

MetriCorr

101443-01

Slimline ICL & MasterLink Operation Guide

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100	2018-07-20	Operating manual for Slimline ICL & MasterLink	FrB	LVN	LVN
001	2018-07-19	Operating manual for Slimline ICL & MasterLink	FrB	LVN	LVN

1. Scope

This document is a guideline on the set up and operation of the MetriCorr Slimline ICL and MasterLink remote monitoring equipment.

The MetriCorr remote monitoring system makes use of an online WebService where all the data from site is sent and stored. The MasterLink and ICL units are also configured and controlled from here.

Before you start:

- If you want to link your new unit to an existing MetriCorr WebService account. Please email info@metricorr.com with the following information
 - a. **Account Name** (existing, or new) you wish the unit(s) to be assigned to.
 - b. **User email address** (for new users to log in to existing or new accounts)
 - c. **MasterLink Serial Number(s)** you wish to link to the account

- If you are a new customer or setting up a **NEW account**, please also provide details of a Primary contact person for data & administration communication with MetriCorr.
 - i. Name & title / position
 - ii. Email address
 - iii. Telephone number

Once you have received confirmation that the units have been assigned to the account as requested (together with login details if you have requested a new account, or user), you are ready to start.

IMPORTANT: MetriCorr cannot guarantee the unit if the ICL and MasterLink units are disconnected. Please do not attempt to undo the cap screws. Please contact MetriCorr if you are in doubt.

2.Components

2.1 The ICL - MasterLink Unit

The Slimline ICL ER measurement module is paired with a MasterLink control and communications module. They are shipped preassembled as shown in Figure 1, below.



Figure 1: ICL & MasterLink as shipped

<i>Quick Facts</i>	
Battery Lifetime	+3 years @ 1h logging intervals and weekly transmissions
Casing	IP65
Humidity	0-100% RH condensing conditions
Operating conditions	-40°C to +85°C
Storage capacity	+200 000 readings
Logging interval - Normal mode	10 min -∞, Recommended 1 hour
Logging interval - Campaign mode	1 sec in pre-defined time intervals

<i>Channel characteristics</i>	
Voltage	
Input Resistance	+10 MΩ
Range	100 V
Resolution	0.1 mV
Accuracy	±1 mV ±1% reading
Current	300 mA/probe
Resolution	1 μA
AC accuracy	±4μA ±1% reading
DC accuracy	±1μA ±1% reading

<i>ER channels</i>	
Resistance range	150 mΩ
Repeatability	0.4 μΩ
Precision	0.8 μΩ



- A - ER probe port 1
- B - ER probe port 2
(with protective cover)
- C - Pipe/Structure Connection
- D - Reference Electrode Connection

Figure 2: ICL Connections



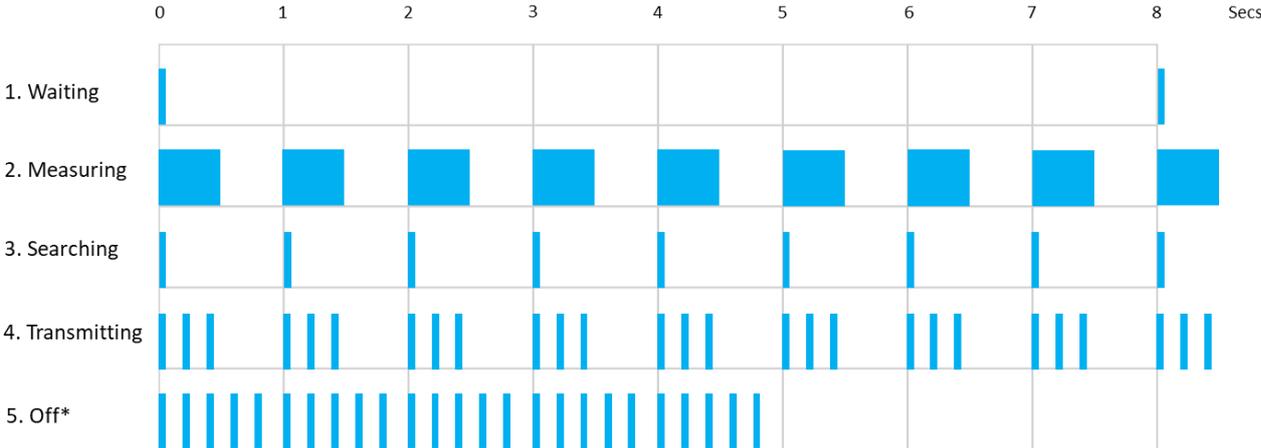
- E - MasterLink Status/Control Button
- F - Antenna Connection
- G - Connection for control of previous generation ICLs
(with protective cap)
- H - Power in Connector
(with protective cap)
- I - Blanked off Ethernet port

Figure 3: MasterLink Connections

3. Configuration

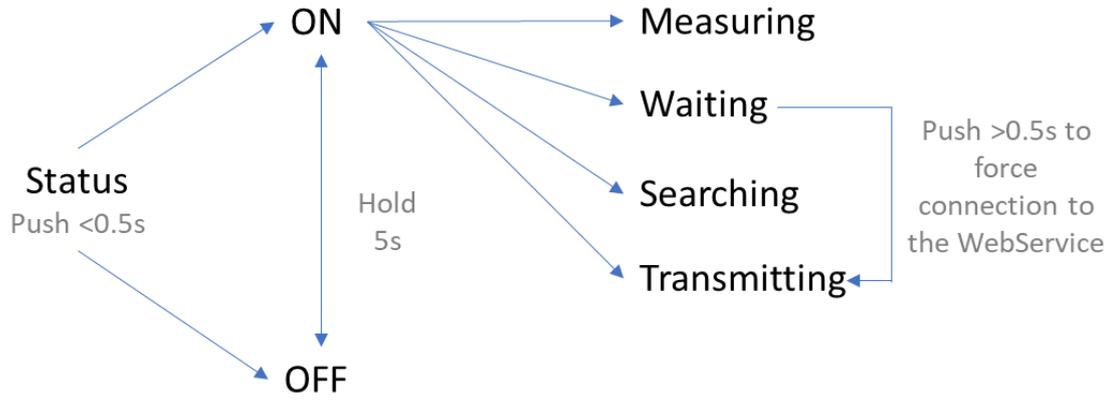
3.1. Switch on & Initial Communication

Once connected to the antenna and battery, push the 'Status/Control' button ('E' in Figure 3) and release (<0.5s). This will indicate the current status/mode of the unit with a series of flashes on the LED built into the button. Please refer to the LED flash patterns below.



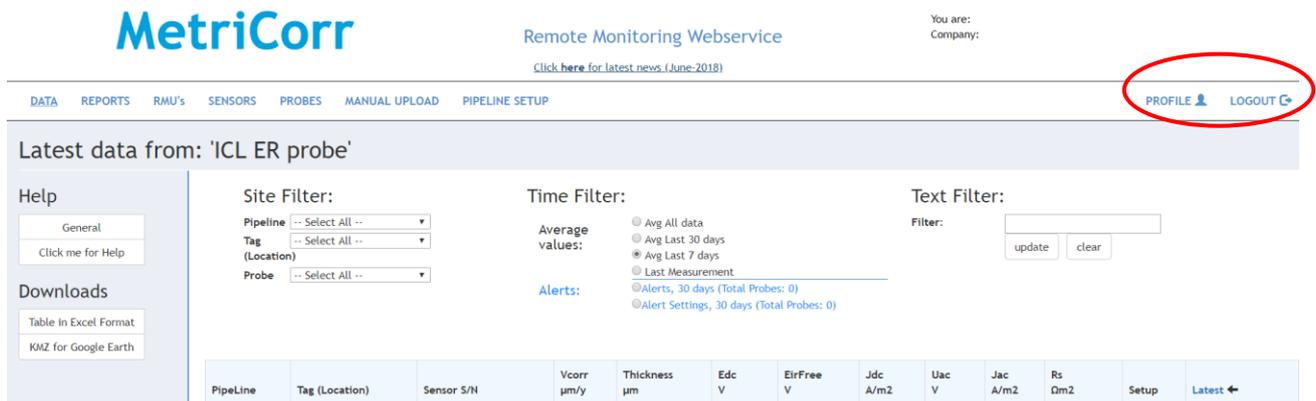
The device is Off. 5 short (0.5 milliseconds) flashes per second for 5 seconds. This signal is triggered by a **short** (<0.5s) push on the push- button.

Mode / status	Description
Waiting	The device is active and waiting for the next measurement to be performed. Short (50 millisecond) flash every 8 seconds
Measuring	The device is performing a measurement. Longer flash (0.5 seconds) repeated every second.
Searching	The device is searching for network. 1 short (0.5 milliseconds) flash repeated every second.
Transmitting	The device is transmitting data to the Webservice. 3 short (0.5 milliseconds) consecutive flashes repeated every second.
Off	The device is Off. 5 short (0.5 milliseconds) flashes per second for 5 seconds.

