

# Smart Flow Water Monitoring System

## SFM Cabling Installation Scope

Document Date: 2026-04-10



# Table of Contents

Table of Contents.....	2
Scope overview.....	3
Enware Scope.....	3
Cabling Contractor Scope.....	3
Plumber Scope.....	3
Builder Scope.....	3
Contractor Responsibility Assignments.....	4
System Architecture.....	5
Hub Numbering.....	6
TMV Monitoring Plans.....	7
TMV & Fixture Monitoring Plans.....	8
Hospital IT Network.....	9
Cabling System Design Guide.....	10
RS485 Backbone Cabling.....	11
Backbone Cabling Details.....	11
Backbone Cabinet Layout.....	12
Backbone Connector.....	13
Backbone Testing.....	14
Backbone Labelling.....	15
Hub Cabling (Hub to TMV / Fixture).....	16
Hub Cabling Details.....	16
Hub Cabling Cabinet Layout.....	17
Hub Cabling Testing.....	18
Hub Cabling Labelling.....	19

## Scope overview

The scope for the Smart Flow Water Monitoring System is as follows:

### Enware Scope

- **SFM Backbone Dual Connectors:** Supply of backbone connectors
- **HUB Cabinets:** Supply of hub cabinets
- **Initial System Plans:** Supply of plans for all cable runs and locations
- **As-Built Plans:** Final markup of as-built plans
- **SFM LAN Interfaces:** Supply, configuration, installation and testing
- **SFM TFP HUBs:** Supply, addressing, installation and testing
- **TMV & Fixture Sensors:** Supply, installation and testing
- **Smart Flow Backbone Testing:** Confirming that all devices are connected on the RS485 network
- **Client Training:** Client training of usage of the Smart Flow Monitoring system

### Cabling Contractor Scope

- **RS485 Backbone cables:** Supply of CAT6 cable, installation, termination & testing
- **Hub to TMV & Fixture Cables:** Supply of CAT6 cable and RJ45 plugs, installation, termination, testing and labelling.
- **Conduit:** Supply and installation of conduit, we recommend 20mm from the TMV / Fixture to the ceiling and 40mm from the hub cabinet to the ceiling.
- **Testing:** Supply of test results for all cabling
- **Markup Plans:** Markup of any changes to initial system plans

### Plumber Scope

- **Hub Cabinets:** Installation of hub cabinets in the walls including lids at a preferred height of 1.5m
- **TMV/Fixture Schedule:** A spreadsheet linking the hub ports to the TMV/fixtures and providing asset location information and information on the rooms serviced as per Enware's hub numbering design guidelines
- **Communication of changes:** regarding added or deleted TMVs or fixtures during the build
- **Plans:** Initial and final as-built plans clearly showing TMV locations

### Builder Scope

- **Co-ordination:** Co-ordination of services
- **BMS Integration:** Co-ordination of BMS integration requirements
- **IP addresses:** Provision of IP address allocations and rack allocations
- **Room Naming:** Provision of Hospital wayfinding room naming information
- **Training:** Co-ordination of client training

# Contractor Responsibility Assignments

Component	Installed location	Supplied by	Installed by	Timing	Notes
<b>System Engineering Design</b>	n/a	Enware	n/a	Commencement of Project	Design to be supplied at commencement and modified and updated as required
<b>SFM hub Cabinets</b>	In corridor walls as shown on plans	Enware	<b>Plumber</b>	At plumbing rough in stage	Hub cabinets installed at the same time as TMVs
<b>HUB to TMV &amp; Fixture Cable Rough In (CAT6)</b>	Walls and ceilings between hubs and TMVs / fixtures	Cabling Contractor	<b>Cabling Contractor</b>	At plumbing rough in stage	Cabling contractor to supply CAT6 cable and rough in.
<b>HUB to TMV / fixture cable terminations &amp; test (RJ45)</b>	Walls	Cabling Contractor	<b>Cabling Contractor</b>	After Cable Rough in	Cabling contractor to supply RJ45 plug, terminate, test, label and markup plans.
<b>Backbone Cable Rough In (CAT6)</b>	Walls and ceilings between hubs	Cabling Contractor	<b>Cabling Contractor</b>	Prior to plastering	Cabling contractor to supply CAT6 cable and rough in.
<b>Backbone Cable terminations &amp; test (RJ45)</b>	Walls	Enware	<b>Cabling Contractor</b>	Prior to plastering	Enware to supply backbone connectors Cabling contractor to terminate, test, label and markup plans.
<b>Conduit</b>	Walls	Cabling Contractor	<b>Cabling Contractor</b>	At plumbing rough in stage	We recommend: TMV / fixture and ceiling: 20mm Hub cabinet to ceiling: 40mm
<b>SFM TFP HUBs</b>	In hub cabinets	Enware	Enware	System commissioning	Not Installed until all plastering and painting is completed
<b>Cable Audit</b>	N/A	Enware	N/A	System commissioning	Enware will audit the backbone and hub to TMV / fixture cabling to ensure it is correct & matches the plans.
<b>LAN Interfaces</b>	Comms Rooms on each level	Enware	Enware	System commissioning	Installed when Comms rooms are completed and active equipment has been installed.
<b>On-Prem Server</b>	Central Comms Room	<b>VM:</b> LHD IT <b>Physical:</b> Enware	LHD IT Enware	System commissioning	
<b>SFM Azure Platform</b>	Cloud	Enware	Enware	System commissioning	Commissioned once: - TMV / fixture schedule is finalised. - IP network details are finalized - On-prem server is commissioned - On-prem server to Azure connection is working
<b>Client Training</b>	On site / Cloud	Enware	Enware	System Handover	Training on how to use the system

