Abriox

Remote monitoring & control for pipelines

SUNBIRD

TR Monitor
Installation Instructions

V4

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www.abriox.com

Abriox

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2. SAFETY INFORMATION

Please ensure you are familiar with the Electrical Safety Regulations of your company and observe them at all times.

2.1 General Safety Summary

This manual contains information and warnings that must be observed to keep the SUNBIRD TR Monitor (hereafter referred to as SUNBIRD TR) in a safe condition and ensure safe operation. To use the SUNBIRD TR correctly and safely, read and follow all precautions given. Please ensure you fully understand all instructions throughout this manual that relate to specific measurement functions. In addition, please follow all generally accepted safety practises and procedures required when working with and around electricity.

2.2 Safety and Electrical Symbols

The table below lists safety and electrical symbols that appear on the SUNBIRD TR and within this document.

Symbol	Description
CAT III	Installation Category (Overvoltage Category) III
CAT IV	Installation Category (Overvoltage Category) IV
	Risk of danger. Important information. See Installation Instructions
	Hazardous voltage. Voltage > 30V AC (42.4V peak) or 60V DC might be present

2.3 Maximum Input Voltage for ON/OFF Potential Channel

The ON/OFF Potential channel of the SUNBIRD TR is intended to measure ±4V. It can handle a maximum input voltage of 35V AC (RMS) and 50V DC without damage.

2.4 Maximum Input Voltage for TR Volts Channel

The TR Volts channel of the SUNBIRD TR has a maximum input voltage of 150V AC and 150V DC. The SUNBIRD TR has protection against high voltage transients built in, but there is a limit to the amount of energy it can dissipate.

An external high energy voltage clamp rated up to 150V AC or 200V DC maximum is recommended to ensure the rectifier is protected and the SUNBIRD TR internal protection is not overloaded. This is especially important in areas prone to lightning strikes.

2.5 Maximum Input Voltage for TR Shunt Channel

The TR Shunt channel of the SUNBIRD TR provides readings up to 100mV AC and ±100mV DC. The channel itself should not be exposed to voltages greater than ±1V peak. Voltages greater than this will cause the channel input protection to activate which can only protect the SUNBIRD TR for a limited period of time.

2.6 Danger of Electric Shock

When using the SUNBIRD TR on rectifiers with an output greater than 30V AC (42.4V peak) or 60V DC, care should be taken as there is a danger of electric shock.

2.7 Channel Input Protection

Channels 1 and 3 have CAT IV surge protection at their rated input voltage ranges. Channel 2 has CAT III surge protection at its rated input voltage range.

2.8 Battery Replacement

The battery pack is specific to the product and can be replaced. Please contact Abriox to order replacements.

2.9 Disclaimer

If this equipment is used in a manner not specified by Abriox, the protection provided by the equipment may be impaired. Please ensure you follow all guidance for safe and correct use of your equipment.

3. COMPLIANCE

This product is CE marked which means that Abriox declares that the product or equipment complies with all applicable European Directives. A copy of the Certificate of Conformity can be obtained from Abriox.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.

Do not make any changes or modifications to the equipment unless otherwise specified in the manual. If such changes or modifications should be made, you could be required to stop operation of the equipment.

This product is UKCA marked which means that Abriox declares that the product or equipment complies with all applicable UK Directives. A copy of the Declaration of Conformity can be obtained from Abriox.



This symbol indicates that this product is not to be disposed of with your household waste, according to the WEEE Directive (2002/96/EC) and your national law. This product should be handed over to a designated collection point, e.g., on an authorised one-for-one basis when you buy a new similar product or to an authorised collection site for recycling waste electrical and electronic equipment (EEE). Improper handling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. At the same time, your cooperation in the correct disposal of this product will contribute to the effective usage of natural resources. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, waste authority, approved WEEE scheme or your household waste disposal service.

4. COMPATIBILITY

4.1 Software compatibility

The SUNBIRD TR Monitor is only compatible with **iCPSM4**. Earlier versions of the software do not support the features offered by this model.

4.2 MERLIN Compatibility

The SUNBIRD TR has been designed to make installation easy when replacing previous versions of MERLIN Transformer Rectifier Monitors.

Terminal Connections

The **Green Terminal Block** on the SUNBIRD TR is backwards compatible with all previous versions of MERLIN Transformer Rectifier monitors (2G, 3G & 4G versions). Simply unplug the green terminal block from the existing MERLIN monitor and plug the green terminal block into the new SUNBIRD TR monitor. There is no need to rewire.

GPS Antenna

GPS antennas from previous versions of MERLIN Transformer Rectifier monitors (2G, 3G & 4G versions) are fully compatible with SUNBIRD TR. Simply unplug the GPS antenna from the existing MERLIN monitor and plug the GPS antenna into the new SUNBIRD TR monitor. There is no need to replace.

Cellular Antenna

Cellular antennas from previous versions of MERLIN Transformer Rectifier monitors (2G, 3G & 4G versions) are unlikely to be compatible with SUNBIRD TR and will require replacing with the correct type to cater for 5G connectivity.

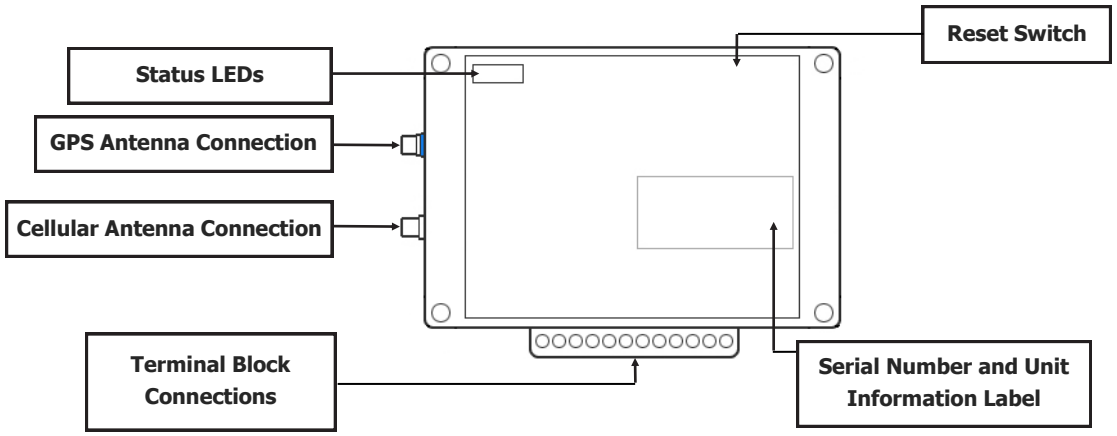
5. INTRODUCTION

The SUNBIRD TR is a small, compact Remote Monitoring Unit (RMU) housed within the rectifier cabinet that carries out the functional checks of the rectifier output (voltage and current measurements) that are required in order to comply with regulatory guidelines.

All data is automatically transmitted in a management report to the system HQ (using the cellular/mobile network) where it is accessed online using Abriox's iCPSM4 software.

The SUNBIRD TR will report immediately if an output alarm threshold is exceeded and will also check that the rectifier remains powered by its external electrical supply. If the power fails, an alarm is transmitted and the SUNBIRD TR internal batteries take over monitoring (for up to 2 years).

5.1 Front View of the SUNBIRD TR



6. BEFORE GOING TO SITE

6.1 Check iCPSM4 is Running

Please ensure you have a running iCSPM4 system and you can log in (as detailed on your iCPSM Licence Certificate).

Note

It is vital the iCPSM4 system is running prior to going to site otherwise the installation will fail.

6.2 Power Requirements for the Power Supply Unit

The Power Supply Unit (PSU) that comes with the SUNBIRD TR should be powered from the AC supply to the rectifier (this enables the SUNBIRD TR to report an AC outage). Make sure beforehand that there is a suitable power point available so that you can plug or wire the PSU in easily on site.

The AC supply input is 100-240V AC, 50/60Hz (1.2A maximum). Abriox recommend that a 3A fused switch or circuit-breaker is used, in close proximity, easily reached and marked as the disconnecting device for the SUNBIRD TR PSU.

The SUNBIRD TR can also be powered via an external 12V DC supply. See section 7.3 for further information.

6.3 Equipment Check

Make sure you have the following equipment prior to going to site.

Item	Description
Current Shunt	An appropriate* current shunt for the output of the rectifier. 20A 200mV or 50A 50mV is recommended.
Magnet	A strong magnet to activate the SUNBIRD TR on site
Tool Kit	Tool kit for the installation on site
Consumables	Rigid solid core or flexible 0.2mm² to 2.5mm² (AWG 24-12) wire
Documents	Installation instructions (this document), Quick Start Guide
Multimeter	Multimeter to check the voltage and current readings on site
Cell/Mobile Phone/ Internet Enabled Tablet/Laptop	Used for checking the readings in iCPSM4 taken by the SUNBIRD TR on site.
Accessories	External antennas, lightning arrestors, MERLIN Interrupter or mercury relay, surge filter†

Note

*The shunt needs to be able to handle the full output of the rectifier (and lightning strikes) whilst also bearing in mind the SUNBIRD TR has an input range of 0 to +/-100mV on its TR Shunt channel.