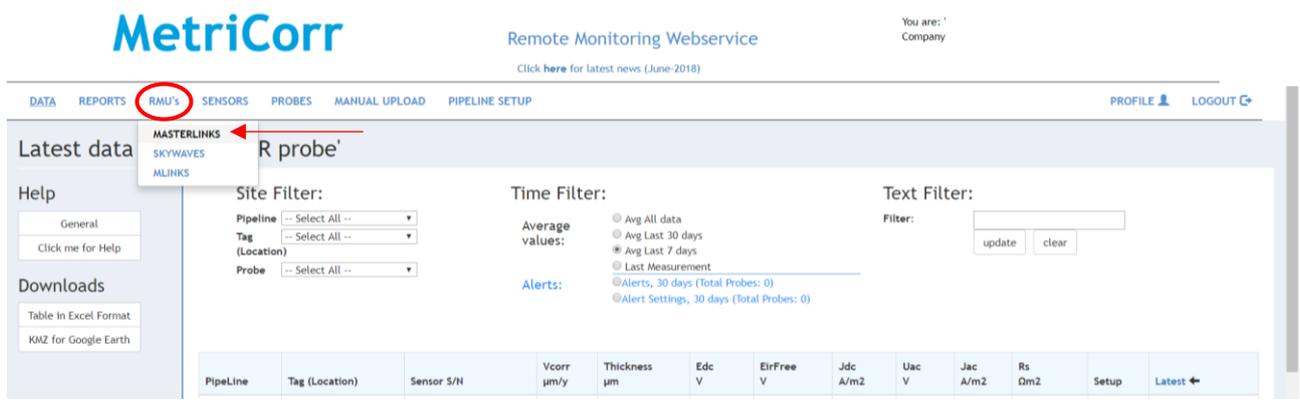


Log on to <https://data-metricorr.com> using the username and password sent to you as per Section 1. For data safety, it is recommended that your assigned password should be changed on your first login. This can be done in the 'Profile' menu. You should also 'Logout' when you have completed your session.

The landing page is the ICL sensor page and looks like this:



1. To check that the MasterLink has successfully made a connection to the Webservice and to configure the units, click 'RMU's' then 'MasterLink' as shown below.



The 'MasterLinks' landing page looks like this:

The screenshot shows the MetriCorr Remote Monitoring Webservice interface. The page title is 'MetriCorr Remote Monitoring Webservice'. The user is logged in as 'Compan'. The navigation menu includes 'DATA', 'RMU's', 'SENSORS', 'PROBES', 'MANUAL UPLOAD', and 'PIPELINE SETUP'. The 'Your Master Links' section is active, displaying a table of defined Masterlinks.

MobileID SW version	Battery/ Net info/	Signal 'To ML'/'From ML'	'Received Time (UTC) '/Next wakeup (UTC)'	Status	Longitude Latitude Time	Connected Dev/ Serial Number	Options
'AL02789138' '1.0.863,1.0.863,1.0.863'	/ HSDPA/ -81dBm	5339/ 61666	19-Jul-2018 7:16:34 / 19-Jul-2018 19:15:40	OK, 11 logger lines received	55.695043, 12.430163 04-Jul-2018 19:57:34	ICL_Module AM02789349	Setup

If the communication was successful, details of that communication will be shown in the table, as above. The 'Received Time' should be approximately that of when the unit was powered up. The Status should be 'OK'.

After the unit has started communication (refer to flash patterns Step 3), it could take a few moments for the Webservice to update. Refresh your browser page if it does not appear within 1 minute.

Should the unit not display on the MasterLink page, restart the unit to force new communication (follow steps 1-3 again).

3.2. MasterLink-ICL Set Up

Once the MasterLink unit(s) has made contact with the server, all of the unit information is displayed in the MasterLink table. Here the devices are differentiated by unit Mobile ID.

Information about the software version installed, battery level, last communication time and status is provided. The serial number of the logger connected to the unit is also displayed.

Click 'Set up' under 'Options' in the MasterLink table to set up the selected unit, as shown below.

Your Master Links:

Help

[Click me for Help](#)

Your defined Masterlinks

MobileID SW version	Battery/ Net info/	Signal 'To ML'/'From ML'	'Received Time (UTC) '/Next wakeup (UTC)'	Status	Longitude Latitude Time	Connected Dev/ Serial Number	Options
'AL02789138' '1.0.863,1.0.863,1.0.863'	/ HSDPA/ -81dBm	5339/ 61666	19-Jul-2018 7:16:34 / 19-Jul-2018 19:15:40	OK, 11 logger lines received	55.695043, 12.430163 04-Jul-2018 19:57:34	ICL_Module AM02789349	Setup

The 'Setup' page is shown below. Here you can set up the MasterLink as well as the connected ICL.

3.2.1. Communication Frequency

Masterlink: 'AL02789138'		
	Request	Latest Registration
Sleep(OK) hours	<input type="text" value="12"/>	
Sleep(Fail) hours	<input type="text" value="4"/>	
Latitude	Get position: <input type="checkbox"/>	
Longitude		

Slimline ICL: 'AM02789349'		
	Request	Latest Registration
Start time, HH:MM (UTC)	Hour: -- ▾ , Minute: -- ▾	
Sample interval (min)	<input type="text" value="60"/>	
Probe 1	<input type="text" value="Pi20304052"/> Auto-detected ERv2 probe	
Probe 2	<input type="text" value="Pi20304050"/> Auto-detected ERv2 probe	

[Save Request](#)

The existing settings are shown under **'Latest Registration'**. For a new unit this will be blank.

Here the communication frequency can be set as desired. It is recommended that unit is set for a 4h sleep time in case of a communication **error (Sleep (FAIL))**, and a 168h (once weekly) for **normal operation (Sleep (OK))** in order to preserve battery life.

You can also request the position of the unit (estimated latitude, longitude by GNSS), by checking the **'Get Position'** box. The retrieved data will be displayed in the **'MasterLink'** table on next scheduled **'wake up'**.

3.2.2. ICL Settings

The connected ICL can also be configured using the **'Setup'** page (above). This can be accessed either through the **'MasterLink'** table or through the **'Sensors'** menu (shown below):

The screenshot shows the MetriCorr web interface. At the top, there is a navigation bar with tabs: DATA, RMU's, **SENSORS** (circled in red), PROBES, MANUAL UPLOAD, and PIPELINE SETUP. Below the navigation bar, the main content area is titled 'ER probe'. On the left side, there is a sidebar with 'Help' (General, Click me for Help) and 'Downloads' (Table in Excel Format, KMZ for Google Earth). The main content area has several filter sections: 'Site Filter' with dropdowns for Pipeline, Tag (Location), and Probe; 'Time Filter' with radio buttons for Average values (Avg All data, Avg Last 30 days, Avg Last 7 days, Last Measurement) and Alerts (Alerts, 30 days (Total Probes: 0), Alert Settings, 30 days (Total Probes: 0)); and a 'Text Filter' section. A red arrow points from the 'SENSORS' tab to the 'ER probe' title.

This will display a list of the ICL units that are assigned to your account, as shown below. This is automatically updated once the MasterLink has successfully communicated with the Webservice for the first time.

Your ICL Modules

Serial Number	Activation Date	Masterlink	
0002768718	04-May-2018 12:15:15	0002760970	Setup
AM02784914	07-May-2018 10:48:20	AL02760975	Setup
AM02768720	11-May-2018 10:47:03	AL02775018	Setup
AM02784918	15-May-2018 8:26:22	AL02760973	Setup

'Set up' takes you to the table where you can configure both the MasterLink and the connected ICL unit.

Sleep(Fail) hours	<input type="text" value="4"/>	
Latitude	Get position: <input type="checkbox"/>	
Longitude		

	Request	Latest Registration
Start time, HH:MM (UTC)	Hour: -- ▾, Minute: -- ▾	Next Measurement: '19-Jul-2018 8:00:00 (UTC)'
Sample interval (min)	<input type="text" value="60"/>	
Probe 1	<input type="text" value="Pi20304052"/> ▾ Auto-detected ERv2 probe	
Probe 2	<input type="text" value="Pi20304050"/> ▾ Auto-detected ERv2 probe	

Slimline ICL: 'AM02789349'

[Save Request](#)

3.2.3. Sampling & Start Time

The 'sampling interval' can be edited here.

In addition, a new 'start logging' time can be specified, should it be desired (e.g. for specific measurements coinciding with a known interference event, or survey campaigns, etc.).

The 'Latest Registration' text shows when the next measurement is currently due to occur. All updates to settings will be performed at this time. This can be 'forced' by physically restarting the MasterLink, remember to 'Save request' beforehand.

3.2.4. Assigning probes to Logger

The ICL has two channels for ER probes: Probe 1 and Probe 2.

1. Under the ICL set up page, you can assign probes to the ICL using the drop-down list of probes you have linked to your account (see **Section 3.3**).

