**sbc✛**
SAIA BURGESS CONTROLS

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 cosφ 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

[ALD1] [32 A] [→] [Modbus] [MID] [EAC]
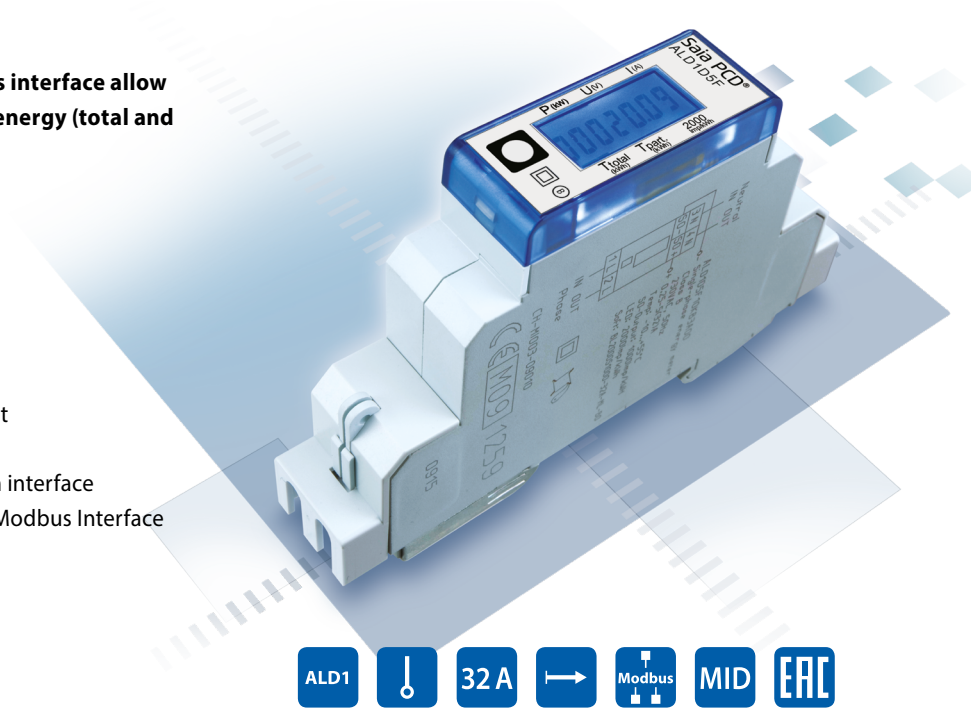
Order Number

