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# 1 External Power Meter

## 1.1 Recording Energy Flows with External Power Meters

External power meters can be connected to every Solar-Log™ model via the S0 input and/or the RS-485 bus.

Solar-Log™ devices have a varying number of S0 inputs:

### S0 inputs

Solar-Log™	Number of S0 inputs
Solar-Log 300, 1200 and 2000	2 x S0-In and 1 x S0-Out
Solar-Log <sup>1000, 500</sup>	1 x S0-In/Out
Solar-Log <sup>200</sup>	1 x S0-In
Solar-Log 250	1 x S0-In

#### Note



The Solar-Log™ requires a S0 pulse duration of 30-40 ms. That is why we recommend using SDS tested meters that we offer.

We cannot guarantee the functionality of other products.

In addition, the maximum length between the power meters and Solar-Log™ should not exceed 10 m.

#### Note



Consumption meters can be assigned to plant groups.

It is only possible to assign a meter after a rule with the calculation of self-consumption has been activated in the power management configuration [Configuration | Feed-in Management](#).

### External power meters/accumulating meters

With multiple phase meters, a basic distinction is made between phase-exact and accumulating meters.

Accumulating meters provide the total values from all three phases. The meter calculates the total output (to and from the grid) of the individual phases and provides this total as a single value.

In the example:

Phase 1 supplies 3 kW via an inverter (single phase).

Phase 2 refers to 2 kW (energy)

Phase 3 refers to 1 kW (energy)

With an accumulating meter, this results in a total of 0 kW.

An example of an accumulating meter is the Janitza UMG 104 or the Solar-Log™ Pro380 Mod.

## 2 Solar-Log™ Meter Operating Modes

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### 2.1 Explanation of the Solar-Log™ Meter Operating Modes

There are various setting options when configuring meters in Solar-Log™. These are in particular:

- Battery meter (bi-directional meter):
  - Records the battery charges and discharges.
- Deactivated: The recording of consumption has been or is deactivated.
- Meter for the entire plant: The entire production from all of the inverters.
- Sub-consumer: Meter to record the individual consumption from appliances that was already recorded with a consumption meter.
- Utility Meter (U+I) (only Solar-Log 2000): Meter for control and reduction functions - including current measurements if necessary with current transformers.
- Utility Meter (U) (only Solar-Log 2000): Meter for control and reduction functions - only voltage measurements.
- Consumption meter: Meter that only records the consumption.
- Consumption meter (Bi-directional meter): Meter that records consumption and production collectively - the actual consumption is determined by monitoring the inverters.
- Inverter mode: The meter values are considered inverter values.

## 3 General Information on Wiring

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### 3.1 Wiring for S0 meter

The S0 connection for external power meters is connected to a 6-pin S0A-In/Out connection (S0-IN A and S0-OUT) or to a 4-pin S0-IN B as follows:

#### S0 meters in general

S0 Solar-Log™	Power meter
PIN	Assignment
1	S0+
2	S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

### 3.2 Wiring for RS485 meter

The meter's RS485 output can be connected to any RS485 interface (A, B and C) on the Solar-Log™.

#### Overview

- 2-pin wiring
- The communication address has to be assigned.

#### Installation steps

- Switch off the meter and Solar-Log™.
- Connect the meter to the Solar-Log™.

### 3.3 Wiring meters to record self-consumption

There are two options to record self-consumption via the Solar-Log™:

- Measuring just the consumption.
- Measuring with bi-directional measurements (two-way measurements) at the grid connection point behind the utility company meter.

Fundamentally, a separate meter needs to be installed to record energy consumption.

The meters used by utility companies generally cannot be used to send data to the Solar-Log™.

### 3.3.1 Meter connection options to record the total consumption via an RS485/S0 interface.

This meter has to measure the total consumption of the house.  
The meters installed by grid operators, or two-way meters, cannot be used to implement this function.

