

AiM Infotech

Car speed sensor

Release 1.03



1

Introduction

This datasheet explains how to use AiM car speed sensor, a non contact device that needs a metallic trigger to pass in front of it.

This sensor **part number** is: **X05SNVS00**.

It fits the wheel speed measurement and needs an accurate installation. This is why we suggest you to address to a specialized workshop. Once the sensor installed it needs to be configured using AiM Race Studio software freely downloadable from download area -> software of www.aim-sportline.com.

2

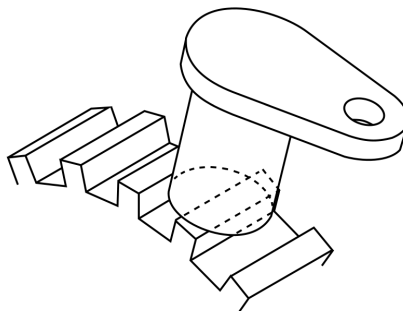
Installation

Install the sensor using a bracket and:

- ensure that distance between sensor and gear tooth is in a 0.5 – 2.0 mm (0.007-0.07 inches) range
- fix the sensor to the bracket
- connect the sensor to AiM device

The sensor measure range is 0.5–2 mm (0.1-0.07 inches). Optimum sensor performance depends on the following variables to be considered in combination: trigger building material, geometry, speed, metallic trigger /sensor distance and magnetic material in close proximity.

The image here below shows the sensor correctly installed.

