CORRSYS
DATRON
Sensorsysteme GmbH

V1- / V2 - Sensor

Speed Vector Sensor

For non-contact slip angle
or drift angle measurement

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USER MANUAL

Contents

1 Security instructions

Please read carefully
In order to achieve correct and secure operation of the sensors, make sure that the units are carefully transported and stored, skillfully installed and put into operation; furthermore a careful maintenance and a usage according to the instructions is important.

Only those persons are allowed to work with the sensors who are familiar with installation, putting into operation and use of units similar to the sensors and those persons with sufficient skills.

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

2 Field of application and working principle

2.1 Field of application

The Datron V-sensor is designed as compact, light weight optical speed vector-sensor for non contact slip angle or drift angle measurements on test vehicles.

Its electro-optical double array design generates two correlated distance vector signals. Out of these, the following measured values are computed in the data processor:

- Longitudinal distance — pulse signal
- Transversal distance — pulse signal
- Transversal direction — digital signal
- Transversal speed — analog signal
- Longitudinal speed — analog signal

Alternatively to longitudinal and transversal speed:

- Drift angle a — analog signal
- Speed amount — analog signal

The Datron DAVIT®-Bus allows direct link to the data processing PC. A comprehensive calibration and setup software pakkage is supplied providing the following features:

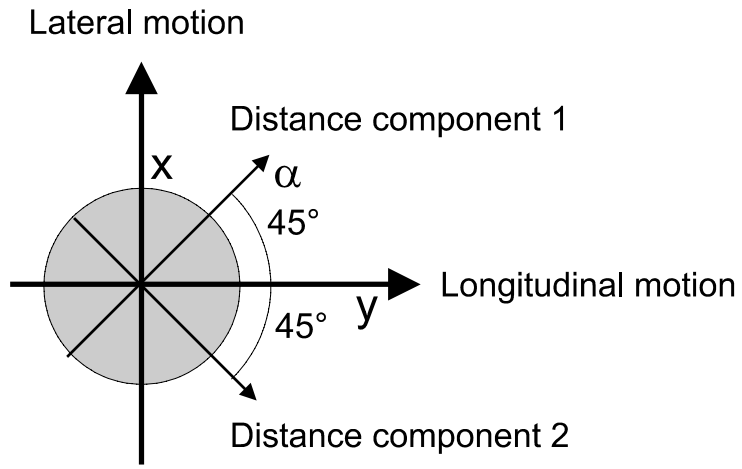
- Automatic sensor identification
- Free choice of measuring values
- Calibration of analogue and digital output signals
- Direct interface for an optional light barrier for distance calibration
- Automatic checking of sensor function
- Graphic online display of measured values

Mainfeatures

- Compact design and significantly reduced weight with respect to conventional setup of two single-vector sensors.
- Highly improved, steady signal for the resulting vector angle.

2.2 Working principle

Functional principle, measured values
The sensor Datron-V 1 functions according to the principle of optical correlation. The image of a rough, illuminated surface is projected through an objective onto a grid of diode arrays arranged at equal intervals.
The photocurrent of the diode arrays has a definite frequency directly proportional to the relative velocity of the diode array in relation to the surface. When the signal has been processed appropriately, the distance traversed can be calculated as to length and direction. Using two diode arrays, it is possible to record the distance in two directions (Figure below: distance components 1 and 2).



One output signal is generated for each distance component. The number of impulses of each output signal corresponds to the distance in direction to the distance components. By offsetting the output signals in a processor unit, the longitudinal and the lateral motion can be determined.

Structure
The Datron V 1 consists of

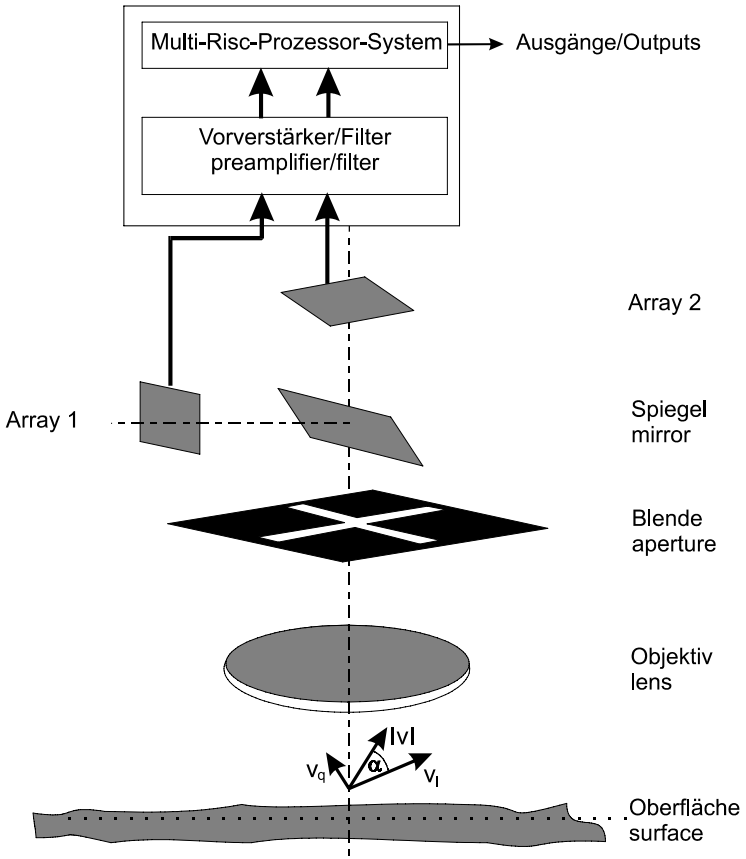
- Sensor
- Illumination equipment
- Assembly board
- Electronic components for signal processing

Sensor
The sensor (∅ 50 mm x L 285 mm incl. spray guard) comprises the optical components to form the image of the surface on the diode arrays, as well as a signal amplifier to process the analog sensor signals for each filter.