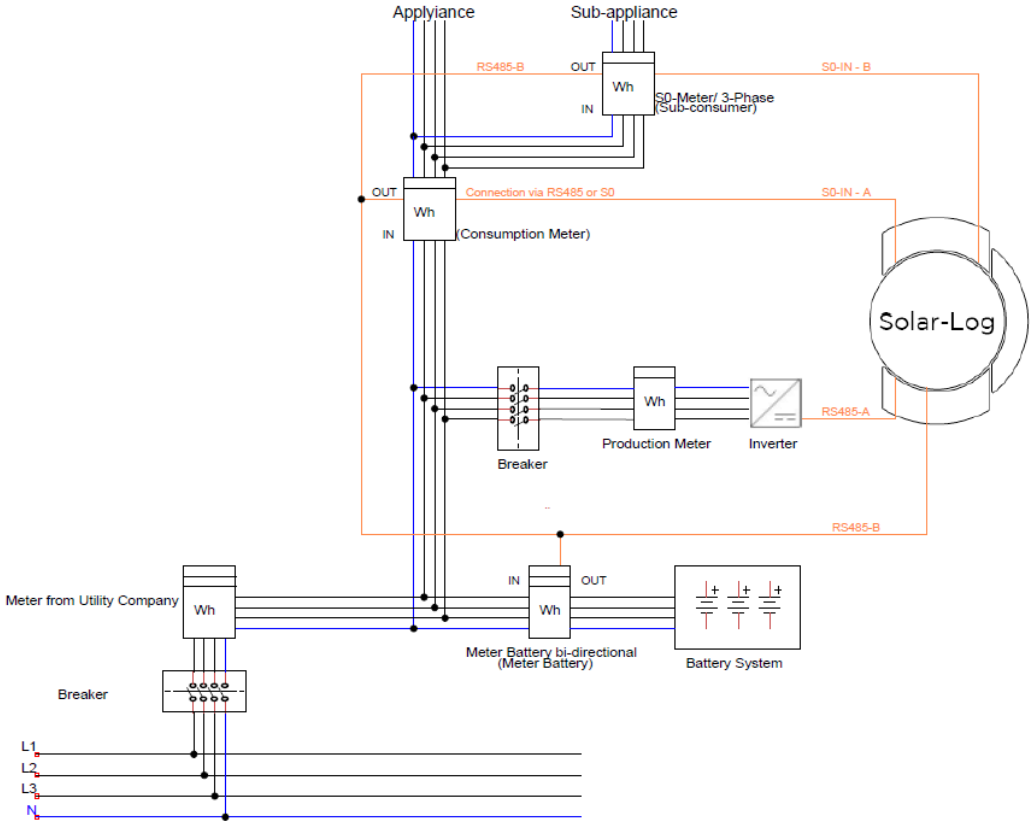


Fig.: Wiring diagram to record self-consumption. (optional with battery storage)

### 3.3.2 Meter connection options for bi-directional recording of the total consumption via only an RS485 interface.

If there is feed-in in a sub-distribution, the option mentioned above can be used. In this case, the the amount of feed-in power and power obtained from the grid can be recorded with a bi-directional meter. With this, the Solar-Log™ can calculate the consumption.

