

Manual for Large displays

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Please read before use!

This manual belongs to the product. It contains important information for installation and handling of the large display. Please regard this fact, if 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.

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

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!

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 at special order)

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 its intended manner.

All trademarks referred to in this document are the property of their respective owners.

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 customer's 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 installing 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 (first inner page 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 chapter “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 (energy meter or data logger)! This can be done with the help of the adhesive envelope!

Hint If possible, test the correct configuration and function of the display, before it is installed at its final destination. The push button for configuration is easy accessible and the display can be seen if 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 depending on the 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!

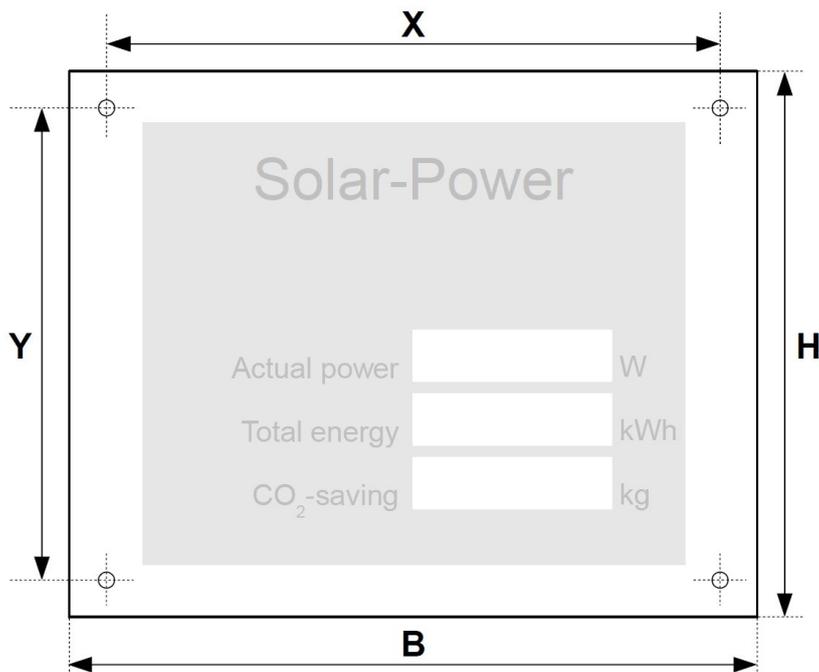


Figure 3.1: Outside dimensions and drilling dimensions glass displays

The distance, from the center of each mounting hole to the edge of the glass is 27 mm.

The drilling dimensions **X / Y** in relation to the glass dimensions **B / H**

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

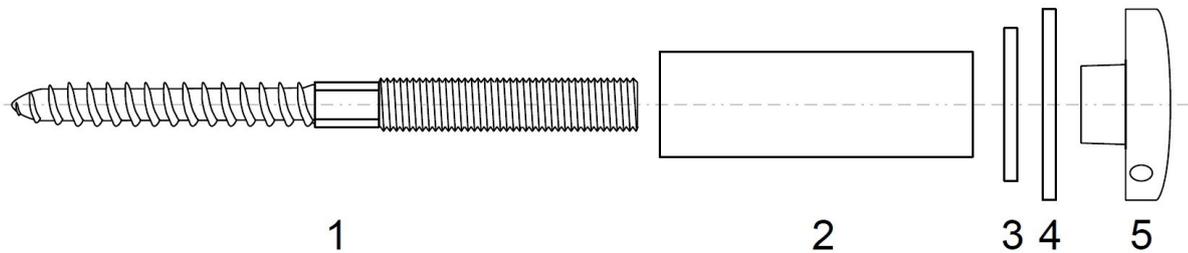


Figure 3.2: Mounting material of the glass display

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.

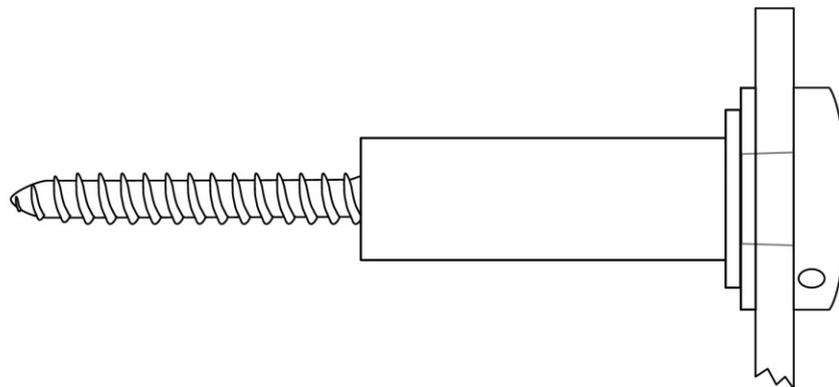


Figure 3.3: Mounting of the glass display

! Attention ! No warranty in case of broken glass!

3.2.1 Water tightness 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 back plate 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 Water tightness 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 back plate 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 back plate 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)

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 / Y**, depending on the housing type and dimensions **B / H**, are:

