# Eversolar Inverter – Domestic Installation

## Inverter summary

| | |
|---|---|
| Inverter Manufacturer | Eversolar |
| Inverter Model | All Models |
| Inverter Size | All |
| Maximum number of inverters connected to a single SPLASH Monitoring STREAMbox | 99 |

## List of parts required for connection of inverter to SPLASH Monitoring

To enable you to connect the above inverter to SPLASH Monitoring you will need a SPLASH Monitoring STREAMbox and connection cables, these parts are listed below.

| Part description | Part number |
|---|---|
| Inverter Make / Model | As above |
| SPLASH Monitoring STREAMbox | SMSB HW - Hardwired network and inverter connections |
| Connection cable STREAMbox to Eversolar Solar River inverter | Part numbers Eversolar D9F-RJ45 3m<br><br>Eversolar D9F-RJ45 10m<br><br>Unitek USB Adapter UT-890 (FTDI) |
| Connection cable STREAMbox to clients router or LAN | Part numbers SM CAT5 1m – 1m CAT5 cable<br><br>SM CAT5 2m – 2m CAT5 cable<br><br>SM CAT5 5m – 5m CAT5 cable<br><br>SM CAT5 10m – 10m CAT5 cable |
| **Optional** | |

# Installation Guidelines

We have found that the most reliable long-term results are achieved when the Streambox and its power supply is installed well away from daily operational areas. The problem is that the loss of the Splash Monitoring service is not immediately obvious, so it can be many days or weeks before someone realises that their system is not being updated. We are in the process of developing a mechanism to detect the loss of communication which optionally sends an email alert to one or more nominated recipients, but it is always prudent to minimise the risk of disruption by following these guidelines:

- If possible install the equipment and power supplies well away from daily operational areas such as someone's desk or work bench.
- Try and secure the equipment by attaching it to a wall or shelf with screws, Velcro or double sided tape. This should prevent it from slipping and becoming disconnected.
- Always secure the STREAMbox power cord to the STREAMbox using the P clip supplied. The P clip should be located on the back of the STREAMbox using one of the existing jack posts, as illustrated:



- Always ensure the LAN cables you use are in sound condition with their retaining clips intact, and make sure they are securely fitted to the equipment by giving them a gentle tug.
- Always ensure that all cables are secured using cable ties to protect them from accidental snagging.
- Never stretch cables to the point where any movement could cause them to become dislodged.
- Always install the STREAMbox with the ridged heat sink outwards and the side vents unobstructed. It doesn't matter what orientation is used; horizontally on its bottom (the flat black surface); or vertically on its side.
- The equipment and power supplies will be labelled 'DO NOT SWITCH OFF', but you should inform people with access to the installation area that this equipment should not be turned off; for example cleaning and maintenance personnel.

# Setting Up Your Eversolar Inverters

This section is intended as a quick guide to setting up SPLASH Monitoring and assumes your inverters are already connected to the PV panels and grid/batteries, and where necessary programmed according to your requirements. For more details please refer to the Eversolar Installation Manual.

