3L-SP/AP

Leak Control Panel with Alarm and LCD Display

For

Liquid Leakage Locating & Detection System

User Guide

(2017 Rev 1)

Asia Pacific Head Office Elsa Adanced Systems Pte. Ltd. 2 Balestier Road #03-687 Singapore 320002 Tel/Fax: +65-6258 1598

We won't have the society if we destroy the environment. *American Scientist, Margaret Mead. 1901-1978*

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CHAPTER 1 QUICK GUIDE TO INSTALLATION

1.1 INTRODUCTION

3L-SP/AP is an advance panel of Early Warning Leak Locating System. Once leak is detected, it responses within 18 seconds and provide liquid leakage location accurately. This panel shall be mounted directly on the wall or within the enclosure box.

General Features:

- LCD with backlight – 4 lines, up to 35 characters
- Sensing Cable Length – up to 200m per panel
- Communication interface with BMS/EMS & High level RS485/Modbus interface protocol
- 4 x Relay (2-Trouble relay & 2-Leak relay)
- Alarm by Buzzer (90dB max.) and LED indicator

1.2 3L-SP/AP PANEL WIRING DETAILS

1.2.1 3L-SP/AP PANEL PIN NUMBER DETAILS

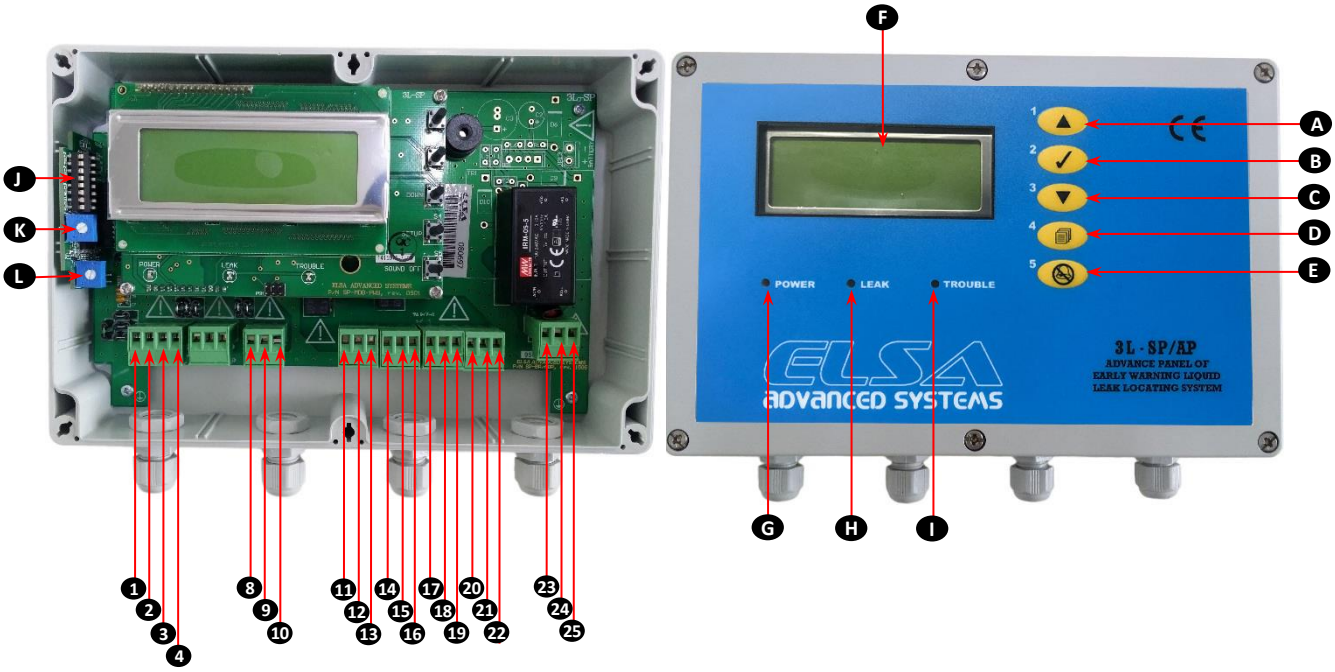


Figure 1: 3L-SP/AP PANEL

Pin number	Details		Pin number	Details
1	Leader cable - RED		14	Trouble Relay – NO (Normally Open)
2	Leader cable - WHITE		15	Trouble Relay - COM
3	Leader cable - GREEN		16	Trouble Relay – NC (Normally Close)
4	Leader cable - BLACK		17	Leak Relay – NO (Normally Open)
5	N.A		18	Leak Relay - COM
6	N.A		19	Leak Relay – NC (Normally Close)
7	N.A		20	Leak Relay – NO (Normally Open)
8	MODBUS - COM		21	Leak Relay - COM
9	MODBUS - (+) ve		22	Leak Relay – NC (Normally Close)
10	MODBUS - (-) ve		23	AC Supply 100-240V - LIVE
11	Trouble Relay – NO (Normally Open)		24	AC Supply 100-240V - NEUTRAL
12	Trouble Relay - COM		25	AC Supply 100-240V - EARTH
13	Trouble Relay – NC (Normally Close)			

Point A - Representing move "UP" action or as digit # "1".

Point B - Representing "OK" action or as digit # "2".

Point C - Representing move "Down" action or as digit # "3".

Point D - Representing System Menu for "Setup" action or as digit # "4".

- When pressing "**Setup**" button, the LCD display will show a list of System Menu to select.
  - **Sensor Lengths:** It shall show the length of sensing cable of each monitoring zone
- **System Parameters:**
  - **Sound ON/OFF Setup** (Password protected: Default password is "12341234")
    - To permanently turn ON or OFF the Alarm/Buzzer.
  - **System Setup** (Password protected: Default password is "12341234")
    - **Modbus Interface**
      - For interfacing with high level Building Management System (BMS) or SP panel. Can assign from **1 to 100** numbers of code.
    - **Time/Date Setup**
      - To set or adjust Time and Date.

Point E- Representing Alarm “Sound OFF” action or as digit # “5”.

Point F- Representing “System LCD display, displays the operation process of 3L-SP/AP panel.

Point G- Representing “Power LED”.

Point H - Representing “Leak LED”.

Point I- Representing “Trouble LED”.

Point J- Representing DIP switch. Always default number #1.

Point K- Representing sensitivity adjustment.

Point L- Representing sensing cable total length adjustment.

1.2.2 CABLE CONNECTION DETAILS

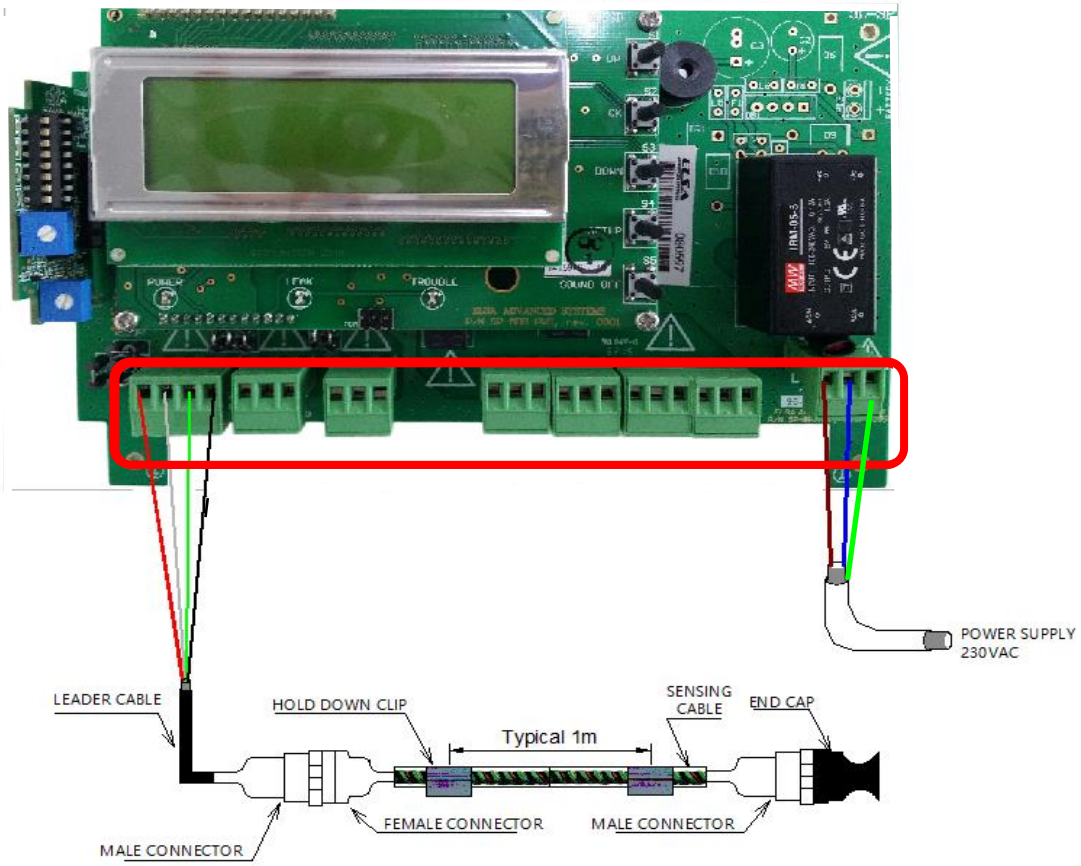


Figure 2: Schematic diagram for 3L-SP/AP with one zone

- Sensing cable connection:
  - Follow the color code such as R-Red, W-White, G-Green & B-Black by using leader cable.
- Output (To Panels):
  - N.A
- MODBUS (To 3L/SP,3L-SP/DP,BMS OR EMS):
  - Connect RS485 communication cable to Building Management System (BMS) or Environment Management System (EMS).

