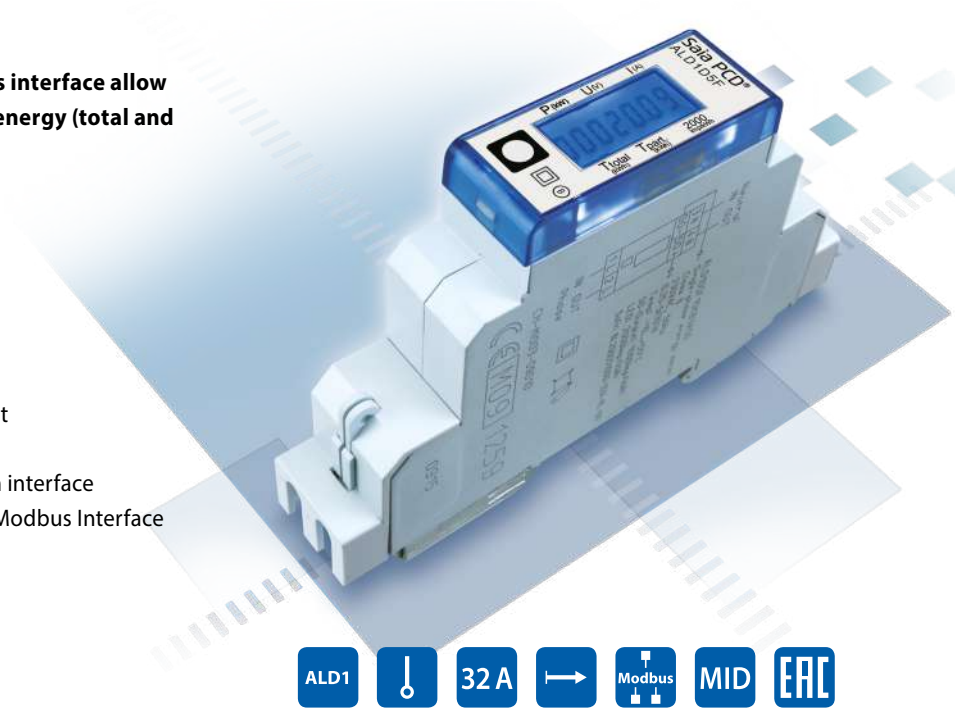


Single phase energy meter with Serial Modbus interface

Energy meters with a Serial RS-485 Modbus interface allow direct reading of all relevant data, such as energy (total and partial), current, voltage, active and reactive power.

Main features

- ▶ Single-phase energy meter, 230 VAC 50 Hz
- ▶ Direct measurement up to 32 A
- ▶ Display of active power, voltage and current
- ▶ Modbus RTU Interface to query the data
- ▶ Reactive power and $\cos\phi$ available through interface
- ▶ Up to 247 meters can be connected to the Modbus Interface
- ▶ 7-digits display
- ▶ Lead seal possible with cap as accessory
- ▶ Accuracy class B according to EN50470-3, accuracy class 1 according to IEC62053-21



Order Number

Standard Version: ALD1D5FD00A2A00
 MID Version: ALD1D5FD00A3A00
 Sealing caps 4 104 7420 0

