

AiM Infotech

Bike speed sensor

Release 1.02

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# 1

## Introduction

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This datasheet explains how to use AiM bike speed sensor. This is a non contact sensor that needs a metallic trigger to pass in front of it. It is sold with a magnet and the needed locknuts and is available in two versions: with plastic connector (Binder 719) and with metallic connector (Binder 713).

This sensor **part numbers** are:

- Bike speed sensor ending with plastic connector      **X02SNVM00**
- Bike spees sensor ending with metallic connector      **X05SNVB301**

It fist the measurement of the wheel speed and needs an accurate installation. This is why we suggest to address to a specialized workshop. Once the sensor installed it needs to be setup using AiM Race Studio software freely downloadable from download area -> software of [www.aim-sportline.com](http://www.aim-sportline.com).

# 2

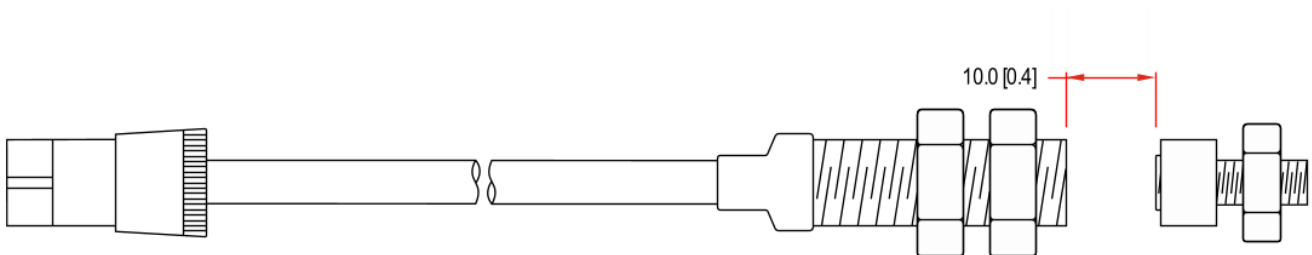
## Installation

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Install the sensor using a bracket and:

- ensure that the distance between sensor and magnet is between 8 and 20 mm (0.31-0.78 inches)
- fix the sensor to the bracket
- connect the sensor to AiM logger

The image here below shows the sensor with its magnet correctly installed.



## 2.1

### Specificity of AiM loggers

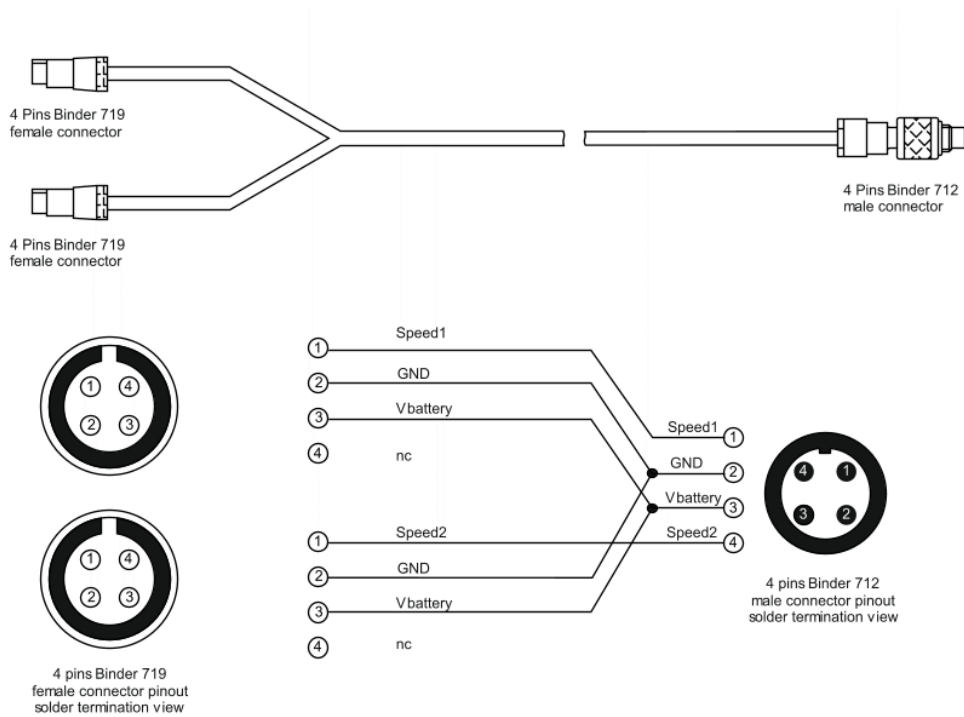
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AiM loggers can support one or more speed sensor.