- Trouble Relay:
  - Sensing cable break or Power failure will activate this Trouble Relay.
  - Number of "Trouble" Relays: 2 units, Single Pole Double Throw (SPDT).
- Leak Relay:
  - Liquid leaked detected on the sensing cable will activate this "Leak" Relay.
  - Number of "Leak" Relays: 2 units, Single Pole Double Throw (SPDT).
- Power Supply:
  - 100VAC~240 VAC input power supply. **(Optional: 12 VAC/12 VDC or 24VAC/24VDC is available upon request. Battery Backup option is also available upon request.)**

1.2.3 3L-SP/AP CONTROL PANEL – POWER ON

- Check all power supply cable, dry contacts are properly connected (see all detail **wires connection indication under section 1.2**).
- Switch ON AC Power to 3L-SP/AP
- Check 3L-SP/AP in TEST mode or self-initialization:
  - An audible alarm/buzzer sound.
  - "**POWER**" LED turn on as **GREEN** when power supply is in normal condition.
  - "**LEAK**" LED turn off when all sensing cable do not detect any liquid leakage.
    - "**LEAK**" LED will turn on **RED** when leak occur at any **Control Panel**.
  - "TROUBLE" LED turn off when all wires are properly connected
- "**TROUBLE**" LED will turn on **YELLOW** when sensing cable break occur.
- Check LCD displays "ELSA ADV. SYSTEMS SUPERVISION <ON>" after self-initialization has completed and all are under normal condition.
  - "**Time**" is display on the top left of the LCD.
  - "**Date**" is display on the top right of the LCD.

1.3 TESTING PROCEDURE

- **Leak Test:**
  - Pour some drop of liquid **(to simulate liquid leakage)** on the floor.
  - Check red "**Leak**" LED turns ON continuously.
  - Check display "**LEAK**" and leak location in meter.
  - Check **Buzzer** continuous sound.
  - **Leak Relay/Dry** Contact will be activated.
  - Removed all liquid with dry cloth in spiral way and dry the cable.
  - Check 3L-SP/AP, it will clear the fault automatically and the "Leak" LED turns OFF, Buzzer stops sounding and display "LEAK CLEARED" then comes back normal.
  - LCD display will show "Date, Time and SUPERVISION (ON)"

Note: 3L-SP/AP shall detect **multi leak** (1st leak and 2nd leak), but 3L-SP/AP panel cannot show accurate leak location if the previous leakage alarm not be cleared.

- **Cable Break Test:**
  - Disconnect the end termination point **(Remove end cap)**
  - Check red "**Trouble**" LED turns ON.
  - Check display "**CABLE BREAK**".
  - Check **Buzzer** intermittent sound.
  - **Trouble Relay/Dry** Contact will be activated.
  - Reconnect end termination point.
  - Check 3L-SP/AP, it will clear the fault automatically and the "Trouble" LED turns OFF, Buzzer stops sounding and display "CABLE BREAK CLEARED" then comes back to normal.
  - LCD display will show "Date, Time and SUPERVISION (ON)"

Note: During Cable Break, 3L-SP/AP still able to detect all preceding cables for leakage alarm.

1.4 FALSE ALARM TROUBLESHOOTING

- Cable break alarm
  - Check the entire cable length for a **cut or shearing** which cause cable break.
  - Check all 4 wires **(R, W, G, B)** connections on sensing cable for continuity by a multi-meter.
    - By using the multi-meter measure the cable resistance (Red &black, white & greed).

      The resistance for sensing cable is 25 Ohm/meter.
- Leakage alarm
  - Check the sensing cable for **proper installation** and **avoid contact with metals** (or other conductive elements) which cause leak.
  - Check sensing cable to identify any badly contaminated by some chemical for unknown reason.
- If the false alarm still not clear Refer ***CHAPTER 6***troubleshooting guide.

1.5 TAG OR LABEL FOR SENSING CABLE

- It is recommended to place 3m to 5m per tag or label.
- To determine the tag or label location exactly, simulate a leak at that point and get the leak location from 3L-SP/AP panel. Write the distance on the tag or label.

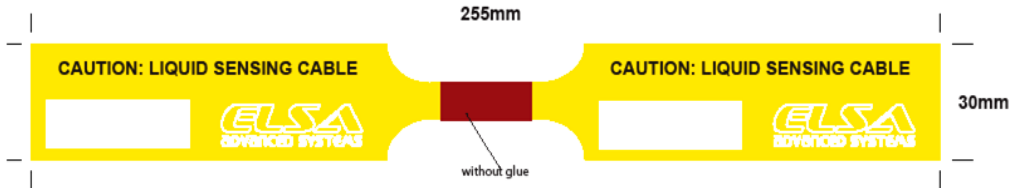


Figure 3: 3L-Tag for sensing cable

1.6 HOLD DOWN CLIP FOR SENSING CABLE

- It is recommended to place hold down clip with a spacing of 1m per clip.
- For corner or any bending angle area, use more clips per 1m.
- Use more hold down clip to isolated the sensing cable with the contact of metals.

Figure 4: 3L-HDC for sensing cable

1.7 3L-SP/AP PANEL MOUNTING HOLE DIMENSIONS

Figure 5: 3L-SP/AP panel dimensions

Refer the above figure to get the dimension details for the mounting purpose of 3L-SP/AP panel.

CHAPTER 2 PRODUCT SPECIFICATION

2.1 GENERAL FEATURES

Maximum accumulated length of sensing cable	: 200m
Precision to locate leak location	: +/-1m or 0.5%
Failsafe operation	: Ability to operate in loop operation Ability to detect liquid leakage during cable break
Display	: Permanent backlight with LCD of 4 lines x 20 English characters
Sound Alarm	: 90dB max. buzzer with silencing button
System Menu	: Configuration Modbus slave number and sound
Time to display Leak/Trouble from supervised panel	: 18 seconds typical
Liquid Leak detection data	: Typically, 20mm in length of liquid (e.g. tap water) in full contact with sensing cable, leak sensitivity is adjustable
Supervised Panels Identification	: By different panel number and name with up to 35 characters
Mechanical dimensions	: Rugged ABS UL-VO case of 222 x 146 x 55mm
Ingress Protection	: Dust-and splash-proof IP 65

2.2 ENVIRONMENTAL RATINGS

Operating temperature : 0°C to 40°C (indoor installation only)

Storage temperature : -20°C to 70°C

Humidity : 5% to 95% non-condensing

2.3 POWER REQUIREMENTS

Power supply : 100-240 VAC, 50/60 Hz

Optional input : 12 to 30 VAC/DC power input

Power consumption : 8VA/3 W maximum

2.4 POWER RELAYS SWITCHING CHARACTERISTICS

Cable break/power failure by contact (1 relay) : Operation – SPDT
Switching current -0.5 A at 250 VAC, 1A at 30 VDC

Liquid leakage dry contact : Operation – SPDT
Switching current -0.5 A at 250 VAC, 1A at 30 VDC

2.5 SUPERVISING CHANNEL

Physical support : RS485-two-wire, ESD and surge protected as per IEC 61000-4-2

Protocol : Modbus

2.6 SERIAL COMMUNICATION INTERFACE

Physical support : RS485-two-wire, ESD and surge protected as per IEC 61000-4-2

Protocol : Modbus

Operational GSM/GPRS transmitter interfacing

Optional Modbus over TCP/IP (allow world-wide remote supervision through Internet connection)

Optional BACnet/IP interface

Optional Profibus interface

Optional LONworks interface

2.7 COMPLIANCE TO INTERNATIONAL STANDARDS

EMC emission : IEC61000-6-3(2001) – Electromagnetic compatibility Generic emission standard for residential, commercial and light industrial environment

EMC immunity : IEC61000-6-1(2001) – Electromagnetic compatibility Generic immunity standard for residential, commercial and light industrial environment

3.1 3L-SP/AP PANEL WITH MULTI ZONES

- Below *figure* shows how to connect two zones with 3L-SP/AP panel by using jumper cable.