Technical data

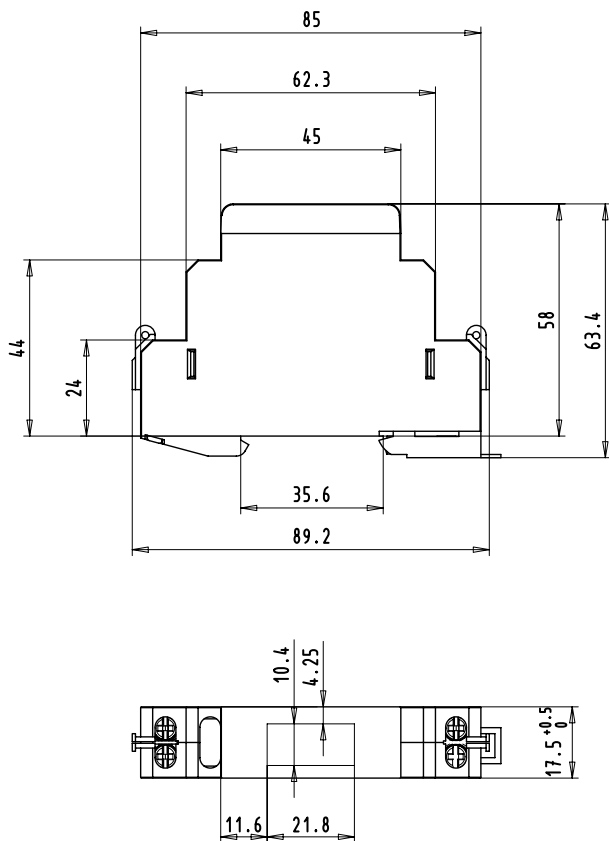
Precision class	B according to EN50470-3 1 according to IEC62053-21
Operating voltage	230 VAC, 50 Hz Tolerance -20% / +15%
Reference/maximal current	$I_{ref} = 5 \text{ A}$, $I_{max} = 32 \text{ A}$
Starting/minimum current	$I_{st} = 20 \text{ mA}$, $I_{min} = 0.25 \text{ A}$
Power consumption	Active 0.4 W
Counting range	00'000.00...99'999.99 100'000.0...999'999.9
Pulses per kWh	LC-Display : 2000 Imp./kWh

Mounting

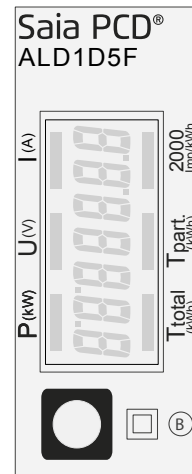
Mounting	On 35mm rail, according to EN60715TH35
Terminal connections main circuit	Conductor cross-section max. 6mm ² . Screwdriver Pozidrive no. 1, Slot no. 1 Break torque: 1.2 Nm
Terminal connections control circuit	Conductor cross-section max. 2.5mm ² . Screwdriver Pozidrive no. 0, Slot no. 1 Break torque: 0.5 Nm
Insulation characteristics	- 4 kV / 50 Hz test according to VDE0435 for Energy Meter part - 6 kV 1.2 / 50µs surge voltage According to IEC255-4 - 2 kV / 50 Hz test according to VDE0435 for Interface - 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/interference immunity	- Surge voltage according to IEC61000-4-5 at main circuit 4 kV, at Modbus interface, 1 kV - Burst voltage according to IEC61000-4-4 at main circuit 4 kV, at Modbus interface 1 kV - ESD according to IEC61000-4-2, contact 8 kV, air 15 kV

