Merlin

Water Leak Monitor Controller

Contents

## Technical Submission

System Architecture

The system will be supplied as a pre-wired enclosure housing a NetMaster and IO modules. This configuration of enclosure will be a 'Master Enclosure'.

The NetMaster will act as the system manager as well as providing communications connectivity for BMS and IoT cloud integration.

'Slave Panels' housing IO modules only can be connected to the Master Enclosure via BACnet communications to add more zones to the system.

Each Master Panel will be supplied with a Touch-7 user interface to provide local indication of each zone's status.

Multiple master panels can be connected to a local BMS or Cloud via their respective IP connections.
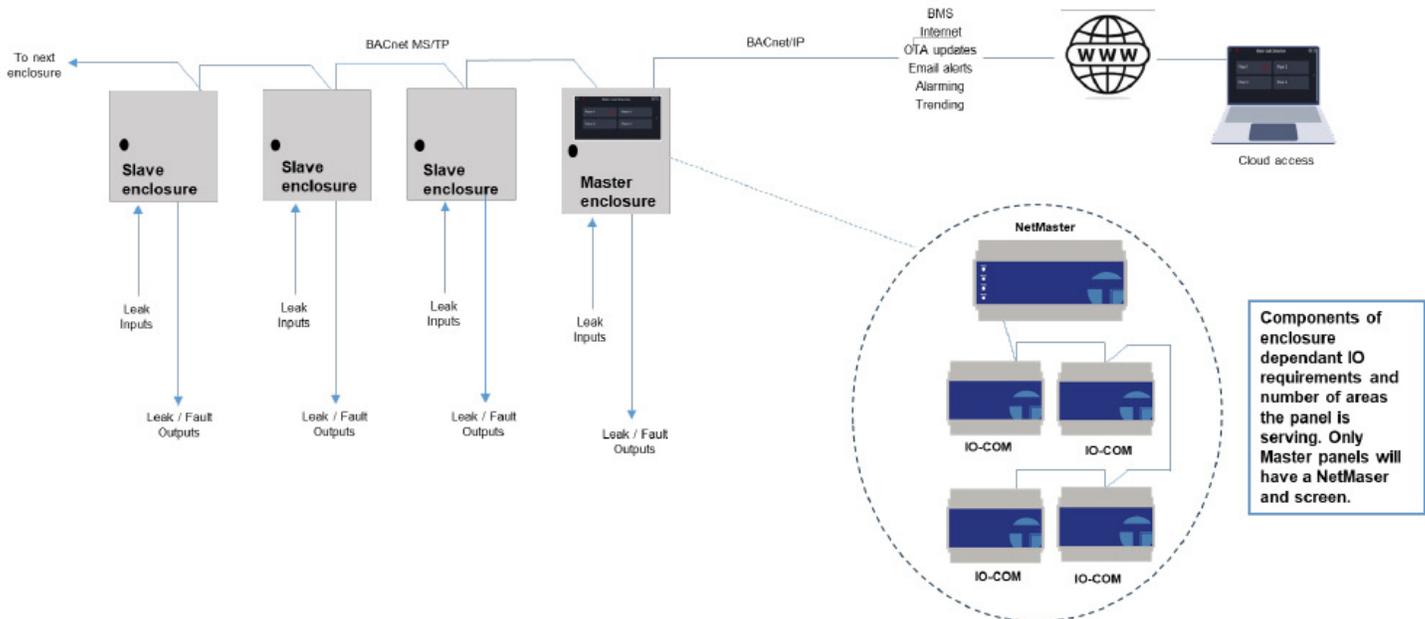
Number of Zones

The system is designed to detect leaks and system faults across multiple monitored zones with the total number of zones scalable from 4 to 128.

The Master Enclosure is available with up to 8 IO modules within. Each IO module supports 4 zones making the making the maximum number of zones supported from a single Master Enclosure 32 zones.

'Slave Panels' housing IO modules only can be connected to the Master Enclosure via BACnet communications to add more zones to the system.

