

MERLIN

Transformer Rectifier Monitor
Installation Instructions

V36

Revision Date
2020-05-21

www.abriox.com

1. CONTENTS

1. CONTENTS **Page 2**

2. SAFETY INFORMATION **Page 3**
2.1 General Safety Summary Page 3
2.2 Safety and Electrical Symbols Page 3
2.3 Maximum Input Voltage for ON/OFF Potential Channel Page 3
2.4 Maximum Input Voltage for TR Volts Channel Page 3
2.5 Maximum Input Voltage for TR Shunt Channel Page 3
2.6 Danger of Electric Shock Page 3
2.7 Channel Input Protection Page 3
2.8 Battery Replacement Page 3
2.9 Disclaimer Page 3

3. COMPLIANCE **Page 4**

4. SOFTWARE COMPATIBILITY **Page 4**

5. INTRODUCTION **Page 5**
5.1 Front View of the MERLIN (no external antennas) Page 5
5.1 Front View of the MERLIN (with external antennas) Page 5

6. BEFORE GOING TO SITE **Page 6**
6.1 Check the HQ(s) Page 6
6.2 Power Requirements for the Power Supply Unit Page 6
6.3 Check and Designate the MERLIN Page 6
6.4 Equipment Check Page 7
6.5 Setting Up Your Cell/Mobile Phone Page 7

7. ON SITE **Page 8**
7.1 The Install Process Page 8
7.2 House the MERLIN Page 8
7.3 Power the MERLIN Page 8
7.3.1 Using the Supplied PSU Page 8
7.3.2 Using an External DC Supply Page 8
7.4 Connect the MERLIN Page 9
7.4.1 Relay Connections Page 10
7.4.2 ON/OFF Potential Connections Page 10
7.4.3 TR Volts Connections Page 10
7.4.4 TR Shunt 1 / 2 Connections Page 10
7.5 Fit Any Accessories Page 11
7.5.1 Cellular Antenna Page 11
7.5.2 GPS Antenna Page 11
7.5.3 MERLIN Interrupter, Mercury Relay or SSR Page 11
7.5.4 Lightning Surge Arrestors Page 12
7.5.5 Surge Filter Page 13
7.6 Activate the MERLIN Page 13
7.7 Take a Reading Page 14
7.8 Compare the Readings with a Multimeter Page 14
7.9 Configure the HQ(s) Page 15
7.10 Name the MERLIN Page 16
7.11 Finish On Site Page 16
8. POST SITE CONFIGURATION **Page 16**
8.1 iCPSM Users Page 16
8.2 CPSM Users Page 16

9. INSTALLATION EXAMPLES **Page 17**
9.1 MERLIN Basic Page 17
9.2 MERLIN Premium Page 17
9.3 MERLIN Super with Mercury Relay Page 18
9.4 MERLIN Super Dual Current with Mercury Relay Page 18
9.5 MERLIN Excel with MERLIN Interrupter Page 19
9.6 MERLIN Excel Dual Current with MERLIN Interrupter Page 19
9.7 MERLIN Excel with DC SSR Page 20
9.8 MERLIN Excel Dual current with DC SSR Page 20
9.9 MERLIN Excel with AC SSR Page 21

10. DIMENSIONS **Page 22**
10.1 MERLIN Dimensions Page 22
10.2 Power Supply Unit Dimensions Page 22

11. NOTES **Page 22**

12. APPENDIX A - PRE-INSTALLATION CHECKLIST **Page 23**

13. APPENDIX B - NAMING CONVENTIONS **Page 24**

14. APPENDIX C - LED DESCRIPTIONS **Page 25**

Blank Page **Page 26**

Blank Page **Page 27**

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 MERLIN Transformer Rectifier Monitor (hereafter referred to as MERLIN) in a safe condition and ensure safe operation. To use the MERLIN 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 MERLIN 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 MERLIN is intended to measure ±4V. It can handle a maximum input voltage of 70V AC (RMS) and 70V DC without damage.

2.4 Maximum Input Voltage for TR Volts Channel

The TR Volts channel of the MERLIN has a maximum input voltage of 150V AC and 150V DC. The MERLIN 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 MERLIN 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 MERLIN provides readings up to 100mV AC and ±100mV DC. The channel itself should not be exposed to voltages greater than ±4V peak. Voltages greater than this will cause the channel input protection to activate which can only protect the MERLIN for a limited period of time.

2.6 Danger of Electric Shock

When using the MERLIN 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

CE

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.

FC

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 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. SOFTWARE COMPATIBILITY

MERLIN Excel and **Dual Current** models require **iCPSM V3.09** or **CPSM V3.09** or newer. Earlier versions of the software are not compatible and do not support the features offered by these models.

MERLIN6 models require **iCPSM V4.00** or **newer**. Earlier versions of the software are not compatible and do not support the features offered by these models.

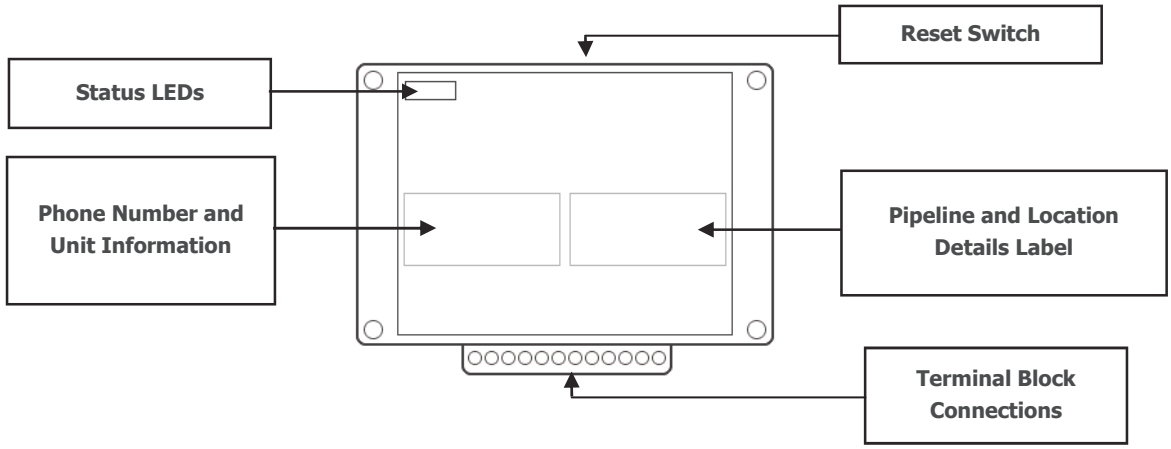
5. INTRODUCTION

The MERLIN 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.

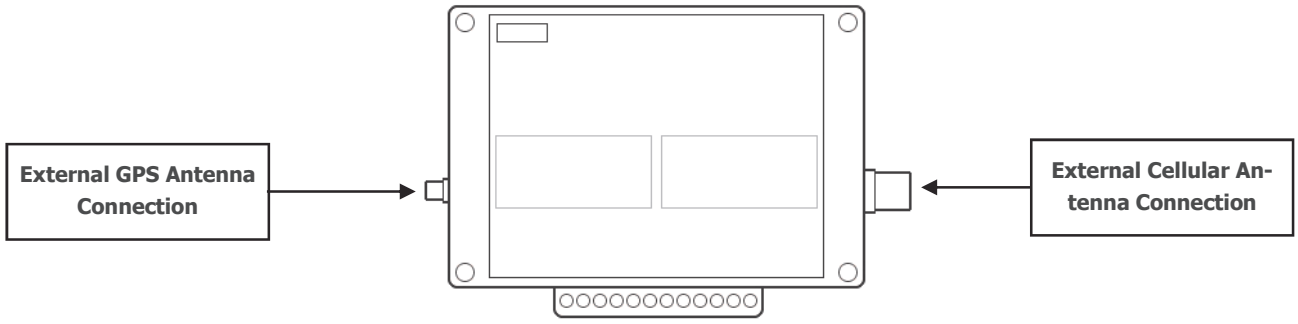
All data is automatically transmitted in a management report to the system HQ (using the cellular/mobile network) where it is accessed online using Abriox's iCPSM software, or at a PC using CPSM software.

The MERLIN 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 MERLIN's internal batteries take over monitoring (for up to 2 years).

5.1 Front View of the MERLIN (no external antennas)



5.2 Front View of the MERLIN (with external antennas)



Note

Only certain models will offer external antenna connections. Contact Abriox for further information on the available options.

6. BEFORE GOING TO SITE

6.1 Check the HQ(s)

If you are using the web-based iCPSM system, make sure you have noted the phone number of your iCSPM HQ as detailed on your iCPSM Licence Certificate.