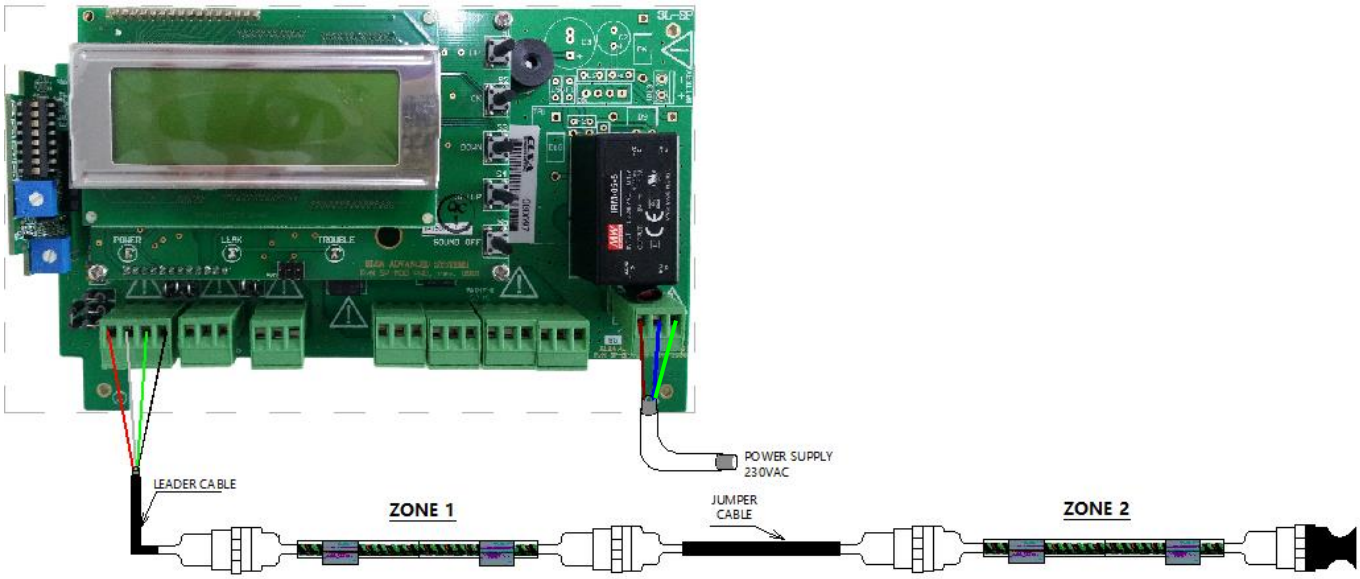


Figure 6: Schematic diagram for 3L-SP/AP with multi zones

3.2 3L-SP/AP PANEL FAIL SAFE LOOP BACK CONNECTION DETAILS

Below *figure* shows how to do the fail-safe loop back cable connection with 3L-SP/AP panel by using "Leader cable (Front) and Leader cable (Back)". This unique Fail-safe loop back feature shall continue to detect leak if there is a cable break.

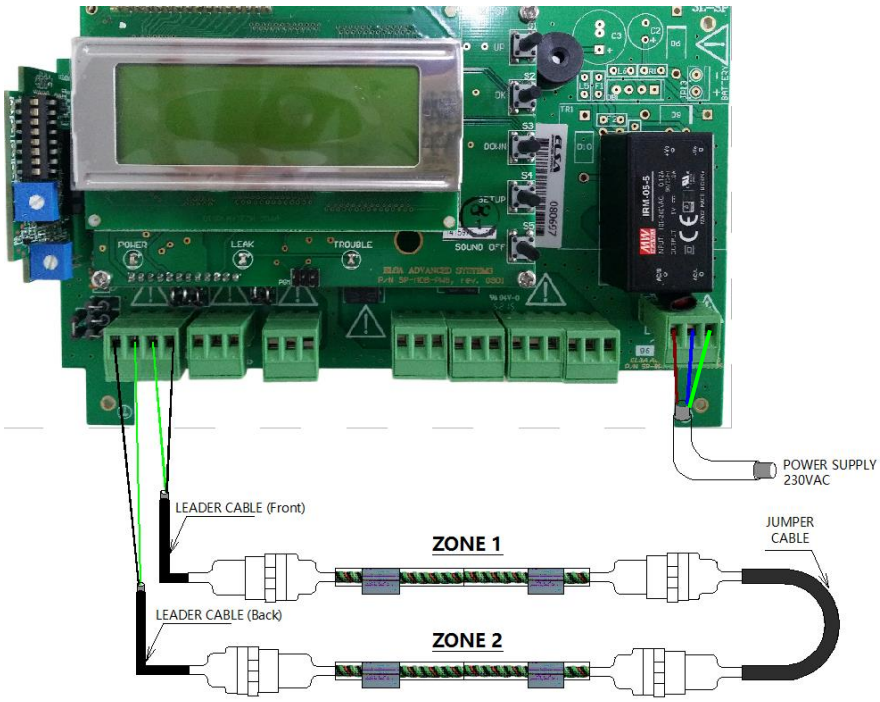


Figure 7: 3L-SP/AP Fail -Safe loop back connection

- There shall be two wires (green & black) from the Leader cable (Back), connect the black wire to 'R' terminal and connect the green wire to 'W' terminal.
- There shall be two wires (green & black) from the Leader cable (Front), connect the green wire to 'G' terminal and connect the black wire to 'B' terminal.

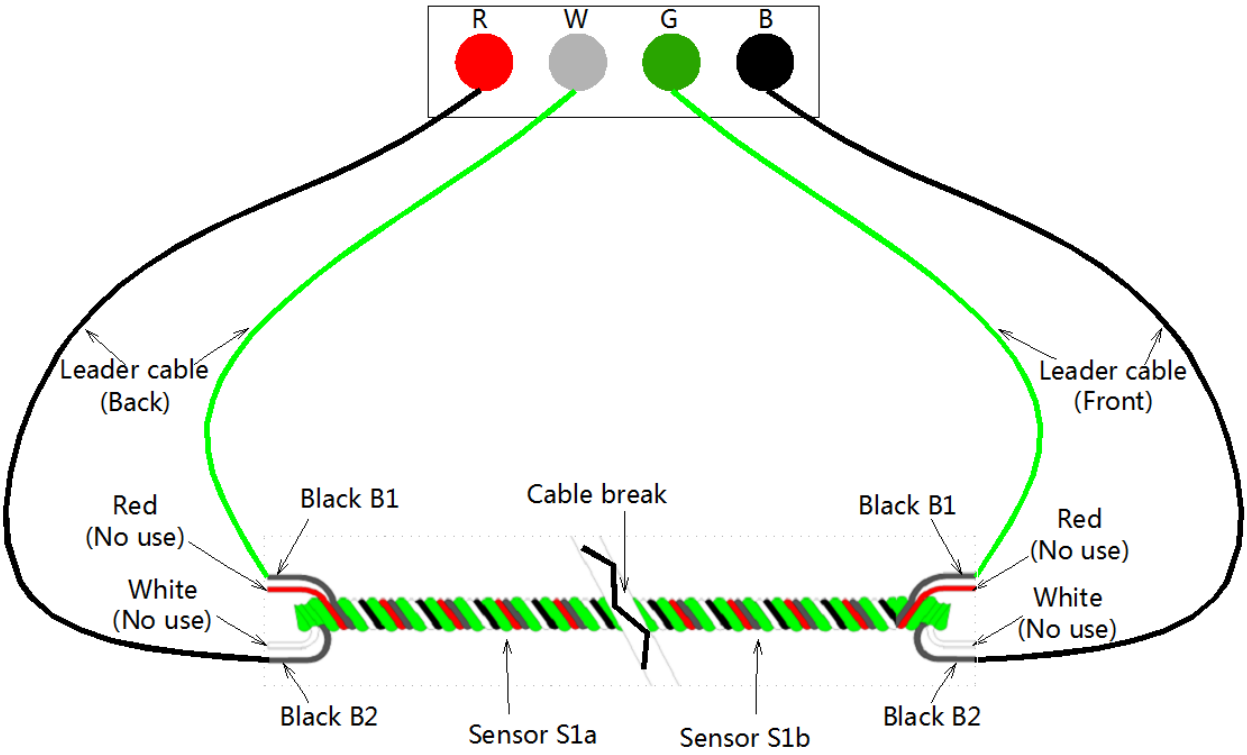


Figure 8: Fail-safe cable connection details

- Connect wire coloring code as per above figure when fail-safe loop back connection method is selected instead of normal end-termination method.
- When the black wire (B2 as per above diagram) on the white-black pair of the sensing cable is broken and the black wire (B1 as per above diagram) on red-black pair remain connected, the system is still able to detect and locate the leak.
- When both wires are broken at any one point of the cable, either side (S1a or S1b as per above diagram) of the cable is still able to detect leak but it shall not provide the leak location.

