

3-phase bidirectional energy meter with serial S-Bus interface

Bidirectional energy meters with a serial S-Bus interface make it possible to read out all relevant data such as energy (total and partial), current and voltage per phase, active and idle power per phase or as total output.

Specifications

- ▶ 3-phase energy meter, 3 × 230 / 400 VAC 50 Hz
- ▶ Direct metering to 65 A in both directions of current
- ▶ Display of the active power, voltage and current per phase
- ▶ Display of the total active power
- ▶ S-Bus interface used to query data
- ▶ Idle power per phase or total available via the interface
- ▶ Up to 254 energy meters can be connected to a single S-Bus interface.
- ▶ 7-digit LCD display for energy supply and feeding back
- ▶ Can be sealed and is provided with a sealing cap as an accessory
- ▶ Accuracy class B in accordance with EN50470-3, Accuracy class 1 in accordance with IEC62053-21



Order number

Standard version: ALE3B5FS00C2A00
 MID version: ALE3B5FS00C3A00
 Sealing cap: 4 104 7485 0

Technical data

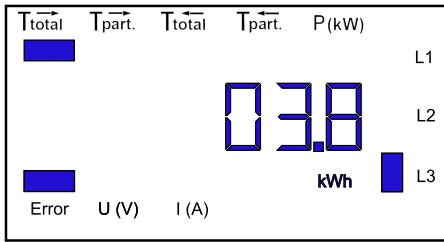
Accuracy class	B in accordance with EN50470-3, 1 in accordance with IEC62053-21
Operating voltage	3 × 230 / 400 VAC, 50 Hz Tolerance - 20%/+15%
Reference current/maximal current	$I_{ref} = 10 \text{ A}$, $I_{max} = 65 \text{ A}$
Start current /min current	$I_{st} = 40 \text{ mA}$, $I_{min} = 0.5 \text{ A}$
Power consumption	Active 0.4W per phase
Meter range	00'000.00... 99'999.99 100'000.0... 999'999.9
Display	Backlit LCD, numbers 6 mm high
Display without mains electricity	Condenser protected LCD maximum 2 times in 10 days
Pulses per kWh	LED 1000 pulses/kWh

Assembly

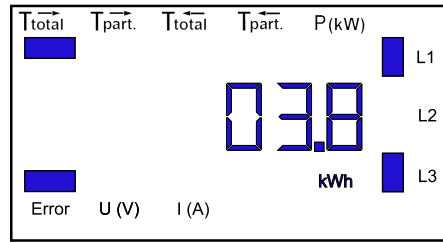
Assembly	On 35 mm top-hat rail in accordance with EN60715TH35
Connections Main current circuit	Conductor cross section 1.5–16 mm ² , Pozidrive screwdriver size 1, flat-head screwdriver size 2, torque 1.5–2 Nm
Connections Control current circuit	Conductor cross section 2.5 mm ² , Pozidrive screwdriver size 0 or flat-head screwdriver size 2, torque 0.8 Nm
Insulating properties	- 4 kV / 50 Hz test in accordance with VDE0435 for energy meters - 6 kV 1.2 / 50 μs overvoltage in accordance with IEC255-4 - 2 kV / 50 Hz test in accordance with VDE0435 for interfaces - Device protection class II
Ambient temperature	-25 °...+55 °C
Storage temperature	-30 °...+85 °C
Environment	Mechanical M2 Electromagnetic E2
Relative humidity	75 % without condensation
EMC/resistance	- Surge voltage in accordance with IEC61000-4-5 at the main current circuit 4 kV at the S-Bus interface 1 kV - Burst voltage in accordance with IEC61000-4-4, at the main current circuit 4 kV at the S-Bus interface 1 kV - ESD in accordance with IEC61000-4-2, contact 8 kV, air 15 kV