If you are using the PC-based CPSM system, make sure you have noted the phone number of your HQ(s) and confirm the software is installed and running*.

Note

*It is vital the CPSM system is installed and 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 MERLIN should be powered from the AC supply to the rectifier (this enables the MERLIN 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 MERLIN PSU.

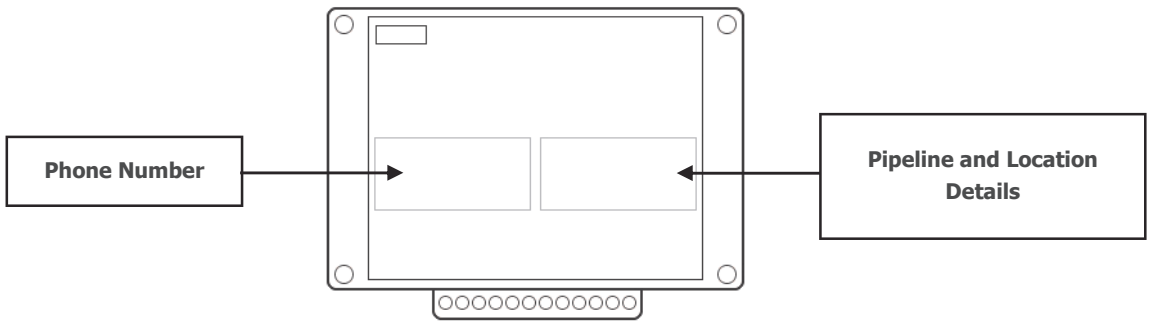
The MERLIN can also be powered via an external 12V DC supply. See section 7.3 for further information.

6.3 Check and Designate the MERLIN

Check that MERLIN has a SIM card installed and the phone number is written or printed on the label on the front of the MERLIN. In most cases this will have been completed during production, unless you have opted to source and install your own SIM cards.

Write the Pipeline name (up to 30 characters) and the Location name (up to 50 characters) on the MERLIN front label with a marker pen or using a label maker. You can have multiple MERLINs with the same Pipeline name but each MERLIN must have its own unique Location name. See Appendix B for further information on naming conventions.

Remember – you will have to text these details to the MERLIN so, to avoid mistakes, do not make them longer than necessary.



Note

Do not exceed the character limitation for Pipeline (up to 30 characters) and Location (up to 50 characters) as the system will shorten the names and they will not install as you had intended.

6.4 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 MERLIN 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, ring terminations
Documents	Installation instructions (this document), Quick Start Guide
Multimeter	Multimeter to check the voltage and current readings on site
Cell/Mobile Phone	Used for setting up the MERLIN. See the next section for messages you can store in your phone before going to site to make installation easier
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 MERLIN has an input range of 0 to +/-100mV on its TR Shunt channel.

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

6.5 Setting Up Your Cell/Mobile Phone

If you store the text messages required for installation prior to going on site, it will be easier and save time in the field. Write the messages on your cell/mobile phone and save them as a Draft, Template or Outgoing Message.

You must use the international format for all cell/mobile communications i.e. +44 for UK, then the phone number without the leading zero.

Commands to save:

- **CMD:READ**
  Instructs the MERLIN to take an immediate reading.

- **CMD:CONFIG HQ1:+441234567891 HQ2:+441234567892**
  Configures the HQ number(s) which the MERLIN will report to (where the numbers in light grey are the respective telephone numbers of your iCPSM/CPSM HQs). If you only have a single HQ you can set HQ2 to OFF (**HQ2:OFF**).

- **CMD:INSTALL PIPE:PIPELINE NAME LOC:TR NAME**
  Installs the MERLIN in the iCPSM/CPSM software database with the given Pipeline and Location names.

You can use the **CMD:READ** and **CMD:CONFIG** commands for all the MERLIN monitors you are going to install. You will need a separate **CMD:INSTALL** for each MERLIN to give it its own unique Location name. See Appendix B for further information on naming conventions.

Note

You will need to set the phone's SMS message validity to 1 hour to prevent an SMS message getting stuck. For example, if an install message gets stuck in the network and arrives 3 days late, the MERLIN clock will be set 3 days slow. Setting the message validity to 1 hour stops this happening.

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 MERLIN (see section 7.2)
3. Connect the MERLIN (see sections 7.3 and 7.4)
4. Fit any accessories (see section 7.5)
5. Turn the AC supply on
6. Activate the MERLIN (see section 7.6)
7. Take a reading (see section 7.7)
8. Compare the readings with a multimeter (see section 7.8)
9. Configure the HQ(s) (see section 7.9)
10. Name the MERLIN (see section 7.10)
11. Finish on site (see section 7.11)
12. Post site configuration (see section 8)

7.2 House the MERLIN

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

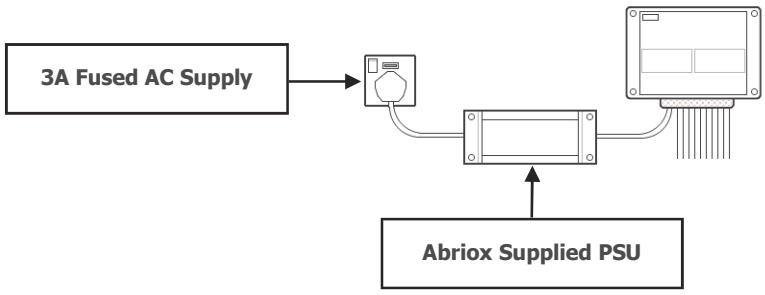
7.3 Power the MERLIN

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

7.3.1 Using the Supplied PSU

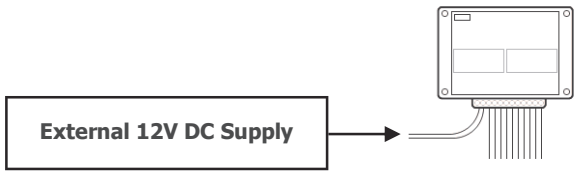
The MERLIN PSU should be powered from the AC supply to the rectifier. The AC supply input is 100-240V AC, 50/60Hz (0.56A maximum). Abriox recommend that a 3A fused switch or circuit-breaker is used, in close proximity, easily reached and marked as the disconnecting device for the MERLIN PSU.

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



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 MERLIN.



7.4 Connect the MERLIN

The MERLIN has up to 12 connections (model dependant), these are labelled A to L and are briefly described on the front label of the MERLIN.

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 MERLIN Super, Premium and Excel models
†Only applicable for MERLIN Super and Excel Dual Current models

7.4.1 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**

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

7.4.3 TR Volts Connections

Connect to the positive and negative rectifier output terminals.

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

7.4.4 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 MERLIN Super and Excel Dual Current models.

7.5 Fit Any Accessories

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

7.5.1 Cellular Antenna

When fitting the external antenna, ensure it is mounted outside any metal enclosures and ideally as high up as possible in order to gain the best Cellular signal.

Note

Only MERLINs with an external cellular antenna connector can use an external cellular antenna. When installing external cellular and GPS antennas, please fit them as far apart as possible.

7.5.2 GPS Antenna

For MERLINs that require GPS for synchronising (MERLIN Super and Excel models). When installing the external GPS antenna ensure it is mounted outside any metal enclosures, has a clear view of the sky and is installed in a horizontal position.

Note

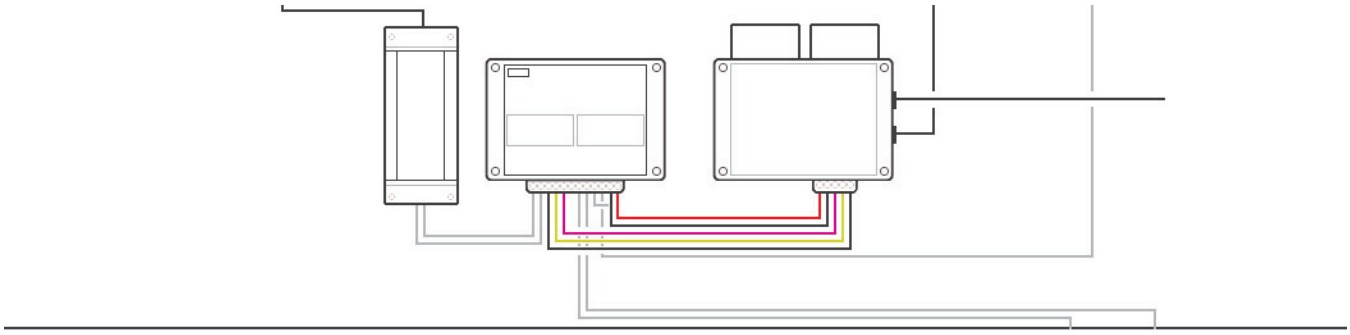
When installing external cellular and GPS antennas, please fit them as far apart as possible.

