User Manual

ACC3

Release 1.01

1 – Introduction and compatibility with AiM devices

ACC3 (**Analog CAN Converter**) is an expansion module that expands the possibility to read extra channels from an AiM Master unit of the last generation.
ACC3 samples up to 4 signals and transmits their converted values on AiM EXP CANbus, with a maximum frequency of 1000Hz each.

The four ACC3 signal inputs are managed as follows:
* **two inputs (Ch01 and Ch02)** can only be **analog**;
* **two inputs (Ch03 and Ch04)** can be both **analog** or **digital** to handle **speed sensors**.

ACC3 can be connected to the following AiM devices:
* MX 1.2-1.3 (all versions)
* MX V2
* PDM (all versions)
* Solo 2 DL (provided that the logger is externally powered)
* Solo2DL v2
* SW4
* XLog (provided that the logger is externally powered)
* ECULog
* EVO4S
* EVO5
* MXPS
* MXS Strada Light
* MXS v2
* MXsl
* MXm
* MXm v2
* MXq
* MX2E
* MXK10

2 – Technical details

Analog inputs can read different voltage intervals without losing resolution. The transmission of the logged signals over CAN, can top up to1000Hz of refresh rate. Typical inputs are:

- o 0-50mV
- o 0-500mV
- o 0-5V
- o 0-12V
- o K Type thermocouple
- o Thermoresistor (with pull up resistor)

Technical tip

Most analogue sensors used to measure pressure, position, accelerations, angular rates, etc. natively output variable voltage signals. These type of sensors can be directly plugged into the analogue inputs of an ACC3, without needing any tweak.

Oppositely, most temperature sensors (thermoresistor) output a variable resistance signal. To read these signals it is necessary to add a conditioning resistor, which translates the resistance into a voltage, to be read by the analog-to-digital-converter (ADC) of a data logger.
This is done bridging the sensor signal and the regulated Vref with a resistor (pull-up), whose value depends on the characteristic of the specific thermoresistor.

To simplify any installation, AiM supplies its car/bike PT100 thermoresistor with an integrated 2kOhm pull-up resistor. In this way, these can be plugged directly to the analogue inputs,: just select the sensor PT-100 2K (X05TRxxxA451xBPRS) and they are ready to work.

Available AiM PT100 part numbers are:
- X05TRM05A4514BPRS (M5 thread)
- X05TRM10A4512BPRS (M10 thread)
- X05TRNPTA4513BPRS (1/8 NPT thread)

Digital inputs can read Hall effect speed sensors or, more in general, squared speed signals. ACC3 features an internal pull up to work with open-drain or open-collector inputs.
The maximum sampling frequency is 10kHz; once the speed has been calculated, its value is transmitted over CAN with a maximum update frequency of 1000Hz.

3 – Top LED status

As shown below, ACC3 features a LED top of it. Here follows description of its meaning according to colour and blinking frequency:

- **red blinking slow**: booter recovery
- **red blinking fast**: updating firmware
- **bleu steady**: calibration needed or EEPROM reading error
- **green steady**: normal (both in AiM CAN network or in non-AiM CAN network)
- **OFF**: no power/no communication for more than 3 seconds

4 – Wirings

ACC3 can manage many different sensor types. Please, note that thermocouples require dedicated compensated cables, they are yellow with the standard Mignon connector. Different kits and different harnesses and cables are available. Here down some examples of the available harnesses are shown.