3.3 3L-SP/AP PANEL WITH EXTERNAL RELAY AND SOLENOID VALVE

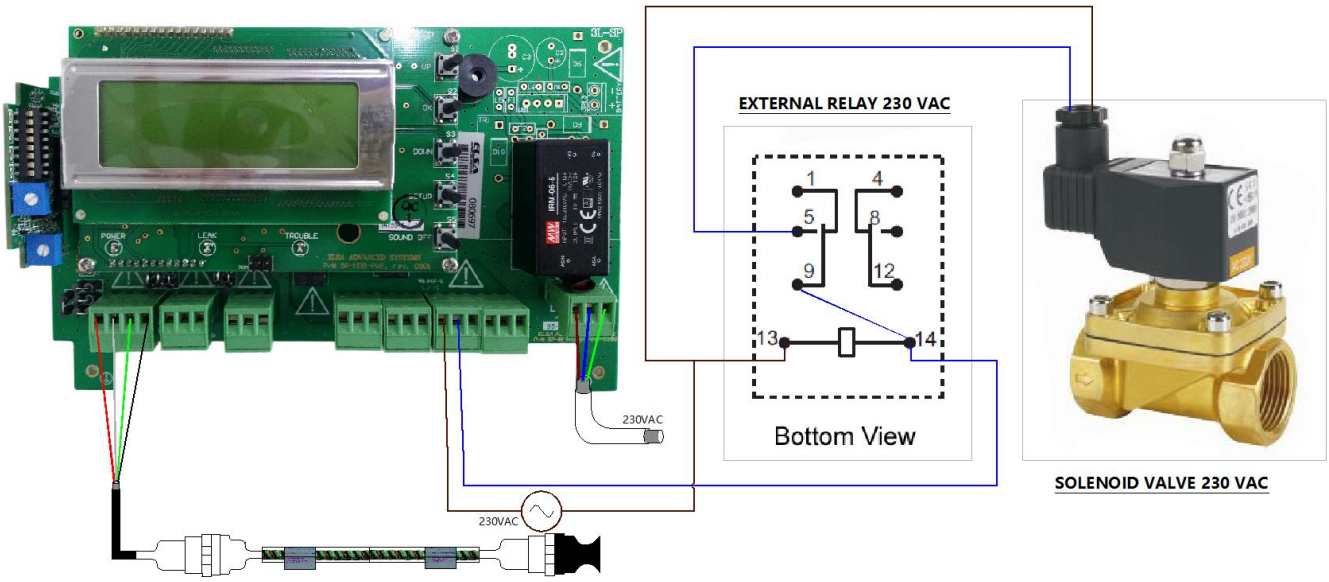


Figure 9: 3L-SP/AP panel with external relay and solenoid valve wiring diagram

There is four Relay/Dry contact in 3L-SP/AP panel. Two for Trouble alarm and other two for leakage alarm. According to our requirement, we shall use any relay for this connection.

NOTE: #1: 3L-SP/AP panel relay (NO)
#2: External relay (2 pole relay – NO)
#3: The solenoid valve (Normal Open) can be replaced by electrical Hooters or warning light or SMS dialer.

3.4 3L-T-JOINT CONNECTION DETAILS

Below *figure* shows how to connect 3L-T-Joint with 3L-SP/AP panel. In this T-joint type of sensing cables normally comes with end termination/endcap.

According to the 3L-T-Joint internal wiring system, cable length shall measure first from output 1 then it shall go to output 2.

i.e.: Let's say zone 1 sensing cable length is 40m and zone 2 sensing cable length is 60m.

- At point 'A' cable length shall be 1m
- At point 'B' cable length shall be 40m
- At point 'C' cable length shall be 41m
- At point 'D' cable length shall be 100m

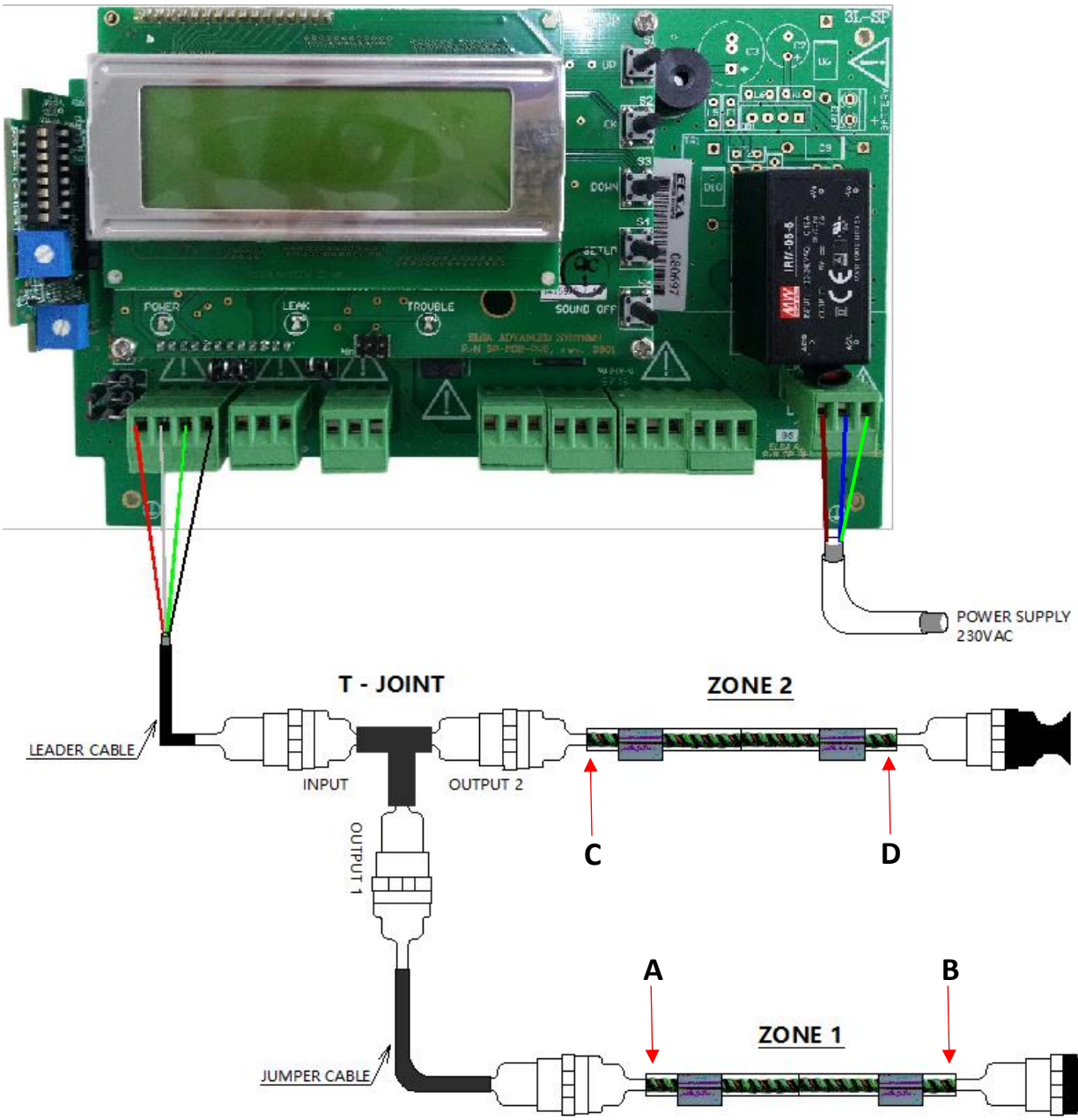


Figure 10: Schematic diagram for 3L-SP/AP with T-joint

3.5 3L-DS WITH MULTI ZONE CONNECTION DETAILS

3L-DS is the 'Distance Spacer' which shall provide ELAS standard 4m distance space in application, this can be denoted as 3L-DS (04).

i.e.: Let's say zone 1 sensing cable length is 40m and zone 2 sensing cable length is 60m, 3L-DS is installed between the 'output 2' point and zone 2 starting point.