7.5.3 MERLIN Interrupter, Mercury Relay or SSR

As detailed in sections 7.4.2 and 7.4.4, 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.



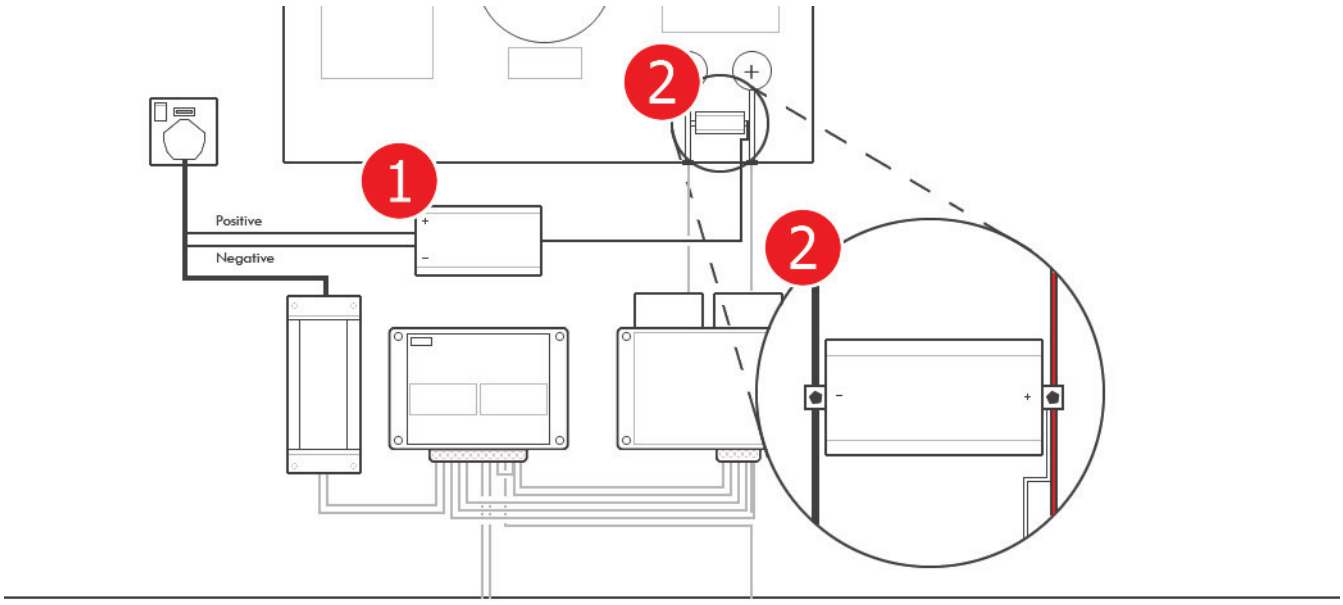
7.5.4 Lightning Surge Arrestors

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 MERLIN PSU and rectifier is isolated before installing the surge arrestors.

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

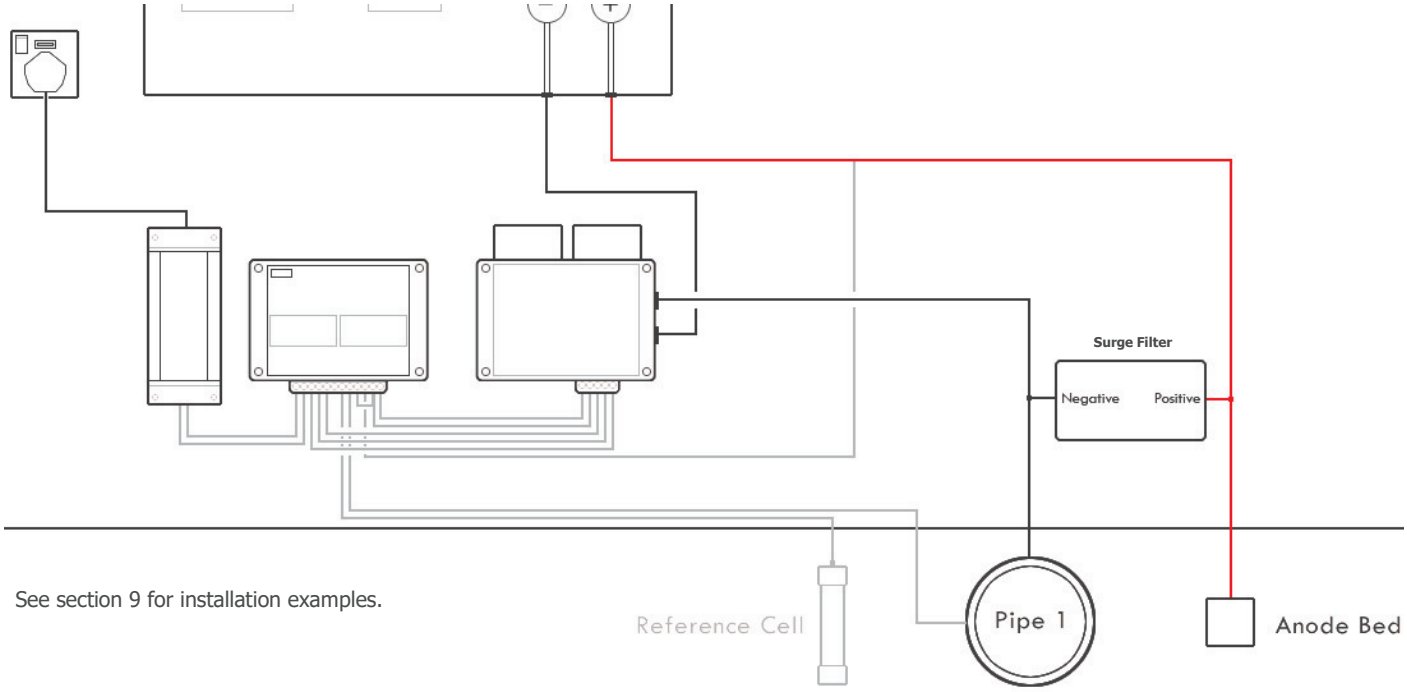
- The white ground wire of the arrestor is connected to the rectifier's positive output/ground bed connection (not electrical ground)
- The black AC line wires are connected to the AC supplying the MERLIN PSU

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

7.5.5 Surge Filter

The surge filter is only applicable for MERLIN Excel and MERLIN Interrupter or SSR installation's where the Pipeline Locate feature is required.

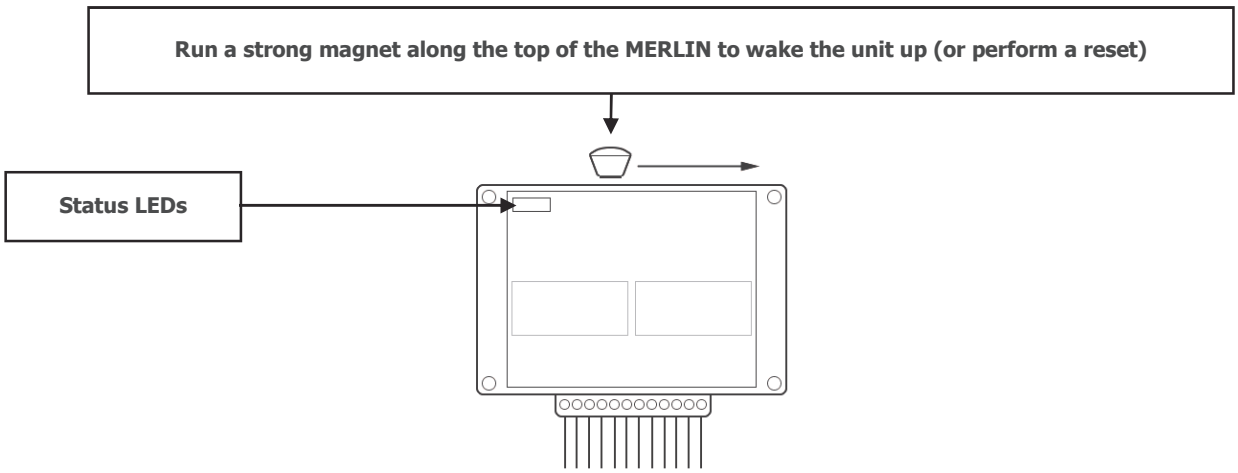
The surge filter is fitted between the rectifier's positive and negative output as shown below.



See section 9 for installation examples.

