

Manual for large displays

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Firmware 5.08
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Please read before use!

Never connect the display to voltages above 12 V!

Never connect the display to AC-Voltages!

Please check the category download on our website for the “Startup FAQ“. This FAQ should simplify the installation and startup of the large display.

This unit includes sensitive electronic components and therefore has to be protected from shock influence and sudden climatic variations.

Protect the display from impacts.

We have tried to make this manual complete and correct. If you do miss information or find any mistakes, please do not hesitate to inform us.

All trademarks, referenced in this document, are property of the corresponding owner.

Only use the original power supply unit. Separate the power supply unit from the mains voltage if you have finished work with the large display. The Power supply unit is for indoor use only!

This manual belongs to the product. It contains important information for installation and handling of the large display. Please regard this fact, when you pass the large display to third persons. After the installation, please store this manual at a place where it is available. In case of a necessary service, this will help us to identify your display quickly.

Proper use of the large display:

The large display is intended to show measured values. It is compatible with different types of data sources, listed in this manual.

The manufacturer does not take any responsibility, guarantee or warranty, if the display is not used in it's intended manner.

Please take some time and read this manual before starting up the display.

Introduction

We congratulate you to the purchase of this large display. By the generous visualization of the measured values or other values, you are now able to demonstrate relationships and effects to a huge audience. Especially with regenerative energies you can point a way regarding sustainability. Before you use the large display, please read this manual carefully. We wish you great success with the presentation.

Our ambition for the customers complete contentment does not stop after the purchase of the large display. We attend you during its usage. If you do have questions or suggestions, please do not hesitate to contact us.

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1 Outline

This manual helps you with the preparation, connection and installation of the large display. In this manual different types of our displays are merged; sorted in sections, by their different attributes of housing and connection. The essential sections for your display are shown on the outside cover-sheet of this manual.

Please read the required sections as marked on the cover. Please do also read the superior section. There you will find general, important information concerning this topic.

We recommend to install the large display as follows:

- Check whether the display is intact and the accessory is complete. See scope of delivery!
- Check the configuration of the data source (outside cover-sheet).
- Connect the display to the power supply and the data source. If needed, change configuration of the data source. Check whether the shown values are correct.
- Disconnect the display and install it at the point of its destination.
- Connect the display again to power supply and data source.

If this is your first installation of a large display, please start with the section “Configuration”.

Please regard to store the installation manual, including the serial number, at a place, where it is available in case of a necessary service!

Hint: We recommend to store this manual somewhere near the displays data source (electricity meter or data logger)! This can be done with the help of the adhesive envelope.

Hint: When possible, test the correct configuration and function of the display, before it is installed at it's final destination. The push-button for configuration is easy accessible and the display can be seen when the push-button is used.

2 Scope of delivery

The scope of delivery is standard as follows. Please compare the document of delivery for further accessory.

2.1 Scope of delivery for glass displays

- Large display
- Power supply unit
- Manual of installation
- Mounting set for glass pane
 - 4 x Hanger bolts
 - 4 x Stainless-steel sleeve
 - 4 x Metal washer
 - 4 x Plastic washer
 - 4 x Stainless-steel flat-headed-nut

2.2 Scope of delivery for frame based displays

- Large display
- Power supply unit
- Manual of installation

3 Mounting the large display

3.1 General remark for mounting

! Attention ! Improper use and mounting of the display can cause serious injuries to persons and damage. Do not mount the display in a position where falling parts can hit persons. Do only use suitable screws and anchors for mounting.

The large display is intended for wall-mounting only.

Whether your large display is suitable for outdoor use, can be seen in the technical specifications or your order.

The large display is therefore mounted with suitable screws and anchors to a stable surface. Screws and anchors have to be chosen for the best halt and are not included in the delivery.

! Attention ! Since the displays GA-500, GA-600, GA-1200, GA-2100 have to be watertight after installation, please read section [3.2.1](#) for correct handling!

3.2 Mounting the glass display

Glass displays have to be mounted on a solid and plane surface!

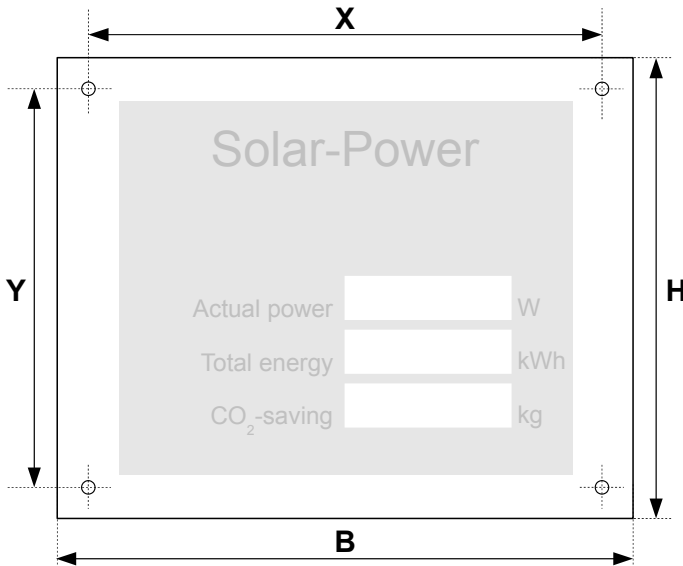


Figure 3.1: Outside dimensions and drilling dimensions, glass displays

The distance, from the center of each mounting hole to the edge of the glass is 27 mm. The drilling dimensions $X \times Y$ in relation to the glass dimensions $B \times H$ are:

| Glass dimension B / H [mm] | Display type | Drilling dimension X / Y [mm] |
|-------------------------------|-----------------------|----------------------------------|
| 500 / 400 | GA-310, GA-500 | 446 / 346 |
| 800 / 600 | GA-1100, GA-2100 | 746 / 546 |
| 1000 / 700 | GA-1200, Special size | 946 / 646 |

The mounting material (see figure 3.2) contains, as follows:

- 4 x Hanger bolts (1)
- 4 x Stainless-steel sleeve (2)
- 4 x Metal washer (3)
- 4 x Plastic washer (4)
- 4 x Stainless-steel flat-headed-nut (5)

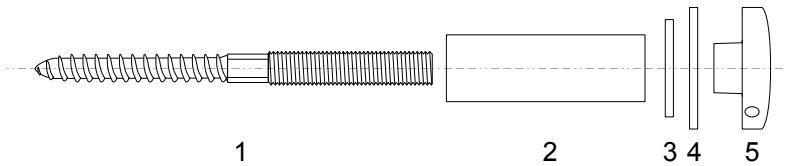


Figure 3.2: Mounting material of the glass display

Please mount the glass displays using the mounting material, as shown in figure 3.3. Choose the anchors matching to your surface and the hanger bolts. Ensure that the surface is solid enough to carry the display at any circumstances. Ensure that the hanger bolts are mounted perpendicular to the surface and the display! Don't tighten the flat headed nuts too much! If needed, secure them with the help of a screw-securing adhesive.

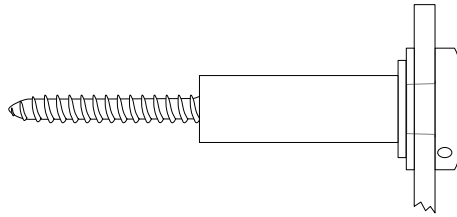


Figure 3.3: Mounting of the glass display

! ATTENTION ! No warranty in case of broken glass !

! Attention ! Since the displays GA-500, GA-600, GA-1200, GA-2100 have to be watertight after installation, please read section 3.2.1 for correct handling!

3.2.1 Watertightness of glass displays

The GA-500, GA-600, GA-1200 and GA-2100 are intended for outdoor use. This requires special attention as to the mounting of the display! The backplate of the housing must cover the gap to the composition completely! If only one cable fitting is used for the cabling, the other one has to be closed with the help of a tamping, or silicon! If no cable with a round outer profile is used, close the cable fitting with silicon! The Watertightness must be secured after the installation of the cables!

! Attention ! Please ensure, that all Screws and the cable fitting are closed properly! This is absolutely necessary to ensure that no water will enter the large display! The warranty claim expires, if the displays housing or the cable fitting is not properly closed!

3.3 Mounting the frame-based large display

All frame based large displays are intended for a wall mount. For some displays a special kit for suspension from the ceiling can be ordered!

3.3.1 GA-300

The large display GA-300 has two drillings in the backplate for the installation on a wall. The drill-holes are on a horizontal line, and the distance between the two drilling centers is 306 mm. The drill-hole diameter is 8 mm.

Open the housing for the mounting of the display. Open the display by removing the screws on the left side. Pull out the front to the left carefully!