Error display

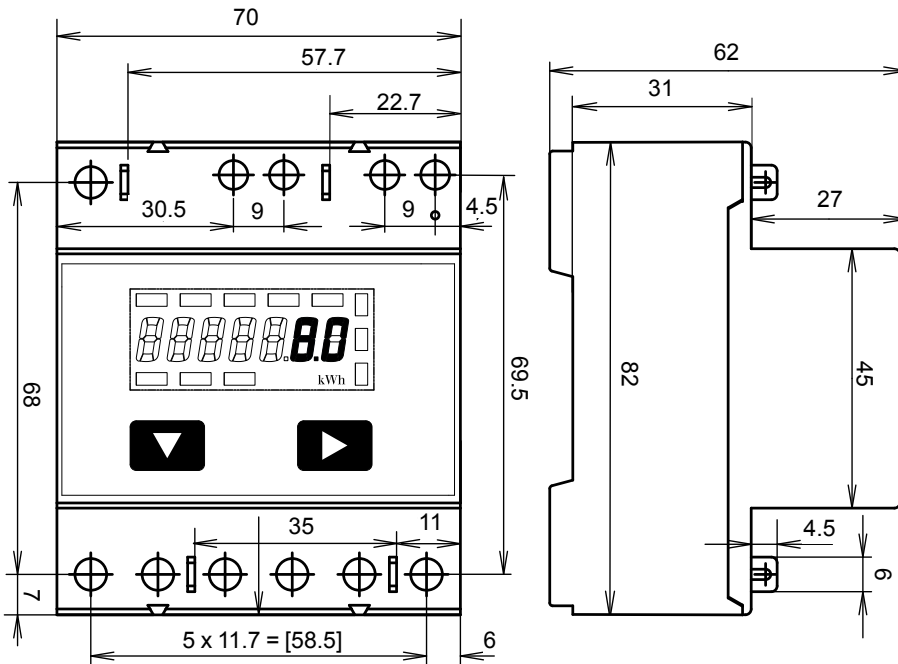
Example: Connection error at L3



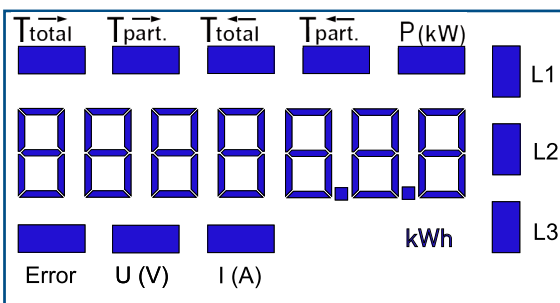
Example: Connection error at L1 and L3



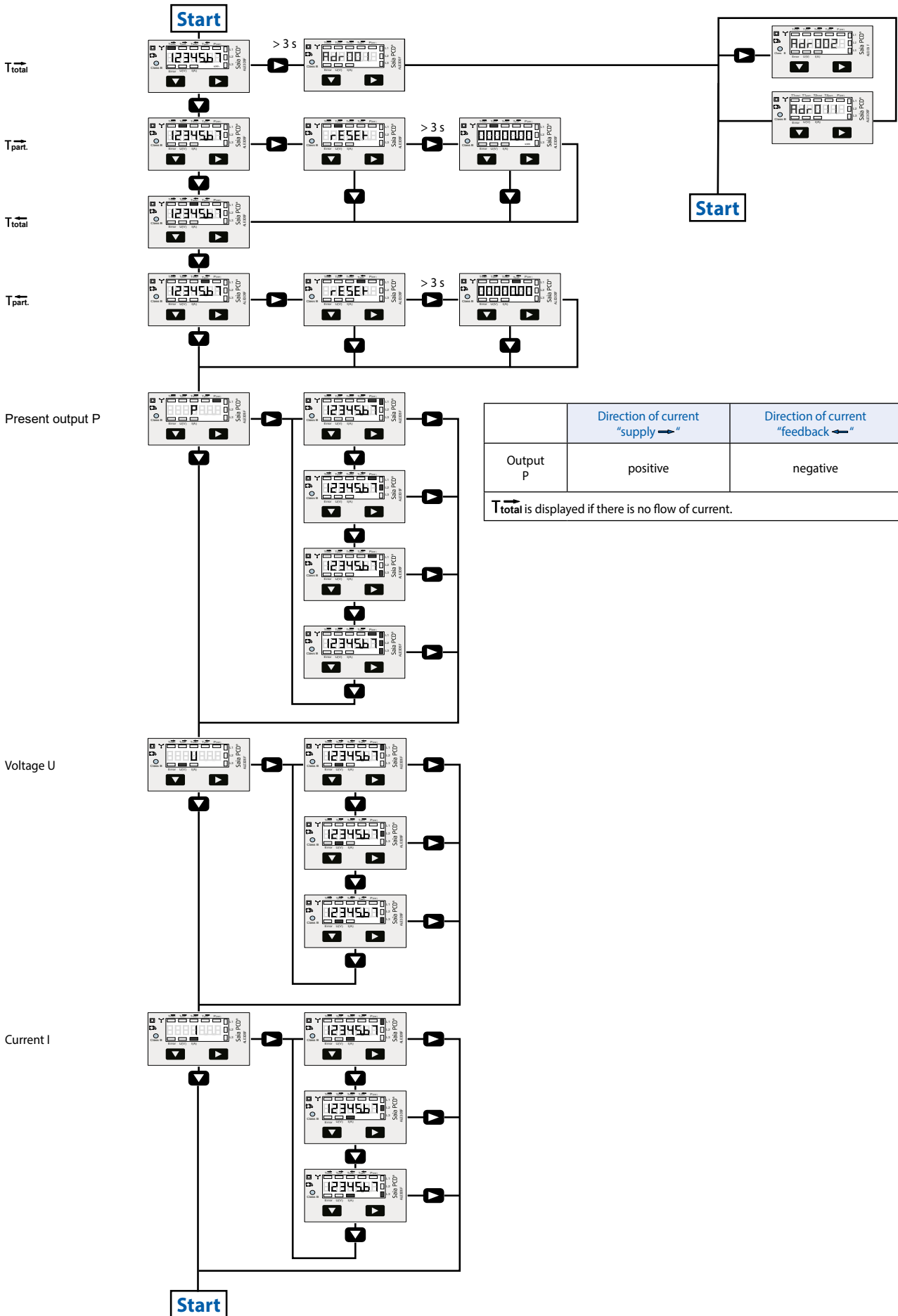
Dimension drawings



Display components, direct measurement



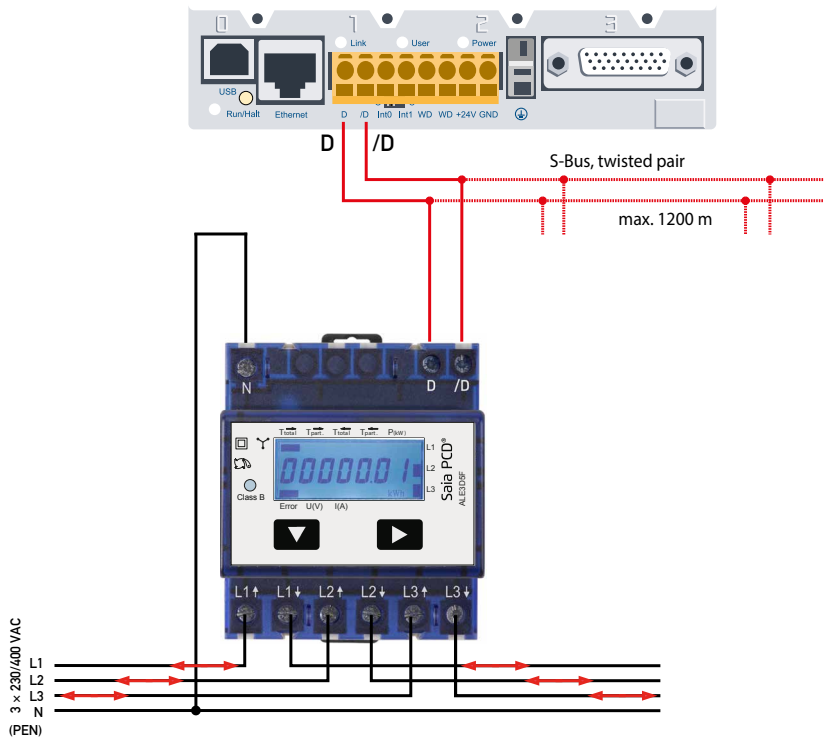
- ▶ T_{total}^{\rightarrow} Shows the total consumption T^{\rightarrow}
- ▶ $T_{part.}^{\rightarrow}$ Shows the partial consumption at T^{\rightarrow} ; this value can be reset
- ▶ T_{total}^{\leftarrow} Shows the total consumption T^{\leftarrow}
- ▶ $T_{part.}^{\leftarrow}$ Shows the partial consumption at T^{\leftarrow} ; this value can be reset
- ▶ P (kW) Shows the present output per phase or for all phases
Current $\leftarrow\rightarrow$ = supply (P positive)
Current $\leftarrow\leftarrow$ = feedback (P negative)
- ▶ U (V) Shows the voltage per phase
- ▶ I (A) Shows the current per phase
- ▶ kWh Shows the unit kWh in the consumption or in the feedback display
- ▶ L1/L2/L3 Displays the corresponding phase for the P, U, I or error display
- ▶ Error In the absence of a phase. The corresponding phase is also displayed.



