

3-phase, ALE 3 bidirectional energy meter with integrated serial S-bus interface

Controls Division

Bidirectional energy meters with an integrated 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 / 400VAC 50 Hz
- Direct metering to 65A 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, Class 1 in accordance with IEC62053-21	
Operating voltage	3 × 230 / 400VAC, 50 Hz Tolerance -20%/+15%	
Reference current/ measuring current	$I_{ref} = 10A, I_{max} = 65A$	
Start current /min current	$I_{st} = 40 mA, I_{min} = 0.5 A$	
Power consumption	Active 0.4W per phase	
Meter range	00'000.00...99'999.99 100'000.0...999'999.9	
Display	Backlight LCD, numbers 6 mm high	
Display without mains electricity	Condenser protected LCD maximum 2 times in 10 days	
Pulses per kWh		
Standard version	LCD display	100 pulses/kWh
MID version	LED	1000 pulses/kWh

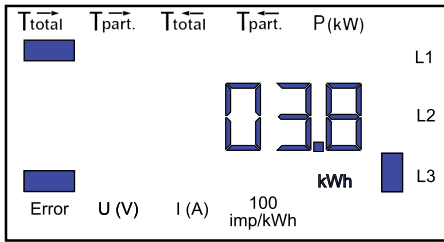


Assembly

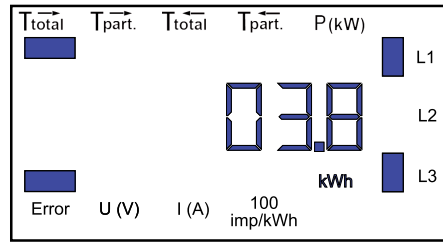
Assembly	On 35 mm top-hat rail in accordance with EN60715TH35
Connections Main current circuit	Conductor cross section 1.5–16 mm ² , Pozidrive screwdriver size 1, flat-head screwdriver size 2, torque 1.5–2 Nm
Connections Control current circuit	Conductor cross section 2.5 mm ² , Pozidrive screwdriver 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
Relative humidity	95% at 25°...+40 °C, 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