Drilling dimensions, frame-system 56 mm

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

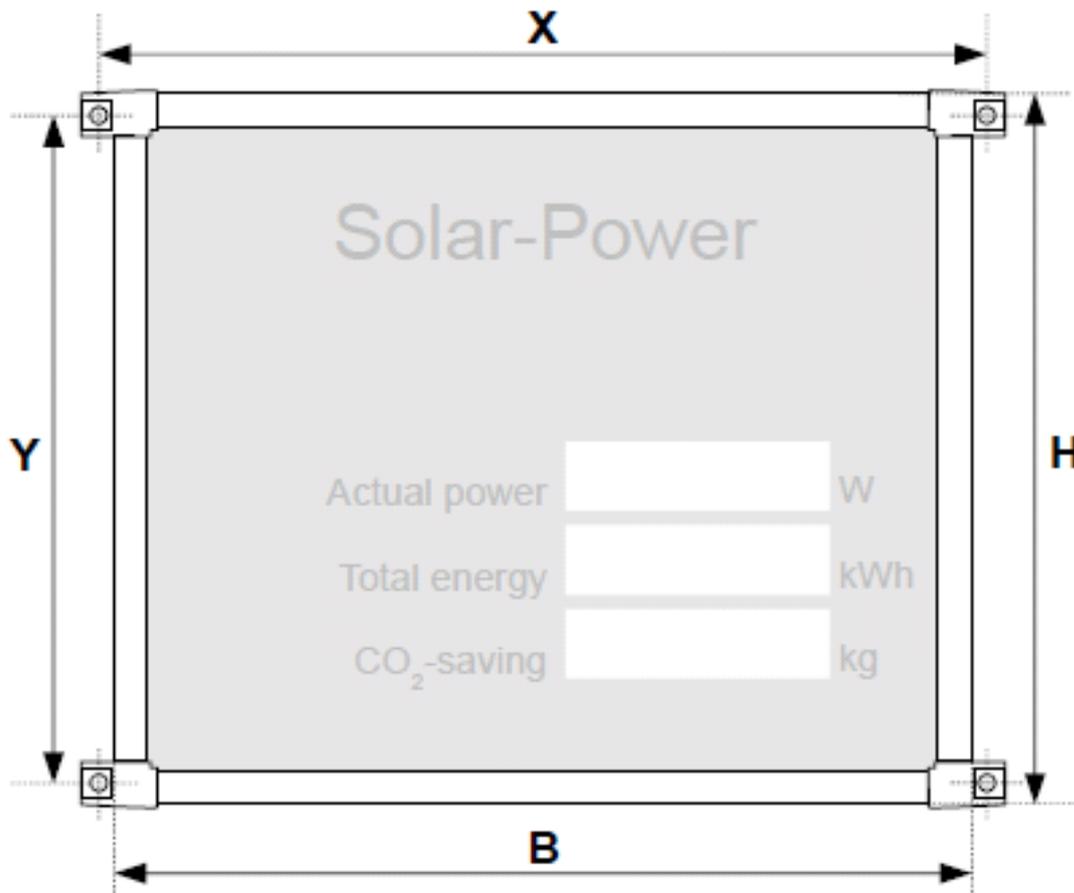


Figure 3.4: Drilling dimensions, frame-system 56 mm

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

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

4 Connectors pin assignment of the large displays

4.1 General description of the connection

At the following pages you will find the most common pin assignments 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 clamp connectors or with socket connectors.

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.

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 requirement, before powering up the display.

Hint If possible, test the correct configuration and function of the display, before it is installed at its final destination. The push button for configuration is easy accessible and the display can be seen if the push button is used.

4.2 Pin assignment luster terminal GA-1000 series, GA-1100, GA-2000 series

At standard configuration the GA-1000-series and GA-2000-series are equipped with this cabling scheme

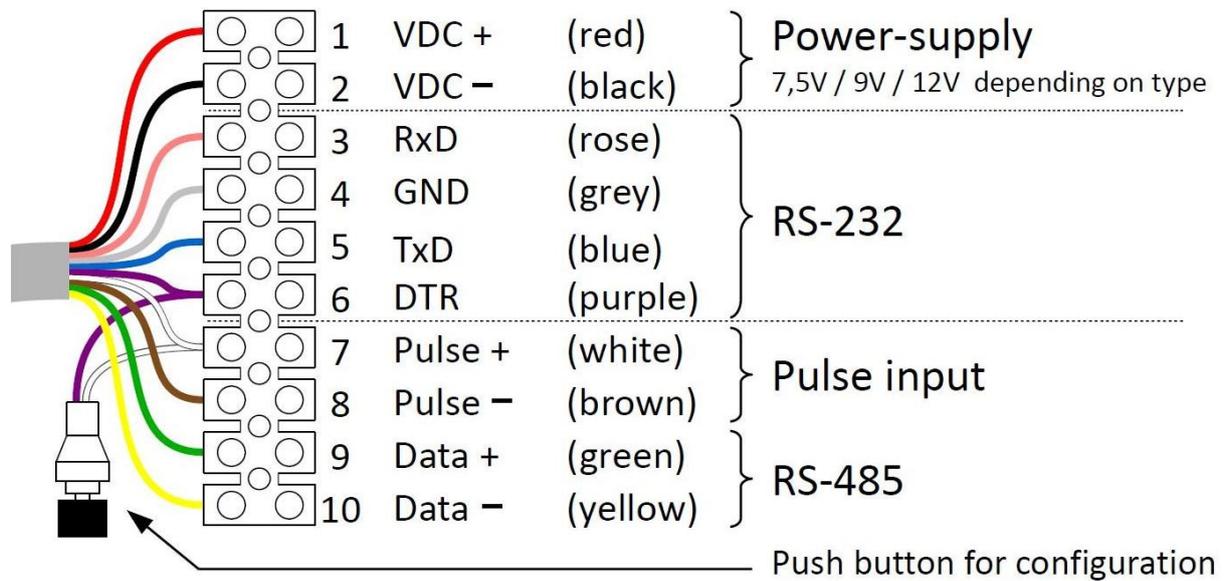


Figure 4.2: Luster clamp terminal

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 Pin assignment board clamp connectors GA-300, GA-310, GA-330, GA-1200, GA-2100, Vitrine version

Please avoid unnecessary force to the electronic board while connecting the cable. Hereby the board 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 board from the backside, if possible, to reduce the bending of the board to a minimum.