	Direction of current "supply →"	Direction of current "feedback ←"
Output P	positive	negative

→
T_{total} is displayed if there is no flow of current.

Connection diagram



Technical data S-Bus

Bus system	S-Bus
Transmission rates	4800-9600-19'200-38'400-57'600-115'200. The transmission rates are detected automatically.
Transmission mode	Data
Bus length (max.)	1200 m (without repeater)
Reactions time	Writing: Up to 60 ms Reading: Up to 60 ms

- ▶ The interface only functions if phase 1 is connected.
- ▶ Communication is ready 30 s after activation
- ▶ Energy meters in a bus system with high data volume can result in performance losses in the bus
- ▶ Data are updated every 10 s. For this reason, an energy meter's query interval should not be shorter than 10 sec.
- ▶ 254 devices can be connected to the S-Bus. With more than 128 devices, a repeater should be used
- ▶ The interface has no terminating resistance; this should be provided externally
- ▶ The registers being used are explained in the register list

Data transmission

- ▶ Only «read/write» register commands are recognised.
- ▶ Only one register can be written at a time.
- ▶ The device returns a «NAK» if more than one register is written at the same time.
- ▶ Up to 10 registers can be read at the same time.
- ▶ The device returns a «NAK» if more than 10 registers are read at the same time.
- ▶ The device will not respond to unknown queries.
- ▶ The device has a voltage monitor. The registers are saved in the EEPROM (transmission rate, etc.) in the event of a drop in voltage

Changing the device's S-Bus address

- ▶ To change the S-Bus address, hold ▶ pressed for 3 sec
- ▶ In the menu, ▼ increases the address by 10, ▶ increases the address by 1
- ▶ Once the desired address has been reached, wait until the main display reappears

Registers

The following registers are available. The registers 4, 10, 13 and 18 are not used, and a 0 is always issued.

R	Read	Write	Description	Values
0	X		Firmware version	Ex: «11» = FW 1.1
1	X		Number of supported registers	Will give «41»
2	X		Number of supported flags	Will give «0»
3	X		Baud rate	BPS
4			Not used	Will give «0»
5	X		Type/ASN function	Will give «ALE3»
6	X		Type/ASN function	Will give «B5FS»
7	X		Type/ASN function	Will give «00Cx» x: 2 = non MID x: 3 = MID
8	X		Type/ASN function	Will give «A00»
9	X		HW version modif	Ex: «11» = FW 1.1
10			Not used	Will give «0»
11	X		Serial number	serial number high
12	X		Serial number	serial number low
13			Not used	Will give «0»
14	X		Status/Protect	«0» = no problem «1» = problems with the last communication query
15	X		S-Bus timeout	ms
16	X	X	S-Bus address	
17	X		Flags error	0: No errors 1: Error, phase 1 2: Error, phase 2 3: Error, phase 1 and 2 4: Error, phase 3 5: Error, phase 1 and 3 6: Error, phase 2 and 3 7: Error, phase 1, 2 and 3
18			Not used	Will give «0»
19	X		Energy direction register	0 = energy direction «consumption» 4 = energy direction «feedback»
20	X		Counter total «energy → consumption»	10 ² kWh (multiplier 0.01) Example: 00912351 = 009123.51 kWh
21	X	X	Counter partial «energy → consumption» Every written value deletes the counter.	10 ² kWh (multiplier 0.01) Example: 00912351 = 009123.51 kWh
22	X		Counter total «energy ← feedback»	10 ² kWh (multiplier 0.01) Example: 00912351 = 009123.51 kWh
23	X	X	Counter partial «energy ← feedback» Every written value deletes the counter.	10 ² kWh (multiplier 0.01) Example: 00912351 = 009123.51 kWh
24	X		URMS, phase 1 Voltage, phase 1	V Example: 230 = 230 V
25	X		IRMS, phase 1 Current, phase 1	10 ¹ A (multiplier 0.1) Example: 314 = 31.4 A
26	X		PRMS, phase 1 Output, phase 1	positive: Energy "→" negative: Energy "←" 10 ² kW (multiplier 0.01) Example: 1545 = 15.45 kW
27	X		QRMS, phase 1 Idle power, phase 1	10 ² kvar (multiplier 0.01) Example: 1545 = 15.45 kvar
28	X		Cos phi, phase 1	10 ⁻² (multiplier 0.01) Example: 67 = 0.67
29	X		URMS, phase 2 Voltage, phase 2	V Example: 230 = 230 V
30	X		IRMS, phase 2 Current, phase 2	10 ¹ A (multiplier 0.1) Example: 314 = 31.4 A
31	X		PRMS, phase 2 Output, phase 2	positive: Energy "→" negative: Energy "←" 10 ² kW (multiplier 0.01) Example: 1545 = 15.45 kW
32	X		QRMS, phase 2 Idle power, phase 2	10 ² kvar (multiplier 0.01) Example: 1545 = 15.45 kvar
33	X		Cos phi, phase 2	10 ⁻² (multiplier 0.01) Example: 67 = 0.67
34	X		URMS, phase 3 Voltage, phase 3	V Example: 230 = 230 V
35	X		IRMS, phase 3 Current, phase 3	10 ¹ A (multiplier 0.1) Example: 314 = 31.4 A
36	X		PRMS, phase 3 Output, phase 3	positive: Energy "→" negative: Energy "←" 10 ² kW (multiplier 0.01) Example: 1545 = 15.45 kW
37	X		QRMS, phase 3 Idle power, phase 3	10 ² kvar (multiplier 0.01) Example: 1545 = 15.45 kvar
38	X		Cos phi, phase 3	10 ⁻² (multiplier 0.01) Example: 67 = 0.67
39	X		PRMS, total Output, total	positive: Energy "→" negative: Energy "←" 10 ² kW (multiplier 0.01) Example: 1545 = 15.45 kW
40	X		QRMS, total Idle power, total:	10 ² kvar (multiplier 0.01) Example: 1545 = 15.45 kvar

