

3-phase, AWD3 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, 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
- Converter metering to 1500 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: AWD3B5WS00C2A00
MID version: AWD3B5WS00C2A00
Sealing cap: 4 104 7485 0

Technical data

Accuracy class	Class B in accordance with EN50470-3, Class 1 in accordance with IEC62053-21
Operating voltage	3 × 230 / 400 VAC, 50 Hz Tolerance -20% / +15%
Power consumption	Active 0.4 W per phase
Meter range	000'000.0...9'999'999
Display	Backlight LCD, numbers 6 mm high
Display without mains electricity	Condenser protected LCD maximum 2 times in 10 days



Assembly

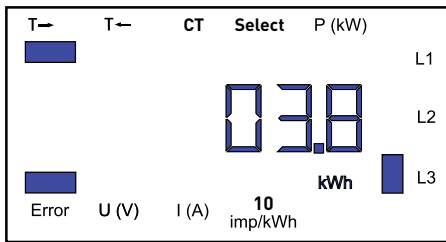
Assembly	On 35 mm top-hat rail in accordance with EN60715TH35
Connections Main current circuit	Conductor cross section 1.5–16 mm², Pozidrive screwdriver size 1, flat-head screwdriver size 2, torque 1.5–2 Nm
Connections Control current circuit	Conductor cross section 2.5 mm², Pozidrive screwdriver size 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 energy meters 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

Converter measurement

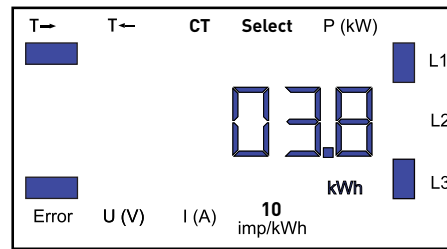
Reference current / maximum current	5...1500 A $I_{ref} = 5 \text{ A}, I_{max} = 6 \text{ A}$			
Start current / minimum current	$I_{st} = 10 \text{ mA}, I_{min} = 0.05 \text{ A}$			
Conversion factor	5:5	50:5	100:5	150:5
	200:5	250:5	300:5	400:5
	500:5	600:5	750:5	1000:5
	1250:5	1500:5		
Pulses per kWh	Standard version: LCD display MID version: LED		10 pulses / kWh 10 pulses / kWh	

