

Hydronix Moisture Sensor Electrical Installation Guide

To re-order quote part number:	HD0678
Revision:	1.4.0
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Hydronix welcomes comments and suggestions relating to the product and this documentation

ACKNOWLEDGEMENTS

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Revision history

Revision No	Date	Description of Change
1.0.0	Feb 2015	First Release
1.1.0	May 2015	Sensor Cable Product Number Changed
1.2.0	March 2016	Sensor Interface References updated
1.3.0	March 2017	Non-Mil Spec Sensor details added (Change to permanently wired sensor details added)
1.4.0	Nov 2017	Update sensor Model Numbers

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1 Introduction

This Electrical Installation guide is valid for the following Hydronix sensors only:

Hydro-Probe	(Model number HP04 onwards)
Hydro-Probe XT	(Model number HPXT02 onwards)
Hydro-Probe Orbiter	(Model number ORB3 onwards)
Hydro-Probe SE	(Model number SE03 onwards)
Hydro-Mix	(Model number HM08 onwards)
Hydro-Mix HT	(Model Number HMHT01 onwards)
Hydro-Mix XT	(Model Number HMXT01 onwards)

User guides for other model numbers are available for download from the Hydronix website: www.hydronix.com



2 Installation Guidelines

2.1 Mil Spec Connector Sensors

Hydronix supplies cable 0975A for use with these sensors and it is available in different lengths. Any extension cable required should be connected to the Hydronix sensor cable using a suitable screened junction box. The sensor is directly backward compatible with older 0090A cables (as used with the previous versions of Hydronix Moisture Sensors). When connecting to a 0090A cable it is not possible to use the 2nd analogue output provided by the sensor.

For installations using both Analogue Outputs, it is necessary to use Sensor Cable part number 0975A.

It is recommended to allow the sensor to stabilise for 15 minutes after applying power before use.

2.2 Permanently Wired Sensors

Some Hydronix sensors do not utilise the Mil spec connector as supplied with the 0975A cable. These sensors are supplied with a factory fitted permanent cable. However, all cable specifications and connection methods as detailed in this guide are identical to the 0975A cable.

2.3 Cable Specification

- Six pairs twisted (12 cores total) screened (shielded) cable with 22 AWG, 0.35mm² conductors.
- Screen (shield): Braid with 65% minimum coverage plus aluminium/polyester foil.
- Recommended cable types: Belden 8306, Alpha 6373
- Maximum cable run: 100m, separate to any heavy equipment power cables.

2.4 Cabling Recommendations

- Ensure that the cable is of a suitable quality
- Ensure that the RS485 cable is taken back into the control panel. This can be used for diagnostic purposes and takes the minimum of effort and cost to connect at the time of installation.
- Route the signal cable away from any power cables.
- Check that the installation is properly grounded.
- The cable should **only** be grounded at the sensor end.
- Ensure that the cable screen is **not** connected at the control panel.
- Ensure that there is continuity of the screen through any junction boxes.
- Keep the number of cable joins to a minimum.

3 Analogue Outputs

Two DC current sources generate analogue signals proportional to separately selectable parameters (e.g. filtered Unscaled, filtered moisture, average moisture, etc). See Configuration guide HD0679 for further details. Using the Hydro-Com software or direct computer control, the output may be selected to be:

1. 4-20 mA
2. 0-20 mA - 0-10 V output can be achieved using the 500 Ohm resistor supplied with the sensor cable.

Sensor cable (Part no 0975A) connections (for new installations):

Twisted Pair Number	MIL spec pins	Sensor connections	Cable colour
1	A	+15-30V DC	Red
1	B	0V	Black
2	C	1 st Digital input	Yellow
2	--	-	Black (Cut back)
3	D	1 st Analogue Positive (+)	Blue
3	E	1 st Analogue Return (-)	Black
4	F	RS485 A	White
4	G	RS485 B	Black
5	J	2 nd Digital input	Green
5	--	-	Black (Cut back)
6	K	2 nd Analogue Positive (+)	Brown
6	E	2 nd Analogue Return (-)	Black
	H	Screen	Screen

