

Operating Manual

M2/ M3 Sensor

Microwave Doppler Sensor



CORRSYS

DATRON

Sensorsysteme GmbH



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1 Security instructions

Please read carefully before operating the sensor.

To assure safe and proper operation of the sensor, the unit must be carefully transported and stored, as well as professionally installed and operated. Furthermore, careful maintenance and usage in accordance with operating instructions is imperative.

This sensor should be installed and operated only by qualified persons who are familiar with devices of this type.

Should the information provided by these operating instructions not be sufficient, contact the service department of CORRSYS-DATRON Sensorensysteme for help you with further details.

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 instruction, may cause harmful interference to radio communications.

However, it is not guaranteed that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio 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 the receiver.
- Connect the equipment into an outlet and a circuit different from that to which the receiver is connected.

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- Consult the dealer or an experienced radio/TV technician for help.

2 Field of application and working principle

2.1 Field of application

Microwave Doppler sensor for speed and distance measurement

M 2 sensor: Article No. S32432
(with integrated electronics)

M 3 sensor: Article No. S32433
(with external electronics)

- Tests of performance and vehicle dynamics (cars, heavy goods vehicles, motorcycles)
- Speed control of trains
- Determination of vehicle's position and speed in connection with traffic control

Main Features

- Non-contact slip free measurement for off-road and track-bound vehicles
- Compensation of the pitch movements by use of dual-beam technology
- Insensitive to dirt, rough ground and wet conditions
- Small in size, robust in design, low in weight
- Universally applicable and easy to operate
- Connected to the vehicle battery via pole binder or cigarette lighter adapter

2.2 Working principle

The Datron microwave sensors function on the basis of the Doppler-effect by using the frequency shift of a wave reflected from a moving surface.

Data acquisition and processing

The included calibration and setup software has numerous user functions and is provided for the automatic sensor calibration and the online processing of all relevant data.

Datron DAVIT® bus interface for direct PC-connection guarantees online display and on-site storage of the test results.

3 Scope of delivery

3.1 Scope of delivery M2 sensor

- Sensor head
- Sensor signal cable
- Disk 3.5" with DLS software for calibration and setup
- 3 Fixing screws
- Scale
- Transport case

Available accessories

- LB interface for M2 for light barrier connection (calibration)
- Light barrier
- Reflection foil
- Suction foot for light barrier
- Magnetic mounting plates, 3 different types (please ask for separate sheet)

3.2 Scope of delivery M3 sensor

- Sensor head
- Signal conditioning unit
- Sensor cable
- Power supply cable for signal conditioning unit
- PC-link cable for DAVIT-Bus
- Signal output cable (2 x BNC)
- Spare fuse T 1 A
- Disk 3.5" with DLS software for calibration and setup
- 3 Fixing screws
- Scale
- Transport case

Available accessories

- Light barrier
- Reflection foil
- Suction foot for light barrier
- Magnetic mounting plates, 3 different types (please ask for separate sheet)
- Suction holder for sensor mounting (please ask for separate sheet)

4 Technical specifications

Construction	One-piece aluminium housing with printed planar antenna and durable antenna shield
Transmitter characteristics	2 x 49° in longitudinal direction 2 x 15° in lateral direction
Frequency range	24.125 GHz
Protection class	IP 66
Dimensions	M 2: 176 mm x 55 mm x 108 mm M 3: 176 mm x 33 mm x 108 mm
Mounting	3 fixing holes M6 (at the rear)
Weight	M 2: 1.2 kg, M 3: 0.7 kg
Voltage supply	10.5 ... 30 V DC, 5 ... 10 W
Cable length	5 m
Stand off distance	12.0 ... 47 inches (300 ... 1200 mm)
Speed measurement range	1.0 kph (typical) > 400 kph > 0.3 kph (typical)
Linearity	± 0.5 %
Reproducibility	± 0.25 %
Signal output, digital	TTL compatible 30 ... 180 pulses/foot (100 ... 600 pulses/m)