3.3.2 GA-330 and GA-350

The large displays GA-350 and GA-330 have two drill-holes in the backplate for the installation on a wall. The drill-holes are on a horizontal line, and the distance between the two drilling centers is 272 mm. The drill-hole diameter is 6 mm.

Open the housing for the mounting of the display. Open the display by removing the countersunk head screws on the top of the display. Take away the aluminum frame and pull out the front to the top carefully!

3.3.3 GA-1000- and GA-2000-series

For the large display of the GA-1000- and GA-2000-series, currently two different frame-systems are used.

- Aluminum, powder-coated, black, 56 mm depth, (GA-1000-series, GA-2000-series)
- Aluminum, powder-coated, light-gray, 105 mm depth, (Special orders)

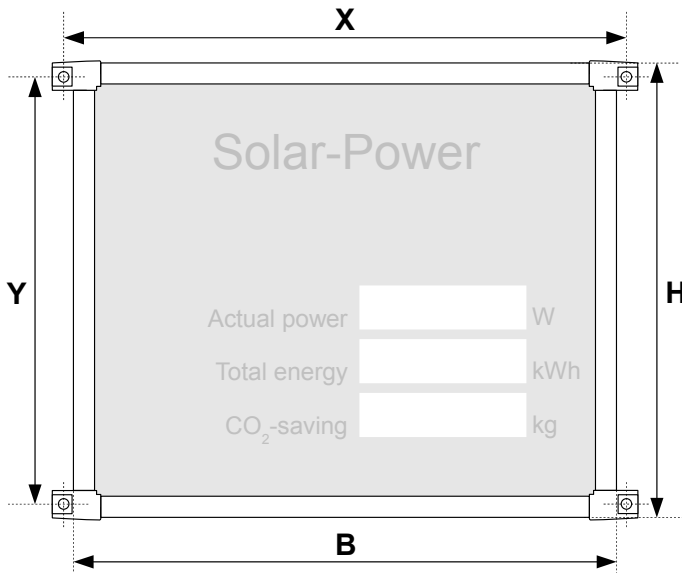


Figure 3.4: Drilling dimensions, frame-system 56 mm

The drilling holes at the edges of the frame have different positions, according to the frame-type. See figure 3.4 for the frame-system with 56 mm depth. The drilling dimensions **X** and **Y**, depending on the housing type and dimensions **B** x **H**, are:

Drilling dimensions for frame-housings , Aluminum, black (56 mm depth)

| Housing name B / H [mm] | Housing dimensions B / H [mm] | Display type | Drilling dimensions X / Y [mm] |
|----------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 500 / 500 | 495 / 495 | GA-1000-series GA-2000-series | 504 / 471,5 |
| 700 / 500 | 695 / 495 | GA-1000-series GA-2000-series | 704 / 471,5 |
| 1000 / 700 | 995 / 695 | GA-1000-series GA-2000-series | 1004 / 671,5 |
| B / H | B / H | Special size | B + 9 / H - 23,5 |

Drilling dimensions for frame-housings, Aluminum, light gray (105 mm depth)

| Housing name B / H [mm] | Housing dimensions B / H [mm] | Display type | Drilling dimensions X / Y [mm] |
|----------------------------|----------------------------------|--------------|-----------------------------------|
| 1500 / 1200 | 1500 / 1200 | Special size | 1468 / 1168 |
| 2000 / 1500 | 2000 / 1500 | Special size | 1968 / 1468 |
| B / H | B / H | Special size | B - 32 / H - 32 |

The hole diameter at the mounting holes is 5,3 mm for both frame-systems.

4 Connection schemes of the large displays

4.1 General description of the connection

On the following pages you will find the most common connection schemes for our displays for photovoltaics.

! Attention ! An incorrect connection of the large display can cause serious injuries to persons and damage, or destroy the display. Above all never connect the display directly to the 110 VAC or 230 VAC grid !

The connection is done with a luster terminal at the end of the large display cabling, or with on-board connector blocks.

The detailed assignment can be found at the luster terminal or on a label at the connection board! Special orders do always include a customized connection scheme, which replaces the scheme shown in this manual!

If this label is missing, and none of the following connection schemes describes your display exactly, please ask RiCo for the information. If the label is not exactly in the correct position in front of the on-board connection blocks, please orientate at the 3-pole connector for the power supply.

Each large display is equipped with different inputs/interfaces. This manual includes the most common options for the connection with different data sources. The words "large display" are shortened with LD here and there.

! Attention ! In favor of the optimum clarity, the illustration of the connections is NOT shown as it is in real! Please do only orientate yourself at the labeling of the single connectors!

The scope of delivery includes a power supply unit for the power supply of the large display. This adapter reduces the mains voltage of 110-240 VAC to a safety-low voltage of 7.5 V to 12 V, which the large display needs for operation. The required voltage and maximum current consumption are shown at the type-label of the display. Please check whether the power supply unit meets this requirements, before powering up the display.

Hint: When possible, test the correct configuration and function of the display, before it is installed at it's final destination. The push-button for configuration is easy accessible and the display can be seen when the push-button is used.

4.2 Connection scheme of the luster terminal GA-1100, GA-2000-series, GA-1000-series

Since 2011 all displays* of the GA-1000-series and GA-2000-series are equipped with this cabling scheme (figure 4.1).

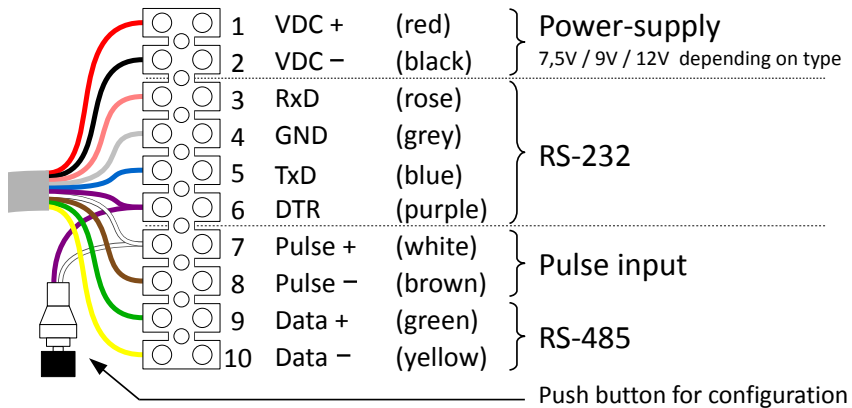


Figure 4.1: Connection scheme, Luster terminal

Hint: Leave the push-button for configuration and the luster terminal at the display, after the installation is finished. This simplifies the process, in case of a necessary service or reconfiguration. The Luster terminal can be cut congruent to the dashed lines, to simplify the storage. The printed connection scheme is performed as a label.

*Special versions of the large displays include a specific, customized connection scheme. **This provided scheme replaces the connection scheme, shown on this page!** Please do necessarily preserve this customized scheme!

4.3 Connection scheme of the PCB adapter blocks GA-300, GA-310, GA-330, GA-1200, GA-2100, Vitrine-versions

Please avoid unnecessary force to the PCB, while connecting the cable. Hereby the PCB could be damaged, in particular soldered points could break. Strain each connection pin with the help of a screwdriver, before inserting the cable. Support the PCB from the backside, when possible, to reduce the bending of the PCB to a minimum.

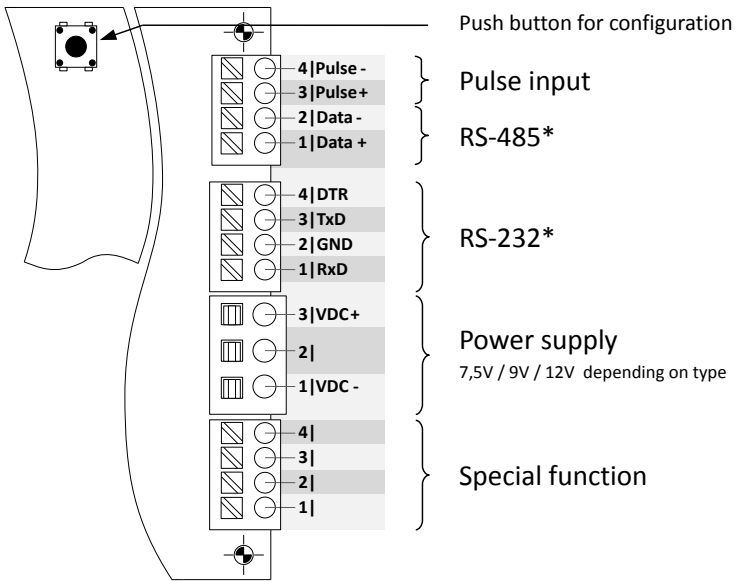


Figure 4.2: Connection scheme, PCB adapter blocks

Special versions of the large displays include a specific, customized connection scheme. **This provided scheme replaces the connection scheme, shown on this page!** Please do necessarily preserve this customized scheme!