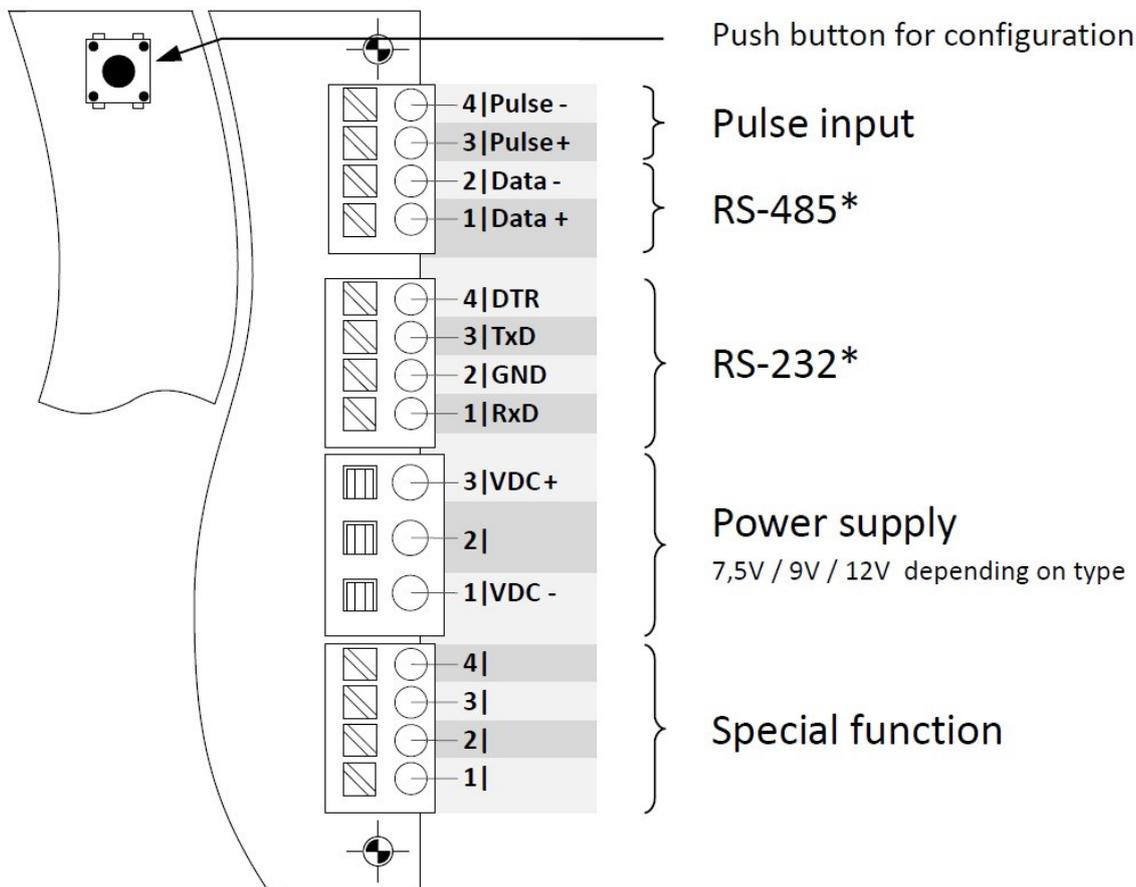


Figure 4.3: Connector clamps general

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 countersunk 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, if 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 board! 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 board! Please regard the Label with VDC+ and VDC- !

4.4 Pin assignment 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, if the plug connectors are connected to the electronic board!

Fix the cables to the plug connectors, as shown in figure 4.4.

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

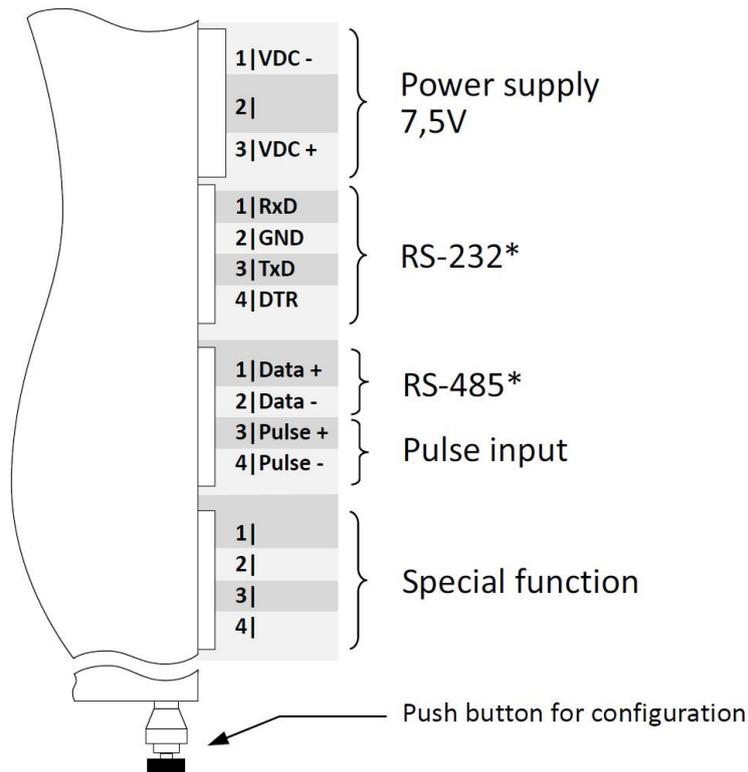


Figure 4.4: Connector plugs GA-350

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, if the option was ordered with the display!

4.5 Pin assignment GA-500

Please avoid unnecessary force to the electronic board, while connecting the cable. Hereby the board 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 board from the backside, if possible, to reduce the bending of the board to a minimum.