Slimline ICL: 'AM02789349'		
	Request	Latest Registration
Start time, HH:MM (UTC)	Hour: -- ▾, Minute: -- ▾	Next Measurement: '19-Jul-2018 8:00:00 (UTC)'
Sample interval (min)	<input type="text" value="60"/>	
Probe 1	<div style="border: 1px solid black; padding: 2px;"><div style="border-bottom: 1px solid black; padding: 2px;">-- Probe Disabled -- 2 ▾</div><div style="padding: 2px;">-- Probe Disabled --</div><div style="padding: 2px;">CC22345678</div><div style="padding: 2px;">CC32345678</div><div style="padding: 2px;">PA14013084DUM</div><div style="padding: 2px;">Pi20304050</div><div style="padding: 2px;">Pi20304051</div><div style="padding: 2px; background-color: #007bff; color: white;">Pi20304052</div><div style="padding: 2px;">Pi20304053</div><div style="padding: 2px;">PL16010497</div><div style="padding: 2px;">PL16010504</div></div>	
Probe 2		

2. Probes are **'Disabled'** when a probe is not selected. Assigning a probe to the probe ports allows the logger to take readings on that channel.

The probes should be linked before the logger makes the first 'real' measurements so that the data is correctly assigned.

In the case where ERv2 probes are connected to the ICL, the unit will automatically detect the probe serial number and the probe certificate data, which does not need any further action once the probe serial number is displayed.

Remember to **'Save request'** before leaving the page.

3.3. Linking Probes to your Account

The new ERv2 generation probes are automatically recognized by the slimline ICL and the data is saved automatically. However, previous generation probes require an additional set up step:

To link your ER probe(s) to your account, click 'Probes'. This will display a table of all probes that are connected to your account (if any), together with the probe certificate data in the system.

Your Probe Certificate data

Number of probes: '3', Number of probes where M-Reader is enabled: '0'

Help

[Click me for Help](#)

Options **2**

[Add a Probe](#)

[Download Certificates](#)

Probe S/N (In alphabetical order)	Probe type	Coating defect Area cm ²	Initial Thickness µm	Rr mΩ	Rc mΩ	Available in 'M-Reader'	Deletion
--------------------------------------	------------	--	-------------------------	----------	----------	----------------------------	----------

Click the 'Add a Probe' button indicated above.

Input the serial number of the first probe in the field indicated above. This should automatically fetch the probe certificate data from the MetriCorr database. Repeat with all probes for this account.

Add

Please enter the probe serial number for the probe you want to add

Note: Probes added in error can be deleted in the probe list

Serial Number:

Add

If you have an old probe where certificate data is not available in MetriCorr Database, you can enter Certificate data [here](#)

[Back to List](#)

If you are using existing probes in your stores, it is possible that the certificate has not yet been uploaded to the server. As such, automatic adding may not be possible (the website will respond with an error: *'probe xyz is not defined...'*).

You can manually enter the certificate data (serial number, probe type, Rc, Rr, thickness, surface area). The certificate is provided with each probe. If you do not have the certificate for the probe you want to upload, please email the serial number to info@metricorr.com and we will email a copy as soon as possible.

4. Installation

This section covers the installation of the Slimline units in different applications. The accessories required as well as the assembly there of are described in the relevant sections, below.

Please refer to MetriCorr recommended procedure 100231 for installation practices for ER probes.

4.1. Solar Junction Box Installation



The junction box itself can be installed on a stable wooden pole or test station pipe such as a big fink. The mounting should be carried out according to the mounting sketch present in Appendix 1. To the best possible extent, it is important to mount the junction box such that it is not shadowed (in any season) as the solar panel needs direct sun to recharge the battery effectively. A back-up battery for three months operation (without solar charging) at 1-hour measurement intervals and weekly uploads is supplied with the junction box.

Once the junction box is securely mounted in place, the onsite installation/set up of the RMU can commence.

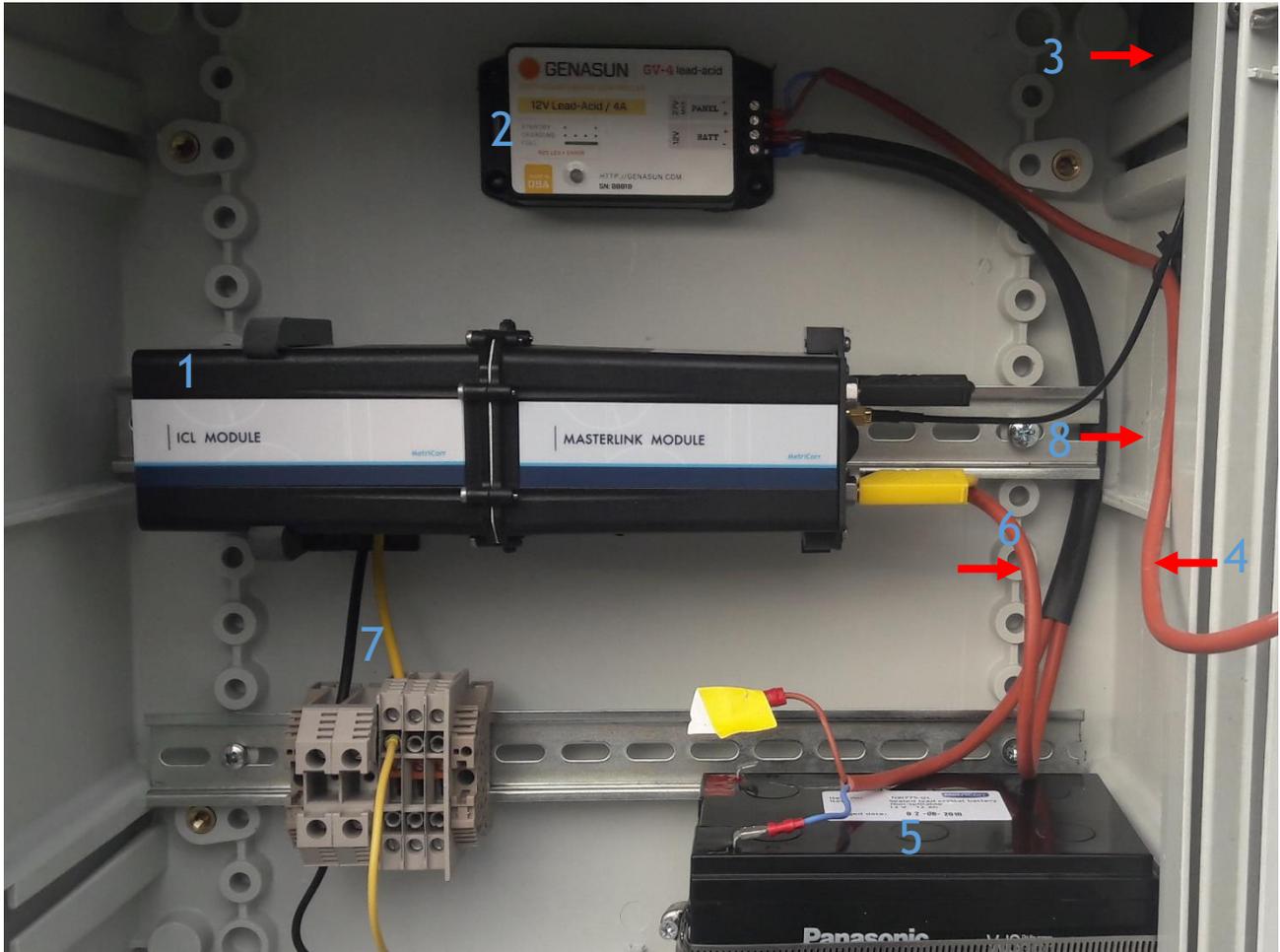


Figure 8ai: Interior of Single ICL Solar Junction Box as

- | | |
|-----------------------------|--|
| 1 - ICL - MasterLink Unit | 5 - Battery |
| 2 - Solar Charge Controller | 6 - Power connector to ICL-MasterLink |
| 3 - Antenna | 7 - Input: Pipe (black) & reference (yellow) |
| 4 - Power from solar panel | 8 - Reflective Panel for LED |

1. Bring the ER probe cables as well as the pipe and reference electrode cables into the junction box through the glanded cable entries.