Connection diagram / Method of operation

Energy is added as indicated by the arithmetic operator. Positive output in the meter indicates that energy is being supplied, while negative output indicates that energy is being delivered. The energy measurement is carried out in accordance with mode 2, is balanced.

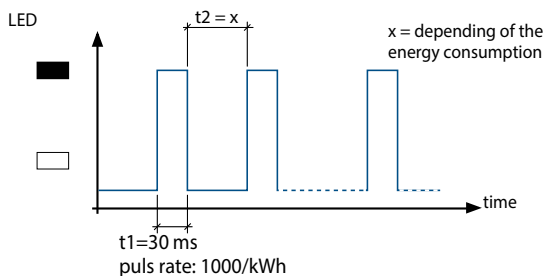
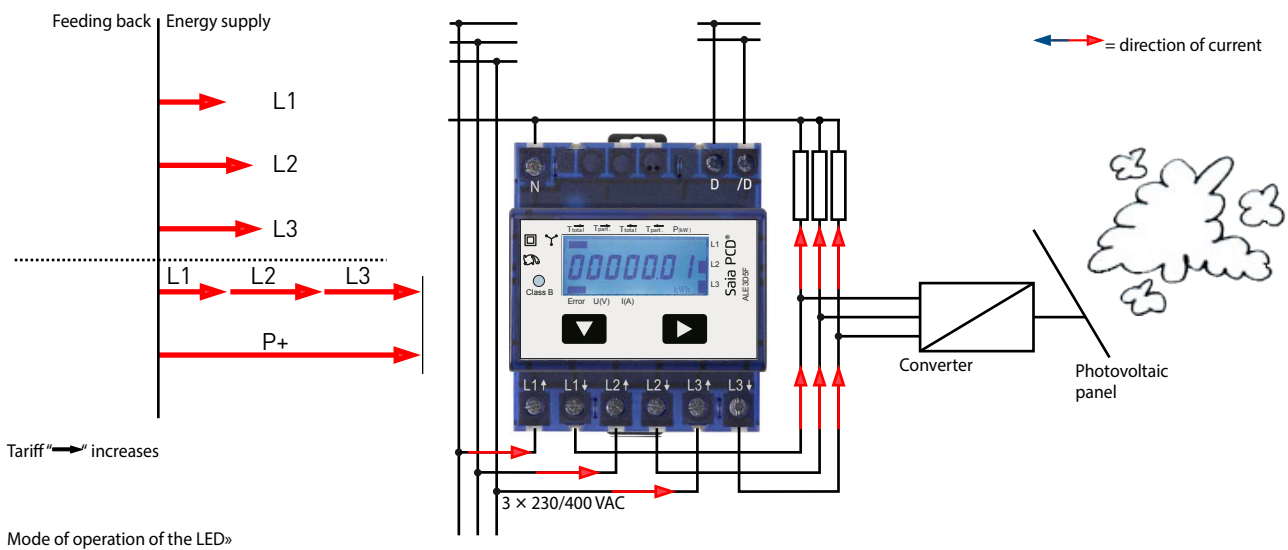
If the supply of energy (P positive) is greater than the delivery of energy (P negative), the counter $T \rightarrow$ increases.