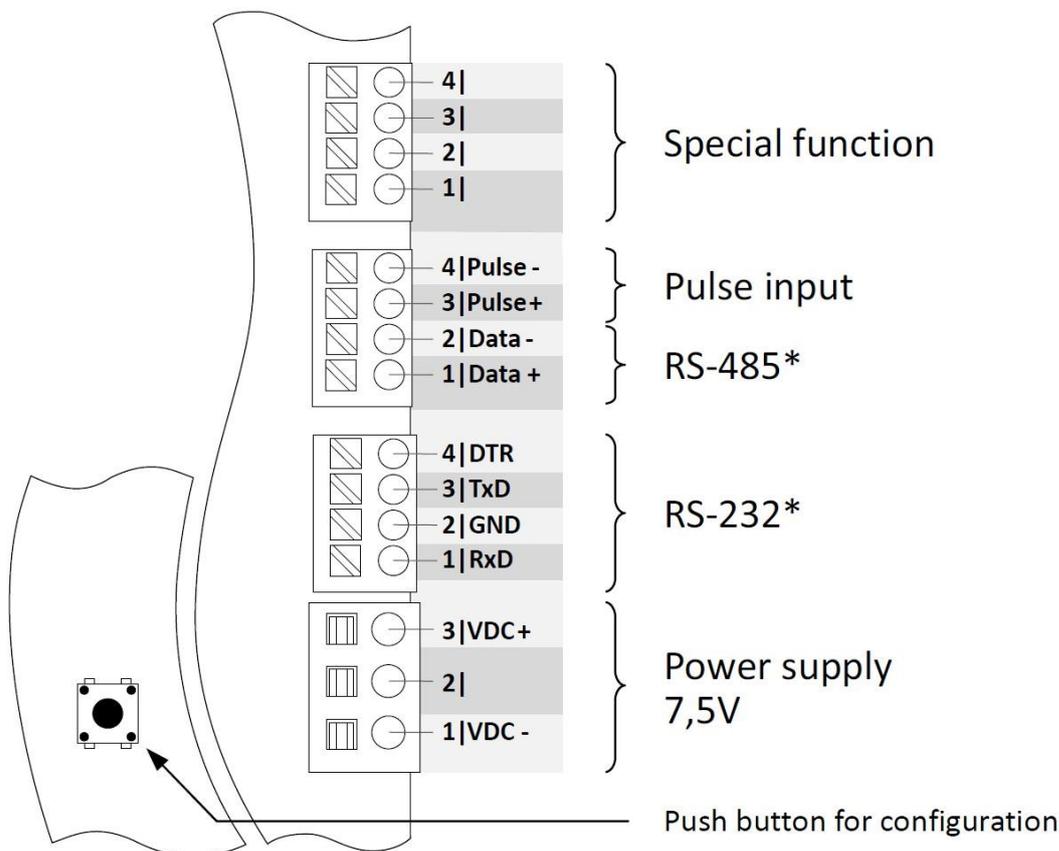


Figure 4.5: Connector clamps GA-500

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, if the option was ordered with the display

4.6 Pin assignment GA-600

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

Please avoid unnecessary force to the electronic boards, while connecting the cable. Hereby the boards 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 boards from the backside, if possible, to reduce the bending of the boards to a minimum.

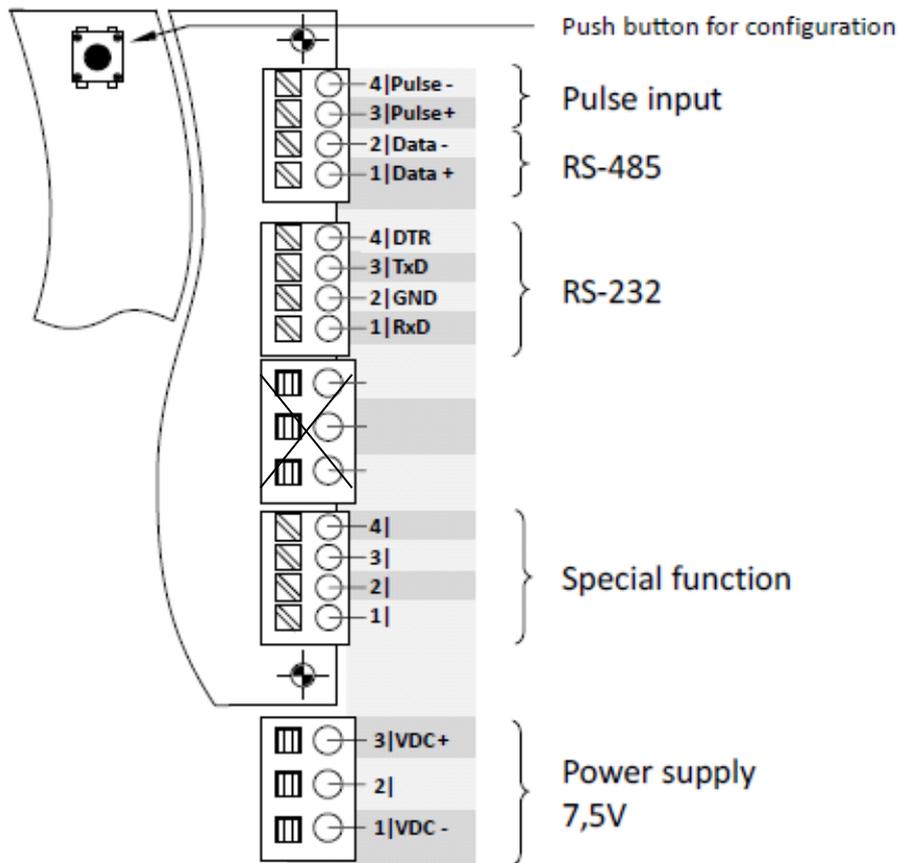


Figure 4.6: Connector clamps GA-600

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!

The following interfaces are available for data acquisition:

- Pulse input
- RS-232 for supported data loggers, see table 5.1*
- RS-485 for supported data loggers, see table 5.1*

* For the large displays GA-330, GA-350, GA-500 only functional if 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:

- Short time push (< 1 second): Changes the actual configurable value
- Long time push (> 1.5 second): Step to the next option or save the value

In configuration mode the first two displays lines shows 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.

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.

5.2 Configuration of 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“ or „ConFiG“* occurs in the first display line.
- After releasing the push button, the first display shows „SrC“ or „Source“*
- The second display shows the number of the current data source. See table 5.1.
- The data source can now be changed by a short push of the push button. For the allocation of a specific number to the data source see table 5.1. The data source is saved by a long push of the push button.
- Depending on the selected data source further setting options appear. These are explained at the corresponding connection description of the specific data source.

Important The value of a digit does change after releasing the push button!

* Text might variate, depending on display type!

Numeric allocation of data sources

Number	Data source	Additional setting options	Interface	Chapter
0	Energy meter/Data logger/Inverter with pulse output (Time span measurement)	Starting value total energy Pulse rate	Pulse	6.1
1	SMA Sunny Boy Control	-	RS-232	o. r.*
2	SMA Sunny Boy Control	-	RS-485	o. r.*
3	Sputnik Max Web, Max Comm Basic enerserve e.manager nD AS Solar Energy Master, AS Control	-	RS-485	o. r.*
4	Fronius DisplayCard Grotkasten Soldes ER3	-	RS-232	o. r.*
5	RiCo Protocol	Baud rate	RS-232	o. r.*
6	RiCo Protocol	Baud rate	RS-485	o. r.*
7	RiCo Ethernet/RS-485 converter (all versions) Smart1 Data logger Meier NT ADL-MXS Schüco Sunalyzer Skytron data logger Gilltec CV485	-	RS-485	6.3
8	ABB Power One Aurora PVI inverter (1x)	-	RS-485	o. r.*
9	Solutronic Solplus inverter (Master) Solutronic Solcombox	-	RS-232	o. r.*
10	Solare Datensysteme Solar-Log (Base) Plexlog PL40/100/500+ Ecodata PowerDog Solarworld Suntrol STL 400/800 Oelmaier LogPAC 60/100	Baud rate	RS-485	6.2
14	Papendorf SOL.Connect Center Diehl Ako WebMaster (until 2012) Danfoss ComLynx Weblogger (old version) IBC ServeMaster Weblogger (old version)	-	RS-485	o. r.*
15	Energy meter/Data logger/Inverter with pulse output (Pulse gap measurement)	Starting value total energy Pulse rate	Pulse	6.1
17	Circutor CVM-MINI power analyzer	Starting value total energy	RS-485	o. r.*
18	Siemens Sinvert inverter REFUsol inverter	Baud rate	RS-485	o. r.*
19	Kostal inverter (old series < UI5)	-	RS-485	o. r.*
20	SolarEdge inverter	Baud rate #1 address inverter inverter count	RS-485	6.4
21	Large display as ModBus RTU slave be4energy be4trade	Baud rate	RS-485	o. r.*
22	Janitza UMG 103, 104, 604	Starting value total energy	RS-485	o. r.*
24	Socomec DIRIS A14	Starting value total energy	RS-485	o. r.*
25	Kostal inverter (PIKO IQ, PIKO 36 EPC, Plenticore)	Inverter count	RS-485	6.5