NB: Take note of the probe serial numbers (on yellow or white tags) as the correct assignment of these is paramount to ensuring the correct data is sent to the WebService. Where indicated, one probe port (ER2**) is designated as the '**NATIVE**' probe i.e. it is NOT connected to the pipeline while **ER1** IS connected to the pipeline.**

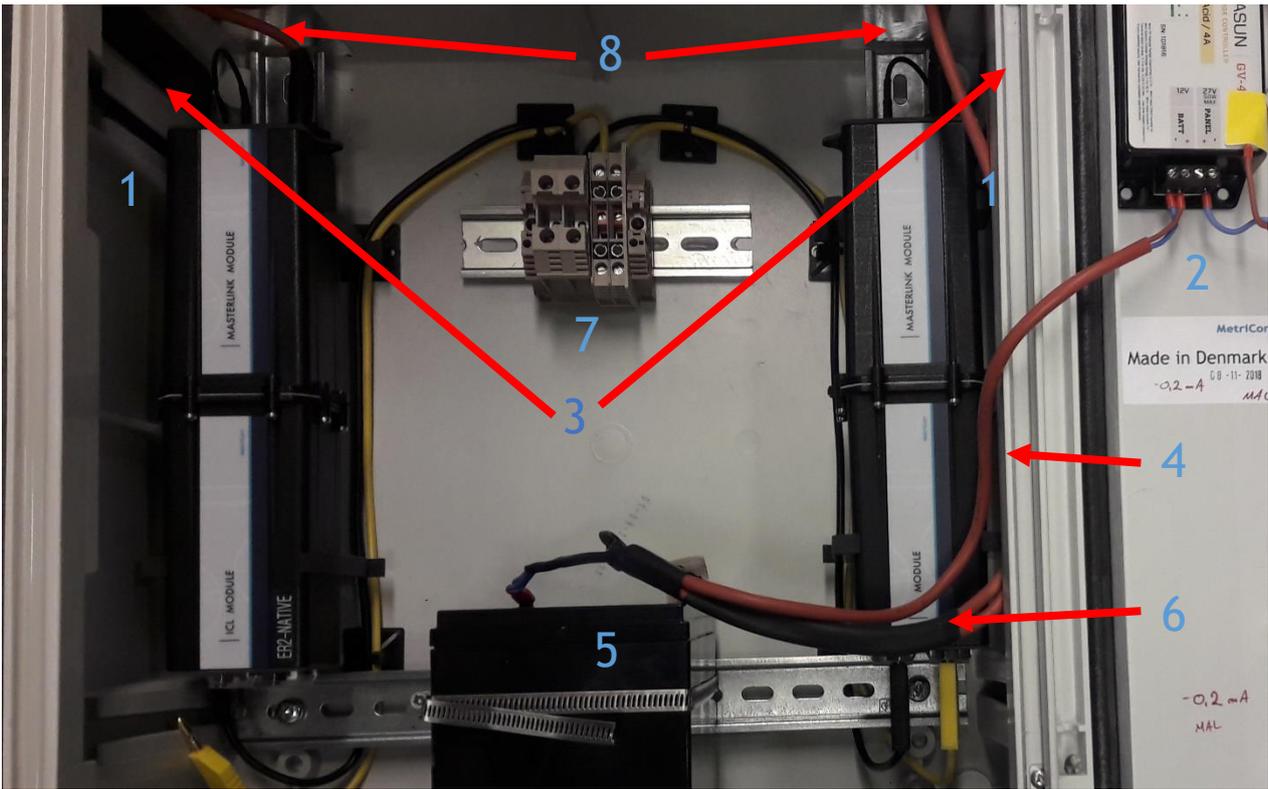


Figure 8a: Interior of a Double ICL Solar Junction Box as Shipped

- 1 - ICL - MasterLink Unit
- 2 - Solar Charge Controller
- 3 - Antenna
- 4 - Power from solar panel
- 5 - Battery
- 6 - Power connector to ICL-MasterLink
- 7 - Input: Pipe (black) & reference (yellow)
- 8 - Reflective Panel for LED



2. Connect the probes to the desired ports. The connector will only engage when the red dots are facing forward (as pictured Figure 8c, above).



Figure 8d: Pipe & Reference IN

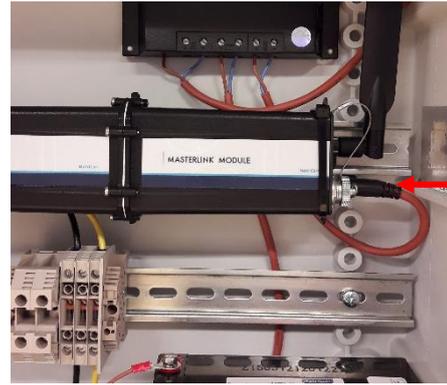


Figure 8e: Power Connected

3. Refer to Figure 8d above: plug in the supplied pipe connection (**black** - Top) and the reference electrode (**yellow** – Bottom) to the ports C & D (fig 1). Connect the pipe and reference cables from the field through the terminal block indicated above.
4. Connect the power into connection H (Fig 1), indicated with an arrow in 8e, above.

Important

Please follow the sequence below exactly. Failure to do so may result in damage to the solar charge controller.

Test the charge of the battery before you head to site. It should be above 12V. If it is not, charge the battery with a separate lead crystal battery charger (note that the battery **MUST** be disconnected from the solar charger during charging). Once charged, follow the steps below.



Step 1: Connect the Solar Charger to the battery



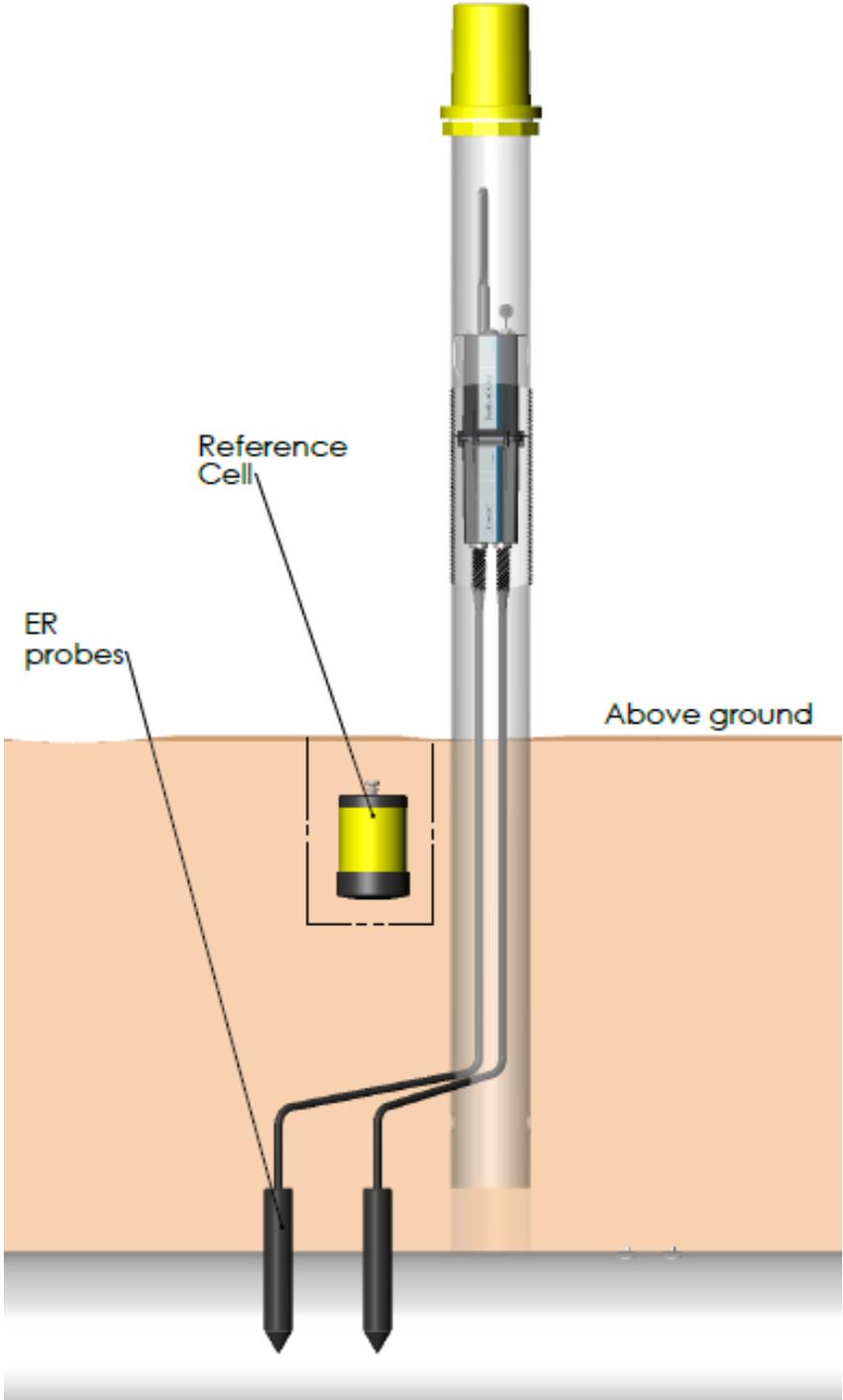
Step 2: Connect the Solar Charger to the solar panel



Step 3: Connect the Solar Charger OUT to the ICL power socket

4.2. Big Fink Installation

The Slimline loggers are designed to fit inside a Big Fink type test post, as shown in the general illustration, below.



The loggers can be mounted within the test post either using factory fitted clips, or brackets depending on the Client's preference. It should be noted that for the suspended battery type (Section 4.2.3), brackets are required.