Harness intended to be used with AiM sensors (thermoresistors, 0-5V, 0-12V).
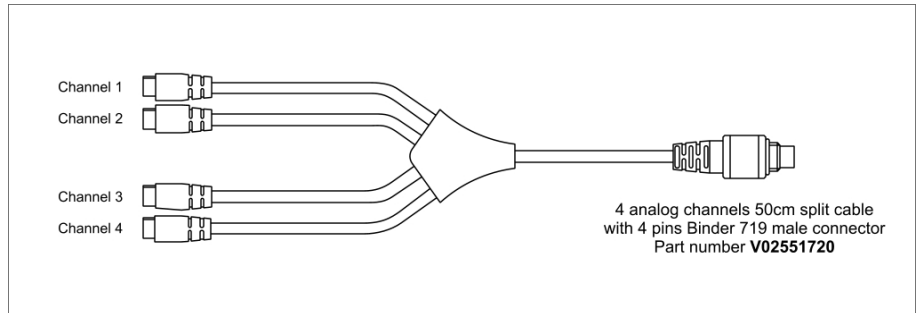
Harness free wires for thermoresistors, 0-5V, 0-12V.
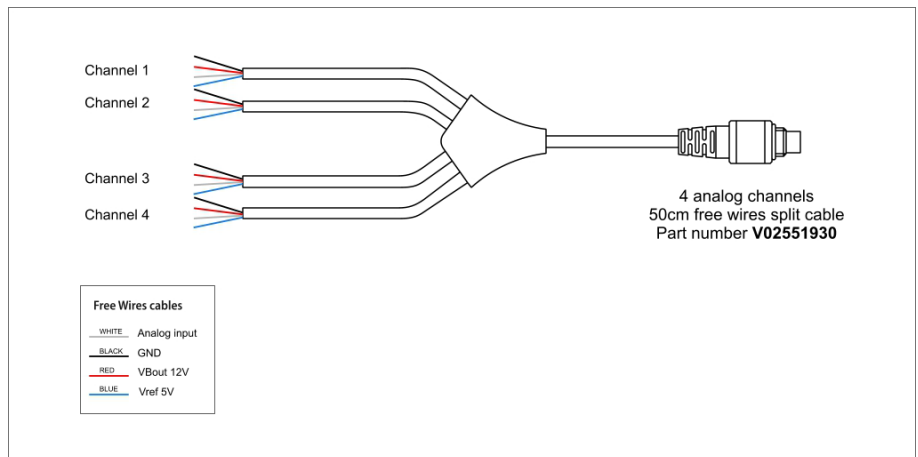

Harness for 2 thermocouples and two AiM sensors.
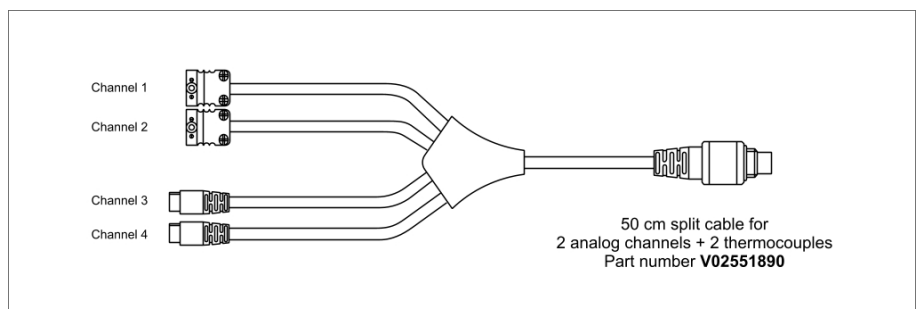
Please refer to ACC3 technical sheet you find here for detailed information about the available harnesses.

5 – Configuration

To configure ACC3 follow these steps:

- run RaceStudio 3 software and select the Master device you need to configure (MXS 1.x in the example)
- enter "CAN Expansions" tab and select "ACC3" expansion as shown here below
- Note: if you have an ACC3 Open, the selection is different, select ACC3 Open.
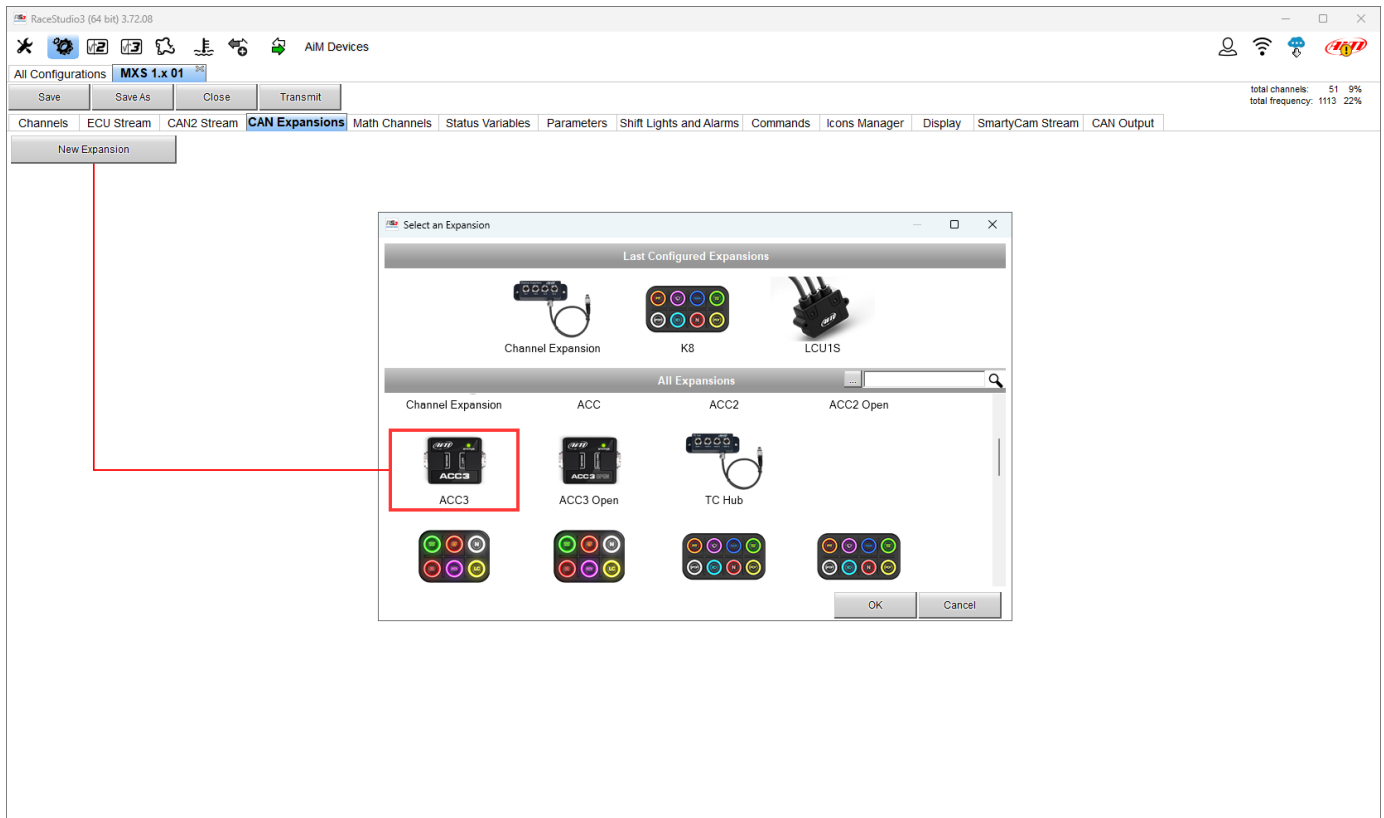
The software enters ACC3 configuration tab. Keeping the device switched on you can:
• name it
• set the serial number. If ACC3 is already connected to the master unit, read the serial number pressing the corresponding button (**1**). When setting offline, the serial number can be entered manually.