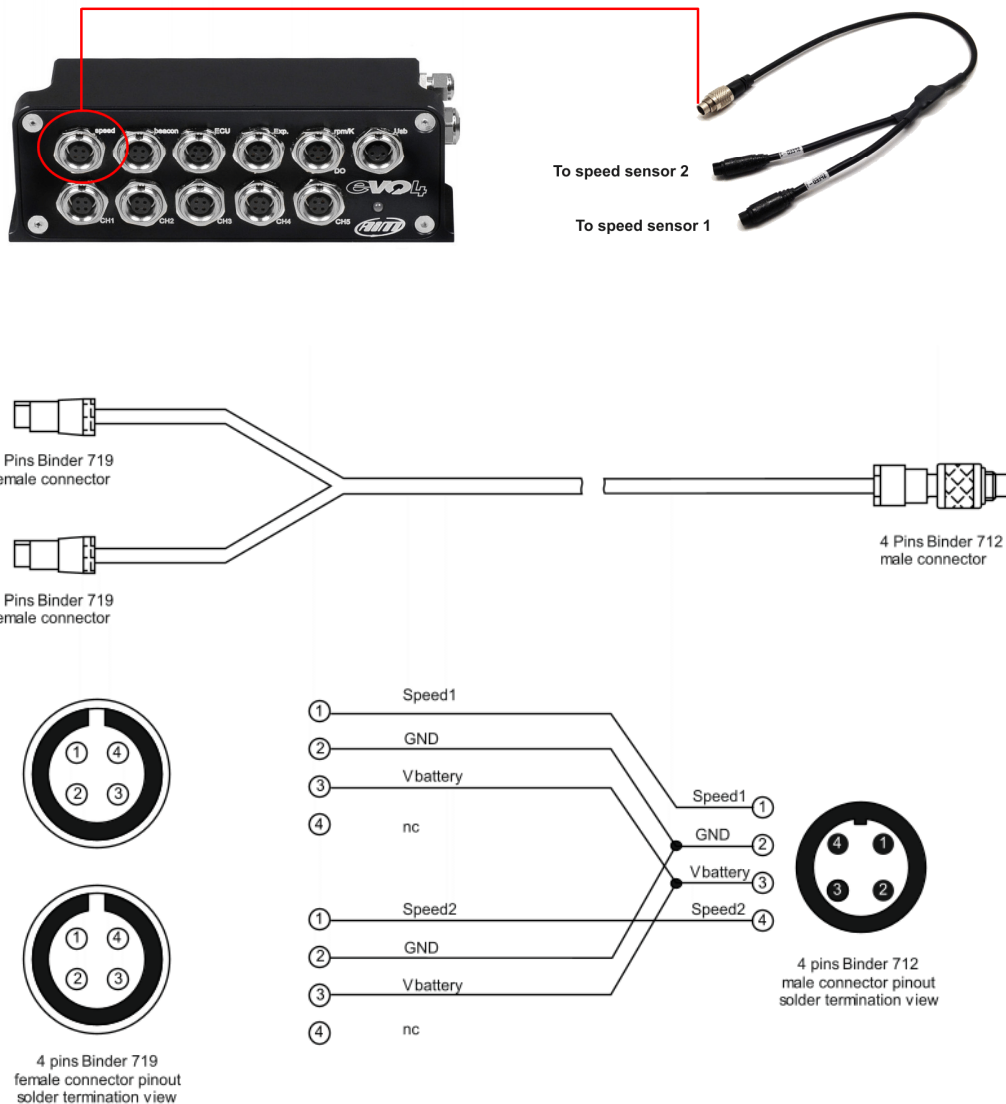


2.1

Specificity of AiM loggers

AiM loggers can support one or more speed sensors.

- **MXL2, MXG** and **MXS** can support up to four speed sensors one of which can be connected to the standard harness (**V02573010**) while the other three needs the optional harness (**V02573020**).
- **EVO4** and **EVO4S** can support up to two speed sensors that needs to be connected to a dedicated connector, labelled Speed. To connect both speed channels you need an optional split cable as the one shown here below on the right ;its part number is: **V02549030**. Below is construction scheme.



MXL Strada/Pista have one speed channel only. The seed sensor is included in the optional basic sensors kit – part number **X10MXLS00000** – that includes RPM, water temperature sensors and their harness. Part number of the harness only is: **V02554020**.

MXL Pro05 has four speed channels that needs to be connected to the following optional cables:

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

All harness are labelled and the sensor is to be connected to the cable labelled "Speed".