Table 5.1: Numeric allocation of data sources

* Connection descriptions are available from the manufacturer on request

Enter the configuration mode		
Function	Action	Comment
Starts up 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 first line switches to 'Src' or 'Source' for data source, as the first menu item.

If 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 digit 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 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

6 Connection to the data source

At the following pages you will find detailed connection diagrams for the most common current data sources. The required configuration is also given. How the large display is set to the appropriate data source can be found in chapter 5.

Connection descriptions for data sources not included in this manual or for older or obsolete data sources are available on request.

If you receive a special version of the large display, do only regard the customized connection scheme!

Hint If possible, test the correct configuration and function of the display, before it is installed at its final destination. The push button for configuration is easy accessible and the display can be seen if the push button is used.

! 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 labelling of the single connectors!

6.1 Connection to energy meter/data logger/inverter 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 energy meter/data logger/inverter.

The output must be a potential free closing contact; standard IEC 62053-31!

The pulse rate must be adjusted to the one of the used energy meter or pulse source. The rate is set in **n** pulses/kWh (**n** integer number with the value from 1 to 99999). Please regard the point "Advanced" in this chapter!

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

Display configuration

- Hold the push button for configuration and establish power supply
- Choose **data source 0** or **15** (SrC) with short pushes
- Confirm the data source with a long push
- Set the value for **total energy** (Strt) by editing the single digits from right to left
- Set the value for **pulse rate** (PULS) by editing the single digits from right to left
- After the last digit is confirmed with a long push, the display restarts. The configuration is finished

Energy meter/data logger/inverter configuration

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

Connection

Pulse+ of the LD ↔ **positive pulse output (+)** of the energy meter/data logger/inverter

Pulse- of the LD ↔ **negative pulse output (-)** of the energy meter/data logger/inverter

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, CAT5/7). 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.

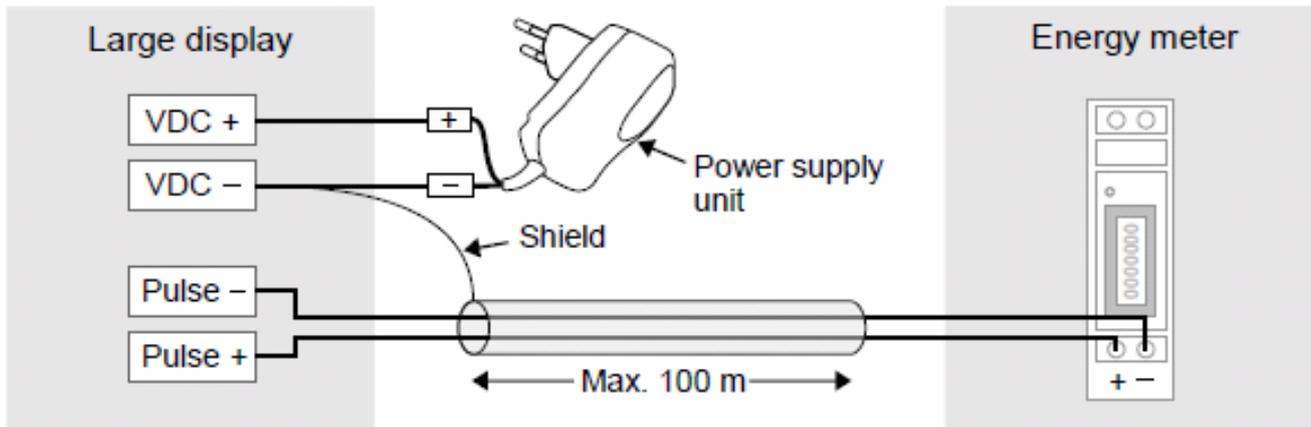


Figure 6.1: Connection scheme example energy meter with pulse output

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 section "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 maximum power

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 „Strt“ or „StArt“*. The value is always set in kWh (even if 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. The next digit is edited. After all 6 digits have been edited, the total energy collected has been set after another long button push.

In the next step, the pulse rate is set. The first display shows „PULS“ or „PULSE“*. The unit of the pulse rate is pulses/kWh. Only integer values can be set (1 to 99999)! 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. The next digit is edited. After all 5 digits have been edited, the pulse rate has been set after another long button push. The display saves the settings and restarts.

* Text might variant, 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 integer pulse rates! Regard this, if you choose current transformers for your energy meter with pulse output! The effective pulse rate, resulting of the transformers factors and the pulse rate value of the energy meter must be an integer number!

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 integer 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:

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

Selection of the data source using the pulse input

If the pulse rate is set too high, the display can't 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. If you choose current transformers for you energy 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 an integer number!

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:

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

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 on the output is 7..12VDC (depending on display type), the maximum current is limited to 3 mA.

6.2 Connection to Solar-Log (Base) via RS-485

Interface

The RS-485 interface is ready for connection with a Solar-Log 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.

! Attention ! The large display can NOT operate on the same RS-485-bus with all kind of inverters! All parameters for communication must be the same!