Complement for GA-300

To connect the display, open its housing. Remove the screws on the left side. Pull out the front to the left carefully!

Complement for GA-310 and GA-2100

To connect the display, open it's backside by removing the screws.

Complement for GA-330

Open the housing to connect the display. Open the display by removing the counter-sunk head screws on the top of the display. Take away the aluminum frame and pull out the front to the top carefully!

* The RS-232- and RS-485-input are only functional, when the option was ordered with the display!

Complement for GA-1200

To connect the display, open it's backside by removing the screws.

! Attention ! The connection of the power supply is on a separate PCB! Please regard the label with VDC+ and VDC- !

Complement for vitrine-versions of the GA-1000

To connect the display, open the front of the vitrine.

! Attention ! For the digit heights of 58, 85, 135, 200 and 300 mm of the single-LED-displays, the connection of the power supply is on a separate PCB! Please regard the Label with VDC+ and VDC- !

4.4 Connection scheme of the GA-350

Open the housing by removing the countersunk head screws on the top of the display. Take away the aluminum frame and pull out the front to the top carefully! Use the green plug connectors for cabling. Regard that the screws will show to the backside of the display, when the plug connectors are connected to the PCB!

Fix the cables to the plug connectors, as shown in figure 4.3.

! Attention ! Please regard, that the plug connectors will have the screws to the backside, when they are finally connected to the PCB!

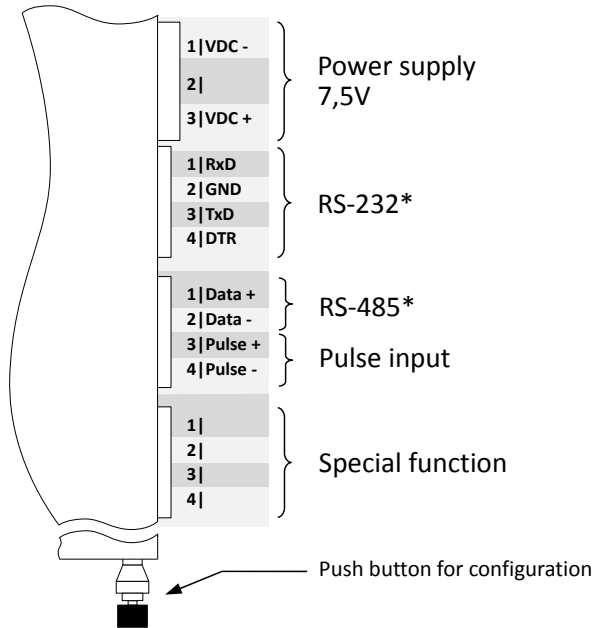


Figure 4.3: Connection scheme, PCB adapter blocks GA-350

Special versions of the large displays include a specific, customized connection scheme. **This provided scheme replaces the connection scheme, shown on this page!** Please do necessarily preserve this customized scheme!

* The RS-232- and RS-485-input are only functional, when the option was ordered with the display!

4.5 Connection scheme of the GA-500

Please avoid unnecessary force to the PCB, while connecting the cable. Hereby die PCB could be damaged, in particular soldered points could break. Strain each connection pin with the help of a screwdriver, before inserting the cable. Support the PCB from the backside, when possible, to reduce the bending of the PCB to a minimum.

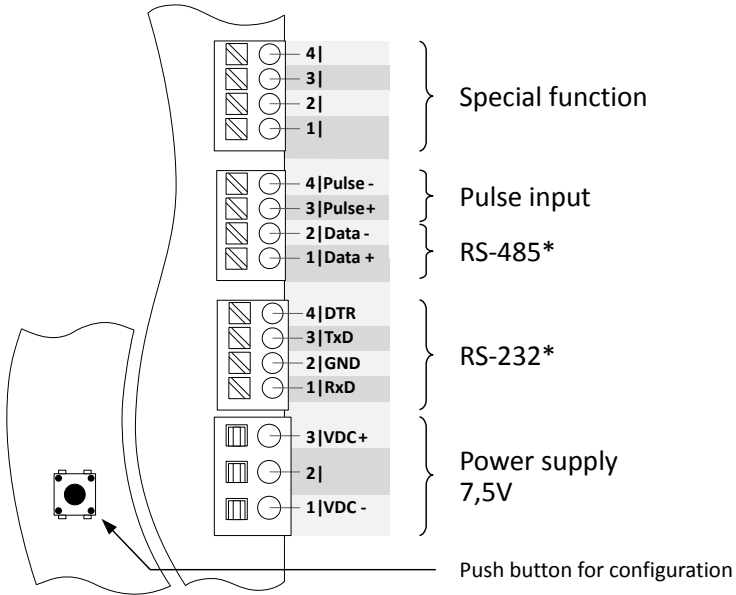


Figure 4.4: Connection scheme, adapter blocks GA-500

Special versions of the large displays include a specific, customized connection scheme. **This provided scheme replaces the connection scheme, shown on this page!** Please do necessarily preserve this customized scheme!

* The RS-232- and RS-485-input are only functional, when the option was ordered with the display!

4.6 Connection scheme of the GA-600

! Attention ! The connection of the power supply is on the black PCB! The three-pole connector on the green PCB remains unassigned!

Please avoid unnecessary force to the PCB, while connecting the cable. Hereby die PCB could be damaged, in particular soldered points could break. Strain each connection pin with the help of a screwdriver, before inserting the cable. Support the PCB from the backside, when possible, to reduce the bending of the PCB to a minimum.

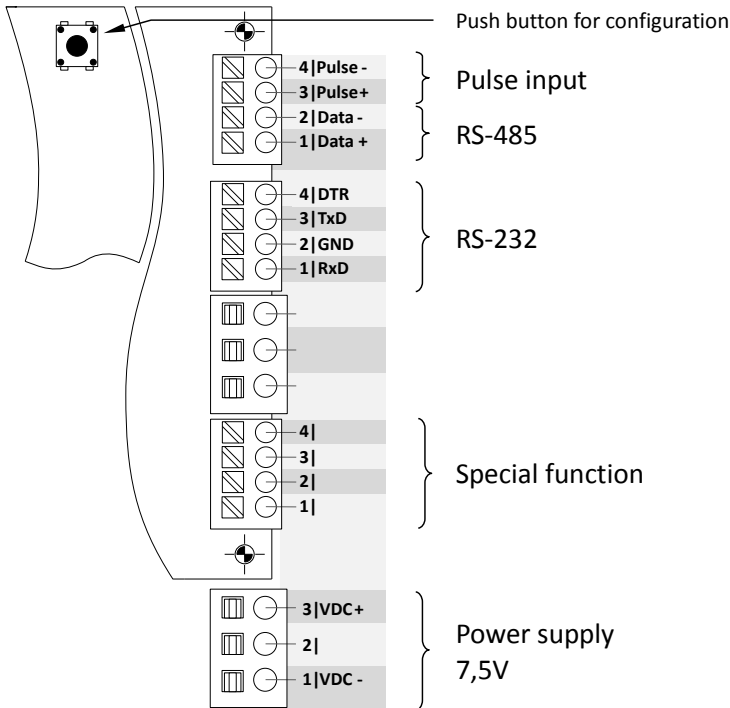


Figure 4.5: Connection scheme, adapter blocks GA-600

Special versions of the large displays include a specific, customized connection scheme. **This provided scheme replaces the connection scheme, shown on this page!** Please do necessarily preserve this customized scheme!

5 Configuration

5.1 Common hints for configuration

The display is pre-configured ex works, but it might be necessary to adjust it on site.

The pre-adjustment is found on the outside cover-sheet of this manual!

Following interfaces for the data input can be set:

- Pulse input
- RS-232 for supported data loggers*
- RS-485 for supported data loggers*

* For the large displays GA-330, GA-350, GA-500 only functional when ordered!

The configuration on site is done with the push-button for configuration. The menu is a single run menu, which is controlled by this push-button. The input determination depends on the endurance of the push. This means, the setting of the actual configurable value (short push) or the step to the next option or configurable value (long push).








In configuration mode, the first two displays show the menu! The first display shows which value you change; the second display shows the actual value.

For further information, please take a look at table [5.2](#) and the Section [5.3](#).

If the display starts up in normal operation mode, a segment-test for all displays follows; as the next step, the firmware version is shown in the first display. Then the display switches to normal operation.

A configuration can also be done by using the serial interface of a PC!