Signal output, analog	0 ... 10 V (max.) speed proportional user programmable with the provided software: 10 ... 100 mV/(kph)
Serial interface	Datron DAVIT® bus interface for PC 9.6 ... 155 kBaud, RS-232 compatible
Temperature range	-20 °C ... +65 °C
Shock resistance	50 g half-sine, 6 ms
Vibration	10 g with 10 ... 150 Hz

5 Installation and connection

5.1 Installation and connection M 2 Sensor

POWER IN

4-pin Binder plug

Pin 1 + 2 power + (10.5 ... 30 V DC)

Pin 3 + 4 ground (GND)

Signal cable (yellow tape)

9-pin D-Sub socket

Pin 1 ANA.OUT

Pin 2 free

Pin 3 TTL-OUT

Pin 4 free

Pin 5 TTL-GND

Pin 6 ANA.GND

Pin 7 free

Pin 8 free

Pin 9 shield

PC COM 1/2 connection

9-pin D-Sub plug

Pin 1 ANA.IN (sensor)

Pin 2 RXD (DIG 1)

Pin 3 TXD

Pin 4 NC

Pin 5 GND

Pin 6 ANA.GND

Pin 7 NC

Pin 8 CTS (LB)

Pin 9 NC

If the sensor is connected to a PC and is supplied with power, the sensor recognizes the PC interface.

On powering the sensor, the PC interface is checked automatically. When the 9-pin D-Sub socket is connected to a PC, the

sensor starts in PC operation. When the D-Sub socket is connected to a different instrument (e. g. AEP 5) or not connected at all, pulses will automatically be given in proportion to the distance (see Software, section 6.5.2, Sensor setup).

A PC that is attached after the sensor has been powered can not be recognised by the sensor. The communication with the PC cannot be established.

Signal cable

5-pin plug with pig end tail

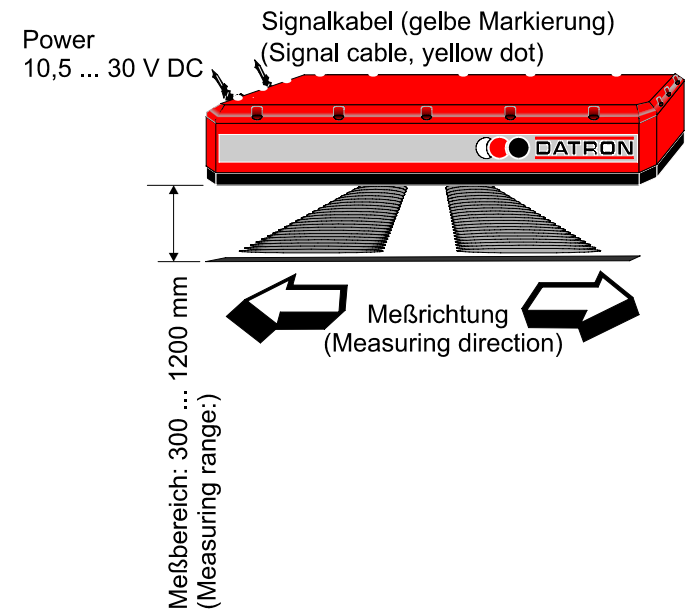
Pin 1 free (brown)

Pin 2 TTL-OUT (white)

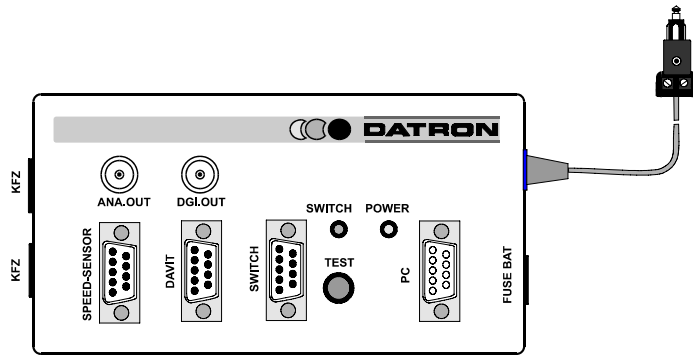
Pin 3 TTL-GND (blue)

Pin 4 ANA.OUT (black)

Pin 5 ANA.GND (grey)



5.2 Installation and connection M2 with LB interface



To calibrate the sensors with the PC, it is necessary to interface the start and stop signal from a light barrier. The light barrier interface must be interposed between the sensor and the PC.