## Basic Connectivity
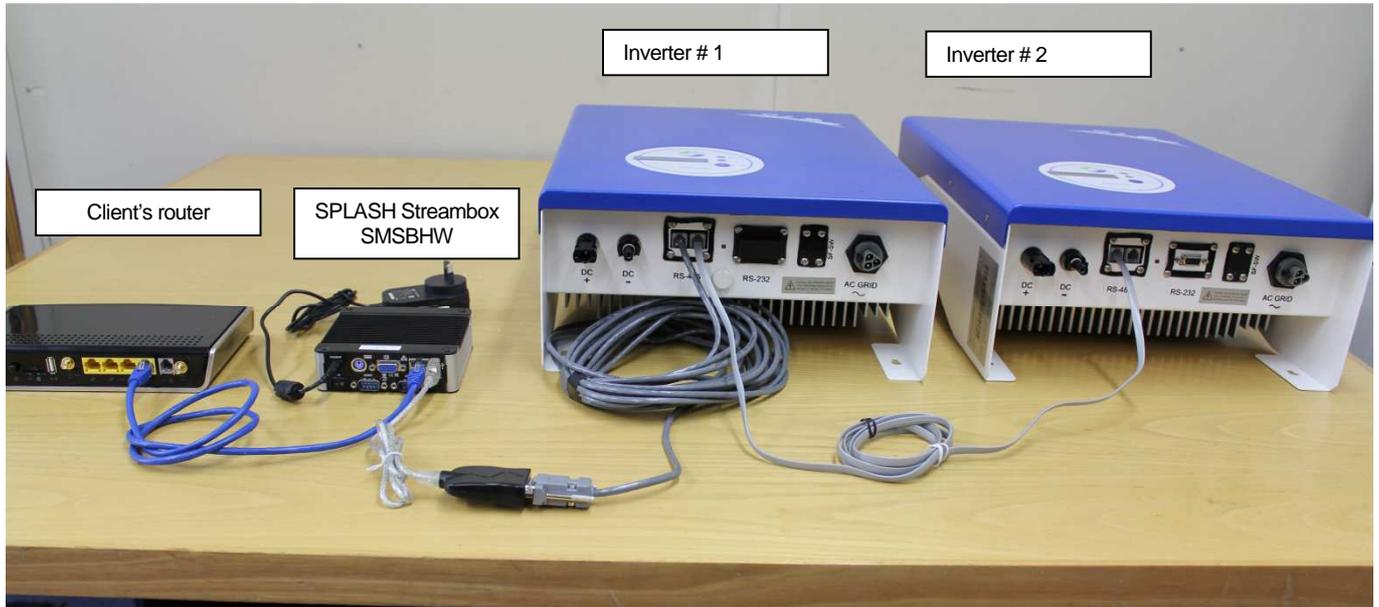


The photo above shows the connectivity between the various devices. The connections from left to right are:

1 – CAT5 or CAT6 LAN cable between the STREAMbox and your LAN, router or Network Access Device (blue cable).
2 – USB to RS422 adapter and data cable between the STREAMbox and the first inverter (dark grey cable).
3 – RJ45 extension cable between inverters (light grey cable).


Network Access Device: This may be a Router, ADSL Modem, Switch or other network device connected to the Internet.

Please take care when connecting the inverter(s) to the STREAMbox, if the distances are long then SPLASH Monitoring approved twisted pair cable is crucial.


## Setting Up Your STREAMbox

Unless the STREAMbox has already been configured according to your specifications, it will be configured to acquire a DHCP IP address from your router or DHCP server. For most domestic applications this will work without any modification. However, if you do need to change its settings see below for guidance.

**Trouble Shooting:**

"No Stream Found" on the SM Web site:
This is because the web site hasn't received any data from the STREAMbox.

- Eversolar inverters can't be interrogated for data if there is no DC power from the PV panels, so setting up your STREAMbox for the first time at night is not going to work.

- Allow at least 10 minutes after powering up the STREAMbox before starting your diagnostic checks.

- Check the connections between the STREAMbox and your router and ensure you have a solid green light at the top left of the RJ45 socket and a flashing green light at the top right of the socket.

- No solid green light could indicate: the STREAMbox is switched off (check the power light on the front of the STREAMbox); or the router isn't powered up, or the LAN cable isn't connected to the router; or the LAN cable is faulty. To eliminate the LAN cable and router, connect the LAN cable to a known working device like your laptop or PC and if you can get a web session, then the LAN connectivity is OK.

- Check the connection between the STREAMbox and the inverter. There's not much you can do other than check the physical connections at the STREAMbox, USB converter and the inverter.

  Unitek USB Adapter UT-890 (FTDI)                                    Eversolar Inverter

                Rx+(B) 3 --------------Green/White---------------- 1 TxA

  D9 Female  Rx-(A) 4 -----------------Green-------------------- 2 TxB    RJ45 Male

                Tx+(B) 1 ------------Orange/White--------------- 3 RxA

                Tx-(A) 2 -----------------Orange-------------------- 6 RxB

                                CAT 5 Cable

- Try power cycling the STREAMbox – switch it off, wait 5 sec, switch it back on.

- Try logging on to the STREAMbox: enter "splash" in your web browser's address line, or if your STREAMbox has a fixed IP address, enter that into your web browser. For instructions on how to use the STREAMbox's 'Web Information Page' go to http://www.splashmonitoring.com/assets/SM-STREAMbox-Web-Information-Page.html

- The most common issue we encounter is the site's network firewall not allowing outbound traffic. This is rarely an issue with domestic routers, but very common in managed commercial networks. Unless you have someone you can ask (like a network administrator) a good way to detect this issue is to log onto the STREAMbox and run a 'Healthcheck' report. This will give you lots of information including whether the STREAMbox can 'see' the internet.

- The STREAMbox is not able to work with a proxy server. If you have a proxy server you will need to make special arrangements with your network administrator to have the STREAMbox circumnavigate it by issuing a fixed IP address with appropriate privileges.