Dimension diagram

Structure

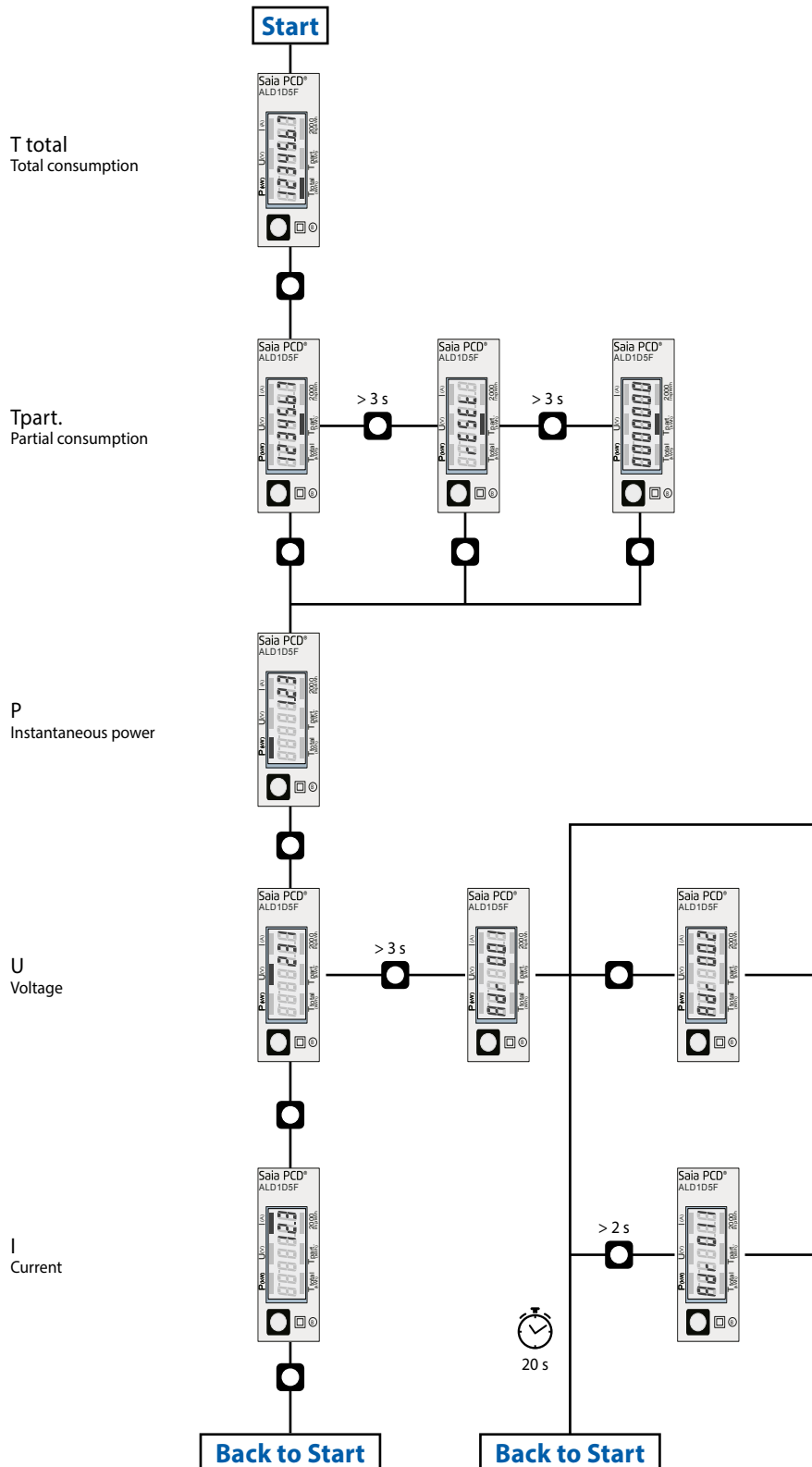


Display elements, direct measurement

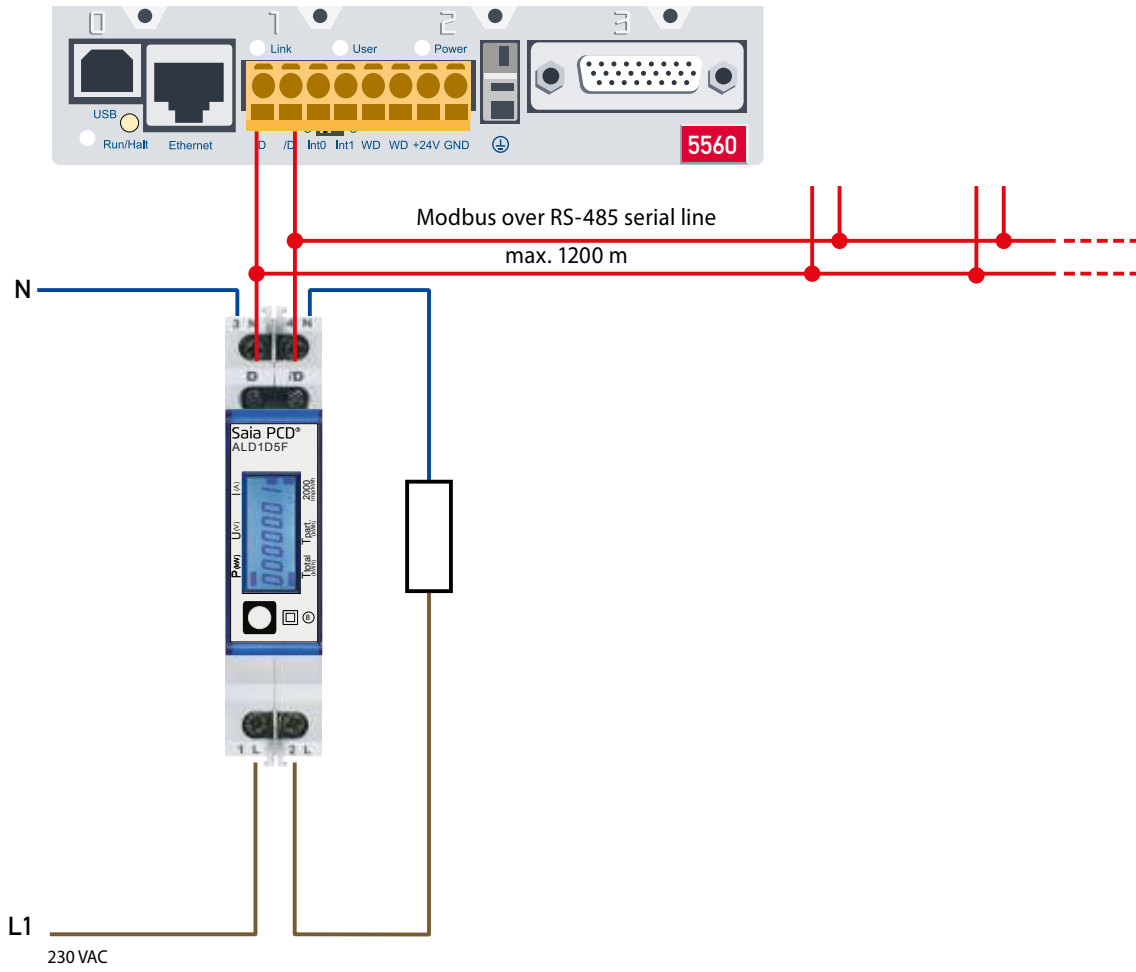


- ▶ P (kW) Indicates the instantaneous power
- ▶ U (V) Indicates the voltage
- ▶ I (A) Indicates the current
- ▶ T total (kWh) Indicates the total consumption
- ▶ T part (kWh) Indicates the partial consumption.
This value can be reset
- ▶ 2000 pulses/kWh Pulsates according to the amount of used power.
- ▶ Error indication (Line 1L/2L inverted) pulsating with 600/600 ms

Menu to display the value on LCD



Wirings Diagram



Technical data Modbus

Protocol	Modbus RTU according to IDA specification
Bus system	RS-485 Serial line
Transmission rate (bps)	4800-9600-19'200-38'400-57'600-115'200. The transmission Baud rate is automatically detected
Transmission mode	Even parity: 8 data bits, 1 stop bit Odd parity: 8 data bits, 1 stop bit No parity: 8 data bits, 2 stop bits The parity is automatically detected
Bus cable	Twisted, shielded, 2 × 0.5 mm ² , 1200 m max.
Response time	typ. 5 character times max. 60 ms

- ▶ The communication is ready 30 s after the Power On.
- ▶ Refresh Time for the Data is 5 s. Therefore the delay between reads of the same Data should be at least 5 s.
- ▶ The use of Energy meters in Bus with intensive communication can increase the data refresh time.
- ▶ 247 Devices can be connected to the Modbus. Over 128 Devices, a repeater should be used.
- ▶ The Interface don't have a terminal resistor, this should be provided external.
- ▶ For a description of the used Registers please look at the Register Page.

