

## Technical Information

# EngyVolt RV12 and RV15

Multifunctional electrical energy meters  
for top-hat rail installation or panel mounting



### Application

For measuring voltage, frequency, current, power, as well as imported and exported active and reactive power

- in low-voltage systems with a maximum nominal voltage of 500 V L-L (289 V L/N)
- in single-phase and three-phase power systems with 3 or 4 wires

### Your benefits

- Multifunction
- Pulse output and/or MODBUS module
- Top-hat rail installation or panel mounting
- Easy to use

## Function and system design

### Measuring principle

The multifunction electrical energy meters are designed to record, display and transmit electrical measured values in low-voltage systems with a maximum nominal voltage of 500 V L-L (289 V L/N), current connected via low-voltage current converter  $\times/5$  A at a nominal frequency of 45 to 66 Hz. They are suitable for use in single-phase power systems, and in three-phase power systems with three or four wires.

Among other values, the multifunction electrical energy meters measure the voltage, frequency, current, power, power factor, total harmonic distortion (THD) as well as active power and reactive power.

The EngyVolt RV12 with housing according to DIN 43880 is designed for mounting on a top-hat rail, while the EngyVolt RV15 is designed for installation in a panel.

## Input

### Measured variable

#### Measured process variables

Current (L1, L2, L3,), voltage (L1/N, L2/N, L3/N or L1/L2, L2/L3, L3/L1 respectively), frequency in low-voltage systems

#### Calculated process variables

EngyVolt RV12: active, reactive and apparent power, power factor (Cos-Phi), imported and exported active and reactive energy, total harmonic distortion (current L1, L2, L3; voltage L1/N, L2/N, L3/N or L1/L2, L2/L3, L3/L1 respectively), neutral current, max. current (L1, L2, L3, N)<sup>1)</sup>, max. active power<sup>1)</sup>.

EngyVolt RV15: active, reactive and apparent power, total harmonic distortion (current L1, L2, L3; voltage L1/N, L2/N, L3/N or L1/L2, L2/L3, L3/L1 respectively), active and reactive energy, neutral current, max. current (L1, L2, L3, N)<sup>1)</sup>, max. active power<sup>1)</sup>.

### Measuring range

Nominal voltage	100 to 289 V AC L-N (173 to 500 V AC L-L)
Voltage measuring range	25 to 600 V
Maximum short-duration overvoltage	2 x nominal voltage for 1-second application repeated 5 times in 5-minute intervals
Nominal current (secondary)	5 A AC RMS
Secondary current measuring range	0.05 to 6 A
Maximum short-duration overcurrent	10 x nominal current for 1-second application repeated 5 times in 5-minute intervals
Primary current measuring range	1 to 9 999 A (per phase)
Frequency	45 to 66 Hz
Nominal power (secondary)	1 445 W (3-phase 4 325 W)
Power measuring range (secondary)	14.45 to 2 080 W (3-phase: 43.25 to 6 228 W) <sup>1)</sup>
Power measuring range (primary)	5 to 12 450 000 W (12.45 MW) <sup>1)</sup>
Power consumption voltage circuits	<0.2 VA per phase
Power consumption current circuits	<0.6 VA per phase

1) depending on CT

### Energy counter

0 to 9 999 999.9 Wh, kWh, MWh / varh, kvarh, Mvarh

1) calculated from the integrated averages and representation as maximum value over an adjustable interval of 5, 8, 10, 15, 20, 30, 60 min

## Output

### Output signal

#### Pulse output

Number	EngyVolt RV12: 1 EngyVolt RV15: max. 2 (optional, via extension modules)
Contact load	50 mA maximum at 250 V AC
Version	Semiconductor relay

#### RS485 MODBUS

Number	EngyVolt RV12: 1 EngyVolt RV15: 1 (optional, via extension module)
Type	Two-wire, half-duplex
Baud rate	2400, 4800, 9600, 19200, 38400

## Power supply

### Supply voltage

AC nominal voltage	110 to 400 V AC $\pm 10\%$
DC nominal voltage	120 to 350 V DC $\pm 20\%$

