Read these instructions carefully before using this product.
Keep these instructions in a safe place for future reference.

EMS-5 / 10
Water Leak Detection System
Instruction Manual

Document Information

Copyright

Publication

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All possible care has been taken in the preparation of this manual, but Aqualeak, its agents and distributors accept no liability for any inaccuracies that may be found. This manual reflects the state of the product at the publication date below, but further enhancements while in service may mean that the manual does not precisely reflect your system. Aqualeak reserves the right to make changes without notice both to this manual and the products which it describes.

Purpose

This document provides installation and operating instructions for the Environmental Monitoring System (EMS-5/10) Water Leak Detection System.

Symbols and Notices Used

Important information has been highlighted throughout this document using the following symbols:

Warning

See relevant section

Take note of this information

Important Safety Information has been highlighted throughout the Safety Information section using the following warning notices:

DANGER	WARNING	CAUTION	DAMAGE
Death / serious injury (irreversible)	Death / serious injury (irreversible)	Minor injury (reversible)	Damage to property
Immediate risk	**Potential risk**	**Potential risk**	**Potential risk**

Contact Details

Address	Telephone	Email	Website
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1 Safety Information

To ensure your safety and the safety of others, please ensure that you read the Safety Information below **before** you install or operate this product.

1.1 Intended Use

Only use this product for the intended purpose described in this manual.

1.2 Statutory Obligations

- ✓ Installation and maintenance must comply with all relevant local laws and regulations ('statutory obligations'), particularly concerning electrics, water supplies, and building regulations.
- ✓ Statutory obligations always override manufacturer documentation.
- ✓ It is the responsibility of the customer to conduct a Health & Safety risk assessment prior to installing and operating this product.
- ✗ This product should not be operated by children or persons with reduced physical, sensory or mental capabilities. Where necessary, such Persons should be given supervision by a qualified person responsible for their safety.
- ✗ **DO NOT** position the unit (including its power cable) where it may violate Fire or Health and Safety regulations (e.g. block fire exits or stairwells, etc.).

1.3 Electrical Safety

⚠DANGER

RISK OF 230 VOLT ELECTRIC SHOCK

- ✓ ONLY qualified, competent and approved persons (e.g. 'electrical engineers') may undertake installations, repairs, or relocations of this product.
- ✓ The product must be earthed correctly.
- ✓ For **indoor use** only.
- ✓ Ensure that the building electrical system is compliant with Safety Regulations.

⚠WARNING

RISK OF DEATH OR SERIOUS INJURY

- ✗ **DO NOT** allow children or any other unqualified or unapproved persons to install, repair, clean, relocate, or otherwise interfere or tamper with the product.
- ✗ **DO NOT** immerse the unit or its peripherals in liquid.
- ✗ **DO NOT** install outdoors, near hot works, or where there is a danger of freezing.

1.4 Installation Safety

⚠DAMAGE

RISK OF DAMAGE

- ✓ Install the product on a **hard, solid, and level** surface.
- ✓ Follow the instructions provided in this manual. Where necessary, refer to the Aqualeak website (www.aqualeak.com) for contact and support information.

⚠CAUTION

RISK OF INJURY

- ✓ Be aware of any existing electrical (e.g. wiring), water (e.g. pipes), or other installations in the vicinity (including within or behind the surface used for mounting.
- ✓ Where applicable, this manual should be read in conjunction with manufacturer documentation for any components specified in the installation requirements of this manual.

1.5 Post-Installation Safety

Once installed:

1. Perform a test run to ensure normal operation.
2. Explain all safety precautions to the end user.
3. Provide a copy of this manual to the end user.

- ✓ It is the responsibility of the end user to supply this manual to any other subsequent users.
- ✓ All goods are sold subject to our 'Conditions of Sale'.
- ✓ As Aqualeak Detection Ltd. continuously improves products, they may be modified without notice. In such circumstances this manual and other relevant documentation should be disregarded. Updated documentation will be produced, supplied with new product ranges, and made available on request.

SAVE THESE INSTRUCTIONS

2 Product Overview

Ensure you have read the Safety Information in section 1 before attempting installation or operation of this unit.

The Aqualeak Environmental Monitoring System (EMS) Water Leak Detection System series are standalone leak detection systems designed to be integrated with larger Building Management Systems (BMS) and networks.

Designed for continuous operation with minimal human intervention, the EMS series is also compatible with a wide variety of sensing technologies (sold separately) to detect the presence of water and other liquids.

With 5 (EMS-5) or 10 (EMS-10) input channels as standard, these models are ideal for applications ranging from small multi-room offices to medium-sized industrial and commercial complexes.

Our most affordable and cost-effective solution also requires no configuration for ease of installation and operation.

Figure 1: *Aqualeak EMS-10*

Features

- Affordable
- No configuration required – works straight 'out of the box'
- Easy operation
- Designed and built in the United Kingdom
- CE Compliant
- Monitors for leaks, sensor cable breaks, and internal system faults

Operation

In operation, the EMS-5/10 continuously monitors all independent sensing circuits connected to it to reduce risks from flooding. If a leak or cable break is detected, the EMS-5/10 will and/or can be configured to:

- Activate a visual alarm
- Activate an audible alarm
- Activate default outputs
- Shut off local water supplies

EMS Series Models

Model	Channels	Configuration	Notes
EMS-01	1	DIP switches	Single zone applications
EMS-5X	5	Touchscreen	Small scale applications
EMS-10X	10	Touchscreen	Medium scale applications
EMS-OS	Variable	Touchscreen	Large scale applications
EMS-5	5	None	Operates 'out of the box' with no configuration required
EMS-10	10	None	

2.1 Technical Specifications

Master Panel	Specification	Notes
Dimensions	335 x 270 x 110 mm	**Millimetres**. Width x Height x Depth
Weight	4.5 KG	**Kilograms**
Supply Voltage	80 – 264 VAC	**Volts / Alternating Current**. 50/60 Hz frequency
Motherboard Output Relay Voltage Rating	250 VAC	
Motherboard Output Relay Current Rating	8 A	**Amps**. Maximum into resistive load.
Relay Minimum Load	10 mA	**Milliamps**. At 5 VDC (Volts / Direct Current)
Detection Response Time	1 second	
Ingress Protection (IP) Code	IP51 (dust protected and dripping water)	Ingress Protection to IEC 60529. Holes drilled during installation may affect unit IP
Alarm (Audible)	85 dB	**Decibels**. Within 0.6 m range
Alarm (Visible)		Via LED panel
Input channels	5 or 10	
Leader Cable	Belden 9534	Variable length
Operating Temperature	0 to +50˚C	Degrees Centigrade. Ambient temperature
Operating Humidity	10 to 95%	Relative humidity (non-condensing) at 45˚C
Operating Altitude	0 to 3,000 m	**Metres**
Storage Temperature	-20 to +70˚C	
Sensor Cable Length (per input channel)	100m (or maximum 20 probes)	Use recommended yellow Sensor Cable. Also requires End of Line (EOL) terminator