- **MXL2, MXG and MXS** can support up to four speed sensors: one can be connected to the standard harness (**V02573010**) and the other three to the optional harness (**V02573020**).
- **EVO4** and **EVO4S** can support up to two speed sensors that needs to be connected to the only available dedicated connector labelled Speed. To plug both sensors you need to buy an optional speed split cable like the one shown here below on the right; according to the sensor you are using its part number is:
  - **V02549030** for the split cable featuring two plastic Binder connectors and one metallic to be used for speed sensors ending with a plastic Binder connector (shown below)
  - **V02563100** for the split cable featuring three metallic Binder connectors to be used for speed sensors ending with a metallic Binder connector



Here below is the cable constructive scheme.



**MXL Strada/Pista** have one only speed channel. Speed sensor is included in the optional basic sensor kit – part number **X10MXLS00000** – that includes RPM and water temperature sensors too. The cable part number is: **V02554020**.

**MXL Pro05** has four speed channels. Speed sensors have to be connected to these optional cables:

- part number **V02554200** for speed 1 and 2
- part number **V02554240** for speed 3 and 4.

The harnesses are labelled and the sensors have to be plugged to the cables labelled "Speed".

## 3

# Software setup

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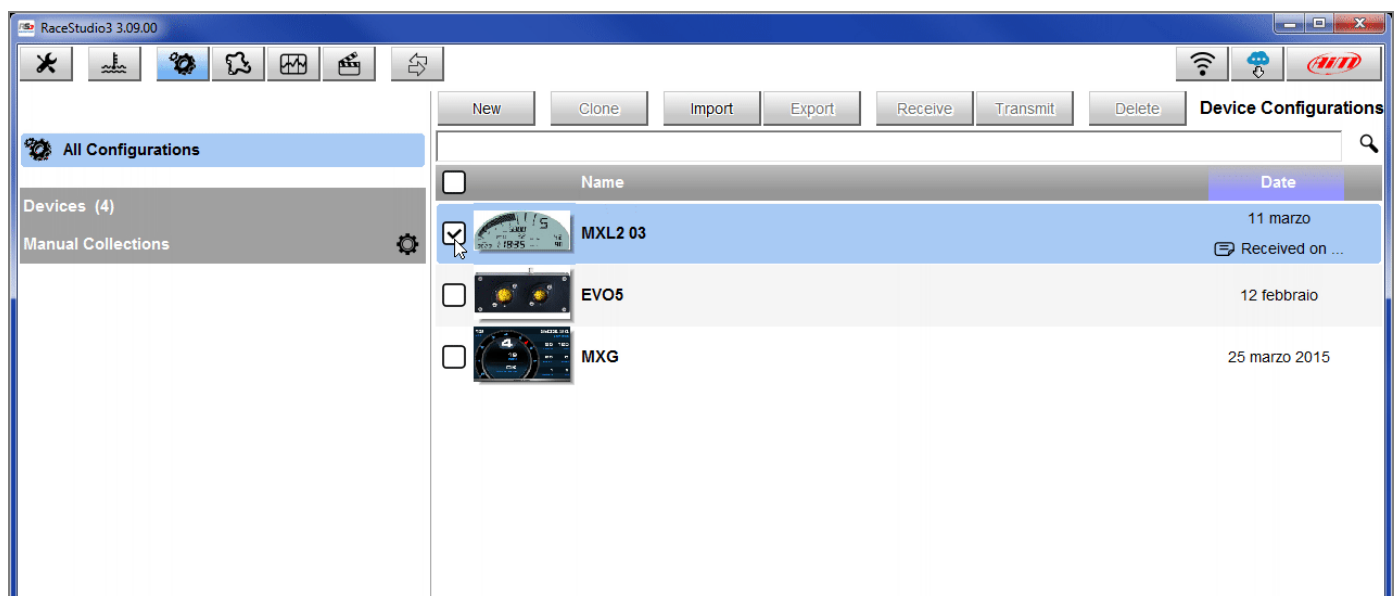
Once the sensor installed it is necessary to load it in the configuration of its logger.