7.6 Activate the MERLIN

With the power reconnected to the rectifier and MERLIN PSU, activate the MERLIN by running a strong magnet along the reset switch located on the top of the unit (as indicated on the MERLIN front label). The green status LED will flash twice to show that the MERLIN is waking up.



After approximately 30 - 90 seconds, the green LED should start flashing once every 2 seconds, this confirms the MERLIN has logged onto the cellular/mobile network. You may now continue to take a read, configure the HQ(s) and finalise the installation by giving the MERLIN a Pipeline and Location name (see the next sections for further details on each step).

Note

If the green LED is double-flashing every 2 seconds, then the MERLIN is running but cannot log onto the cellular/mobile network. Please refer to the LED Descriptions in Appendix C for full details of the Status LEDs.

7.7 Take a Reading

Retrieve the pre-stored **CMD:READ** text from your cell/mobile phone and send (or forward) it to the phone number on the front of the MERLIN.

This will instruct the MERLIN to take a reading on all channels and send the results back to your phone (within approximately 60 - 90 seconds).

Example:

Message Sent: **CMD:READ**

Reply: **CPM:020 UNIT:10000001 TR VOLTS:18.00V SHUNT:20mV ON:0mV OFF:0mV**

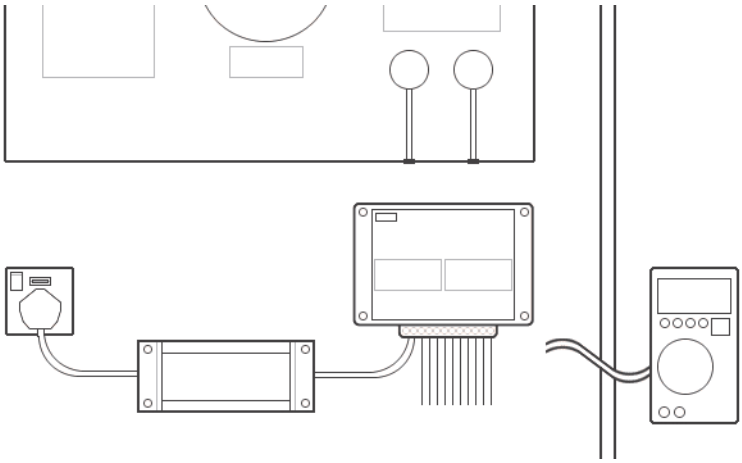
Depending on what model you are using, the reply may consist of:

Message Text	Description
CPM:020	System response code
UNIT:10000001	The serial number of the MERLIN
TR	Type of MERLIN (POST or TR)
VOLTS:	Rectifier output voltage
SHUNT:	Rectifier output current
ON:	ON Potential in mV*
OFF:	OFF Potential in mV*
SHUNT 2:	Rectifier output current 2†

Note
*Only applicable for MERLIN Super, Premium and Excel models
†Only applicable for MERLIN Super and Excel Dual Current models

7.8 Compare the Readings with a Multimeter

Take a reading of the input levels to the MERLIN, we recommend taking the measurements at the terminal screws on the MERLIN 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 response to the **CMD:READ** command as described in section 7.7.



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

7.9 Configure the HQ(s)

Retrieve the pre-stored **CMD:CONFIG** text from your cell/mobile phone and send (or forward) it to the phone number on the front of the MERLIN.

This command configures the HQ number(s) which the MERLIN will report to. Once the MERLIN has received the message it will reply back to your phone advising its current configuration (within approximately 60 - 90 seconds).

Wait for the reply and confirm that the HQ number(s) given in the response are correct.

If you have only a single HQ you can set HQ2 to OFF (**HQ2:OFF**). See examples below.

Example (Single HQ):

Message Sent: **CMD:CONFIG HQ1:+441234567891 HQ2:OFF**

Reply: **CPM:009 UNIT:10000001 MTIME:05:00 RDAY:TUE RTIME:12:30 RETRY:1 RETRY-HRS:6 ACK:MSG LED:ON HQ1:+441234567891 HQ2:OFF**

Example (2 HQs):

Message Sent: **CMD:CONFIG HQ1:+441234567891 HQ2:+441234567892**

Reply: **CPM:009 UNIT:10000001 MTIME:05:00 RDAY:TUE RTIME:12:30 RETRY:1 RETRY-HRS:6 ACK:MSG LED:ON HQ1:+441234567891 HQ2:+441234567892**

The reply will consist of:

Message Text	Description
CPM:009	System response code
UNIT:10000001	The serial number of the MERLIN
MTIME:05:00	Shows the daily measurement time HH:MM
RDAY:TUE	Shows the reporting day of the week
RTIME:12:30	Shows the reporting time of day HH:MM
RETRY:1	Shows the number of report retries: 0, 1, 2
RETRY-HRS:6	Shows the interval between report retries
ACK:MSG	Shows the type of acknowledge the MERLIN should request: SMS (MSG) or a Delivery Report (REP)
LED:ON	The LEDs on the MERLIN can be set to: OFF, ON or DIS (Discreet)
HQ1:+441234567891	HQ 1 phone number
HQ2:+441234567892	HQ 2 phone number (this should be set to OFF if there is no second HQ)

Note

One or more parameters may be changed with a single text message. If a command is sent without any parameters, the reply still contains all current configuration settings. For further information on all text based user commands, please refer to the MERLIN Commands document. Once the MERLIN has been installed in the iCPSM/CPSM database, full configuration can be done via the software.

7.10 Name the MERLIN

Retrieve the pre-stored **CMD:INSTALL** text from your phone and edit the Pipeline name and Location name. Send (or forward) it to the phone number on the front of the MERLIN. This installs the MERLIN in the iCPSM/CPSM software database with the assigned Pipeline and Location names. Wait for the "**Installed Successfully**" reply from the HQ(s) - this could take a minute or two.

Example:

Message Sent: **CMD:INSTALL PIPE:PIPELINE NORTH LOC:MAIN TR FENTON**

Reply: **PIPELINE NORTH/MAIN TR FENTON INSTALLED SUCCESSFULLY**

You can have multiple MERLINs with the same Pipeline name but each MERLIN must have its own unique Location name. See Appendix B for further information on naming conventions.

Note

The **pipe:** and **loc:** text are not case sensitive and will be converted to uppercase by the system. The names can include spaces, punctuation and numbers but not "**loc:**" or "**pipe:**".

The MERLIN system will accept the following characters:

! " # % & ' ( ) * + , - . / : ; < = > ?

0 1 2 3 4 5 6 7 8 9

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

The MERLIN system will not recognise the following characters:

@ £ $ _ ^ { } \ [~] | € ¡ ¿

7.11 Finish On Site

If you haven't already, to aid maintenance, write the Pipeline name and Location name on the front of the MERLIN in the labelled boxes. We recommend using a label maker to ensure a tidy finish. The MERLIN is now installed and you can close up the cabinet.

8. POST SITE CONFIGURATION

Once the physical installation has been completed, it's time to configure the MERLIN in your chosen software (iCPSM or CPSM).

You will need to configure the following: **Shunt Values** and **Alarm Thresholds** (specify the high and low values that trigger an alarm).

Further configuration options and system features are available via the software.

8.1 iCPSM Users

For users who choose the web-based iCPSM - simply go to **www.icpsm.com** in your chosen browser and log in with your Abriox issued Username and Password.

