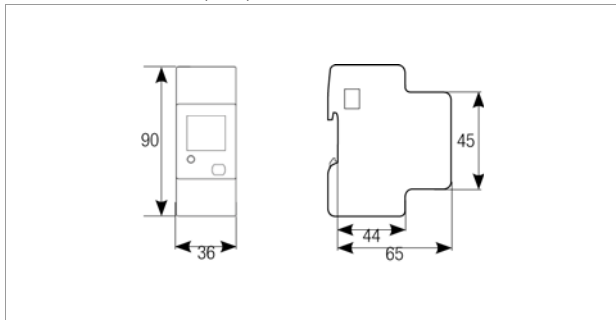
Real-Time Values	Symbol		U/M	Display	Comm.
	2-wire	3/4-Wire			
Voltage	V	$V_{\Sigma} - V_{L1-N} - V_{L2-N} - V_{L3-N}$	V		●
Delta voltage	–	$V_{L1-L2} - V_{L2-L3} - V_{L3-L1}$	V		●
Current	I	$I_{\Sigma} - I_1 - I_2 - I_3 - I_N$	A		■
Power factor	PF	$PF_{\Sigma} - PF_{L1} - PF_{L2} - PF_{L3}$			●
Apparent power	S	$S_{\Sigma} - S_{L1} - S_{L2} - S_{L3}$	kVA	■	■
Active power	P	$P_{\Sigma} - P_{L1} - P_{L2} - P_{L3}$	kW	■	■
Reactive power	Q	$Q_{\Sigma} - Q_{L1} - Q_{L2} - Q_{L3}$	kvar	■	■
Frequency	f	f	Hz		●
Phase sequence	–	CW/CCW	–	●	●
Power direction	Import/export	Import/export	–	●	●
Energy Meters	2-wire	3/4-wire			
Total active energy	L	$\Sigma - L1 - L2 - L3$	kWh	■	■
Total reactive energy, ind. and cap.	L	$\Sigma - L1 - L2 - L3$	kvarh	■	■
Total apparent energy, ind. and cap.	L	$\Sigma - L1 - L2 - L3$	kVAh	■	■
Energy meters, tariff T1/T2	L	Σ	kWh, kvarh, kVAh	■	■
Resettable energy meters	L	Σ	kWh, kvarh, kVAh	■	■
Energy balance	L	Σ	kWh, kvarh, kVAh	■	■
Additional Information	2-wire	3/4-wire			
Momentary tariff		T	1/2		●
Secondary meter value (U187B/U189B)	–	SEC	On/off	●	●
Current transformer ratio (U187B/U189B)	–	CT	Setting value	●	●
Voltage above/below limit		VOL, VUL	On/off		●
Current above/below limit		IOL, IUL	On/off		●
Frequency above/below limit		fOL, fUL	On/off		●
Partial meter		PAR	Start/stop	●	●
Running communication		COM	On/off	●	
Active S0 pulses		S0-1, S0-2	On/off	●	
Error status		ERR	01/02	●	●
Meaning	● = Standard		■ = Bidirectional value		

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General Data

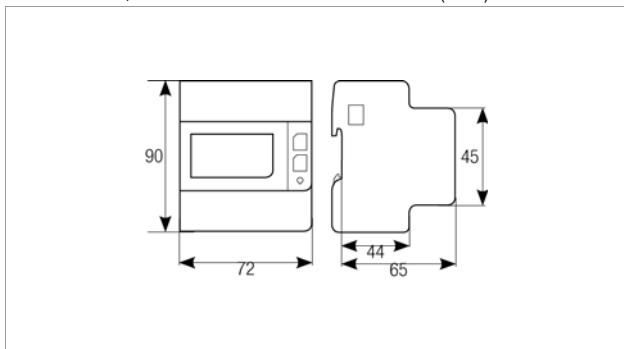
Dimensional Drawings / Installation

Dimensions, U181 (mm)



Single Phase Energy Meter

Dimensions, U189/U187 and U189/U187 (mm)

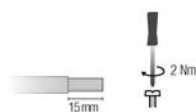


3-Phase Energy Meter

Wire Stripping / Wiring

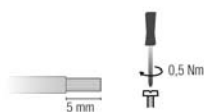
U181 and U189/187

Connection measuring terminals (I & U)



Use a PZ2 screwdriver

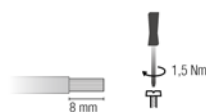
S0 output / tariff terminals connection



Use a blade screwdriver with 0.8 x 3.5 mm size

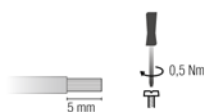
U189/U187

Connection measuring terminals (I & U)



Use a PZ1 screwdriver

S0 output / tariff terminals connection



Use a blade screwdriver with 0.8 x 3.5 mm size

Technical Data

Measuring Ranges

Voltage	U181	U187	U189
Nominal voltage	230 ... 240 V	3 x 400 V ... 415 V	3 x 230/400 V ... 3 x 240/415 V