- At point 'A' cable length shall be 1m
- At point 'B' cable length shall be 40m
- At point 'C' cable length shall be 44m
- At point 'D' cable length shall be 104m

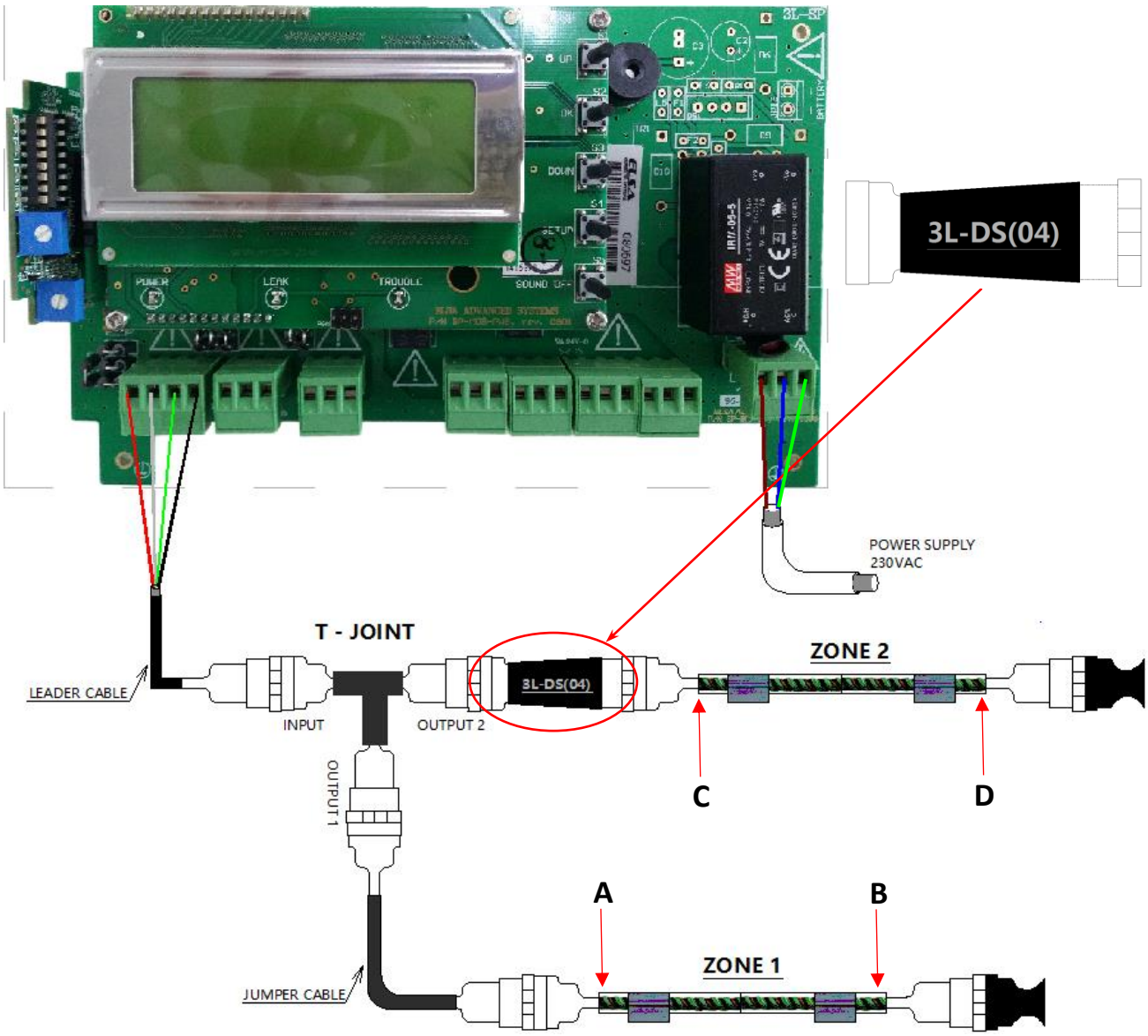


Figure 11: 3L-SP/AP panel with 3L-DS

3.6 3L-SP WITH 3L-SP/AP CONNECTION DETAILS

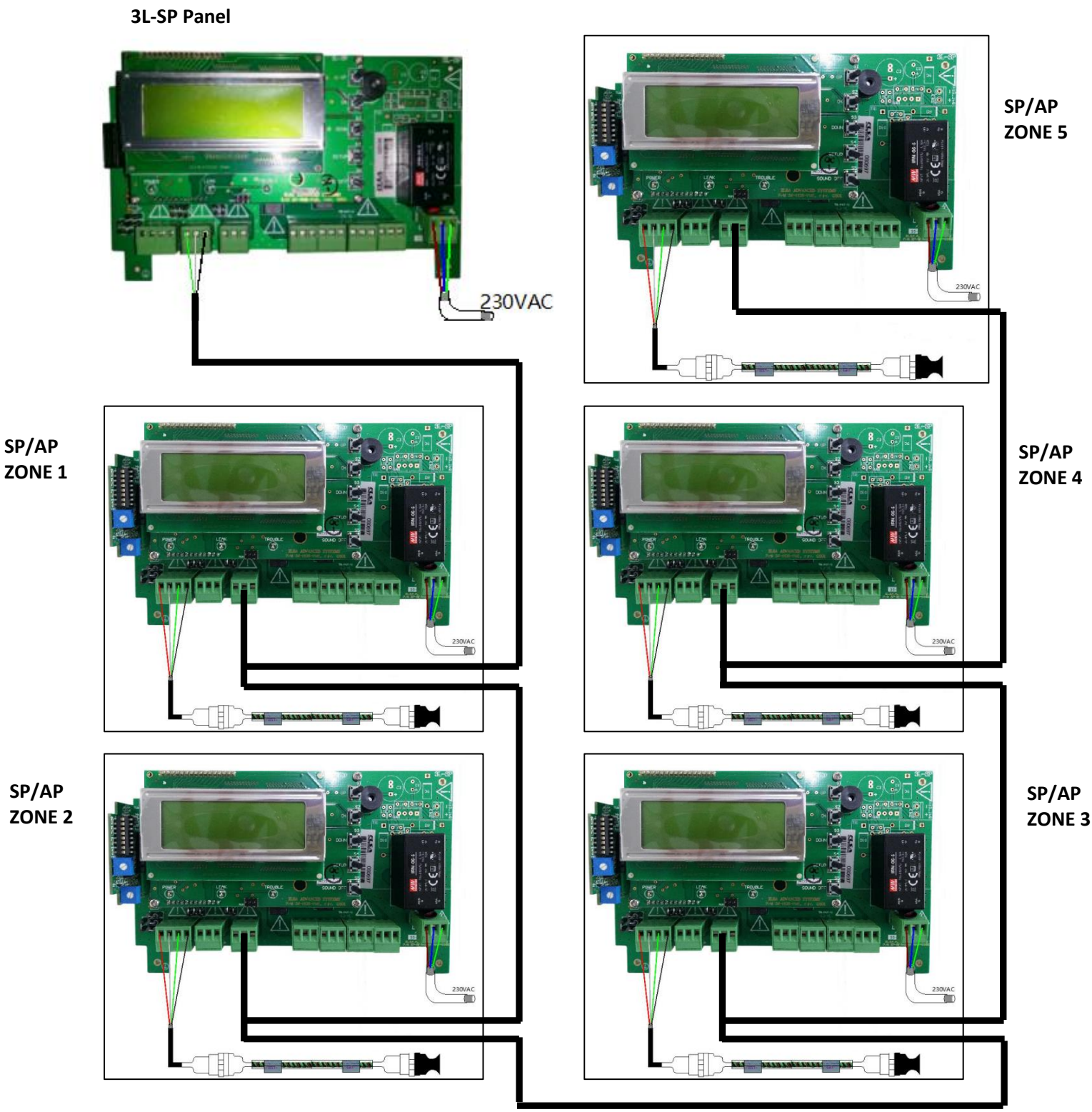
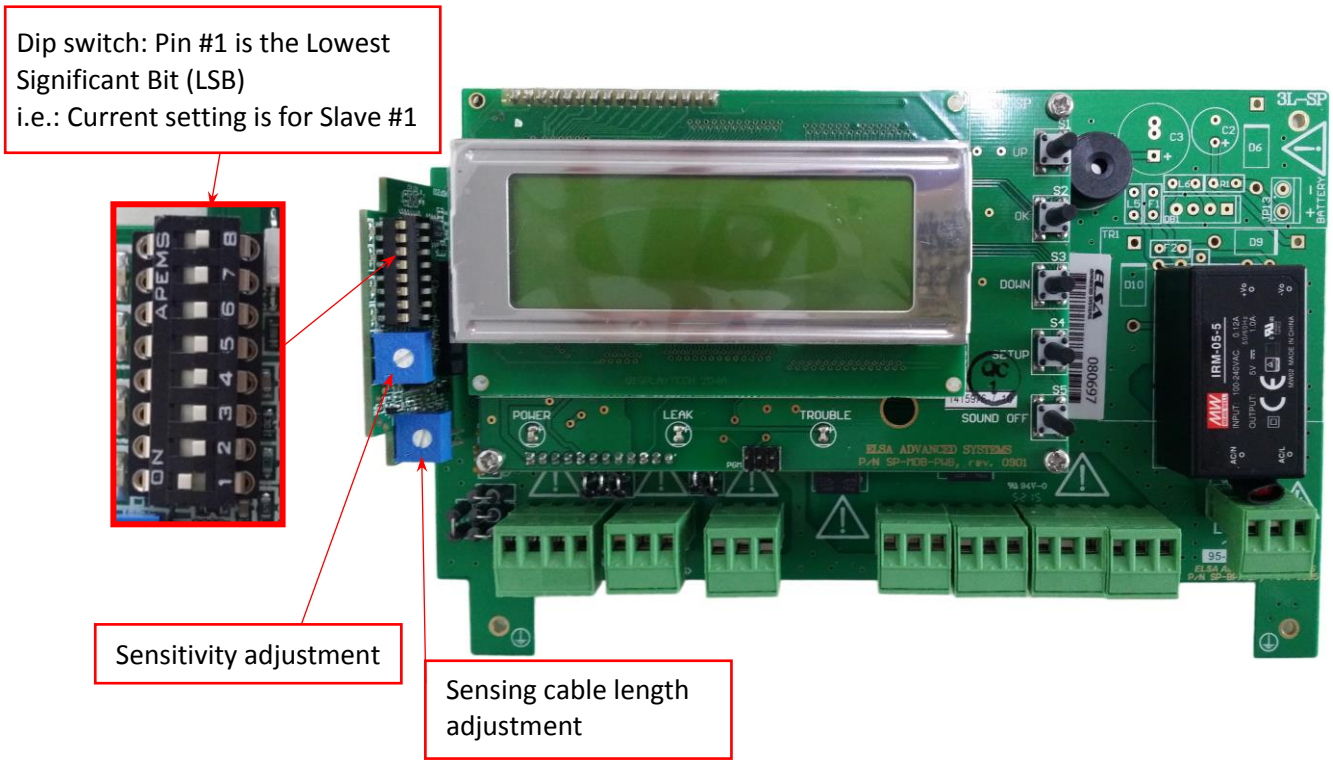


Figure 12: Schematic diagram for 3L-SP with 3L-SP/AP

3.7 RS485 MODBUS COMMUNICATION PROTOCOL



- **Sensitivity Level adjustment**: Potentiometer in blue square with white color circle.

