Speed Wedge 2.2R5

Part no. 90.1000

MSO Meßtechnik und Ortung GmbH

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1 Technical Data

Power supply	9 - 28V DC
Current consumption	typ. 80 mA @ 12V DC
Power consumption	< 1W
Frequency and Power	24.15 GHz to 24.25 Ghz at 12.7 dBm EIRP FCC ID: 2AXQCSWMKII-21 Contains FCC ID: UXS-SMR3X3 Contains IC ID: 6902A-SMR3X3
Update rate	20 Hz
Speed range	typ. 0.8 km/h to 200 km/h The range depends on the application and can differ from these values
Temperature range	Storage -40°C - 85°C Operation -40°C - 70°C
Environmental protection	IP6KX, IPX7, IPX9K acc.to ISO 20653
Connector	Plug M12 5 Pos. A-Coded according to IEC 61076-2
Cable length	Housing - Plug 170mm ± 20mm
	

2 Serial Interface RS232

Baud rate	19200
Parity	No Parity
Data bits	8
Stop bits	1
Update rate	20 Hz

Output data sets are comma separated.

Data set separator Line break <CR><LF>, resp. 0x0D 0x0A

Field separator Comma

Field 1 Data set identifier: $PMSO

Field 2 Velocity in km/h

Field 3 Direction of velocity (1–Forward; -1–Backward; 0–no direction given)

Field 4 Internal value for diagnostic purposes

Field 5 Internal value for diagnostic purposes (quality):
Bit 0: Signal to noise ratio low
Bit 1: Amplifier saturated (strong reflections, short distance, high speed)
Bit 2: Multiple speeds detected
Bit 3: Speed reading invalid.

Bit 3 is the most important for application. If this is set the speed reading is not reliable.
So in short:
quality = 0 everything ok
quality = 1 - 7 difficult, reduced performance
quality $\geq$ 8 speed invalid

Checksum Checksum is separated by * (asterisk) and calculated according to NMEA 0183. Representaion as ASCII-HEX number. The checksum is the 8-bit exclusive of all characters in the message, including the commas between fields, but not including the $ and asterisk delimiters.

```
$PMSO,2.22,1,29966,0*2E
$PMSO,2.50,1,31659,0*21
$PMSO,3.19,1,56565,0*20
$PMSO,3.84,1,87022,0*2E
$PMSO,4.17,1,117585,0*13
$PMSO,4.69,1,131921,0*1C
$PMSO,4.84,1,129882,0*1E
$PMSO,4.87,1,129739,0*12
$PMSO,4.77,1,128083,0*1A
```



Figure 1: RS232-TX signal on Oscilloskop

3 Pulse Output

The sensor generates a pulse- / frequency signal proportional to the velocity with $130\frac{Pulses}{m}$ resp. $36.111\frac{Hz}{\frac{km}{h}}$ according to DIN 9684 / ISO 11786. High and low level are driven to power supply level resp. GND.

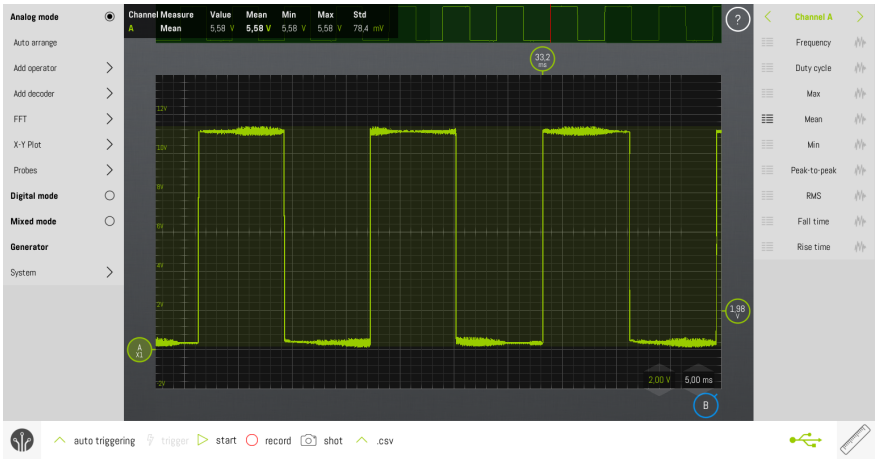


Figure 2: Puls signal on Oscilloskop (12V power supply

4 Connection

Description	Pin Connector	Cable colour
Power supply +12V DC($< 100mA$ at 12V)	1	Brown
Power supply GND	2	White
Pulse Push/Pull	3	Blue
RS232 TX. Sensor Transmit Data	4	Black
RS232 RX. Sensor Receive Data	5	Grey