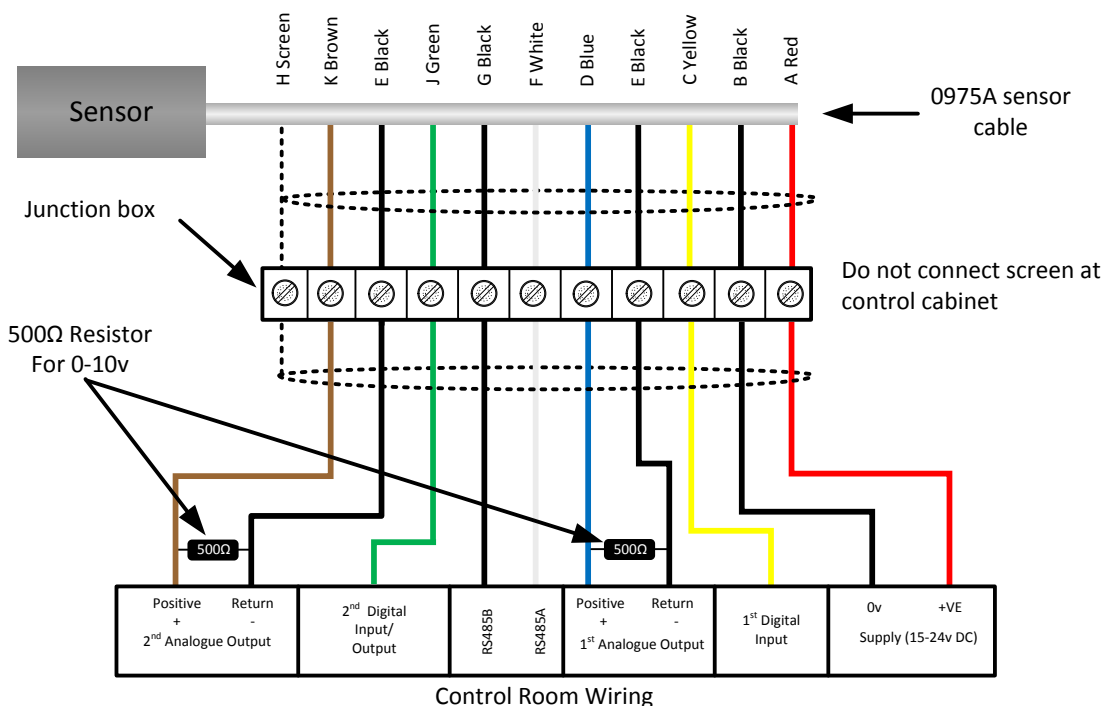


Figure 1: 0975A Sensor Cable Connections

Note: The cable screen is grounded at the sensor. It is important to ensure that the installation where the sensor is installed is properly grounded.

4 RS485 Multi-drop Connection

The RS485 serial interface allows up to 16 sensors to be connected together via a multi-drop network. Each sensor should be connected using a waterproof junction box.

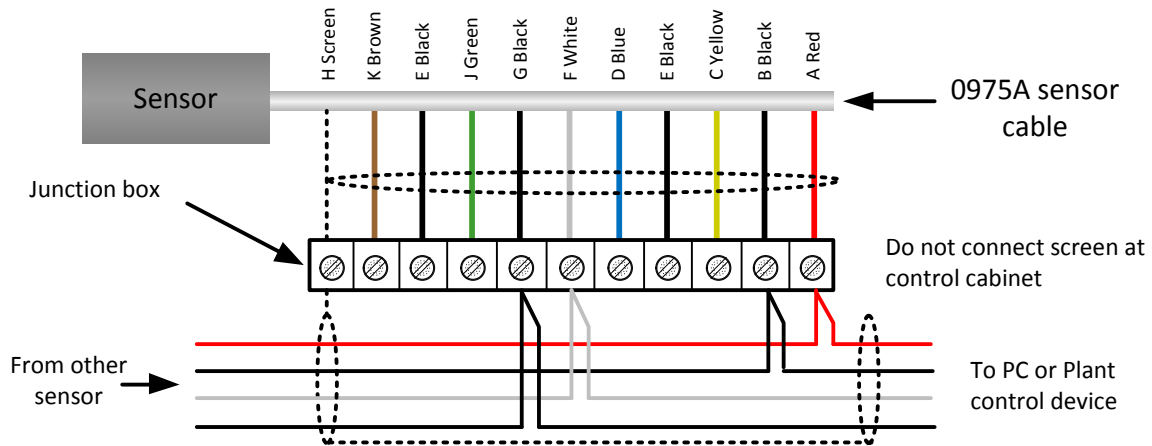


Figure 2: RS485 Multi-drop Connections

5 Digital Input/Output Connection

The sensor has two digital inputs, the second of which can also be used as an output for a known state. Full descriptions of how the digital inputs/output can be configured are included in the configuration guide HD0679. The most common use of the digital input is for batch averaging, where it is used to indicate the start and end of each batch. This is recommended as it provides a representative reading of the full sample during each batch.