3

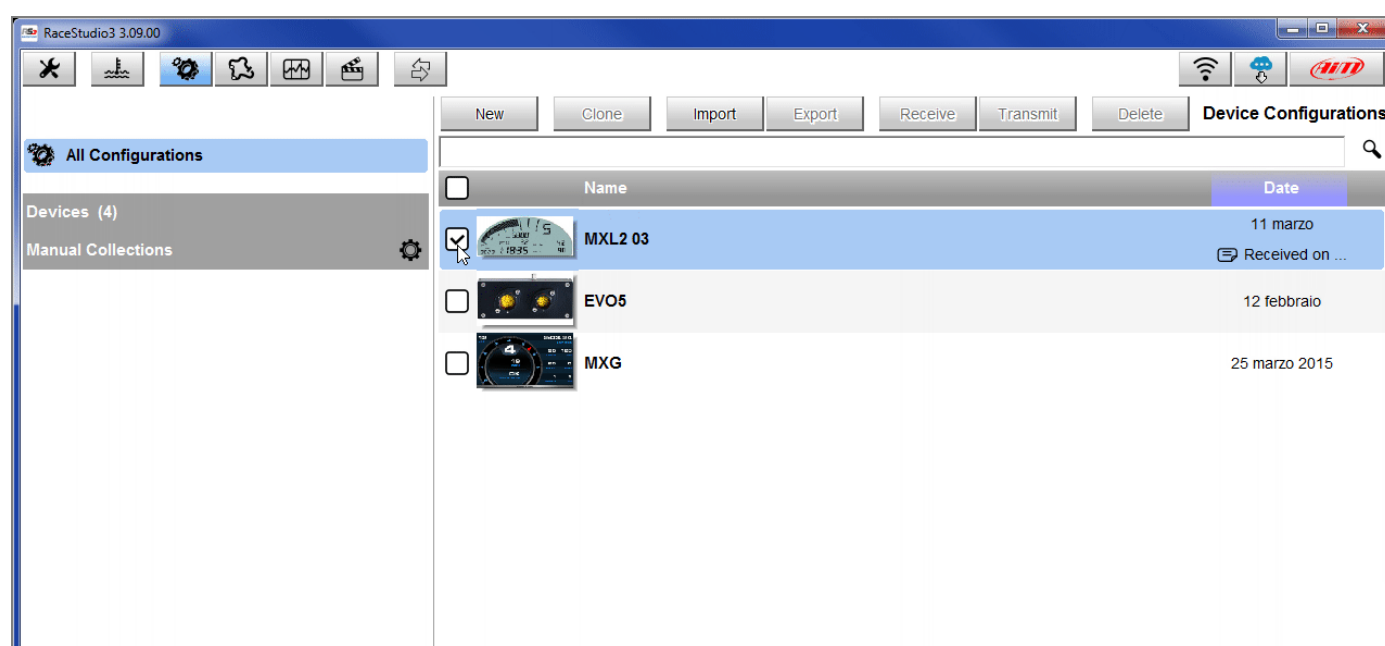
Software setup

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

3.1

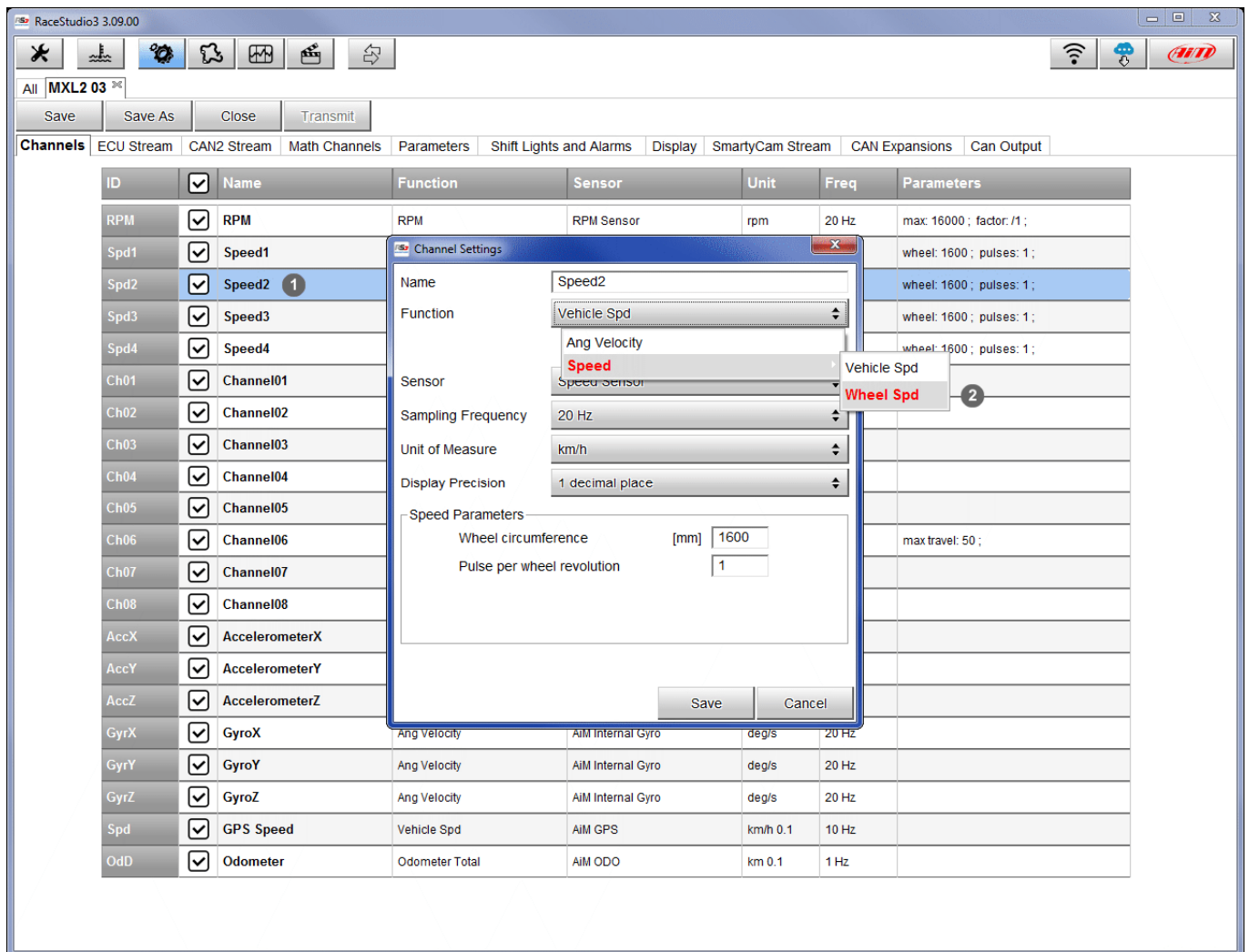
Setup with Race Studio 3

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



The software enters "Channels" layer.