The LED is OFF and only switches on if there is a pulse.

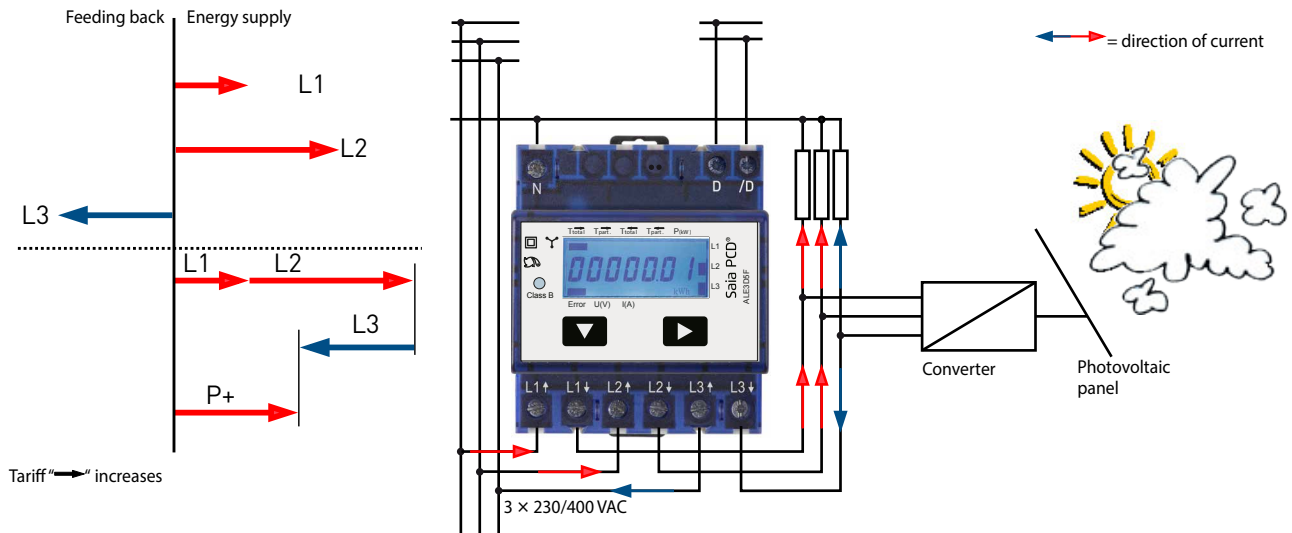
If the delivery of energy is greater than the supply of energy, the counter $T \leftarrow$ increases.

The LED is ON and only switches off if there is a pulse.

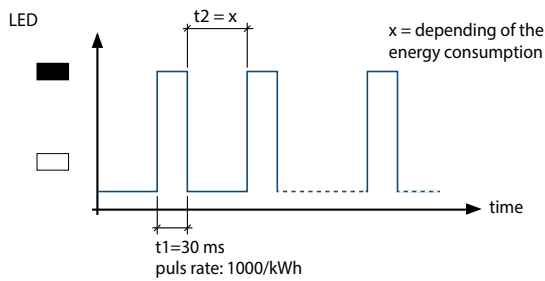
Method of operation with direction of current «supply \rightarrow »



