

# Energy Meters | COMPACT LINE

## U181A, U189A/U187A, U189B/U187B

### Double-Tariff Energy Meter for 4 Quadrants

3-349-669-03  
1/12.11

- 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
- Top quality and outstanding reliability



## Applications

The calibrated, compact energy meter 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, and further interfaces are in preparation, for example EIB/KNX and LON. 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

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

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### Double-Tariff Energy Meter for 4 Quadrants

#### 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	–	●	●
<b>Energy Meters</b>	<b>2-wire</b>	<b>3/4-wire</b>			
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	$\Sigma$	kWh, kvarh, kVAh	■	■
Resettable energy meters	L	$\Sigma$	kWh, kvarh, kVAh	■	■
Energy balance	L	$\Sigma$	kWh, kvarh, kVAh	■	■
<b>Additional Information</b>	<b>2-wire</b>	<b>3/4-wire</b>			
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	●	●
<b>Meaning</b>	● = Standard		■ = Bidirectional value		

# Energy Meters | COMPACT LINE

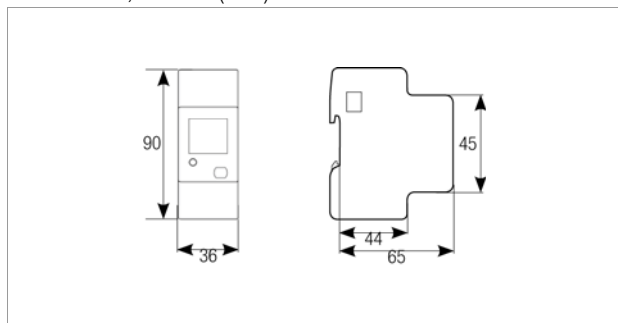
## U181A, U189A/U187A, U189B/U187B

### Double-Tariff Energy Meter for 4 Quadrants

#### General Data

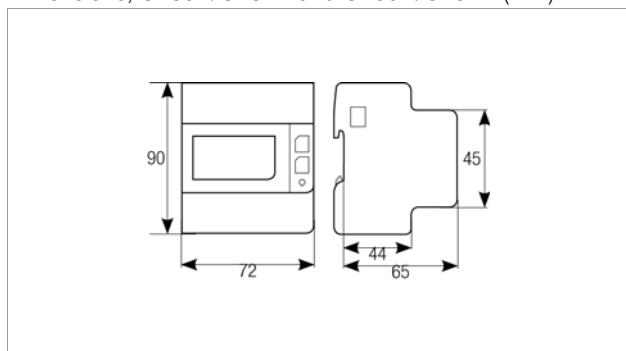
##### Dimensional Drawings / Installation

Dimensions, U181A (mm)



Single Phase Energy Meter

Dimensions, U189A/U187A and U189B/U187B (mm)

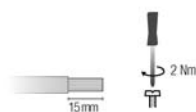


3-Phase Energy Meter

##### Wire Stripping / Wiring

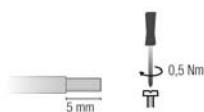
U181A and U189A/187A

Connection measuring terminals (I & U)



Use a PZ2 screwdriver

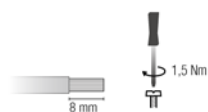
S0 output / tariff terminals connection



Use a blade screwdriver with 0.8 x 3.5 mm size

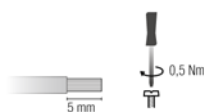
U189B/U187B

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	U181A	U187A/U187B	U189A/U189B
Nominal voltage	230 ... 240 V	3 x 400 V ... 415 V	3 x 230/400 V ... 3 x 240/415 V

Current	U181A	U189A/U187A	U189B/U187B
Max. value for I <sub>max</sub>	80 A		6 A
I <sub>ref</sub> value (I <sub>b</sub> )	5 A		1 A
I <sub>r</sub> value	500 mA	50 mA	5 mA
I <sub>min</sub> value	250 mA		10 mA
Start-up current I <sub>st</sub>	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 <sub>AC-DC</sub>
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 <sub>AC-DC</sub>