Error display

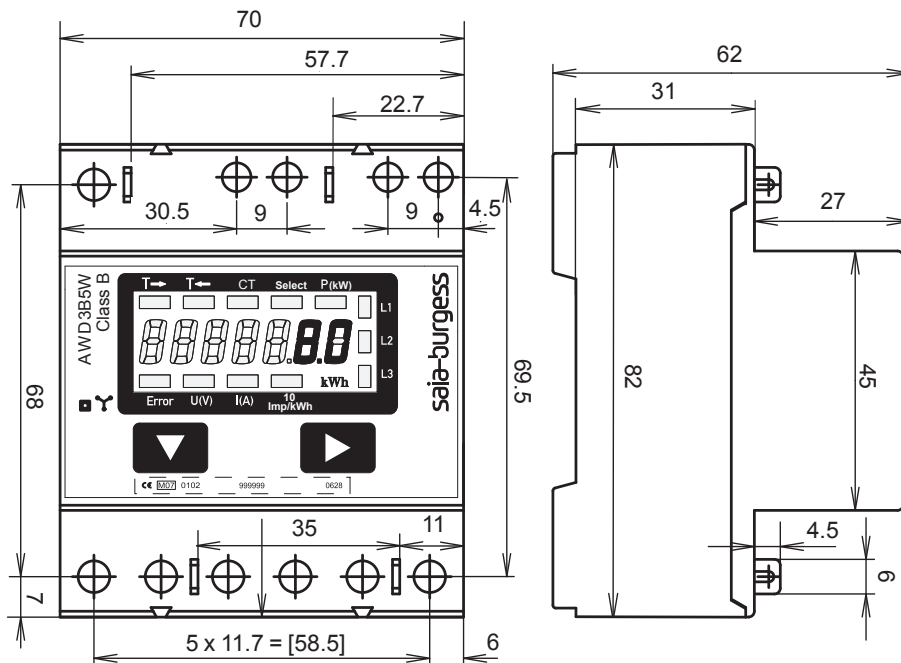
Example: Connection error at L3



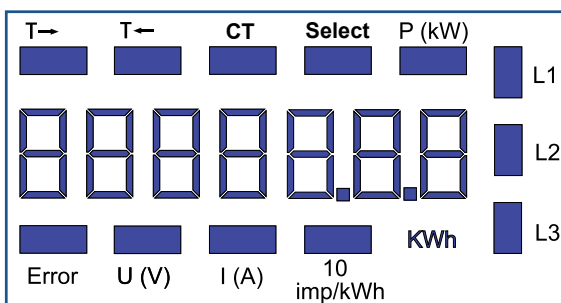
Example: Connection error at L1 and L3



Dimension drawings

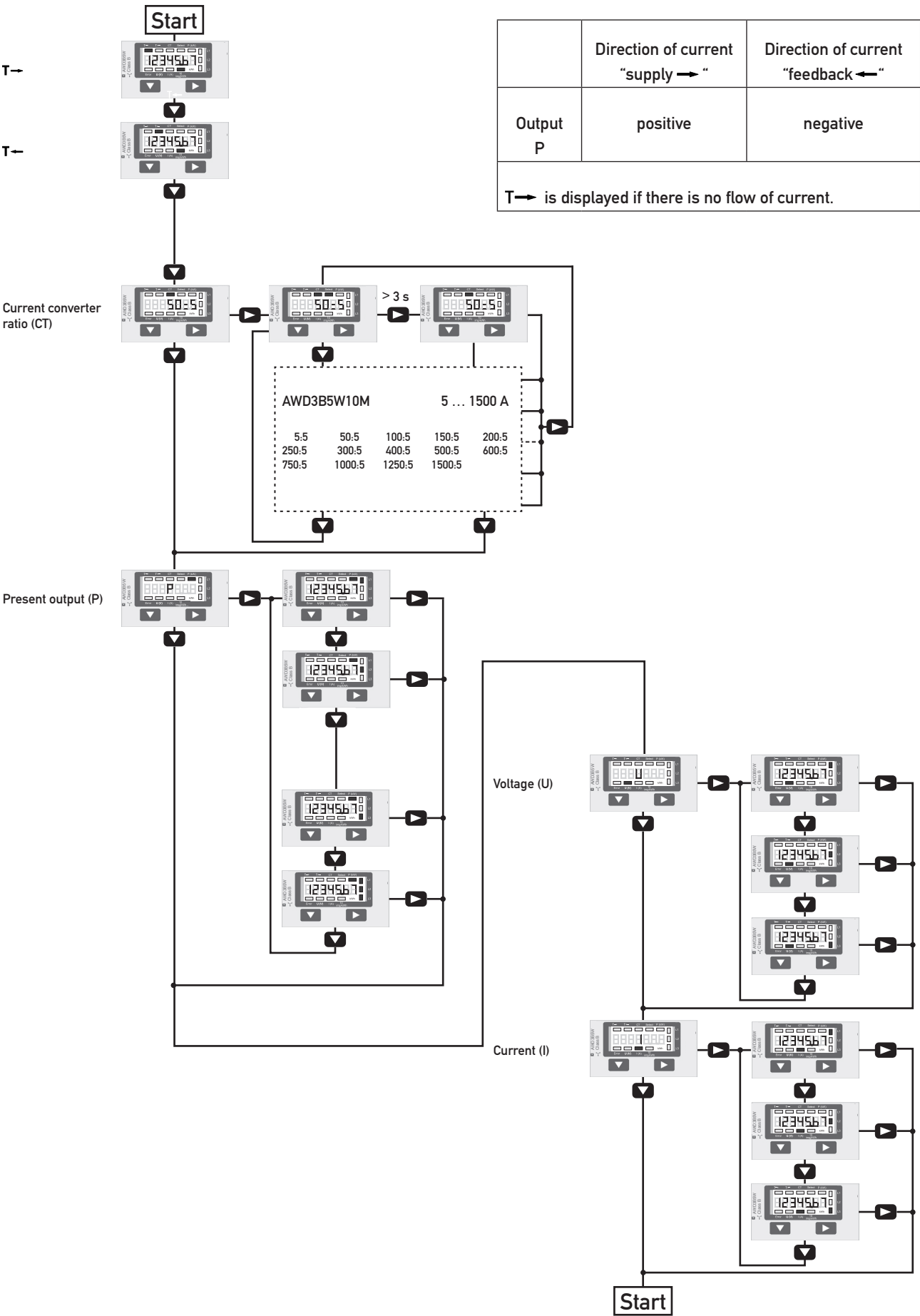


Display components

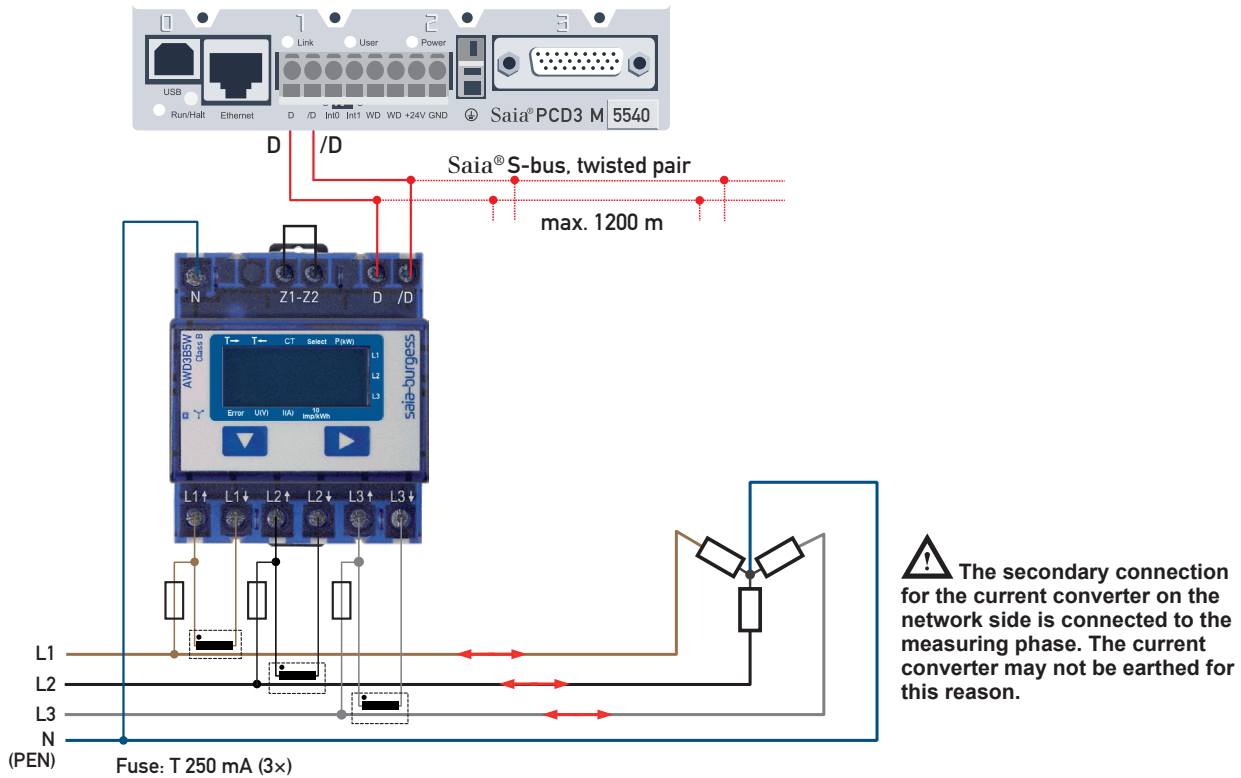


- **T→** Shows the total consumption →
- **T←** Shows the total consumption ←
- **CT** Shows the set current converter ratio
- **Select** When the Z1-Z2 bridge is open, the converter ratio can be set under the menu item: Select
- **P (kW)** Shows the present output per phase or for all phases
Current «→» = supply (P positive)
Current «←» = feedback (P negative)
- **U (V)** Shows the voltage per phase
- **I (A)** Shows the current per phase
- **10 pulses/kWh** Pulses in accordance with the supplied power.
- **kWh** Shows the unit kWh in the consumption display (only for standard version)
- **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.

Menu used to display the values on the LCD display