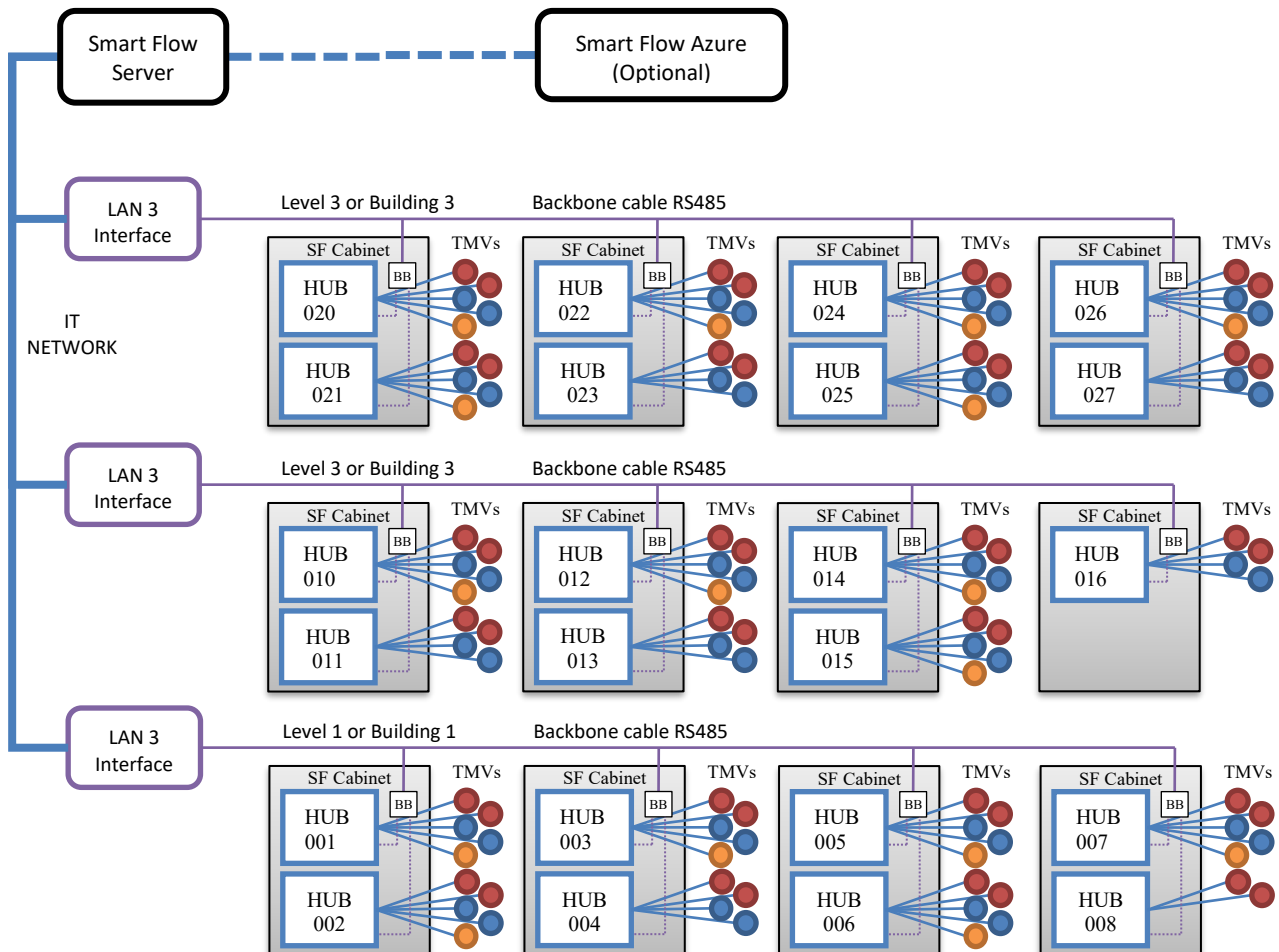
# System Architecture

The Smart Flow System utilizes three cabling network components in the complete system architecture.

These are:

1. **Hospital IT Network** – supplied by others
2. **RS485 Backbone Network** – connects Smart Flow field devices (HUBs) together back to the Comms Room
3. **HUB Cabling** – connects sensors at TMVs and Fixtures back to HUBs

The system design can be replicated without limit over multiple levels and buildings. Each level will contain its own RS485 Network cabled back to a LAN Interface on each Level. Enware will supply Plans showing all HUB locations, the backbone system design, and all connected endpoints for sensors, either TMVs or fixtures.



**Note:** The RS485 Backbone Cable and hub to TMV / fixture cabling **are not** part of the structured cabling network. All cable should be installed by a qualified person.

## Hub Numbering

Hubs are to be numbered sequentially along the backbone from the LAN interface (comms room) end of the backbone to the last hub, hubs are numbered sequentially along the backbone to assist with diagnosing faults in the backbone.

We start the hub numbers at 001 for the first hub in the hospital, usually starting at the lowest floor and working our way up as this is typically how projects are delivered.

Between backbones we leave a gap and round up to the nearest 10 to allow for minor design changes without having to re-number all hubs. For example, the hubs might be:

- GND: HUB001, HUB002, HUB003, HUB004, HUB005
- L1: HUB010, HUB011, HUB012, HUB013, HUB014, HUB015, HUB016, HUB017, HUB018
- L2: HUB020, HUB021, HUB022, HUB023, HUB024, HUB025, HUB026, HUB027
- ...

Since each Smart Flow Hub Cabinet (SFM4000C) can fit two Smart Flow TFP Hubs (SFM-TFPHUB), we will typically allocate two hubs in each cabinet to minimise the number of hub cabinets (up to 10 TMV/fixtures), this may not always be practical in the base that there are 5 or fewer TMVs within 50m of the hub cabinet, in this case another hub cabinet will be required.