†The surge filter is only applicable for SUNBIRD TR EXCEL and MERLIN Interrupter installation's where the Pipeline Locate feature is required.

6.4 Pre-installation Checklist

Please see Appendix A - Pre-installation Checklist for further details on what you may require prior to going on site.

7. ON SITE ⚠

Please ensure you are familiar with the Electrical Safety Regulations of your company and observe them at all times.

7.1 The Install Process

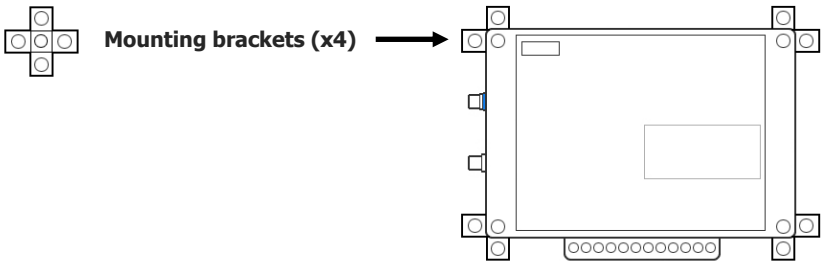
1. Open the rectifier cabinet and **ensure that the AC supply to the rectifier is isolated** ⚠
2. House the SUNBIRD TR (see section 7.2)
3. Powering the SUNBIRD TR (see section 7.3)
4. Fit GPS and Cellular antennas (see section 7.4)
5. Connect the SUNBIRD TR (see section 7.5)
6. Fit any additional accessories (see section 7.6)
7. **Turn the AC supply on** ⚠
8. Activate the SUNBIRD TR (see section 7.7)
9. Take a reading with a multimeter (see section 7.8)
10. Compare the readings on iCPSM4 (see section 7.9)
11. Finish on site (see section 7.10)
12. Post site configuration (see section 8)

⚠ **ENSURE THAT THE AC SUPPLY TO THE RECTIFIER IS ISOLATED BEFORE CONTINUING**

7.2 House the SUNBIRD TR

Locate a suitable position inside the rectifier cabinet for the SUNBIRD TR, PSU and any accessories to be installed. Dimensions for the SUNBIRD TR and the PSU are detailed in section 10.

To mount the SUNBIRD TR Monitor to a chipboard, use the supplied brackets and fix in place using No.6/3.5mm screws.



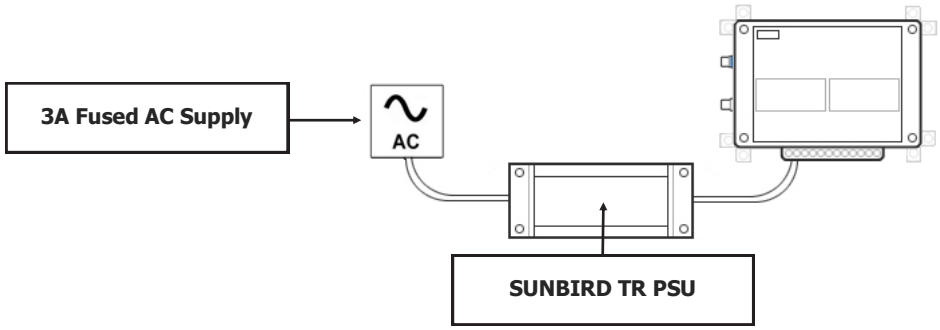
7.3 Powering the SUNBIRD TR

The SUNBIRD TR can be powered using the supplied PSU or via an external 12V DC supply.

7.3.1 Using the Supplied PSU

The SUNBIRD TR PSU should be powered from the AC supply to the rectifier. The AC supply input is 100-240V AC, 50/60Hz (<1A maximum). Abriox recommend that a 3A fused switch or circuit-breaker is used, in close proximity, easily reached and marked as the disconnecting device for the SUNBIRD TR PSU.

Connect the negative wire from the PSU to Terminal A (0V) and the positive wire to Terminal B (+12V) on the SUNBIRD TR.



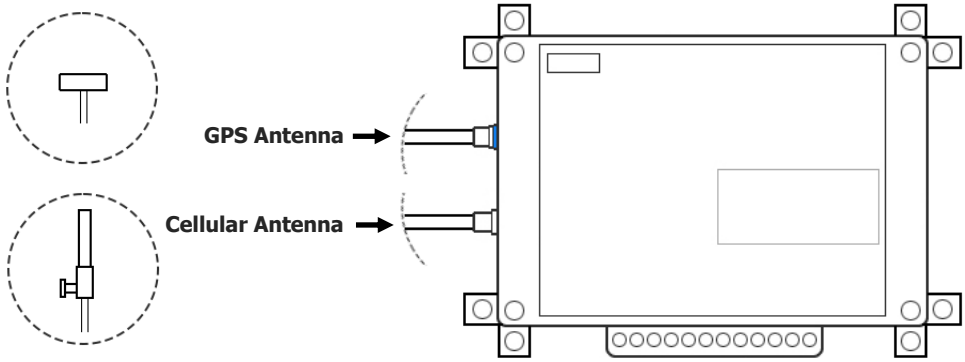
7.3.2 Using an External DC Supply

Connect the negative wire from the external 12V DC supply to Terminal A (0V) and the positive wire to Terminal B (+12V) on the SUNBIRD TR.

7.4 Fit GPS and Cellular Antennas

When fitting the external antennas, ensure they are **mounted outside any metal enclosures** and ideally as high up as possible in order to gain the best signal. The external GPS antenna requires a clear view of the sky and needs to be installed in a horizontal position.

Connect both the GPS and Cellular antennas as shown (GPS is colour coded blue).



Note

When installing cellular and GPS antennas, please fit them as far apart as possible.

7.5 Connect the SUNBIRD TR

The SUNBIRD TR has up to 12 connections, labelled A to L and are briefly described on the front label of the SUNBIRD TR.

The connections correspond with the labelled terminal block and are explained in greater detail in the following sections. See section 9 for installation examples.

For wiring we recommend rigid solid core or flexible 0.2mm² to 2.5mm² (AWG 24-12).

Wire up the terminal block as follows (functions are model dependant):

Terminal	Description	Function
A	0V	Power
B	+12V	
C	0V	Relay Control
D	FS (Fail Safe) Electromechanical Relay Drive	
E	INT (Interrupt) Solid State Relay Drive	
F		Not Used (leave unconnected)
G	ON/OFF Potential –ve	ON/OFF Potential*
H	ON/OFF Potential +ve	
G	TR Shunt 2 –ve	TR Amps 2†
H	TR Shunt 2 +ve	
I	TR Volts –ve	TR Volts
J	TR Volts +ve	
K	TR Shunt –ve	TR Amps
L	TR Shunt +ve	

*Only applicable for SUNBIRD TR EXCEL models

†Only applicable for SUNBIRD TR EXCEL Dual Current models

7.5.1 Relay Connections

If a MERLIN Interrupter or mercury relay are not being installed these connections should all be left unconnected.

If a mercury relay is used, connect the drive connections for the mercury relay to 0V and INT. If a MERLIN Interrupter is being installed please refer to the MERLIN Interrupter Installation Instructions, however:

- **Terminal C (0V) should be connected to MERLIN Interrupter Terminal C**
- **Terminal D (FS) should be connected to MERLIN Interrupter Terminal D**
- **Terminal E (INT) should be connected to MERLIN Interrupter Terminal E**

7.5.2 ON/OFF Potential Connections (model dependant)

Connect terminal G (–ve) to the reference cell, connect terminal H (+ve) to the pipe, ideally via a test wire connected directly to the pipe (this will allow IR free ON potential reads). If this is not available then connect to the pipe side of the MERLIN Interrupter or mercury relay.

The connection must be made on the pipe side of the relay to allow OFF potential reads to be taken. If there is no reference cell, or pipe potentials are not required, link terminal G to H.

- **Terminal G = ON/OFF Potential –ve**
- **Terminal H = ON/OFF Potential +ve**

Note

The pipe will be connected to the –ve output of the rectifier. The SUNBIRD TR's ON/OFF Potential +ve is connected to the pipe (and therefore the -ve output of the rectifier). This means SUNBIRD TR will read conventionally i.e. a negative ON potential.

7.5.3 TR Volts Connections

Connect to the positive and negative rectifier output terminals.

- **Terminal I = TR Volts –ve**
- **Terminal J = TR Volts +ve**

7.5.4 TR Shunt 1 / 2 Connections* (model dependant)

If no shunt is present one will need to be installed. The shunt can be installed on either output of the rectifier.

