

## INTRODUCTION

Every speedometer has tolerances. Moreover, after a gear ratio change (after crown wheel or pinion replacements) the speed displayed on the stock speedometer may be very inaccurate if the speed is read from internal gears instead of directly from the wheel. How to obtain accurate readings, then? It is not necessary to use a precision instrument, a speed calibrator is sufficient. The speed calibrator correctly adjusts the signal coming from the sensor.

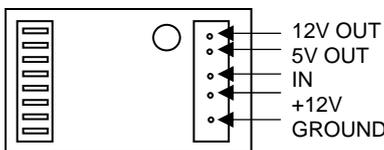
## I2M SPEED CALIBRATOR

“Speed calibrator” is a very compact instrument; it allows corrections up to  $\pm 31,75\%$ , with steps as small as  $0,25\%$ . Its tolerances are those typical of quartz based systems. Thanks to its small size and weight, it can be mounted in very confined spaces. Internal resin coating renders the system rugged and vibration proof. Installation and set up are fast and easy. Operation can be checked thanks to LED indicator.

## TECHNICAL SPECIFICATION

- size: 58mm x 35mm x 20mm
- weight: 40g
- correction range:  $-32\%$ ,  $+32\%$
- precision:  $0,25\%$
- power supply: 12V
- double exit available, for use with 5V e 12V systems
- polarity inversion protection
- real time correction (no delays)
- operation LED indicator
- antishock internal resin coating
- internally equipped for open-drain systems

## STRUCTURE



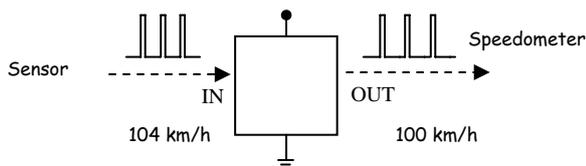
This is a schematic representation of speed calibrator. Looking to the resin-coated side, on the left are visible the configuration switches, at the top the LED indicator, and on the right the power and signal connector.

The **LED indicator** signals the correct operation. After the initial internal test, a single flash signals the successful powering on. After that, the indicator lights up every time the system receives a positive input pulse.

The **connector** is used to supply power (ground and +12V) and to read the exit signal, both for 5V and 12V systems.

The **switches** set the operation details, the kind of input (more details later), and the correction amount.

## OPERATION



Speed calibrator contains a fast microprocessor which reads the speed input pulses, applies the correction and gives out the adjusted pulses. The correction is applied to every pulse, thus ensuring an instantaneous response and a very high accuracy for every speed change. The system must be connected between the speed sensor and the speedometer.

## INSTALLATION

We advise to mount the speed calibrator away from the engine and protected from atmospheric agents. The system is not guaranteed against atmospheric agents; the switches contacts may be tarnished, thus preventing correct operation. The calibrator must be connected between the sensor and the speedometer. It is therefore necessary to identify the speed cable, cut it, and connect the calibrator. The part of cable coming from the sensor will be connected to the IN signal of the calibrator, while the OUT signal will be connected to the dashboard. See attached tables to help identify the correct cable.

The first step is to find out if the signal is 5V or 12V (the vast majority of bikes uses 5V). The simplest procedure is the following:

- 1) put the bike on stand
- 2) keep the engine off, but turn on the dashboard
- 3) spin the rear wheel, slowly
- 4) using a voltmeter, measure the voltage between signal and ground BEFORE cutting the cable; verify the total excursion of the signal (5V or 12 V)

Now that the signal voltage is known, use the corresponding output from speed calibrator.

Connect the speed calibrator power supply to a “key activated” voltage: if the power supply is drawn continuously, even when the bike is turned off, the battery will discharge faster.

Make sure the voltage to speed calibrator is fuse protected.

## ATTENTION:

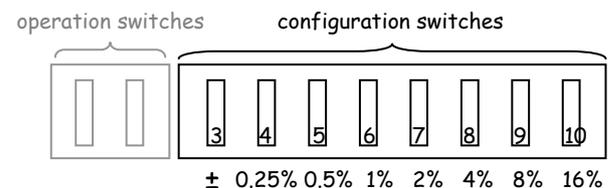
Some sensors do not provide an “active” signal, capable of reaching the whole span  $0V - 5V$  (or  $0V - 12V$ ), but they simply “pull” the signal to ground or to the supply voltage, leaving to the dashboard the duty to provide the other level. These sensors are called “pull-down” and “pull-up”, respectively. If your bike has such a sensor, after the cable is cut the dashboard will not be able to perform this function, being no longer connected to the sensor. The signal will therefore remain fixed at ground or at the supply voltage, even when the wheel is spun. Speed calibrator can manage this. To find out if the adjustment is necessary, repeat the previous measure AFTER cutting the cable:

- 1) If you measure the same signal as before, the signal is already “rail to rail”, the sensor is “active”, and the adjustment is not necessary.
- 2) If the signal remains at ground “pull-up” is needed.
- 3) If the signal remains at the supply voltage, you need to activate the “pull-down”.