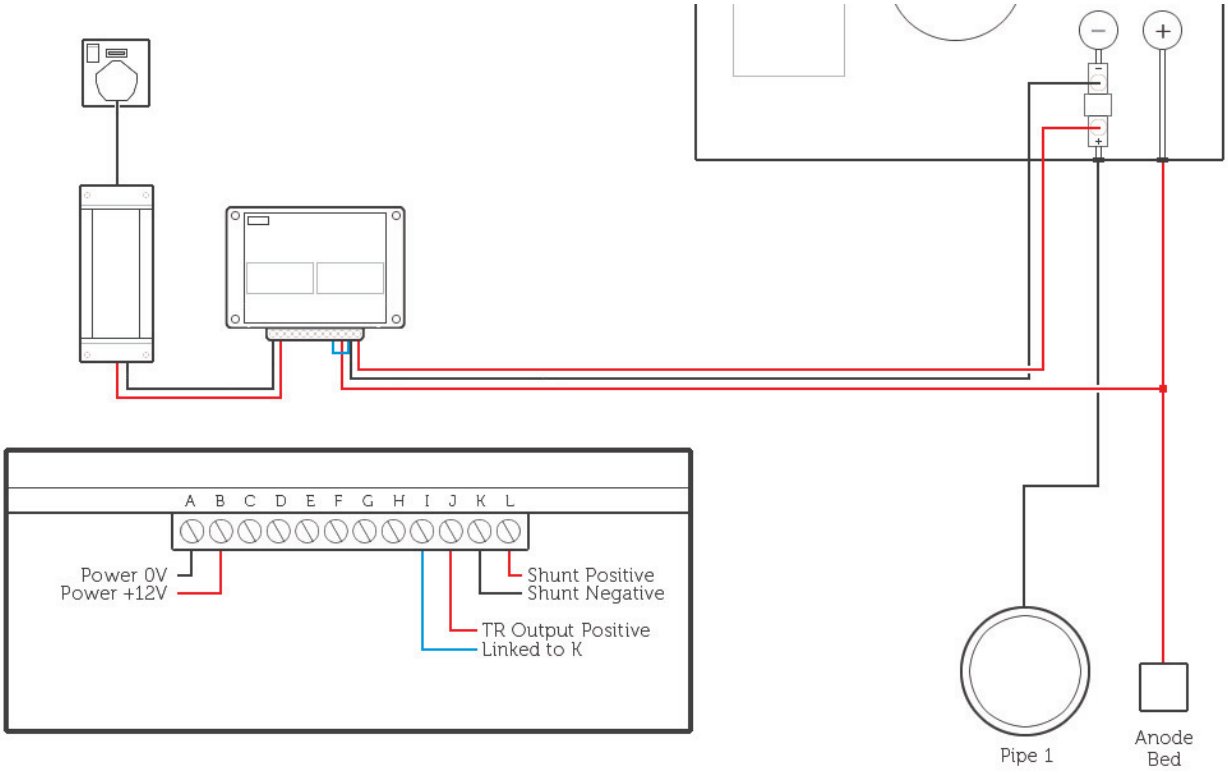
8.2 CPSM Users

Launch CPSM by double clicking the icon from the task bar.

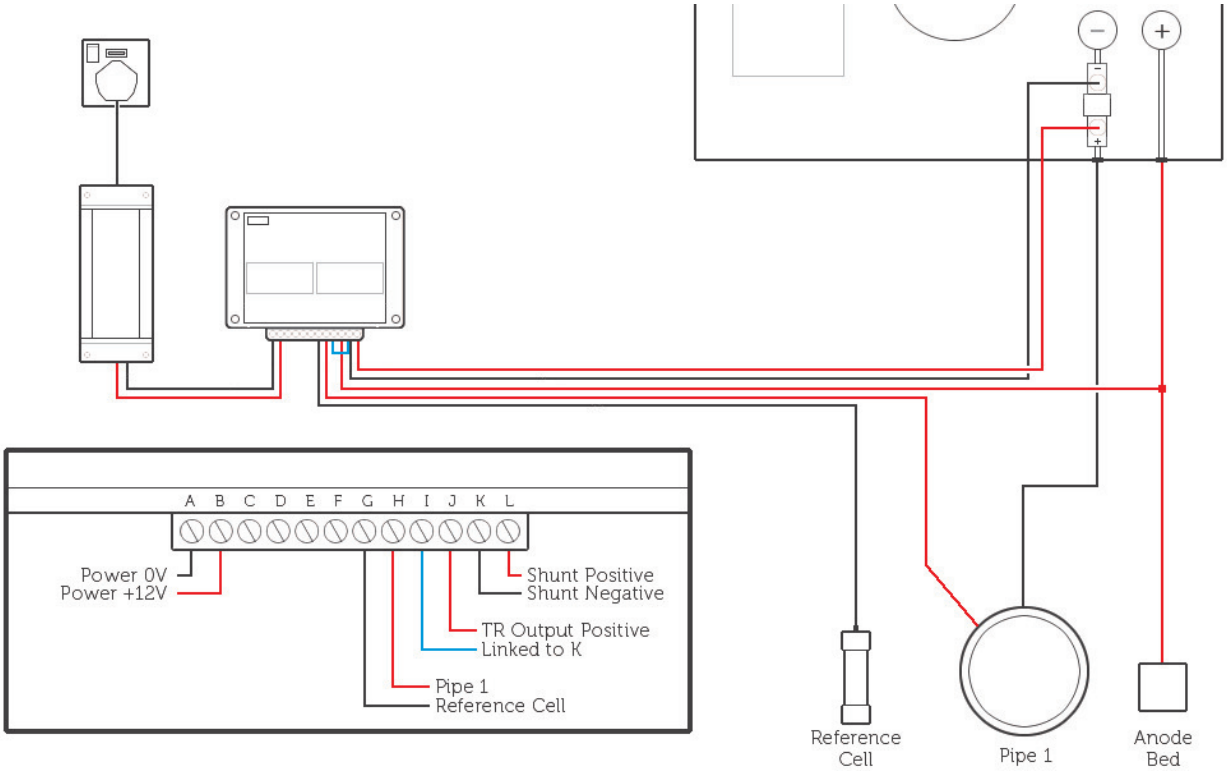
9. INSTALLATION EXAMPLES

The following examples are shown only as a guide.