The correct shunt needs to be selected to handle the maximum output of the rectifier, and lightning surges, whilst providing the best resolution for the current reading. We recommend a shunt with a rating at least double that of the rectifier e.g. 20A 200mV on a 10A rectifier, and by default a 50A 50mV shunt if the rectifier output is greater than 10A.

The TR Shunt channel can read 0 to ±100mV. If there is no current shunt then link -ve to +ve.

- **Terminal K (and Terminal G) = TR Shunt –ve**
- **Terminal L (and Terminal H) = TR Shunt +ve**

If a MERLIN Interrupter is being installed this has an internal shunt:

- **Terminal K (–ve) can be connected to MERLIN Interrupter Terminal K**
- **Terminal L (+ve) can be connected to MERLIN Interrupter Terminal L**

Otherwise if the rectifier has an accessible shunt then connect to this.

Note

*The TR Shunt 2 channel (Terminals G & H) is only available on SUNBIRD TR EXCEL Dual Current models.

7.6 Fit Any Additional Accessories

The following sections provide a brief overview for installing any additional accessories.

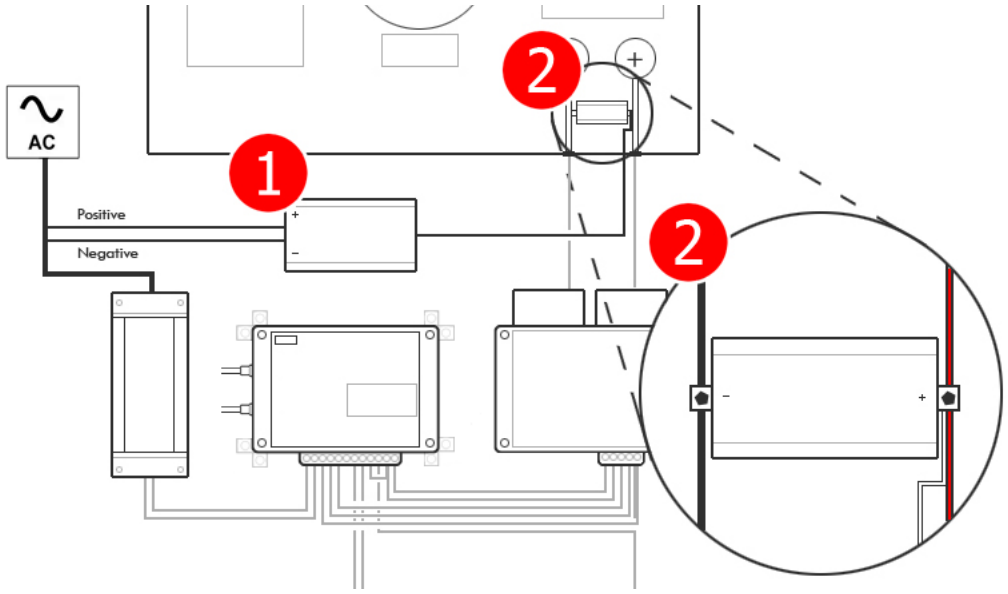
7.6.1 Lightning Surge Arrestors

For areas at risk of lightning strikes/surges, we strongly recommend surge arrestors are fitted. No surge arrestor can deal with a direct strike but this arrangement should provide a high level of protection. Abriox recommend the following lightning surge arrestors:

	Model	Type	Position
1	ASZH240C201	240V Single Phase 3 Wire Service	AC Supply
2	LPC11895-2120	0-180V DC	Rectifier Output

For rectifiers that will not accept the LPC11895-2120:

	Model	Type	Position
2	Epcos B60K130	Screw Terminals, 0-130V	Rectifier Output



Ensure that the AC used to power the SUNBIRD TR PSU and rectifier is isolated before installing the surge arrestors.

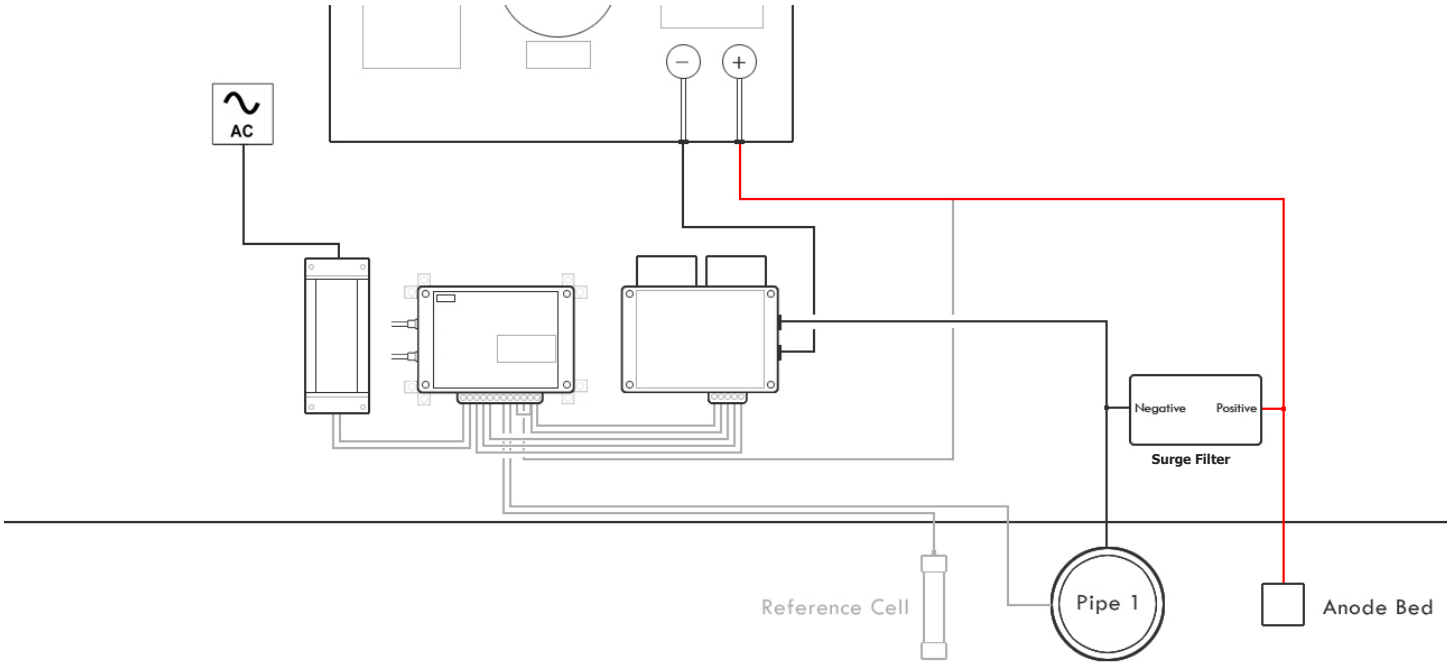
The ASZH240C201 surge arrestor is installed across the SUNBIRD TR PSU AC input and the rectifier's positive output/ground bed connection:

- The white ground wire of the arrestor is connected to the rectifier's positive output/ground bed connection (not electrical ground)
- The black AC line wires are connected to the AC supplying the SUNBIRD TR PSU

Note
It is vital to keep the connections as short as possible.

7.6.2 Surge Filter

The surge filter is only applicable for SUNBIRD TR EXCEL and MERLIN Interrupter or SSR installation's where the Pipeline Locate feature is required. The surge filter is fitted between the rectifier's positive and negative output as shown below.



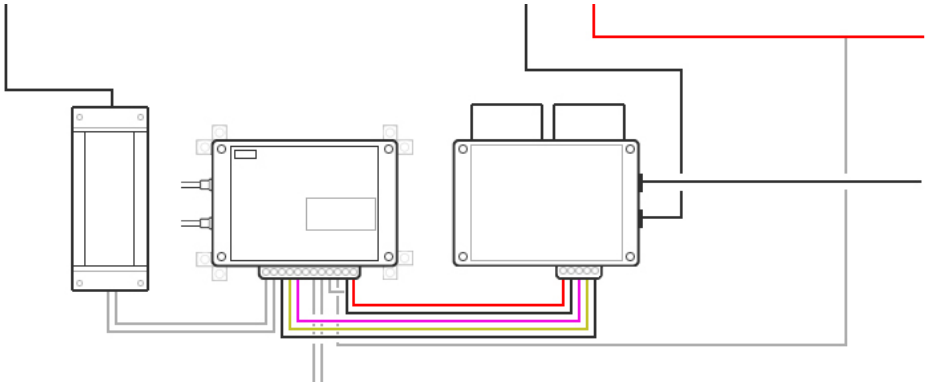
See section 9 for installation examples.