Select the cable in use, which strictly depends on the number of thermocouple sensors you plan to use. Make your selection in the **total number of thermocouples to use** (2 in the example).
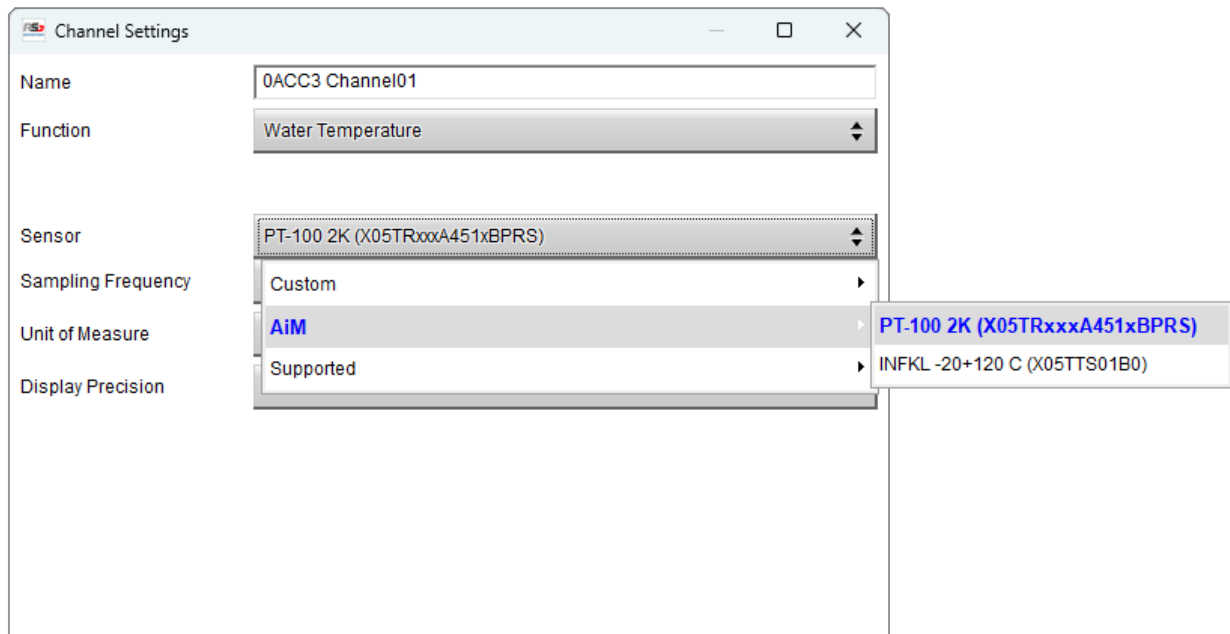
In the following example a water temperature sensor is set:
- select the ACC3 channel to configure
- name it ("Water Temp" in the example below)
- select the function in the menu (Temperature -> Water Temperature)
- select the specific Sensor in use
- set the sampling frequency, the unit of measure (°C or °F) and the decimal precision.
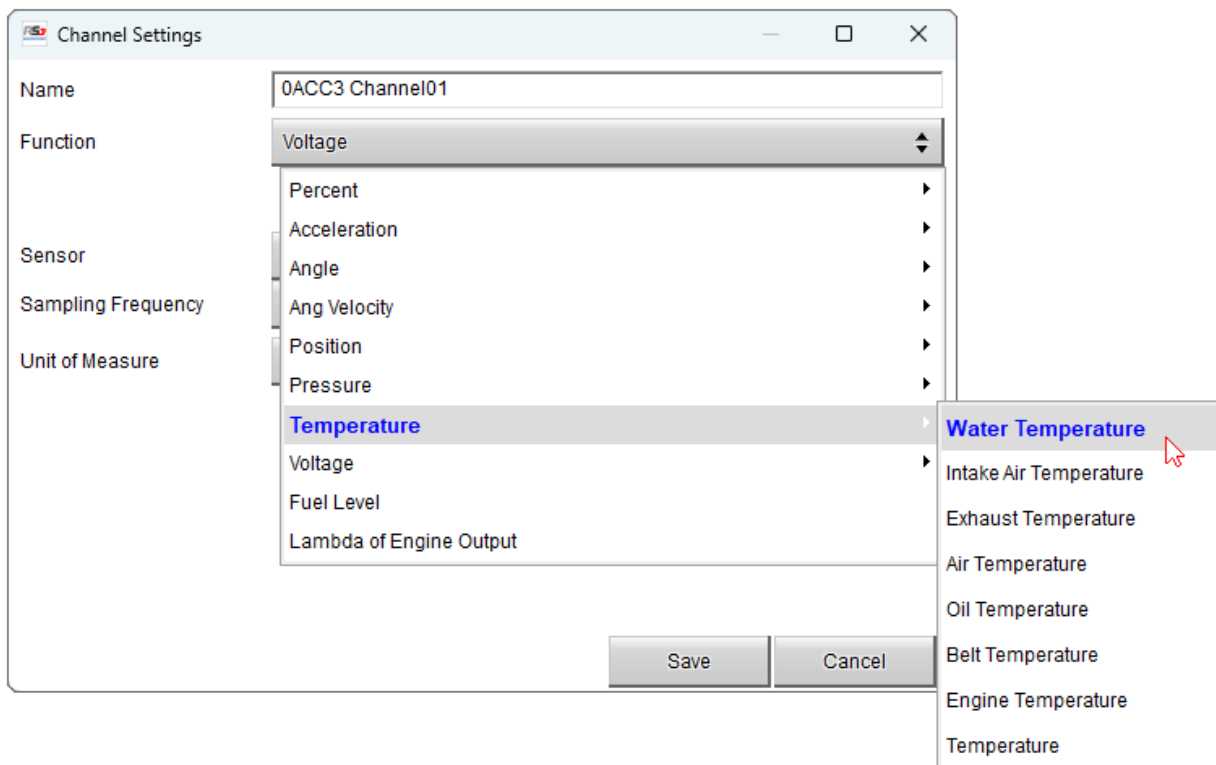
Sensors are grouped in three subgroups:
- **Custom**: those sensors built by the user in Custom Sensors area
- **AiM**: groups the current range of sensors built and supplied by AiM
- **Supported**: groups legacy sensors supplied by AiM, or reference sensors predefined in the database