Figure 9: Mounting brackets and Clips for Slimline Installation in Big Finks

1. The ER probes should be installed in accordance with MetriCorr recommended procedure 100231. The ER probe cable terminations as well as the reference electrode cable and the pipe connection(s) should be available at the top of the Big Fink as shown.

NB: if installing in an existing installation, and additional connections (e.g. foreign pipeline, coupon etc.) should also be brought up so that they can be terminated correctly.

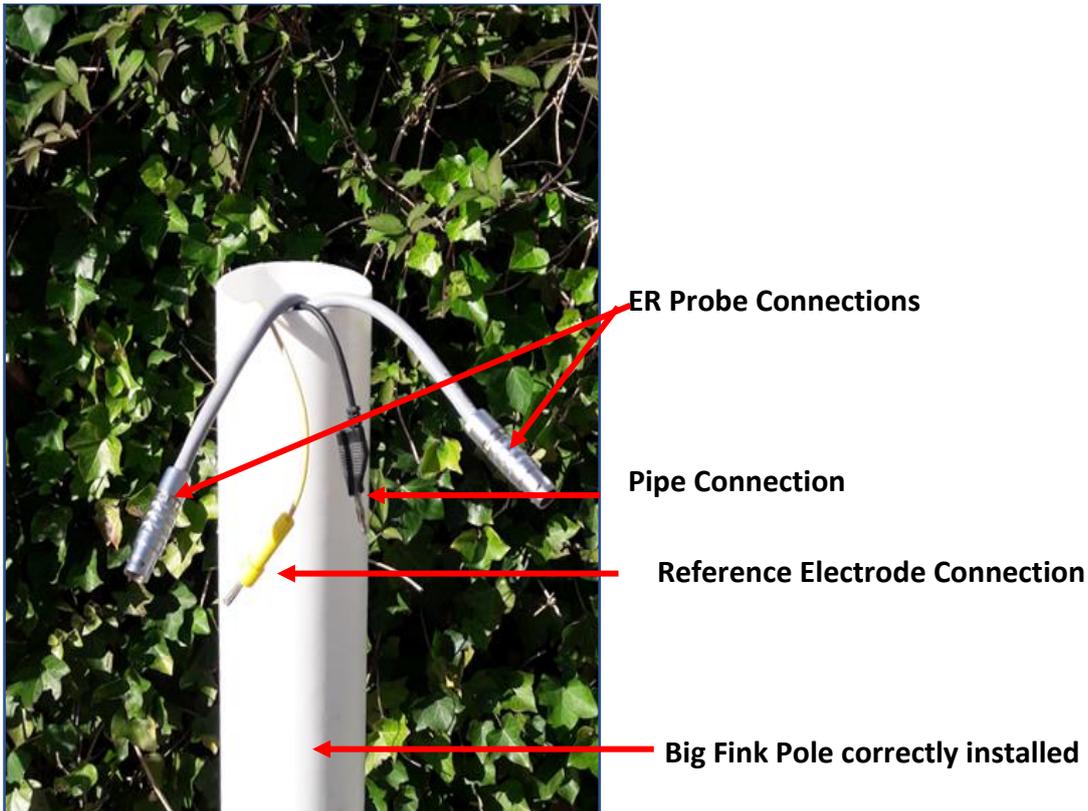


Figure 10a: Big Fink Test Station ready for the installation of Slimline ICL

NB: Take note of the probe serial numbers (on yellow or white tags) as the correct assignment of these is paramount to ensuring the correct data is sent to the WebService. As standard, one probe port (**ER2**) is designated as the '**NATIVE**' probe i.e. it is NOT connected to the pipeline while **ER1** IS connected to the pipeline.

2. Connect the probes to the desired ports. The connector will only engage when the red dots are facing forward (as pictured Figure 10b)
3. Connect the pipe and reference electrode cables to the logger. The connection should be made using banana plugs (depending on the existing set up, making-off the cable ends with banana plugs before installation of the logger may be necessary).

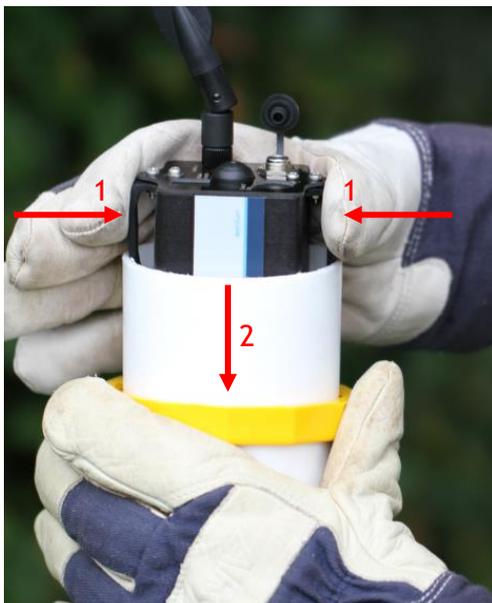


Figure 10b: ER Probe Cables after connection (note red dots line up)



Figure 10C: ER, Pipe and Reference Cables after connection

4. Connect the antenna to connector F (Figure 3) and the power cable to connector H (Figure 3) and go through commissioning procedure to start the logger as outlined in **Section 3**.



5a. Clips

Squeeze the clips in towards the ICL and insert into the test station, pushing down such that there is room enough for the antennae beneath the Big Fink cap, ensuring the cables are not excessively bent, or trapped between the logger and the side of the test post.

5b. Brackets

The logger should be lowered until the Big Fink top attached to the bracket can be correctly seated on top of the pole. Tighten the collar nut to ensure a secure fit.



6. All additional cables should be correctly terminated on either the standard Big Fink terminal board (in the case of the Solar Hat Solution), or on the supplied modified (flat) terminal board in the case of the hat battery solution (see Section 4.2.2).

The modified terminal board is supplied in case additional connections in test stations with the battery solution are required. Connections to the existing standard terminal board in the solar solution are possible.

These additional connections are NOT necessary for the installation of the Slimline ICL, pipe and reference cables can be directly connected to the logger from the field without passing through the terminal board.

4.2.1 Big Fink Solar Solution

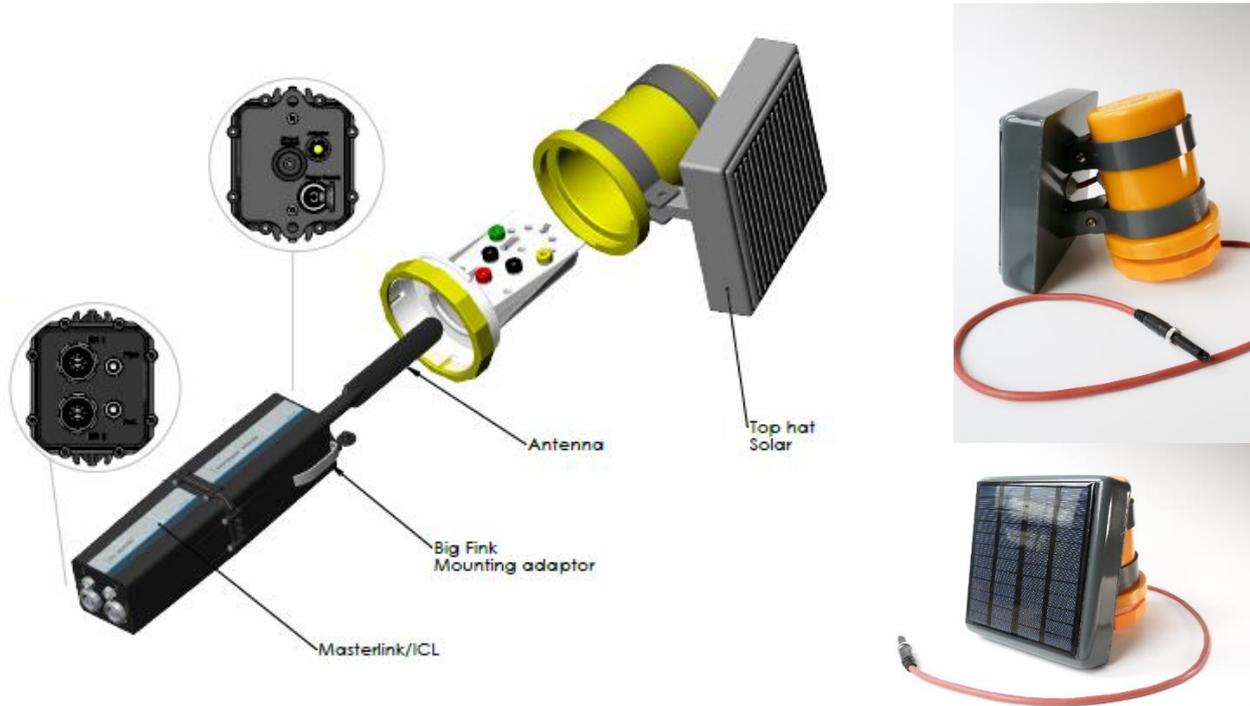


Figure 11: Big Fink Solar Hat general layout & appearance

The MetriCorr Big Fink Solar power solution requires only that the power cord is connected to connector H (Figure 3), as per **step 4**, above. Once power is connected ensure that the logger is ON and set up correctly (see **Section 3**).