Connectors and pin assignment

ANA.OUT

Analogue output for speed

DIGI.OUT

Digital output for distance

SPEED SENSOR

9-pin D-Sub-plug to connect the signal cable of the sensor

- Pin 1 ANA.IN (sensor)
- Pin 2 RXD (DIG 1)
- Pin 3 TXD
- Pin 4 NC
- Pin 5 GND
- Pin 6 ANA.GND
- Pin 7 NC
- Pin 8 CTS (LB)
- Pin 9 NC

DAVIT

9-pin D-Sub plug for one more DAVIT sensors (sensor with serial interface)

- Pin 1 NC
- Pin 2 RXD
- Pin 3 TXD
- Pin 4 NC
- Pin 5 GND
- Pin 6 NC
- Pin 7 NC
- Pin 8 NC
- Pin 9 NC

SWITCH

9-pin D-Sub plug for the light barrier (LB) or brake switch (BR)

- Pin 1 NC
- Pin 2 NC
- Pin 3 NC
- Pin 4 +12 V
- Pin 5 Car_GND
- Pin 6 BR
- Pin 7 NC
- Pin 8 LB
- Pin 9 NC

PC

9-pin D-Sub socket to interface the asynchronous serial interface of the PC or Laptop

- Pin 1 NC
- Pin 2 RXD
- Pin 3 TXD
- Pin 4 NC
- Pin 5 GND
- Pin 6 NC
- Pin 7 RTS (/LB)
- Pin 8 CTS (LB)
- Pin 9 NC

Vehicle plugs and sockets

The box is supplied with power via the supply cable with 12 V DC nominal tension. The power supply input range of the interface 10.5 ... 30 V DC (only for M 2 sensor).

Both vehicle output sockets are connected parallel and supply the same voltage as their input plug.

FUSE

T 8 A max. current

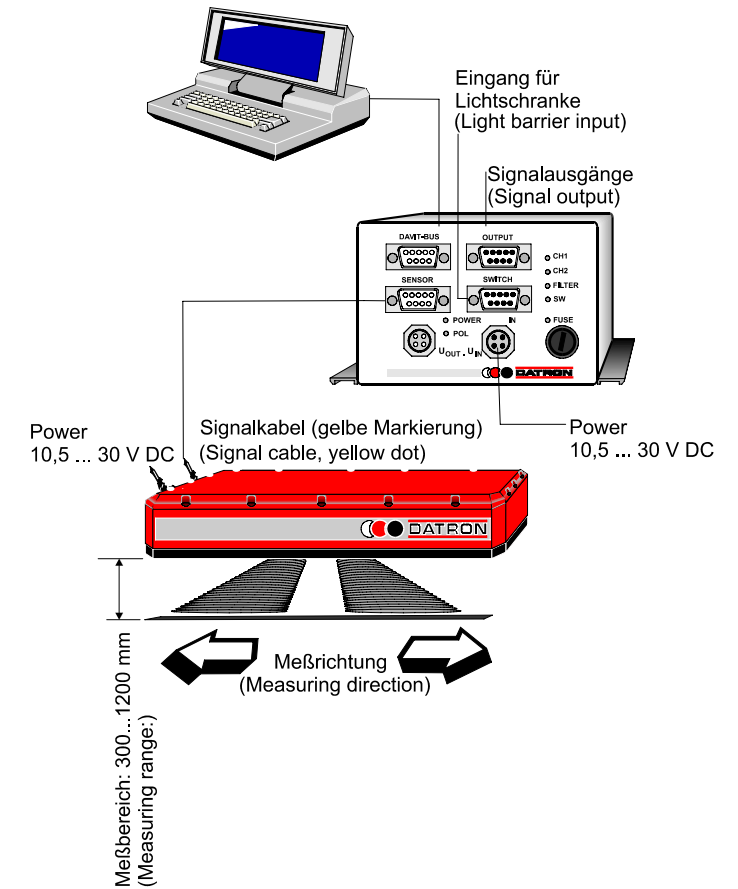
TEST

For light barrier simulation (red LED)