5.2 Configuration for data sources

-  Hold the push-button for configuration, while you switch on the displays power supply unit, (connect the power supply unit to the mains voltage) to enter the configuration menu:
-  „CFG“¹ occurs in the first display.
-  After releasing the push-button for configuration, the first display shows „SrC“¹.
-  The second display shows the config-number of the current data source. See table 5.1.
-  The data source can now be changed (Allocation in table 5.1) by a short push of the push-button for configuration. The data source is saved by a long push of the push-button for configuration.
-  Except for the data sources 0, 15 (pulse input) and 10 (SolarLog) the configuration is finished, the display does restart.
-  For the data sources 0, 15 (pulse input) and 10 (SolarLog) further settings are made. See section 6.1 and 6.7.

Important: The value of a digit does change after releasing the push-button for configuration!

¹ text might vary, depending on display type!

Numeric allocation of data sources

| Data source + hints | Protocol | Interface | Number | Section |
|--|-----------------|-----------|--------|---------------------|
| Danfoss ComLynx Weblogger (< 100 kW-peak) | HvG | RS-485 | 2 | 6.6 |
| Danfoss ComLynx Weblogger | HvG+ | RS-485 | 14 | 6.6 |
| Diehl Ako WebMaster (< 100 kW-peak) | HvG | RS-485 | 2 | 6.6 |
| Diehl Ako WebMaster | HvG+ | RS-485 | 14 | 6.6 |
| EMU 32.61 Generation meter | - | Pulse | 0 | 6.1 |
| Fronius Display Card/Box | RiCo | RS-232 | 4 | 6.4 |
| Generation meter with pulse output (potential free closing contact) Norm: Standard IEC 62053-31 | - | Pulse | 0 | 6.1 |
| Grotkasten Soldes ER3 | RiCo | RS-232 | 4 | |
| IBC ServeMaster Weblogger (< 100 kW-peak) | HvG | RS-485 | 2 | 6.6 |
| IBC ServeMaster Weblogger | HvG+ | RS-485 | 14 | 6.6 |
| IBC SolControl | - | Pulse | 0 | 6.1 |
| KACO Powador-proLOG | - | Pulse | 0 | 6.1 |
| Kostal Piko x.x (2000 pulses/kWh) | - | Pulse | 0 | 6.1 |
| Meteocontrol WEB'log | - | Pulse | 0 | 6.1 |
| Oelmaier LogPAC 60/100 | nn ² | RS-485 | 10 | 6.7 |
| | - | Pulse | 0 | 6.8 |
| Papendorf SOL.ConnectCenter (< 100 kW-peak) | HvG | RS-485 | 2 | 6.6 |
| Papendorf SOL.ConnectCenter | HvG+ | RS-485 | 14 | 6.6 |
| Power One PVI-AEC Basic/Pro/Eco | - | Pulse | 0 | 6.1 |
| Schüco Sunalyzer Web | RiCo | RS-485 | 7 | 6.5 |
| SMA WebBox via RiCo Ethernet-Adapter (< 100 kW-peak) | HvG | RS-485 | 2 | 6.2 |
| SMA WebBox via RiCo Ethernet-Adapter | RiCo | RS-485 | 7 | 6.2 |
| Solare Datensysteme SolarLog 500/800/1000 | nn ² | RS-485 | 10 | 6.7 |
| | - | Pulse | 0 | 6.8 |
| Solarworld Suntrol STL 400/800 | nn ² | RS-485 | 10 | 6.7 |
| | - | Pulse | 0 | 6.8 |
| Solutronic WR Master | RiCo | RS-232 | 9 | |
| Sputnik MaxWeb | Sputnik | RS-485 | 3 | 6.3 |
| Steca TarCom 01 data logger with aktive RS-232-Interface | nn ² | RS-232 | 11 | |
| Sunways Communicator | - | Pulse | 0 | 6.1 |

Table 5.1: Numeric allocation of data sources

The HvG-protocol is only valid for PV-plants with less than 100 kW-peak! For larger PV-plants either the HvG+ -protocol, or the RiCo-protocol must be chosen!

² protocol not named

| To enter the configuration mode: | | |
|--|---|--|
| Function | Action | Comment |
| Startup the display in configuration-mode: | Hold the push-button while the display's power supply is established. | The first line shows 'cfg' or 'config' for configuration mode. After the button is released the first line switches to 'src' or 'source' for data source, as the first menu-item. |
| When in configuration mode: | | |
| Function | Action | Comment |
| Increase the actual value: | Short time push: < 1 second | The increment follows after the button is released! Increases single digits or whole numbers, depending on the position in menu. After the maximum value, the minimum value is shown. |
| Confirm the actual value and proceed with the next step in the menu: | Long time push: > 1,5 seconds | A long time push of the push-button for configuration results in one of the following effects, depending on the position in the menu: - The configurable value switches one position to the left (e.g. Setup for total energy amount or pulse rate). - A switch to the next configurable option (e.g. switch between possible options). - The saving of all settings and the end of the configuration menu (after the setting of the last possible option). |

Table 5.2: Functions of the push-button for configuration

5.3 Structure of the configuration menu

The following pages show a graphical flow chart of the configuration menu. The second display is illustrated engaged.

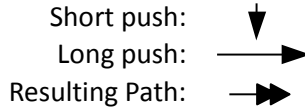


Figure 5.1: Legend of configuration menu

*Depending on the display type, the text might variate (e.g.: SourcE / Config / PuLS)