Display configuration

- Hold the push button for configuration and establish power supply
- Choose **data source 10** (Src) with short pushes
- Confirm the data source with a long push
- Choose the necessary **baud rate** (bAud) with short pushes
- Confirm the baud rate with a long push, the display restarts. The configuration is finished

Solar-Log configuration

- At menu '**LARGE DISPLAY**' of the Solar-Log the display output must be activated (Type RiCo Electronic) at the corresponding RS-485 interface

Connection

Data+ of the LD ↔ **RS-485 Data+** of the Solar-Log (Base)

Data- of the LD ↔ **RS-485 Data-** of the Solar-Log (Base)

The large display is connected with Data+ and Data- in line to the RS-485 bus of the Solar-Log and the inverters, respective to the bus topology. Data+ and Data- of the display are connected in series to Data+ and Data- of the Solar-Log™ and the inverters. For the connection a shielded cable must be used. The maximum total cabling length is 1000 m. Only if 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.

If the large display is included into the RS-485 bus as final device a resistor for termination of 120 Ω may be placed between Data+ and Data-.

It is recommended generally to connect the display to an unused RS-485 bus to the Solar-Log if possible.

If the display is connected to an unused RS-485 bus without inverters the baud rate is always 9600.

If the display is in series with the inverters at the same bus the baud rate must be set to the same baud rate as the Solar-Log communicates with the inverters, additionally take care that the other interface parameters are identically: 8 data bits, 1 stop bit, no parity (8N1).

If the interface parameters are not compatible the display must be connected to an unused RS-485 bus of the Solar-Log.

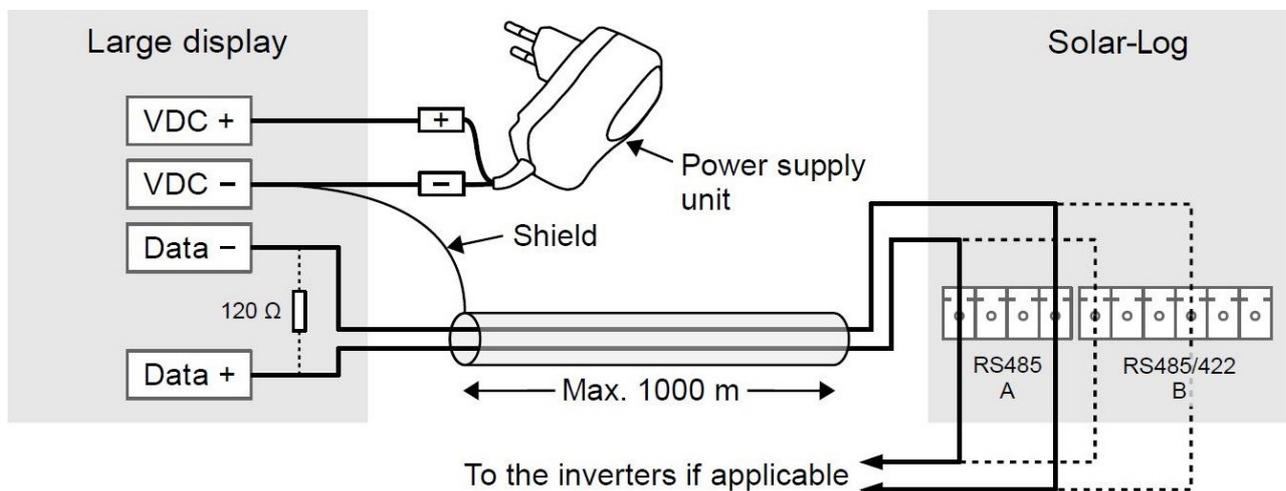


Figure 6.2: Connection scheme Solar-Log

6.3 Connection to Ethernet/RS-485 converter

Important

This description applies to all available variants of the Ethernet/RS-485 converter. Only the connection between converter and large display is described here. For detailed information on connecting the converter to the data source and how to configure the converter please refer to the manual of the converter.

Interface

The RS-485 interface is ready for connection to an Ethernet/RS-485 converter. The cabling length can be up to 1000 m.

Display configuration

- Hold the push button for configuration and establish power supply
- Choose **data source 7** (SrC) with short pushes
- Confirm the data source with a long push, the display restarts. The configuration is finished

Converter configuration

- The configuration of the Ethernet/RS-485 converter is described at the manual of the converter

Connection

Data+ of the LD ↔ **Data+** (Pin 1) of the Ethernet/RS-485 converter

Data- of the LD ↔ **Data-** (Pin 3) of the Ethernet/RS-485 converter

The large display is connected with Data+ and Data- to the RS-485 interface of the Ethernet/RS-485 converter. 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.

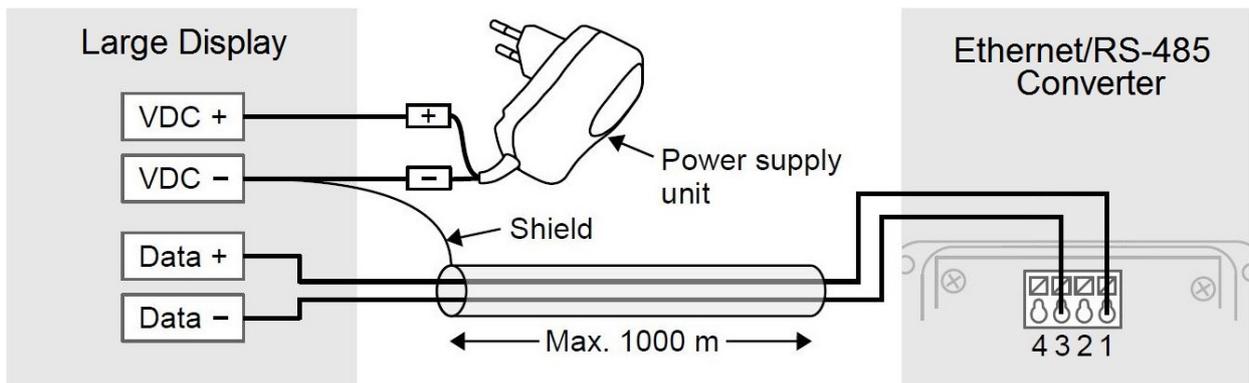


Figure 6.3: Connection scheme Ethernet/RS-485 converter

6.4 Connection to SolarEdge inverters via RS-485

Interface

The RS-485 interface is ready for connection with up to 31 SolarEdge inverters in daisy chain with a maximum of 1000 m total cabling length.