Secure the hat onto the top of the pole using the terminal board / collar and twist to lock, as you would a normal Big Fink hat, ensuring that the solar panel is facing toward the prevailing sun. It is important that there is no shadowing of the solar panel.



Figure 12: Securing the Big Fink Solar Hat



4.2.2. Battery Hat Solution

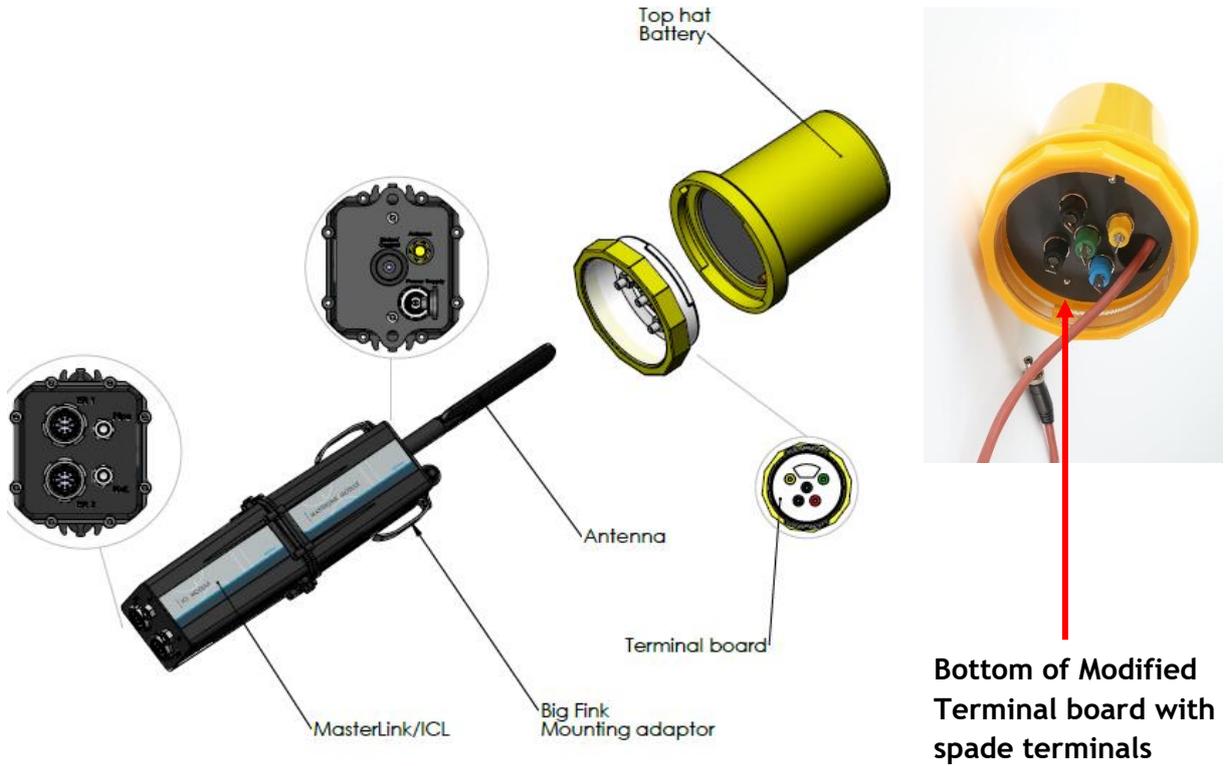


Figure 13: Big Fink Battery Hat general layout & appearance



The MetriCorr Big Fink Battery requires only that the power cord is connected to connector H (Figure 3), as per **step 4**, above. Once power is connected ensure that the logger is ON and set up correctly (see **Section 3**).

Secure the hat onto the top of the pole using the terminal board / collar and twist to lock, as you would a normal Big Fink hat.

Figure 12: Securing the Big Fink Battery Hat

5. Your Data - Simple Webservice Instructions

The MetriCorr Webservice is a powerful tool that allows you to view, treat and download data as well as associated logger and pipeline information. Here are a few tips to get you going.

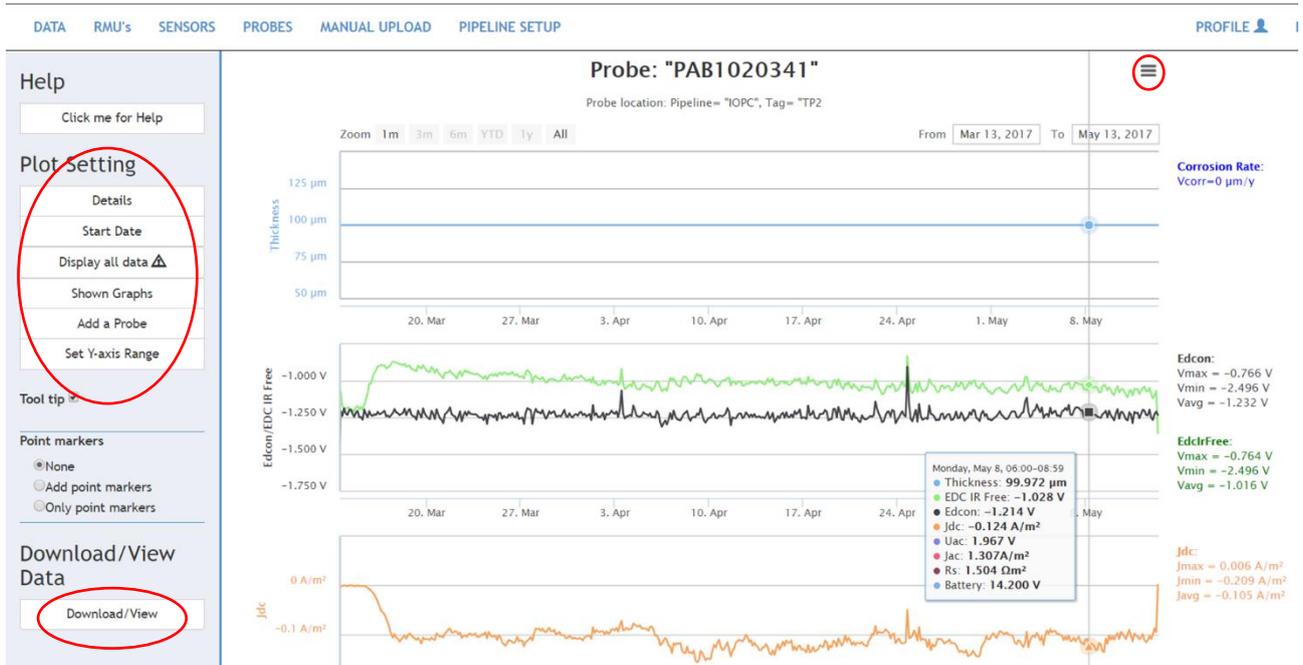
5.1. View & Download Logged Data

Once your unit(s) have logged and sent the first set of data, you can view it by clicking the 'Data' heading and selecting the type of data you wish to see (in the case of the ICL this will be 'ICL ER Probe').

The screenshot shows the MetriCorr web interface. The 'DATA' tab is selected and circled in red. Below the navigation bar, there is a search bar with 'ICL ER probe' and 'POT - Potential' entered, and a dropdown menu showing 'from: 'ICL ER probe''. The main content area is divided into several sections: 'Help' (General, Click me for Help), 'Downloads' (Table in Excel Format, KMZ for Google Earth), 'Site Filter' (Pipeline, Tag, Probe dropdowns), 'Time Filter' (Average values: Avg All data, Avg Last 30 days, Avg Last 7 days, Last Measurement; Alerts: Alerts, 30 days (Total Probes: 0), Alert Settings, 30 days (Total Probes: 5)), and 'Text Filter' (Filter input, update, clear buttons). Below these filters is a table of data:

PipeLine	Chainage	Tag (Location)	Sensor S/N	Vcorr $\mu\text{m}/\text{y}$	Thickness μm	Edc V	EirFree V	Jdc A/m ²	Uac V	Jac A/m ²	Rs Ωm^2	Setup	Latest \leftarrow
NotDef	NotDef	NotDef	PAB1020321	2	99.801	-1.044	-1.014	-0.039	2.127	5.726	1.869	Setup	13-May-2017
NotDef	NotDef	NotDef	PAB1020341	0	99.974	-1.225	-1.059	-0.109	2.544	1.655	2.404	Setup	13-May-2017

This will display a table of all of your ER probes and the latest measurements values (average of the last 7 days is the default). You can use the **Site**, **Time** and **Text filters** to change the probes/sensors that are displayed. Clicking on the **sensor number** will display a graphical representation of the data for that probe/sensor.