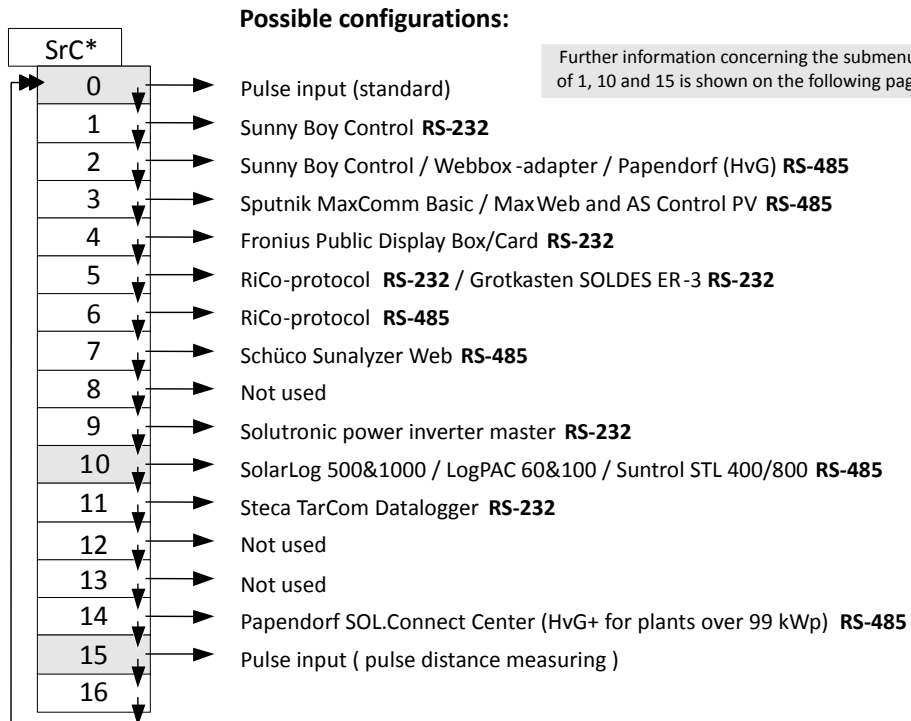


Figure 5.2: configuration menu

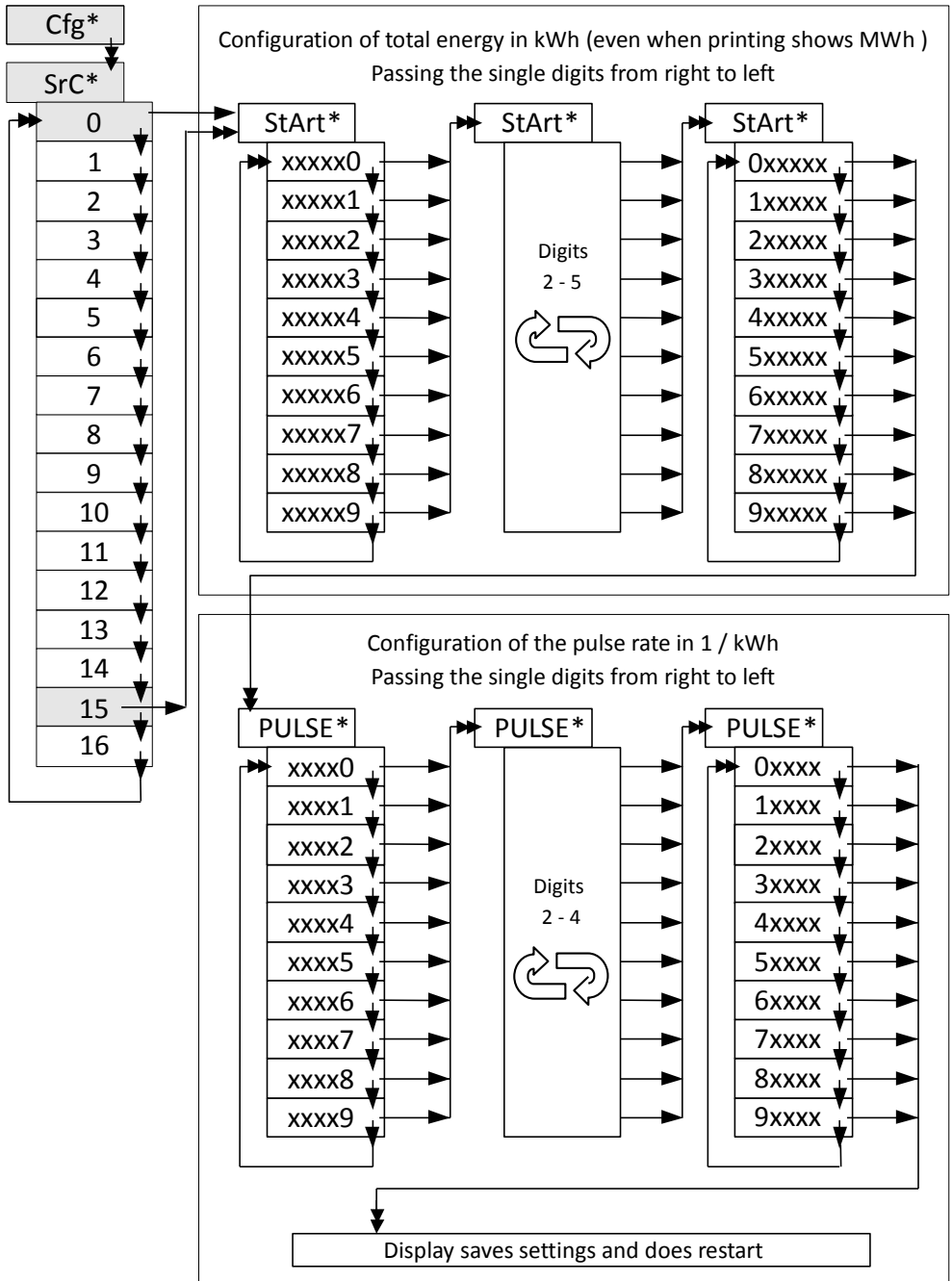


Figure 5.3: configuration menu, subsection pulse input

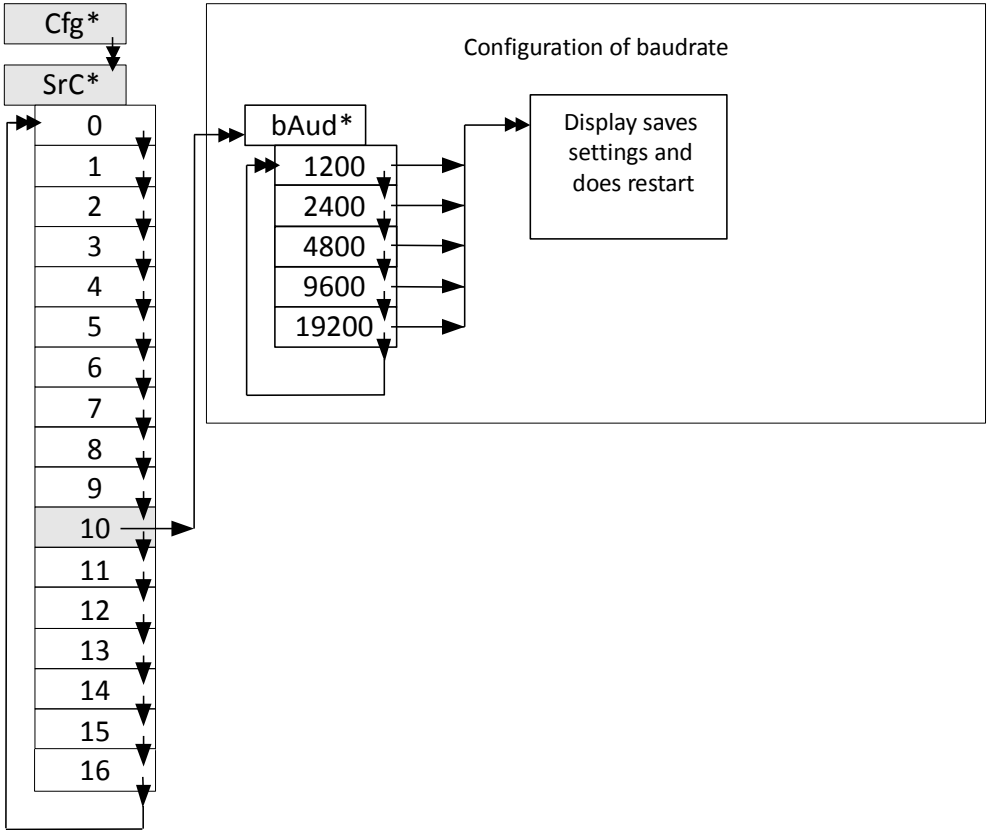


Figure 5.4: configuration menu, subsection Solarlog

6 Connection to the data source

The following pages show detailed information about configuration and connection scheme for the connection with several data sources. How the display is set to receive data from a specific data source, can be read in the chapter “configuration”. **If you receive a special version of the large display, do only regard the customized connection scheme!**

Hint: When possible, test the correct configuration and function of the display, before it is installed at it's final destination. The push-button for configuration is easy accessible and the display can be seen when the push-button is used.

6.1 Connection: electricity meter with pulse output







Interface

By using the pulse input, a very simple connection to all PV-plants, independent of the manufacturer of the components, is possible. The display is connected to the pulse-output of the electricity meter or data logger or power inverter. **The output must be a potential free closing contact; standard IEC 62053-31!** Possible devices are displayed in table 5.1.



The pulse rate must be adjusted to the one of the used power counter or data logger. The rate is set in n pulses/kWh (n only full numbers with the value from 1 to 10000). Please regard the point "Advanced" in this Section!

! Attention ! The direct connection to current controlled pulse outputs (S0) is NOT possible. A converter is available at RiCo.

Display configuration

-  Start the display in configuration mode: Hold the push-button for configuration and establish power supply
-  Choose data source 0 or 15 (see Advanced) with short pushes
-  Confirm the data source with a long push
-  Set the value for total energy (always in full kWh) by editing the single digits from right to left
-  Set the value for pulse-rate (see table 6.1) by editing the single digits from right to left
-  After the last digit is confirmed, the display restarts
⇒ The configuration is finished

Generation meter/data logger configuration

-  Adjust pulse-rate, if possible
-  Activate pulse output, if necessary

Connection

Pulse + of the LD \Leftrightarrow positive pulse output (plus) of the electricity meter

Pulse - of the LD \Leftrightarrow negative pulse output (minus) of the electricity meter

The large display is connected with pulse+ and pulse- to the pulse output of the data source. For the connection a shielded cable must be used (e.g. YSTY, LIYCY, CAT-7). The shield must be connected to VDC- of the large display only! The cabling length can be up to 100 m. The cross-section of the cable is irrelevant.

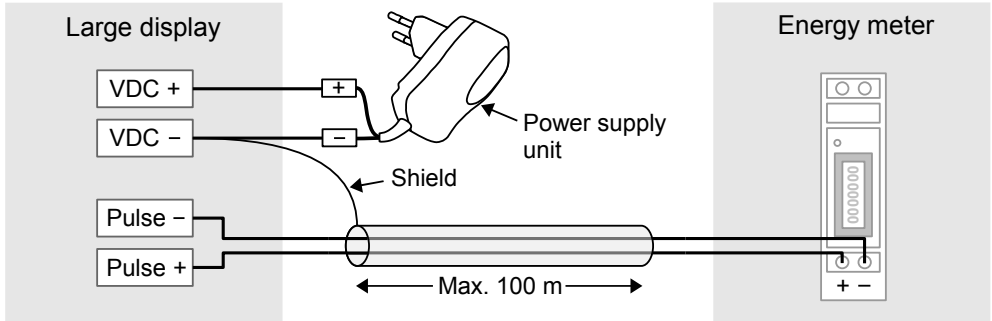


Figure 6.1: Connection scheme, electricity meter with pulse output

Hint: The choice of the pulse rate has a direct effect on the resolution of the actual power. The pulse rate can also be too high, so the display might not count all pulses correctly. For details, please read the point "Advanced".