Hint at using further SolarEdge devices, e. g. Firefighter-Gateway

The operation of a large display and another SolarEdge **Master** device, e. g. Firefighter-Gateway or master inverter, at the same RS-485 bus is not possible because the large display always acts as a master. In this case two separate RS-485 buses must be set up, one bus for communication between the SolarEdge master device ↔ inverters and one bus for communication between large display ↔ inverters. For this purpose all inverters must be equipped with a second RS-485 interface. At some inverters this is already available at delivery or is available as an option from SolarEdge. The two RS-485 interfaces in the inverters can be configured independently from each other.

Display configuration

- Hold the push button for configuration and establish power supply
- Choose **data source 20** (SrC) with short pushes
- Confirm the data source with a long push
- Choose the **baud rate 9600** (bAud) with short pushes
- Confirm the baud rate with a long push.
- Set the value of **#1 inverter address/Device ID** (Addr) of the first inverter by editing the single digits from right to left
- Confirm the last digit with a long push
- Set the value of **inverter count** (Cnt) connected to the display by editing the single digits from right to left
- After the last digit is confirmed with a long push, the display restarts. The configuration is finished

Inverter configuration

- All inverters must be configured as **Slave** devices
- The **CPU-Version** of the inverters must be at least **2.0549**
- At **each** inverter the following settings in menu **Communication** → **RS485-x Conf** must be done:
 - Set **Device ID** of each inverter to an **unique, ongoing** address, starting with the value configured in **Addr** (see display configuration)
 - Set **Device Type** to **Non-SE Logger**
 - Set **Protocol** to **SunSpec**
 - Set **Baud Rate** to **9600**
- The **last** inverter in the RS485 bus must be **terminated**. Set switch **SW7** to **ON**

For further questions to the SolarEdge devices please ask the manufacturer.

Connection

Data+ of the LD ↔ **RS-485 A** of the first inverter

Data- of the LD ↔ **RS-485 B** of the first inverter

The large display is connected with Data+ and Data- in series to the inverters. For the connection a shielded cable must be used. The maximum total cabling length is 1000 m. The shield is connected to VDC- of the LD. The cross-section of the cable is irrelevant.

Between Data+ and Data- at the large display the delivered termination resistor (120 Ω) must be connected. The **last** inverter in the RS485 bus must be terminated also.