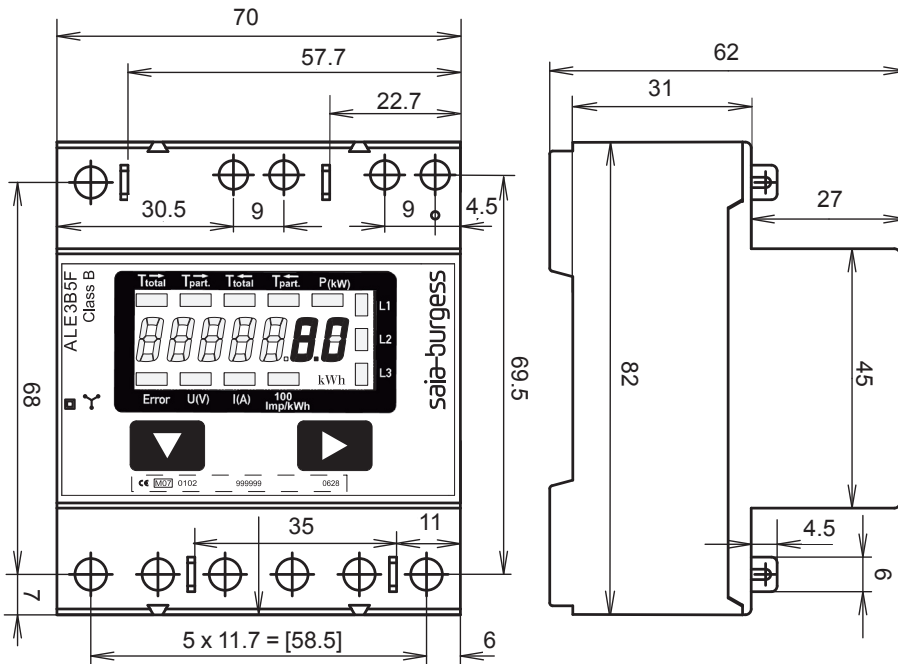
Example: Connection error at L3



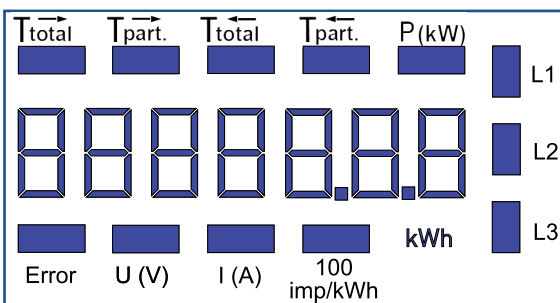
Example: Connection error at L1 and L3



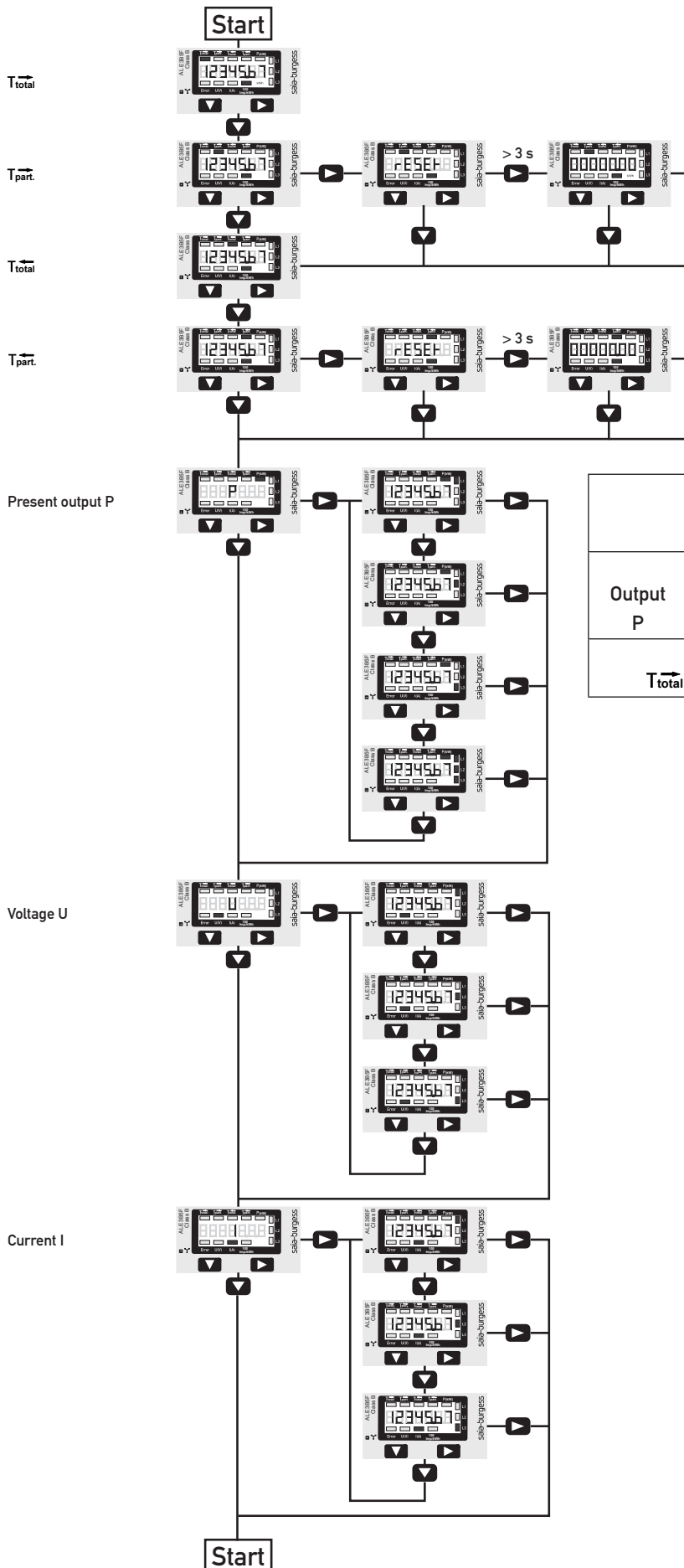
Dimension drawings



Display components, direct measurement

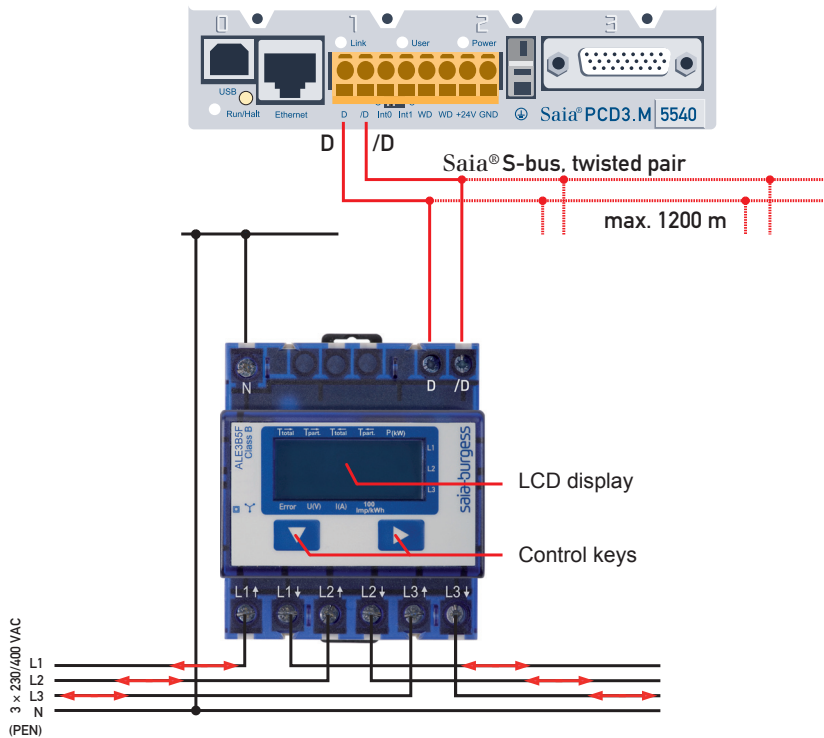


- $T_{total} \rightarrow$ Shows the total consumption $T \rightarrow$
- $T_{part.} \rightarrow$ Shows the partial consumption at $T \rightarrow$; this value can be reset
- $T_{total} \leftarrow$ Shows the total consumption $T \leftarrow$
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- P (kW) Shows 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
- 100 pulses/kWh Pulses in accordance with the supplied power
- 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	Saia® S-bus
Transmission rates	1200-2400-4800-9600-19200-38400-57600-115200. The transmission rates are detected automatically.
Transmission mode	Data
Bus length (max.)	1200 m (without repeater)
Reactions time: (System reaction 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, 11, 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	X		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 «00C»
8	X		Type/ASN function	Will give « »
9	X		HW version modif	Ex: «11» = FW 1.1
10	X		Not used	Will give «0»
11	X		Not used	Will give «0»
12	X		Serial number	Will give the serial number
13	X		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	X		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 2 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.