The graph appearance as well as the data that is shown can be changed by using 'Plot Settings' and downloaded as a .jpeg etc. by clicking the three-line symbol (circled above).

Data for that probe/sensor can be downloaded in tabular form by clicking 'Download/View'.

5.2. Unit Pipeline & Location Assignment

A sensor/probe can be assigned to a pipeline and specific tag/location for easy data identification. You can define the particular information regarding pipelines, locations etc. using the 'Pipeline Setup' menu.

Maintenance of Pipeline and Tags

Help

Click me for Help

Options

Your Pipelines

Your Tags

New Pipeline:

Name

New Tag (Location):

Tag

Chainage

Latitude

Longitude

Pipeline -- Select --

Sensor Position:

Pipeline -- Select --

Tag -- Select --

Sensor Type -- Select --

Sensor

Your defined Probe and Sensor positions

Once a pipeline and tag have been defined, you can assign the **'Sensor Position'**.

The sensor/probe's pipeline, tag and chainage will be shown in the Data table and can be filtered using the **Site, Time and Text filters** as described in Section 6.1.

5.3. Alerts

You can define alert values/ limits for specific parameters for specific probes/sensors, or for an entire group of sensors/probes. This is done on the main **'Data'** or landing page by clicking **'Alert Settings'**.

1. Set alert for all probes shown for this parameter
2. Set alert for this parameter for this specific probe/sensor only
3. View triggered alerts

Site Filter:

Pipeline -- Select All --

Tag -- Select All --

(Location)

Probe -- Select All --

3 Time Filter:

Average values:

- Avg All data
- Avg Last 30 days
- Avg Last 7 days
- Last Measurement

Alerts:

- Alerts, 30 days (Total Probes: 0)
- Alert Settings, 30 days (Total Probes: 0)

Text Filter:

Filter:

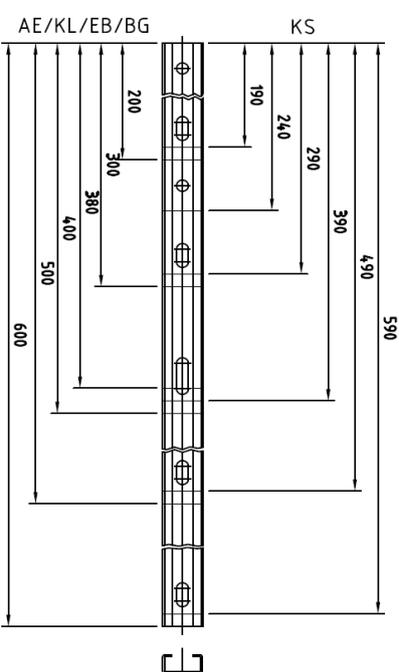
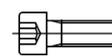
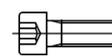
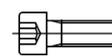
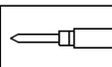
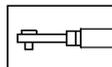
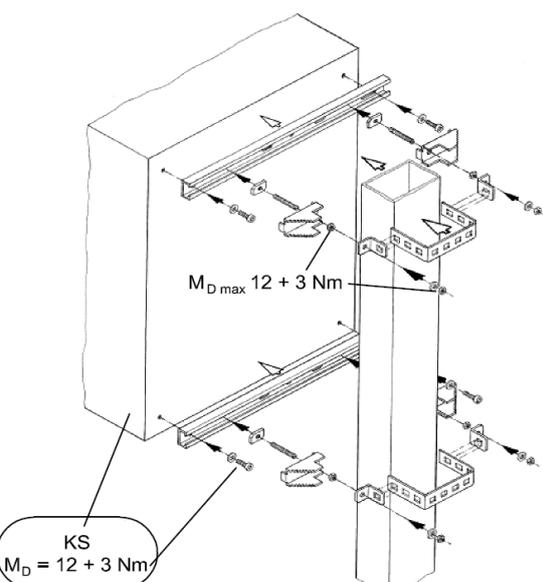
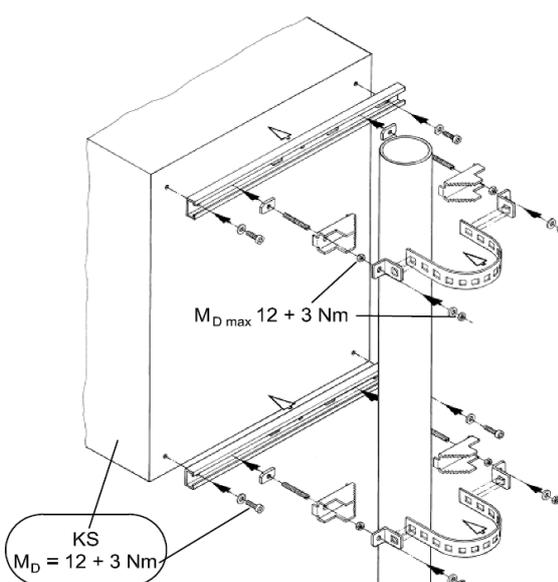
PipeLine	Tag (Location)	Sensor S/N	Vcorr µm/y	Thickness µm	Edc V	EirFree V	Jdc A/m2	Uac V	Jac A/m2	Rs Ωm2	Setup	Latest ←
NotDef	NotDef	123456789_u	***	***	***, ***	***, ***	***, ***	***	***	***	Setup	20-Jun-2018
NotDef	NotDef	987654321_u	***	***	***, ***	***, ***	***, ***	***	***	***	Setup	20-Jun-2018
NotDef	NotDef	CC32345678	***	***	***, ***	***, ***	***, ***	***	***	***	Setup	13-Jun-2018

5.4. Reports

A chainage graph for a specific pipeline with average, minimum and maximum values over a specified period can be generated automatically in the 'Reports' menu.

The screenshot shows the 'Chainage graphs' page in the MetriCorr application. At the top, there is a navigation bar with the following items: DATA, REPORTS, RMU's, SENSORS, PROBES, MANUAL UPLOAD, and PIPELINE SETUP. On the left side, there is a 'Help' sidebar with a 'Click me for Help' button and a dropdown menu containing 'Chainage Graphs' and 'Section Analysis'. The main content area is titled 'Chainage graphs' and features a 'Pipeline' dropdown menu currently set to '-- Select --'. Below this, there is a 'Sampling interval:' section with two columns of time selection fields. The 'Start Time' column includes fields for Day (13-Jun-2018), Hour (08), and Minute (58). The 'End Time' column includes fields for Day (27-Jun-2018), Hour (08), and Minute (58). A blue 'Show' button is positioned below the 'Start Time' fields. At the bottom of the form, there is a text instruction: 'Select a graph and a sampling period in the menu above'.

Appendix 1: Junction Box Mounting Guide

 <p style="margin-top: 10px;">C-Profilischiene entsprechend der gewählten Schrankbreite abhängen. Break down profile bar C in accordance with the chosen cabinet width. Trogomner barre profilée C en accord avec largeur de l'armoire choisie. C-profilen alleen op gekozen kastbreedte afzagen. C-profiliskenan kapas till motsvarande skåpets bredd.</p>	<div style="text-align: right;"> <p>SZ 2584.000</p> </div>  <p style="font-size: small; margin-top: 5px;">Raum für Verpackungsdatum Area for date of packing (MMJJTT / MMYYDD)</p> <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 10%;">4 X</td> <td style="width: 40%;"></td> <td style="width: 50%;">M8x45</td> </tr> <tr> <td>4 X</td> <td></td> <td>15x25x6</td> </tr> <tr> <td>8 X</td> <td></td> <td>Ø8.4 1.4305</td> </tr> <tr> <td>12 X</td> <td></td> <td>M8</td> </tr> <tr> <td>4 X</td> <td></td> <td>M8x16</td> </tr> <tr> <td>4 X</td> <td></td> <td>Ø8.4 PA</td> </tr> </table> <div style="font-size: x-small; margin-top: 5px;"> <p>Zchg.-Nr. / No. of dwg. : A4316700SZ Versandbeutel-Nr. / No. of accessory bag : 265834 Lieferanten-Nr. / No. of supplier :</p> </div>	4 X		M8x45	4 X		15x25x6	8 X		Ø8.4 1.4305	12 X		M8	4 X		M8x16	4 X		Ø8.4 PA
4 X		M8x45																	
4 X		15x25x6																	
8 X		Ø8.4 1.4305																	
12 X		M8																	
4 X		M8x16																	
4 X		Ø8.4 PA																	
<div style="display: flex; justify-content: space-around; align-items: center; margin-bottom: 10px;"> <div style="text-align: center;">  1,1 x 7 </div> <div style="text-align: center;">  SW 5 </div> <div style="text-align: center;">  SW 13 </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%; text-align: center;">  <p style="margin-top: 10px;">KS $M_D = 12 + 3 \text{ Nm}$</p> </div> <div style="width: 45%; text-align: center;">  <p style="margin-top: 10px;">KS $M_D = 12 + 3 \text{ Nm}$</p> </div> </div>																			

Appendix 2: Solar Charger Instructions



GENASUN **GV-4** Manual

Solar Charge Controller with Maximum Power Point Tracking

For models:

GV-4-Pb-12V:	12V Lead-Acid/AGM/Gel/Sealed/Flooded
GV-4P-Pb-12V:	12V Lead-Acid/AGM/Gel/Sealed/Flooded
GV-4-Pb-CV:	12V Custom Multi-Stage Lead-Acid/AGM/Gel/Sealed/Flooded

www.genasun.com

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4A / 50W

GENASUN GV-4 (ALL MODELS) MANUAL, REVISION 2.0 | 01.2018

IMPORTANT SAFETY INSTRUCTIONS | SAVE THESE INSTRUCTIONS

Safety Instructions:

This manual contains important instructions for the GV-4-Pb-12V, GV-4P-Pb-12V, and GV-4-Pb-CV solar charge controller that shall be followed during installation and maintenance.