Important: Do not connect any voltage higher than +12V to the RS232-TX line (Pin 4). This will destroy the RS232 Transceiver!

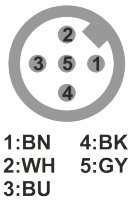


Figure 3: Pin-Out M12 Connector male

5 Mounting

The sensor is to be mounted parallel to the ground facing forward under the vehicle with free view towards the ground. Distances to ground 100 mm to 700 mm. At larger distance the lowest measurable velocity is being increased.

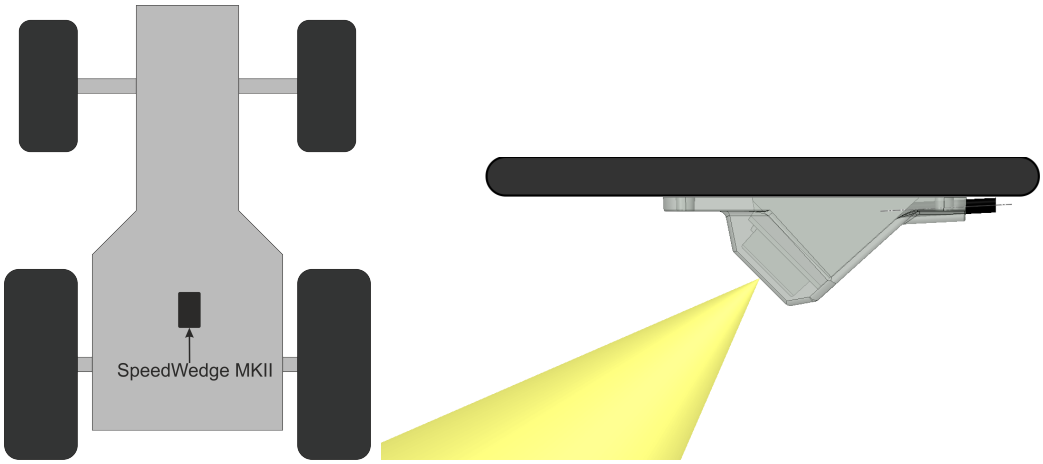


Figure 4: Required mounting position under Vehicle

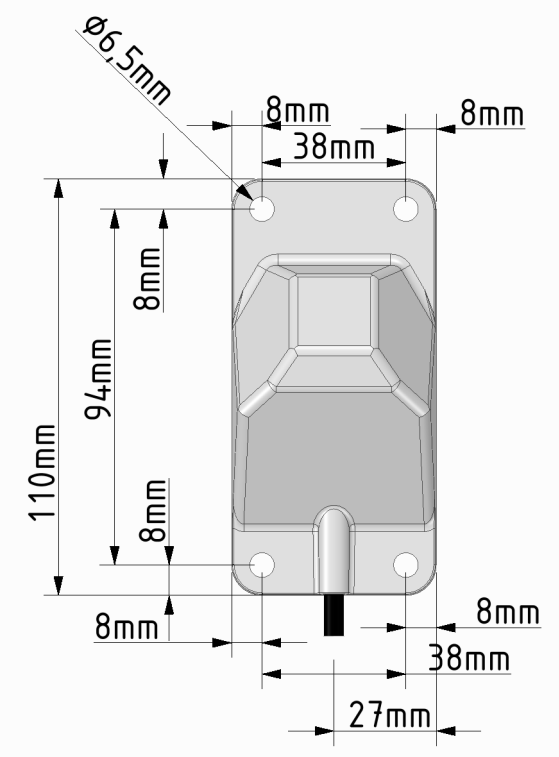


Figure 5: Dimensions Speed Wedge 2.1 - top view

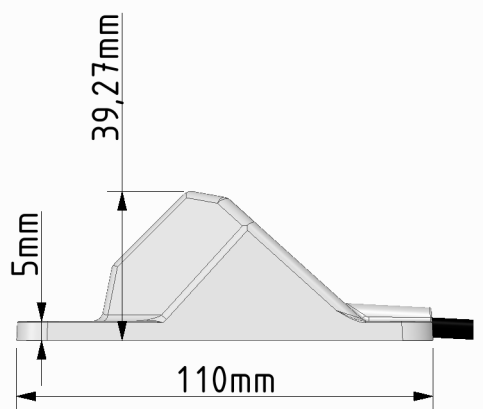


Figure 6: Dimensions Speed Wedge 2.1 - side view

6 Regulatory Statements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

7 Contact

Company	MSO Meßtechnik und Ortung GmbH
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8 Declaration of conformity

Manufacturer's name	MSO Meßtechnik und Ortung GmbH
Manufacturer's address	Hohweg 8-10, 53902 Bad Münstereifel, Germany
Equipment type	Radar speed sensor
Model	Speed Wedge MKII Version 2.1
Product standard	Date code 15 February 2021
TARIC number of the product	90292031
Country of origin	Germany

The Product is compliant with the following standards and/or other normative, essential requirements according to European Radio Equipment Directive 2014/53/EU.

	applied specifications / Standards
Electrical Safety [1]	EN 62368-1: 2014+ A11:2017 IEC 62368-1: 2014+ A11:2017 EN 60950-22: 2017
EMC [2]	EN 301 489, EN 61326-1:2013
RF [2]	EN 62311 (MPE)
RoHS	Directive 2011/65/EU, EN 50581:2012 (EN IEC 63000:2018)