Data transmission

- ▶ Only «Read Holding Registers [03]/ Write Multiple Registers [16]» instructions are recognized.
- ▶ Up to 20 Registers can be read at a time.
- ▶ The device supports broadcast messages.
- ▶ In accordance with the Modbus protocol, a register R is numbered as R - 1 when transmitted.
- ▶ The device has a voltage monitoring system. In case of voltage loss, registers are stored in EEPROM (transmission rate, etc.)

Exception Responses

- ▶ ILLEGAL FUNCTION [01]: The function code is not supported.
- ▶ ILLEGAL DATA ADDRESS [02]: The address of some requested registers is out of range or more than 20 registers have been requested.
- ▶ ILLEGAL DATA VALUE [03]: The value in the data field is invalid for the referenced register.

Change the Modbus address direct on device

- ▶ In the menu, go for «U»
- ▶ Push long (≥ 3 s) → «Adr»
- ▶ Push short → address +1, push long → address +10
- ▶ Once the desired address is selected, wait to validate, till the root menu to come back

Registers

For double registers (4–5, 16–17, 28–29, 30–31) the high register is sent first (big-Endian).

Partial counter (30–31) can be reset by writing 0 in both registers in the same message.

R	Read	Write	Description	Unit
1	X		Firmware-Version	Ex: 11 = FW 1.1
2	X		Number of supported registers	Will give 40
3	X		Number of supported flags	Will give 0
4–5	X		Baudrate	Ex: Baudrate High = 1 Baudrate Low = 49'664 $1 \times 65'536 + 49'664 = 115'200$ bps
6			Not Used	Will give 0
7	X		Type / ASN function	Will give «AL»
8	X		Type / ASN function	Will give «D1»
9	X		Type / ASN function	Will give «D5»
10	X		Type / ASN function	Will give «FD»
11	X		Type / ASN function	Will give «00»
12	X		Type / ASN function	Will give «Ax» x : 2 = Non MID x : 3 = MID
13	X		Type / ASN function	Will give «A0»
14	X		Type / ASN function	Will give «0»
15	X		HW vers. Modif.	Ex: 11 = HW 1.1
16–17	X		Serial number	Unique 32 bit serial number Low
18	X		Serial number	Unique 32 bit serial number High
19			Not Used	Will give 0
20			Not Used	Will give 0
21			Not Used	Will give 0
22	X		Status	0 = no Problem 1 = problem with last communication request
23	X		Response timeout	ms
24	X	X ¹⁾	Modbus Address	Range 1–247
25	X		Error register	0 : No error; 1 : Error
26			Not Used	Will give 0
27			Not Used	Will give 0
28–29	X		WT1 total Counter Energy Total Tariff 1	10^{-2} kWh (multiplier 0,01) Ex: WT1 total High = 13 WT1 total Low = 60'383 $13 \times 65'536 + 60'383 = 912'351 = 9123.51$ kWh

R	Read	Write	Description	Unit
30-31	X	X	WT1 partial Counter Energy Partial Tariff 1	10 ⁻² kWh (multiplier 0,01) Ex: WT1 partial High = 13 WT1 partial Low = 60'383 13 × 65'536 + 60'383 = 912'351 = 9123.51 kWh
32			Not Used	Will give 0
33			Not Used	Will give 0
34			Not Used	Will give 0
35			Not Used	Will give 0
36	X		URMS phase 1 Effective Voltage of Phase 1	V Ex: 230 = 230 V
37	X		IRMS phase 1 Effective Current of Phase 1	10 ⁻¹ A (multiplier 0,1) Ex: 314 = 31.4 A
38	X		PRMS phase 1 Effective active Power of Phase 1	10 ⁻² kW (multiplier 0,01) Ex: 1545 = 15,45 kW
39	X		QRMS phase 1 Effective reactive Power of Phase 1	10 ⁻² kvar (multiplier 0,01) Ex: 1545 = 15,45 kvar
40	X		cos phi phase 1	10 ⁻² (multiplier 0,01) Ex: 67 = 0,67

¹⁾ The Modbus Address register is not writable with a broadcast message.



EAC Mark of Conformity for Machinery Exports to Russia, Kazakhstan or Belarus.

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