The GV-4 is intended for charging 12V Lead-Acid, AGM, Gel, Sealed, and Flooded batteries. Consult your battery charging specifications to ensure that the GV-4 is compatible with your chosen batteries.

The GV-4 does not include a fuse. Overcurrent protection suitable for the application must be provided by the user.

WARNING: EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

ATTENTION: RISQUE D'EXPLOSION. NE PAS CONNECTER NI DÉCONNECTER PAS LORSQU'IL EST SOUS TENSION. NE PAS CONNECTER LE CIRCUIT ALORS QUE EST VIVANT OU A MOINS QUE LA ZONE EST LIBRE DE CONCENTRATIONS IGNITAIRES.

CAUTION: INTERNAL TEMPERATURE COMPENSATION. RISK OF FIRE, USE WITHIN 0.3 m (1 ft) of BATTERIES. Lead-acid batteries can create explosive gases. Short circuits can draw thousands of amps from a battery. Carefully read and follow all instructions supplied with the battery. Use only 12V lead-acid batteries with the GV-4-Pb-12V and GV-4-Pb-CV.

DO NOT SHORT CIRCUIT the solar array when plugged into the controller. **DO NOT MEASURE SHORT CIRCUIT CURRENT** of the array while connected to the controller. This may damage the controller, and such damage will not be covered under warranty.

Grounding is not necessary for operation and is at the user's discretion. If the GV-4 is to be used with a solar array electrically connected to earth ground, please note the following: **WARNING: THIS UNIT IS NOT PROVIDED WITH A GFDI DEVICE.** Consult Article 690 of the National Electrical Code (or the standards in force at the installation location) to determine whether a GFDI is necessary for your installation.

WARNING: THIS UNIT IS NOT PROVIDED WITH DISCONNECT DEVICES. Consult Article 690 of the National Electrical Code (or the standards in force at the installation location) to determine whether disconnect devices are necessary for your installation.

Use only 12-30 AWG (3.0 mm² max) copper conductors suitable for a minimum of 60 degrees C. If operation at high power or at high ambient temperatures is expected, wire with a higher temperature rating may be necessary.
Recommended terminal block tightening torque: 3-5 in-lbs, 0.35-0.55 Nm.

Inspection & Maintenance

No user-serviceable parts inside.

Inspect the controller at least once per year to ensure proper performance.

- Check for animal or insect damage.
- Inspect for corrosion / water damage.
- Inspect the security of all connections.
- Ensure the solar array does not exceed the maximum input voltage.
- Repair and clean as necessary.

Installation & System Connections:

- Connections should be made according to Article 690 of the National Electrical Code (NFPA 70) or the standards in force at the installation location.
- Electrical connections may be made in any order; however the sequence below is recommended.

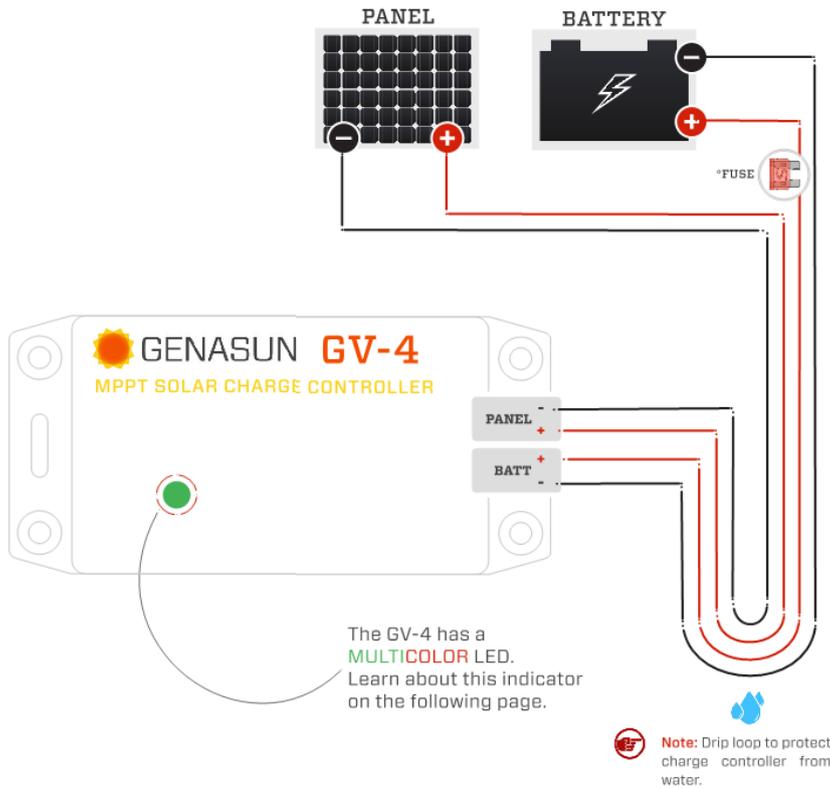
1 MOUNTING

Mount the controller near your battery securely using the holes provided on the enclosure's flanges or with a means appropriate to the application.

- Mount near the battery (use within 0.3 m (1 ft) of batteries. See Caution, p.2).
- The GV-4 can be mounted in any orientation on the floor or wall. We recommend a position in which all labels are clearly visible.
- Do not expose to water.
- Do not mount in direct sunlight or near a source of heat.
- Allow adequate airflow around the controller to achieve maximum output capability.
- For outdoor use, the controller must be housed in an enclosure providing protection at least equivalent to NEMA Type 3.



Note*: The positive or negative battery cable must be protected by a fast-acting fuse or circuit breaker of 10A or less, rated for the maximum battery voltage and connected close to the battery terminal or power distribution block. This fuse will protect the wiring in the event of a short circuit or controller damage.



Troubleshooting

If the LED Indicator will not light, or displays an indication not listed in this manual:

- Verify correct battery polarity;
- Check that there is a solid electrical connection to the battery;
- Check that battery voltage appears on the GV-4 battery terminal screws;
- Check the GV-4 terminal area for evidence of water or mechanical damage.

The GV-4 will not operate without a battery. If the system appears to be overcharging or the GV-4 will not begin charging, ensure that the solar panel is wired only to the GV-4, and in particular that the solar panel negative terminal is not connected to ground (battery negative). If the GV-4 does not appear to be charging, note that the GV-4 waits up to one minute before trying to restart if it has shut down due to lack of power from the solar panel. For more in-depth system troubleshooting, please visit the support area of our website: www.genasun.com/support/

Specifications:

GV-4-Pb-12V

Maximum Recommended Panel Power:	50W
Rated Battery (Output) Current:	4A
Nominal Battery Voltage:	12V
Maximum Input Voltage:	27V
Recommended Max Panel Voc at STC:	22V
Minimum Battery Voltage for Operation:	7.2V
Input Voltage Range:	0-27V
Maximum Input Short Circuit Current*:	4A
Maximum Input Current**:	7A

*Panel Isc. Maximum input power and maximum input voltage requirements must also be respected. **Maximum current that the controller could draw from an unlimited source.

Specifications (cont.):

GV-4-Pb-12V

Charge Profile:	Multi-Stage with Temperature Compensation
Absorption Voltage:	14.2V
Absorption Time:	2 Hours
Float Voltage:	13.8V
Charging Output Voltage Range:	7.2-18V
Battery Temperature Compensation:	-28mV/°C
Operating Temperature:	-40°C - 85°C
Maximum Full Power Ambient:	50°C
Electrical Efficiency:	96% - 99.85% typical
Tracking Efficiency:	99% typical
MPPT Tracking Speed:	15Hz
Operating Consumption:	0.125mA (125uA)
Night Consumption:	0.09mA (90uA)
Environmental Protection:	IP40, Nickel-Plated Brass & Stainless Hardware
Connection:	4-position terminal block for 12-30AWG wire
Weight:	2.8 oz., 80 g
Dimensions:	4.3 x 2.2 x 0.9", 11 x 5.6 x 2.5 cm
Warranty:	5 years

Certifications:   

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