Each slave panel can house up to 8 IO modules with each slave panel adding up to a further 32 zones per slave panel.

The maximum total number of zones per system is 128 zones.

1For applications requiring greater than 128 zones the solution will require additional Master Panels.

Inputs/Outputs

The IO modules will accept 2 x inputs per zone and provide 2x outputs per zone. Each IO module can support 4 zones.

The first input per zone will operate as a fault input, the second input will accept a resistive input for the leak detection.

The resistance read on the second zone input will allow the system to estimate the location of the leak detected along the leak detection tape.

The first output per zone will be a VFC fault output to the BMS made active on the relevant fault input being active.

The second output will be a 240V switched output to a solenoid valve made active on a leak detected on the relevant zone input.

User Interface

Each Master panel will be supplied within an in-built Touch-7 user interface to provide local status indication for each zone.

Zones can be grouped within the user interface for navigational ease.

The system name, group names, and zone names will be fully editable via the Touch-7 user interface.

Live fault and leak notifications will be shown both on the home page and within each zone.

Each live fault and leak notification will be time stamped to illustrate the time and date the fault / leak occurred.

When a leak s present, the location of the leak along the leak detection tape will be shown on the zonal page. This will be dependent on the resistance received on the relevant leak input.

Each zone page within the user interface will provide a history log of the last 5 faults / leaks detected within that zone along with a time stamp for each of the 5 events.

The user interface will provide the ability to test the leak and fault outputs for each zone from the relevant zone section of the user interface.

System Settings

Through a settings page on the 7" screen it will be possible to switch between UK and US settings for date format and distance units

UK Date Format: DD/MM/YYYY Leak Distance: Metres
US Date Format: MM/DD/YYYY Leak Distance: Feet

Local Logging

It will be possible from the NetMaster's web browser to set up logging of the leak / fault points of the system. This logging will be held locally within the NetMaster and can be downloaded as a .CSV file.

Email Notifications

It will be possible from the NetMaster's web browser to set up email notifications.

This will allow users to receive email notifications should a zone enter a fault or leak detected state. For email notification the Master Panel will require an internet connection.

Connectivity

Communications between each IO and NetMaster wll be va BACnet MS/TP communications.

Communications between Master and Slave panels will be via BACnet MS/TP communications.

Communications between each Master Panel and the BMS wll be via BACnet/IP. Communications between each Master Panel and the cloud will be via MQTT.

Cloud Connectivity

The system will be fully compatible with cloud platform when it becomes available late 2025.

BACnet Objects

In addition to the standard BI and BO Active/Inactive BACnet objects available in the IO/COM-8R modules the additional BACnet AV objects will be created for Leak distance n meters and Leak distance in Feet