To configure this option, use the first two switches on the left (switches 1 and 2):

- The first switch indicates the kind of pull:  
ON = pull-up, OFF = pull-down
- The second switch indicates if the pull is needed at all: ON = passive sensor=pull needed, OFF = active sensor=pull not needed

## CALIBRATION



To adjust the correction it is sufficient to activate 8 calibration switches (switches from 3 to 10). Switch 3 discriminates between positive adjustments (ON position, needed for speedometers that signal lower speeds) or negative (OFF position, for higher signaled speeds).

The other switches are used to specify the correction amount. For example, if switch 4 is active the correction is increased by  $0,25\%$ , switch 5 increases correction by  $0,5\%$ , and so on. Each successive switch increases the correction by an ever greater

amount; the last switch adds 16%. The correction can thus be varied in steps of 0,25%. Go to [www.i2m.it](http://www.i2m.it) to download a table with all possible correction and the corresponding switches configurations.

We advise to start by activating the switch giving the largest possible correction.

For example, if the needed correction is 21,5%, start from switch 10, giving a 16% correction. There is still a 5,5% correction to go. Now the largest possible correction is 4%, so switch 8 will be activated. The remaining 1,5% correction can be obtained activating switches 6 and 5. The final configuration (apart from the sign) is: switches 10, 8, 6 and 5 active.

## CORRECTION DETERMINATION

If the gear ratio has been changed, the necessary correction can be calculated as following:

Correction=1-(new pinion teeth/old pinion teeth)

Or, equivalently:

Correction=1-(old crown teeth/new crown teeth)

For example, exchanging a 16-teeth pinion for a 15-teeth one, the correction will be  $1-15/16 = 0,0625 = +6,25\%$ .

| Speed           |  |                                   |   |                              |
|-----------------|--|-----------------------------------|---|------------------------------|
| <b>APRILIA</b>  |  |                                   |   |                              |
|                 | RSV 100<br>Factory<br>2004 >                           | RSV 1000<br>2002                  | MILLE<br>2001   |                              |
|                 | Grey-White   | Blue-Orange                       | Grey-White  |                              |
|                 | Management system                                      | Dashboard rear                    | Dashboard rear  |                              |
| <b>HONDA</b>    |  |                                   |   |                              |
|                 | Pink-Green   | Dashboard rear                    |   |                              |
| Except:         | CBR 900 RRV<br>1996                                    | CBR 600 RR<br>2003-2004           | CBR 1000R<br>2004><br>VFR800 VTEC<br>2003<br>VFR 800 2001 | CBF<br>600<br>2004           |
|                 | Black-Red  | Pink-Blue                         | Pink  | Pink-Green                   |
|                 | Dashboard rear   | Blue connector under air manifold | Dashboard rear  | Main wiring                  |
| <b>KAWASAKI</b> |  |                                   |   |                              |
|                 | Yellow   | Dashboard rear                    |   |                              |
| Except:         | ZX10R<br>2004>   | ER6N<br>2006                      | Z1000<br>2003>  | Z750<br>2003>                |
|                 | Blue-Yellow  | Pink                              | Pink  | Pink                         |
|                 | Dashboard rear   | Dashboard rear                    | Dashboard rear  |                              |
| <b>SUZUKI</b>   |  |                                   |   |                              |
|                 | Pink   | Dashboard rear                    |   |                              |
| Except:         | SV 1000<br>2003  |                                   |   |                              |
|                 | Pink-White   |                                   |   |                              |
|                 | Dashboard rear   |                                   |   |                              |
| <b>YAMAHA</b>   |  |                                   |   |                              |
|                 | White  | Dashboard rear                    |   |                              |
| Except:         | FZ 6 2004><br>FZ 1 2006<br>YZF-R1 2002><br>YZF-R6 2003 | YZF-R6<br>2006                    | FZS 600 Fazer<br>2000>                                    | FZS<br>1000<br>Fazer<br>2001 |
|                 | White-Yellow   | Pink                              | White   | White                        |
|                 | Management system                                      | 3-pole speed sensor connector     | Dashboard rear  | Main wiring                  |
| Except:         | YZF-R1 2004<br>YZF-R6 2006                             |                                   |   |                              |
|                 | White-Yellow   |                                   |   |                              |
|                 | 3-pole speed sensor connector                          |                                   |   |                              |

speed calibrator is compatible with all bikes with digital speedometer. The tables list wire colors for all bikes listed underneath, valid till 2006. For other connections, see repair manuals.