  Turn the potentiometer (SENS.) anti-clockwise all the way (+ sign on front face) for most sensitivity level (about 20mm length of tap water).

  Turn the potentiometer (SENS.) clockwise all the way (- sign on front face) to for least sensitivity level (about 200mm length of tap water).

  Select slave number: DIP switch in BLACK color component (the picture shows slave or zone #1)

  Slave number is set as #1(as picture).

- **Modbus interface** : Modbus Slave Number

Subsequent 3L-SP/AP modules connected in daisy-chain have to be set at different Modbus slave number (i.e.: different Zone#) so that each can be individually identified by the Supervising system. Refer the below steps to set Modbus Slave number:

- Press "**Setup**" button.
- Select "**SYSTEM PARAMETERS**", and Select "**SYSTEM SETUP**", and input password : 12341234.
- Select **"MODBUS Interface",** and change the Modbus slave number.
  - For interfacing with high level Building Management System (BMS) or SP panel. Can assign from **1 to 100** numbers of code.
- After change the Modbus slave number, quit the setup and restart SP/AP panel.

CHAPTER 4 COMMUNICATION PROTOCOL: MODBUS PARAMETERS OF 3L-SP/AP

Serial port configuration: 9600 B, 8 data bits, 1 stop bit, no parity.

Communication protocol: MODBUS, functions 3 or 4.

Slave (control panel) #: Set-up in a configuration menu on panel.

Maximum no. of words to read per request: 35, 32 recommended to avoid unnecessary loading of communication lines.

Modbus register address for 3L-SP/AP panel:

Zone 1 [Type of alarm]	Modbus address (Function 3)	Physical address (Hex)	Remark
Zone 1 [cable length (Hex)]	40001	0001h	Address value in **hex** and unit = **meter**
Zone 1 [cable break (Hex)]	40002	0002h	0 - cable OK, 65535 (decimal)- cable break
Zone 1 [1st leak alarm (Hex)]	40003	0003h	1st leak alarm 0 - no leak 65535 (decimal) - leak alarm
Zone 1 [2nd leak alarm (Hex)]	40004	0004h	2st leak alarm 0 - no leak 65535 (decimal) – leak alarm
Zone 1 [1st leak location (Hex)]	40005	0005h	Address value in **hex** and unit = **meter**
Zone 1 [2nd leak location (Hex)]	40006	0006h	Address value in **hex** and unit = **meter**

- The RS485 polarisation shall be ensured by the supervising station.
- The transmission line shall be terminated by a 120 Ohms/1W resistor at the end of the RS485 link (the last panel of the link). The shield of the data transmission cable should be connected to the Supervisor's panel ground point.

CHAPTER 5 MAINTENANCE SERVICE PROCEDURE

5.1 MAINTENANCE SERVICE

- It is recommended to conduct quarterly check on ELSA leak detection system performance by authorized ELSA distributors/installers.
- During quarterly checking and maintenance:
  - Conduct check list as per page 21 – 24 (Testing & Commissioning Check List).
  - Check physically on the sensing cable surface cleanliness and free from any chemical contact.
- For any parts replacement or extension, ELSA local distributors offer ex-stock and will provide an immediate turnaround service to meet the requirements.

5.2 MANUFACTURING PRODUCT INFORMATION AND CONTACT

ELSA ADVANCED SYSTEMS PTE LTD

Address : 2, BALESTIER ROAD

#03-687, SINGAPORE 320002.

Tel : +65 6258 1598

Web site : www.elsaadv.com

Email : enquiry@elsaadv.com

5.3 TESTING & COMMISSIONING CHECK LIST

Test & Commissioning Check List

Project name : _____

Location or site name: _____

Customer name: _____

ELSA product model: _____

Installer completion date: _____

Installer company name: _____

Installer name & designation: _____

Installer signature: _____

Approval Conducted by:

Customer's Representative: _____

Representative name & designation: _____

Representative signature: _____

Check and approve date: _____

Remark: _____

Function Testing:

- Turn ON Power Supply to 3L-SP/AP (Supervising & Locating Panel) ,the system will go into an auto self-initialization mode.

		Passed	Failed
1.	Check Alarm/buzzer sounded momentarily upon power up.		
2.	Check “Leak” & “Trouble” LEDs switch-on for about 1 second on 3L-SP/AP.		
3.	Check Sensing cable length of each MODULE’s zone tally to the actual length laid.		
4.	Check Dry Contacts are in the correct status. (NC/NO)		
5.	Check System is operating normally (under no fault condition). LCD display is in normal condition for 3L-SP/AP .		
6.	Check Hold down clips are fixed at correct position to properly hold the sensing cable in place. Check Tag/Label is stuck and marked precisely with distance on the sensing cable.		

Remarks: _____

Leak simulation:

- Place about 20mm to 200mm (depend on sensitivity level adjustment) of water in continuous contact on the sensing cable.

		Passed	Failed
1.	Check LCD display at 3L-SP/AP lighted up and display the Leak message.		
2.	Check "Leak" LED switch to RED.		
3.	Check Buzzer sounded. If yes, acknowledge it by pressing the Silence Button.		
4.	Check LCD display leak location accuracy against actual Tag/Label marking.		
5.	Check Leak Relay/Dry contact activated.		

- Remove and dry the water on the sense cable by dry cloth.

		Passed	Failed
1.	Check LCD display is back to normal (no fault) condition.		
2.	Check "LEAK" LED switch off.		
3.	Check Leak Relay/Dry contact de-activated.		
4.	Check & simulate leak at different points on the sensing cable as per client/consultant requirement. If necessary, adjust the leak sensitivity to meet the site requirement.		

Remarks: _____

Cable Break simulation:

- Disconnect one or two wires connection at the sensing cable connection points of the Control Panel .
- Alternatively, disconnect a pair or all 4 wires on the sensing cable end point if end-termination method is used.

		Passed	Failed
1.	Check LCD on 3L-SP/AP lighted up and display Cable Break message.		
2.	Check “Trouble” LED switch to Yellow.		
3.	Check Buzzer sounded. If yes, acknowledge it by pressing the Silence Button.		
4.	Check Trouble Relay/Dry contact activated.		

- Re-connect back all the sensing cable connection points which were previously disconnected.

		Passed	Failed
1.	Check LCD display is back to normal (no fault) condition.		
2.	Check “Trouble” LED switch is off.		
3.	Check Cable Break Relay/Dry contact de-activated.		

Remarks: _____

CHAPTER 6 TROUBLESHOOTING GUIDE

6.1 TROUBLESHOOTING

- In case loss of PASSWORD at 3L-SP/AP panel, contact ELSA office for master PASSWORD.
- Liquid leaked is detected when there is no obvious liquid presence. The possible reasons are as follows (it is highly recommended to replace the affected section):
    - The sensing cable was badly contaminated by some chemical for unknown reason.
    - The sensing cable was coated with glue, epoxy and paint accidentally.
    - The 2 black sensing wires are in contact or not isolated properly.
- Use a bright torch light to identify the location of the physical liquid leaked area which is visible by naked eye. Some leakage is difficult to be observed due to very small volume of liquid presence and the environment is not so accessible, then professional help should be required.
- Cable break is detected where there is no visible wire cut externally is observed:
    - Check the continuity of the 4 wires by a multi-meter.
    - Check that the 4 termination points of the leader cable to the Control Panels are secured properly.
- If leak location is not accurate:
    - This may probably due to small amount of liquid still exists at different points on the sensing cable.
    - Also, it can be due to some contamination with electrostatic dust, transparent chemical or glue deposited on the cable.
    - Check the sensing cable with naked eye and clean the cable with dry cloth. If problem persist and contamination is the cause, then the sensing cable will need to be replaced.