Recommended values for the pulse rate

| Maximum power in kWp | Maximum pulse rate |
|----------------------|--------------------|
| < 9 | 4000 |
| < 18 | 2000 |
| < 36 | 1000 |
| < 45 | 800 |
| < 60 | 600 |
| < 90 | 400 |
| < 180 | 200 |
| < 360 | 100 |
| < 720 | 50 |
| < 1200 | 30 |
| < 1800 | 20 |
| < 3600 | 10 |

Table 6.1: pulse rate in relation to plant capacity

Advanced

Configuration

After the data source 0 or 15 is confirmed, the starting value for the total energy collected is set. The first display shows „start“¹. The value is always set in kWh (even when the display shows MWh as printed unit)! For configuration, all 6 digits are set separately, beginning with the digit to the right. The actual digit for configuration is indicated by its blinking appearance. After the designated digit is set, the value is confirmed by a long push of the push-button for configuration. The next digit is edited. After all 6 digits have been edited, the total energy collected has been set.

In the next step, the pulse rate is set! The first display shows „pulse“¹. The unit of the programmed pulse rate is: pulses / kWh. Only whole-number values can be set (1 to 10000)! For configuration, all 5 digits are set separately, beginning with the digit to the right. The actual digit for configuration is indicated by its blinking appearance. After the designated digit is set, the value is confirmed by a long push of the push-button for configuration. The next digit is edited. After all 5 digits have been edited, the pulse rate has been set. The display saves the settings and restarts.

¹ text might vary, depending on display type!

! Attention ! If the pulse rate is set too high, the display might not count all pulses correctly! This results in a limitation of the actual power below the real value, from a certain level of power output! Please check the chosen pulse rate with table 6.1 or “Calculation of the ideal pulse rate“.

Calculation of the ideal pulse rate

The usage of the pulse interface goes along with some limitations, which have to be considered at the choice of the pulse rate. The actual power is calculated by energy per time. Since the maximum output-rate and the maximum input-rate are limited by the hardware, the resolution of the actual power is also limited.

The recommended pulse rate in relation to the capacity of the PV-plant, is shown in table 6.1. If the recommended pulse rate is different for data source and large display, please always choose the minor value.

For data source 0 the time span for measuring is one minute. For data source 15, the time between two pulses is measured, which is recommended for little pulse rates. Depending on the technical kind of measuring, this method might be inappropriate, since the output of the pulses must be continuous!

! Attention ! The display can only process whole-numbered pulse rates! Regard this, when you choose current transformers for your electricity meter with pulse output! The effective pulse rate, resulting of the transformers factors and the pulse rate value of the electricity meter must be whole-numbered!

The ideal pulse rate is calculated as follows: The number of incoming pulses per second should be at a maximum of 10! This makes a total of 36000 pulses per hour. Divide this value through the maximum power output of your PV-plant, to get the maximum value of pulses / kWh for your plant. Round this value down, to the next straight whole-numbered value to get the ideal pulse rate for the configuration.

The formula for calculation is:

$$\text{ideal pulse rate} \left[\frac{1}{kWh} \right] = \frac{36000}{\text{maximum power output}[kWp] \cdot h}$$

If the calculated value is higher than the standard setting of your data source, you can just use the standard setting. If it is much higher, you should adjust it to the calculated setting. If the calculated value is lower than the standard, you have to adjust the pulse rate in any case! The maximum resolution of the actual power is 600 steps! Do also regard the maximum output frequency of your data source!

For data source 0 you can also calculate the smallest step of the resolution in watt. The formula is:

$$\text{res. actual power [W]} = \frac{60000}{\text{pulse rate } \left[\frac{1}{\text{kWh}} \right]}$$

Technical description The pulse output for the connection with the display must be a potential free closing contact! The minimum pulse-width for data source 0 must be 2 ms. The minimum pulse-width for data source 15 must be 20 ms. The pulse input can handle up to 10 - 12 pulses per second (depending on the pulse width). The supplied potential to the output is 7V - 12V (depending on display type), the maximum current is limited to 3 mA.

If the pulse rate is set too high, the display can not count all pulses correctly! If the pulse rate is too low, the resolution for actual power is little. By choosing data source 15, this effect can be minimized. When you choose current transformers for you electricity meter with pulse output, regard that the effective pulse rate, resulting of the transformers factors and the pulse rate value of the electricity meter, must be whole-numbered!

Selection of the data source, using the pulse input If you can't avoid a little pulse rate, you can decide, whether a switch to data source 15 makes sense. For data source 0, the resolution of the actual power is limited by the maximum count of pulses per minute. If you have less than 1 pulse per second it might be better to switch to data source 15. Precondition is that the pulses are sent continuously! The number of pulses per second is calculated as follows:

$$\frac{\text{pulses}}{s} = \frac{\text{maximum power output [kWp]} \cdot h \cdot \text{pulse rate } \left[\frac{1}{\text{kWh}} \right]}{3600s}$$




6.2 Connection: Ethernet Adapter (SMA WebBox) / RS-485

Interface

The RS-485 interface is ready for connection with the Ethernet Adapter for SMA WebBox. The RiCo Ethernet-Adapter is required for connection with a SMA WebBox! The cabling length can be up to 1000 m.

Detailed information for connection with the Ethernet-Adapter can be found in its installation manual.

Display configuration

-  Start the display in configuration mode: Hold the push-button for configuration and establish power supply
-  Choose data source 2 (PV-plant with less than 100 kW peak) or 7 (PV-plant with more than 100 kW peak) with short pushes
-  Confirm the data source with a long push ⇒ The configuration is finished

For PV plants with more than 100 kW peak, the Ethernet-Adapter has to be set to RiCo-protocol as well.

Connection

Data+ of the LD \iff Data+ (Pin 1) of the Ethernet-Adapter

Data- of the LD \iff Data- (Pin 3) of the Ethernet-Adapter

The large display is connected with Data+ and Data- to the RS-485 interface of the Ethernet-Adapter. For the connection a shielded cable must be used. The cabling length can be up to 1000 m. The shield must be connected to VDC- of the large display only! The cross-section of the cable is irrelevant.

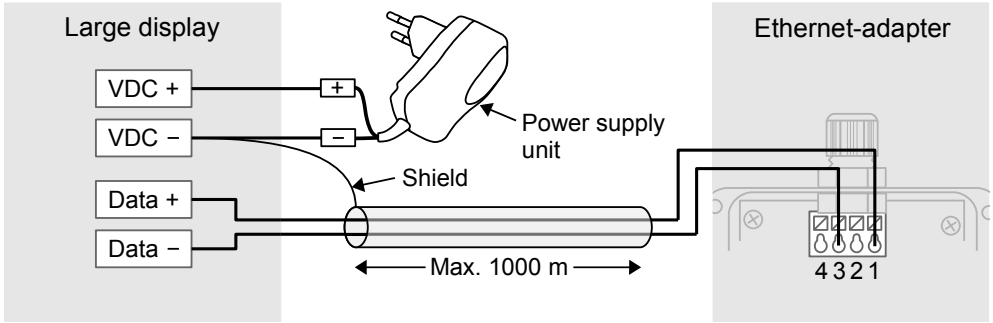





Figure 6.2: Connection scheme, Ethernet-Adapter for SMA WebBox

6.3 Connection: Sputnik MaxWeb / RS-485



Interface

The RS-485 interface is ready for connection with the MaxWeb for a maximum cabling length of 1000 m.

Display configuration

-  Start the display in configuration mode: Hold the push-button for configuration and establish power supply
-  Choose data source 3 with short pushes
-  Confirm the data source with a long push ⇒ The configuration is finished

MaxWeb configuration

-  The MaxWeb must be configured with the option MaxDisplay 1.0
-  For further questions regarding the configuration of the MaxWeb, please contact its manufacturer

Connection

Data+ of the LD \iff Bus A / Data+ of the RS-485 network

Data- of the LD \iff Bus B / Data- of the RS-485 network

Connect Data+ and Data- to the RS-485 network with the MaxWeb and the power inverters. For the connection a shielded cable must be used. The cross-section of the cable is irrelevant. The maximum cabling length is 1000 m.

Hint: When the large display is included into the RS-485 network as final device, a resistor for termination of $120\ \Omega$ is placed between Data+ and Data- . See also manual of MaxWeb.