## 3.1

# Setup with Race Studio 3

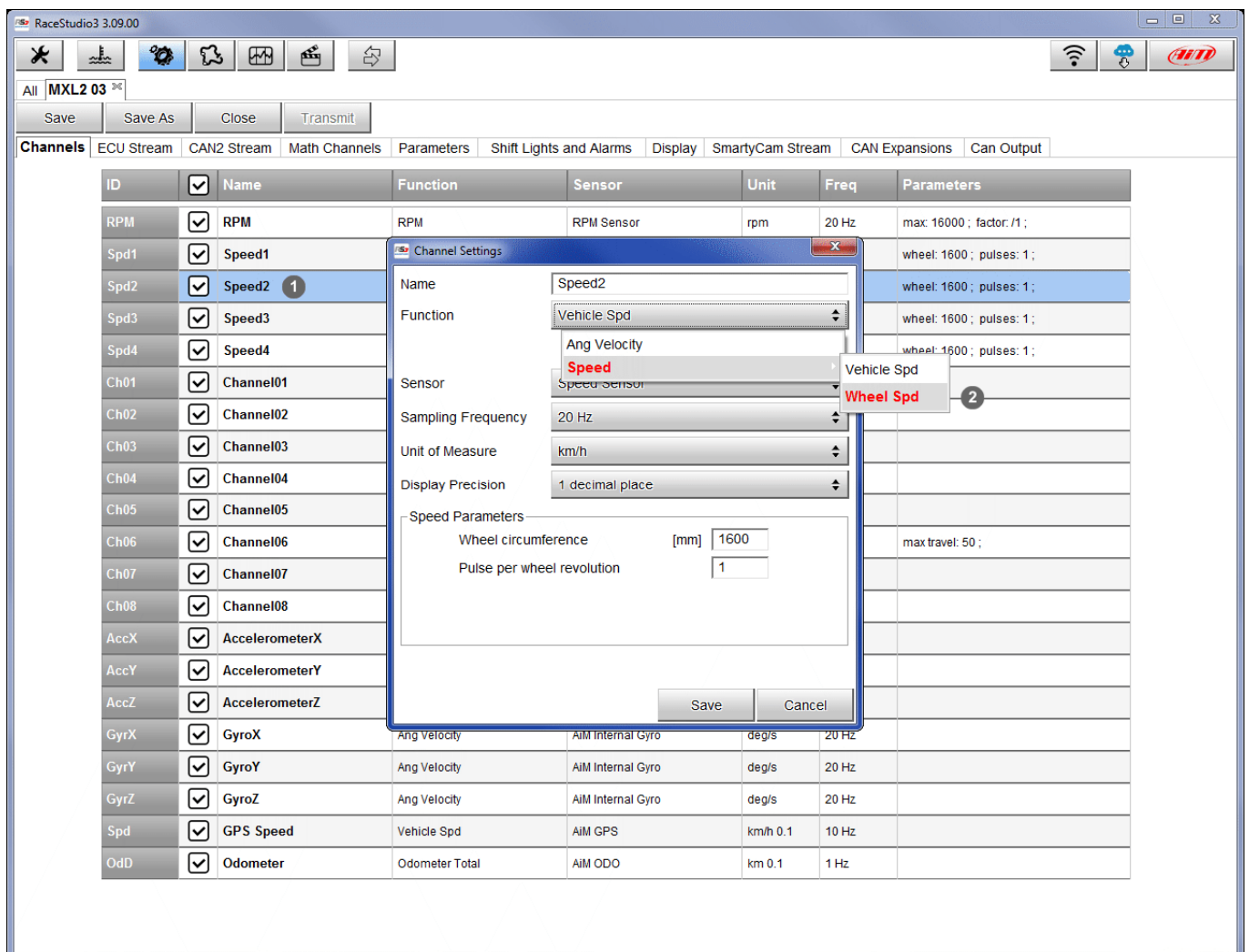
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To load the car speed sensor in AiM logger configuration run the software and select the configuration to load it on (in the example MXL2 03).



The software enters "Channels" layer.

- Select the speed channel where you want to set the sensor on – in the example Speed2 (1) and fill in the panel that shows up
- Select "Speed" function and choose:
  - Vehicle Speed, fill in other fields and press "Save" or
  - Wheel Speed(2)