6.2 TROUBLESHOOTING FALSE ALARMS AFTER INSTALLATION

ELSA liquid (incl. water) leak sensing cable is a conductive type of sensing cable. Any liquid or solid materials that are conductive can trigger the alarm accidentally or unintentionally when in contact with the two black sensing wires (i.e.: shorted). Such false alarms can appear in two possible scenarios, such as, ***Continuous or Intermittent*** *false alarm.*

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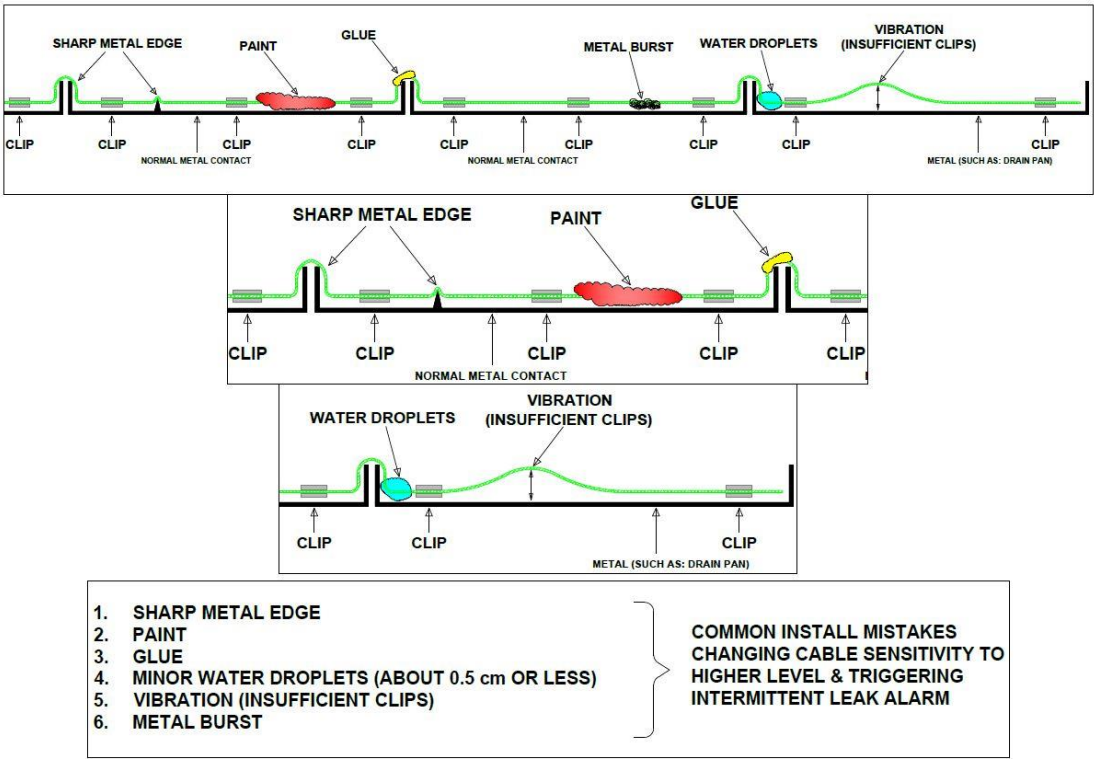
Sensing cable is sensing by conductivity. Thus, any external changes at site may affect cable (such as paint, glue, cement, metal works & etc).



TYPICAL SCENARIO: FALSE LEAK ALARM

6.2.1 CONTINUOUS FALSE ALARM - POSSIBLE SCENARIOS:

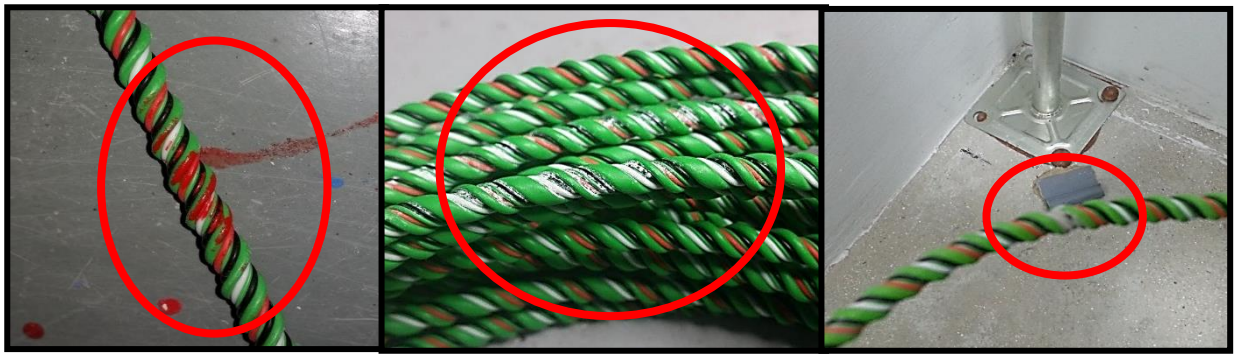


Figure 12: Leak false alarm due to chemical stains

The above pictures show residues of chemical (e.g. paint, corrosive liquids) stained on the sensing cables which causes the continuous leak alarm.

Recommended Solution:

- Use clean cloth (wet and dry) to wipe the sensing cables in a spiral movement thoroughly between the grooves and gaps of the cables. DO NOT use paint remover (e.g.: thinner).
- If the false alarm still exists after cleaning, that means its already damaged and the whole length of sensing cable need to be replaced.

Figure 13: Leak false alarm due to the contact with metallic parts

If part of the sensing cable touches some metallic parts (e.g.: Bracket/clamp, metal pedestal of raised floor panels, grounding strip, aluminum foils, screws, bolts & nuts, etc.) or even metallic burrs that accumulated around the sensing cables, they can cause false leak alarm.

Recommended Solution:

- Vacuum the affected area to remove any metallic burrs and objects.
- Use the hold down clips to separate the sensing cable from the metallic parts
- Use PVC spiral sleeve (min. dia.: 10mm) to wrap round the affected length of the sensing cable. This will insulate the sensing cable from the metallic parts/objects, especially when the area to insulate is much larger and using a hold down clip is not so effective.

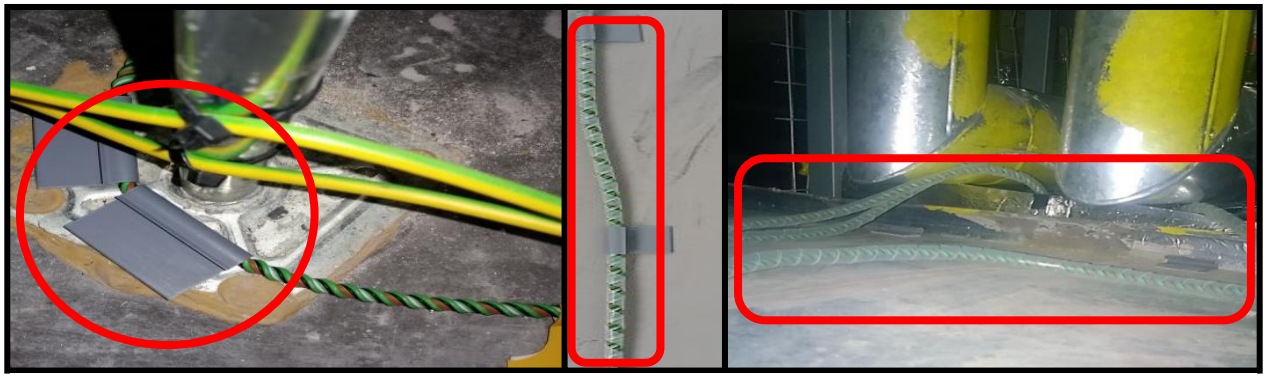


Figure 14: Use Hold down clip to separate the sensing cable & Use PVC spiral sleeve to wrap round the affected length of the sensing cable

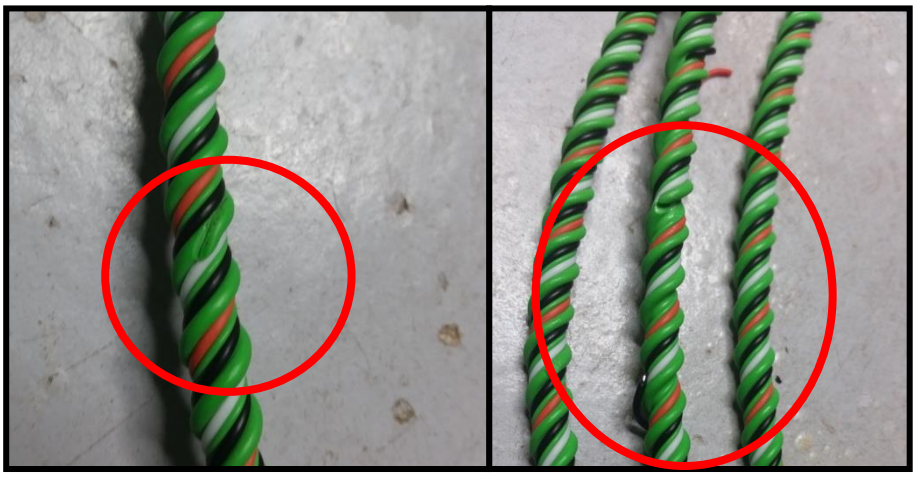


Figure 15: Cable break alarm due to broken wires

Cable dented and wire broken due to heavy objects placed on the sensing cables or sharp objects (eg: worker using pen-knife) accidentally cut through the wire while working nearby. If any one of the wires breaks-off (i.e.: open circuit), there is no way to repair.