7.6.3 MERLIN Interrupter, Mercury Relay or SSR

As detailed in previous sections, if a MERLIN Interrupter is being installed please refer to the MERLIN Interrupter Installation Instructions, however:

- **Terminal C (0V) should be connected to MERLIN Interrupter Terminal C**
- **Terminal D (FS) should be connected to MERLIN Interrupter Terminal D**
- **Terminal E (INT) should be connected to MERLIN Interrupter Terminal E**
- **Terminal K (–ve) should be connected to MERLIN Interrupter Terminal K**
- **Terminal L (+ve) should be connected to MERLIN Interrupter Terminal L**

If a mercury relay is used, connect the drive connections for the mercury relay to 0V and INT.

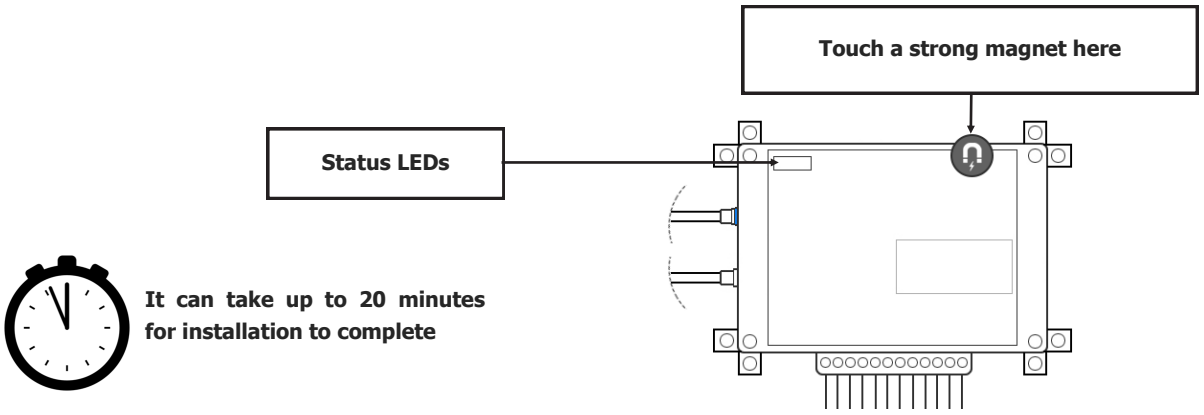


See section 9 for installation examples.

TURN THE AC SUPPLY TO THE RECTIFIER BACK ON

7.7 Activate the SUNBIRD TR

With the power reconnected to the rectifier and SUNBIRD TR PSU, activate the SUNBIRD TR Monitor by touching a strong magnet on top of the Reset switch where indicated on the label, all 3 LEDs (Green, Amber and Red) will illuminate whilst the magnet is held in place.



Once the LEDs have illuminated, remove the magnet to start the installation process.

The Status LEDs on the SUNBIRD TR Monitor will flash to indicate the installation status. The LEDs will flash between Amber and Green to show communications/installation is taking place. Once the unit is flashing green (1 green flash every 2 seconds), communications have been established and installation has been completed.

During Installation

LED Colour	Sequence	Description
	All LEDs Illuminated	Magnet is present on Reset Switch
	Amber/Green Alternating	Connecting to the network and installing

During Normal Operation

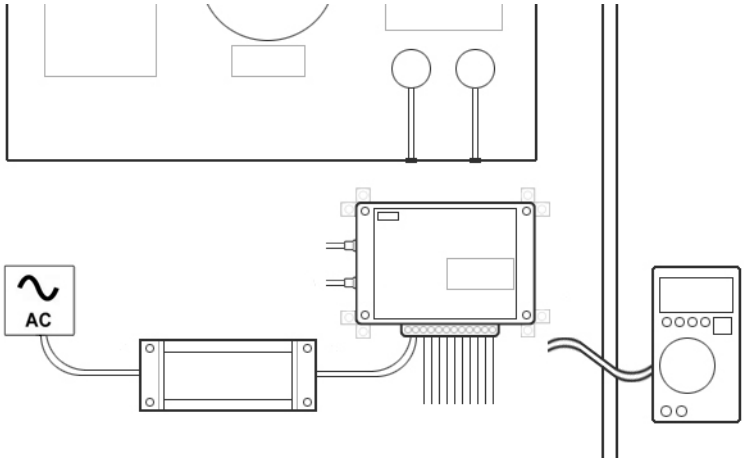
	1 flash every 2 seconds	Everything is OK

Note

The Status LED can indicate various statuses, please refer to the Appendix C for further information on the LED Status.

7.8 Take a Reading with a Multimeter ⚠ ⚠

Take a reading of the input levels to the SUNBIRD TR, we recommend taking the measurements at the terminal screws on the SUNBIRD TR itself. If the shunt input is over-range then the reading will clip at maximum i.e. 150.00mV. Change the shunt if necessary. The values can be compared against the iCPSM4 readings as described in section 7.9.



7.9 Compare the Readings on iCPSM4

To check the measurements taken by the SUNBIRD TR, open iCPSM4 via a browser on your phone/tablet/laptop etc.

Once you are logged in, click on "New Installations" from the menu on the left and locate your unit by matching the serial number on the front of the unit. Check the reading values match those given by the multimeter.

If any other readings are inconsistent with the multimeter check the wiring and the condition of the reference cell.

7.10 Finish On Site

The SUNBIRD TR is now installed and you can close up the cabinet.

8. POST SITE CONFIGURATION

Once installed you will need to assign the SUNBIRD TR Monitor to a Pipeline and Location, you will also need to configure the following: **Shunt Values** and **Alarm Thresholds** (specify the high and low values that trigger an alarm).

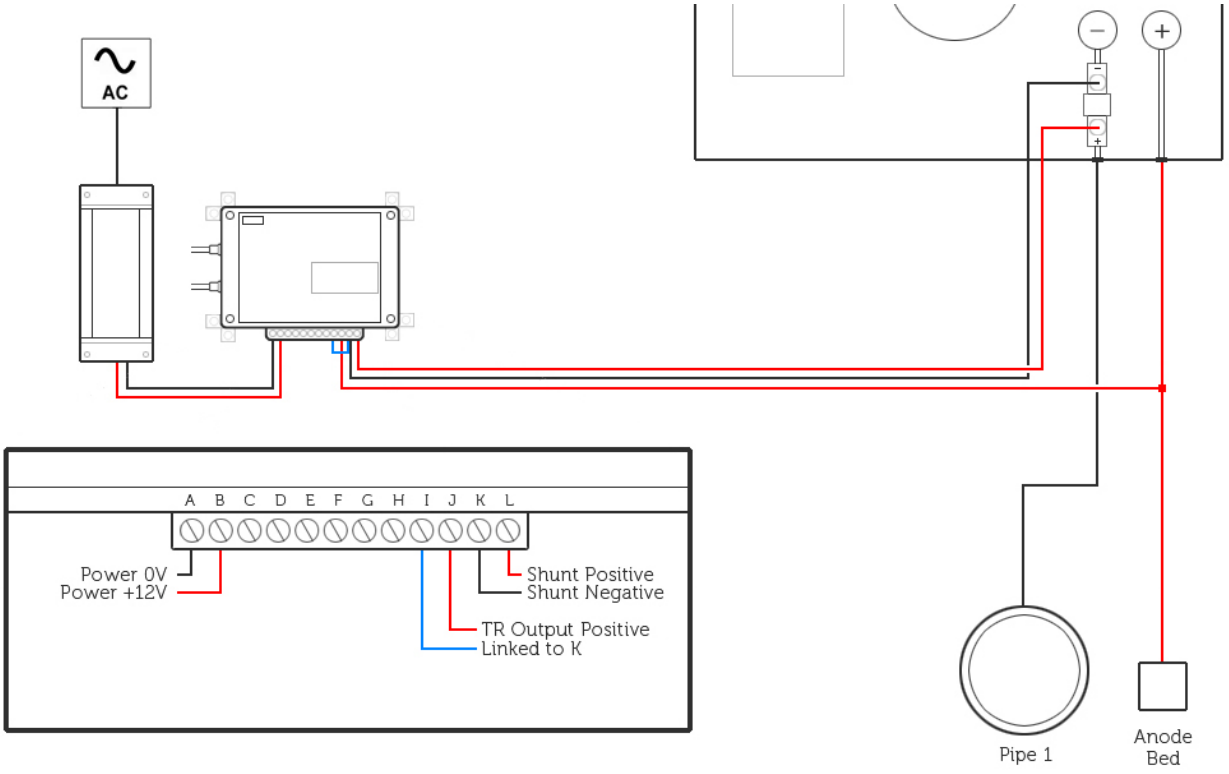
Go to **www.icpsm.com** in your chosen browser and log in with your Abriox issued Username and Password.

Further configuration and operational features can be carried out directly via the software.