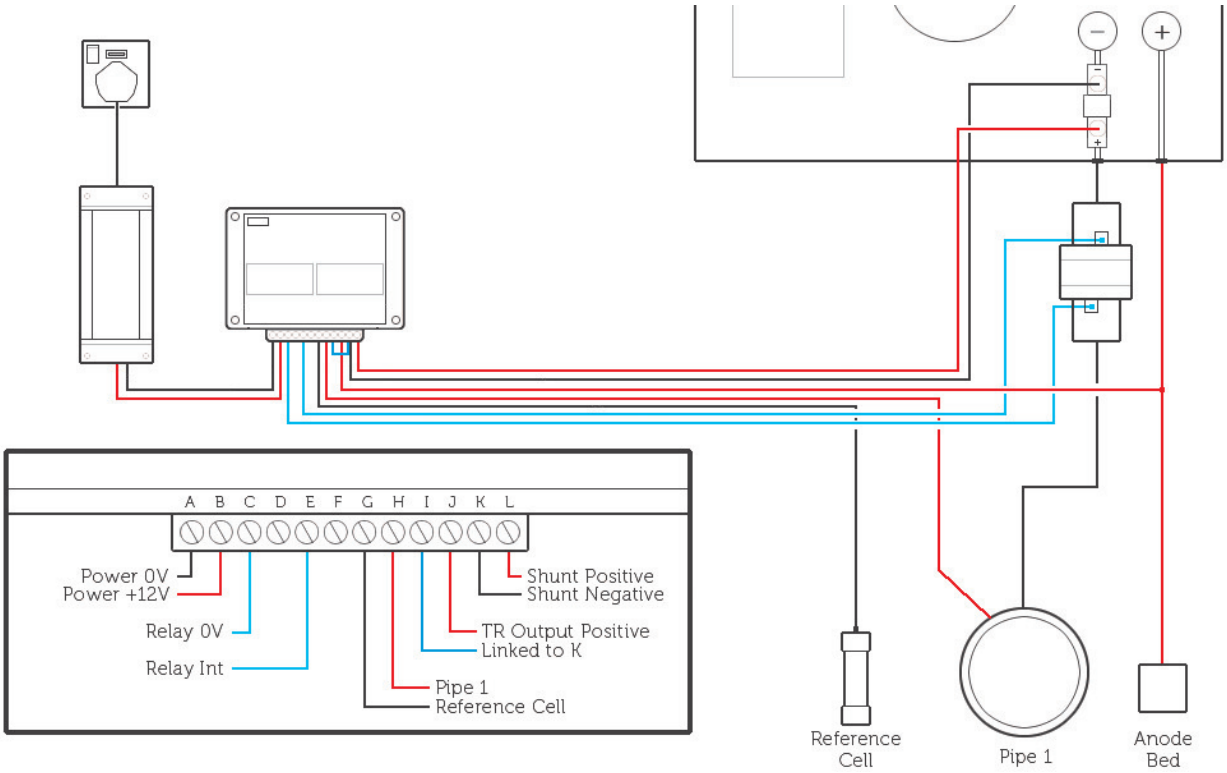
9.1 MERLIN Basic



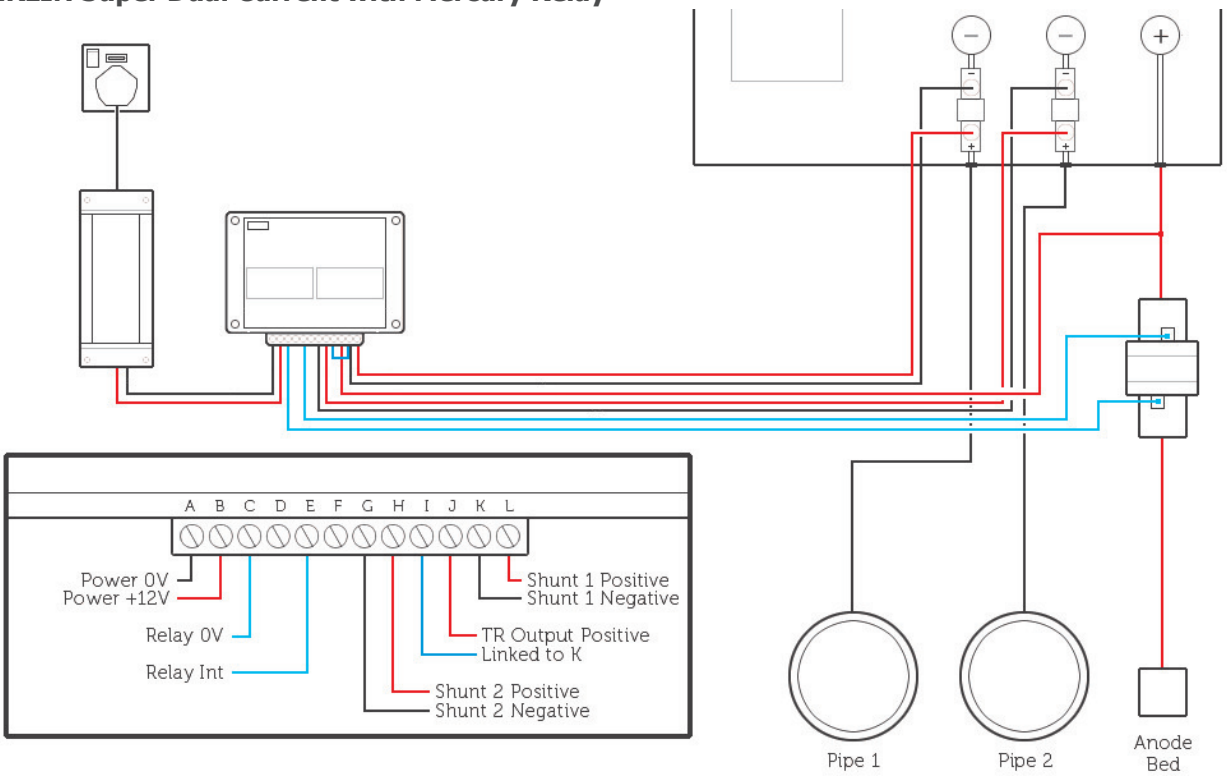
9.2 MERLIN Premium



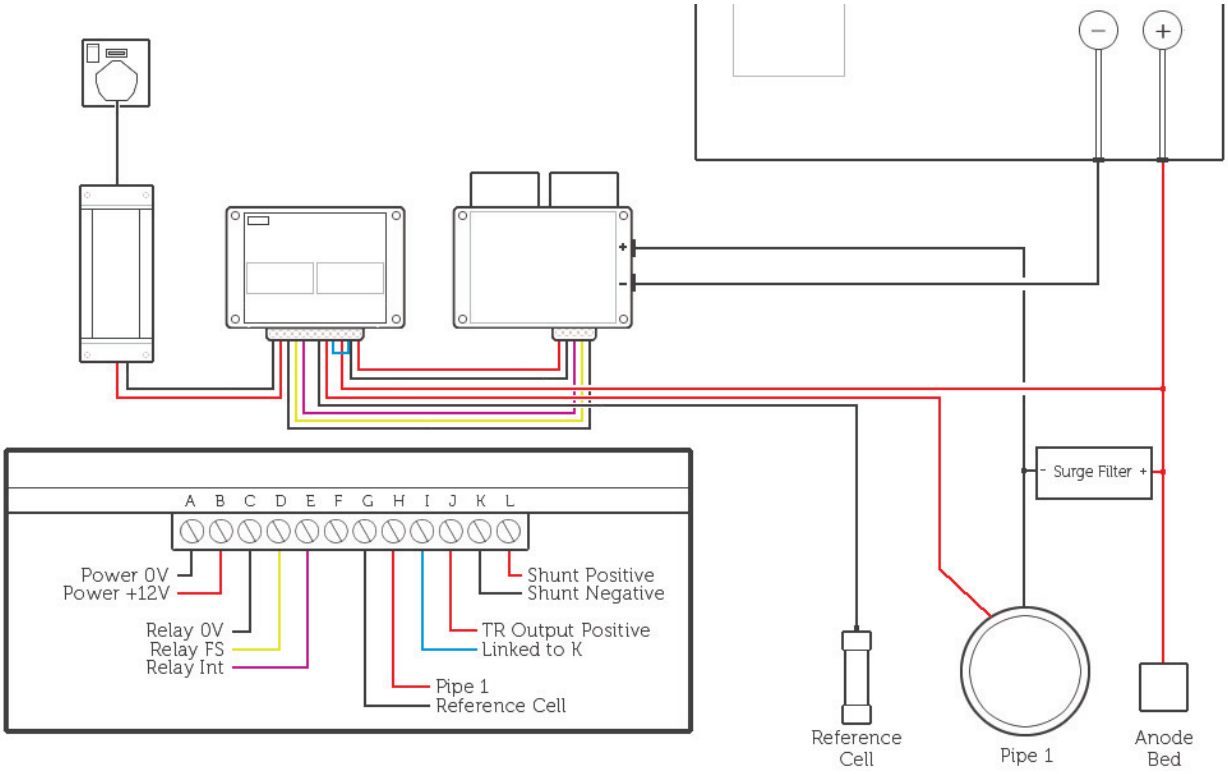
9.3 MERLIN Super with Mercury Relay



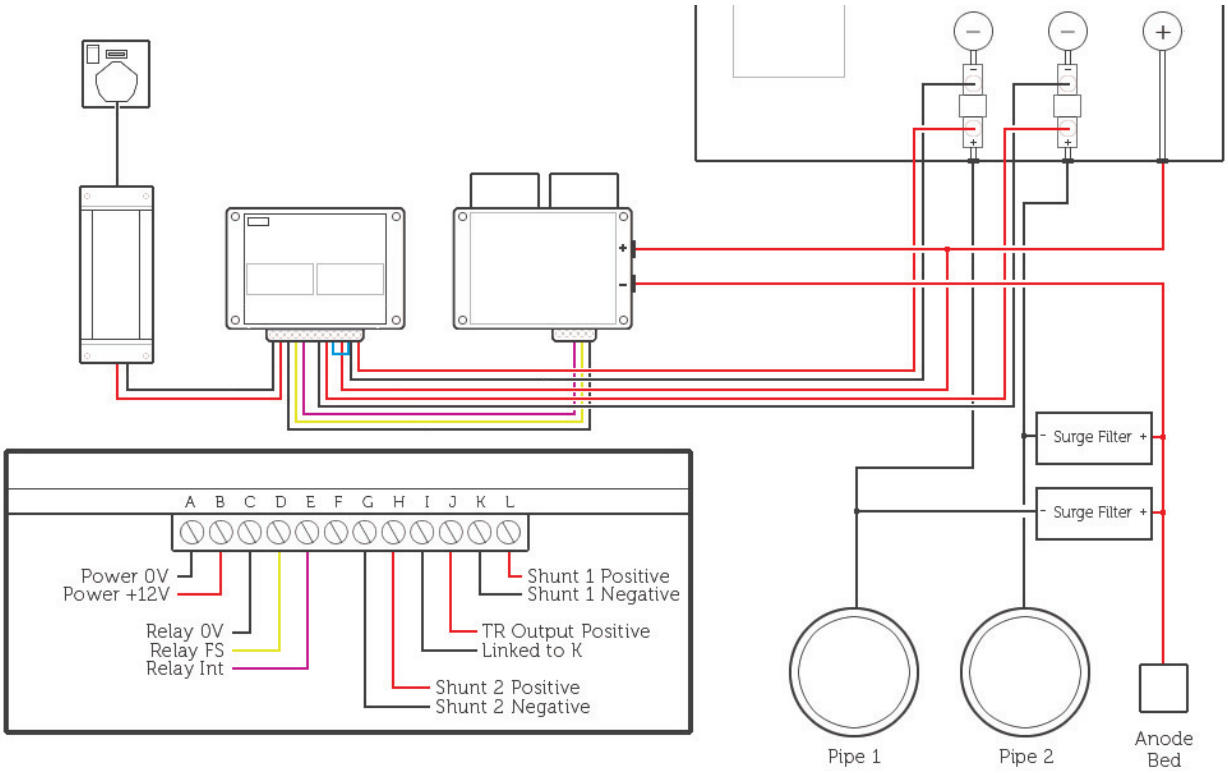
9.4 MERLIN Super Dual Current with Mercury Relay