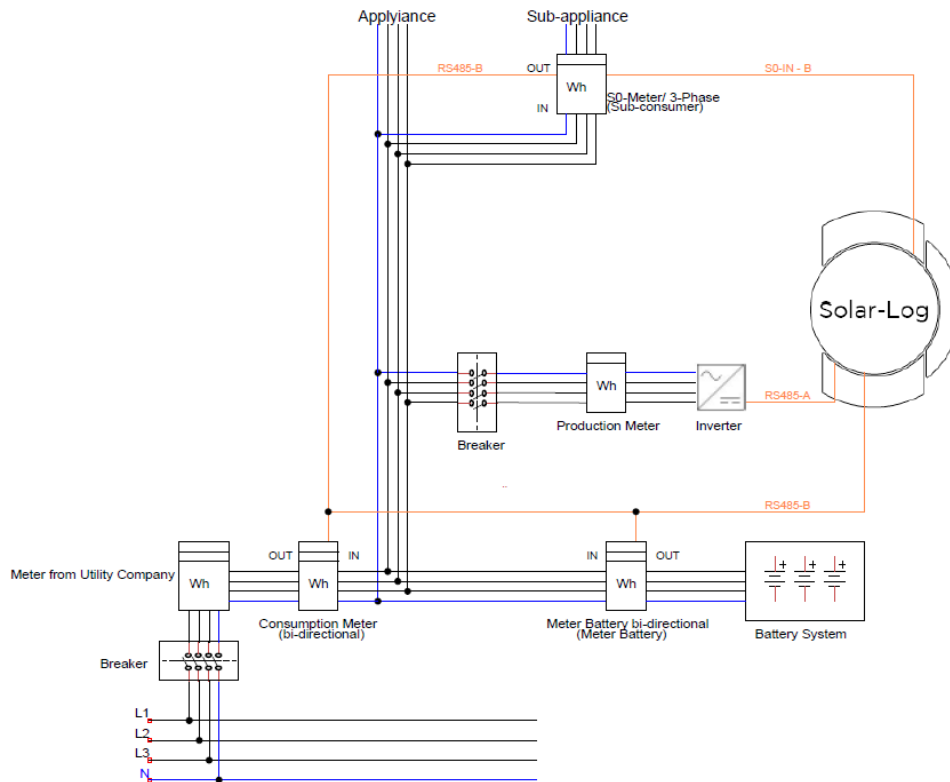


Fig.: Wiring diagram for recording self-consumption - bi-directional meter. (optional with battery storage)



## 4 Solar-Log™ PRO380 Mod

### 4.1 Solar-Log™ PRO380 Mod

Selections available under Solar-Log Pro

#### Overview

- The communication address has to be assigned.
- 2-pin wiring
- Installation steps
  - Switch off the meter and the Solar-Log™.
  - Connect the meter to the Solar-Log™.



#### Note

The communication address is set to 1 by default, but can be adjusted if several meters are connected to one RS485 bus. Maximum of 32 meters per RS485 bus

Connect the meter to the Solar-Log™.

The wiring is done using a

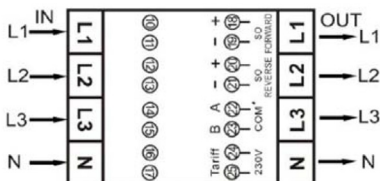
- self-made cable connection with a terminal block connector.

#### 4.1.1 Connection diagram

according to circuit type 1000 (DIN 43856)

Input "L1, L2, L3"	Supply line input phase "L1, L2, L3"
Output "L1, L2, L3"	Supply line output phase "L1, L2, L3"
Terminal "N"	Neutral conductor connection "N"
Terminal 18, 19	S <sub>o</sub> pulse output "consumption" (terminal 18 = "+")
Terminal 20, 21	S <sub>o</sub> pulse output "supply" (terminal 20 = "+")
Terminal 22, 23	ModBus connection terminal 22 -> A, 23 -> B
Terminal 24, 25	External tariff switching (230V AC)

The SO signal for the supply is not used when a meter is connected to the Solar-Log™.



## Connection diagram for different operating modes

The meter connections are labeled IN (bottom) and OUT (top).

### Solar-Log™ Pro380 Mod (RS485 or S0) connection assignments

▶ As consumption or sub-consumer meter	Connection to the grid (IN) – connection for appliances (OUT)
▶ As inverter / production meter	Connection for the production (IN) – connection to the grid (OUT)

### Solar-Log™ Pro380 Mod connection assignments (only RS485)

▶ As a consumption meter (bi-directional)	Connection for grid (OUT) – connection to the house/plant (IN) (installation position according to the arrow system)
▶ As battery meter (bi-directional):	Connection to the production/grid (IN) – connection to the battery (OUT)

Cable connection via RS485:

Solar-Log™ terminal strip connector	Solar-Log™ PRO380 Mod
Terminal	PIN
▶ 1	22 (A)
▶ 4	23 (B)



#### Note

If the meter is the last device on the bus, it has to be terminated at connection block 22 and 23 with a resistor (120 ohm / 0.25W).



#### Note

The Solar-Log™ PRO380 Mod cannot be connected to the inverters with a single bus. For this reason, use one RS485 connection for the inverters and one RS485 connection for the Solar-Log™ PRO380 Mod.

▶ A combination with an M&T Sensor on the same bus is possible.