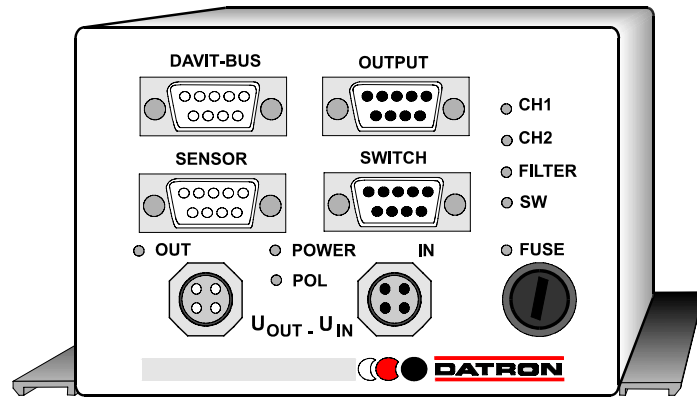
LEDs

The green LED will blink if the power supply is switched on, the red LED will blink if the light barrier is active.

5.3 Installation and connection M 3 sensor



5.4 Signal conditioning unit



Pin assignment

DAVIT-BUS

9-pin D-Sub socket

Pin 1 free
 Pin 2 TXD
 Pin 3 RXD
 Pin 4 free
 Pin 5 GND digital
 Pin 6 free
 Pin 7 free
 Pin 8 TRIGGER OUT
 Pin 9 free

OUTPUT

9-pin D-Sub plug

Pin 1 DIG 1
 Pin 2 -
 Pin 3 -
 Pin 4 GND digital
 P 5 free

Pin 6 free
 Pin 7 ANALOG 1
 Pin 8 -
 Pin 9 GND analog

SENSOR

9-pin D-Sub socket

Pin 1 channel 1 (brown)
 Pin 2 -
 Pin 3 free
 Pin 4 free
 Pin 5 free
 Pin 6 +8 V
 Pin 7 GND analog (black)
 Pin 8 free
 Pin 9 free

SWITCH

9 pin DSub plug

PIN 1 free
 PIN 2 free
 PIN 3 free
 PIN 4 power +12 output (50 mA)
 PIN 5 GND power
 PIN 6 free
 PIN 7 free
 PIN 8 SWITCH IN (activ low)
 PIN 9 free

POWER IN

4-pin Binder plug

Pin 1 + 2 Power supply + (10.5 ... 30 V DC)
 Pin 3 + 4 GND power supply

POWER OUT

4 pin Binder socket

Pin 1 power supply + switchable output 5 A
(U_{OUT} = U_{IN})

Pin 2 power supply + switchable output 5 A

Pin 3 GND power supply

Pin 4 GND power supply

Fuse T 1 A

Signification of the LEDs

POWER active when unit is connected to power

POL active, if power poles are inverted

OUT active, if power supply is switched on
POWER OUT

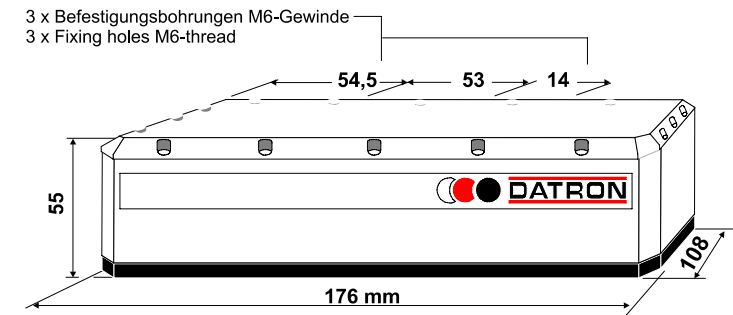
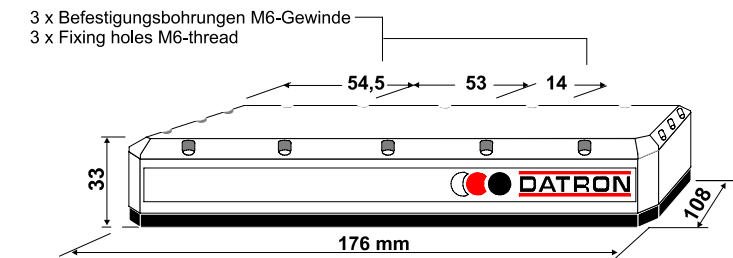
FUSE active, if fuse is blown