***Table 1**: EMS-5 / 10 Technical Specifications*

2.2 Input-Output Connections

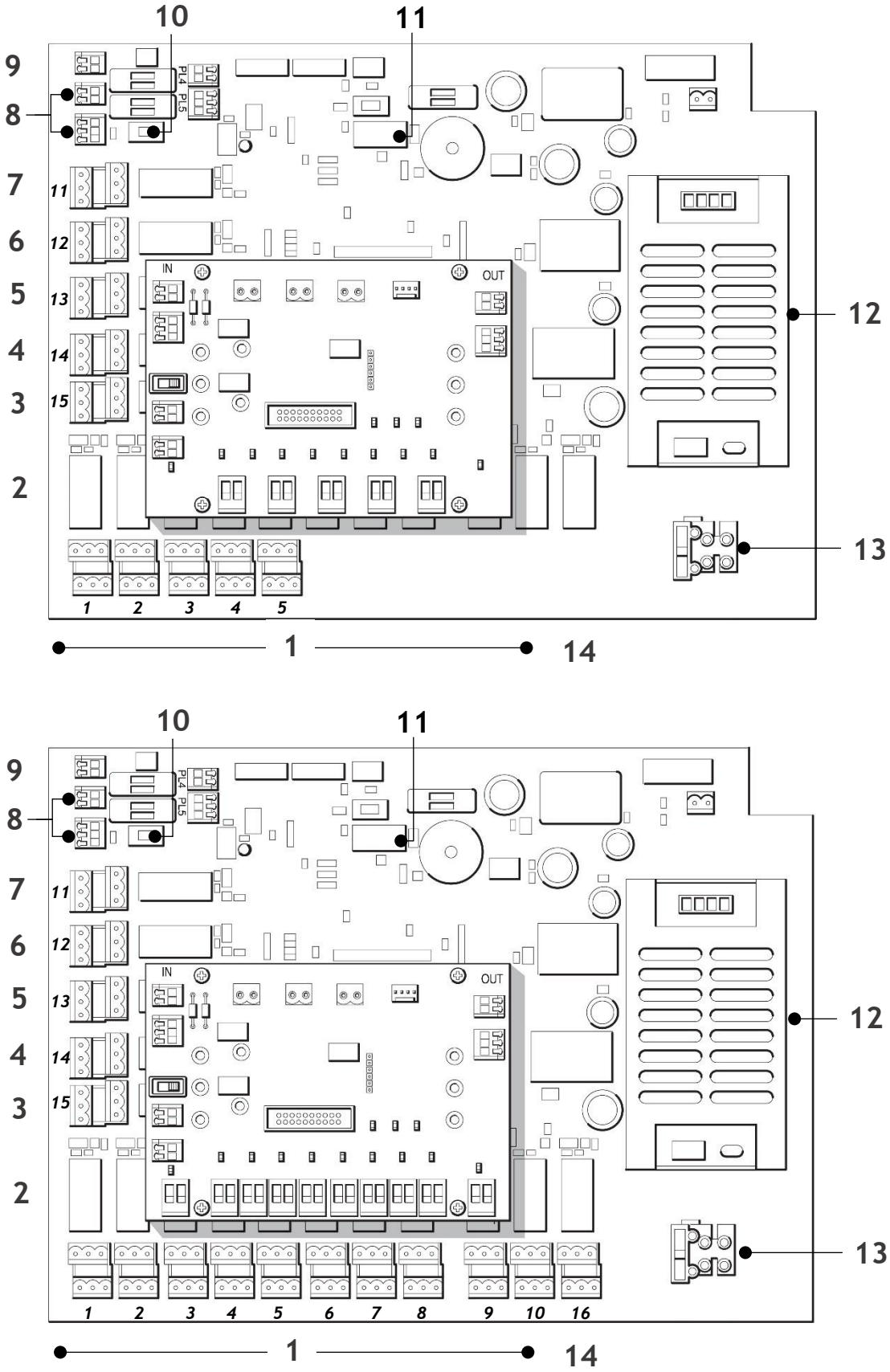

Figure 2: EMS-5 / 10 Input-Output Connections

Item	Name	Notes	Relay Abbreviations
1	Configurable Relays	5 or 10 Configurable Relays	Relay terminals are marked **NC | COM | NO** **NO** = Normally Open **NC** = Normally Closed **COM** = Common
2	Interface Board	5 or 10 Zone Inputs	
3	Watchdog Relay	Relay 15	
4	Configurable Alarm / Fault Relay	Relay 14	
5	Alarm Relay	Relay 13	
6	Cable Break Relay	Relay 12	
7	Common Alarm / Fault Relay	Relay 11	
8	Interface Board Power	PL7	**Mains Abbreviations**
	Communications Terminals	PL8	Mains terminals are marked **L | E | N** **L** = Live **E** = Earth **N** = Neutral
9	12/24 VDC Output Terminals	PL6	
10	12/24 VDC Selector Switch	SW2	
11	Reboot Relay Switch	SW1	
12	230 VAC to 24 VDC Power Supply Unit		
13	230 VAC Mains Cable Input Terminals		
14	Spare / Unused Relay	Relay 16	

Table 2: *EMS-5 / 10 Input-Output Connections*

2.3 Multiple Zone Application Example

Aqualeak EMS water leak detection and prevention systems are based on a **modular design**. Parts supplied depend upon intended application and particular requirements. Once the individual components have been selected, the system can be built and installed.