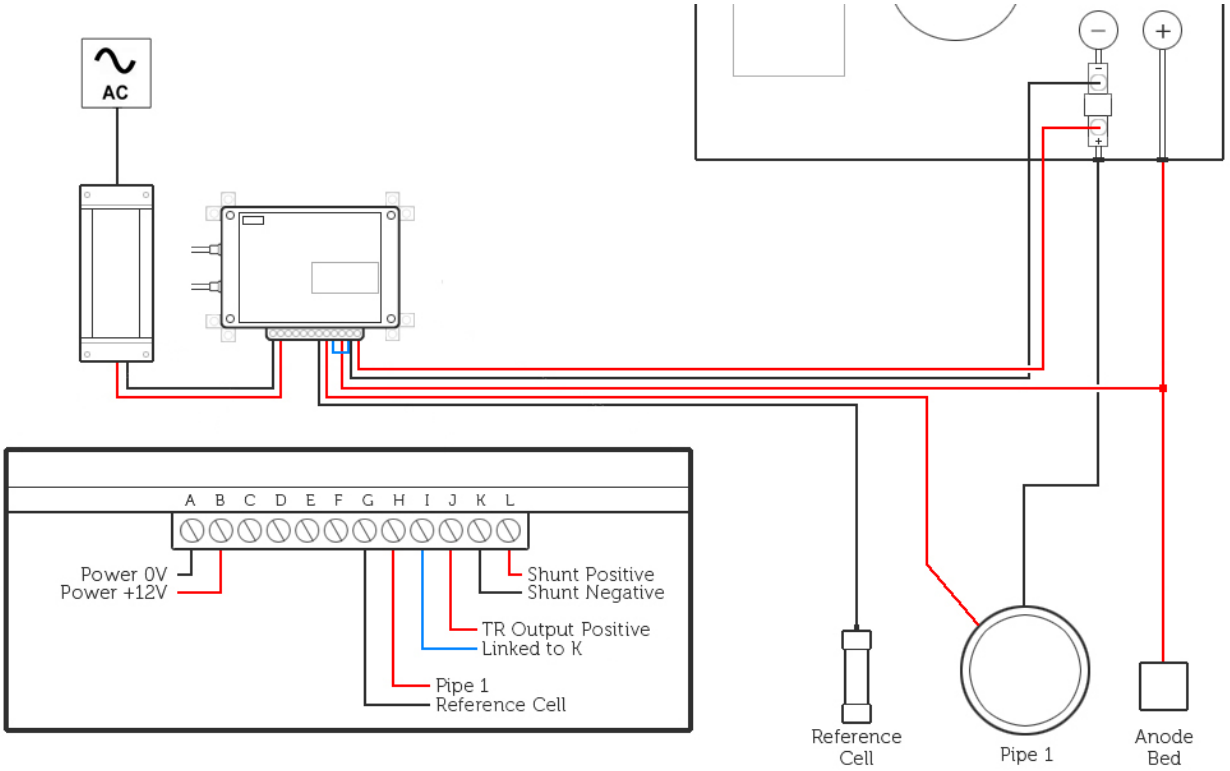
9. INSTALLATION EXAMPLES

The following examples are shown only as a guide.