## TMV Monitoring Plans

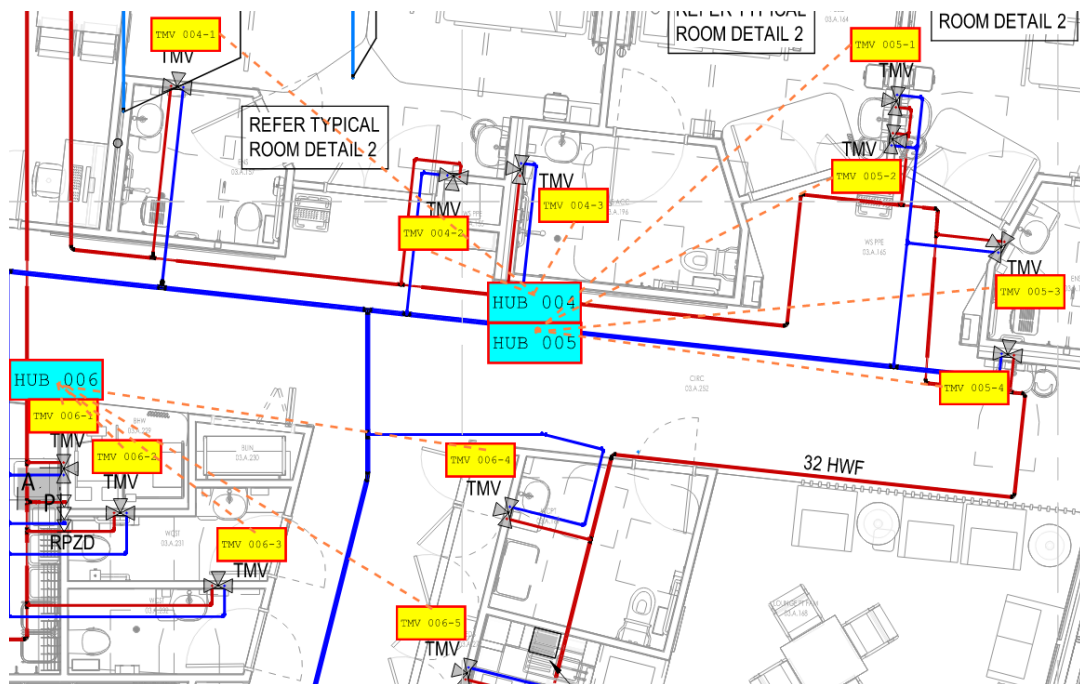
The example below shows a typical plan that will be supplied to the contractor by Enware. This plan will show the suggested locations of HUB cabinets. As HUB cabinets installed in walls are considered an architectural item, final locations will need to be confirmed by others. Hubs should be installed in the walls in the corridors.

The backbone cable should be run in the route shown, **any changes to backbone routing due to onsite practicalities shall be documented on the site plans and reported back to Enware.**

The hub cabling cable should be run to the hub and hub port shown on the plans, **any changes to hub cabling due to onsite practicalities shall be documented on the site plans and reported back to Enware.**

As can be seen on the plans, TMVs are labeled based on the hub number and port number in the format:

- “TMV YYY-Z” eg “TMV 004-1”
  - YYY is the hub number (address) starting at 001
  - Z is the hub port (sensor port position) starting at 1



## TMV & Fixture Monitoring Plans

The example below shows a typical plan that will be supplied to the contractor by Enware. This plan will show the suggested locations of HUB cabinets. As HUB cabinets installed in walls are considered an architectural item, final locations will need to be confirmed by others. Hubs should be installed in the walls in the corridors.

The backbone cable should be run in the route shown, **any changes to backbone routing due to onsite practicalities shall be documented on the site plans and reported back to Enware.**

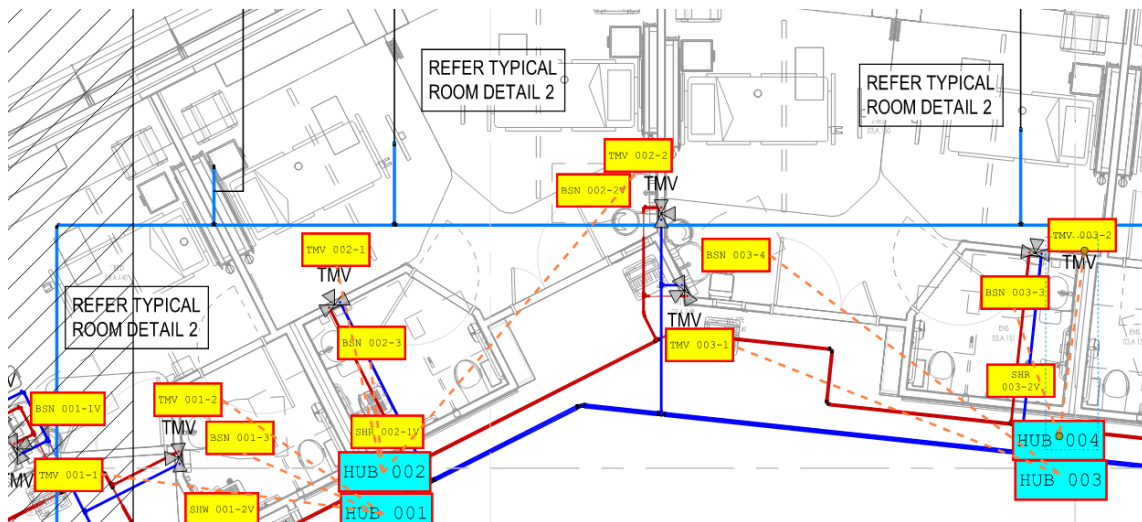
The hub cabling cable should be run to the hub and hub port shown on the plans, **any changes to hub cabling due to onsite practicalities shall be documented on the site plans and reported back to Enware.**