Possible meter operating modes for the Solar-Log™ PRO380 Mod via RS485:

- Battery (Bi-directional meter)
- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Battery (Bi-directional meter)
- Inverter mode

Cable connection via SO (consumption):

Solar-Log™ S <sub>0</sub> terminal block	Solar-Log™ PRO380 Mod
Pin assignment	Pin assignment
1 - SO+	18 - SO+
2 - SO-	19 - SO-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Possible meter operating modes for the Solar-Log™ PRO380 Mod via SO connection (consumption):

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode

## 5 Inepro

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### 5.1 Inepro 1250D

Selections available under Inepro / DMM

#### Overview

- The communication address cannot be freely assigned.
- 2-pin wiring
- Installation steps
  - Switch off the meter and the Solar-Log™.
  - Connect the meter to the Solar-Log™.

#### Connect the meter to the Solar-Log™.

The wiring is done using a

- self-made cable connection with a terminal block connector.

#### Cable connection via RS485:

Solar-Log™ RS485 terminal block	Inepro 1250D
Pin assignment	Pin assignment
1	11 - RS485A
4	10 - RS485B

#### Possible meter operating modes for the Inepro meter 1250D via RS485:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode

#### Cable connection via SO:

Solar-Log™ S <sub>0</sub> terminal block	Inepro 1250D
Pin assignment	Pin assignment
1 - SO+	9 - SO+
2 - SO-	8 - SO-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

#### Possible meter operating modes for the Inepro 1250D meter via SO:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode

## 5.1.1 Connection diagram for different operating modes

### Solar-Log™ Inepro 1250D (RS485 or S0) connection assignments

▶ As consumption or sub-consumer meter	Connection to the grid (IN) – connection for appliances (OUT)
▶ As inverter / production meter	Connection for the production (IN) – connection to the grid (OUT)



#### Note

The Inepro 1250D cannot be used on the same bus input with RS422 connected inverters.



#### Note

All three phases have to be connected for the Solar-Log™ to accurately detect the meter.

If an Inepro 1250D is used, the PRG button on the meter must be pressed and held down during entire detection process.

If it is not possible to hold down the PRG button during the whole process, we recommend provisionally connecting the meter to the Solar-Log™ with a short cable after the installation in order to be able to press and hold down the PRG button during entire detection process.

In a second detection attempt with the inverter, the meter is then detected by the Solar-Log™ even if the PRG button is not pressed.

The detection of an Inepro 1250D in an existing installation can take up to 15 minutes. After the detection, a restructuring of the data takes place which can take up to 45 minutes depending on the amount of data on the devices.



#### Note

The Inepro 1250D meters are automatically assigned the mod bus address 234 by Solar-Log™ during the detection process.

This address is therefore not allowed to be used for other devices.

After the configuration, the display on the Inepro meter alternates between the meter status and the address display (ID=EA). This can be used to check if Solar-Log™ has correctly detected the meter.

▶ All RS485 meters have to be terminated with a 120Ω resistor between the two pins used.

## 5.2 Inepro 75D

Selections available under Inepro / DMM

### Overview

- The communication address cannot be freely assigned.
- 2-pin wiring
- Installation steps
  - Switch off the meter and the Solar-Log™.
  - Connect the meter to the Solar-Log™.

### Connect the meter to the Solar-Log™.

The wiring is done using a

- self-made cable connection with a terminal block connector.

### Cable connection via RS485:

Solar-Log™ RS485 terminal block	Inepro 75D
Pin assignment	Pin assignment
1	8 - RS485A
4	7 - RS485B

### Possible meter operating modes for the Inepro 75D meter via RS485:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode

### Cable connection via S0:

Solar-Log™ S <sub>0</sub> terminal block	Inepro 75D
Pin assignment	Pin assignment
1 - S0+	6 - S0+
2 - S0-	5 - S0-
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

### Possible meter operating modes for the Inepro 75D meter via S0:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode



Note

The Inepro 75D cannot be used on the same bus input with RS422 connected inverters.

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Note

The Inepro 75D meters are automatically assigned the mod bus address 234 by Solar-Log™ during the detection process.

This address is therefore not allowed to be used for other devices.

After the configuration, the display on the Inepro meter alternates between the meter status and the address display (ID=EA). This can be used to check if Solar-Log™ has correctly detected the meter.