### Power consumption

5 VA

### Electrical connection

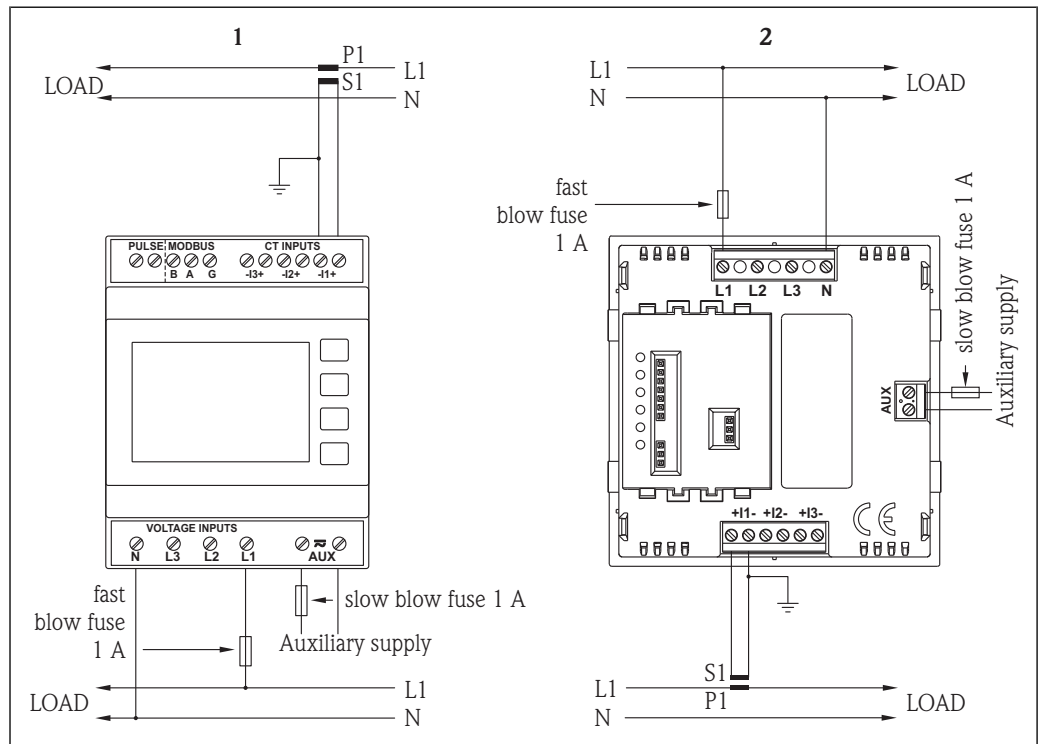


**The measuring device is designed exclusively for operation on external current converters.**

The multifunction EngyVolt RV12 and RV15 electrical energy meters are suitable for single-phase and three-phase power systems with 3 or 4 wires.

The "S2" secondary terminals of the current converters are connected in the electrical energy meter. Only one protective ground connection  $\ominus$  is provided for this reason.