As can be seen on the plans, TMVs and fixtures are labeled based on the hub number at port number in the format:

- “XXX YYY-Z” eg “BSN 001-3”
  - XXX: the asset type eg:
    - TMV: Thermastatic Mixing Valve
    - BSN: Basin
    - SWR: Shower
  - YYY is the hub number (address) starting at 001
  - Z is the hub port (sensor port position) starting at 1

For assets that are virtually monitored the following convention is used:

- “XXX YYY-ZV” eg “BSN 001-1V”
  - XXX: the asset type eg:
    - BSN: Basin
    - SWR: Shower
  - YYY is the hub number (address) starting at 001
  - Z is the hub port (sensor port position) of the upstream TMV



## Hospital IT Network

The hospital IT network is not part of this scope, it is up to others to provide essential networking equipment such as space in the racks, switch ports, IP addresses etc.

The hospital IT network is the Structured Cabling Network and stands separate from Smart Flow System Cabling. The Smart Flow system utilizes the Hospital IT Network to efficiently communicate across the whole Hospital site.

An on-premises server is typically required for each Smart Flow installation, this server may be a physical server provided by Enware (order code SFM6100) or a virtual machine provided by hospital IT. If it is a physical server, it will be installed in the rack by Enware.



Each floor of each building will typically have a single RS485 backbone between each of the hubs which run back to comms room where the 24V LAN Interface (SFM5200) is in the rack. The Smart Flow LAN Interface connects to the hospital IT network via ethernet. The LAN Interfaces are installed in the rack by Enware.



The LAN Interfaces communicate with the server via the hospital network, the server will communicate to both the BMS via BACnet IP and the Smart Flow Azure Cloud Service that aggregates multiple Smart Flow installations throughout a local health district or private operator into a single management portal [ssf.smartflow.com.au](http://ssf.smartflow.com.au).

Below is an example of the details that we will require from the organisation that is managing the IT network:

Smart Flow - IP Address Allocations																		
Device	Description	MAC Address	Building	Device Location	Device Rack ID	Device Rack Position server: 2RU LAN Interface: 3RU	IP Address allocation	Subnet mask	IP Gateway Address	IP Switch Rack & Switch Name	IP Switch Port	RS485 Patch Rack & Panel Name	Backbone ID	RS485 Patch Port	Start and Finish Hubs	BACnet Network Number	BACnet Device Instance Number	
1 x Dell Power Edge Server	WMS Server WMS Bacnet			Comms Room													1	125
SF LAN Interface 01	RS485 to IP Interface			Comms Room GND														
SF LAN Interface 02	RS485 to IP Interface			Comms Room L1														
SF LAN Interface 03	RS485 to IP Interface			Comms Room L2														

# Cabling System Design Guide

These guidelines are necessary to ensure the system meets its performance requirements including functionality, reliability and maintainability.

## RS485 Backbone:

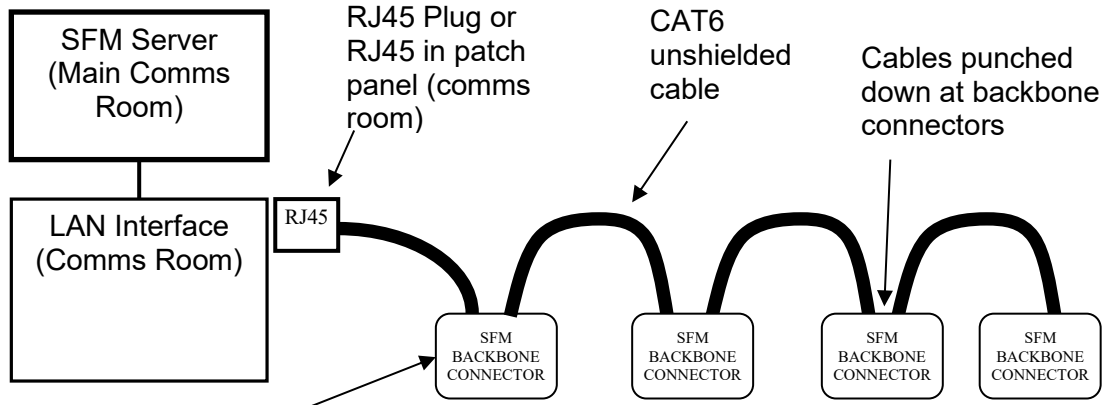
- **Architecture:** RS485 daisy chained from hub cabinet to hub cabinet
  - Star or Tee connections are not allowed for RS485.
- **Cable:** CAT6 unshielded.
- **LAN Interface:** Each RS485 backbone starts at a LAN interface. Located in the comms room rack. A single backbone shall not traverse from one floor to another or from one building to another.
- **Terminations:** SFM backbone connector at each hub cabinet, except in comms room where it is terminated in the patch panel.
- **Service Loop:** 0.5m service loop in the ceiling space above each hub cabinet.
- **Conduit:** 40mm conduit between the hub cabinet and the ceiling space.
- **Hub Cabinet Installation:** Hubs to be installed in cabinets on the walls at height of under 1.5m
- **Hubs Per Cabinet:** 1 to 2 hubs per cabinet (5 to 10 TMVs/Fixtures), leave at least 1 TMV/Fixture port unused in each cabinet to allow for design changes.
- **Hubs Per Backbone:** 26 hubs max.
- **Cable Length:** 500m max (total length).
- **Hub Numbering:** Hubs to be numbered in sequential order (see "Hub Numbering" section).
- **Labelling:** Label the incoming and outgoing cables (see "Backbone Labelling" section).
- **Testing:** Wire continuity testing from the first termination in comms room patch panel to each SFM backbone connector in the hub cabinets.
  - A test report showing this has been tested is required (see "Backbone Testing" section).