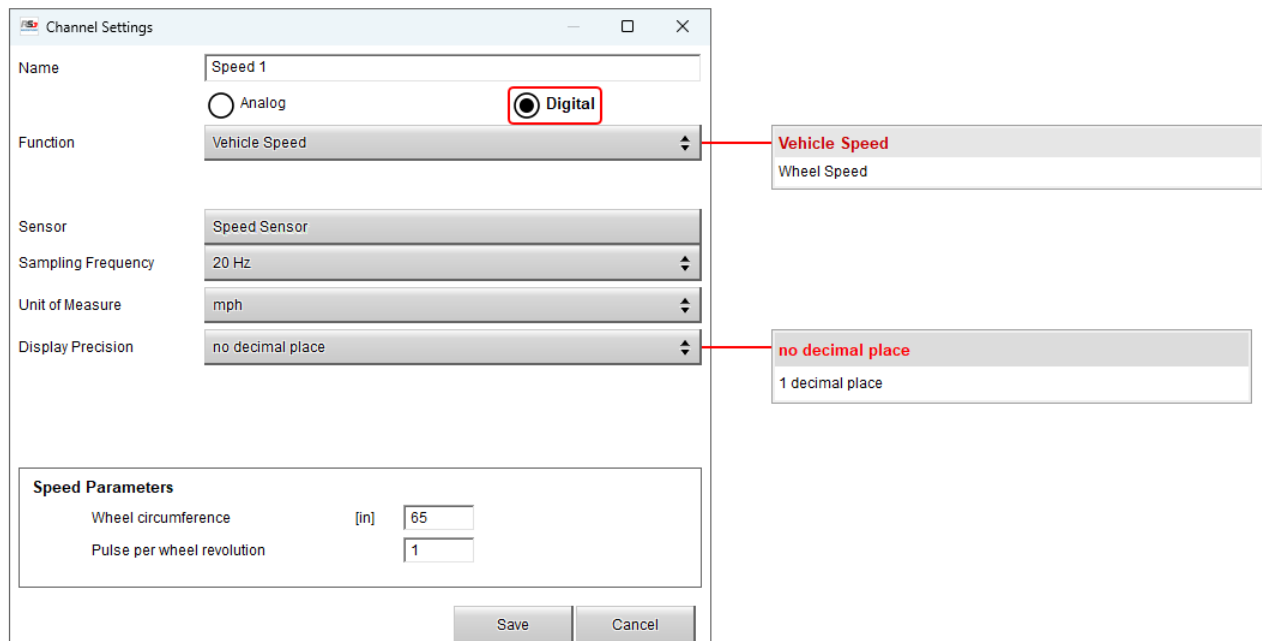**Please note**: as shown here below **PT-100 resistors have been divided between "AiM" and "supported":**
- **AiM - PT-100 2K (X05TRxxxA451xBPRS)** already integrates the pull up resistor (top image below) while
- **Supported sensor - PT-100 requires a 2kOhm pull up resistor between Vref (5V) and signal input**;