|	
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 A, I_{max} = 32 A
Starting/minimum current	I_{st} = 20 mA, I_{min} = 0.25 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. 6mm². Screwdriver Pozidrive no. 1, Slot no. 1 Break torque: 1.2 Nm
Terminal connections control circuit	Conductor cross-section max. 2.5mm². 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
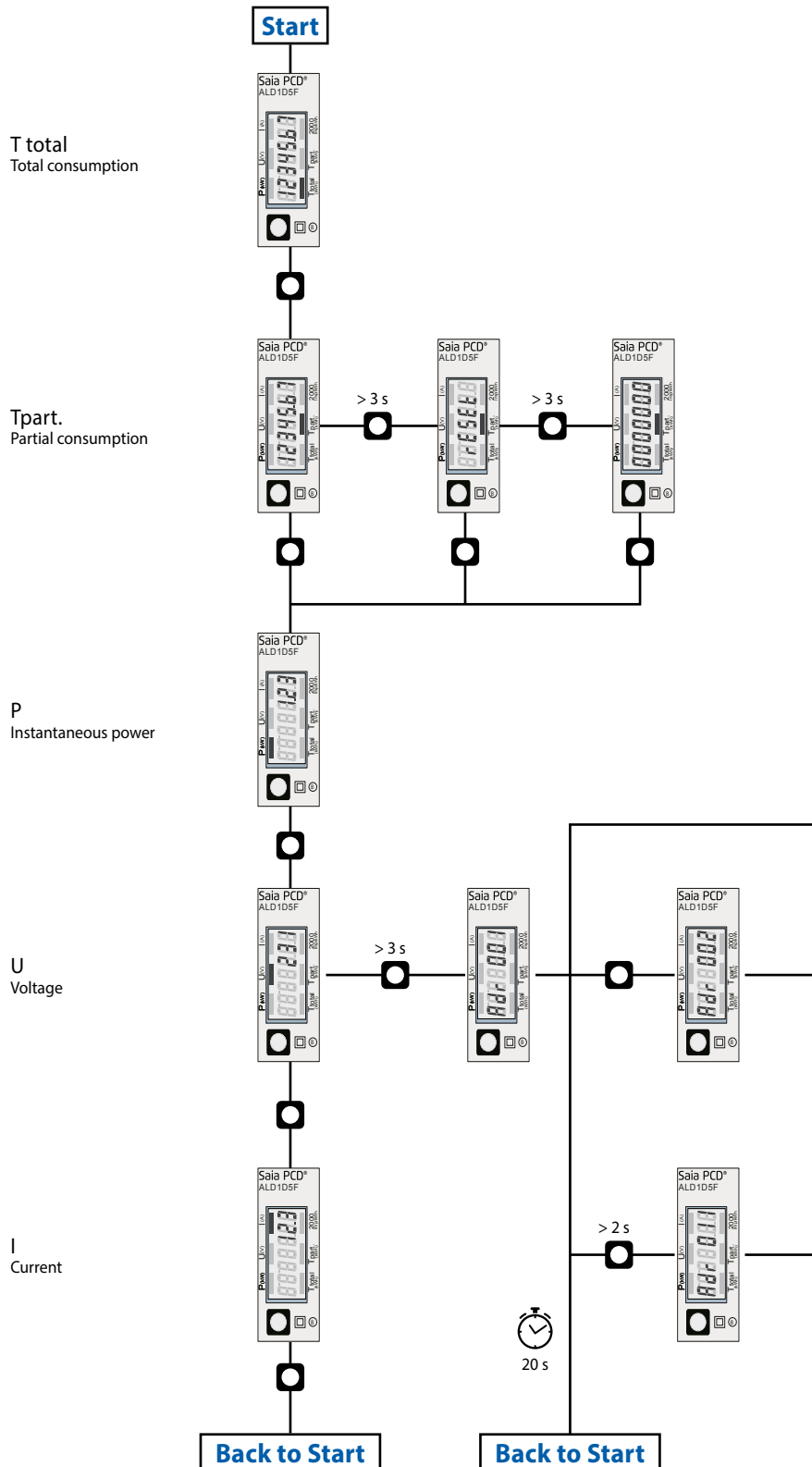
Structure
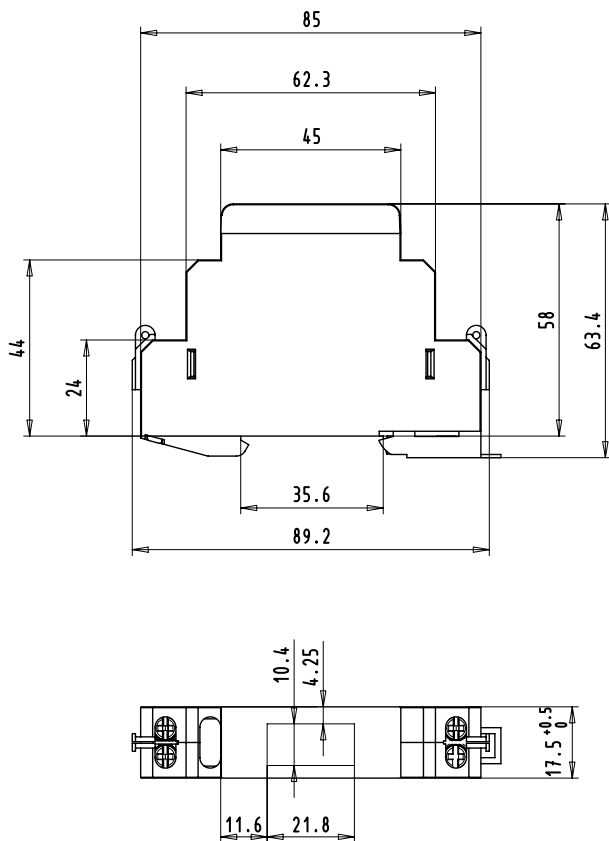
Display elements, direct measurement
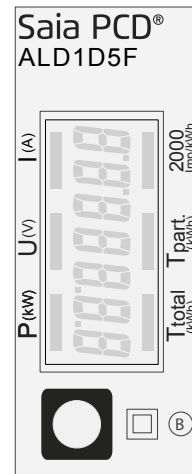
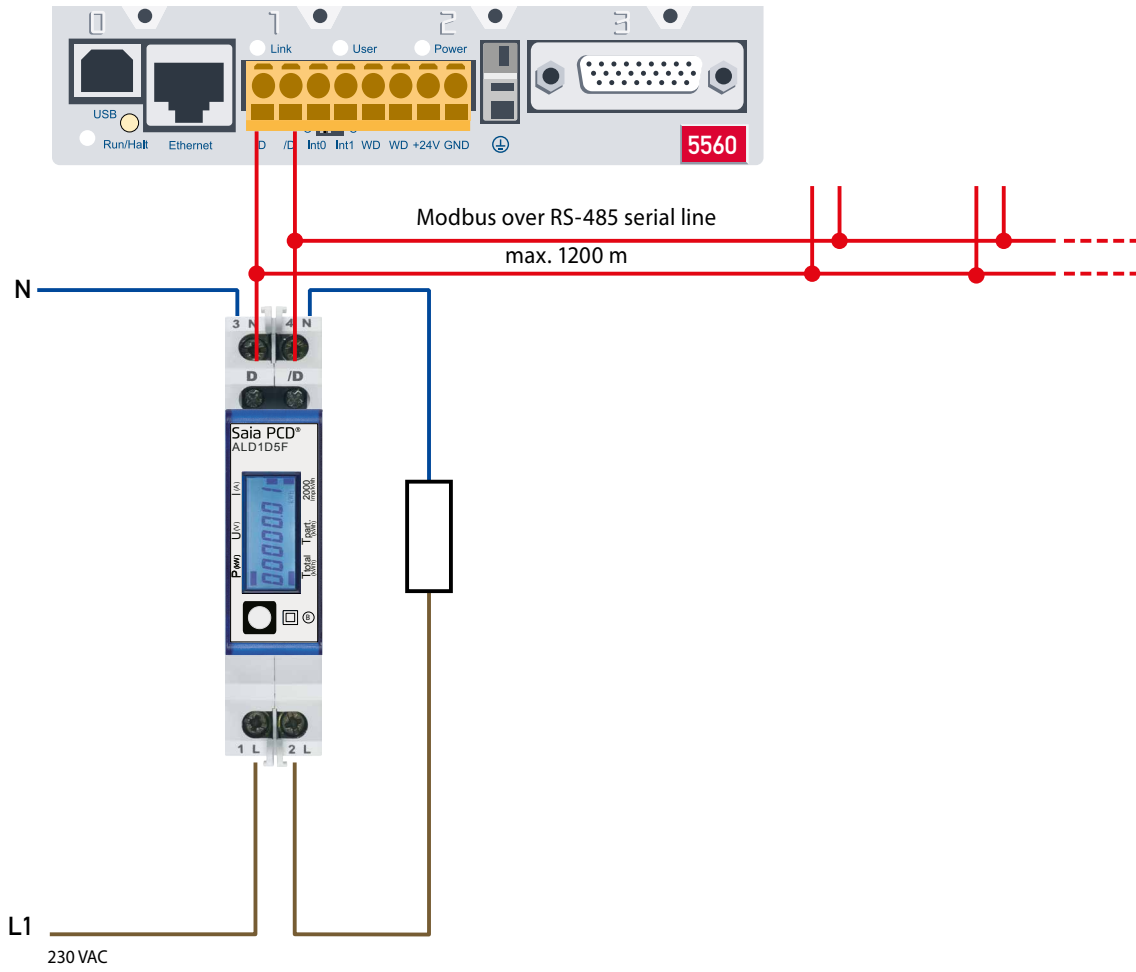- ▶ P (kW)   Indicates the instantaneous power
- ▶ U (V)   Indicates the voltage
- ▶ I (A)   Indicates the current
- ▶ T total (kWh)   Indicates the total consumption
- ▶ T part (kWh)   Indicates the partial consumption. This value can be reset
- ▶ 2000 pulses/kWh   Pulsates according to the amount of used power.
  Error indication (Line 1L/2L inverted) pulsating with 600/600 ms

Menu to display the value on LCD

Start

T total
Total consumption

Tpart.
Partial consumption

> 3 s   > 3 s

P
Instantaneous power

U
Voltage

> 3 s

I
Current

> 2 s

20 s

Back to Start   **Back to Start**

Wirings Diagram

Modbus over RS-485 serial line
max. 1200 m

N

L1
230 VAC

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 $13 \times 65'536 + 60'383 = 912'351 = 9123.51$ 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.

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