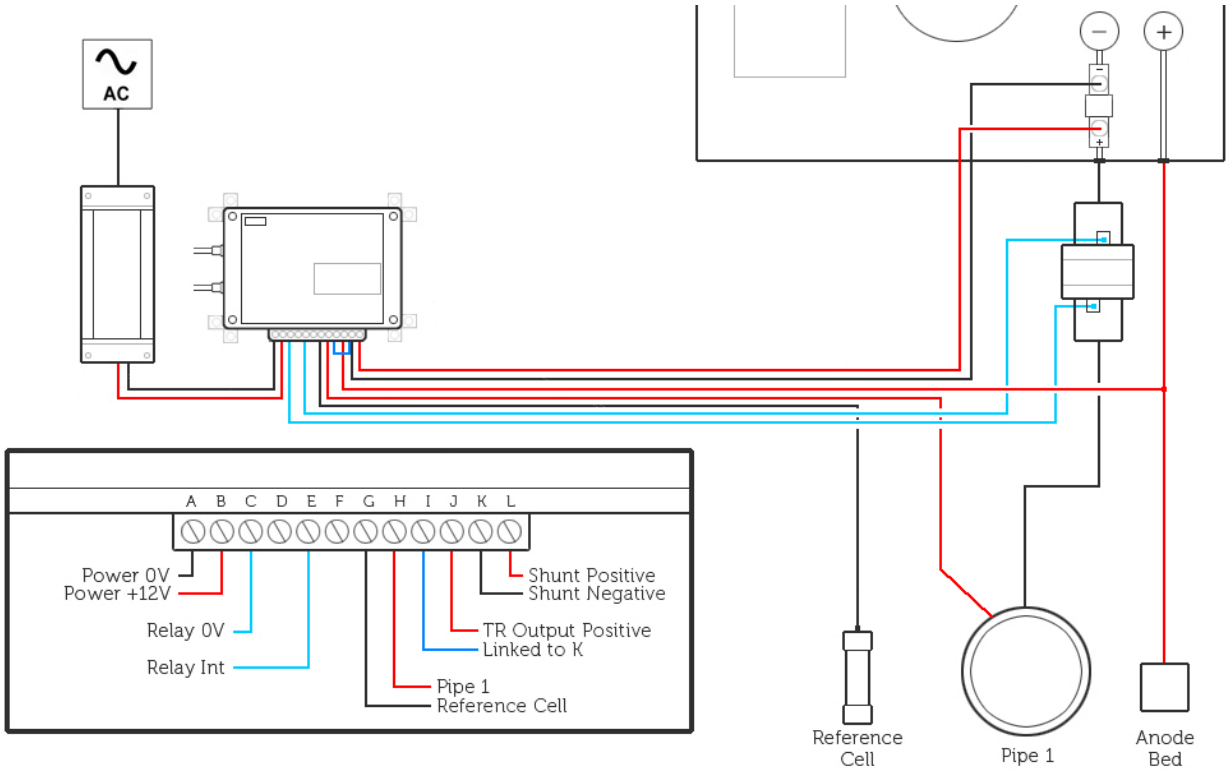
9.1 SUNBIRD TR BASIC



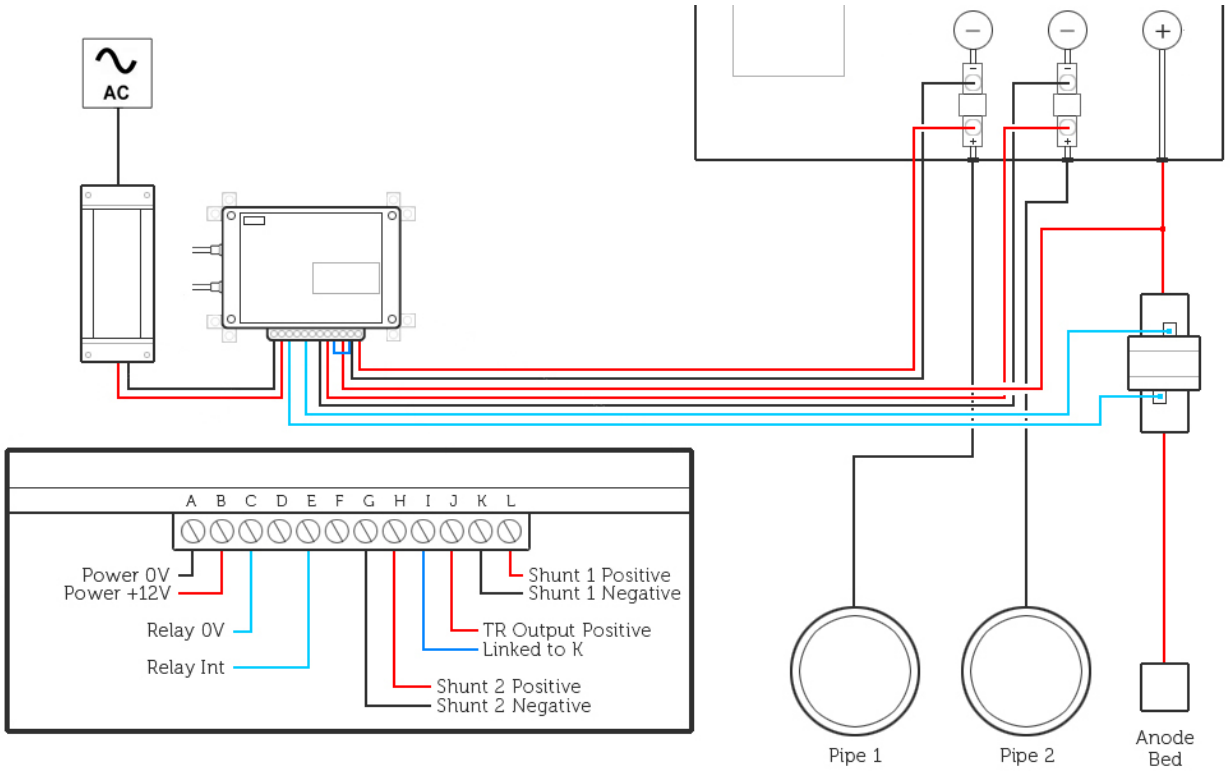
9.2 SUNBIRD TR EXCEL



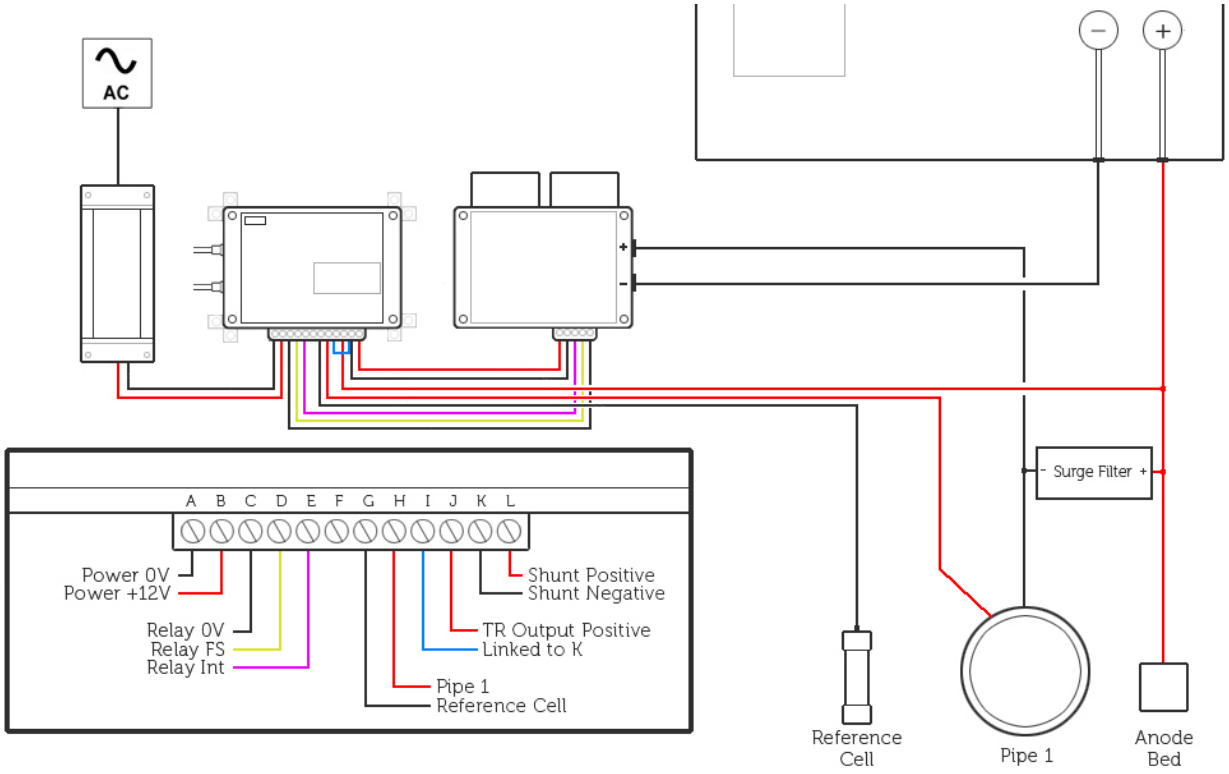
9.3 SUNBIRD TR EXCEL with Mercury Relay



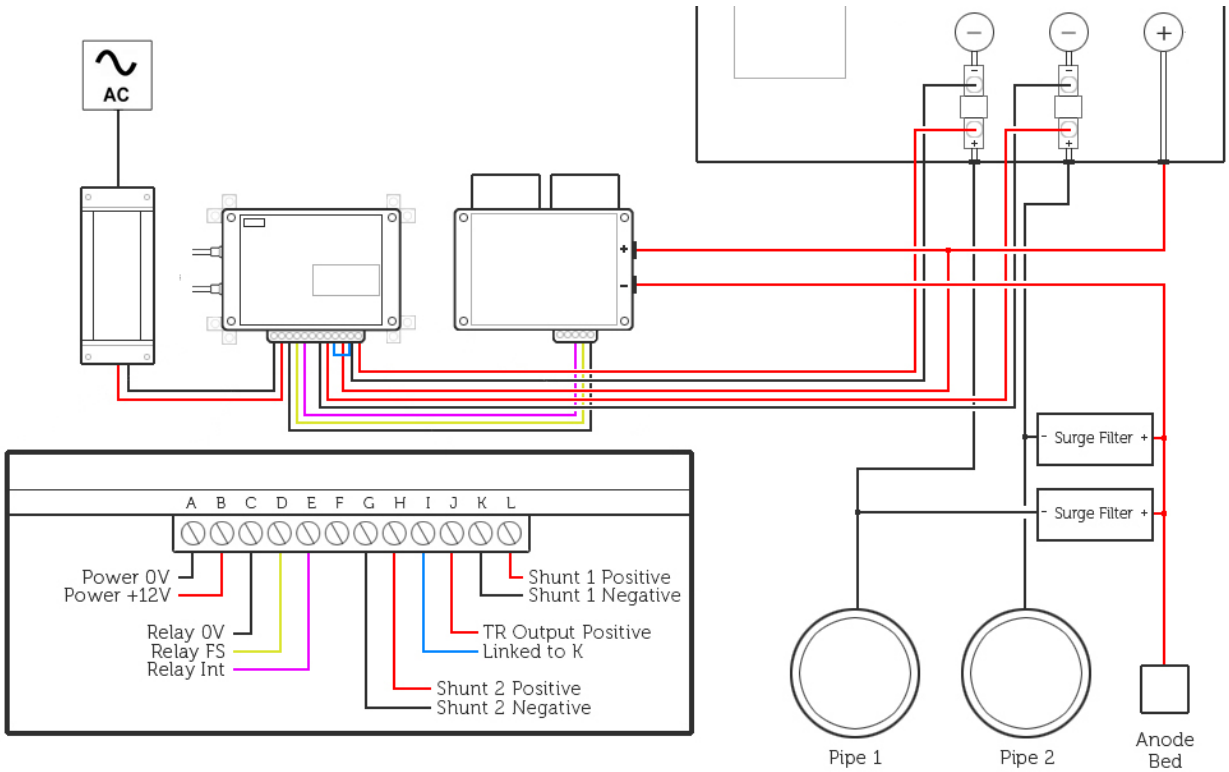
9.4 SUNBIRD TR EXCEL Dual Current with Mercury Relay



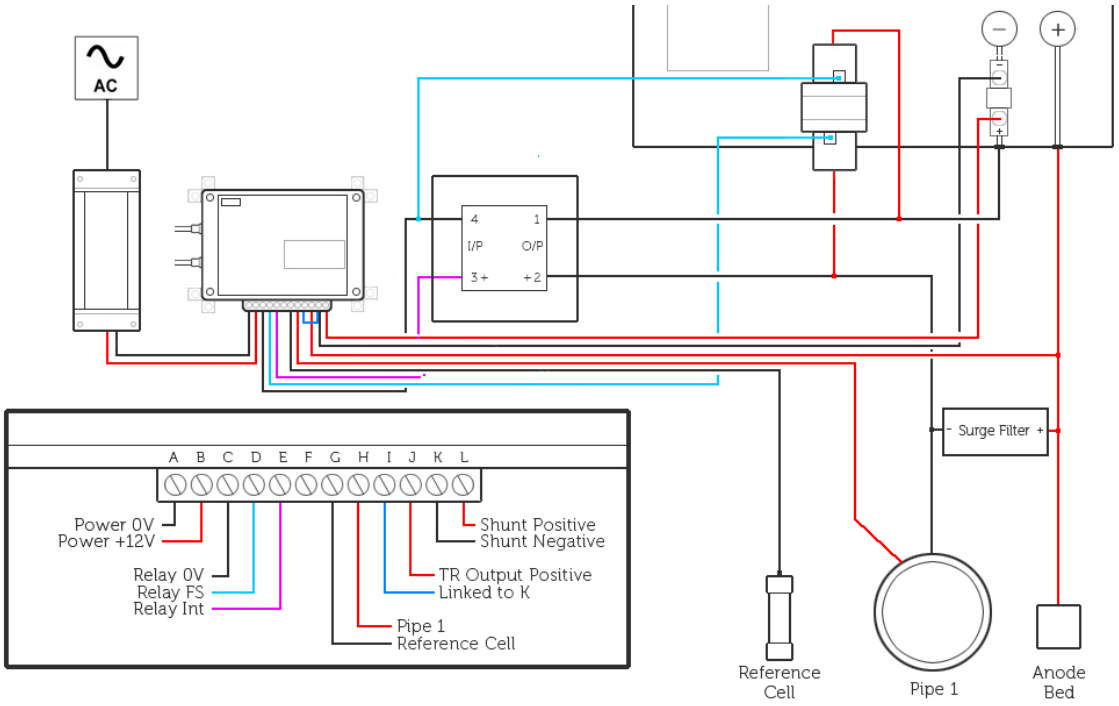
9.5 SUNBIRD TR EXCEL with MERLIN Interrupter