An input is activated using 15 – 30vDC into the digital input connection. The sensor power supply may be used as an excitation supply for this, or alternatively an external source may be used as shown below.

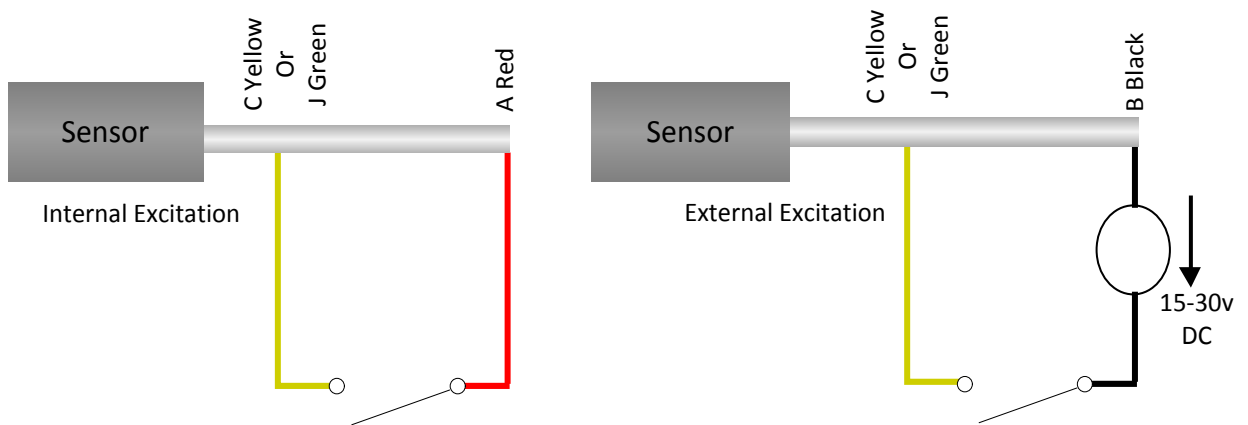


Figure 3: Internal/External Excitation of Digital Input 1 & 2

When the digital output is activated the sensor electronically switches pin J to 0V. This can be used to switch a relay for a signal, for example 'bin empty'. Note that the maximum current sink in this case is 500mA and in all cases over current protection should be used.