Only Solution:

- Replace whole length of the affected sensing cable.

6.2.2 INTERMITTENT FALSE ALARM - POSSIBLE SCENARIOS:

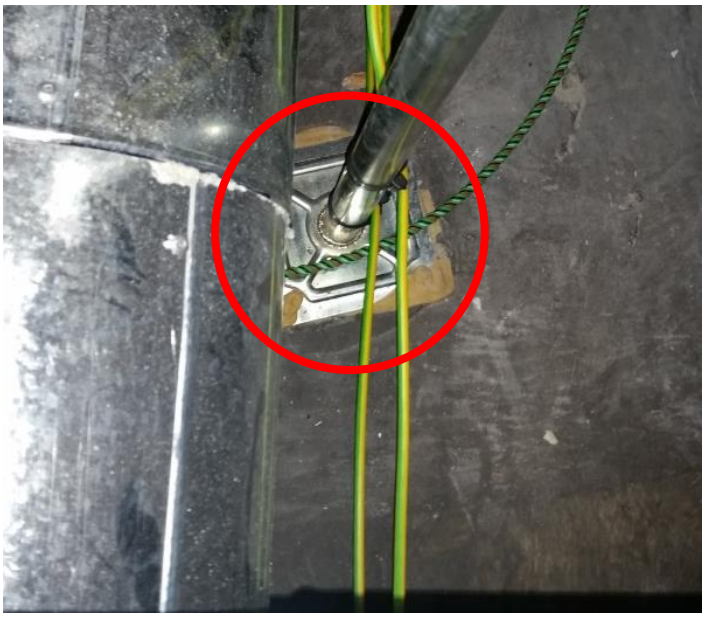


Figure 16: Leak false alarm due to sensing cable touching metallic parts

Recommended Solution:

- Use the hold down clips to isolate the sensing cable from the metallic pedestal or move away from the pedestal if possible

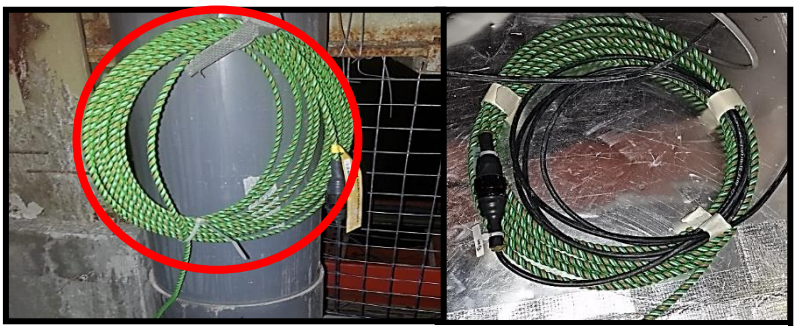


Figure 17: Leak false alarm due to coiling of excess sensing cable

There is a tendency that coiled sensing cable can cause intermittent false alarm. The sensing wires may touch each other momentarily, especially when there are strong wind and/or vibration affecting the sensing cables.

Recommended Solution:

- Uncoil the excess sensing cable and laid them in “S” shape using hold down clips to avoid touching or overlapping each other.

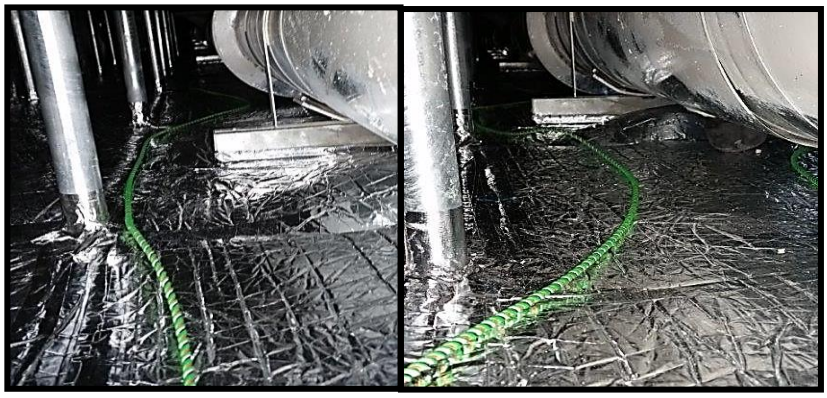


Figure 18: Improper laying of sensing cable

Above pictures shows that there is insufficient hold down clips used to support the sensing cables. When there are strong winds and vibration below the raised floor, there is a tendency that these sensing cables may be moved and touching the metallic pedestal or any other metallic objects nearby, thus causing intermittent false alarm.

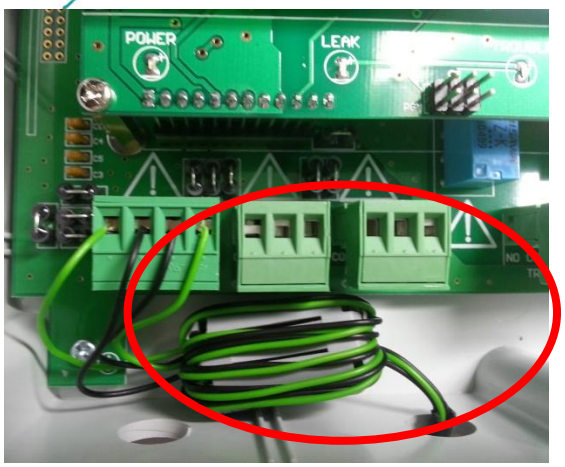
Recommended Solution:

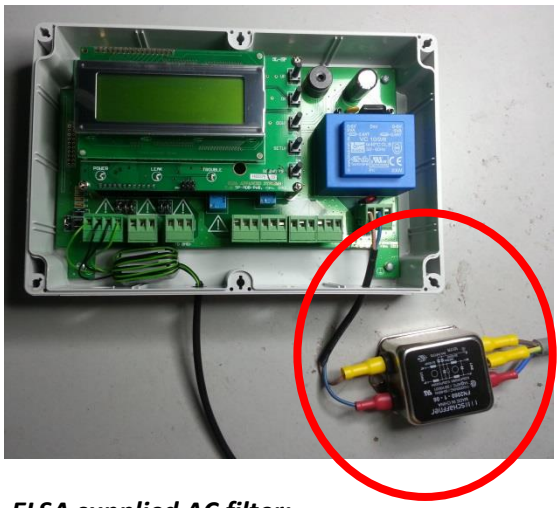
- Stick more hold down clips to these loosely supported sensing cables and clear from any metallic parts/objects.
- Use PVC spiral sleeve to wrap round the affected length of the sensing cable if accessibility is an issue.

Figure 19: Leak false alarm due to EMI from nearby High Voltage cables

Recommended Solution:

- Separate the sensing cable away from the HV power and grounding cables.
- If not possible, then insulate with PVC spiral sleeve wrap or hold-down clip or both
- If there are still interference from these HV sources and/or poor grounding installation in the building (especially retrofitted old building), then install ELSA supplied ferrite-core filter and AC filter to minimize it.





<u>ELSA supplied Ferrite-core Filter</u>:
****Note: to connect between the terminal block and the sensing cable.***
Installation guide will be provided and advice separately

<u>ELSA supplied AC filter</u>:
****Note: to connect as close to the AC power source as possible***

Figure 20: Leak false alarm due to general dirty site condition

- Recommended Solution:
- Before laying of sensing cables, the site condition must be cleaned and vacuumed.
- If not possible, at least the site is reasonably clear of debris and big objects, especially minimized metallic burrs and objects.
- Inform workers to be careful with those laid sensing cables, especially NOT to paint on it, step and/or place heavy objects or equipment over the sensing cables.

Please make sure that the laid sensing cable can be physically access and check, in order to have a better opportunity to eradicate the false alarms.

If after faithfully going through the above troubleshooting guides, the false alarms still cannot be eradicated, please feel free to contact ELSA for further assistance and advice.

CHAPTER 7 APPLICATIONS

- Data Centers, Computer /Server/ IT Rooms for Banks, Financial centers, Logistics hubs & etc.
- Telecommunication Switching Room
- Clean Room and Laboratory build in
  - Semiconductor Plants
  - LCD Manufacturing Plants
  - Wafer Fabrication Plants
  - Bio-Medical Plants
- District Cooling/Heating Systems, ACMV (CHILLED WATER PIPING, CRAC, FCU)
- Water Treatment Plants
- Underground hot water piping
- Tunnel
- Library & Museum

~END~