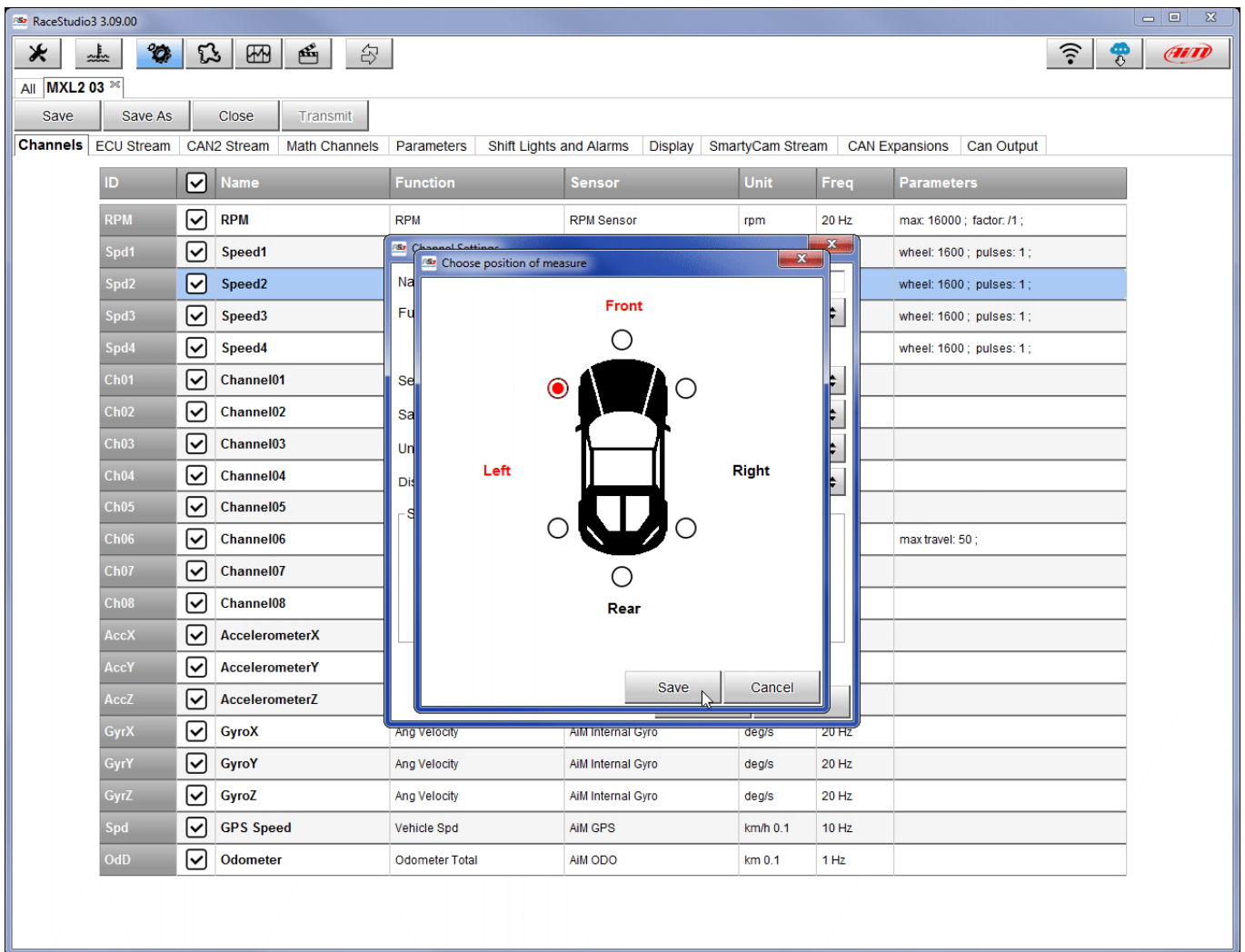


The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is selected, displaying a list of channels. The 'Speed2' channel is highlighted with a blue selection bar and a circled '1' next to it. A 'Channel Settings' dialog box is open, showing the configuration for 'Speed2'. The 'Function' dropdown is set to 'Vehicle Spd', and the 'Sensor' dropdown is set to 'Speed Sensor'. The 'Speed Parameters' section shows 'Wheel circumference' set to 1600 [mm] and 'Pulse per wheel revolution' set to 1. The 'Save' button is highlighted. A circled '2' is next to the 'Wheel Spd' option in the 'Sensor' dropdown menu.

ID	Name	Function	Sensor	Unit	Freq	Parameters
RPM	RPM	RPM	RPM Sensor	rpm	20 Hz	max: 16000 ; factor: /1 ;
Spd1	Speed1					wheel: 1600 ; pulses: 1 ;
Spd2	Speed2					wheel: 1600 ; pulses: 1 ;
Spd3	Speed3					wheel: 1600 ; pulses: 1 ;
Spd4	Speed4					wheel: 1600 ; pulses: 1 ;
Ch01	Channel01					
Ch02	Channel02					
Ch03	Channel03					
Ch04	Channel04					
Ch05	Channel05					
Ch06	Channel06					
Ch07	Channel07					
Ch08	Channel08					
AccX	AccelerometerX					
AccY	AccelerometerY					
AccZ	AccelerometerZ					
GyrX	GyroX	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
GyrY	GyroY	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
GyrZ	GyroZ	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
Spd	GPS Speed	Vehicle Spd	AIM GPS	km/h 0.1	10 Hz	
OdD	Odometer	Odometer Total	AIM ODO	km 0.1	1 Hz	

In this second case "Position" option appears in the panel:

- click and the panel below shows up:
  - choose the wheel the sensor is connected to
  - press "Save"
- press "Save" again





The software shows the sensor installed: in the example it is installed on the front left wheel.

The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is selected, displaying a list of channels. The 'Speed2' channel is highlighted with a red box, indicating it is installed on the front left wheel.