**Aprilia:** RSV 1000, MILLE.

**Honda:** VTR 1000 SP1/SP2, CBR 600F, CBR900, CBR1100, Hornet600, CBR 600 RR, CBR 900 RR, CBR 954, CBR 1000 R, CBF 600, VFR 800 VTEC

**Kawasaki:** ZX6RR, ZX636, ZX6R, ZX6R, ZX12R, Z1000, Z750, ZX10R, ER6N

**Suzuki:** Hayabusa, GSXR600, GSX600, GSX750-GSXR750, GSXR1000, SV 1000

**Yamaha:** FZ 6, FZ 1, YZF-R6, YZF-R1, fazer 600, fazer 1000

**N.B.:** always verify listed connection; constructor will not assume any responsibilities due to errors in the wire colors listed.

The correction can be estimated with more precision, and also if no gear change has been done, by driving for a known distance, the longer the distance the more precise the estimation. Read the distance indicated by the odometer, and calculate the correction:

Correction=1-(odometer distance/covered distance)

## NOTES:

- speed calibrator is intended for track use only and is not sanctioned for road use
- constructor will not assume any responsibilities due to improper use or mounting of the product
- in case of switch malfunctions, spray with an electrical components totally evaporating solvent, and operate the switches at least 20 times (if the switches are sealed with silicone or other sealants after the calibration, this will not be necessary)
- speedometers have a minimum threshold speed below which the speedometer itself is deactivated. It is therefore normal not to see very low speeds, below a few km/h.

| +12V            |  |  |                                     |                     |
|-----------------|--|--|-------------------------------------|---------------------|
| <b>APRILIA</b>  |  |  |                                     |                     |
|                 | RSV 100<br>Factory<br>2004 >                   | RSV 1000<br>2002                                   | MILLE<br>2001                       |                     |
|                 | Green-Red                                      | Green  | Green                               |                     |
|                 | Dashboard rear                                 | Dashboard rear                                     | Dashboard rear                      |                     |
| <b>HONDA</b>    |  |  |                                     |                     |
|                 | Black-Brown                                    | Dashboard rear                                     |                                     |                     |
| Except:         | CBR 900 RRV<br>1996<br>CBR 600 RR<br>2003-2004 | CBR 600<br>HORNET<br>2002                          | VFR800<br>VTEC 2003                 | CBR 1000 R<br>2004> |
|                 | White-Green                                    | Bright Red-Black                                   | Brown-Blue                          | Brown-White         |
|                 | Dashboard rear                                 | Dashboard rear                                     | Dashboard rear                      | Dashboard rear      |
| <b>KAWASAKI</b> |  |  |                                     |                     |
|                 | Brown-White                                    | Dashboard rear                                     |                                     |                     |
| <b>SUZUKI</b>   |  |  |                                     |                     |
|                 | Orange-Green                                   | Dashboard rear                                     |                                     |                     |
| Except:         | GSXR600 / 750<br>1999                          |  |                                     |                     |
|                 | Orange-Red                                     |  |                                     |                     |
|                 | Dashboard rear                                 |  |                                     |                     |
| <b>YAMAHA</b>   |  |  |                                     |                     |
|                 | Light Brown                                    | Dashboard rear                                     |                                     |                     |
| Except:         | FZ 6<br>2004>                                  | FZ 1<br>2006                                       | FZS 1000<br>Fazer<br>2001           |                     |
|                 | Red-White                                      | Red-White  | Red-Yellow                          |                     |
|                 | Main wiring                                    | Dashboard rear                                     | Main wiring                         |                     |
| Ground          |  |  |                                     |                     |
| <b>APRILIA</b>  |  |  |                                     |                     |
|                 | Blue-Green                                     | Dashboard rear                                     |                                     |                     |
| Except:         | RSV 100<br>Factory<br>2004 >                   |  |                                     |                     |
|                 | Blue   |  |                                     |                     |
|                 | Dashboard rear                                 |  |                                     |                     |
| <b>HONDA</b>    |  |  |                                     |                     |
|                 | Green  | Dashboard rear                                     |                                     |                     |
| Except:         | CBR 900 RR<br>2002<br>CBR 954 2002             | CBF 600<br>2004                                    | CBR 600 RR                          |                     |
|                 | Green-Black                                    | Green  | Green                               |                     |
|                 | Main wiring                                    | Main wiring  | Blue connector under air manifold   |                     |
| <b>KAWASAKI</b> |  |  |                                     |                     |
|                 | Black-Yellow                                   | Dashboard rear                                     |                                     |                     |
| <b>SUZUKI</b>   |  |  |                                     |                     |
|                 | Black-White                                    | Dashboard rear                                     |                                     |                     |
| <b>YAMAHA</b>   |  |  |                                     |                     |
|                 | Black-Blue                                     | Dashboard rear                                     |                                     |                     |
| Except:         | FZ 6<br>2004>                                  | YZF-R6 2006<br>YZF-R1 2002<br>2004><br>YZF-R6 2003 | FZ 1 2006<br>FZS 600 Fazer<br>2000> |                     |
|                 | Black  | Black-White  | Black                               |                     |
|                 | Main wiring                                    | Dashboard rear                                     | Dashboard rear                      |                     |