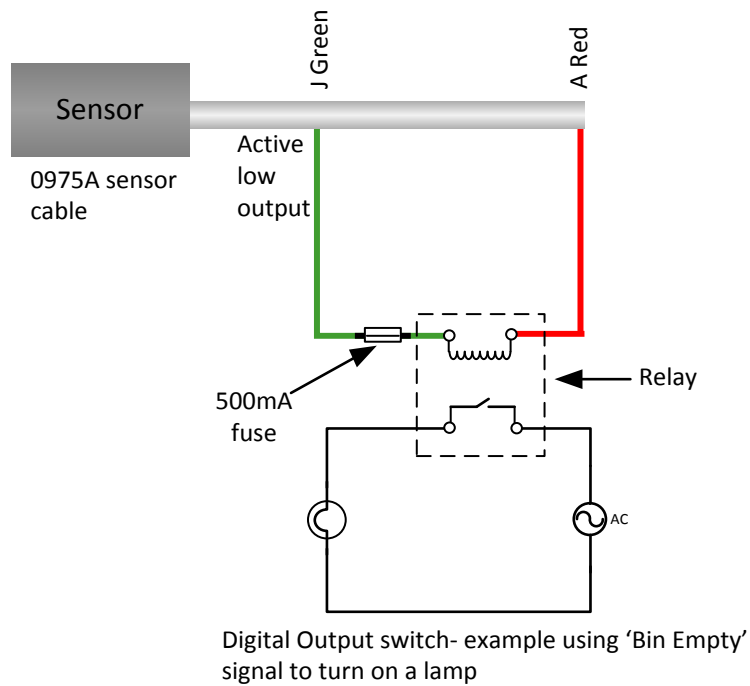


Figure 4: Activation of Digital Output 2

6 Connecting the Sensor Cable to Rotating Connector (Orbiter)

6.1 Wiring for all Rotating Connector Types

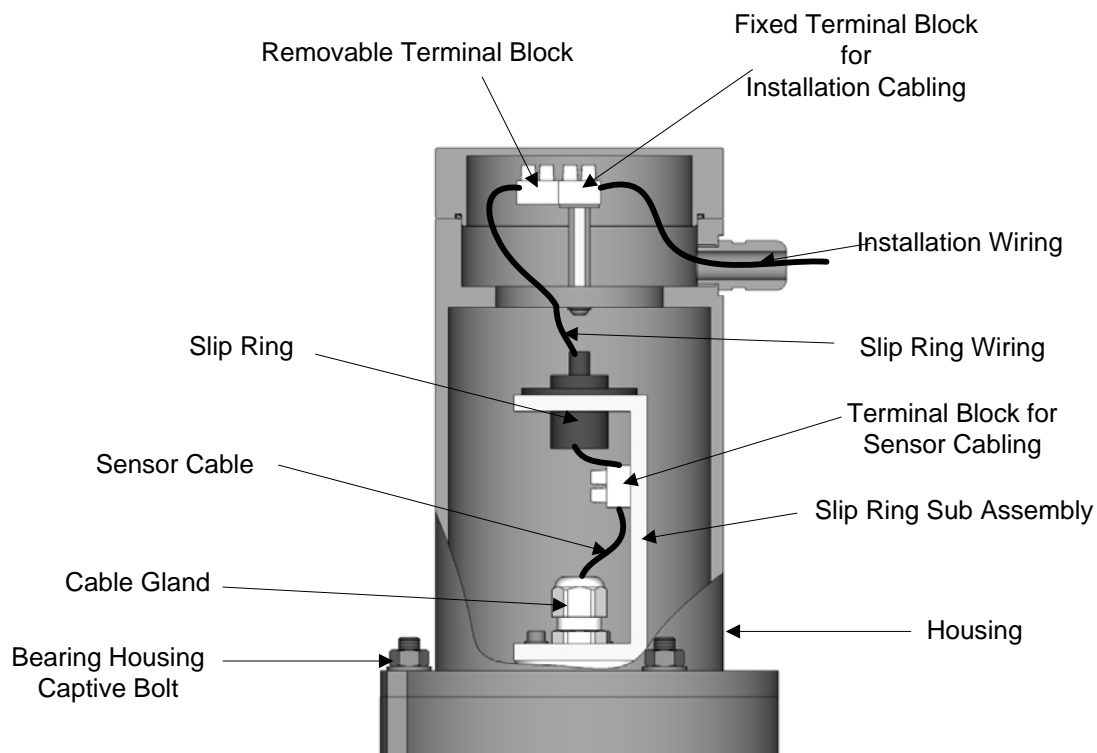
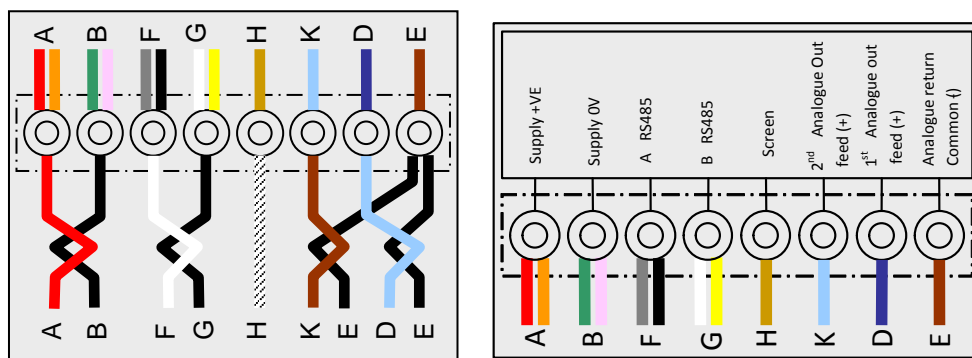


Figure 5: Sensor Connections for all types of Rotating Connector.