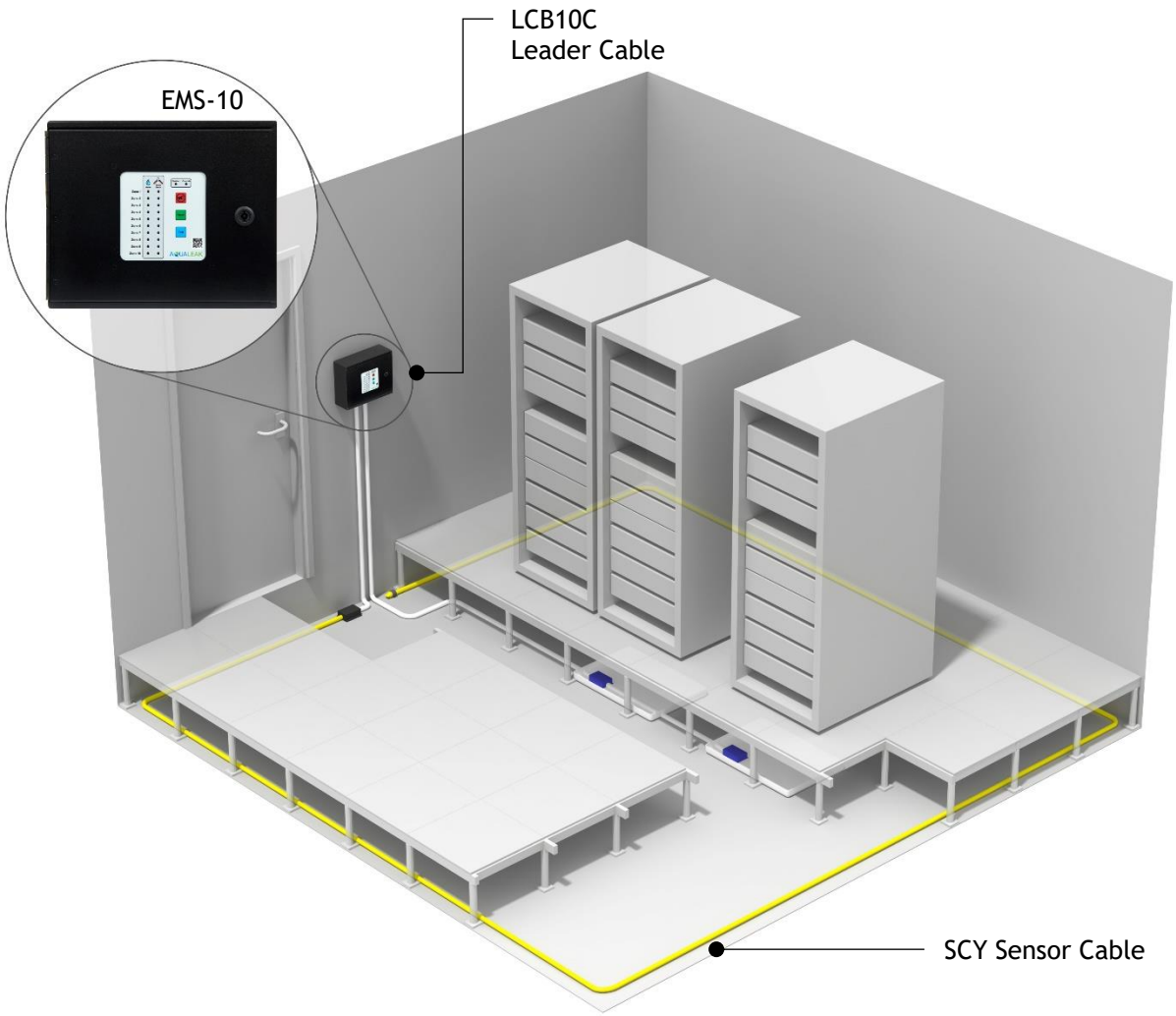

***Figure 3**: EMS-10 Three-Zone Communications Room Example*

3 Installation

Risk of electric shock and equipment damage! Ensure you have read section **1 Safety Information** before attempting installation.

3.1 Master Panel Installation

3.1.1 Mounting

The Master Panel has knock-outs for electrical cables on the top, bottom and lower rear of its enclosure.

Mount the Master Panel as follows:

1. Ensure the Master Panel has been properly removed from its packaging.
2. Securely mount the Master Panel in a **suitable location**, making cable entries as required.
3. Bring the cables through into the Master Panel **before** starting to make final connections.

3.1.2 Power Connection

A competent person must install a **230 VAC unswitched fused spur** near to the EMS. The switched fused spur must be clearly marked as the **disconnecting device** for the EMS. Where available, the EMS unit should be connected to a **UPS-backed power supply**.

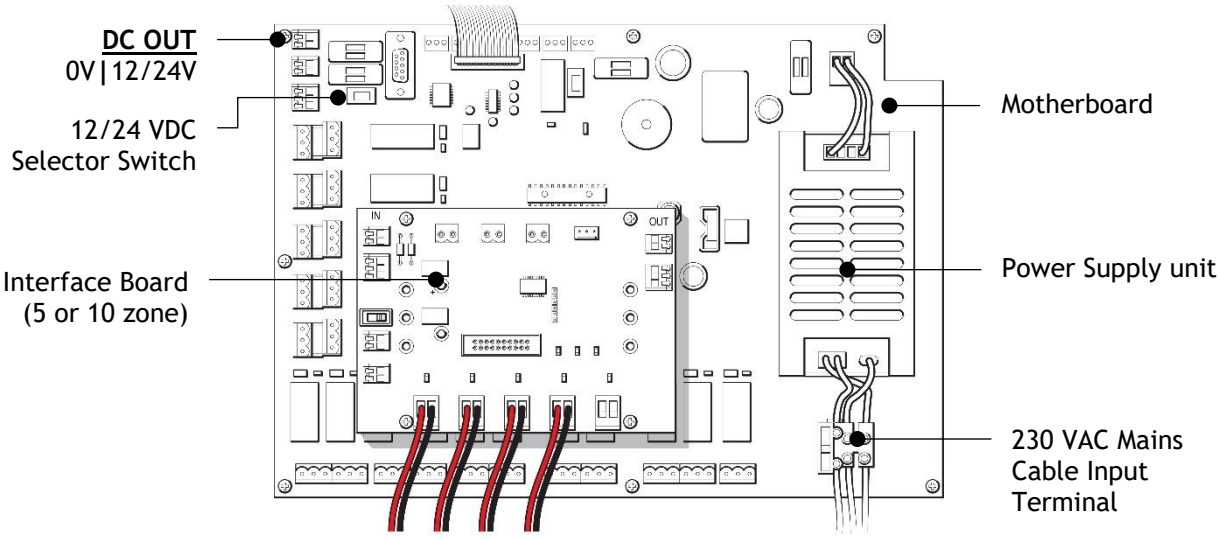

Figure 4: Master Panel Electrical Power Connections

Connect power to the EMS as follows:

1. Route the **power cable** from the **unswitched fused spur** into the **Master Panel** through a suitable containment or cable protection method.
2. Connect the **power cable** (i.e. Live, Neutral and Earth) to the Master Panel **mains cable input** terminal (**Figure 4**).

3.2 Relays and Sensors

Although multiple sensors and sensor types may be connected to the unit, there must always be an **end of line (EOL) terminating resistor** at the end of the sensing circuit to allow for **cable break monitoring** and **alarm reference set point**. The unit relies upon a terminating resistor of value **47k ohms**.

The unit should be **powered OFF** when making connections. Sensors should be installed so that they remain **accessible for maintenance**.

3.2.1 Relay Functions and Triggers

Relay	Function	Description and Triggers	
1-10	Individual zone	Used to operate auxiliary devices.	
11	Common Alarm / Fault	Relay latched upon alarm until acknowledged by User or Engineer.	
		✓ Zone cable break ✓ Motherboard communication failure	✓ Zone Alarm ✓ Interface boards / communication failure
12	Cable break	Relay latched upon alarm until acknowledged by User or Engineer.	
		✓ Zone cable break.	
13	Alarm	Relay latched upon alarm until acknowledged by User or Engineer.	
		✓ Zone alarm	
14	Latch on Alarm (13) and/or Cable Break (12).	Relay latched only when alarm or cable break present in real time.	
		✓ See Alarm (13) and/or Cable Break (12)	
15	Watchdog	Relay normally energised. De-energised on any system fault.	
		✓ Motherboard loss of power ✓ Interface Board (IB) loss of power ✓ Complete power failure to EMS	✓ Motherboard communication failure ✓ Interface Board communication failure
16	Spare	Unused.	
		✗ Not applicable	

