INSTALLATION GUIDE

Daisy Chaining Capabilities Of Sensors

Overview

Not all parts of a room experience similar conditions. To monitor the environmental conditions of a room, providing necessary conditioning monitoring with a single sensor is insufficient. To tackle this problem 75F has introduced a portfolio of sensors that can be mounted in various parts of a room.

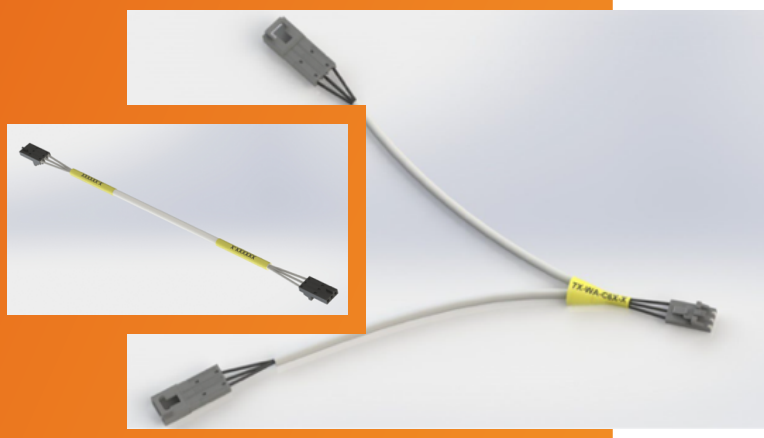
Master device room controllers such as SmartNode, SmartStat, and HyperStat have just one port to accommodate one sensor, apart from the onboard ones (as applicable).

This has led 75F to introduce daisy chaining capabilities in our latest sensor releases, and a wiring harness to support the daisy chaining of the sensors in a bus network.

Wiring Harness for Daisy Chaining

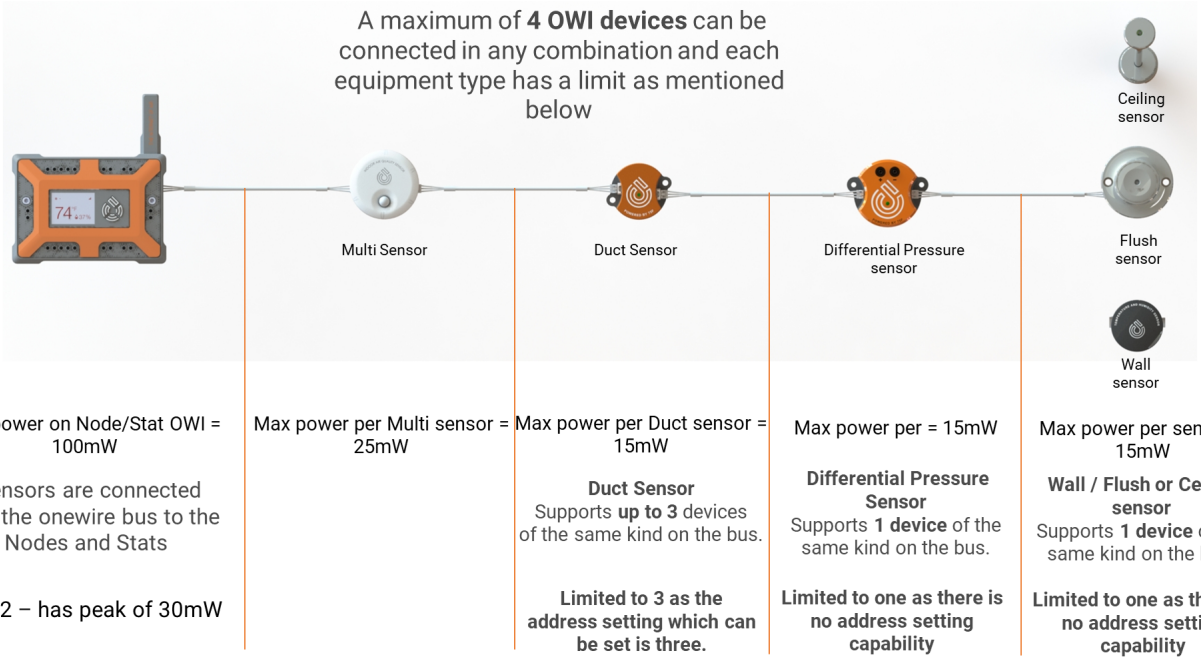
This wiring harness comprises a 3-pin female connector at one end, and two male connectors at the other. This can be plugged into the daisy chain ports provided in the sensors for power and communication.