All RS485 meters have to be terminated with a 120Ω resistor between the two pins used.

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## 6 Iskra

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### 6.1 Iskra WS0021

Selections available under Iskra

#### Overview

- 2-pin wiring
- Installation steps
  - Switch off the meter and the Solar-Log™.
  - Connect the meter to the Solar-Log™.

Connect the meter to the Solar-Log™.

The wiring is done using a

- self-made cable connection with a terminal block connector.

Cable connection via S0:

Solar-Log™ S<sub>0</sub> terminal block

Iskra WS0021

Pin assignment

Pin assignment

1 - S0+

9 - S0+

2 - S0-

8 - S0-

3

4

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

Possible meter operating modes for the Iskra WS0021 meter via S0:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode



## 6.2 Iskra WS0031

Selections available under Iskra

### Overview

- 2-pin wiring
- Installation steps
  - Switch off the meter and the Solar-Log™.
  - Connect the meter to the Solar-Log™.

### Connect the meter to the Solar-Log™.

The wiring is done using a

- self-made cable connection with a terminal block connector.

### Cable connection via S<sub>0</sub>:

Solar-Log™ S <sub>0</sub> terminal block	Iskra WS0031
Pin assignment	Pin assignment
1 - S <sub>0</sub> +	S <sub>0</sub> +
2 - S <sub>0</sub> -	S <sub>0</sub> -
3	
4	

Place a cable bridge between pin 3 and 4 on the Solar-Log™.

### Possible meter operating modes for the Iskra WS0031 meter via S<sub>0</sub>:

- Meter for the entire plant
- Sub-consumption meter
- Consumption meter
- Inverter mode

## 7 Janitza UMG 104 (Utility Meter)

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### 7.1 Janitza UMG 104

The Solar-Log™ Utility Meter is a universal metering device. It can be integrated in both low- and medium-voltage networks (via a transformer) and is needed for various functions:

- controlling voltage-dependent reactive power via the Q(U) function
- controlling reactive power at the feeding point
- recording the measurement data needed for the response signals sent to the grid operator

Only voltage measurements are required for voltage-dependent reactive power reduction Q(U). However, we still recommend using both current and voltage measurements to be able to check that the reduction function is operating properly. Current and voltage measurements are needed for the other functions.

Utility Meter supply voltage:

- 95-240Vac, 45-65Hz or 135-340Vdc

The Utility Meter's measuring inputs have the following limits:

- Voltage line conductor AC (without a voltage transformer): 10...300 V AC
- Voltage phase AC (without a voltage transformer): 17...520 V AC
- Current (without a current transformer) 0.005, 7.5 A
- Frequency of the fundamental component: 45 ..65 Hz

The limit may not be exceeded. For this reason, a measuring transformer needs to be installed for most applications.

We recommend the following transformer ratio:

- Voltage: Secondary 100V  
e.g. at 20kV grid converter 20000:100V
- Current: Secondary 5A  
e.g. 100:5A



#### Note

The Utility Meter that we use is produced by the company Janitza. Refer to the Janitza UMG 104 manual for further technical details. We cannot guarantee the functionality of other Janitza devices.

► The operating modes Utility Meter (U / U+I) is only possible with the Solar-Log 1000 and 2000.

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#### Note

The Utility Meter cannot be connected to the inverters with a single bus. For this reason, use one RS485 connection for the inverters and one RS485 connection for the Utility Meter.

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## Connecting the Utility Meter to the power grid