***Table 3**: Relay Functions and Notes / Triggers*

3.2.2 Sensor Connections

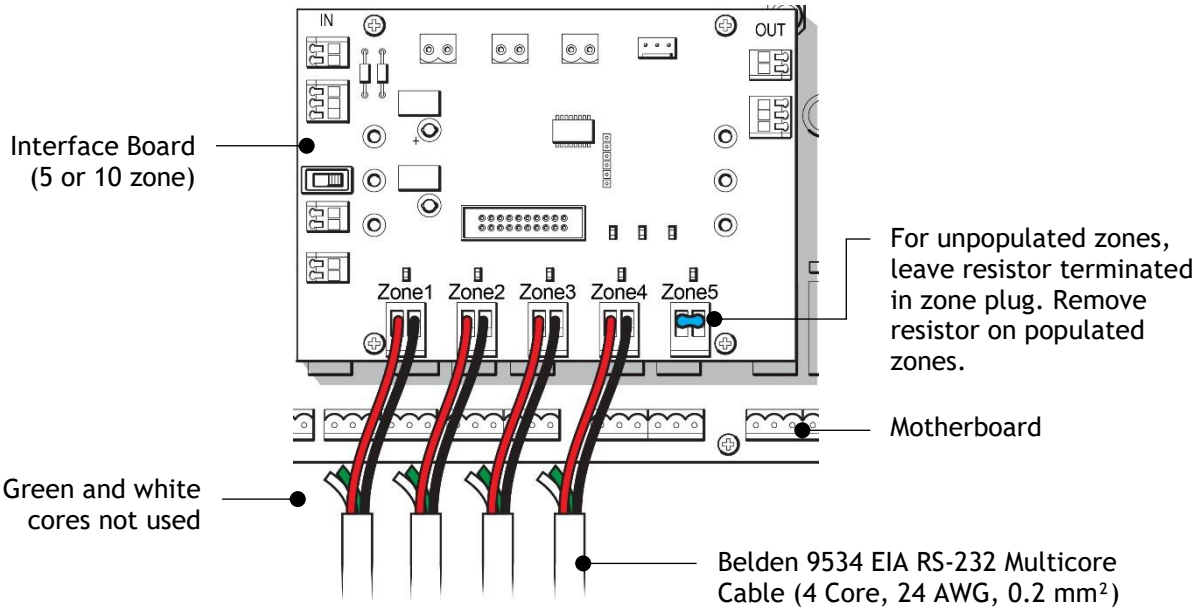

***Figure 5**: Sensor Cable Connection to Interface Board*

A. Sensor Cable (SCY) using LC10C and End of Line

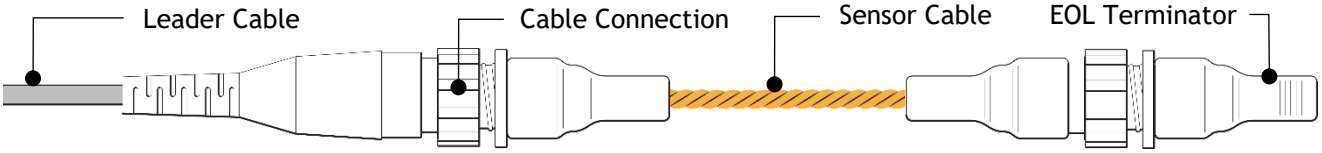

***Figure 6**: Sensor Cable Connection using Leader Cable (LC10C)*

Connect the Sensor Cable using LC10C and End of Line as follows:

1. Ensure that the unit is powered OFF. Connect the **leader cable** into the **sensor input terminals** on the **interface board**. Do not connect the green or white cores (**Figure 5**).
2. When connecting the leader cable to its respective sensor input terminals, ensure that the factory-issued **terminating resistor** is removed. Retain all resistors for future fault finding/testing.
3. Plug the opposite end of the **leader cable** into the **sensor cable** (**Figure 6**).
4. Once all sensor cables are connected, plug the **End of Line (EOL) terminator** into the end of the last run of the **sensor cable**.

B. Sensor Cable (SCY) using LC10/LCB100 and Start of Line

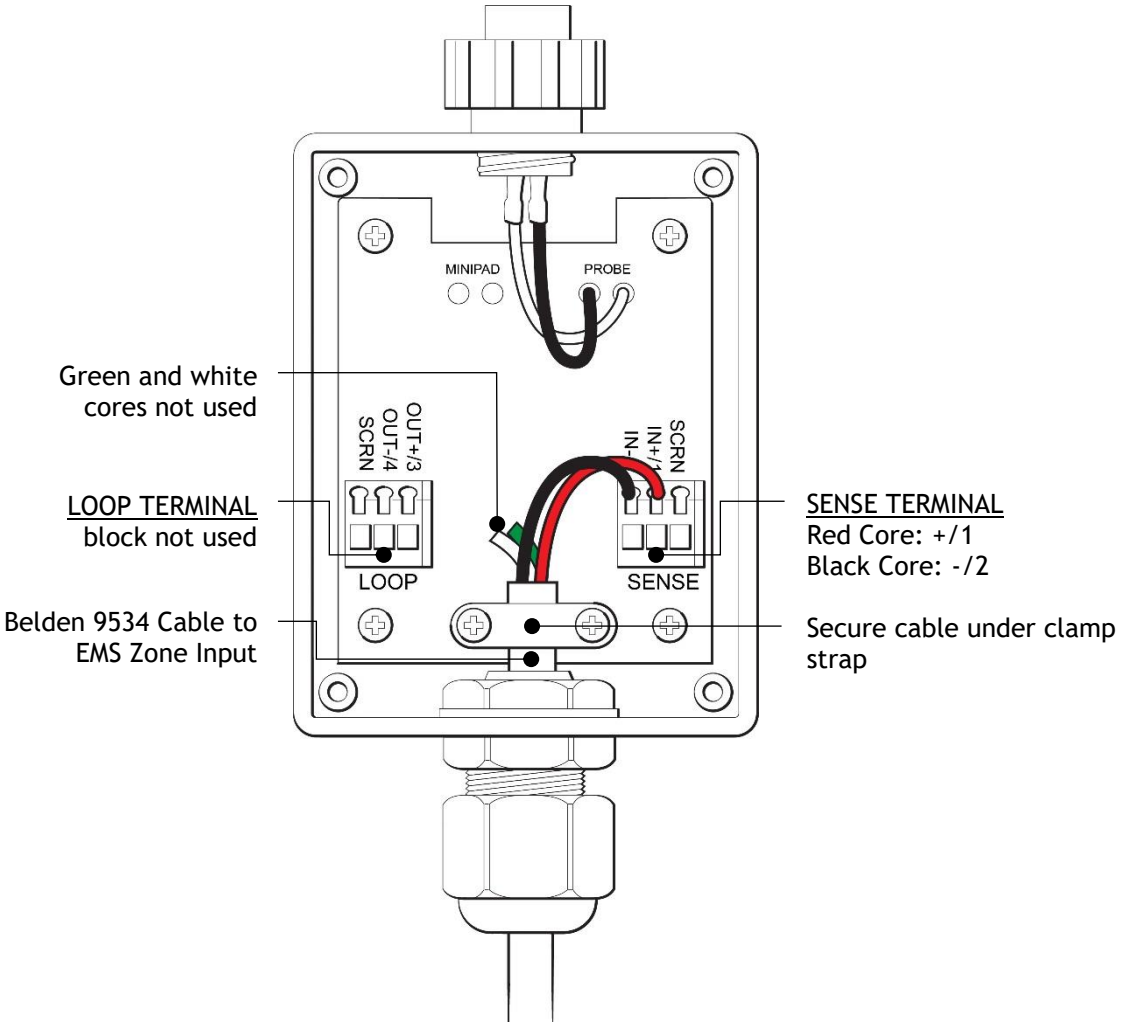

***Figure 7**: Sensor Cable using LC10/LCB100 and Start of Line*

Connect the Sensor Cable using LC10/LCB100 and Start of Line as follows:

1. Ensure that the unit is powered OFF. Connect the **leader cable** into the **sensor input terminals** on the **interface board**. Do not connect the green or white cores (**Figure 5**).
2. When connecting the leader cable to its respective sensor input terminals, ensure that the factory-issued **terminating resistor** is removed. Retain all resistors for future fault finding/testing.
3. Cable the opposite end of the **leader cable** in to the **Start of Line** (SOL; **Figure 7**).
4. Plug the **sensor cable** into the connection on the **SOL**.
5. Once all sensor cables are connected, plug the **End of Line (EOL) terminator** into the end of the last run of the **sensor cable.**

C. Single Environmental Sensing Device (ESD) Sensor Probe

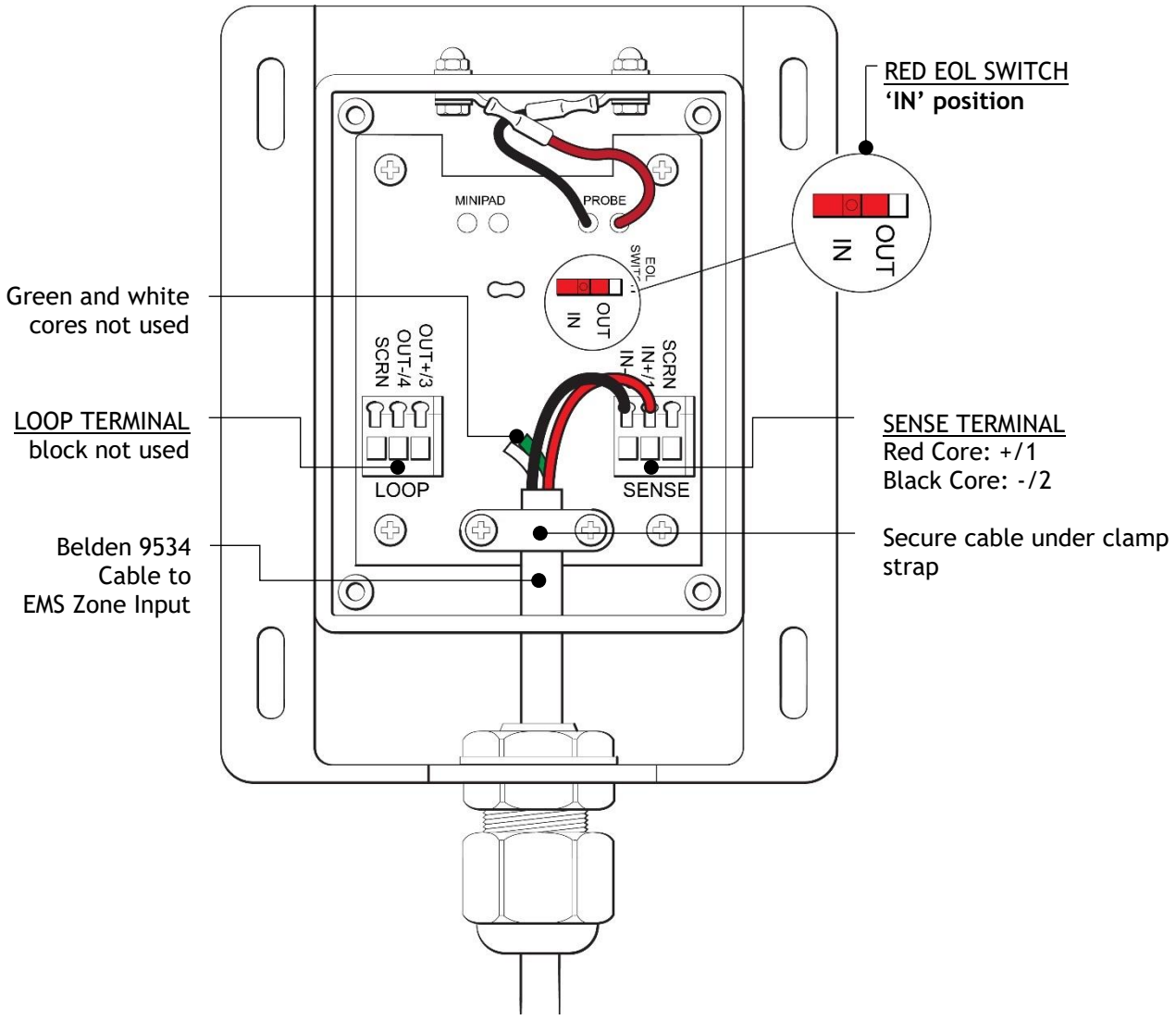

***Figure 8**: Sensor Cable using Single ESD Sensor Probe*

Connect the single ESD Sensor Probe as follows:

1. Ensure that the unit is powered OFF. Connect the **leader cable** into the **sensor input terminals** on the **interface board**. Do not connect the green or white cores (**Figure 5**).
2. When connecting the leader cable to its respective sensor input terminals, ensure that the factory-issued **terminating resistor** is removed. Retain all resistors for future fault finding/testing.
3. Connect the opposite end of the **leader cable** to the **ESD probe** (**Figure 8).**