CH 1 extinguished, if motion signal is detected

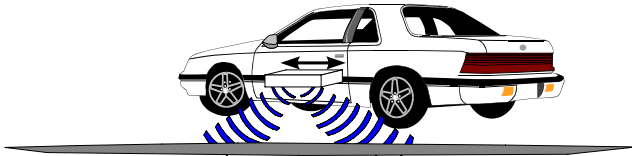
CH 2 no function

FILTER will blink in the rythm of selected filter period

SWITCH active, if switch signal is detected

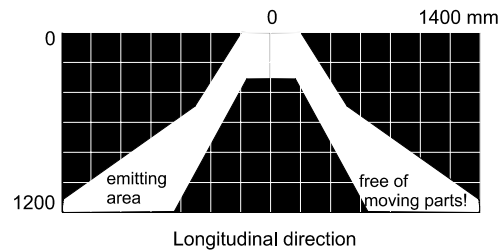
5.5 Dimensioned drawing of the sensors**Dimensioned drawing M 2****Dimensioned drawing M 3**

5.6 Direction of mounting on the vehicle

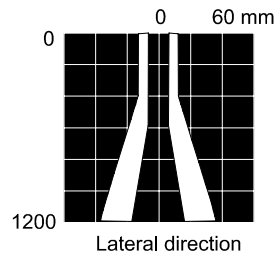


The measuring direction of the sensor must be parallel to the mounting flange!

Emitting beam characteristics in longitudinal direction



Emitting beam characteristics in lateral direction



When mounting the sensor, please pay attention to the following: no moving parts and no parts of the car body should be in the emitting area of the sensor!

7 Warranty and service

Maintenance and care

- The measuring head is wear-free since it has no mechanically moving parts.
- The evaluation electronics are wear-free and long-time stable.
- A yearly recalibration by CORRSYS-DATRON Sensor-systeme GmbH is recommended.
- Cleaning of all housing parts is allowed by means of cloths that are dry or slightly moistened by detergents.
- The antenna side of the measuring head must only be cleaned with slightly moistened cloths. Dry clean with dry cloths without fluffs or with air brushes.

Warranty

One year warranty is guaranteed on material and proper function.

We guarantee delivery of perfect products. All statements regarding use and accuracy are without liability and are based on our experience. This will not relieve the user from checking the instrument in each case. We do not assume any liability for damages or resulting costs caused by improper use of the sensor. The right to claim under guarantee expires as soon as the instrument is opened.

Service

All instruments as soon as the software is produced with greatest accuracy according to the latest technical standards.

Nevertheless, if any reason for complaint should arise during use, please do not repair the equipment or accessories by yourself.

In this case please contact our representative in your country or our service office directly as follows:

CORRSYS-DATRON Sensorsysteme GmbH
Service Department
Charlotte-Bamberg-Str. 12
35578 Wetzlar

Telephone: +49-6441-9282-0
Telefax: +49-6441-9282-17
E-Mail: service@corrsys-datron.com
Internet: [http:// www.corrsys-datron.com](http://www.corrsys-datron.com)

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8 Datron software license contract

Contract conditions effective upon purchase of enclosed software.

Opening this package constitutes acceptance of and agreement to the following terms and conditions. If you as ultimate consumer (or "licensee") do not agree with these conditions, you will not be permitted to open the packaging of the data medium (floppy disks, hard disks, CD-ROM, etc.). In this case, return the unopened package of the data medium, as well as all other parts of the product (including all written material, delivered hardware and packaging) immediately to the place of purchase; you will be reimbursed for the full purchase amount.