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

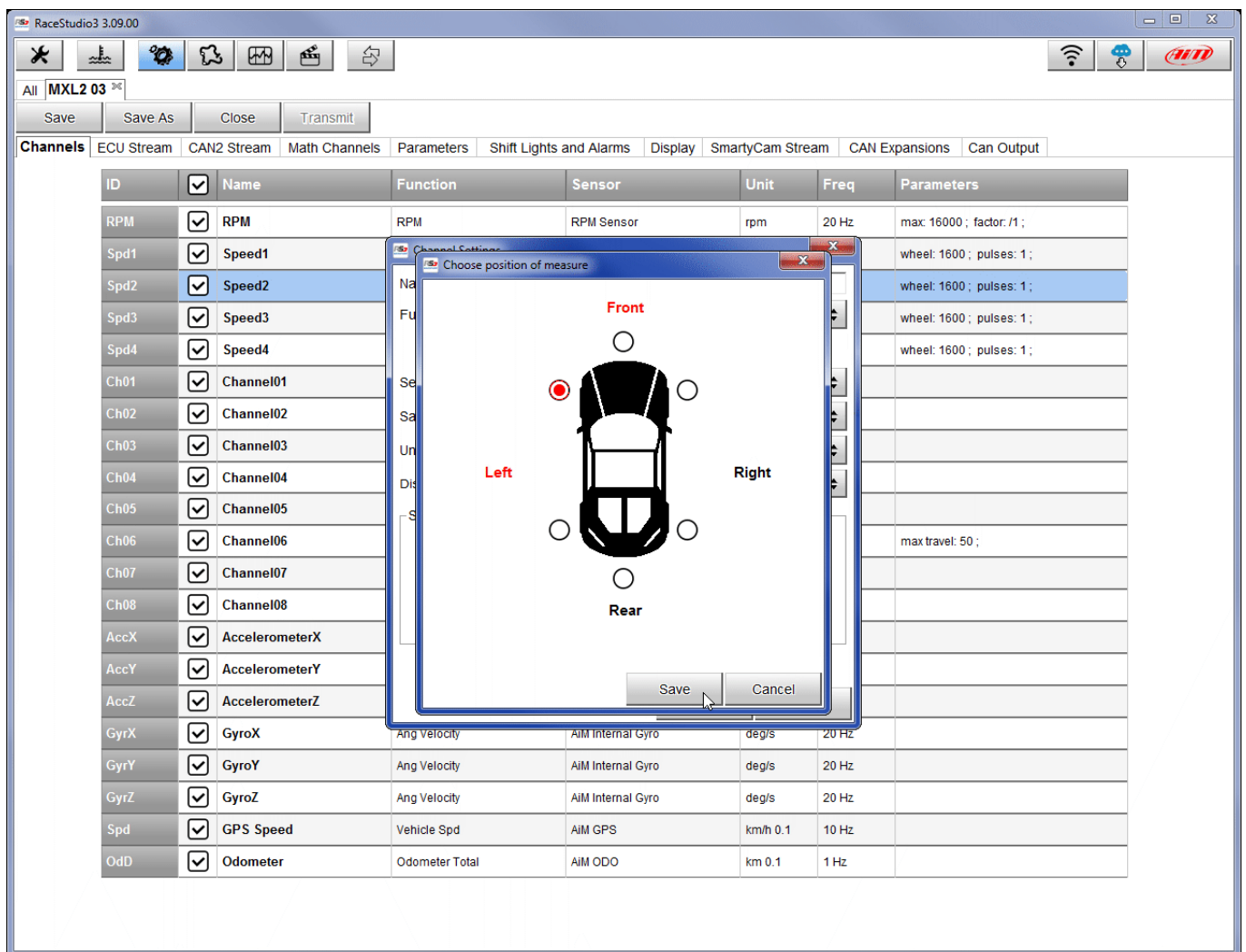


The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is selected, displaying a list of channels. The 'Speed2' channel is highlighted with a blue background and a circled '1' next to its name. A 'Channel Settings' dialog box is open, showing the configuration for 'Speed2'. 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 a "position" option appears:

- click it and choose the panel below shows up:
- select the wheel
- press "Save"
- press "Save" again





The software shows the sensor properly set. In the example the sensor is set on "Speed2" channel and connected to the front left wheel.