In a similar way the remaining channels can be configured according to the sensors in use: click the channel to set and a setting panel is prompted; multiple functions can be chosen according to the kind of sensor connected to ACC3.
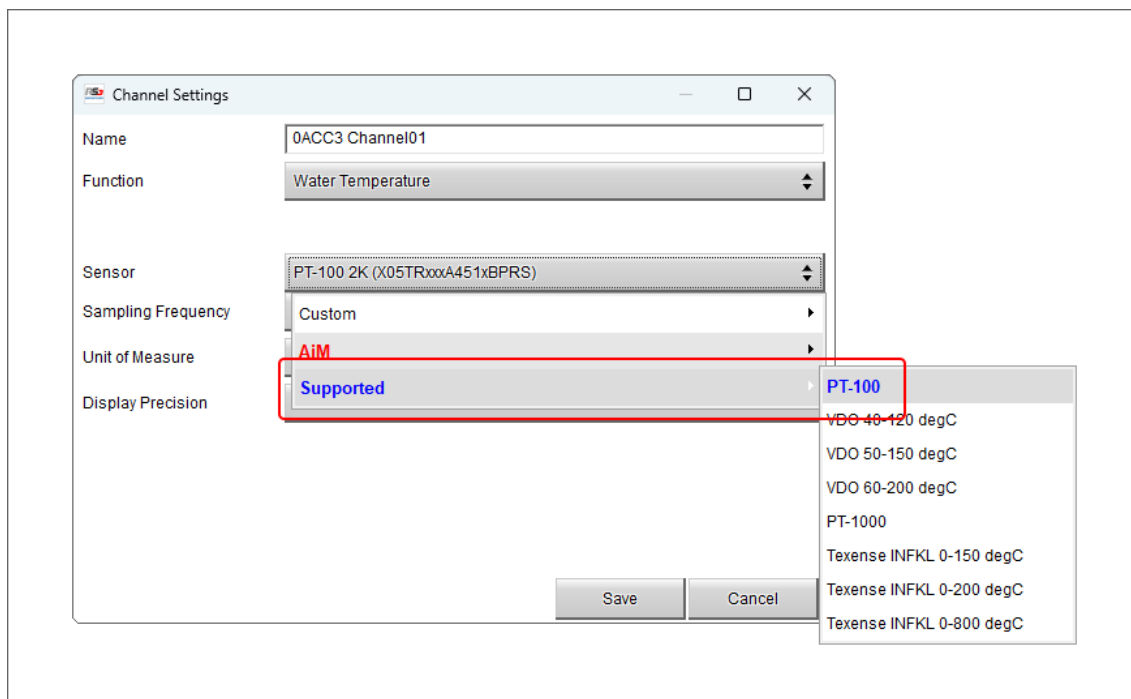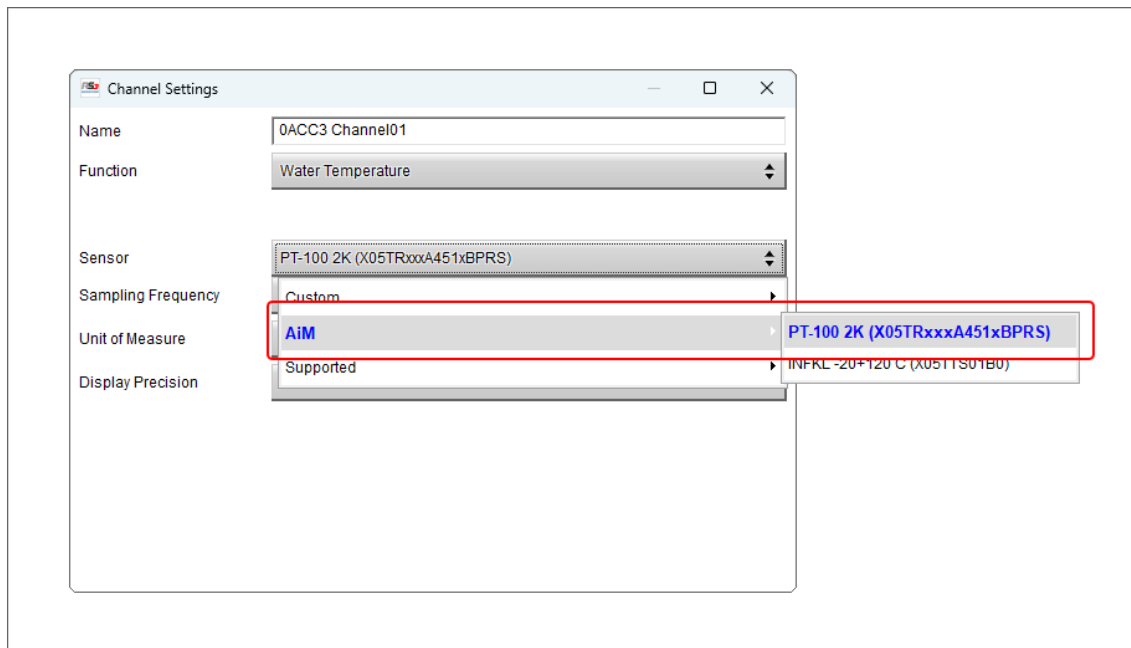
To set a channel as speed input it is necessary to set it as "Digital" as shown here below.