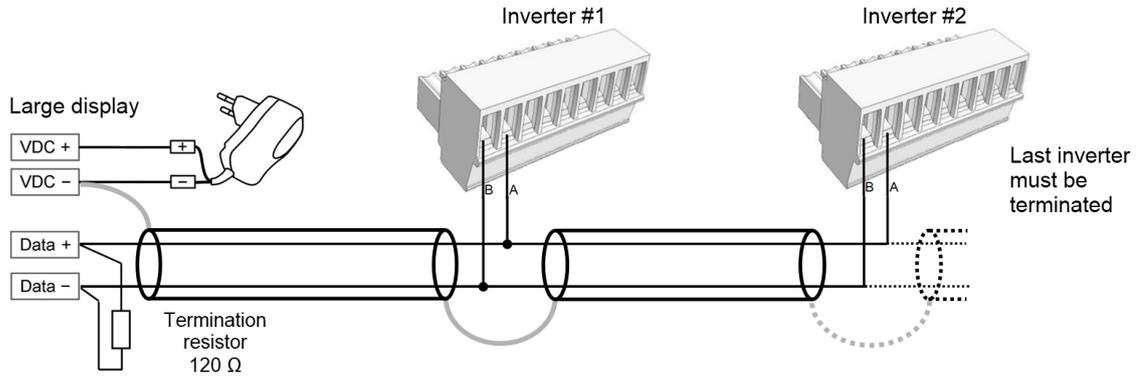


Figure 6.4.1: Connection scheme SolarEdge inverters RS-485

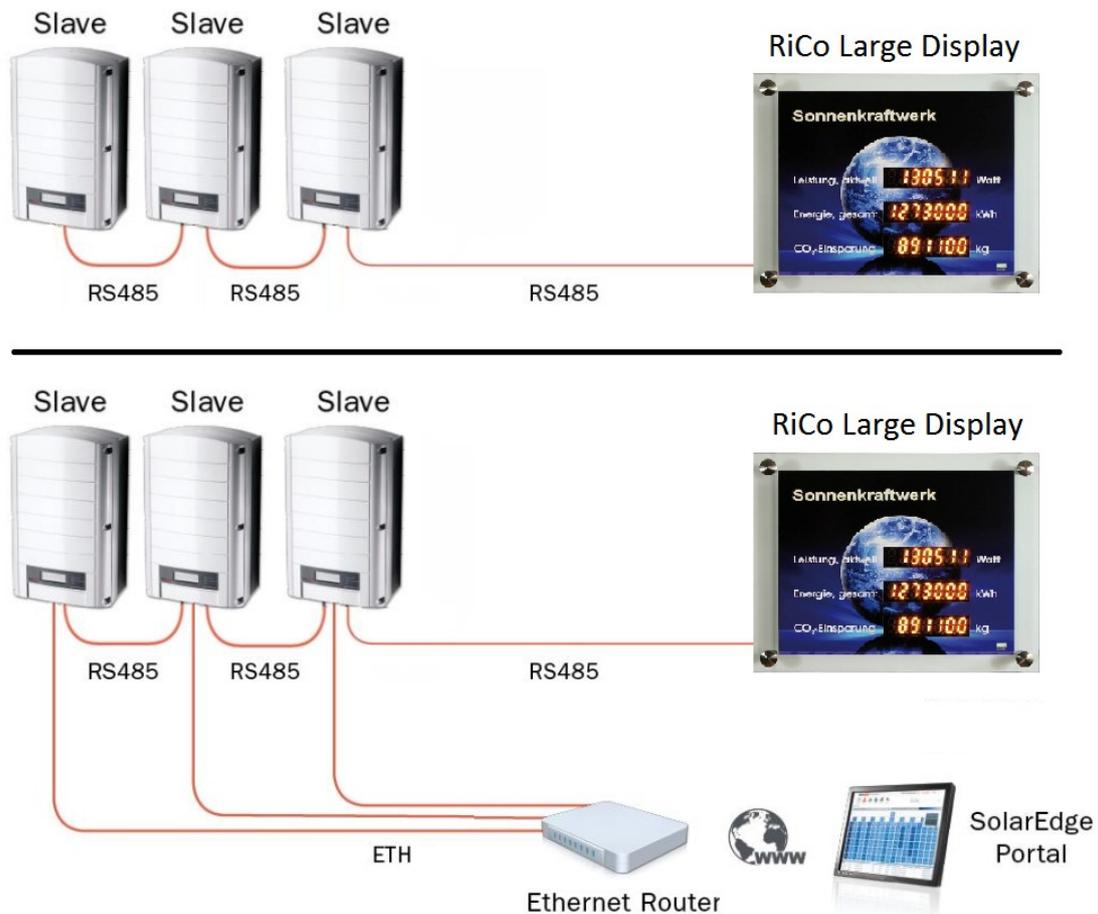


Figure 6.4.2: Possible connection variants

6.5 Connection to Kostal inverters via RS-485

Interface

The RS-485 interface is ready for connection with up to 32 Kostal inverters (PIKO IQ, PIKO 36EPC, PLENTICORE plus) in daisy chain with a maximum of 1000 m total cabling length.

A connection to older Kostal inverters (older UI5) is possible also. For this data source 19 must be selected. A connection description is available from the manufacturer at request.

Display configuration

- Hold the push button for configuration and establish power supply
- Choose **data source 25** (SrC) with short pushes
- Confirm the data source with a long push
- Set the value of **inverter count** (Cnt) connected to the display by editing the single digits from right to left
- After the last digit is confirmed with a long push, the display restarts. The configuration is finished

Inverter configuration

- The inverters communication software must have at least **UI version 5.41**
- At **each inverter** an **unique ongoing RS485 address** must be configured, beginning with '1' (Range 1..32; PIKO menu 'Settings' → 'Communication' → 'RS485 settings' → 'RS485 address')
- At the **first inverter** in the RS485 bus the option 'Bus blas voltage' must be selected (PIKO menu 'Settings' → 'Communication' → 'RS485 settings' → 'Bus blas voltage')
- At the **last inverter** in the RS485 bus bus the option 'Bus termination' must be selected (PIKO menu 'Settings' → 'Communication' → 'RS485 settings' → 'Bus termination')

For further questions to the Kostal PIKO inverters please ask the manufacturer.

Connection

Data+ of the LD ↔ **RS485 A** of the first inverter

Data- of the LD ↔ **RS485 B** of the first inverter

The large display is connected with Data+ and Data- in series to the inverters. For the connection a shielded cable must be used. The maximum total cabling length is 1000 m. The shield is connected to VDC- of the LD. The cross-section of the cable is irrelevant.

Between Data+ and Data- at the large display the delivered termination resistor (120 Ω) must be connected.

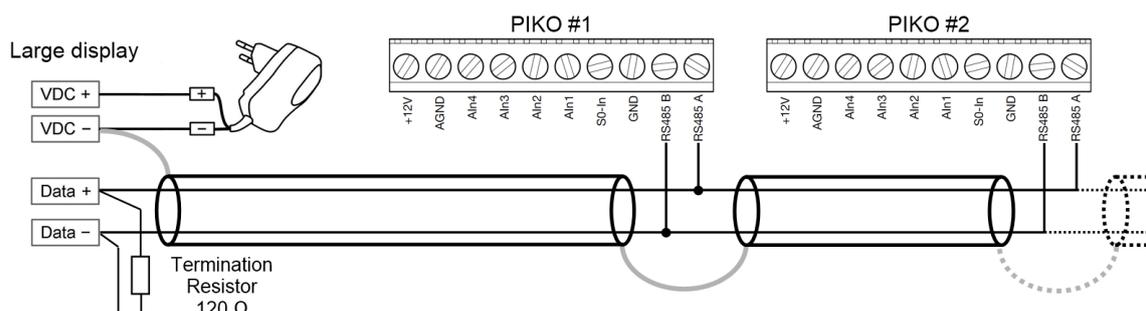


Figure 6.5: Connection scheme Kostal inverter RS-485

7 Technical data

Number of shown values	Depending on order (Standard 3 values)
GA-300, GA-310, GA-330, GA-1100, GA-1000 with digit height 20 mm, 25 mm, 45 mm, 57 mm, 100 mm	7-Segment-LED displays, hyper bright Color: red
GA-600, GA-1200 GA-1000-Serie with digit height 27 mm, 58 mm, 85 mm, 135 mm, 200 mm, 260 mm, 300 mm	Single-LED displays, hyper bright Color: red or orange, depending on order
GA-210, GA-350, GA-500, GA-2100, GA-2000 with digit height 25 mm, 50 mm, 60 mm, 100 mm	7- or 38-segment-LCD displays LCD black on silver background or LCD yellow backlighted
Dimensions of the housings	Width x Height x Depth in mm
GA-1000, GA-2000 series	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	Approx. 500 x 400 x 45
GA-600	Approx. 700 x 500 x 45
GA-1100, GA-2100	Approx. 800 x 600 x 45
GA-1200	Approx. 1000 x 700 x 45
Housing material (standard) GA-1000, GA-2000 series	Aluminum powder coated, front and back plate Plexiglas or Aluminum composite panel
Housing material (Glass displays) GA-310, GA-500, GA-600, GA-1100, GA-1200, GA-2100	5 mm safety glass and ABS or PC plastic housing
Indoor using	All large displays
Outdoor using	GA-500, GA-600, GA-1200, GA-2100, GA-1000 and GA-2000 series with option 'Outdoor'
Operating temperature	+5...+40 °C indoor displays -20...+60 °C outdoor displays
Storage- and transport temperature	-20...+60 °C
Inputs, interfaces (Depending on order!)	- Pulses (potential free closing contact) - RS-232 - RS-485
Supported data sources (Depending on order!)	- Energy meter/pulse source with potential free closing contact (IEC 62053-31) - Ethernet/RS-485 converter for diff. data sources - Solar-Log RS-485 - SolarEdge inverters - Kostal inverters - others on request
Power supply (Depending on order!)	External power supply unit Input: 110...230 VAC Output: 7,5...12 VDC (24 VDC at special order) Depending on display type (see type label)
Warranty	6 month
Norms	CE, EN 61326-1

Subject to change without prior notice

Manufacturer:

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