## Hub Cabling (Hub to TMV/Fixture):

- **Cable:** CAT6 unshielded.
- **Terminations:** RJ45 plugs both ends (T-568A).
- **Service Loop:** 0.5m service loop in the ceiling space above each hub and TMV/fixture.
- **Conduit:** 20mm conduit between the TMV and the ceiling space.
- **Cable Length:** 50m max.
- **Labelling:** At both ends, label the cable (see "Hub Cable Labelling" section)
- **Testing:** Wire continuity testing of each cable to confirm both the pin mapping and labelling is correct.
  - A test report showing each cable has been tested is required (see "Hub Cable Testing" section).

## RS485 Backbone Cabling

### Backbone Cabling Details

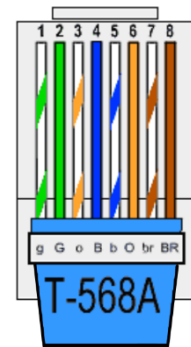


**DESC:** SFM BACKBONE DUAL CONNECTOR SURFACE MOUNT

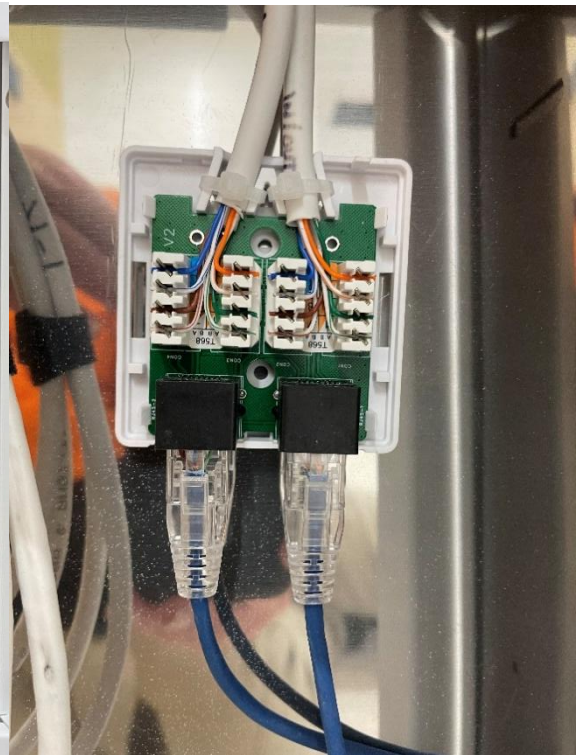
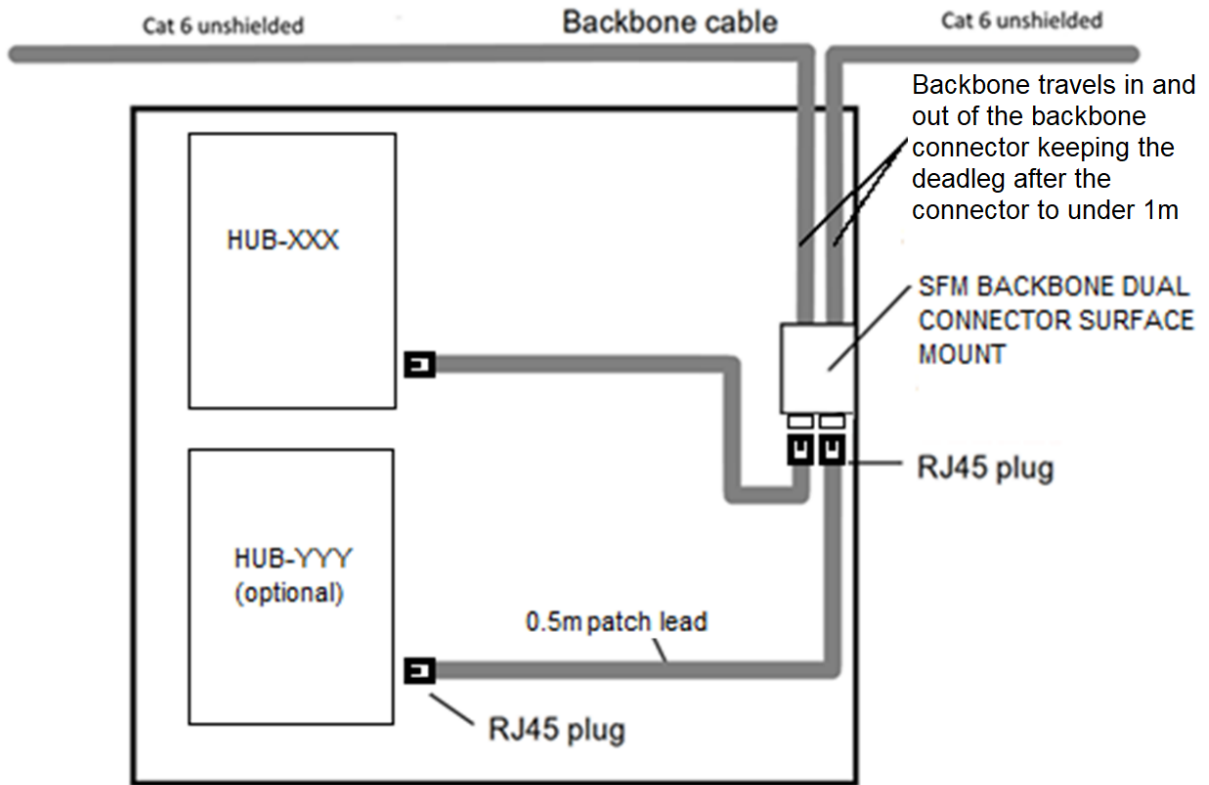
**MFR:** Enware