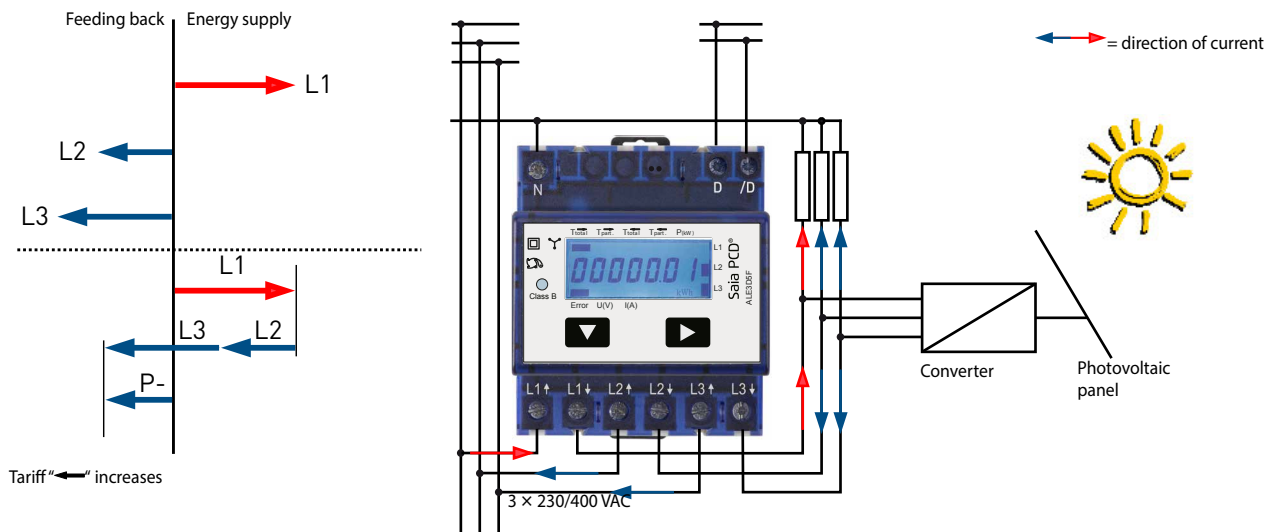
Method of operation with direction of current «supply →» and «feeding back ←»



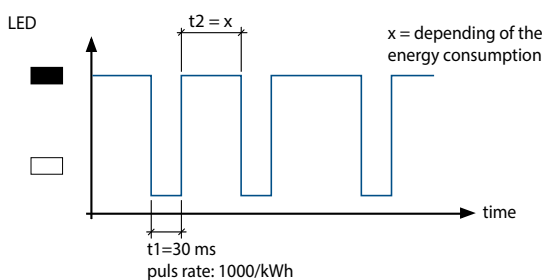
Mode of operation of the LED



Method of operation with direction of current «feeding back ←»



Mode of operation of the LED



Accessories

Sealing cover for:

- Single-phase Saia PCD® energy meter AAE1
- 3-phase Saia PCD® energy meter ALE3, AWC3 and AWD3

2 units are recommended for contact protection on AAE1.

4 units are recommended for contact protection on ALE3, AWC3 and AWD3.

Order no.

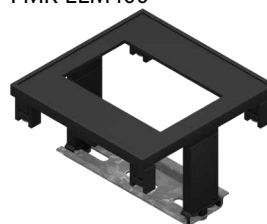
4 104 7485 0



ALE3, AWC3 or AWD3
with sealing cover

Mounting frame for 3-ph energy meters
of the families ALE3/AWC3/AWD3

PMK-EEM400



ALE3, AWC3 or AWD3
mounted in panel kit

Order details

Type	Short description	Description	Weight
ALE3B5FS00C3A00	Three-phase energy meters with integral serial S-Bus interface for direct measurement, 3x 230/400 VAC - 50 Hz	Three-phase two-way energy meter with LCD display S-Bus interface, I _{max} = 65 A display of active power, voltage and current according to MID directive	230 g
ALE3B5FS00C2A00	Three-phase energy meters with integral serial S-Bus interface for direct measurement, 3x 230/400 VAC - 50 Hz	Three-phase two-way energy meter with LCD display S-Bus interface, I _{max} = 65 A display of active power, voltage and current	230 g
4 104 7485 0	Accessories for energy meters	Lead sealing cap for energy meters AAE1, AAE3, ALE3 and AWD3	4 g
PMK-EEM400	Accessories for energy meters	Kit for mounting ALE3/AWD3 energy meters on door cabinet	

Saia-Burgess Controls AG

Bahnhofstrasse 18 | 3280 Murten, Switzerland
T +41 26 580 30 00 | F +41 26 580 34 99
www.saia-pcd.com

support@saia-pcd.com | www.sbc-support.com