Connection to 1-phase, 2-wire

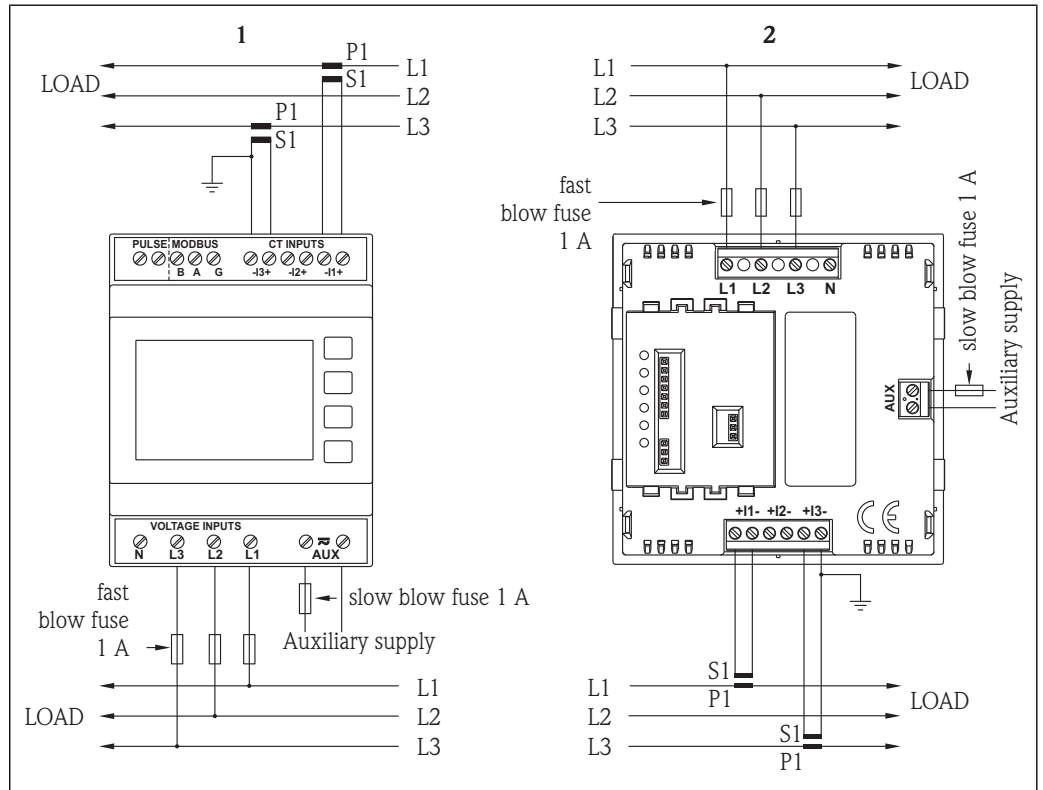


1 Electrical connection for 1-phase, 2-wire

1 Connection for top-hat rail device

2 Connection for panel-mounted device

Connection to 3-phase, 3-wire



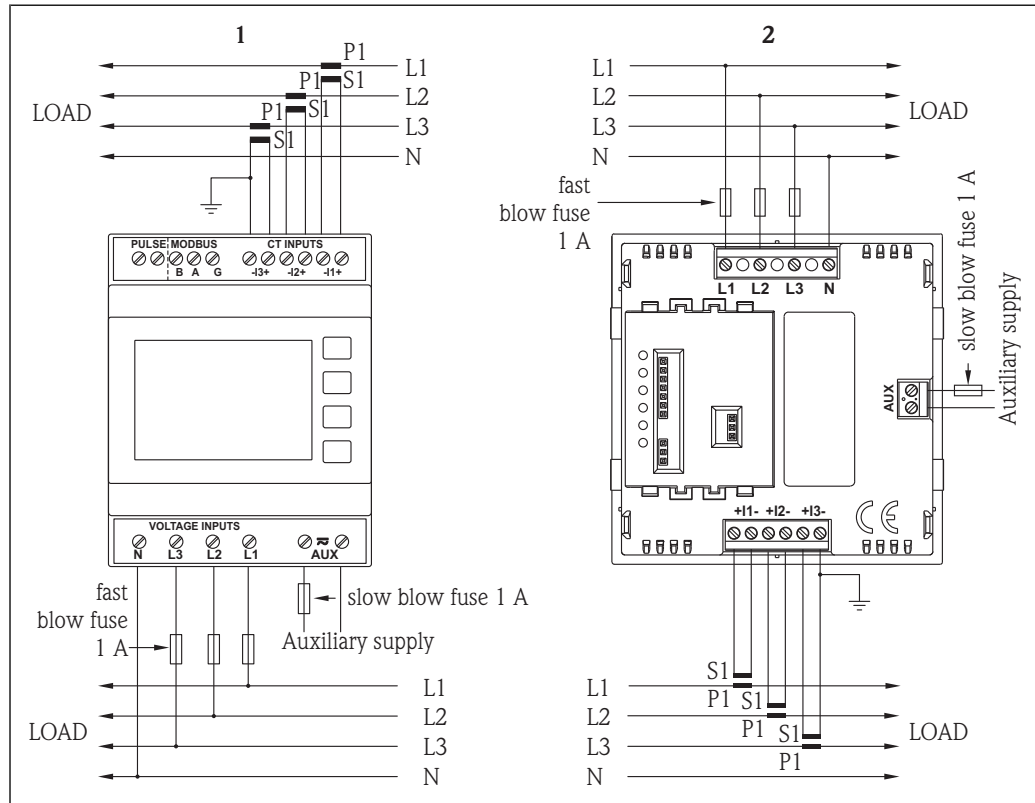
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2 Electrical connection for 3-phase, 3-wire