ID	✓	Name	Function	Sensor	Unit	Freq	Parameters
RPM	✓	RPM	RPM	RPM Sensor	rpm	20 Hz	max: 16000 ; factor: /1 ;
Spd1	✓	Speed1	Vehicle Spd	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Spd2	✓	Speed2	Vehicle Spd - Front Left	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Spd3	✓	Speed3	Vehicle Spd	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Spd4	✓	Speed4	Vehicle Spd	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Ch01	✓	Channel01	Voltage	Generic 0-5 V	mV	20 Hz	
Ch02	✓	Channel02	Voltage	Generic 0-5 V	mV	20 Hz	
Ch03	✓	Channel03	Voltage	Generic 0-5 V	mV	20 Hz	
Ch04	✓	Channel04	Voltage	Generic 0-5 V	mV	20 Hz	
Ch05	✓	Channel05	Percent	Percentage Pot. Calib	% 0.01	20 Hz	
Ch06	✓	Channel06	Position	Position Pot. AutoCal	mm	20 Hz	max travel: 50 ;
Ch07	✓	Channel07	Voltage	Generic 0-5 V	mV	20 Hz	
Ch08	✓	Channel08	Voltage	Generic 0-5 V	mV	20 Hz	
AccX	✓	AccelerometerX	Inline Accel	AIM Internal Accelerometer	g 0.01	20 Hz	
AccY	✓	AccelerometerY	Lateral Accel	AIM Internal Accelerometer	g 0.01	20 Hz	
AccZ	✓	AccelerometerZ	Vertical Accel	AIM Internal Accelerometer	g 0.01	20 Hz	
GyrX	✓	GyroX	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
GyrY	✓	GyroY	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
GyrZ	✓	GyroZ	Ang Velocity	AIM Internal Gyro	deg/s	20 Hz	
Spd	✓	GPS Speed	Vehicle Spd	AIM GPS	km/h 0.1	10 Hz	
OdD	✓	Odometer	Odometer Total	AIM ODO	km 0.1	1 Hz	

Transmit the configuration to the logger pressing "Transmit".

The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is selected, displaying a list of channels. The 'Transmit' button is highlighted with a red box, indicating it is the next step to transmit the configuration to the logger.

ID	✓	Name	Function	Sensor	Unit	Freq	Parameters
RPM	✓	RPM	RPM	RPM Sensor	rpm	20 Hz	max: 16000 ; factor: /1 ;
Spd1	✓	Speed1	Vehicle Spd	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Spd2	✓	Speed2	Vehicle Spd - Front Left	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;
Spd3	✓	Speed3	Vehicle Spd	Speed Sensor	km/h 0.1	20 Hz	wheel: 1600 ; pulses: 1 ;



## 3.2 Setup with Race Studio 2

To load the sensor in AiM logger configuration:

- run the software
- select the logger in use and the configuration where to load the sensor (in the example EVO4)
- enter "Channels" layer
- if speed channels are enabled you can fill in the related panels highlighted here below.

Speed1

Wheel circumference (mm) 1666

Pulses per wheel revolution 1

Speed2

Wheel circumference (mm) 1666

Pulses per wheel revolution 1

Channel identifier	Enabled/disabled	Channel name	Sampling frequency	Sensor type	Measure
RPM	<input type="checkbox"/> Disabled	Engine	10 Hz	Engine revolution speed	rpm
SPD_1	<input checked="" type="checkbox"/> Enabled	Speed1	10 Hz	Speed	km/h .1
SPD_2	<input checked="" type="checkbox"/> Enabled	Speed2	10 Hz	Speed	km/h .1
CH_1	<input checked="" type="checkbox"/> Enabled	Channel_1	10 Hz	Generic linear 0-5 V	V .1
CH_2	<input checked="" type="checkbox"/> Enabled	Channel_2	10 Hz	Zero based potentiometer	mm .1
CH_3	<input checked="" type="checkbox"/> Enabled	Channel_3	10 Hz	AiM 0-100 bar (X05SNP31100R)	bar
CH_4	<input checked="" type="checkbox"/> Enabled	Channel_4	10 Hz	AiM 0-10 bar (X05SNP31010R)	bar
CH_5	<input type="checkbox"/> Disabled	Channel_5	10 Hz	AiM 0-4 bar (X05SNP31004A)	bar
CALC_GEAR	<input type="checkbox"/> Disabled	Calculated_Gear	10 Hz	Calculated Gear	#
ACC_1	<input checked="" type="checkbox"/> Enabled	Lateral_acc	10 Hz	Lateral accelerometer	g .01
ACC_2	<input type="checkbox"/> Disabled	Longitudinal_acc	10 Hz	Longitudinal accelerometer	g .01
ACC_3	<input checked="" type="checkbox"/> Enabled	Vertical_acc	10 Hz	Vertical internal accelerometer	g .01
LOG_TMP	<input checked="" type="checkbox"/> Enabled	Datalogger_Temp	10 Hz	Cold joint	°C
BATT	<input checked="" type="checkbox"/> Enabled	Battery	1 Hz	Battery	V .1
ECU_1	<input checked="" type="checkbox"/> Enabled	RPM	10 Hz	Engine speed sensor	rpm
ECU_2	<input checked="" type="checkbox"/> Enabled	PEDAL_POSITION	10 Hz	Percentage sensor	% .1
ECU_3	<input checked="" type="checkbox"/> Enabled	SPEED_BMW	10 Hz	Speed sensor	km/h .1
ECU_4	<input checked="" type="checkbox"/> Enabled	SPEED2_BMW	10 Hz	Speed sensor	km/h .1
ECU_5	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_FR_LF	10 Hz	Speed sensor	km/h .1
ECU_6	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_FR_RH	10 Hz	Speed sensor	km/h .1
ECU_7	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_RR_LF	10 Hz	Speed sensor	km/h .1
ECU_8	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_RR_RH	10 Hz	Speed sensor	km/h .1
ECU_9	<input checked="" type="checkbox"/> Enabled	STEER_ANGLE	10 Hz	Angle sensor	deg
ECU_10	<input checked="" type="checkbox"/> Enabled	CLUTCH_SWITCH	10 Hz	Raw value	#
ECU_11	<input checked="" type="checkbox"/> Enabled	BRAKE_SWITCH	10 Hz	Raw value	#
ECU_12	<input checked="" type="checkbox"/> Enabled	BRAKE_PRESS	10 Hz	Pressure sensor	bar .1
ECU_13	<input checked="" type="checkbox"/> Enabled	BRAKE_PR_FR_LF	10 Hz	Pressure sensor	bar .1
ECU_14	<input checked="" type="checkbox"/> Enabled	BRAKE_PR_FR_RH	10 Hz	Pressure sensor	bar .1