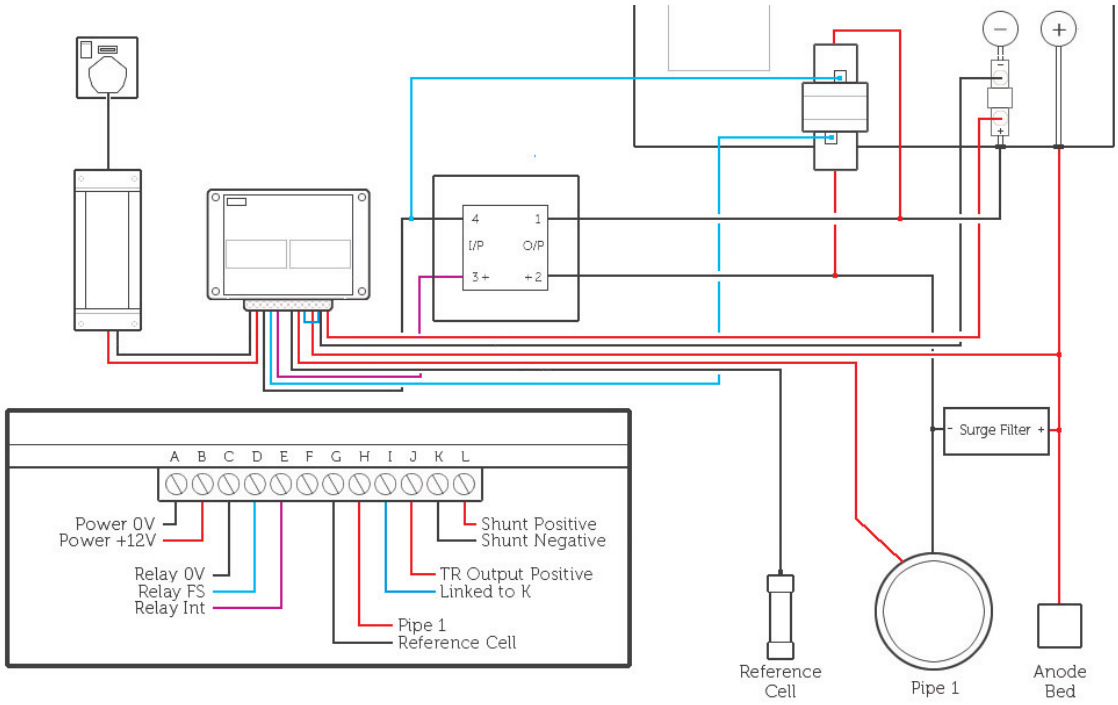
9.5 MERLIN Excel with MERLIN Interrupter



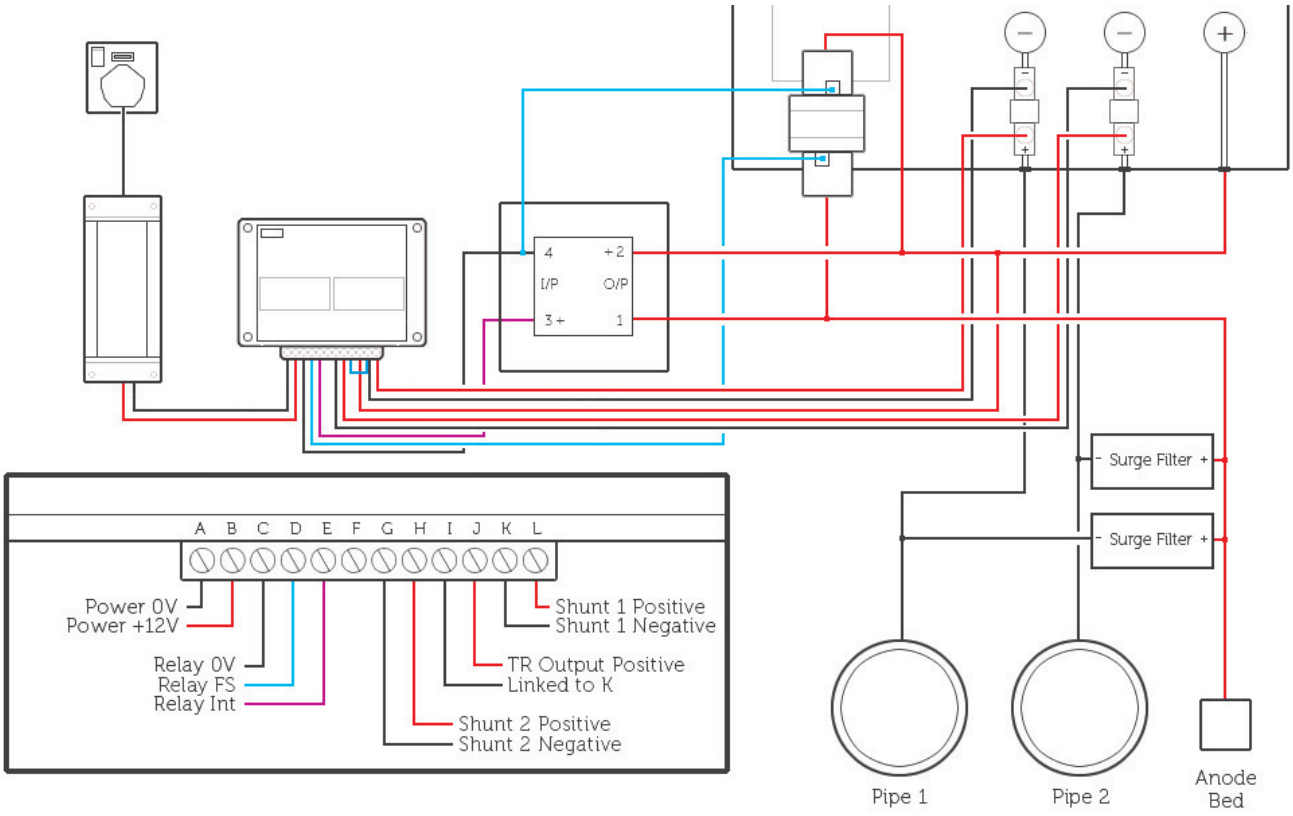
9.6 MERLIN Excel Dual Current with MERLIN Interrupter



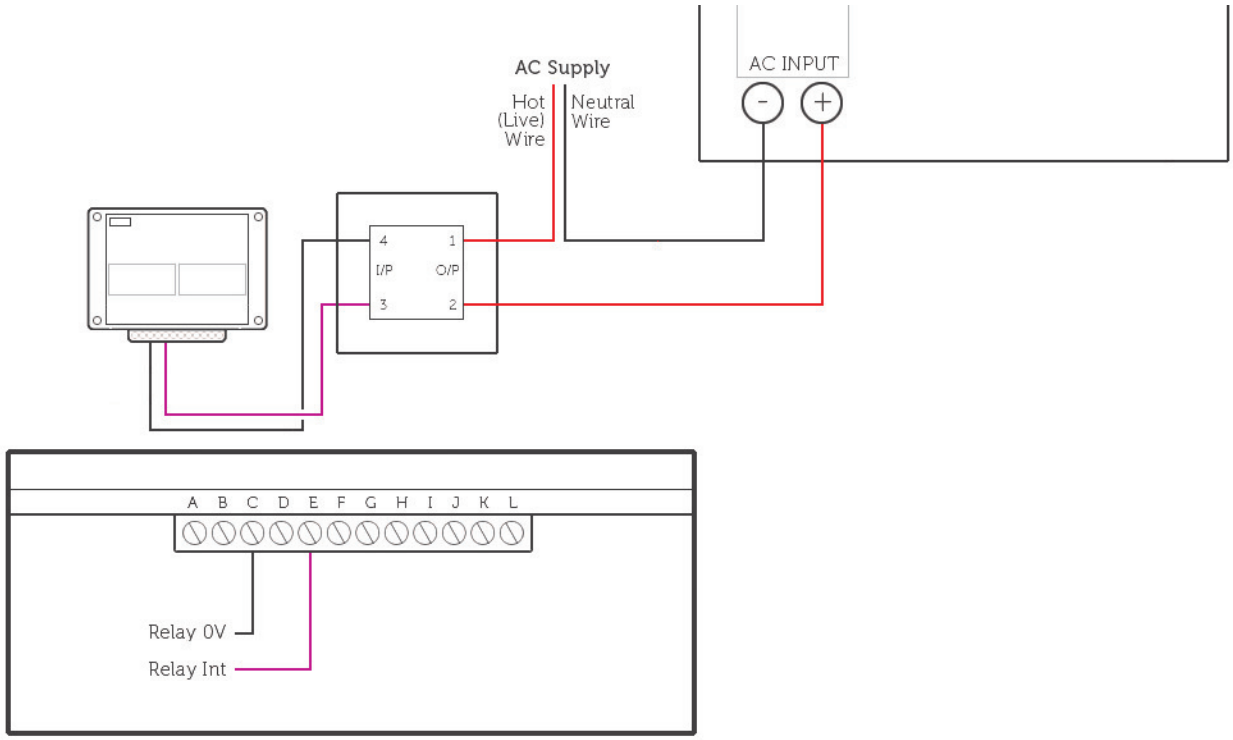
9.7 MERLIN Excel with DC SSR (MERLIN6 Models or Newer)