(A) Sensor Cable Connections

(B) Plant Wiring Connections

Figure 6: Wiring Diagram

Connection Port	Slip Ring Wire Colour	Sensor Wire Colour	Connection Type
A	Red/Orange	Red	Supply +VE
B	Green/Mauve	Black	Supply 0V
F	Grey /Black	White	A RS485
G	White/Yellow	Black	B RS485
H	Khaki	Screen	Screen
K	Light blue	Brown	2 nd analogue (+)
D	Dark blue	Light Blue	1 ST Analogue (+)
E	Dark brown	Black (From both analogue circuits)	Analogue return Common (-)

Table 1: Sensor cable to Slip Ring connections

6.2 Connection - Rotating Connector Type “A”

- With the cable connected to the Hydro-Probe Orbiter and the Rotating Connector Housing removed, feed the cable up through the rotating shaft and Slip Ring Sub-Assembly gland and cut to the correct length. Ensure the cable and its protective hose do not interfere with the mixer arms. Tighten the gland.
- Cut back the cable sheath and crimp on bootlace ferrules. 8 conductors are required, unused conductors should be cut back.
- Connect to the terminals as per the diagram in the Rotating Connector (see Figure 6).
- Install the housing over the slip ring sub assembly and bolt down using the bearing housing captive bolts.
- Feed the installation cabling through the housing cable gland and cut to length. Wire the installation cable to the fixed terminal block as per the diagram in the lid (see Figure 6). Connect the removable terminal block plug from the slip ring sub-assembly.
- Fit the Rotating Connector lid and screw down.

6.3 Connection - Rotating Connector Type “B”

- With the cable connected to the Hydro-Probe Orbiter and the Rotating Connector Housing removed, feed the cable up through the cable gland and cut to the correct length.
- Cut back the cable sheath and crimp on bootlace ferrules. 8 conductors are used so any unused conductors should be cut back
- Connect to the terminals as per the diagram in the Rotating Connector (see Figure 6).
- Install the housing over the slip ring sub assembly and bolt down using the bearing housing captive bolts.
- Feed the plant cabling through the housing cable gland and cut to length. Wire the plant cable to the fixed terminal block as per the diagram in the lid (see Figure 6).
- Connect the removable terminal block plug from the slip ring sub-assembly.
- Fit the Rotating Connector lid and screw down.

1 Connecting to a PC

A converter is required to connect the RS485 interface to a PC. Up to 16 sensors may be connected at any time.

Note: All sensors are set to address 16 as default. If more than one sensor is to be connected to a control system using the RS485 or to Hydronix Hydro-Com software all sensor address numbers must be different. See appropriate Hydro-Com user guide for more details.

RS485 line termination will not normally be required in applications with up to 100 m of cable. For longer lengths connect a resistor (approximately 100 Ohm) in series with a 1000pF capacitor across each end of the cable. It is highly recommended that the RS485 signals be run to the control panel even if they are unlikely to be used as this will facilitate the use of diagnostic software should the need arise.

There are four types of converter supplied by Hydronix.

1.1 RS232 to RS485 Converter – D Type (part no: 0049B)

Manufactured by KK systems, this RS232 to RS485 converter is suitable for connecting up to six sensors on a network. The converter has a terminal block for connecting the twisted pair RS485 A and B wires. The converter can then be connected directly in to the PC serial communication port.

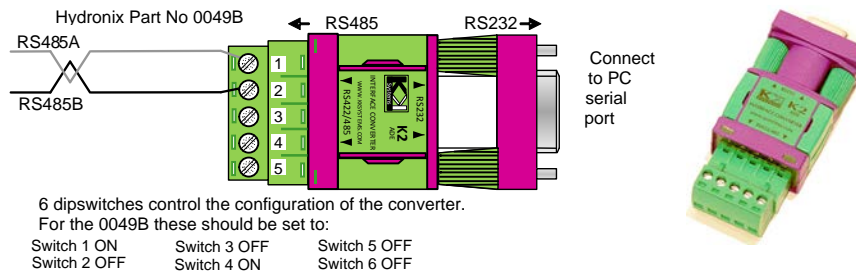


Figure 7: RS232/485 Converter Connections (0049B)

1.2 RS232 to RS485 Converter – DIN Rail Mounting (part no: 0049A)

Manufactured by KK systems, this powered RS232 to RS485 converter is suitable for connecting up to 16 sensors on a network. The converter has a terminal block for connecting the twisted pair RS485 A and B wires. The converter can then be connected to a PC serial communication port.