- Select the speed channel where to set the sensor on and select "Speed" in "Sensor Type" column as shown here below. Fill in the related panel.

The screenshot shows the RaceStudio 2.55.56 System manager window. The left sidebar contains navigation buttons: Analysis, Download Data, Import SmartyCam microSD Data, Device Configuration, Device Info, Online, Device Calibration, Customize Sensor, and Language. The main window displays the 'System configuration' tab. At the top, there are buttons for Transmit, Receive, CAN-Net info, SmartyCam Functions setting, and Set acquisition system time. Below these, the 'Current configuration' table shows details for the installed system. The 'Channels' tab is selected, showing a list of channels with their status, names, sampling frequencies, sensor types, and measures. The 'Speed1' and 'Speed2' channels are highlighted in yellow. The 'Speed1' channel is configured with a wheel circumference of 1666 mm, 1 pulse per wheel revolution, and a sampling frequency of 10 Hz. The 'Sensor type' for 'Speed1' is set to 'Speed', and the 'Measure' is 'km/h .1'. The 'Speed2' channel is also configured with a wheel circumference of 1666 mm, 1 pulse per wheel revolution, and a sampling frequency of 10 Hz. The 'Sensor type' for 'Speed2' is set to 'Speed', and the 'Measure' is 'km/h .1'.

Channel identifier	Enabled/disabled	Channel name	Sampling frequency	Sensor type	Measure
RPM	<input type="checkbox"/> Disabled	Engine	10 Hz	Engine revolution speed	rpm
SPD_1	<input checked="" type="checkbox"/> Enabled	Speed1	10 Hz	Speed	km/h .1
SPD_2	<input checked="" type="checkbox"/> Enabled	Speed2	10 Hz	Speed	km/h .1
CH_1	<input checked="" type="checkbox"/> Enabled	Channel_1	10 Hz	Detonation	V .1
CH_2	<input checked="" type="checkbox"/> Enabled	Channel_2	10 Hz	Revolution speed	mm .1
CH_3	<input checked="" type="checkbox"/> Enabled	Channel_3	10 Hz	ABS speed sensor	bar
CH_4	<input checked="" type="checkbox"/> Enabled	Channel_4	10 Hz	AiM 0-100 bar (X05SNP31100R)	bar
CH_5	<input checked="" type="checkbox"/> Enabled	Channel_5	10 Hz	AiM 0-10 bar (X05SNP31010R)	bar
CALC_GEAR	<input type="checkbox"/> Disabled	Calculated_Gear	10 Hz	AiM 0-4 bar (X05SNP31004A)	bar
ACC_1	<input checked="" type="checkbox"/> Enabled	Lateral_acc	10 Hz	Calculated Gear	#
ACC_2	<input type="checkbox"/> Disabled	Longitudinal_acc	10 Hz	Lateral accelerometer	g .01
ACC_3	<input checked="" type="checkbox"/> Enabled	Vertical_acc	10 Hz	Longitudinal accelerometer	g .01
LOG_TMP	<input checked="" type="checkbox"/> Enabled	Datalogger_Temp	10 Hz	Vertical internal accelerometer	g .01
BATT	<input checked="" type="checkbox"/> Enabled	Battery	1 Hz	Cold joint	°C
ECU_1	<input checked="" type="checkbox"/> Enabled	RPM	10 Hz	Battery	V .1
ECU_2	<input checked="" type="checkbox"/> Enabled	PEDAL_POSITION	10 Hz	Engine speed sensor	rpm
ECU_3	<input checked="" type="checkbox"/> Enabled	SPEED_BMW	10 Hz	Percentage sensor	% .1
ECU_4	<input checked="" type="checkbox"/> Enabled	SPEED2_BMW	10 Hz	Speed sensor	km/h .1
ECU_5	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_FR_LF	10 Hz	Speed sensor	km/h .1
ECU_6	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_FR_RH	10 Hz	Speed sensor	km/h .1
ECU_7	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_RR_LF	10 Hz	Speed sensor	km/h .1
ECU_8	<input checked="" type="checkbox"/> Enabled	WHEEL_SPD_RR_RH	10 Hz	Speed sensor	km/h .1
ECU_9	<input checked="" type="checkbox"/> Enabled	STEER_ANGLE	10 Hz	Angle sensor	deg
ECU_10	<input checked="" type="checkbox"/> Enabled	CLUTCH_SWITCH	10 Hz	Raw value	#
ECU_11	<input checked="" type="checkbox"/> Enabled	BRAKE_SWITCH	10 Hz	Raw value	#
ECU_12	<input checked="" type="checkbox"/> Enabled	BRAKE_PRESS	10 Hz	Pressure sensor	bar .1
ECU_13	<input checked="" type="checkbox"/> Enabled	BRAKE_PR_FR_LF	10 Hz	Pressure sensor	bar .1
ECU_14	<input checked="" type="checkbox"/> Enabled	BRAKE_PR_FR_RH	10 Hz	Pressure sensor	bar .1