Daisy chaining of sensors is achieved when the above wiring harness is combined with the 3-pin to 3-pin cable measuring 18 inches, 20 feet, 30 feet, and 50 feet.



Daisy Chaining Rules

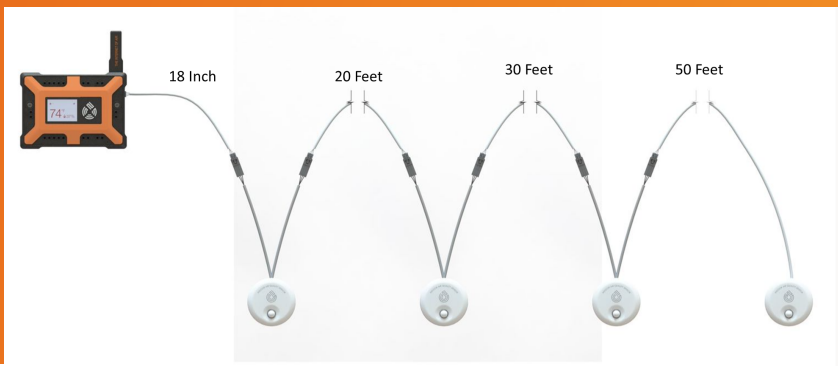
Below are the rules to be followed while daisy chaining sensors in a bus:



- A maximum of 4 one wire interface devices can be connected in a bus.
- A maximum of 4 multi sensors can be supported in a bus.
- A maximum of 3 duct sensors can be supported in a bus.
- A maximum of 1 differential pressure can be supported in a bus.
- A maximum of 1 device of ceiling/flush/wall sensor can be supported in a bus.

Examples

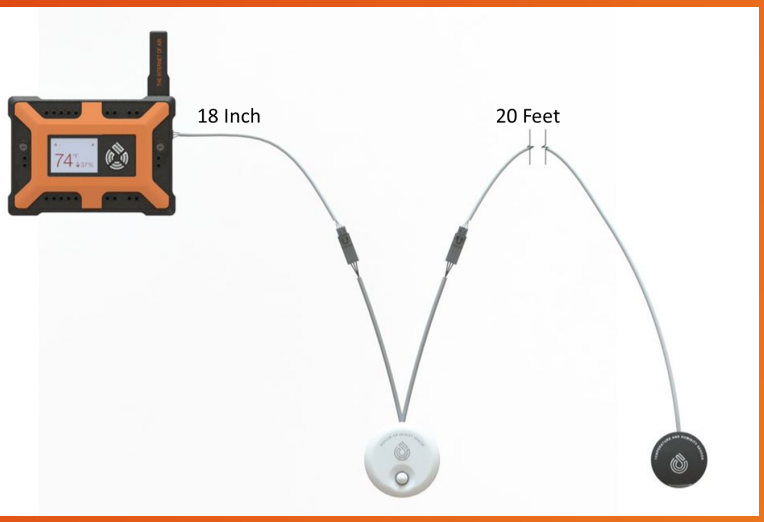
Below is an illustration of the daisy chaining example for the multi sensor:



Daisy Chaining Multi Sensor

Keep the following points in mind when daisy chaining:

- Not more than 4 multi sensors can be daisy chained in a bus.
- The temperature, CO_2, and humidity values of the sensors in the bus are averaged for the master device.
- The occupancy in the master device results, when at least one multi sensor in the bus detects occupancy.



Daisy Chaining Multi and Wall Sensors

When daisy chained:

- Not more than one wall sensor can be daisy chained in the bus, due to the absence of an address setting mechanism.
- The temperature and humidity values of the sensors in the bus are averaged for the master device.

Address Assigning Strategy

When more than a few sensors are used in a bus, each sensor takes up an address for it. The address taken up by sensors would differ based on the types of sensors used in the bus.

The multi sensor and the duct sensor, with address setting switches, can be used to set addresses for when more than one such sensor is used in the bus.

The other sensors in the family, the RTH/ wall, ceiling, flush, and differential pressure sensors, do not come with an address setting switch. When these are used in the bus, they assume the address "0", allowing other sensors in the bus to adopt the other addresses (not more than one of these sensors can be used in the bus, and they are usually the last in the bus).

One of the same types of sensors can be used with the same address. Like 2 x wall sensors or 1 x wall sensor and 1 x ceiling sensors.