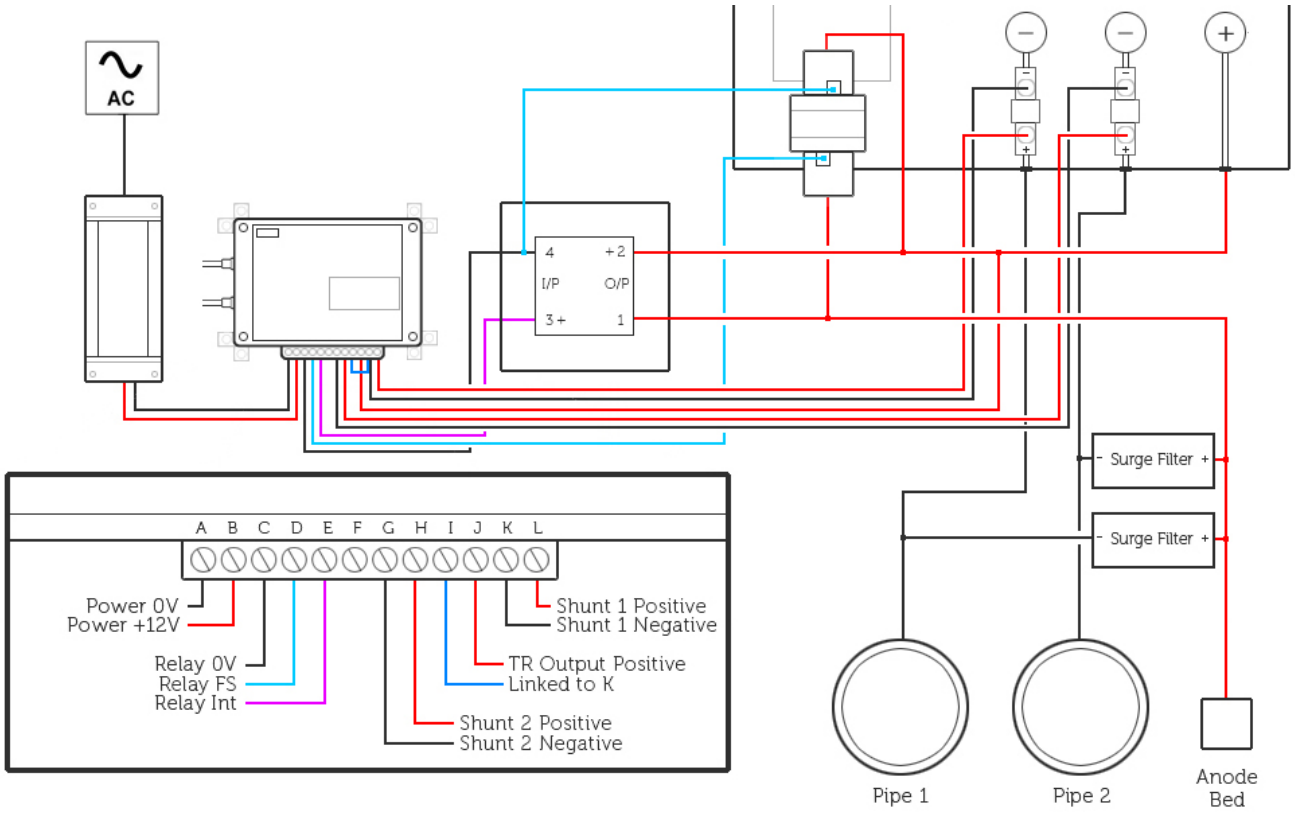
9.6 SUNBIRD TR EXCEL Dual Current with MERLIN Interrupter