Transmit the configuration to the logger pressing "Transmit".

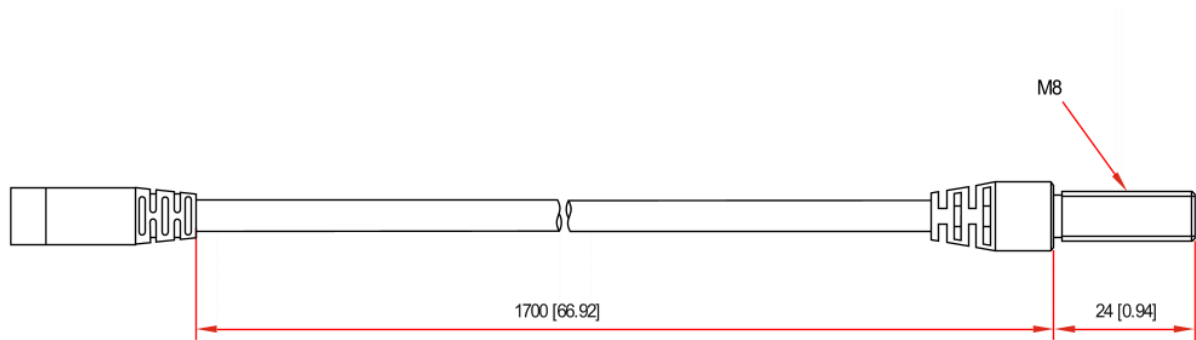
The screenshot shows the RaceStudio 2.55.56 System manager window. The 'Transmit' button is highlighted with a mouse cursor. The 'Current configuration' table and the 'Channels' tab are visible, showing the same configuration as the previous screenshot.

## 4

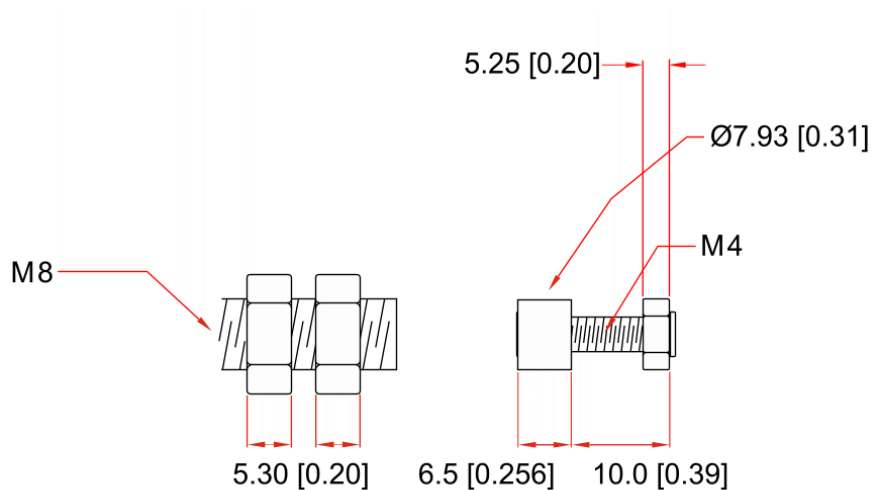
# Dimensions, pinout and technical characteristics