Below are some examples to better illustrate the address assigning strategy:

Example 1

Sensors	Sensors in the Bus			
	Multi Sensor 1	Multi Sensor 2	Duct Sensor	Wall Sensor/RTH
Possible Addresses	0, 1, 2, 3	0, 1, 2, 3	0, 1, 2	NA
Address Taken Up	2/3	2/3	1	0

Example 2

Sensors	Sensors in the Bus			
	Multi Sensor	Duct Sensor 1	Duct Sensor 2	Ceiling/Flush Sensor
Possible Addresses	0, 1, 2, 3	0, 1, 2	0, 1, 2	NA
Address Taken Up	3	1/2	1/2	0

Example 3

Sensors	Sensors in the Bus			
	Multi Sensor	Duct Sensor 1	Duct Sensor 2	DPS
Possible Addresses	0, 1, 2, 3	0, 1, 2	0, 1, 2	NA
Address Taken Up	2/3	0/1	0/1	0

Example 4

Sensors	Sensors in the Bus			
	Multi Sensor 1	Multi Sensor 2	Multi Sensor 3	Multi Sensor 4
Possible Addresses	0, 1, 2, 3	0, 1, 2, 3	0, 1, 2, 3	0, 1, 2, 3
Address Taken Up	0/1/2/3	0/1/2/3	0/1/2/3	0/1/2/3

Daisy Chaining Guidelines

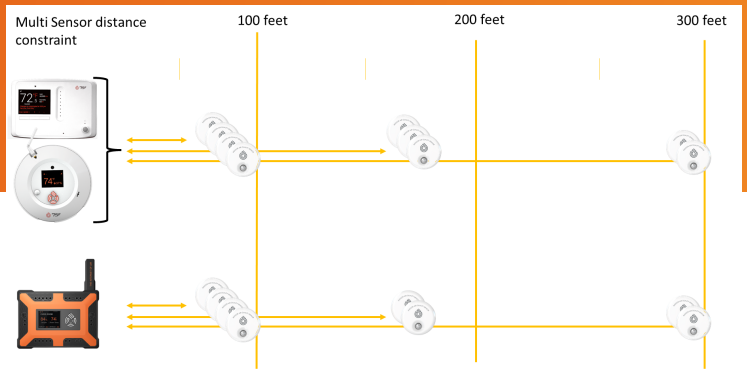
Based on the observations made on various testing and commissioned environments, conclusions are drawn as guidelines for daisy chaining different sensors with different edge devices.

For optimal results from the setup, users must adhere to these practices.

Multi Sensors Daisy Chained

The following table illustrates the distance at which different multi sensors should be, while in a daisy chained setup, with different edge devices using the 3-Pin to 3-Pin cable of different length combinations.

Device	Distance (In Feet)			
	1-MS	2-MS	3-MS	4-MS
HyperStat	190 to 300	190 to 300	100 to 160	60 to 80
SmartNode	120 to 300	120 to 300	100	60 to 80
HelioNode	190 to 300	190 to 300	100 to 160	60 to 80



The above figure depicts one such wiring guideline with distances to be maintained between the multi sensors, daisy chained with different edge devices.

When Multi Sensors are Daisy Chained with HyperStat:

1. Four multi sensors can be wired within 100 feet distance.
2. Above 100 feet and below 200 feet distance only three multi sensors can be wired and the last sensor should be within the 100 feet distance.
3. Above 200 feet and below 300 feet only 2 multi sensors can be wired and the last two sensors can be within 100 feet or 200 feet.

When Multi Sensors are Daisy Chained with SmartNode:

1. Four multi sensors can be wired within 100 feet distance.
2. Above 100 feet and below 200 feet distance only two multi sensors can be wired and the last two sensors should be within the 100 feet distance.
3. Above 200 feet and below 300 feet distance only 2 multi sensors can be wired and the last two sensors can be within 100 feet or 200 feet.