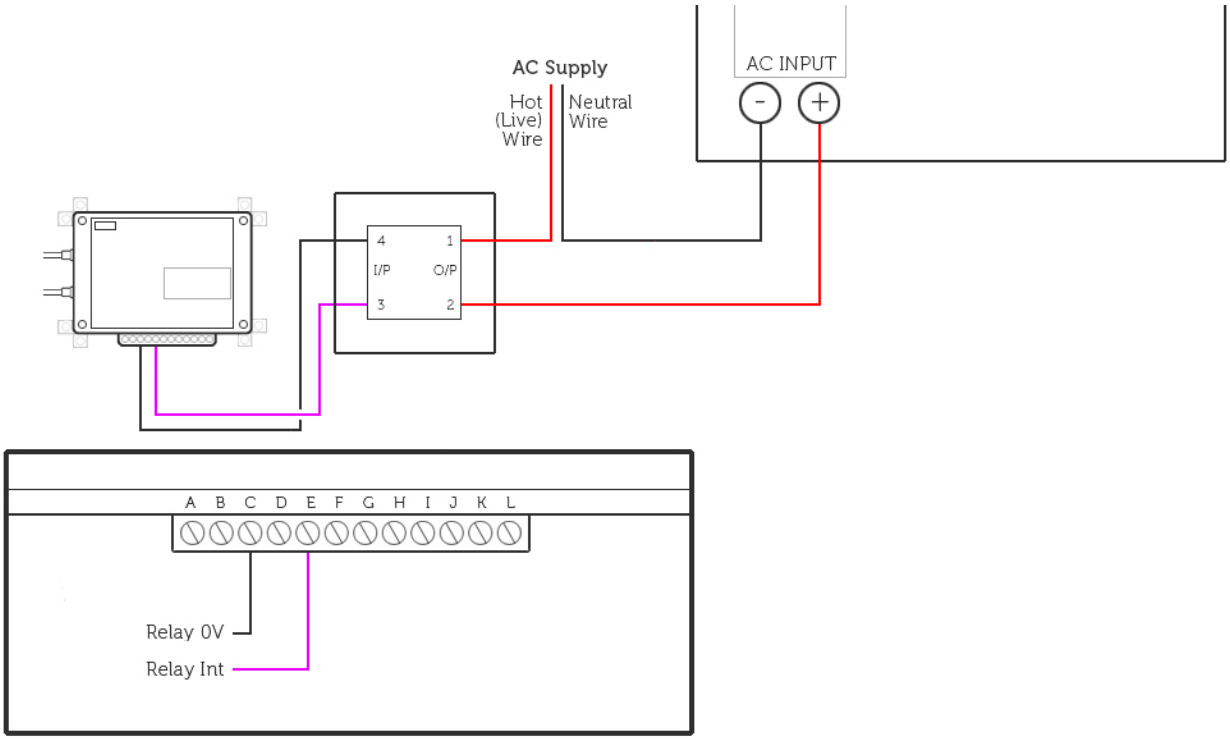
9.7 SUNBIRD TR EXCEL with DC SSR



9.8 SUNBIRD TR EXCEL Dual Current with DC SSR



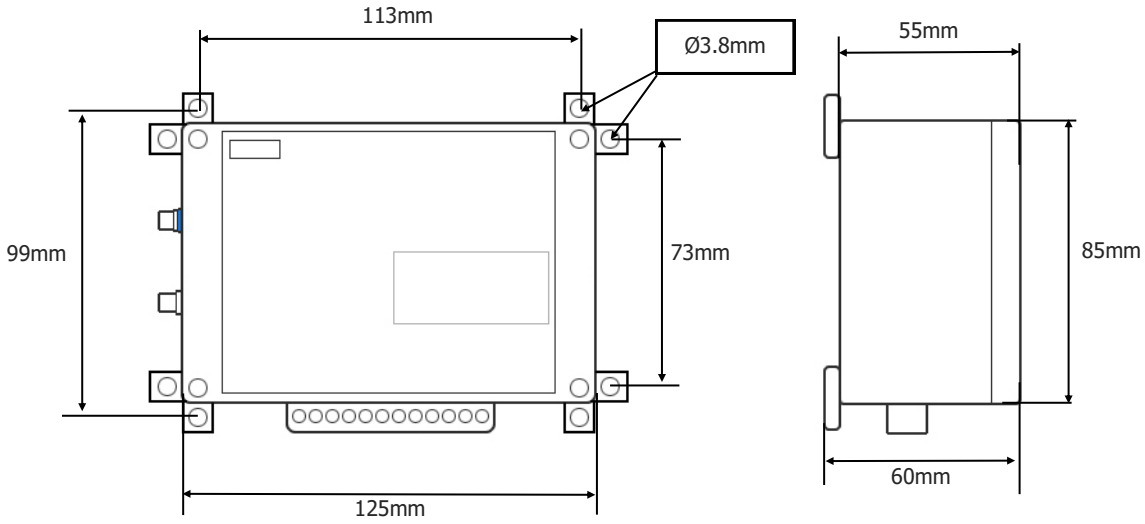
9.9 SUNBIRD TR EXCEL with AC SSR



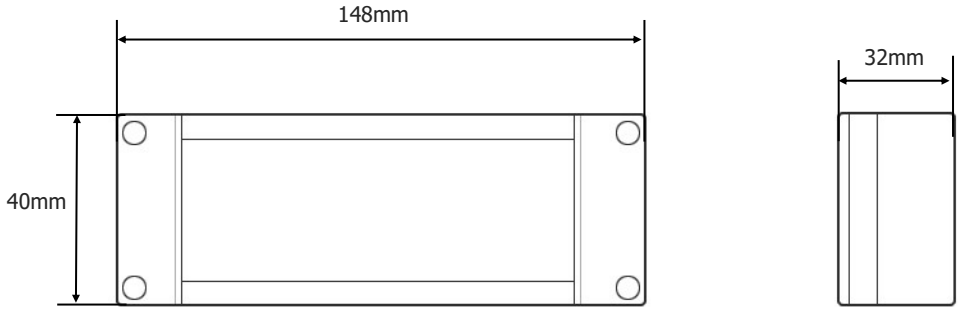
10. DIMENSIONS

10.1 SUNBIRD TR Dimensions

Use No.6/3.5mm screws for mounting using supplied brackets.



10.2 Power Supply Unit Dimensions



11. NOTES

Use this space to write your own notes, tips and cheats to aid future installations (extra space for creating notes is available on page 24).

12. APPENDIX A - PRE-INSTALLATION CHECKLIST

Is there a spare 13A socket available in the rectifier enclosure?

☐ Yes ☐ No

If No, is there a fused 3A spur available?

If neither is available, a permanent electrical supply should be fitted as soon as possible, prior to installing the SUNBIRD TR.

☐ Yes ☐ No

Is there a permanent reference electrode installed at the rectifier?

To monitor ON/OFF potentials you will need a permanent reference electrode installed at the rectifier.

☐ Yes ☐ No

Is the current output of the rectifier below 20A?

If the rectifier current output is below 20A, a MERLIN Interrupter can be installed.

☐ Yes ☐ No

Is there sufficient space in the rectifier enclosure?

There must be space to install:

- SUNBIRD TR: 125mm x 85mm x 55mm (W x H x D)
- SUNBIRD TR Power Supply Unit: 148mm x 40mm x 32mm (W x H x D)
- MERLIN Interrupter: 218mm x 174mm x 106mm (W x H x D)

☐ Yes ☐ No

If there is not enough space, you will need to install additional housing.

What is the rectifier enclosure material?

If the enclosure is concrete or plastic, internally mounted antennas should get sufficient signal. If the enclosure is metal or the signal is low within the concrete or plastic enclosure, you will need to mount the SUNBIRD TR antennas externally (this is the preferred method).

☐ Concrete ☐ Plastic (GRP) ☐ Metal

Is the area prone to lightning strikes?

In locations where lightning could be a problem, Abriox recommend installing lightning arrestors.

☐ Yes ☐ No

13. APPENDIX B - LED DESCRIPTIONS

The Status LEDs on the SUNBIRD TR describe the current status and can indicate any problems.



Red LED



Amber LED



Green LED

During Installation

LED Colour	Sequence	Description
	All LEDs Illuminated	Magnet is present on Reset Switch
	Amber/Green Alternating	Connecting to the network and installing

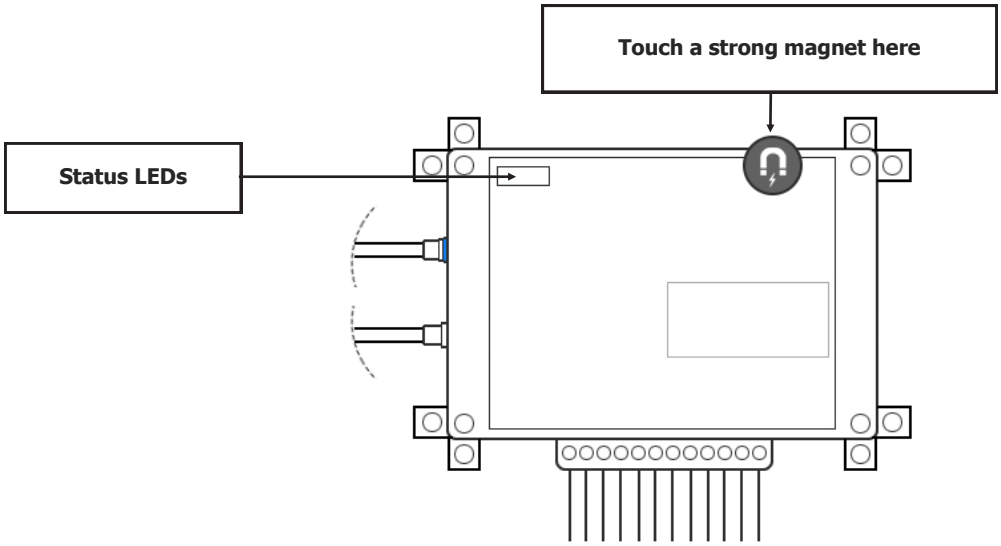
During Normal Operation

	1 flash every 2 seconds	Everything is OK
	2 flashes every 2 seconds	Temporary loss of cellular communications
	3 flashes every 2 seconds	Temporary loss of GPS communications
	The Green LED also mimics the OFF period when interrupting and will flash accordingly	
	1 flash every 2 seconds	Low battery or battery not connected
	2 flashes every 2 seconds	Low battery and temporary loss of cellular communications
	3 flashes every 2 seconds	Low battery and temporary loss of GPS communications
	4 flashes every 2 seconds	No SIM/SIM error
	5 flashes every 2 seconds	Installation failure (continuous AMBER LED flashing)
	1 flash every 2 seconds	Invalid configuration (serial number, apn, server, etc.). Contact Abriox
	2 flashes every 2 seconds	Other fault (e.g. no modem comms, no GPS comms). Contact Abriox

14. APPENDIX C - RESET THE SUNBIRD TR

To reset the SUNBIRD TR touch a strong magnet on top of the Reset switch where indicated on the label, all 3 LEDs (Green, Amber and Red) will illuminate whilst the magnet is held in place.

Once the LEDs have illuminated, remove the magnet to start the installation process.



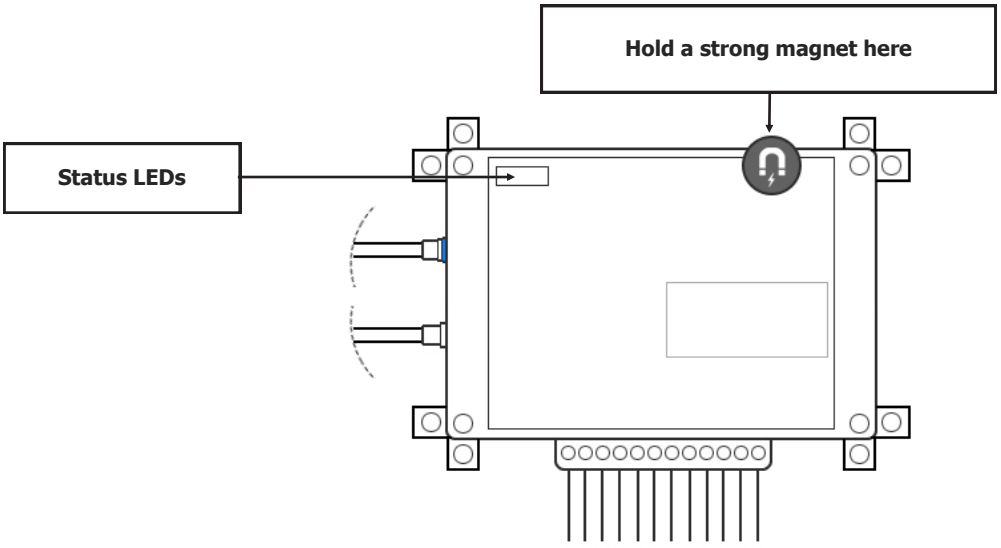
The Status LEDs on the SUNBIRD TR Monitor will flash to indicate the installation status. The LEDs will flash between Amber and Green to show communications/installation is taking place (see Appendix C for further information on LED status).

Once the unit is flashing green (1 green flash every 2 seconds), communications have been established and installation has been completed.

15. APPENDIX D - TURN THE SUNBIRD TR OFF

To turn the SUNBIRD TR off completely, hold a strong magnet on top of the Reset switch where indicated on the label, all 3 LEDs (Green, Amber and Red) will illuminate whilst the magnet is held in place.

After 3 seconds the LEDs extinguish GREEN first, then AMBER then RED last and the unit fully switches off. The magnet can then be removed.



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