- Generally there must only be on 'master' device on an RS422/RS485 bus. The STREAMbox is a master device and as such can be the only one attached to your inverters, so make sure you don't have another data logging device attached to the RS422/RS485 bus. It will very likely work intermittently, but the data flow will be unreliable and possibly corrupt if there are multiple master devices attached.

**Mode:**

The operating 'Mode' will be one of four values:

| Value | Mode | Description |
|---|---|---|
| 0 | Wait | There is insufficient PV voltage to start the inverter. This is a normal condition when there is little or no light available. |
| 1 | Normal | There is sufficient PV voltage to operate the inverter and power is being delivered to the grid. |
| 2 | Fault | The inverter has developed a fault. Attempt to clear the fault by Isolating the AC supply. If the fault clears, then reconnect the AC supply. Otherwise consult your inverter supplier. |
| 3 | Permanent Fault | Consult your inverter supplier. |

**Error Code:**

The inverter can have up to 32 errors at any one time. Each of these errors is represented by a bit in a 32 bit number, so the error code you see on Splash Monitoring is the decimal representation of this 32 bit number, which under normal circumstances, should be zero.

If the error value is greater than zero you will need to translate it from decimal to binary, which is easily done using a web tool such as http://www.mathsisfun.com/binary-decimal-hexadecimal-converter.html Just copy the error value into the 'Decimal' box and it will display the binary value in the 'Binary' box.

Bit0 is the right most digit of the binary value and Bit31 is the left most digit, so counting from the right hand side if the binary value, and start counting from 0 (not 1), count left until you encounter a '1' in the binary value. This is the position of the first error condition, so look up that position in the table below. If the inverter is in multiple error conditions there will be more 1s in the binary number so keep counting left and look up each one as you go.

| | | |
|---|---|---|
| Bit31 | Master-Slave-Fail | Communication between microcontrollers is failing |
| Bit30 | EEPROM-Fail | EEPROM cannot be read or written |
| Bit29 | Fac-Master-Fail | The master-frequency is out of tolerable range |
| Bit28 | Fac-Slave-Fail | The slave-frequency is out of tolerable range |
| Bit27 | NA | |
| Bit26 | NA | |
| Bit25 | Rly1-Fail | Relay has failed |
| Bit24 | NA | |
| Bit23 | ENS-Vac-Fail | Different value between Master and Slave for grid voltage |
| Bit22 | ENS-Fac-Fail | Different value between Master and Slave for grid frequency |
| Bit21 | NA | |
| Bit20 | ENS-Mess-Fail | Different value between Master and Slave for Fac, Uac |
| Bit19 | Offset-Iac-Fail | The DC injection check for grid Current failed |
| Bit18 | Zpv-PE-Fail | Isolation resistance of PV-plant out of tolerable range before connecting to the grid |
| Bit17 | Vac-Master-Fail | Master-grid voltage measurement-value out of tolerable range |
| Bit16 | FanLock-Warning | Fan Lock |
| Bit15 | VpvMax-Fail | Pv input voltage is over the tolerable maximum value |
| Bit14 | NA | |
| Bit13 | Temperature –Fail | Over temperature fault |
| Bit12 | M-S Version Fail | Master and Slave firmware versions don't match (three phase only) |
| Bit11 | Bus-Fail | Dc bus fault |
| Bit10 | GFCI-Fail | Ground current is too high |
| Bit 9 | No-Utility | Grid voltage is zero |
| Bit 8 | NA | |
| Bit 7 | Device Fault | Device Fault |
| Bit 6 | Bus_High-Fail | Dc Bus voltage is too high. |
| Bit 5 | NA | |
| Bit 4 | ENS-GFCI-Fault | Different value between Master and Slave for GFCI |
| Bit 3 | ENS-DCI- Fault | Different value between Master and Slave for DC output current |
| Bit 2 | Ref 2.5V Fault | The internal 2.5V reference is abnormal |
| Bit 1 | DC Sensor Fault | The DC output sensor is abnormal |
| Bit 0 | GFCI Failure | The GFCI detection circuit is abnormal |

**Decyphering Example Error Code:**

Error Value on Splash is 8192

Enter this number into to http://www.splashmonitoring.com/assets/SM-STREAMbox-Web-Information-Page.html



Binary Value is: 10000000000000

Count left from the right hand digit and start counting from zero:

| Bit13 | | | | | | | | | | | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

So the 13$^{th}$ 'bit' from the right is the first '1' encountered, so look up Bit13 in the table above and you will find the inverter has exceeded its maximum operating temperature.

Splash Monitoring makes no attempt to explain the cause or remedy of any of the status or error codes. You should contact the inverter supplier to establish what action is needed.