**CODE:** SFM-BB-SURFACE

Pin	Colour	Description
1	Green/White	Gnd supply voltage
2	Green	24V supply voltage
3	Orange/White	Gnd supply voltage
4	Blue	RS485 A Comms
5	Blue/White	RS485 B Comms
6	Orange	Gnd supply voltage
7	Brown/White	24V supply voltage
8	Brown	Gnd supply voltage



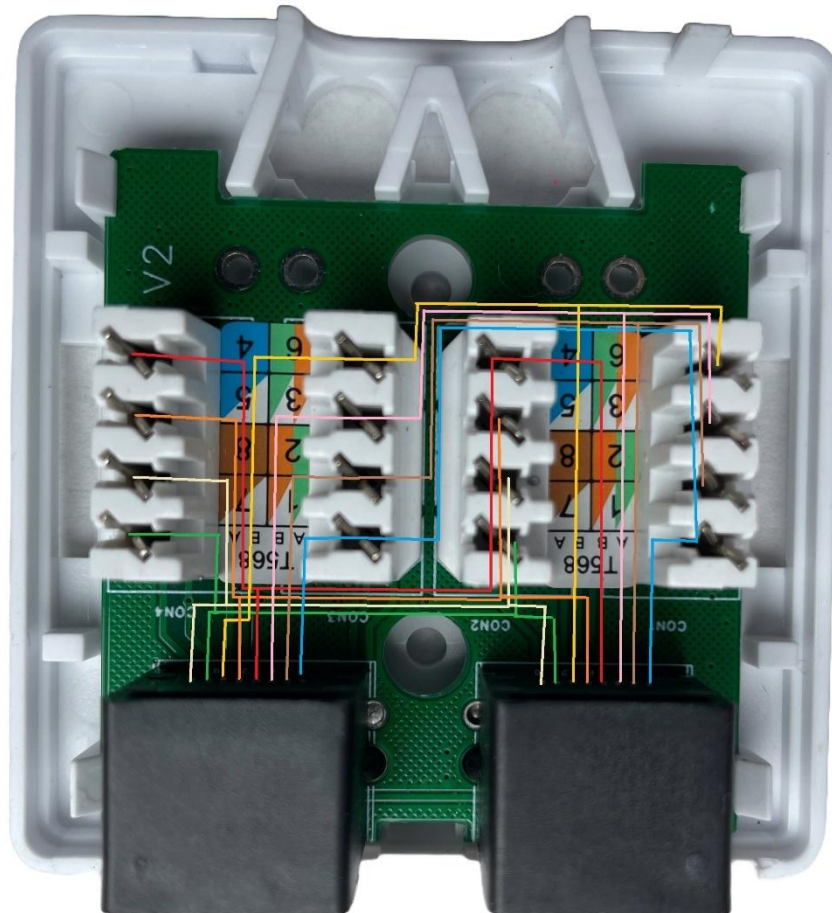
## Backbone Cabinet Layout



## Backbone Connector

The Backbone connector is designed to simplify the installation of the backbone by removing the need to double punch the incoming and outgoing wires into the same RJ45 keystone connector.

The two sets of punch down connectors and the two RJ45 ports are linked inside the PCB so that a bridging wire between the 2 sides is no longer necessary.



The backbone connector pictured above will be included with every hub cabinet. The code is any are lost is SFM-BB-SURFACE.

## Backbone Testing

Testing of the backbone is essential **prior to hub installation**.

When testing the backbone all smart flow hubs and the LAN interface will need to be disconnected from the backbone prior to testing.

Testing of all individual connections throughout the entire backbone run is required. End-to-end testing is not sufficient.