9.8 MERLIN Excel Dual Current with DC SSR (MERLIN6 Models or Newer)



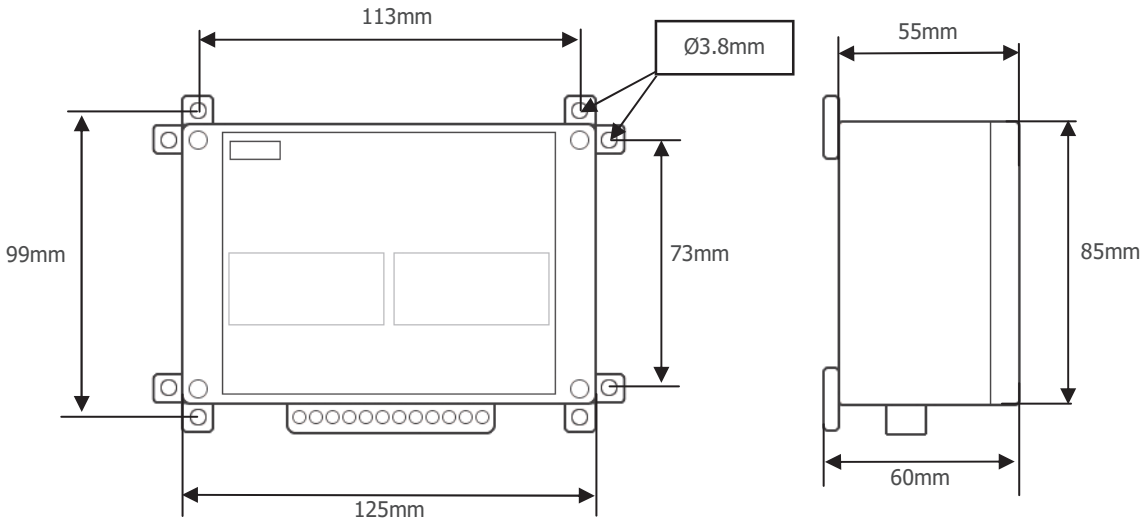
9.9 MERLIN Excel with AC SSR (MERLIN6 Models or Newer)



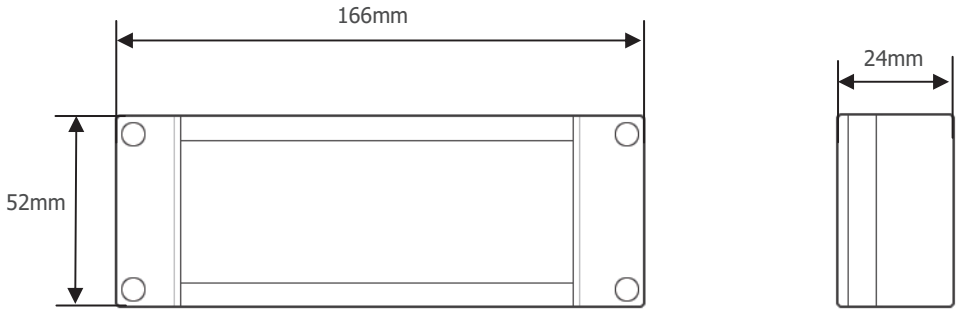
10. DIMENSIONS

10.1 MERLIN 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 pages 24 and 25).

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 MERLIN.

☐ 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:

- MERLIN Transformer Rectifier Monitor: 125mm x 85mm x 55mm (W x H x D)
- MERLIN Power Supply Unit: 166mm x 52mm x 24mm (W x H x D)
- MERLIN Interrupter: 218mm x 174mm x 106mm (W x H x D)

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

☐ Yes ☐ No

What is the rectifier enclosure material?

If the enclosure is concrete or plastic, a MERLIN with an internal antenna should get a sufficient cellular signal. If the enclosure is metal or the cellular signal is low within the concrete or plastic enclosure, you will need a MERLIN with an external antenna.

☐ Concrete ☐ Plastic (GRP) ☐ Metal

Is there a cellular signal at the rectifier location?

☐ Yes ☐ No

If so, which network offers the strongest signal?

A cellular signal strength meter is recommended to find the best network for the installation. SIMs can be changed within the MERLIN unit if necessary although it is recommended the best network SIM is chosen prior to installation. If there is no cellular signal or signals are very low, a MERLIN XT (Satellite) Transformer Rectifier Monitor should be used at this location.

.....

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 - NAMING CONVENTIONS

When naming and installing MERLIN units, it is important to give them a unique location reference. The term 'location reference' is the combination of the 'Pipe' and 'Location' (PIPE: and LOC:) names given to a MERLIN.

All location references must be unique i.e. you can not have multiple MERLINs with the same Pipe and Location names.

Example 1 - Correct Method 

MERLIN A **PIPE:WEST**
LOC:RECTIFIER A

MERLIN B **PIPE:WEST**
LOC:RECTIFIER B

In example 1 above, both MERLINs have been installed on the same Pipeline (**PIPE:WEST**) but have been given unique Location names (**LOC:RECTIFIER A** and **LOC:RECTIFIER B**). This is the correct method of naming.

Example 2 - Incorrect Method 

MERLIN A **PIPE:EAST**
LOC:RECTIFIER A

MERLIN B **PIPE:EAST**
LOC:RECTIFIER A

In example 2 above, both MERLINs have been installed on the same Pipeline (**PIPE:EAST**) but have been given the same Location names (**LOC:RECTIFIER A**), this will cause data confusion and the system will fail.

The only way you can ever use the same Location name is if the MERLINs reside on separate pipes or are assigned a different Pipeline name, see example 3 below.

Example 3 

MERLIN A **PIPE:NORTH**
LOC:RECTIFIER D

MERLIN B **PIPE:SOUTH**
LOC:RECTIFIER D

In example 3 above, the MERLINs have been installed on different pipelines (**PIPE:NORTH** and **PIPE:SOUTH**) but have been given the same Location names (**LOC:RECTIFIER D**). Even though the units have the same Location name (**LOC:RECTIFIER D**), as they reside on separate pipes the 'location references' are unique.

14. APPENDIX C - LED DESCRIPTIONS

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


Indicates Activity


Indicates an Error


Interruption Event

During Normal Operation

LED Colour	Sequence	Description
	Double flash	Start of reset (magnet swipe).
	Single flash every 2 seconds	Unit is awake and active. Unit will respond to SMS. Battery is OK.
	Double flash every 2 seconds	Unit is awake and active but not 100% logged onto the cellular/mobile network. Unit may respond to SMS. Battery is OK.
	Single flash every 10 seconds	Unit is snoozing between measurements and reporting. Unit will not respond to SMS. Battery is OK.
	Single flash every 2 seconds	Unit is awake and active. Unit will respond to SMS. Battery is low.
	Double flash every 2 seconds	Unit is awake and active but not 100% logged onto the cellular/mobile network. Unit may respond to SMS. Battery is low.
	Single flash every 10 seconds	Unit is snoozing between measurements and reporting. Unit will not respond to SMS. Battery is low.
	Flash every X seconds	Shows the "Off Period" during interruption.
	No flashes	Unit is busy initialising cellular communications or sending/receiving an SMS message. Can take up to 3 minutes.

Possible Error Codes (given after unit reset - error code presented within 3 minutes of reset)

	3 flashes	No cellular/mobile network. Unit will keep trying to log on. Try relocating the unit or use an external antenna.
	4 flashes	No SIM card detected. Check SIM card is installed and seated correctly. Check SIM card works by installing it in a phone and checking SMS (text) is working.
	5 flashes	SIM card error. Check SIM card is installed and seated correctly. Check SIM card works by installing it in a phone and checking SMS (text) is working.
	6 flashes	PIN error. SIM card has PIN code enabled. Fit SIM card in a phone and disable the PIN code.
	7 flashes	Setting error. Unit has suffered internal error, please return to Abriox.
	8 flashes	No modem. Unit has not detected modem, please return to Abriox.

Abriox

Specialists in Remote Monitoring

www.abriox.com