D. Multiple Environmental Sensing Device (ESD) Sensor probes to a Single Zone

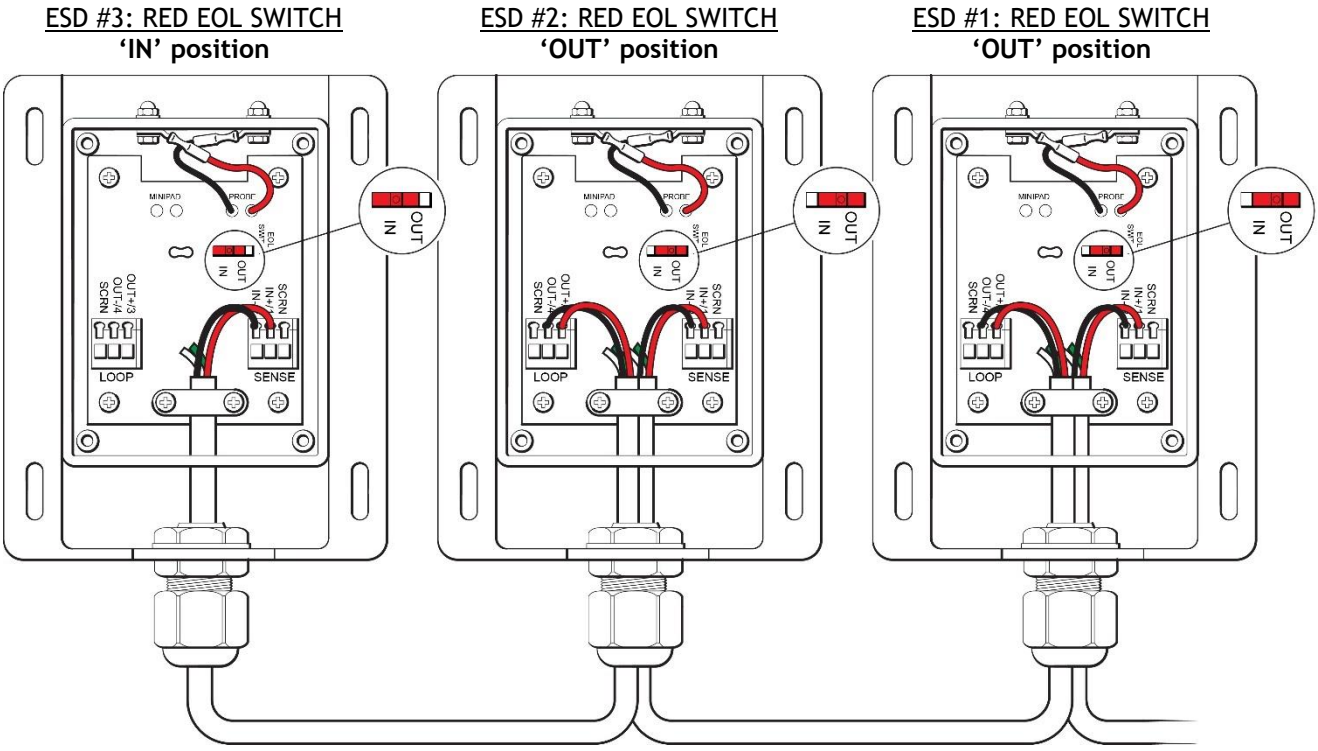

Figure 9: Multiple ESD Sensor Probes to a Single Zone

Connect multiple ESD sensor probes to a single zone as follows:

1. Ensure that the unit is powered OFF. Connect the **leader cable** into the **sensor input terminals** on the **interface board**. Do not connect the green or white cores (**Figure 5**).
2. When connecting the leader cable to its respective sensor input terminals, ensure that the factory-issued **terminating resistor** is removed. Retain all resistors for future fault finding/testing.
3. Connect the series of ESD probes. Ensure that:
   a. **All EOL switches except the last** are set to the **'OUT' position.**
   b. The last EOL switch should be set to the 'IN' position (e.g. **Figure 9**).

3.3 Ancillary Devices

3.3.1 Signalling to Ancillary Device

The EMS can be connected to provide a signal to a range of ancillary devices such as a Building Management System (BMS) or Short Message Service (SMS) alarm unit.

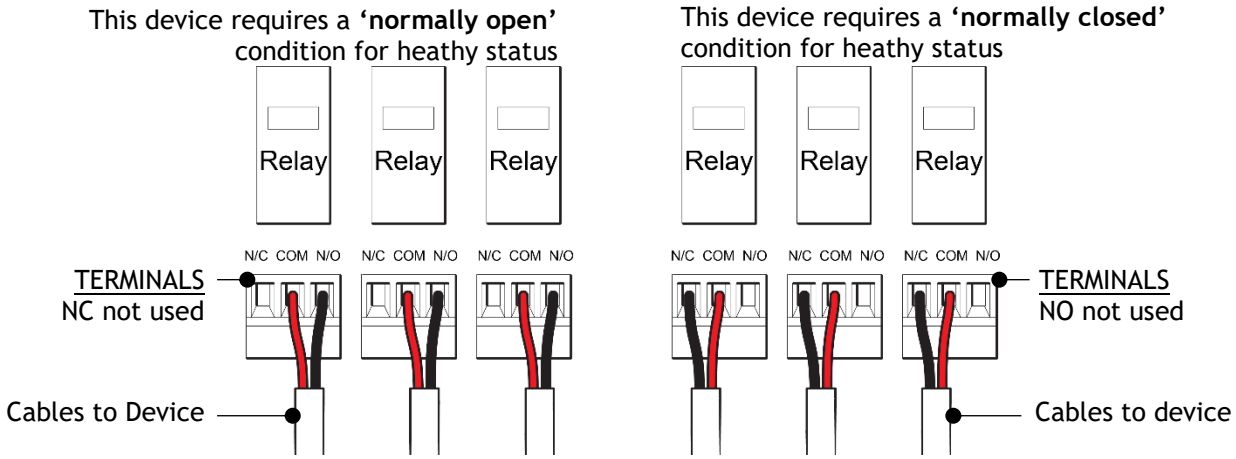

Figure 10: Connection of Master Panel for Signalling to an Ancillary Device

Connect the EMS Master Panel to an ancillary device as follows:

1. Ensure that the unit is powered OFF. Refer to **Table 3** (**3.2.1 Relay Functions and Triggers**) to select the correct **relay** for the application.
2. Connect to the relevant relay **(Figure 10;** core colours are for illustrative purposes only and may differ during application).

3.3.2 12/24V Output to Ancillary Device

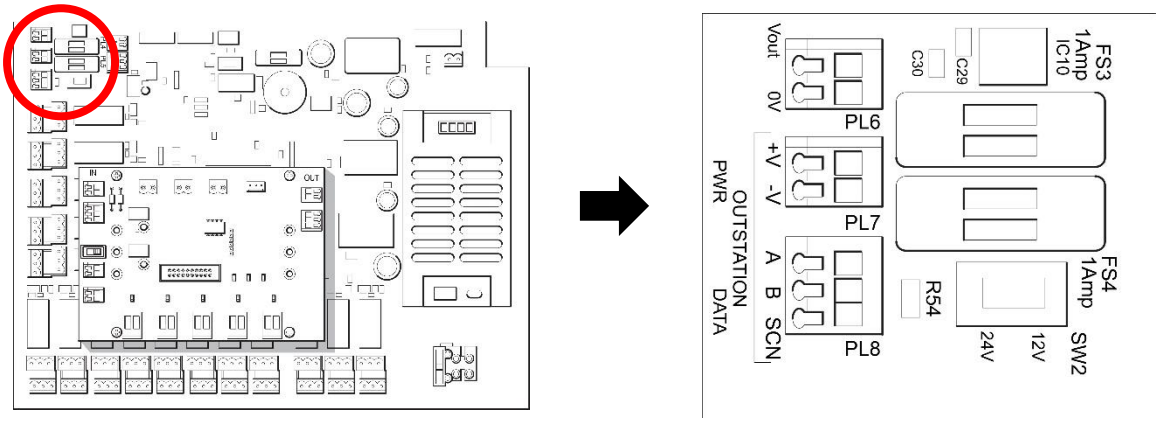

Figure 11: Using the 12/14 Output to Power an Ancillary Device

Use the 12/24V auxiliary output to power an ancillary device as follows:

1. Ensure that the unit is powered OFF. Use the **voltage selector switch SW2 (Figure 11)** to set the output to the correct voltage for your device.
2. Connect your device to the 12/24V output (**Figure 11**).

3.3.3 230V Output to Ancillary Device

The EMS can be used to control a powered ancillary device such as beacons or solenoid valves.

Maximum demand of all connected ancillary devices will be governed by the supply fuse in the unswitched spur, and cable of a suitable cross-sectional area should be used.