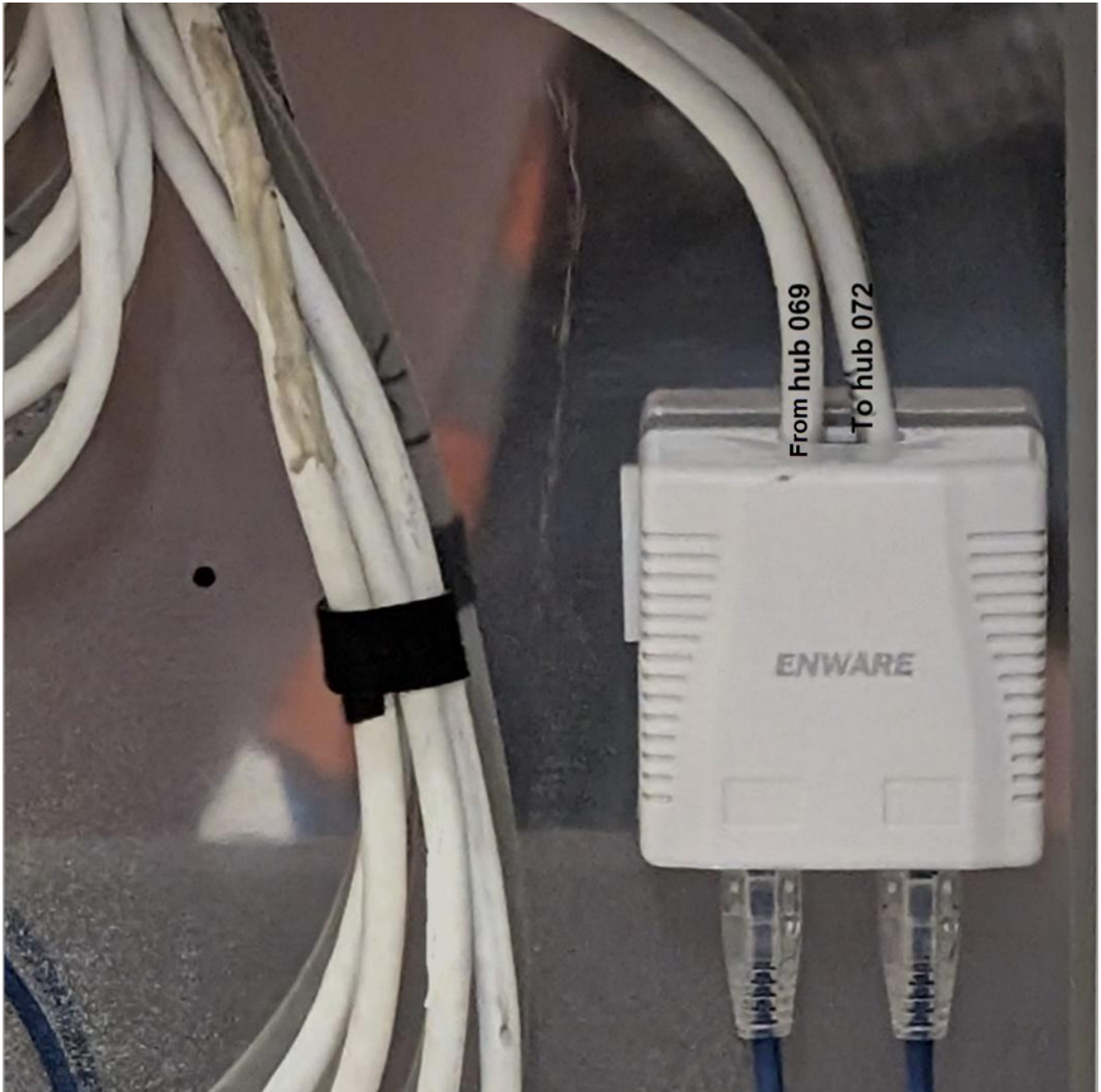
Start	End	Test Result	Tested By	Test Date	Comment (only if required)
L5 Comms	Hub 001				
L5 Comms	Hub 002				
L5 Comms	Hub 003				
L5 Comms	Hub 004				
L5 Comms	Hub 005				
L5 Comms	Hub 006				
L5 Comms	Hub <last>				

## Backbone Labelling

The backbone cable should be labelled with the hub it is going (or LAN interface) to so that the cables can be easily traced.

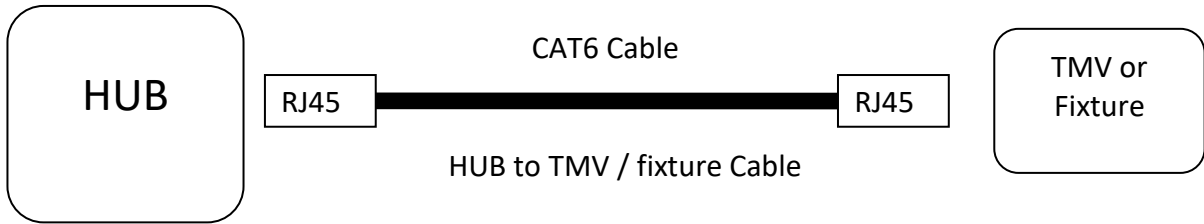
The cables should be labelled with either a label printer or neatly with a fine tip permanent marker.

The cables should be marked with what hub they are running to so that it is easy to determine which cables goes where in the case of a fault. For example, for a cabinet containing hubs 070 and 071, the incoming and outgoing backbone cables should be labelled as "From HUB 069" and "To Hub 072".