RED [2]	EN 300 440, SRD (1GHz to 40GHz) - Category 1
FCC (U.S.A.) [2]	FCC §15.249, Contains FCC ID: UXS-SMR-3x3, FCC ID: 2AXQCSWMKII-21, Certificate issued FCC 47 CFR Part 1
ISED (Canada) [2]	ISED RSS-210 Annex B.10, Contains IC ID: 6902A-SMR3X3, RSS-GEN/ICES-003, Class B
AMCA (Australia) [2]	Authorisation for RCM compliance mark RCM responsible supplier number: E304, ACN/ARBN 84156023504
Environmental Protection [3]	ISO 20653: IP6KX, IPX7, IPX9K
Dry heat test (CENELEC) [3]	DIN EN 60068-2-2, DIN EN 50155
High temp. test (AREMA) [3]	MIL-STD810G
Low temp. test (CENELEC) [3]	DIN EN 60068-2-1, DIN EN 50155
Low temp. test (AREMA) [3]	MIL-STD810G
High temp. storage (AREMA) [3]	MIL-STD810G
Low temp. storage (AREMA) [3]	MIL-STD810G
Low temp. storage (CENELEC) [3]	DIN EN 60068-2-1, DIN EN 50155
Humidity / Damp heat [3]	MIL-STD810G
Humidity / Damp heat [3]	DIN EN 60068-2-30, DIN EN 50155
Random vibration [3]	DIN EN 60068-2-64, DIN EN 61373
Mechanical shock [3]	DIN EN 60068-2-27, DIN EN 61373
Sine vibration (AREMA) [3]	MIL-STD810G
Resonance search (AREMA) [3]	MIL-STD810G
Mechanical shock (AREMA) [3]	MIL-STD810G

[1] Tests commisioned by CETECOM and conducted by Dongguan Dongdian Testing Service Co., http://www.dgddt.com

[2] Tests conducted and reports issued by CETECOM, notified body No. 0682

[3] Tests conducted and reports issued by AKUVIB Engineering and Testing GmbH, Sinterstr. 6, 44795 Bochum, Germany

The EUT described above has been tested and found in compliance with the council Radio Equipment Directive 2014/53/EU (RED). It is possible to use CE marking to demonstrate the compliance with this Directive.