1 Connection for top-hat rail device

2 Connection for panel-mounted device

**Connection to 3-phase, 4-wire**



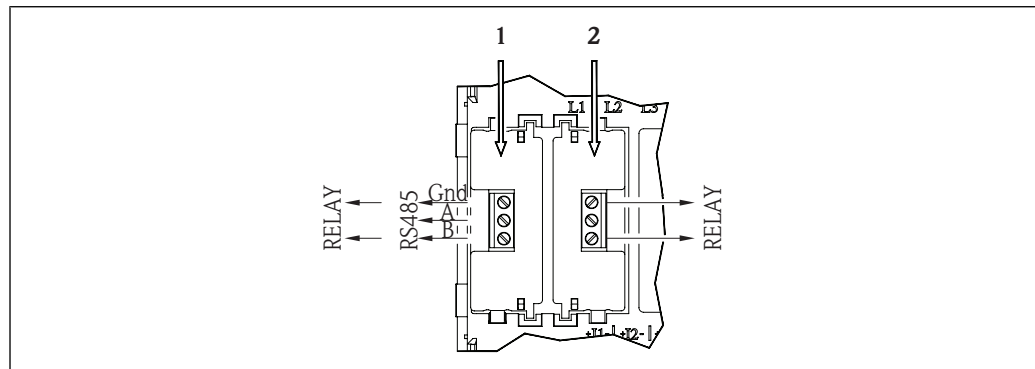
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3 Electrical connection for 3-phase, 4-wire

1 Connection for top-hat rail device

2 Connection for panel-mounted device

**Connection of extension modules for EngyVolt RV15**



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4 Extension module connection

1 RS485 / pulse module

2 Pulse module

**Terminals**

Screw-clamp terminals 0.05 to 2.5 mm<sup>2</sup> (30 to 14 AWG)

## Performance characteristics

<b>Reference operating conditions</b>	Reference temperature	23 °C ±1 °C (73.4 °F ±1.8 °F)
	Input wave form	50 or 60 Hz ±2 %
		Sinusoidal (distortion factor < 0.005)
	Supply voltage	Nominal voltage ±1 %
	Supply voltage frequency (with AC)	Nominal frequency ±1 %
	Supply voltage wave form	Sinusoidal (distortion factor < 0.05)

**Maximum measured error** Extended measured error: IEC 688: 1992

Current (A)	0.5 % of nominal current
Voltage (V)	0.5 % of max. nominal voltage (4 % for I2 in 3-phase 3-wire operation)
Calculated neutral current (A)	4 % of nominal current
Frequency (Hz)	0.1 Hz
Power factor (PF = Cos-Phi)	0 to 1 Power factor is only indicated when the measured VA is over 3 % of range maximum
Active power (W)	±1 % of nominal power
Reactive power (var)	±1 % of nominal power
Apparent power (VA)	±1 % of nominal power
Active energy (kWh)	Class 1 (IEC 62053-21)
Reactive energy (kvarh)	±1 % of measuring range
THD	1 % up to 31st harmonic

### Display repetition rate

1 s typically up to >99 % of the full scale value

### Measurement and calculation interval

Max. 300 ms (maximum with %THD measurement)

**Influence of ambient temperature** Current and voltage: 0.013 %/°C (0.0072 %/°F) of nominal value  
Power: 0.018 %/°C (0.01 %/°F) of measuring range

**Error change due to variation of an influence quantity in the manner described in Section 6 of IEC 688:1992** 2 x error allowed for the reference condition applied in the test. Error due to temperature variation as above.

**Error in measurement when a measurand is within its measuring range, but outside its reference range** 2 x error allowed at the end of the reference range adjacent to the section of the measuring range, where the measurand is currently operating / being tested.