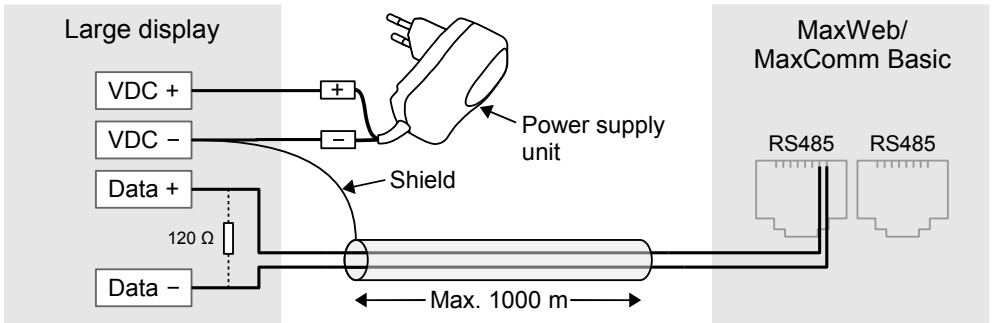


Figure 6.3: Connection scheme, Sputnik MaxWeb

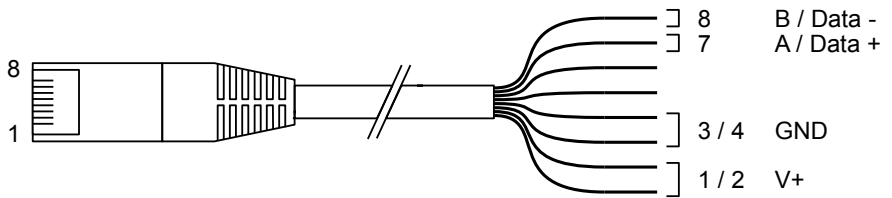


Figure 6.4: Cabling scheme, Sputnik CAT5 network cable

6.4 Connection: Fronius Display Card/Box / RS-232

Interface

The RS-232 interface is ready for connection with a Fronius Public Display Card/Box, for a maximum cabling length of 15 m.

Display configuration

- ☞ Start the display in configuration mode: Hold the push-button for configuration and establish power supply
- ☞ Choose data source 4 with short pushes
- ☞ Confirm the data source with a long push ⇒ The configuration is finished

Fronius IG System configuration

- ☞ Within the IG System, display type A must be chosen

Connection

- RxD of the LD ⇔ TxD (Pin 3) of the Fronius Display Card / Box
- GND of the LD ⇔ GND (Pin 5) of the Fronius Display Card / Box
- TxD of the LD ⇔ RxD (Pin 2) of the Fronius Display Card / Box

The large display is connected with RxD, GND, TxD to the RS-232 output of the Fronius Display Card/Box. For the connection to the Fronius Display Card/Box, a shielded cable must be used. The maximum cabling length is 15 m. The shield must be connected to VDC- of the LD only! The cross-section of the cable is irrelevant.

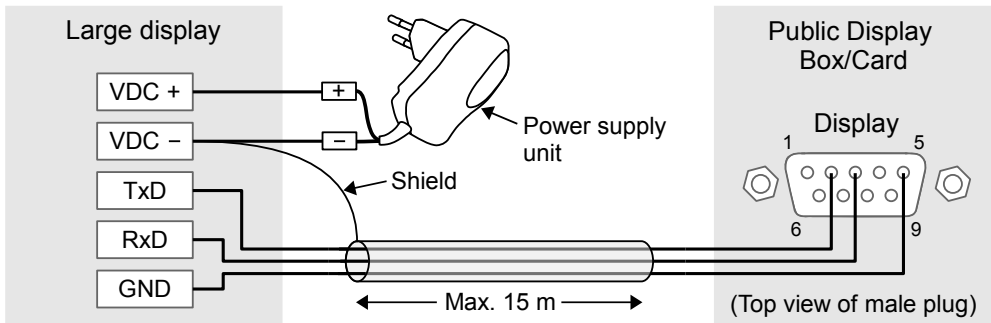


Figure 6.5: Connection scheme, Fronius Public Display Card/Box

! Attention ! For PV-Plants with more than 100 kWp it is necessary to set a plant-factor at the IG-system and reconfigure the display!

6.5 Connection: Schüco Sunalyzer Web / RS-485

Interface

The RS-485 interface is ready for connection with a Schüco Sunalyzer Web, for a maximum cabling length of 1000 m.

Display configuration

- ☞ Start the display in configuration mode: Hold the push-button for configuration and establish power supply
- ☞ Choose data source 7 with short pushes
- ☞ Confirm the data source with a long push ⇒ The configuration is finished

Connection

Data+ of the LD ↔ Display A of the Sunalyzer Web

Data- of the LD ↔ Display B of the Sunalyzer Web

The large display is connected with Data+ and Data- to the display output of the Sunalyzer Web. For the connection a shielded cable must be used. The maximum cabling length is 1000 m. The shield must be connected to VDC- of the LD only! The cross-section of the cable is irrelevant.

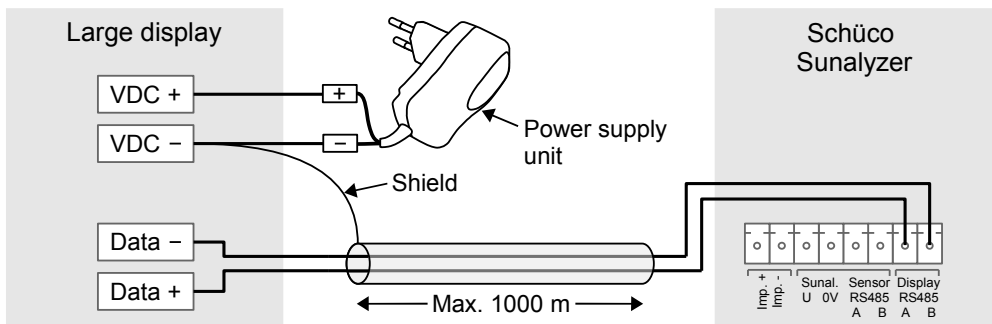





Figure 6.6: Connection scheme, Schüco Sunalyzer Web

6.6 Connection: Papendorf SOL. Connect Center / RS-485

Interface

The RS-485 interface is ready for connection with a Papendorf SOL. Connect Center, for a maximum cabling length of 1000 m.

Display configuration

-  Start the display in configuration mode: Hold the push-button for configuration and establish power supply
-  Choose data source 2 (HvG) or 14 (HvG+ for PV-plants with more than 100 kW peak) with short pushes
-  Confirm the data source with a long push \Rightarrow The configuration is finished

Papendorf SOL. Connect Center configuration

-  The display output must be activated, using HvG-, oder the HvG+ - protocol.

Connection

Data+ of the LD \iff A, RS-485,COM3 of the SOL. Connect Center

Data- of the LD \iff B, RS-485,COM3 of the SOL. Connect Center

The large display is connected with Data+ and Data- to the display output of the SOL. Connect Center. For the connection a shielded cable must be used. The maximum cabling length is 1000 m. The shield must be connected to VDC- of the LD only! The cross-section of the cable is irrelevant.

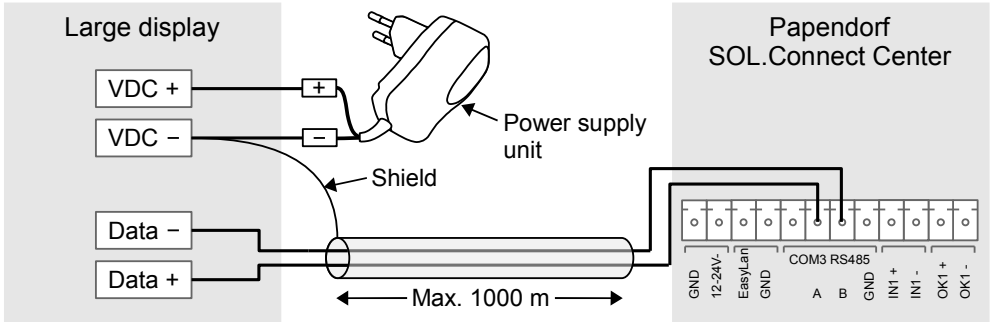


Figure 6.7: Connection scheme, SOL. Connect Center

6.7 Connection: SolarLog / RS-485






Interface

The RS-485 interface is ready for connection with a SolarLog data logger, for a maximum of 1000 m total cabling length. In many cases the display can be connected on the same bus with the inverters.

A connection to the pulse output of the SolarLog 500/1000 is also possible (see Section 6.8).

! Attention ! The large display can NOT operate on the same RS-485-bus with all kind of power inverters! All parameters for communication must be the same! Please take a look at table 6.2!

Display configuration

-  Start the display in configuration mode: Hold the push-button for configuration and establish power supply
-  Choose data source 10 with short pushes
-  Confirm the data source with a long push
-  Choose the baud rate (see table 6.2) with short pushes
-  Confirm the baud rate with a long push ⇒ The configuration is finished

SolarLog configuration

-  The display output must be activated as type RiCo on bus A or bus B

Connection

Data+ of the LD \iff RS-485 Pin 1 of the SolarLog

Data- of the LD \iff RS-485 Pin 4 of the SolarLog

The large display is connected with Data+ and Data- in line to the RS-485 bus of the SolarLog and the power inverters, respective to the bus topology. Data+ and Data- of the display are connected parallel to Data+ and Data- of the SolarLog and the power inverters. For the connection a shielded cable must be used. The maximum cabling length is 1000 m. Only when the display is operating alone on the bus, the shield is connected to VDC- of the LD only! The cross-section of the cable is irrelevant.