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:	Writing: Up to 60 ms
(System reaction time)	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

Register

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 register	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 «AWD3»
6	X		Type/ASN function	Will give «B5WS»
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		Converter ratio	Example: Converter 100/5 Will give 20
19	X		Energy direction register	0 = energy direction «consumption» 4 = energy direction «feedback»
20	X		Counter total «energy → consumption»	10 ⁻¹ kWh (multiplier 0.1) Example: 00912351= 009123.51 kWh
21	X		Counter total «energy ← feedback»	10 ⁻¹ kWh (multiplier 0.1) Example: 00912351= 009123.51 kWh
22	X		Not used	
23	X		Not used	
24	X		URMS, phase 1 Voltage, phase 1	V Example: 230 = 230 V
25	X		IRMS, phase 1 Current, phase 1	A / Except. 5/5=10 ⁻¹ A Example: 145 = 145 A
26	X		PRMS, phase 1 Output, phase 1	positive: Energy "→" negative: Energy "←" 10 ⁻¹ kW (multiplier 0.01) Example: 1545 = 15.45 kW
27	X		QRMS, phase 1 Idle power, phase 1	10 ⁻¹ kVA (multiplier 0.01) Example: 1545 = 15.45 kVA
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	A / Except. 5/5=10 ⁻¹ A Example: 145 = 145 A
31	X		PRMS, phase 2 Output, phase 2	positive: Energy "→" negative: Energy "←" 10 ⁻¹ kW (multiplier 0.01) Example: 1545 = 15.45 kW
32	X		QRMS, phase 2 Idle power, phase 2	10 ⁻¹ kVA (multiplier 0.01) Example: 1545 = 15.45 kVA
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	A / Except. 5/5=10 ⁻¹ A Example: 145 = 145 A
36	X		PRMS, phase 3 Output, phase 3	positive: Energy "→" negative: Energy "←" 10 ⁻¹ kW (multiplier 0.01) Example: 1545 = 15.45 kW
37	X		QRMS, phase 3 Idle power, phase 3	10 ⁻¹ kVA (multiplier 0.01) Example: 1545 = 15.45 kVA
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 ⁻¹ kW (multiplier 0.01) Example: 1545 = 15.45 kW
40	X		QRMS, total Idle power, total:	10 ⁻¹ kVA (multiplier 0.01) Example: 1545 = 15.45 kVA

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.