The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is active, displaying a list of channels. The 'Speed2' channel is highlighted with a red box, indicating it is set to 'Vehicle Spd - Front Left' with a 'Speed Sensor'.

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".

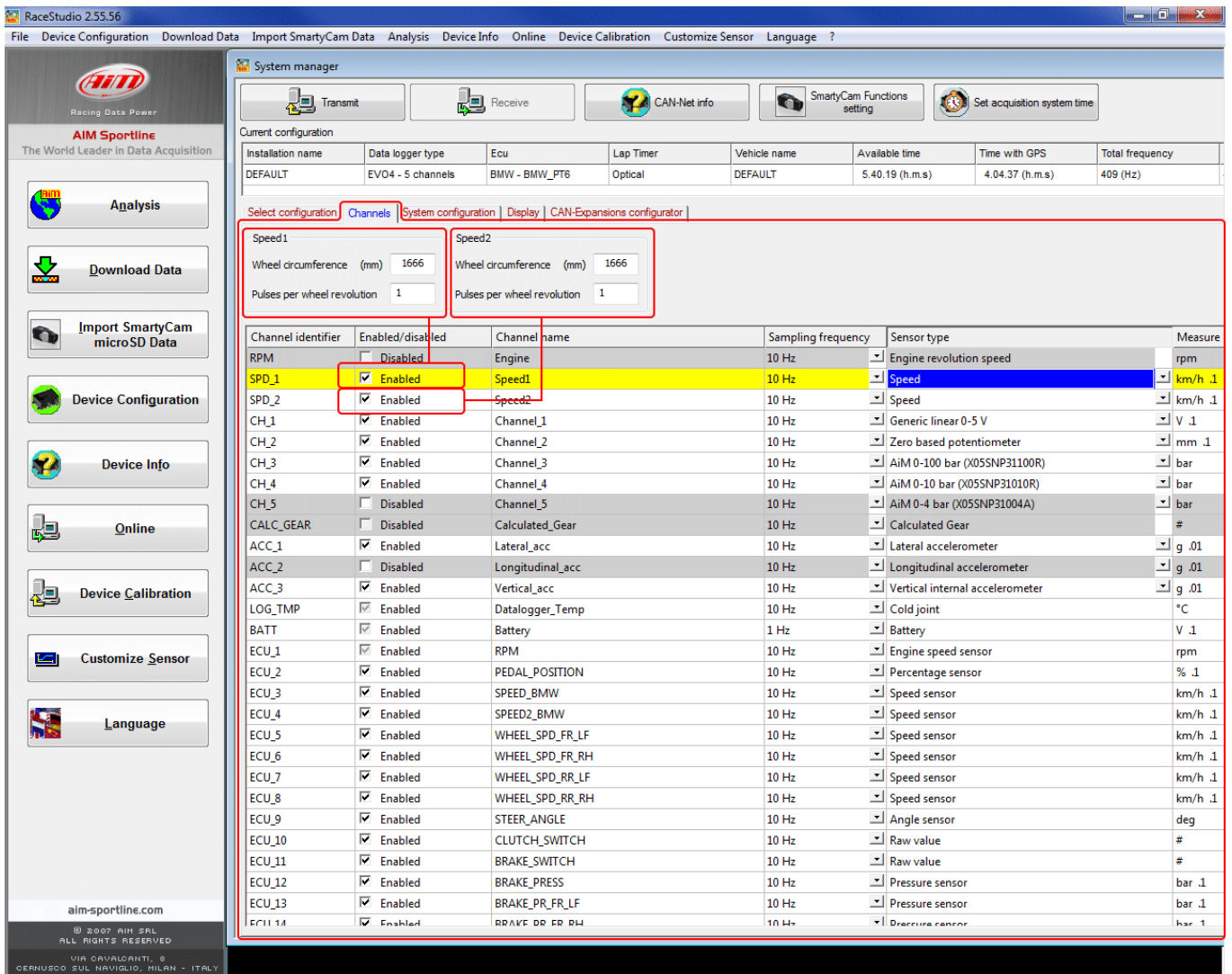
The screenshot shows the RaceStudio3 3.09.00 software interface. The 'Channels' tab is active, displaying a list of channels. The 'Transmit' button is highlighted with a red box, indicating the configuration is being sent to the logger.

