Engineering Note: EN0115 Sensors Cooling Techniques

Summary:	Examples of cooling techniques and wiring to protect the sensor's electronic from overheating due to high ambient temperature.		
Products affected:	All sensors		
Revision Date:	02/09/2024	Author:	A. Mario

1 Introduction

All Hydronix sensor's main electronics must always be kept below 60°C ambient. The electronics produces 15-20°C heat during operation and the reported electronics temperature must be kept below 80°C. When the installation environment could cause the sensor main electronics to overheat, it is necessary to reduce the temperature by moving the heat away from the sensor. This is often achieved by using fluids to capture and remove heat from the sensor. Commonly, air or liquid coolants are used.

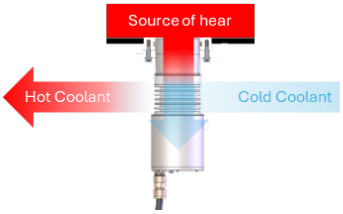

Figure 1 - Heat removal

The following sections describe techniques that can be adopted on all Hydronix sensors. It is important to underline that the HMHT01 offers a much-improved cooling capacity due to the increased cooling area achieved by its heat dissipation flange and an insulator, which slows heat transfer, mounted between the sensing head and the main electronics.

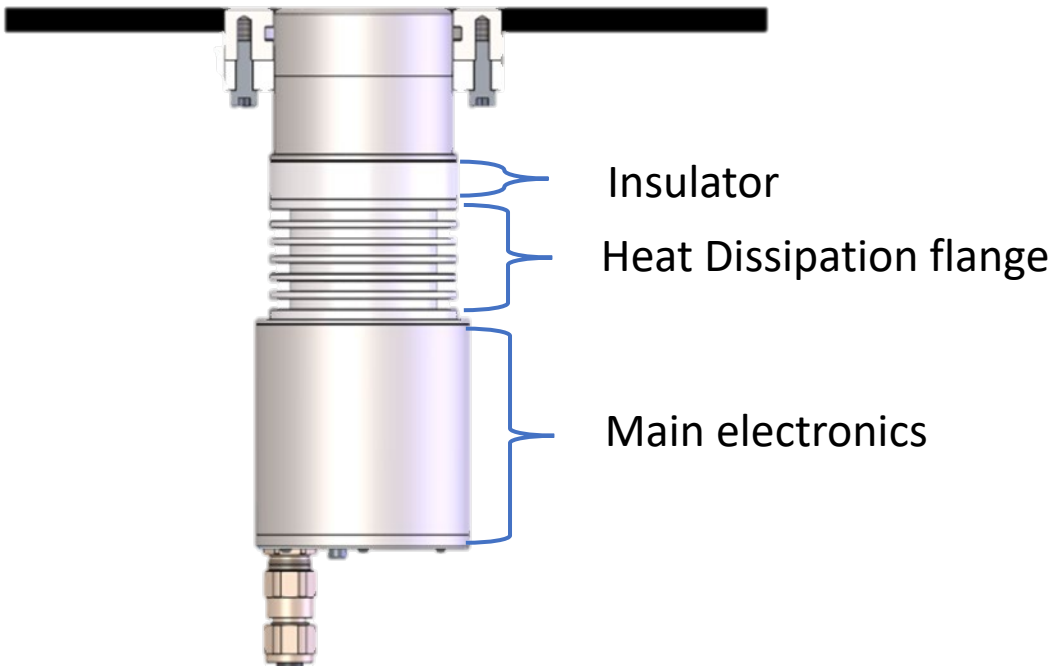

Figure 2 - Hydro-Mix HT

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2 Forced air

A fan or a system of pipes is used to force air on the sensor's electronic compartment to remove heat.