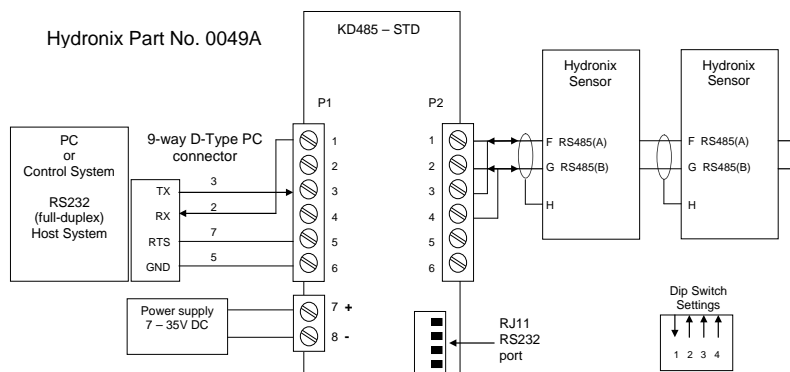


Figure 8: RS232/485 Converter Connections (0049A)

1.3 USB Sensor Interface Module

Manufactured by Hydronix, this USB-RS485 converter is suitable for connecting up to 16 sensors on a network. The converter has a terminal block for connecting the twisted pair RS485 A and B wires. The converter can then be connected to a USB port. The Sensor Interface Module is powered from the USB port. If sensor power is required the external 24v power supply can be used. See USB Sensor Interface Module User Guide (HD0303) for further information.

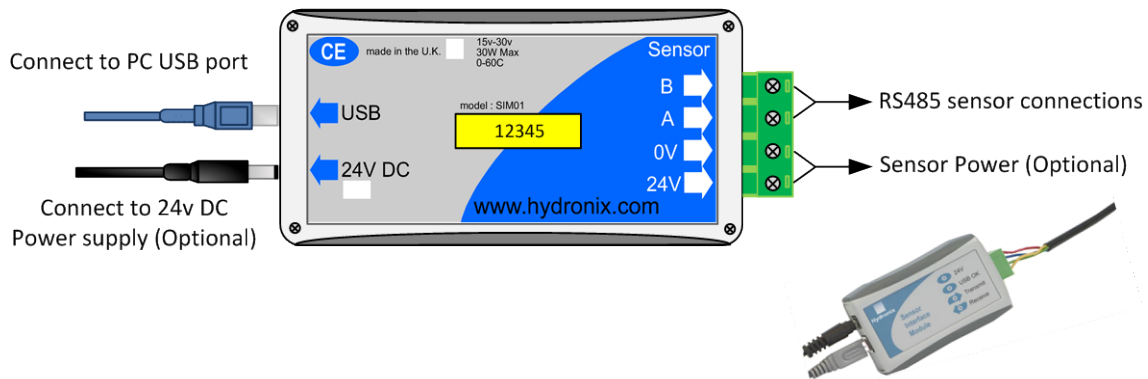


Figure 9: RS232/485 Converter connections (Sensor Interface Module)

1.4 Ethernet Adapter Kit (part no: EAK01)

Manufactured by Hydronix, the Ethernet adapter is suitable for connecting up to 16 sensors to a standard Ethernet network. An optional Ethernet Power Adapter Kit (EPK01) is also available which eliminates the need for additional expensive cables to be run to a remote location which does not have local power. If this is not used then the Ethernet adapter will require a local 24v power supply.