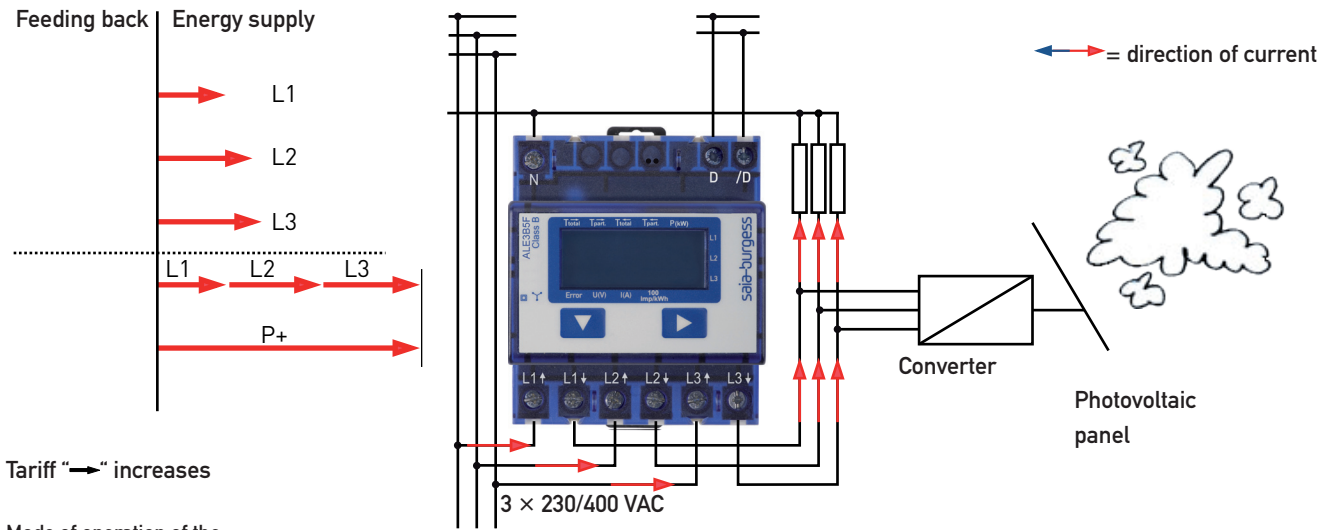
If the supply of energy (P positive) is greater than the delivery of energy (P negative), the counter $T \rightarrow$ increases.

The LCD segment 100 pulses/kwh 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.

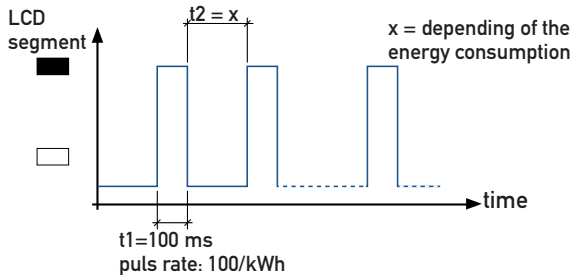
The LCD segment «100 pulses/kwh» is ON and only switches off if there is a pulse.