##### Power Supply

	U181A	U189A/U187A	U189B/U187B
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

	U181A	U189A/U187A	U189B/U187B
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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## U181A, U189A/U187A, U189B/U187B

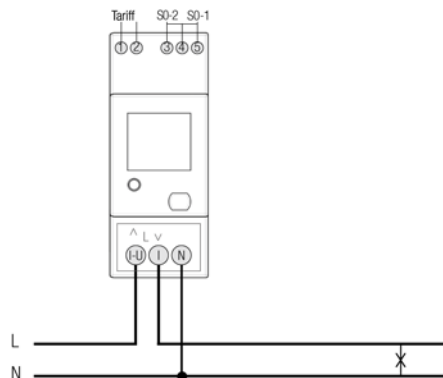
### Double-Tariff Energy Meter for 4 Quadrants

#### Connector Pin Assignments

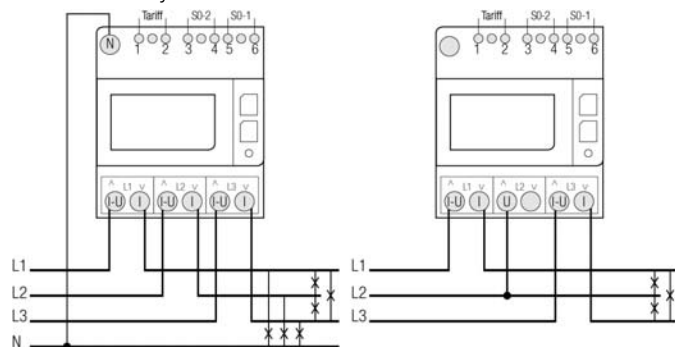
Screw terminals are utilized, and are protected against manipulation with a tamper-proof terminal cover after connection.

#### Wiring Diagrams

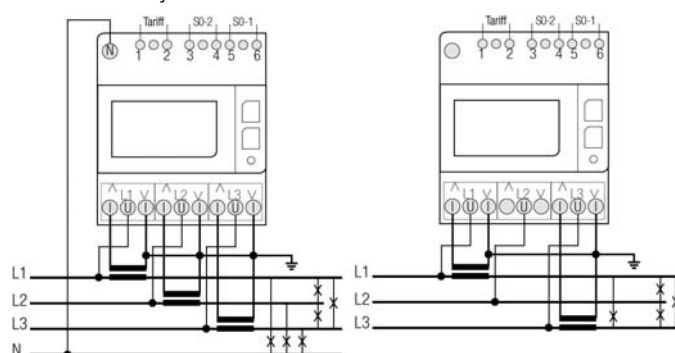
##### 2-Wire AC System, Any Load



##### 4/3-Wire AC System with Direct Connection



##### 4/3-Wire AC System with Connection via Transformer



#### Order Information

Designation	Article Number
<b>Energy meter for direct connection, 80 A</b> – 4 quadrants, import/export, double-tariff, 2 ea. SO, class B, MID	
for 2-wire system, 230 ... 240 V, 50/60 Hz	<b>U181A</b>
for 3-wire system, 3 x 400 ... 415 V, 50/60 Hz	<b>U187A</b>
for 4-wire system, 3 x 230/400 ... 240/415 V, 50/60 Hz	<b>U189A</b>
<b>Energy meter for transformer connection, 1 (6) A and 5 (6) A</b> – 4 quadrants, import/export, double-tariff, 2 ea. SO, class B, MID	
for 3-wire system, 3 x 400 ... 415 V, 50/60 Hz	<b>U187B</b>
for 4-wire system, 3 x 230/400 ... 240/415 V, 50/60 Hz	<b>U189B</b>

Interface Modules*	
Modbus module, RS 485	<b>U180A</b>
M-Bus module	<b>U180B</b>
TCP/IP LAN module	<b>U180C</b>

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