The drawings shows:

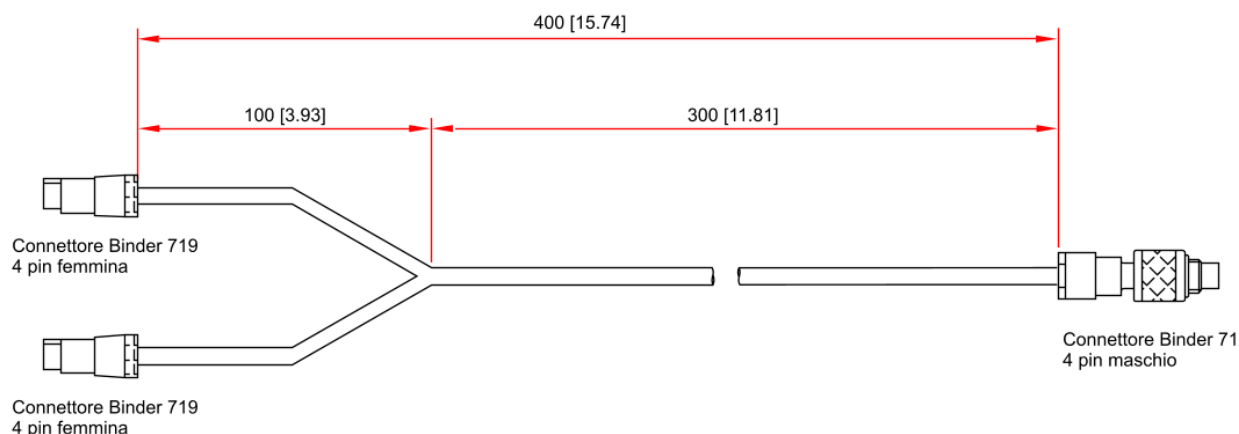
- sensor dimensions in millimeters [inches].



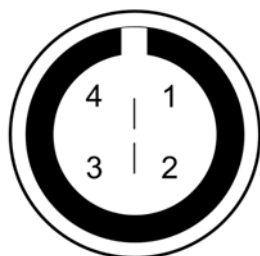
- magnet and locknuts dimensions in mm [inches].



- dimensions of the speed split cable needed to connect two speed sensors to the same speed connector of **EVO4** and **EVO4S** in mm [inches].



The sensor has a cable ending with a 4 pins Binder (719 or 712) male connector. The table below shows the connector – solder termination view – on the left and its pinout on the right.



#### Binder 719 connector pin

1  
2  
3  
4

#### Function

Speed  
GND  
V battery  
Not connected

#### Sensor electrical characteristics:

- power tension: 6-24 VDC
- power supply: 13.5 mA
- output signal type: pulse 0-5 volt
- max current output: 20 mA
- max operating frequency: 100 kHz
- max sensibility distance: 20 mm
- recommended distance: 10 mm
- Number of pulses for wheel revolution: 1

#### Sensor mechanical characteristics:

- operating temperature range: from – 20 to +85 °C
- cable length: 1700 mm

## 5

# Extension cables

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The sensor is sold with an 1700 mm cable and optional extension cables are available with standard length: from 0,5m to 3m; specific length extension cables are also available.

Extension cable part numbers changes according to their length and to the device the sensor is to be connected.

Extension cable for connection with **X02SNVM00** sensor (plastic Binder):

- Channel Expansion
- MyChron Expansion
- EVO4
- EVO4S.

Part numbers:

**V02PCB05BTXG** – cable length: 500mm

**V02PCB10BTXG** – cable length: 1000mm

**V02PCB15BTXG** – cable length: 1500mm

**V02PCB20BTXG** – cable length: 2000mm

**V02PCB25BTXG** – cable length: 2500mm

**V02PCB30BTXG** – cable length: 3000mm

Extension cable for connection with **X02SNVM00** sensor (plastic Binder):

- EVO5EVO4S and EVO4 speed split cable  
**V02549030** (plastic Binder)
- MXL2
- MXG
- MXS
- MXL all versions

Part number:

**V02PCB05B** – cable length: 500mm

**V02PCB10B** – cable length: 1000mm

**V02PCB15B** – cable length: 1500mm

**V02PCB20B** – cable length: 2000mm

**V02PCB25B** – cable length: 2500mm

**V02PCB30B** – cable length: 3000mm



Extension cable for connection with **X02SNVB301** sensor (metallic Binder):

- EVO4S and EVO4 speed split cable **V02549030** (metallic Binder)
- Channel Expansion
- MyChron Expansion
- EVO4
- EVO4S.

Part number:

**V02552620** – cable length: 500mm

**V02552630** – cable length: 1000mm

**V02552640** – cable length: 1500mm

**V02552650** – cable length: 2000mm

**V02552660** – cable length: 3000mm