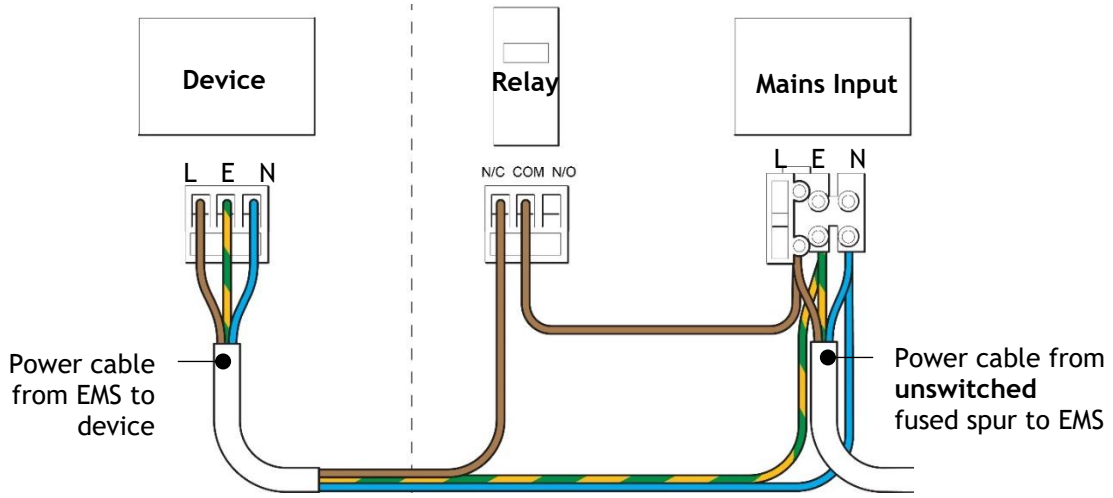

Figure 12: Using the EMS to Power a 230V Ancillary Device (Normally Closed)

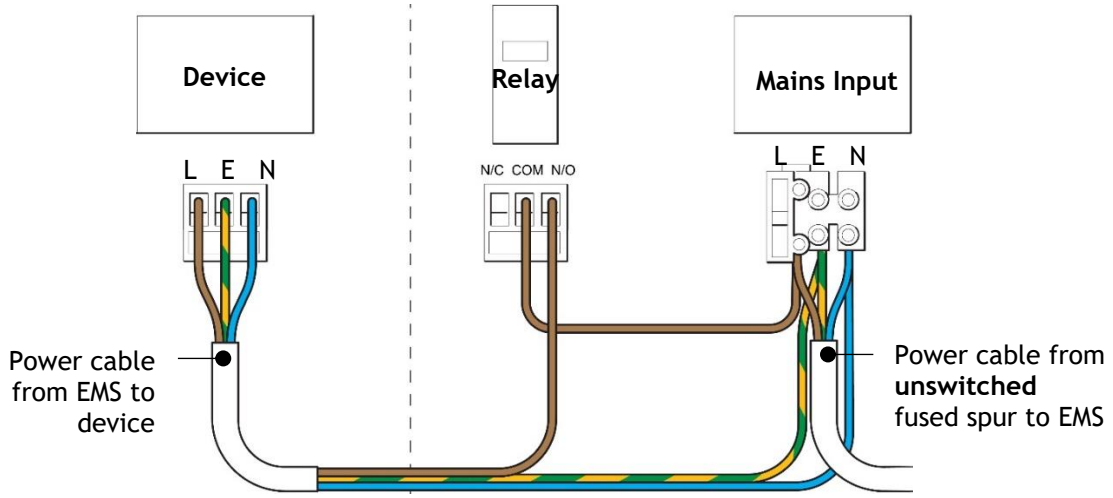

Figure 13: Using the EMS to Power a 230V Ancillary Device (Normally Open)

Use the EMS to power a 230V ancillary device as follows:

1. Refer to **Table 3** (**3.2.1 Relay Functions and Triggers**) to select the correct **relay**.
2. Wire the device (**Figure 12** and **Figure 13**).

   If the device is not within the immediate vicinity of the EMS panel, a **local isolator** must be installed **next to the device** for safe isolation and maintenance. The fuse rating of the local isolator should be less off that in the supply spur for circuit discrimination.

4 Operation

See also section 5 Maintenance for System LED and sounder combinations that indicate there may be a problem with the EMS itself.

All operations of the EMS-5 and 10 are undertaken via the front panel:

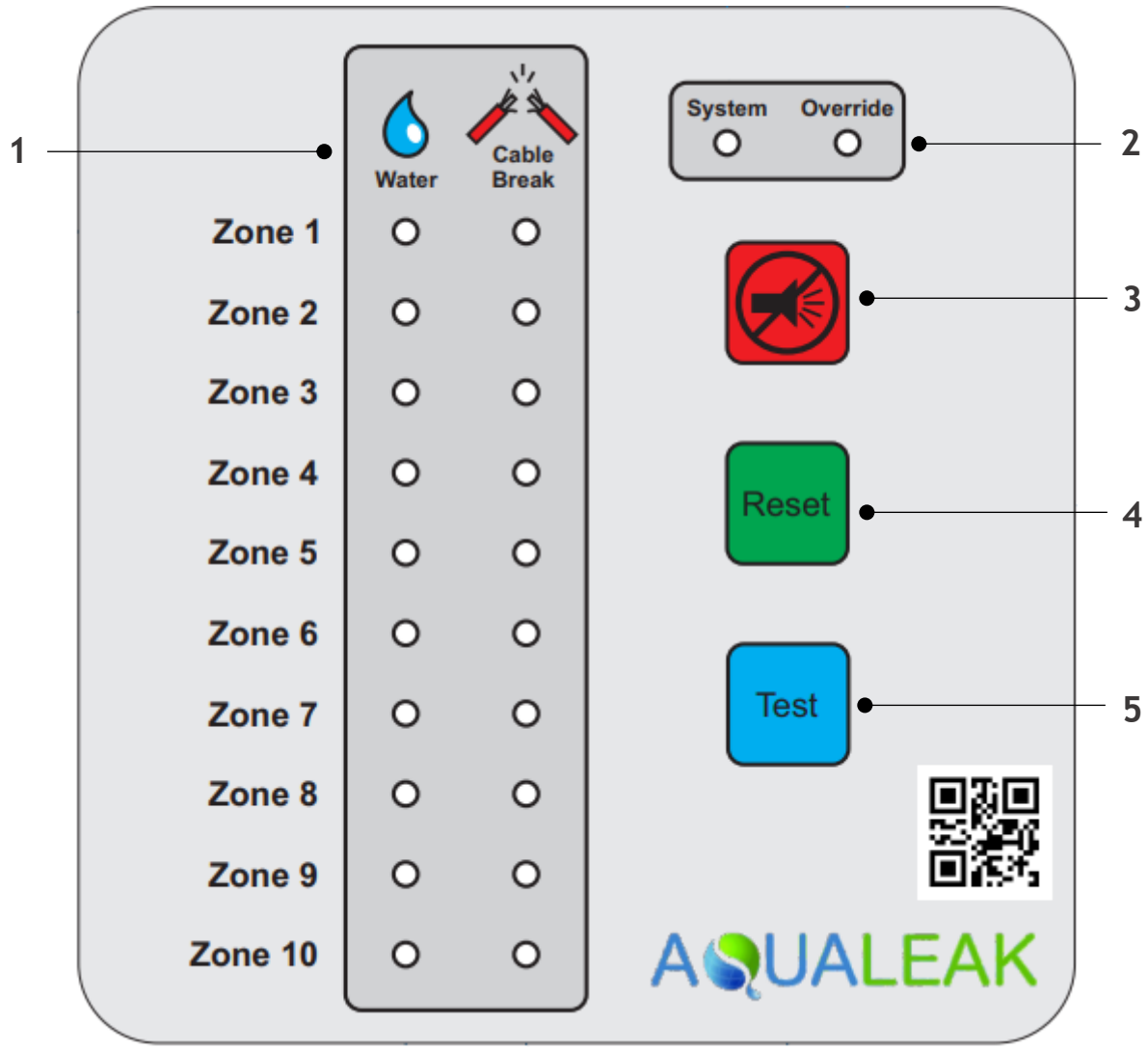

***Figure 14**: EMS-10 Front Panel*

Item	Name
1	Zone Alarm LEDs for water (red) and cable breaks (amber)
2	System (green) and override (red) LEDs
3	Mute button
4	Reset button
5	Test button

***Table 4**: Monitor Mode Button Inputs and Effects*

4.1 Monitor Mode

Standard mode of operation.

System LED SOLID GREEN		
Touch Button(s)	**Hold Time**	**Effect**
Mute	Instant	Disable sounder.
Reset	Instant	Disable sounder (if mute not already pressed).
Test	Instant	Test EMS. Sounder will engage, all relays will latch, and communications to the interface will cease for 10 seconds. At this time, all panel LEDs will be on for 3 seconds before switching off for 7 seconds. The EMS will then return to monitor mode.
Mute and Reset	3 seconds	Enter override mode (see section **4.4**).

***Table 5**: Monitor Mode Button Inputs and Effects*

4.2 Fault Mode

Occurs automatically if a fault (e.g. **cable break**) is detected.

Relevant cable break zone LED(s) FLASH AMBER		
Touch Button(s)	**Hold Time**	**Effect**
Mute	Instant	Disable sounder.
Reset	Instant	Clear fault condition and disable sounder (if mute not already pressed). The relevant cable break zone LED(s) turn solid amber while the EMS checks if the fault has been resolved; If so, the LED(s) will then switch off.
Test	Instant	Same as in monitor mode (section **4.1**), except the EMS will return to fault mode after the 10 second test.
Mute and Reset	3 seconds	Enter override mode (section **4.4**). Relevant cable break zone LED(s) will turn solid amber while the EMS checks if the issue has been resolved.

***Table 6**: Fault Mode Button Inputs and Effects*

4.3 Alarm Mode

Occurs automatically if the presence of water (i.e. a **leak**) or excess humidity is detected.

Relevant water zone LED(s) FLASH RED		
Touch Button(s)	**Hold Time**	**Effect**
Mute	Instant	Disable sounder.
Reset	Instant	Clear alarm condition and disable sounder (if mute not already pressed). The relevant water zone LED(s) turn solid red while the EMS checks the issue has been resolved; If so, the LED(s) will then switch off.
Test	Instant	Same as in monitor mode (section **4.1**), except the EMS will return to alarm mode after the 10 second test.
Mute and Reset	3 seconds	Enter override mode (section **4.4**). Relevant water zone LEDs will turn solid red while the EMS checks if the issue has been resolved.

Table 7: *Alarm Mode Button Inputs and Effects*

4.4 Override Mode

See also section **3.2.1 Relay Functions and Triggers**.

The sounder is disabled in this mode, which is for engineers. In this mode, if a fault or alarm occurs:

- **Before:** Relevant water and cable break zone LEDs will change from flashing to solid. Relay 11 (Common Alarm / Fault) will unlatch; where latched relays 12 (cable break) and 13 (Alarm) will not unlatch until the issue has been resolved and override mode has been exited.
- **After:** Relevant water and cable break zone LEDs will function as normal (i.e. flash). No motherboard relays will latch.

Override LED SOLID RED		
Touch Button(s)	**Hold Time**	**Effect**
Mute	Disabled	No effect.
Reset	Instant	If an alarm or fault is detected, the relevant water (red) and/or fault (amber) LEDs will turn solid while the EMS checks if the issue has been resolved. If so, the LED(s) will then switch off.
Test	Disabled	No effect.
Mute and Reset	3 seconds	Exit override mode.

Table 8: *Override Mode Button Inputs and Effects*

5 Maintenance

Ensure you have read the Safety Information in **Section 1** before undertaking maintenance.

5.1 Cleaning

✓ Clean the outside of the unit. Use a dry, clean cloth.

✗ **DO NOT** use abrasive agents or solvents to clean the equipment.

5.2 Troubleshooting

The table below lists the most common problems and their solutions. If a problem cannot be solved then please call support on **+44 (0)1249 715698** or visit our website at www.aqualeak.com.

Problem	Possible Cause	Possible Solution
System does not power on	**Power cable** is incorrectly connected to the Master Panel.	Check the power cable. Review section **3.1.2.**
	Switched fused spur is faulty or inactive.	Check fuses and power on the switched fuse spur. Review **section 3.1.2.**
Sensor data is intermittent or inactive	Sensors not connected properly.	Check Leader Cable and connections. Review **section 3.2.2.**
Leak detected but no leak present	Sensor cable is touching something conductive.	Check Leader Cable and connections. Review **section 3.2.2.**
	Sensor cable is over 100 metres in length.	
	Sensor cable had debris on it.	Clean sensor cable.
EMS disabled with power LED flashing every 10 seconds and sounder activating every 2 seconds	Communications loss between EMS motherboard and interface board.	Contact Aqualeak if unable to restore communications.
EMS disabled with power LED off and sounder activating every 1 second	Communications loss between EMS motherboard and front panel.	Contact Aqualeak if unable to restore communications. Otherwise, where restored, the EMS will automatically reset after a maximum of 60 seconds.

***Table 9**: Troubleshooting*

6 Warranty

The Aqualeak Environmental Monitoring System (EMS-05) Water Leak Detector has a **1-year back-to-base warranty** as standard, and a **5-year warranty where installed and annually maintained by Aqualeak**.

The warranty is applicable from the original purchase date and includes repair or replacement if the product is defective. The following exclusions apply:

- ✕ If the system is purchased second hand. Only new products are covered.
- ✕ Persons not named as the original purchasers on the order information.
- ✕ Physical damage to the unit due to abuse, accident, neglect, or misuse. This includes:
    - Damage caused by water or other liquids.
    - Damage caused by connection to incompatible power sources.
    - Damage caused by connection to incompatible devices not manufactured by Aqualeak.
    - Damage caused by improper installation (i.e. not following the instructions provided).
    - Normal wear and tear.
    - Unauthorised attempts to repair, modify, or disassemble the item by unqualified persons.

For further information on the warranty and returns procedure, contact us on **+44 (0)1249 715698** or visit our website at www.aqualeak.com.

AQUALEAK

Do not dispose with household waste!

According the European Guideline 2002/96/EC for Waste Electrical and Electronic Equipment and its implementation into national right, measuring tools that are no longer usable must be collected separately and disposed of in an environmentally correct manner.