Current	U181	U189/U187	U189/U187
Max. value for I _{max}	80 A		6 A
I _{ref} value (I _b)	5 A		1 A
I _r value	500 mA	50 mA	5 mA
I _{min} value	250 mA		10 mA
Start-up current I _{st}	20 mA		2 mA

Frequency Range	
Nominal frequency	50/60 Hz

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

Pulse Outputs

Number / type	2 / passive with isolation via optocouplers
Switching voltage	Max. 250 V _{AC-DC}
Switching current	Max. 100 mA
Pulse duration	50 ± 2 ms
Interpulse period	50 ± 2 ms

Tariff Input

Number / type	1 / active with isolation via optocouplers
Voltage	Max. 276 V _{AC-DC}

Power Supply

	U181	U189/U187	U189/U187
Internal	From measuring voltage		
Nominal voltage	± 20%		
Power consumption	Max. 7.5 VA	Max. 7.5 VA per phase	

The meter functions even if only one phase is connected, in which case background illumination is switched off in order to save energy.

Metrological LED

	U181	U189/U187	U189/U187
Pulse constant	1000 pulses per kWh	10,000 pulses per kWh	

Ambient Conditions

Operating temp. range	-25 to +55° C
Storage temperature range	-25 to +75° C
Relative humidity	Max. 80% without condensation
Protection	Front: IP 51, terminals: IP 20

Interfaces

A complete description of the M-Bus, Modbus and TCP/IP interface modules is included in the data sheet for the communication modules.

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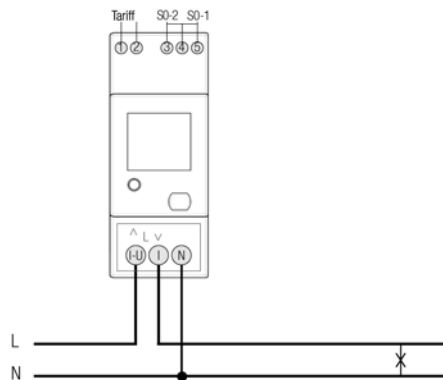
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Connector Pin Assignments

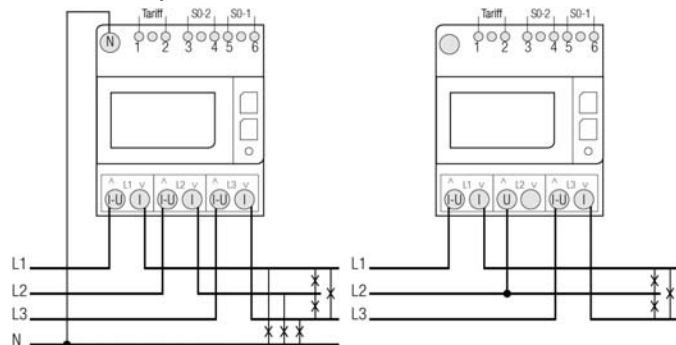
Screw terminals are utilized, and are protected against manipulation with a tamper-proof terminal cover after connection.

Wiring Diagrams

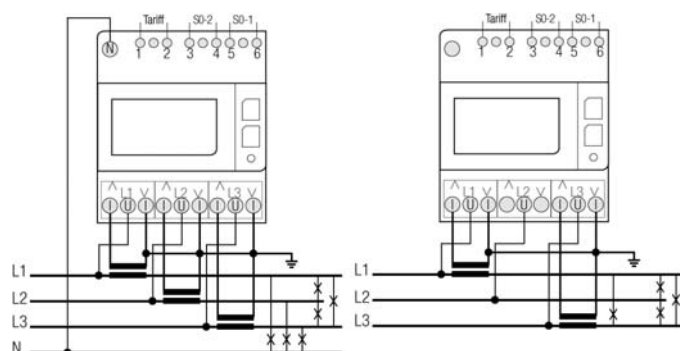
2-Wire AC System, Any Load



4/3-Wire AC System with Direct Connection



4/3-Wire AC System with Connection via Transformer



Order Information

Designation	Article Number	Article Number
Energy meter for direct connection, 80 A		
4 quadrants, import/export, double-tariff, 2 ea. SO, class B, MID		
Output of reactive energy (varh) via display and interface	■	
Output of reactive energy (varh) via interface only		■
for 2-wire system, 230 ... 240 V, 50/60 Hz	U181A	U181D
for 3-wire system, 3 x 400 ... 415 V, 50/60 Hz	U187A	U187D
for 4-wire system, 3 x 230/400 ... 240/415 V, 50/60 Hz	U189A	U189D
Energy meter for transformer connection, 1 (6) A and 5 (6) A		
4 quadrants, import/export, double-tariff, 2 ea. SO, class B, MID		
Output of reactive energy (varh) via display and interface	■	
Output of reactive energy (varh) via interface only		■
for 3-wire system, 3 x 400 ... 415 V, 50/60 Hz	U187B	U187W
for 4-wire system, 3 x 230/400 ... 240/415 V, 50/60 Hz	U189B	U189W

Interface Modules *

Designation	Article Number
Modbus module, RS 485	U180A
M-Bus module	U180B
TCP/IP LAN module	U180C

* A detailed description is included in the data sheet for the communication modules.