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 con Race Studio 2

To load the sensor in the logger configuration:

- run the software
- select the logger in use and the configuration to set the sensor on (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.

Current configuration

Installation name	Data logger type	Ecu	Lap Timer	Vehicle name	Available time	Time with GPS	Total frequency
DEFAULT	EVO4 - 5 channels	BMW - BMW_PT6	Optical	DEFAULT	5.40.19 (h.m.s)	4.04.37 (h.m.s)	409 (Hz)

Select configuration Channels System configuration Display CAN-Expansions configurator

Speed1 Speed2

Wheel circumference (mm) 1666 Wheel circumference (mm) 1666

Pulses per wheel revolution 1 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	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	
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	Speed sensor	km/h .1
ECU_10	<input checked="" type="checkbox"/> Enabled	CLUTCH_SWITCH	10 Hz	Angle sensor	deg
ECU_11	<input checked="" type="checkbox"/> Enabled	BRAKE_SWITCH	10 Hz	Raw value	#
ECU_12	<input checked="" type="checkbox"/> Enabled	BRAKE_PRESS	10 Hz	Raw value	#
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".

Current configuration

Installation name	Data logger type	Ecu	Lap Timer	Vehicle name	Available time	Time with GPS	Total frequency
DEFAULT	EVO4 - 5 channels	BMW - BMW_PT6	Optical	DEFAULT	5.40.19 (h.m.s)	4.04.37 (h.m.s)	409 (Hz)

Select configuration Channels System configuration Display CAN-Expansions configurator

Speed1 Speed2

Wheel circumference (mm) 1666 Wheel circumference (mm) 1666

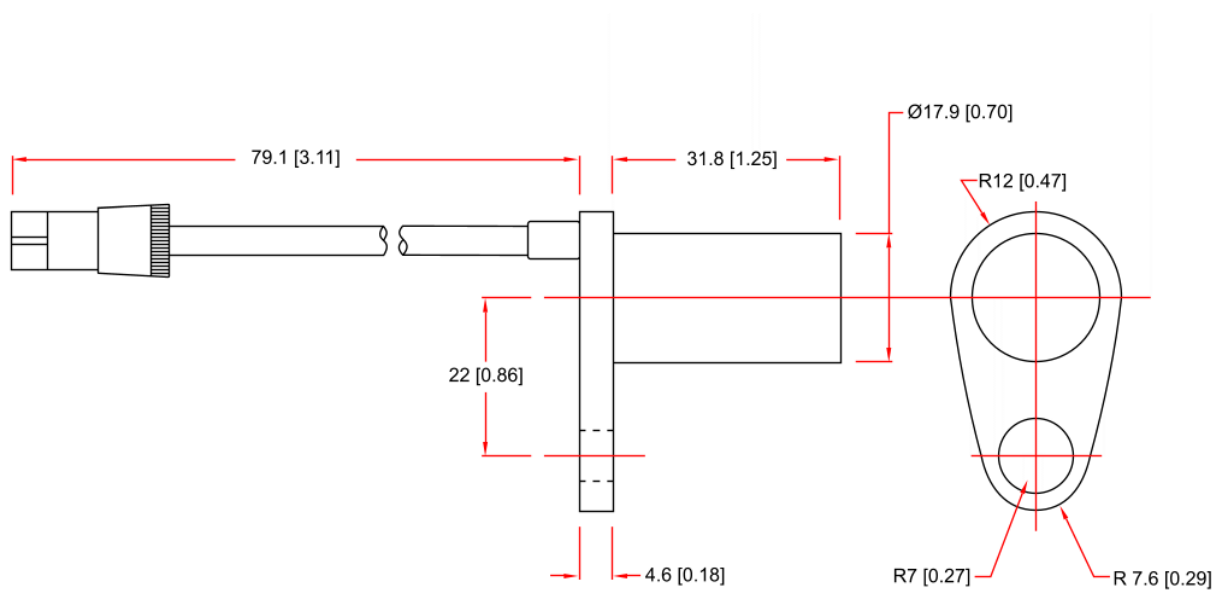
Pulses per wheel revolution 1 Pulses per wheel revolution 1