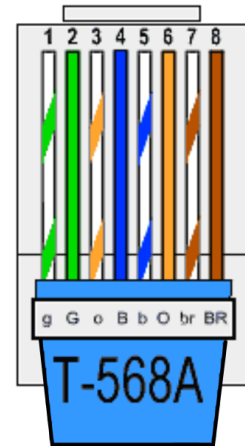


## Hub Cabling (Hub to TMV / Fixture)

### Hub Cabling Details



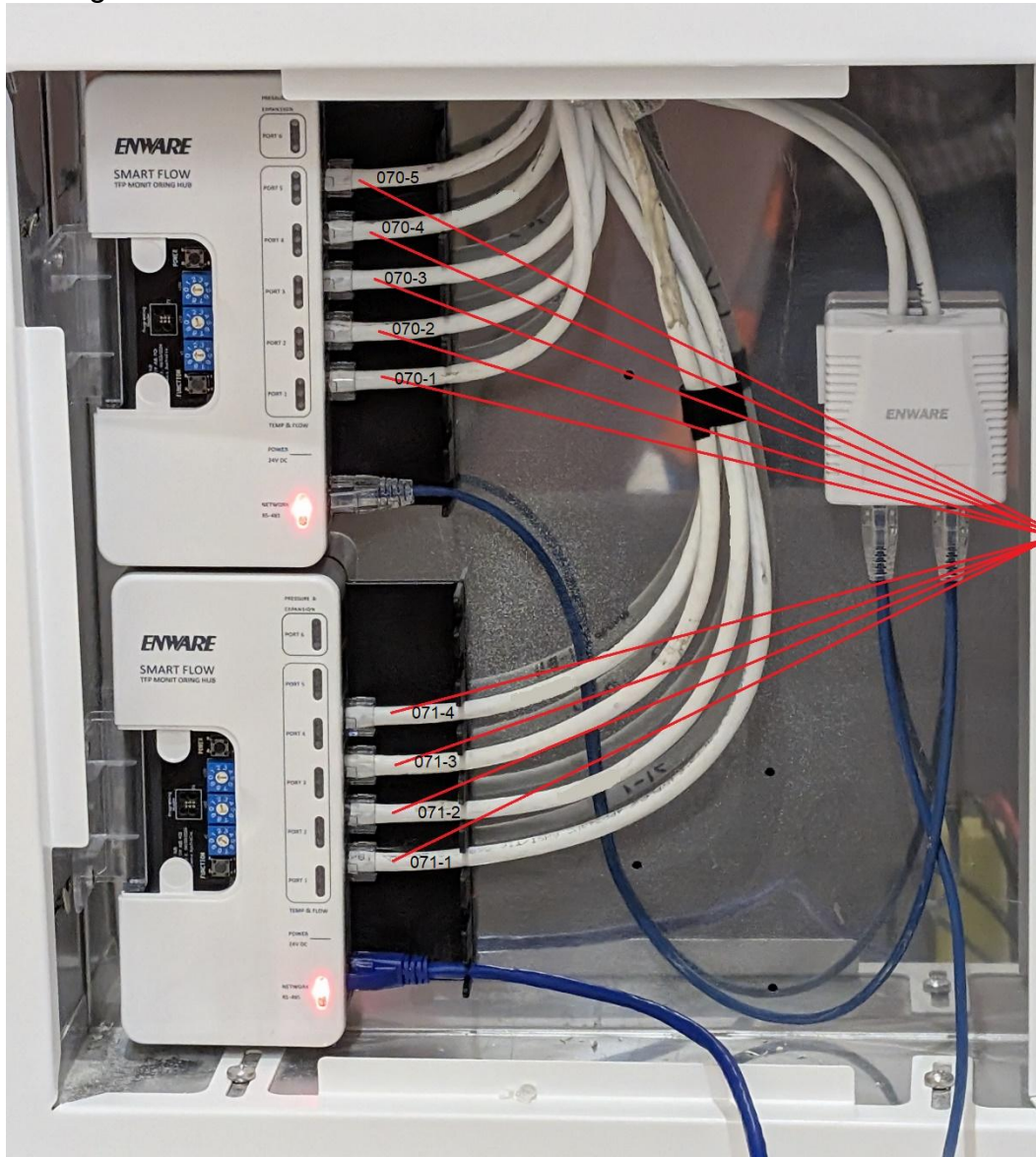
Pin	Colour	Description
1	Green/White	GND supply voltage
2	Green	24V supply voltage
3	Orange/White	Temperature sensor for cold water
4	Blue	Flow sensor for cold water
5	Blue/White	Flow sensor for hot water
6	Orange	Temperature sensor for hot water
7	Brown/White	Flow sensor for warm water
8	Brown	Temperature sensor for warm water



## Hub Cabling Cabinet Layout

Each hub can support up to 5 TMVs / fixtures on ports 1-5 and 2 pressure sensors on port 6.

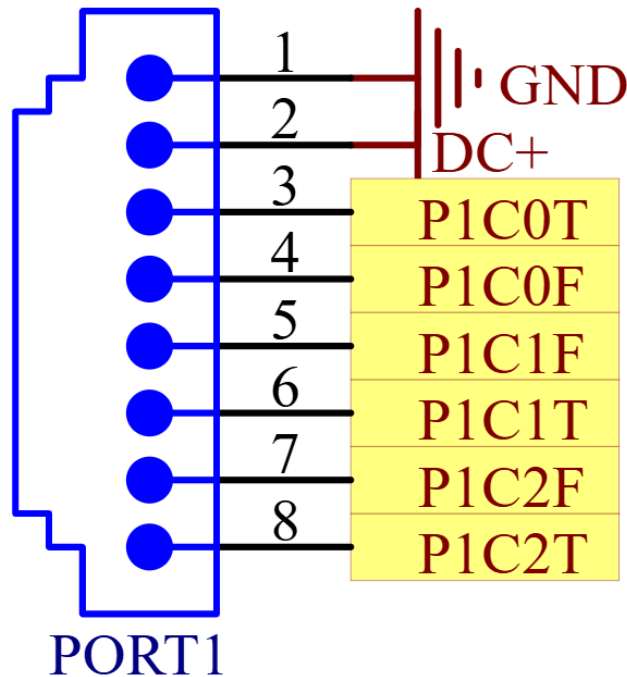
Ports should be populated starting at the top hub port 1 through 5, then the bottom hub port 1 through 5.



**Hub to  
TMV /  
fixture  
cabling**

## Hub Cabling Testing

Testing of the hub cabling is also essential to deliver a functioning system. The SFM TFP hub pinout is below, but for testing purposes the cable can be treated as a standard RJ45 cable and tested as such using industry standard tools.



When testing the hub cabling all smart flow hubs and sensors will need to be disconnected as this will interfere with industry standard test tools.

A test report showing each cable has been tested should be provided to Enware at the completion of the hub cabling.

Start	Port 1	Port 2	Port 3	Port 4	Port 5	Tested By	Test Date	Comment (only if required)
Hub 001	Pass	Pass	Pass	N/C	N/C			
Hub 002	Pass	Pass	Pass	Pass	N/C			
Hub 003	Pass	Pass	Pass	Pass	Pass			
Hub 004	Pass	Pass	Pass	Pass	N/C			
Hub 005	Pass	Pass	Pass	Pass	Pass			
Hub 006	Pass	Pass	Pass	Pass	N/C			
Hub <last>	Pass	Pass	Pass	N/C	N/C			

## Hub Cabling Labelling

Each hub cable should be labelled at both ends in the format of yyy-z where yyy is the hub number (001 to 999) and z is the hub port (1 to 5). The cables should be labelled so that the labels are orientated to be visible when plugged into the hub.

The cables should be labelled with either a label printer or neatly with a fine tip permanent marker.