Speed sensors compatible with ACC3 are those producing a square wave signal; more specifically all sensors based on the open drain / open collector triggering, which are commonly named Hall effect sensors.
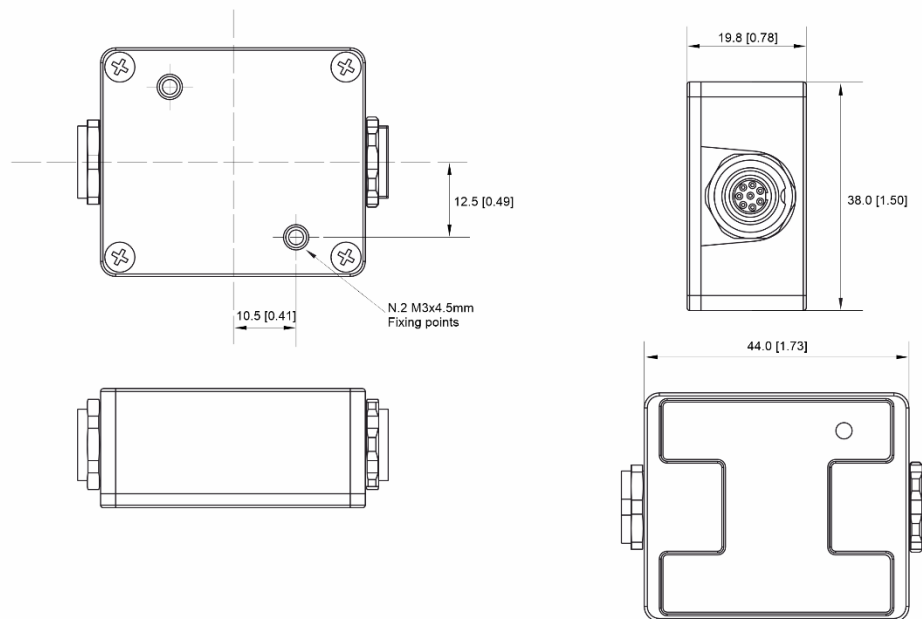

When the configuration is finished save and transmit it to the logger using the software top left keyboard.

6 – Dimensions and technical characteristics

The image below shows ACC3 dimensions in mm [inches]

Technical characteristics:

- Analog Channels: 4 fully configurable, 1000Hz each: thermocouple, thermoresistor, 0-5V, 0-12V. Two channels can be configured as speed input too
- Speed inputs: 2 (An3-An4), max target sampling frequency 1000Hz, internal pull up for open drain/collector input
- External Power: 9-15V (**Please note**: battery powered master units must have an external power supply)
- Connection: CAN
- Connectors: 2 Binder 712 female
- Material: PA6 30% glass
- Dimensions: 44x38x19.8mm
- Weight: 50g
- Waterproof: IP65