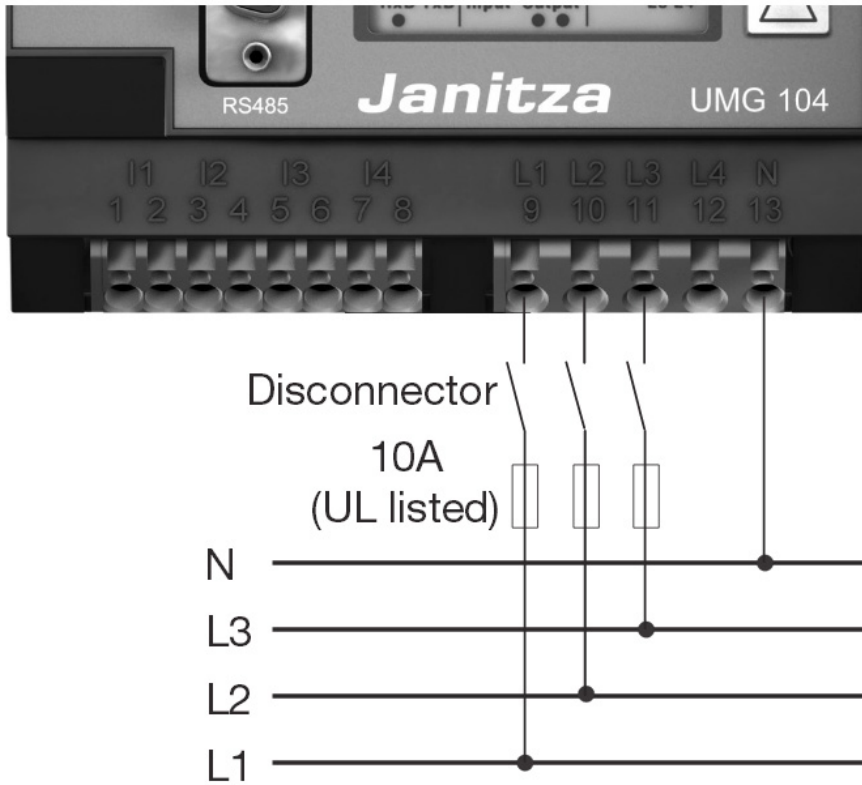


Fig.: Utility Meter connection diagram for voltage measurements in low-voltage power grids

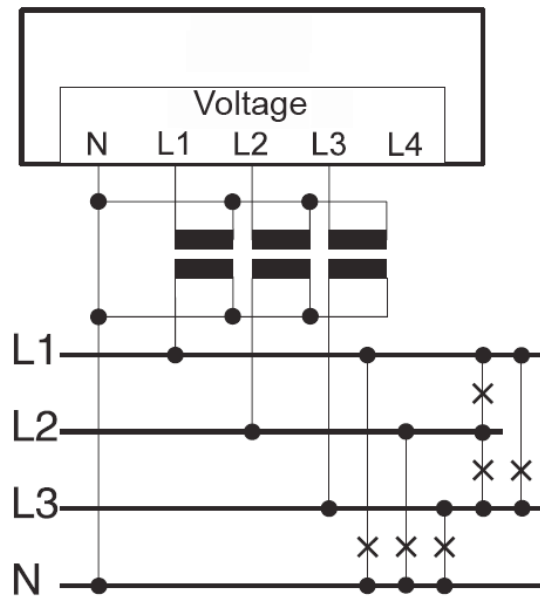


Fig.: Utility Meter connection diagram for voltage measurements with current transformers (medium voltage)