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

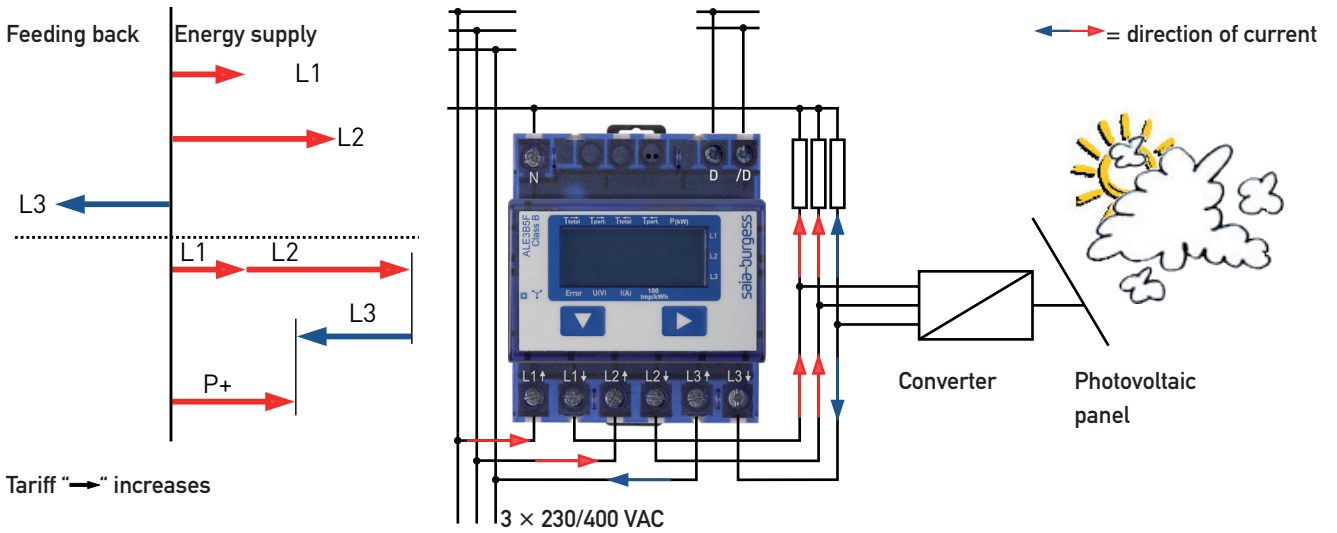


Tariff " \rightarrow " increases

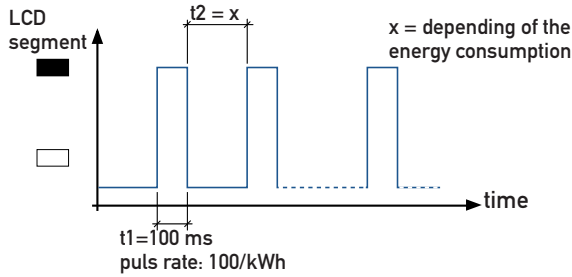
Mode of operation of the LCD segment «pulse/kWh»



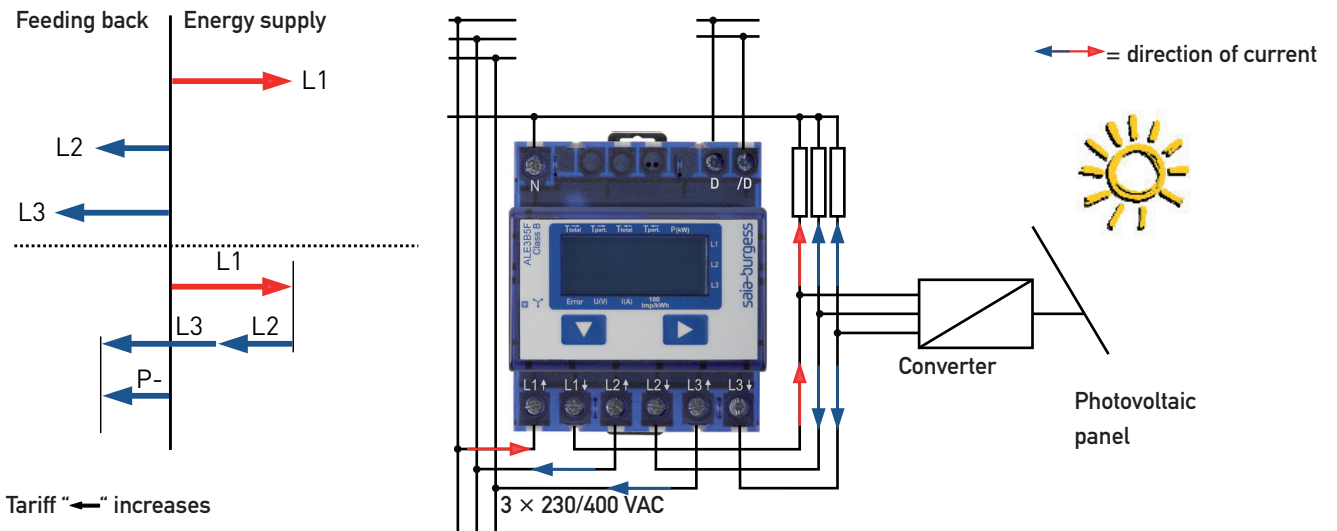
Method of operation with direction of current «supply →» and «feeding back ←»



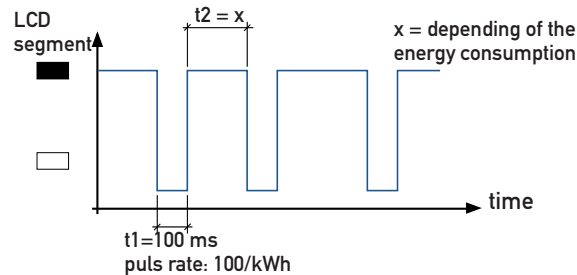
Mode of operation of the LCD segment «pulse/kWh»



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



Mode of operation of the LCD segment «pulse/kWh»



Contact

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