**Warm-up period** 1 minute

## Installation

### Mounting location

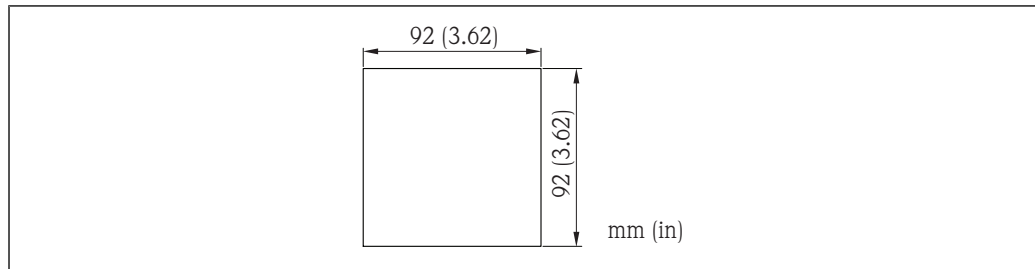
#### EngyVolt RV12

Housing for top hat rail mounting as per DIN 43880

#### EngyVolt RV15

Housing for panel installation as per DIN 96, max. panel thickness 5 mm (0.2 in)

The device is secured using the snap-on fastening unit which is integrated in the housing. When mounting, make sure there is sufficient room to connect cables and wires on all sides of the measuring device.



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5 Dimensions for panel cutout

### Orientation

Vertical

## Environment

**Ambient temperature range** -10 to 55 °C (14 to 131 °F)

**Storage temperature** -20 to 70 °C (-4 to 158 °F)

**Humidity** 0 to 90 %, non-condensing

**Altitude** Up to 2000 m (6560 ft)

### Degree of protection

	EngyVolt RV12	EngyVolt RV15
	IP30 minimum	Degree of protection at front IP52
		Degree of protection at rear IP30

**Shock resistance** 30 g in 3 planes

**Vibration resistance** 10 to 50 Hz, IEC 60068-2-6, 2 g

**Electromagnetic compatibility** EMC emissions: BS EN 61326, Class A  
Interference immunity: BS EN 61326, Class A

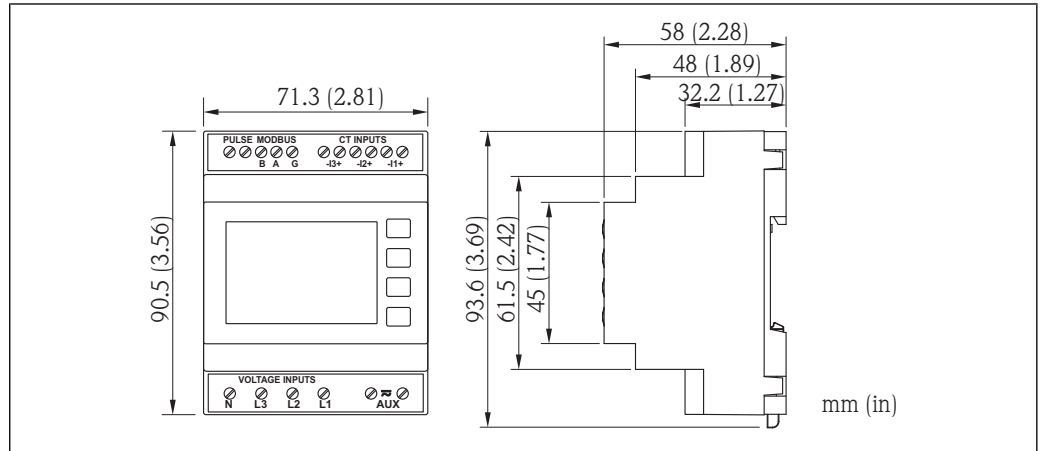
**Dielectric strength** 3.25 kV for 1 minute between communication outputs and measuring inputs, communication outputs and supply voltage. Supply voltage and measuring inputs



## Mechanical construction

### Dimensions

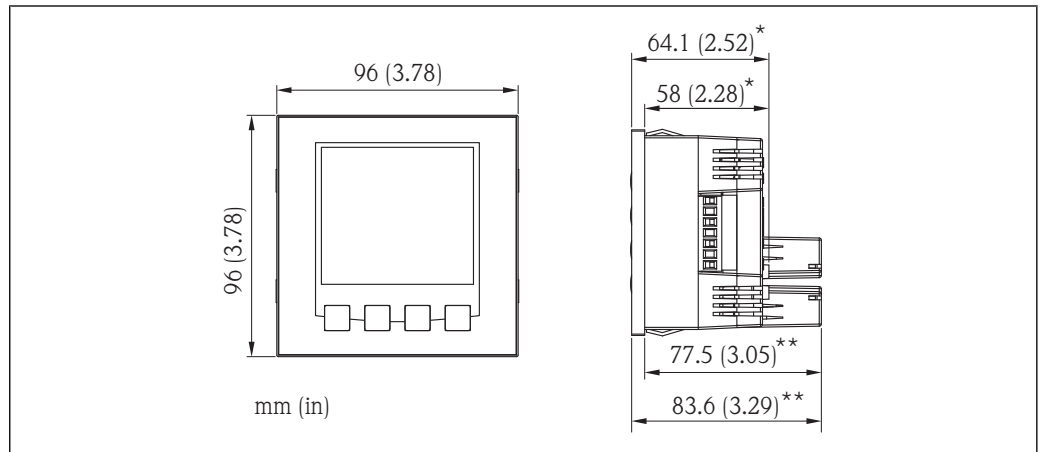
#### EngyVolt RV12 (top-hat rail)