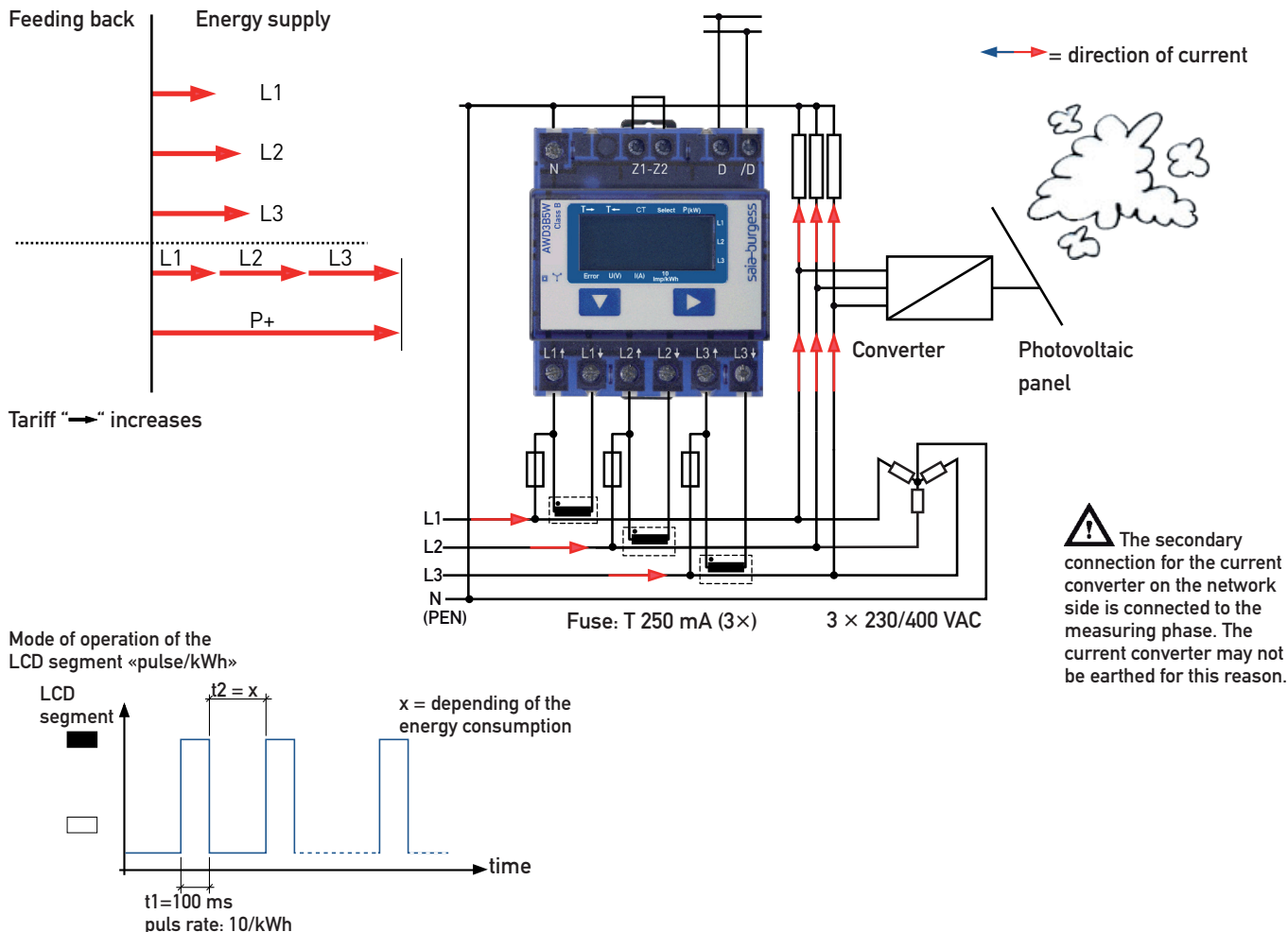
If the supply of energy (P positive) is greater than the delivery of energy (P negative), the counter $T \rightarrow$ increases.