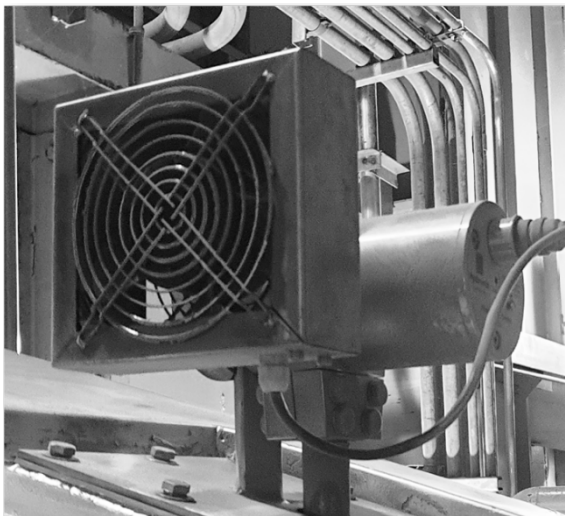

Figure 3 - Forced air onto the sensor electronic housing.

3 Cooling jackets and coils.

This system creates a gap made of flexible or solid material around the sensor. A fluid is then passed in the gap to remove the excess heat. These devices are commonly used to cool electric motors.

Figure 4 - Cooling jacket (SX) and cooling coil (DX) used to cool the sensor

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4 Activating cooling using sensor output.

To avoid energy wastage, it is possible to control the cooling action using the sensor output. This is achieved by enabling the I/O2 to “Material Temperature Alarm” and by setting a suitable material temperature in the sensor software.

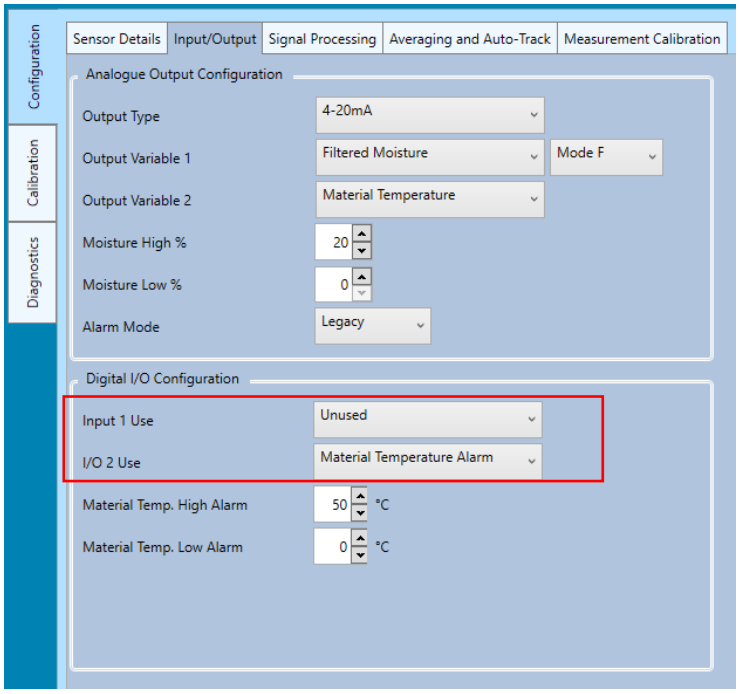

Figure 5 - Hydro-Com Digital I/O Configuration screenshot.

A relay connected to the +Vcc powering the sensor and to the 2nd Digital Output of the sensor (Green conductor) can be used to control a cooling fan.

A Fly Wheel Diode 1N4007 is required to protect the sensor’s output from voltage transients induced when the inductive coil of the relay is de-energised.

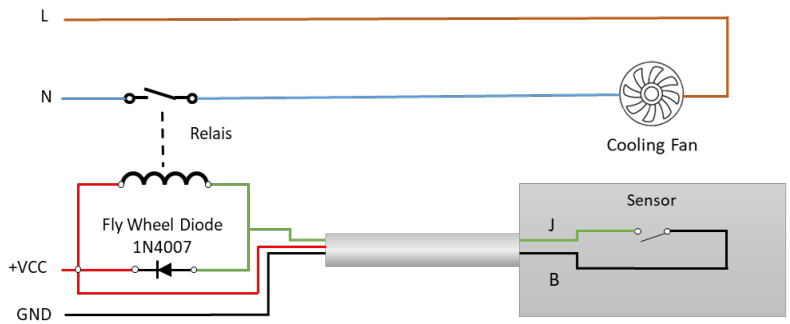

Figure 6 - Wiring to drive a cooling fan from sensor digital output.

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