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6 Device dimensions

#### EngyVolt RV15 (panel-mounted)



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7 Device dimensions

\* Basic device

\*\* Basic device with extension module

#### Panel thickness

1 to 5 mm (0.04 to 0.2 in.)

### Weight

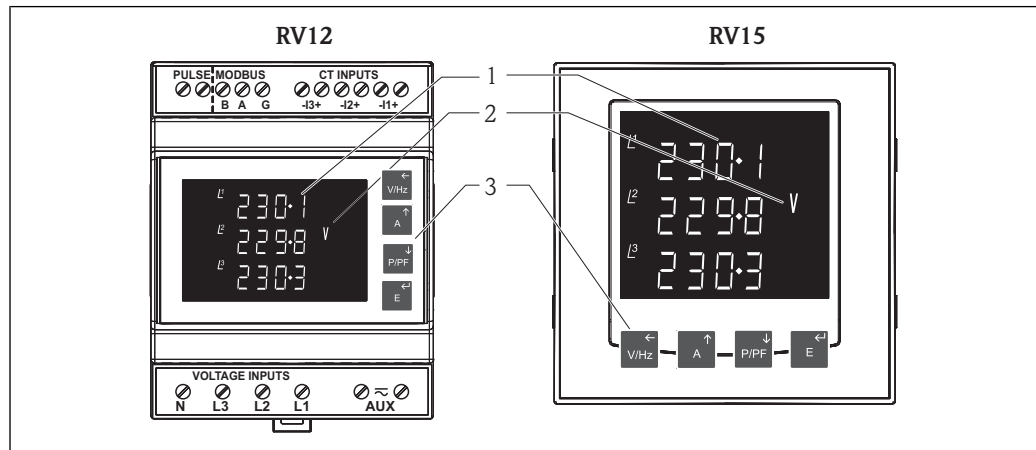
300 g (0.66 lb)

### Materials

Polycarbonate as per UL94V0

## Operability

### Local operation



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8 Display and operating elements of the EngyVolt devices

- 1 Three-line display
- 2 Symbol for parameter displayed
- 3 Operating keys

The display screen is used in 2 operating modes:

- Display mode to indicate measured values
- Configuration mode of the multifunction electrical energy meter

### Display mode

The measured values are shown on the backlit liquid crystal display. The user can call up and run through 15 different views using the operating elements on the front panel.

### Configuration mode

The abbreviation for the parameter is displayed in the top display row in the configuration mode. The middle row displays the parameter value. The bottom row is used to confirm the set value of the parameter. Generally speaking, the "A" and "P/PF" keys change the value of the parameter; the "E" key confirms the change / setting and skips to the next display screen (next parameter).

## Certificates and approvals

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### CE mark

#### Declaration of Conformity

The product meets the requirements of the harmonized European standards.

As such, it complies with the legal specifications of the EC directives.

The manufacturer confirms successful testing of the product by affixing to it the CE mark.

### Other standards and guidelines

- IEC 60529:  
Degrees of protection provided by enclosures (IP code)
- IEC 61010-1: 2001  
Safety requirements for electrical equipment for measurement, control and laboratory use

## Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)



#### Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

## Documentation

- Operating Instructions EngyVolt RV12: BA01039K/09
- Operating Instructions EngyVolt RV15: BA01040K/09
- System components brochure, "Indicators with and without control unit for field and panel mounting, power supplies, barriers, transmitters, energy managers, batch controllers, and surge arresters": FA016K/09

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