Conditions

Subject matter of this contract includes the PC program, the program description, and the operating manual, recorded on the data medium (e.g. floppy disk), as well as any other accompanying material. This subject matter will be further referred to as "software".

The software delivered by the Datron company can be applied in fields defined in company publications. It must be emphasized that in accordance with technical development it is not possible to create a PC software package in such a way as to guarantee faultless operation in all applications and combinations.

For the life of the contract the Datron company grants the single, not exclusive and personal right (further referred to as "license") to use the delivered software with a single PC at one place only. If this PC system is used by several people, the right of use will be valid for all system users.

The licensee is allowed to transfer the delivered software in physical form from one PC to another PC, yet, under the condition that the software is never used on more than one PC at a time. Other usage is prohibited.

The licensee is restrained from

- giving the delivered software or the accompanying written material to a third party or giving a third party access to it, without prior agreement of the Datron company in writing.
- transferring the software from one PC via network or data transfer channel to another PC.
- changing the delivered software, or to translate it, to redevelop it, to decompile, or to disassemble it.
- creating products or works deriving from the delivered software, or to reproduce the written material.

The physical data medium of the delivered software remains the property of the Datron company until the complete purchase price is paid in full. Herein the purchase of software rights is not included. Datron particularly reserves the publication right, the right of reproduction, the right of processing, and the utilization right for the software. The Datron company owns the copyright of the software and the accompanying written material.

The licensee does not have the right of reproduction. The only exception is software without overwrite protection. Making a backup copy of this software for safety purposes is allowed. The licensee is particularly liable to attach or record a copyright sign on each physical backup copy made. The copyright sign on the software, as well as the recorded registration number must not be removed. Furthermore, it is explicitly prohibited to copy or to reproduce the software, or the written material, either in full or in part completely in original or altered form. Only the ultimate user - and for his own purposes - is allowed to combine and to mix the software with other software to an extent described in the manual.

It is explicitly prohibited to give the software to other persons, to rent it, or to hire it. It is also not allowed to transfer the utilization right to other persons without the prior agreement of

the Datron company in writing.

Software delivered by the Datron company in source text, may be changed to meet owner application purposes. The licensee is not allowed to give or to sell programs altered in this way to a third party without the prior agreement of Datron in writing. The delivered example software serves to display certain principles. The licensee is allowed to change those programs at will. To sell or to give the programs to a third party is strictly forbidden. The creation of routines to be used within programs for the purpose of sale is allowed, as long as the software crucially differs from the example software in outward appearance and function, and as long as the programs show a copyright sign, clearly visible to the user.

The Datron company reserves the right to update the software at its own discretion. The licensee does not have any legitimate claim to receive any updated software version automatically, unless he agrees to send another signed registration card or agrees by paying an update version fee.

The Datron company has the right to demand damages in the case of violation of the above stated duties.

The Datron company warrants that the software packages to be free of defaults at the time of delivery, with regard to normal operational conditions, normal maintenance, and usual usage. Paragraph 2 of this contract condition is, however, emphasized.

If the data medium or the delivered software is faulty, the licensee is allowed to demand delivery of compensation within the period of warranty of six months, beginning with the day of delivery. The licensee, however, is liable to return the faulty data medium, together with the possible backup copy, any written material, and an invoice copy to the Datron company. If the compensation delivery, demanded within the period of warranty, is not executed within four weeks, the licensee will be permitted to submit claim for reduction or convertible bonds. Further warranty claims will be forfeited. The Datron company is not responsible for damages (damages caused by defects)

that result from the application of the software, unless damages are caused by Datron either with premeditation, or with gross negligence. There will be also no responsibility for gross negligence in commercial interactions. Responsibility of promised features remains untouched.

Place of performance in commercial interaction is the CORR-SYS-DATRON Sensorsysteme GmbH place of business. Any disputes arising hereunder will be settled before a competent Wetzlar court of law.