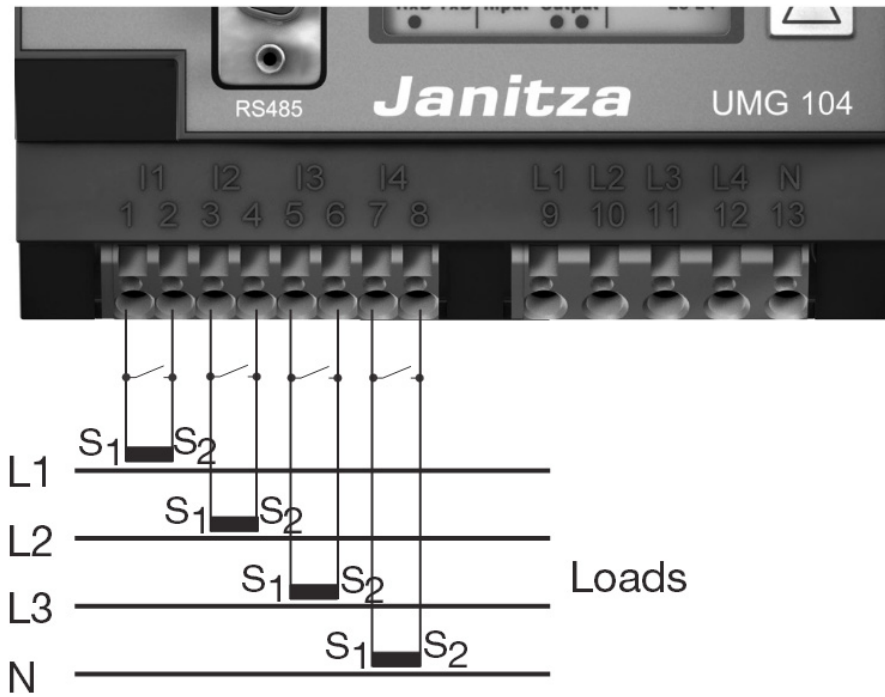


Fig.: Utility Meter connection diagram for current measurements with current transformers

#### Procedure

- Enter the supply voltage into the Utility Meter



#### Note

We recommend using a fuse to safeguard the connection lines for the supply voltage. Please follow the instructions in the Janitza UMG 104 manual.



#### Note

Supply voltages that do not correspond to the specifications on the rating plate can cause malfunctions and damage the device.



#### Caution

The inputs for the supply voltage are dangerous to touch.



#### Note

The measurement voltage must in effect be at least 10V or an exact measurement is not possible.

### Cable connection via RS485:

1. Connect the wires as shown in the following diagram:

Solar-Log™ terminal strip connector	Utility meter terminal strip
Terminal	PIN
▶ 1	22 (A)
▶ 4	23 (B)

2. Insert the terminal block connector into the Solar-Log™ RS485 socket.

- The RS485 bus must be terminated.  
Install a 120 Ohm, 0.25 W resistor between pin 22 and 23 of the Utility Meter to terminate.
- Configuring the Utility Meter from the display  
Setting MODBUS Address (PRG 200 = 1)  
Setting Baud rate RS485 (PRG 202 = 2)  
Setting Mode (PRG 203 = 0)  
Setting Current converter primary (PRG 000)  
Setting Current converter secondary (PRG 001)  
Setting Voltage converter primary (PRG 002)  
Setting Voltage converter secondary (PRG 003)  
Refer to the accompanying manual of the device for the UMG 104 configuration procedure.



#### Note

The parameter settings need to be adjusted before device detection.  
If the parameters differ, the Utility Meter will not be detected by the Solar-Log™.

- Perform an inverter detection  
See the installation manual, Chapter "Performing inverter detections."
- Configure the Utility-Meter under [Configuration | Devices | Configuration](#), select the corresponding **Operating mode** and click on **Save**.

### Check

- Does the Utility Meter display a positive value for inverters feeding power, the current output (kW)?  
If this is not the case, the current measurements are incorrectly connected.  
If necessary, switch the polarity of measuring inputs.



#### Note

When replacing the polarity, the cable must not be energized, since the converter can be destroyed otherwise.

Possible meter operating modes for the Janitza UMG 104 via RS485:

- Battery (Bi-directional meter)
- Meter for the entire plant
- Sub-consumer
- Utility Meter (U)
- Utility Meter (U+I)
- Consumption meter
- Battery (Bi-directional meter)
- Inverter mode

## Connection assignments / installation position of the Janitza UMG 104 (Utility Meter) in connection with the Solar-Log™



### Note

Check the installation position of the current transformers for the different operating modes of the Janitza UMG 104.



### Note

Check that the phase assignment of the voltage measurements for the current measurements is correct.

The following output values are recorded in the various operating modes when the installation position is correct.

Operating mode	Output value
▶ As a Utility Meter (U+I)	with positive output value (kW) for feed-in
▶ As total plant meter	with positive output value (kW) for feed-in
▶ As an inverter	with positive output value (kW) for feed-in
▶ As a consumption or sub-consumer meter:	with positive output value (kW) for consumption
▶ As a consumption meter (bi-directional)	When the production is greater than the consumption, positive output values (kW) (installation position according to the arrow system)
▶ As a battery meter (bi-directional)	<ul style="list-style-type: none"> <li>▶ When the battery storage is being charged, positive output values (kW).</li> <li>▶ When the battery storage is being discharged, negative output values (kW).</li> </ul>



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