User Screens

Click to view active faults/alarms

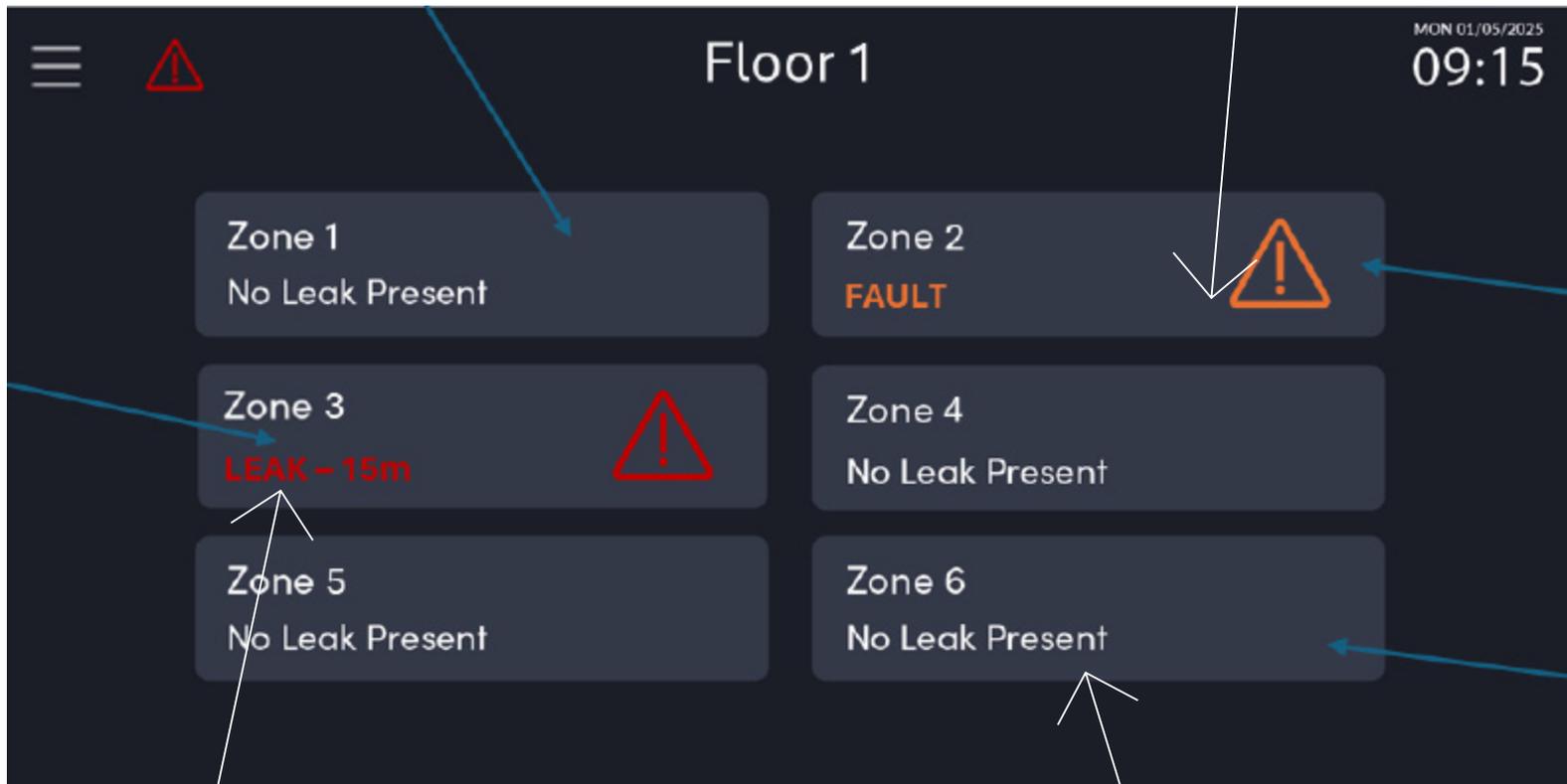Title can be edited to suit purpose

Water Leak Detection

MON 01/05/2025
09:15

Floor 1

Floor 2

Floor 3

Floor 4
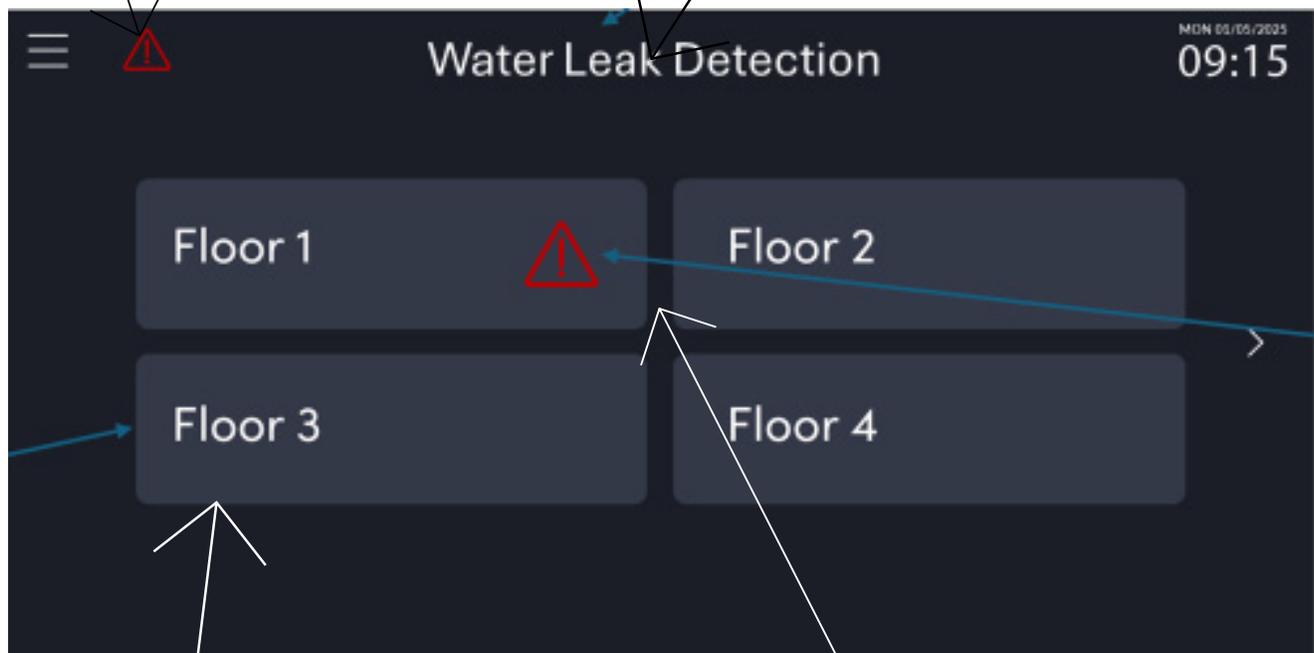
Groups of areas created in settings menu Max 8 per page

Alarm icon too illustrate there is a fault/alarm in one of the group's zone

User Screens

All areas within zone showed

If fault recorded, show orange warning and fault in text

Floor 1

MON 01/05/2025
09:15

Zone 1
No Leak Present

Zone 2
FAULT

Zone 3
LEAK – 15m

Zone 4
No Leak Present

Zone 5
No Leak Present

Zone 6
No Leak Present

If leak recorded, show red warning with Lead and its distance in the text

If no fault/leak recorded, no warning showed and text reads "No leak present"

User Screens

Clicking an area shows the current status and history of latest faults/leak alarms c/w time stamps

When no live faults/leaks in an area, the user will have the option test Leak and test Fault to trigger the relevant output and BACnet object and display and Leak or Fault within the zone, cleared by pressing the test button again.

Connections & Cabling

Action	Communications/Signals
Fault input to IO Module	Volt Free
Leak Input to IO Module	Resistive
NetMaster to IO Modules	BACnet MS/TP RS485
NetMaster to Touch-7 user interface	IP
Fault Output to BMS from IO Module	Volt Free
Leak Output to valve from IO Module	240V (relay rated at 3A max @ 240V

When no live faults/leaks in an area, the user will have the option test Leak and test Fault to trigger the relevant output and BACnet object and display and Leak or Fault within the zone, cleared by pressing the test button again.

Connections & Cabling

Item	Recommended Cable Spec and Reference	Requirements
BACnet MS/TP & Modbus RTU Communications	Belden 9841 (0.2mm2) Twisted Pair with Drain wire and foil wrap or equivalent **Must Be suitable for RS485 Standard**	Daisy Chain Network Configuration Only The cable shield must be connected to Earth ground at the network router end only. A termination resistor of 120ohm should be connected at each of the end devices on the network.
IP Communications	CAT5 or CAT6 RJ45	
Volt Free connections	2 Core twin twisted screened:- 0.75mm -1mm Belden 8760 (0.82mm2) or Equivalent	Screen Earthed at Controller end only
Resistive	Suitable resistive leak detection tape	

For any 240V outputs signals please ensure the use of a suitable mains carrying cable for the application loads.

All Low voltage cables must be segregated from any mains carrying inductors and they should not be run in the same containment system

All cable connections into S&S controllers should use ferrules to prevent short circuits.