4

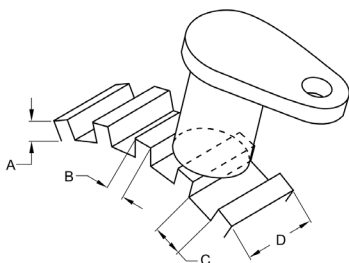
Dimensions, pinout and technical characteristics

The drawings here below shows:

- sensors dimensions in mm [inches].



- dimensions required for a correct sensor installation in mm [inches].



Point description

A = tooth highness

B = tooth wideness

C = space between the teeth

D = Tooth thickness

Value (minimum)

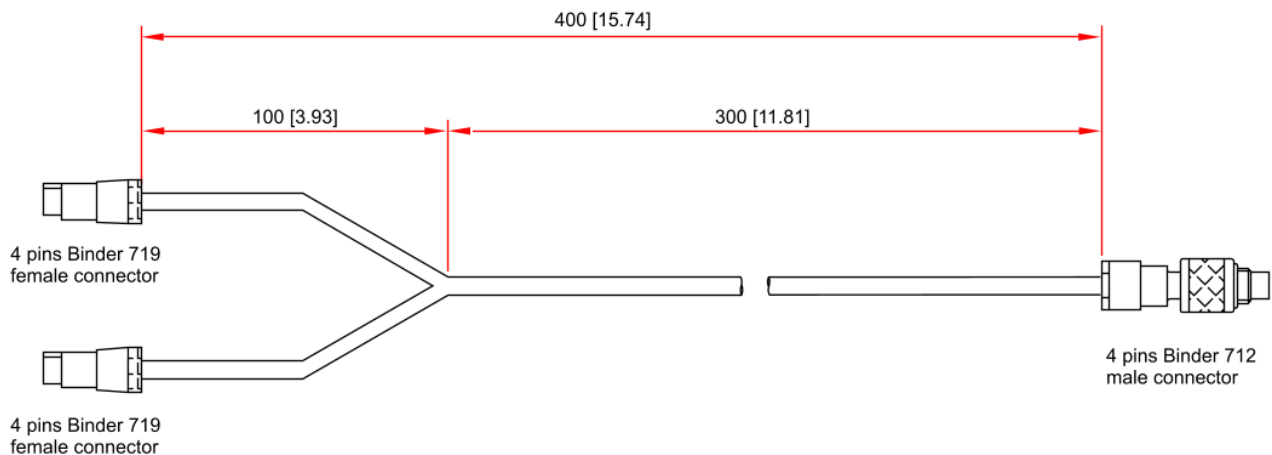
5,06 [0.19]

2,54 [0.09]

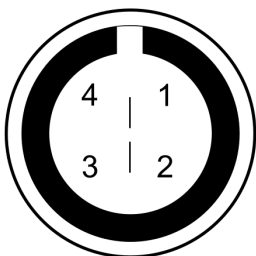
10,16 [0.39]

6,35 [0.24]

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



The speed sensor comes with a cable ending with a 4 pins Binder 719 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

Car speed sensor electrical characteristics are:

- power supply voltage: 4.5-24 VDC
- current consumption: 10 mA (typical) 20 mA (max)
- output signal type: pulse 0-5 volt
- max current output: 20 mA
- max operating frequency: 100 kHz
- sensibility distance: from 0.5 to 2 mm (from 0.007 to 0.07 inches)
- recommended distance: 1mm

Car speed sensor mechanical characteristics are:

- operating temperature range: from – 40 to +150 °C (from 104 to 302 °F)
- Cable length: 80 mm (3.14 inches)

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Extension cables

The sensor comes with an 80 mm cable and optional extension cables are available with standard length from 0,5 to 3m; specific length extension cables are also available.

Extension cable part number changes according to their length and to the device the sensor has to be connected to.

Extension cables for connection with:

- Channel Expansion
- MyChron Expansion
- EVO4.

Part number:

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 cables for connection with:

- EVO4/split cable
- 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