Hydronix Part No: EAK01

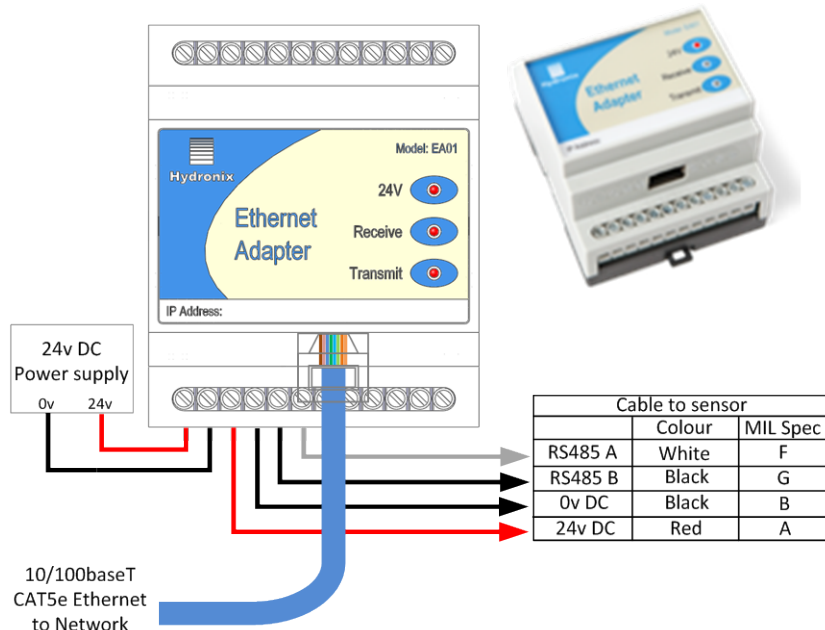


Figure 10: Ethernet Adapter Connections (EAK01)

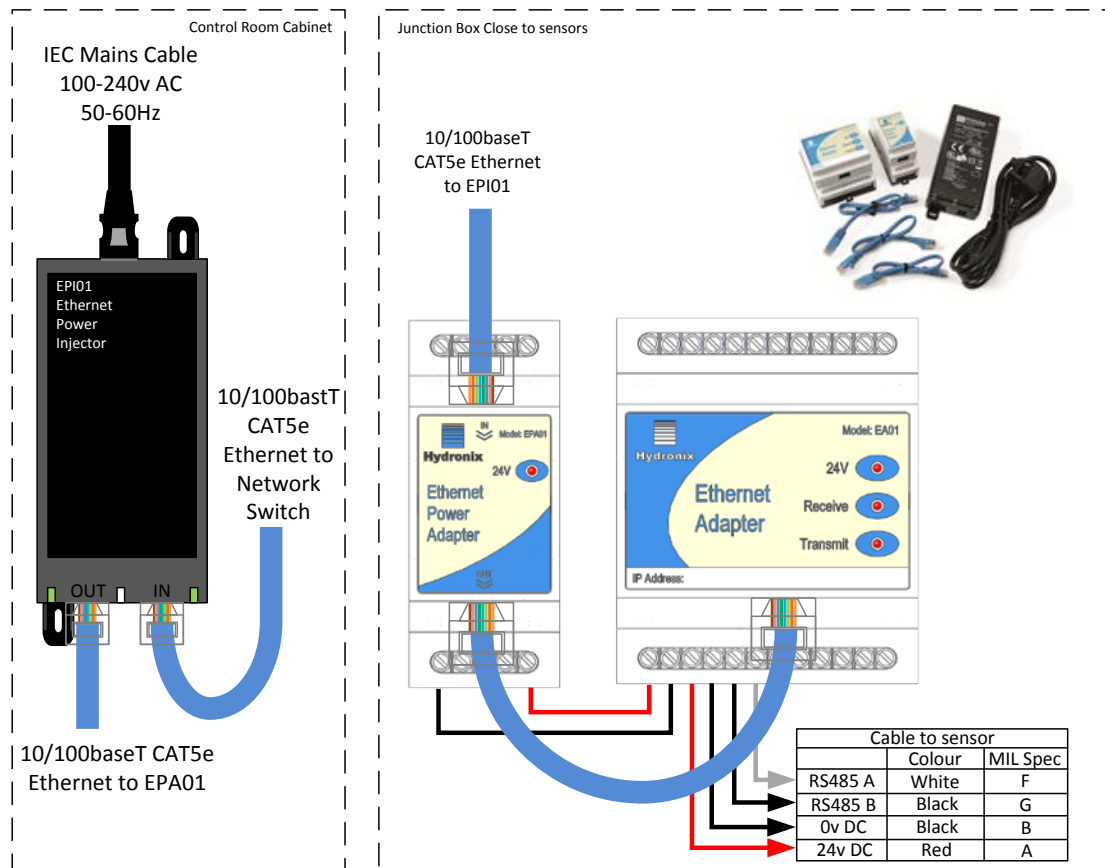


Figure 11: Ethernet Power Adapter Kit Connections (EPK01)

1 Document Cross Reference

This section lists all of the other documents that are referred to in this User Guide. You may find it beneficial to have a copy available when reading to this guide.

Document Number	Title
HD0682	Hydro-Com User Guide
HD0303	Sensor Interface Module User Guide
HD0679	Hydronix Microwave Moisture Sensor Configuration and Calibration Guide

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