Different Sensors Daisy Chained

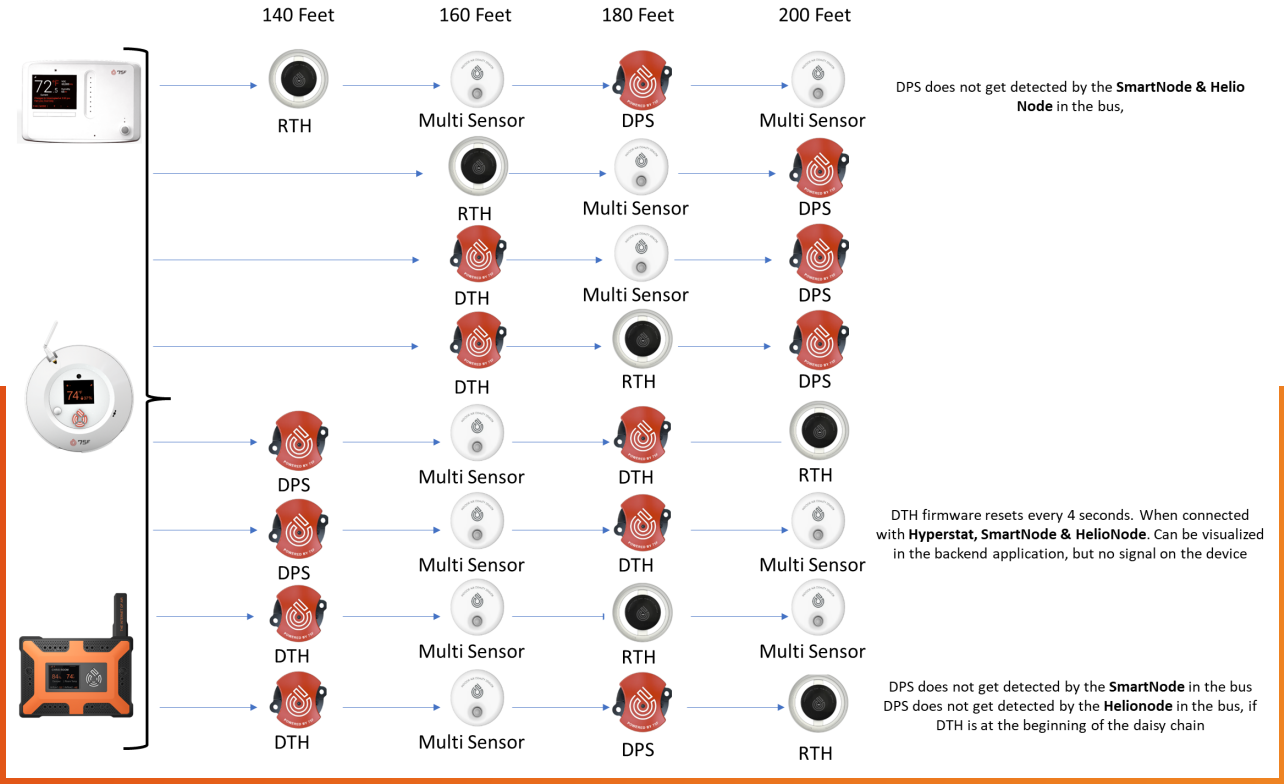
The concept of maintaining a particular distance between the sensors not only applies to the multi sensor but also to other sensors that can be a part of the daisy chain.

The following are the other sensor types that can be combined in a daisy chain:

MS - Multi Sensor
RTH - Wall Sensor
DTH - Duct Sensor
DPS - Differential Pressure Sensor

The table below illustrates the distance at which different sensor types should be, while in a daisy chained setup, with HyperStat/SmartNode/HelioNode using the 3-Pin to 3-Pin cable of different length combinations.

Device	Distance	Sensor Combination	Remarks
HyperStat/ SmartNode/ HelioNode	**200 Feet end** (The last sensor is at 200 feet; other consecutive sensors are 20 feet away with the last one in the bus)	RTH-MS-DPS-MS	DPS does not get detected by the **SmartNode & HelioNode** in the bus
		RTH-MS-DPS	
		DTH-MS-DPS	
		DTH-RTH-DPS	
		DPS-MS-DTH-RTH	
		DPS-MS-DTH-MS	DTH firmware resets every 4 seconds. When connected with **Hyperstat, SmartNode & HelioNode.** Can be visualized in the backend application, but no signal on the device
		DTH-MS-RTH-MS	
		DTH-MS-DPS-RTH	DPS does not get detected by the **SmartNode** in the bus. DPS does not get detected by the **HelioNode** in the bus, if DTH is at the beginning of the daisy chain



Device	Distance	Sensor Combination	Remarks
HyperStat/ SmartNode/ HelioNode	**200 feet Total (40-100-160-200)** (The first sensor is at 40 feet, the second at 110 feet, the third at 160 feet, and the fourth at 200 feet)	MS-RTH-MS-DTH	
		DPS-MS-DTH-MS	DTH firmware resets every 4 seconds when connected with HelioNode. Can be visualized in the backend application, but no signal on the device
		DPS-MS-DTH-RTH