Hint: When the large display is included into the RS-485 network as final device, a resistor for termination of 120 Ω may be placed between Data+ and Data- . See also manual of the SolarLog.

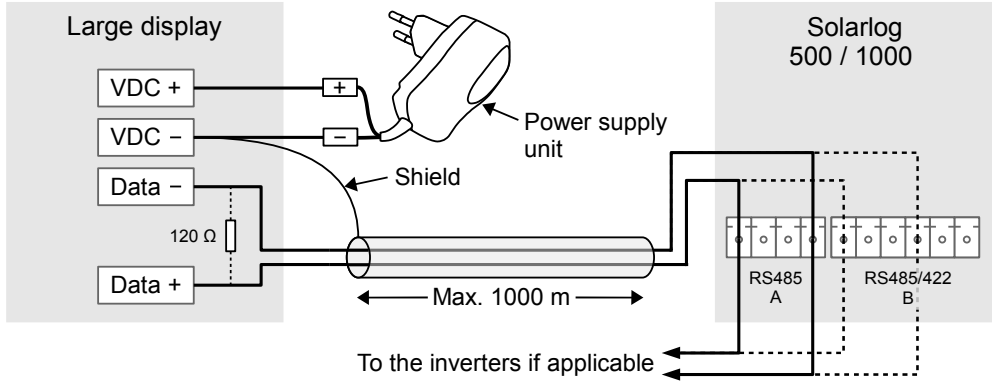


Figure 6.8: Connection scheme, SolarLog

Operation of the large display on the same bus:

| Manufacturer of the power-inverter | Baud rate of the large display |
|--|--------------------------------|
| Danfoss / Delta / Diehl Ako / Kostal / Kyocera / Power One / Q3 / Solarmax / Solarstocc / Solutronic / Sunplug | 19200 |
| Alphasol / Aten / Carlo gavazzi / Effekta / Ehe / EKO Energy / GinLong / Europa-Solar / Ever-Solar / Evoco / Growatt / Hyundai / IDS / Ingeteam / KACO / M&T Sensor / Mastervolt / Motech / Oelmaier / Pairan / Powercom / Salicru EQXLV / Schüco / Siel/Siac Socomec / Sungrow / Sunways / Sustainable Energy / Vaillant / Winaico / Zentralsolar | 9600 |
| SMA | 1200 |

ATTENTION: Operation of the large display only on unassigned bus (Only possible with SolarLog 800/1000)!

| Manufacturer of the power-inverter | Baud rate of the large display |
|--|--------------------------------|
| Fronius, Refusol, Mitsubishi, Santerno | 9600 |
| ... for further manufacturers, please ask Solare Datensysteme! | |

Table 6.2: Baud rate of the large display, depending on the power inverters manufacturer and operation mode

! Attention ! For connection on the unassigned RS-485 Bus, it might be necessary to set a power inverters manufacturer-type, to activate the Bus. For example choose KACO, to activate the RS-485 Bus with 9600 baud. The automatic search on the Bus is not necessary.

Advanced

When the communication on the same bus is not possible, the unassigned RS-485-bus of the the SolarLog 800 or SolarLog 1000 must be used. When the display is used on the unassigned RS-485-bus, the baud rate is always 9600! Please regard table [6.2](#).

You can also use the pulse-output of the SolarLog 500, SolarLog 800 or SolarLog 1000 (see Section [6.8](#)). !

6.8 Connection: SolarLog / Pulse



Interface

The pulse input is ready for use with a SolarLog 500/800/1000 data logger. The maximum cabling length is 100 m.

Display configuration

The configuration is adequate to Section 6.1 and table 6.1.

SolarLog configuration

-  Activate the pulse output
-  Adjust the pulse rate

Connection

Pulse+ of the LD \iff S0_ In/Out Pin 5 of the SolarLog

Pulse- of the LD \iff S0_ In/Out Pin 6 of the SolarLog

The large display is connected with pulse+ and pulse- to the pulse output of the SolarLog. For the connection a shielded cable must be used (e.g. YSTY, LIYCY, CAT-7). The shield must be connected to VDC- of the large display only! The cabling length can be up to 100 m. The cross-section of the cable is irrelevant.

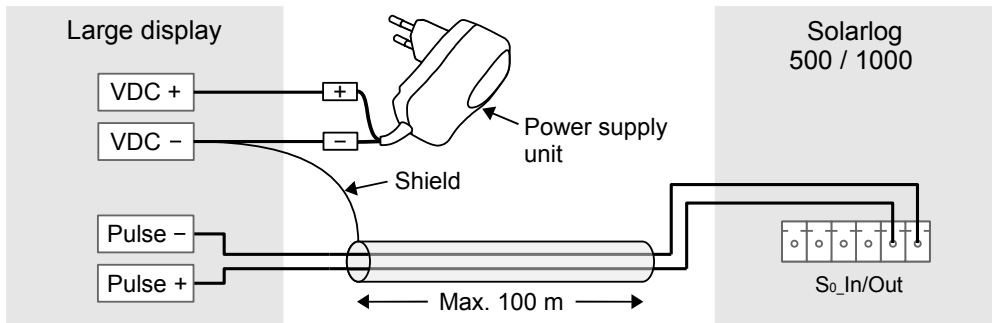


Figure 6.9: Connection scheme, SolarLog, pulse

! Attention ! Please regard further hints from the section 6.1 for the choice of the pulse rate!

7 Technical data

| | |
|---|--|
| Number of shown values | depending on order (Standard is mostly 3 values) |
| Display type: 7-segment-LED-display, hyper bright Color: red | GA-300, GA-310, GA-330, GA-1100 GA-1000-series with digit height 20mm, 25mm, 45mm, 57mm, 100mm |
| Display type: Single-LED-display, hyper bright Color: red, amber, orange | GA-600, GA-1200, GA-1000-series with digit height 27mm, 58mm, 85mm, 135mm, 200mm, 300mm |
| Display type: Segment-LCD-display, LCD black on silver background or yellow with back-light | GA-210, GA-350, GA-500, GA-2100, GA-2000-series with digit height 25mm, 50mm, 60mm, 100mm |
| Dimensions of housing width x height x depth GA-1000-series GA-2000-series | Depending on order approx. 700 x 500 x 56 or 1000 x 700 x 56 |
| GA-330, GA-350 | approx. 400 x 300 x 40 |
| GA-310, GA-500, GA-600 | approx. 500 x 400 x 45 |
| GA-1100, GA-2100 | approx. 800 x 600 x 45 |
| GA-1200, special orders | approx. 1000 x 700 x 45 |
| Housing material (Standard) GA-2000-series GA-1000-series | Aluminum powder coated, front- and back-plate acrylic glass or composite slab |
| Housing material (glass display) GA-310, GA-500, GA-2100 | 5 mm ESG-glass, ABS-plastic-housing |
| Housing material (glass display) GA-1100 | 5 mm ESG-Glas, Aluminum-housing, front- and back-plate acrylic glass or composite slab |
| Indoor-use | All displays |
| Outdoor use | GA-500, GA-2100, GA-1000-series und GA-2000-series when option 'Housing for outdoor use' was ordered |
| Temperature of operation | + 5 ... + 40 °C (- 20 ... + 60 °C for outdoor displays) |
| Storage- and transport-temperature | - 20 ... + 60 °C |
| Inputs, interfaces (Depending on accomplishment!) | - Pulse input (for potential-free closing contact, minimum pulse width: 2 ms) - RS-232 - RS-485 |
| continued on next page ... | |

| | |
|--|---|
| ... continuation | |
| Supported data sources (Depending on accomplishment!) | <ul style="list-style-type: none"> - Pulse output with potential free closing contact - SMA WebBox via Ethernet/RS-485 Converter - Fronius DisplayCard/Box RS-232 - Sputnik MaxWeb RS-485 - Schüco Sunalyzer Web RS-485 - SolarLog RS-485 - further on request |
| NEVER CONNECT THE LARGE DISPLAY DIRECTLY TO THE MAINS VOLTAGE OR POWER SUPPLIES WITH MORE THAN 12 VDC*! DANGER, DESTRUCTION or FIRE ARE POSSIBLE! | |
| *(up to 24 VDC only for special orders) | |
| Power supply (Depending on accomplishment!) | External power supply unit for wall mount: Input: 100-240 VAC Output: 7,5 ... 12 VDC depending on display type (see display label) |
| Warranty | 2 Years |
| Norms | CE, EN 61326-1 |

Subject to change without prior notice.

Manufacturer:

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