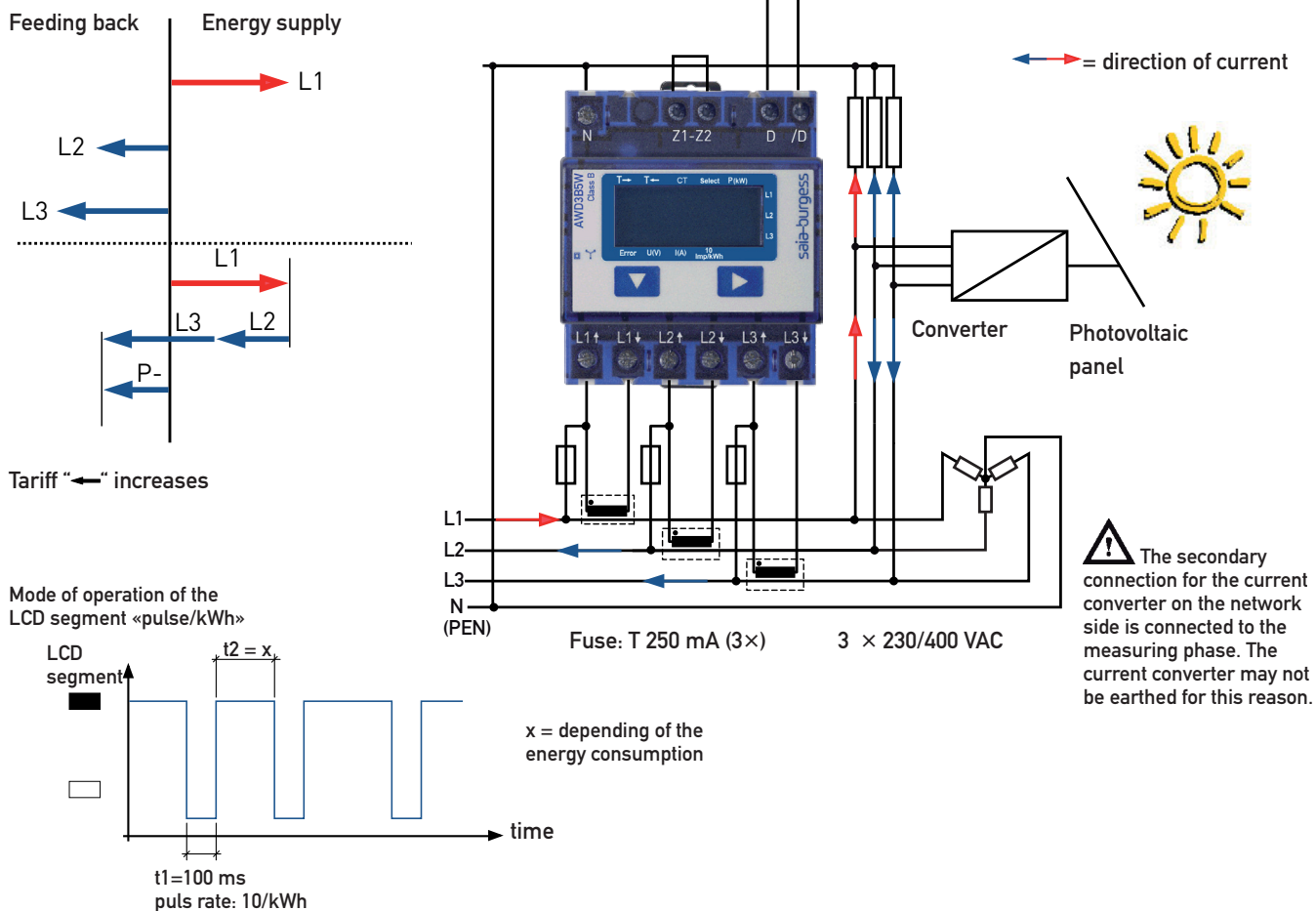
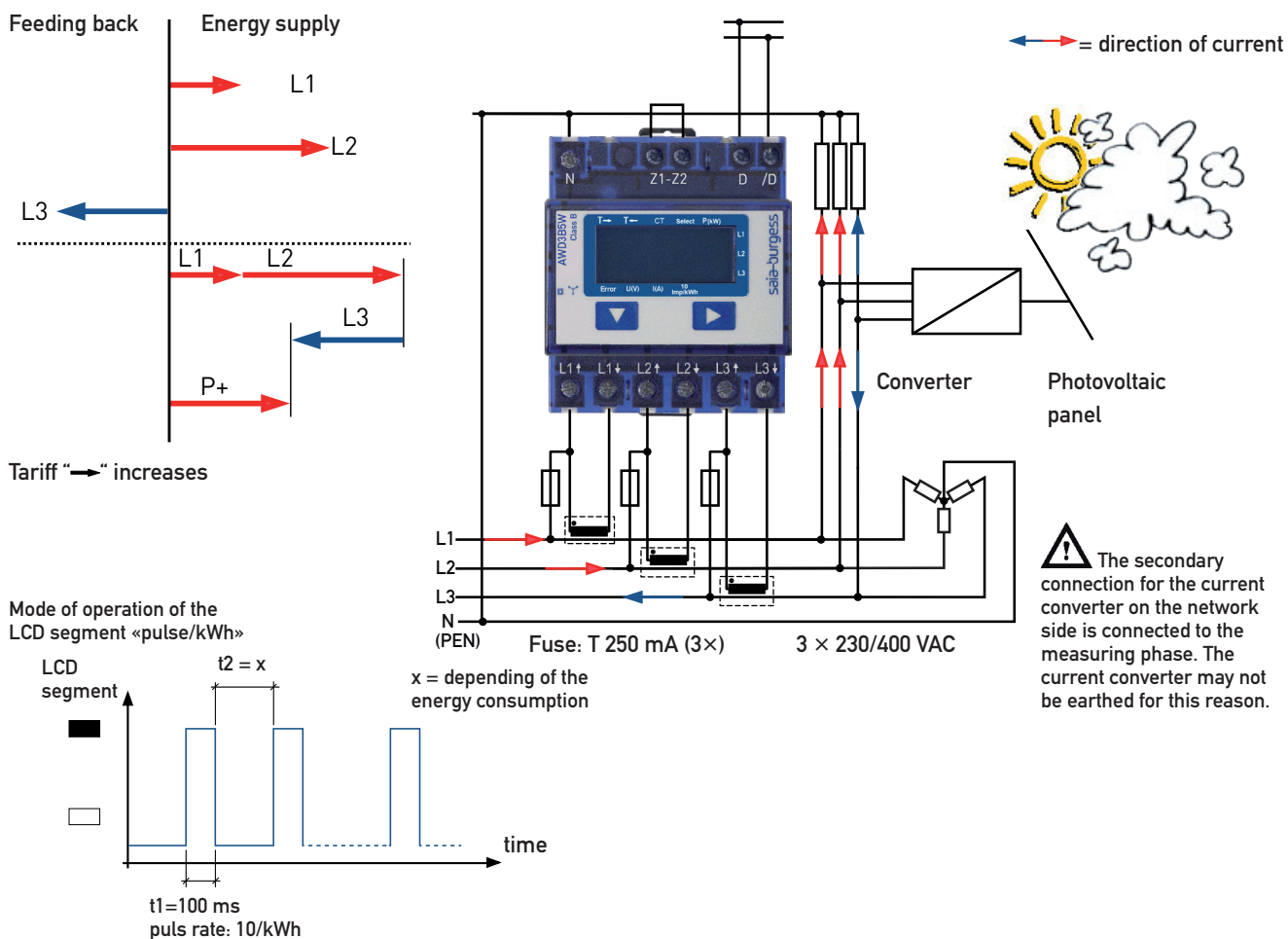
The LCD segment «10 pulses/kwh» is OFF and only switches on if there is a pulse.

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

The LCD segment «10 pulses/kwh» is ON and only switches off if there is a pulse.

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





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