Illumination equipment
The illumination equipment is in a seperate housing and integrated on its mount. Illumination of the surface is achieved by means of a conventional halogen lamp with a protective glass cover.

IR illumination on request.

2.3 Schematic diagram



3 Scope of delivery

1	Sensor with spray guard
1	Signal processing unit
1	Sensor signal cable
1	Power supply cable for lamp
1	Power supply cable for signal processing unit
1	PC-Link cable for DAVIT-Bus
1	Spare halogen lamp 12 V/20 W
1	Spare fuse T 6.3 Amp.
1	Disk 3.5" with online software and calibration program
1	Scale
1	Transport case

3.1 Available accessories

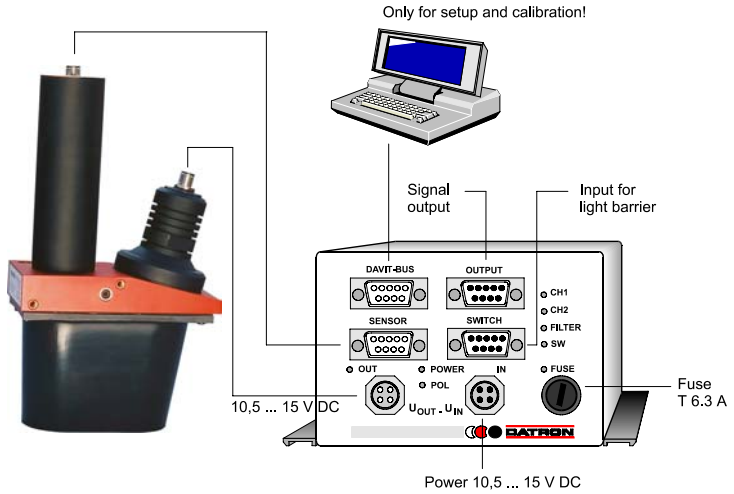
Light barrier
Suction foot for light barrier
Spare spray guard
Ball borne wheel mounting kit for drift angle measurements:
- Lock nut adapters 5 x 17 mm
- Lock nut adapters 5 x 19 mm
- Lock nut adapters 5 x 21 mm

4 Technical specifications

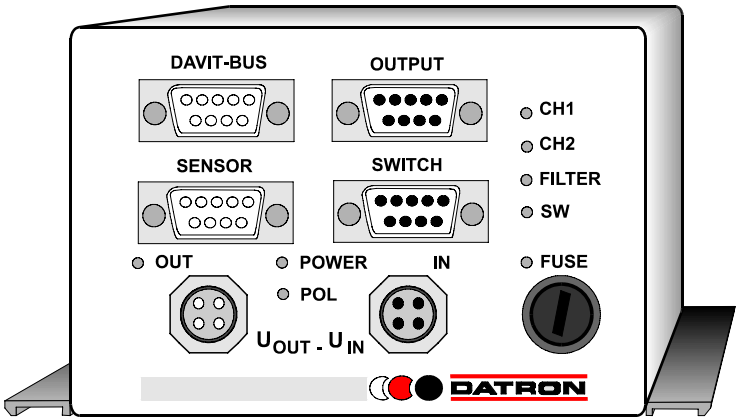
Output signals of sensor electronics		
	Frequency output	0 ... 40 Hz 3 digital outputs (RS 485 driver)
	Analog output	2 outputs 0 ... 10 V resp. - 5 ... + 5 V measured values via mode selectable and calibratable
	Serial interface	Datron DAVIT-Bus interface for PC
Error in measurement		< ± 0.5 % on distance measurement
Angle measurement range		± 40°
Angle resolution		< 0.5°
Measuring range of speed		
	V 1-sensor	0.25 ... 310 kph longitudinal speed range
	V 2-sensor	0.25 ... 250 kph longitudinal speed range
Stand off		
	V 1-sensor	520 mm from lower surface of the mounting flange
	V 2-sensor	310 mm from lower surface of the mounting flange
Optical tolerance		
	V 1-sensor	± 60 mm
	V 2-sensor	± 20 mm (wheel mounting)

Value of measured field	∅ = 40 mm	
Permissible angle error on the mounting	horizontal	± 8°
	vertical	± 4°
Voltage supply		
Electronics and halogen illumination	10.5 ... 15 V DC 7 W + 50 W (75 W)	
Permissible temperatur range	- 25 °C ... + 80 °C	
Weight	sensor	1.2 kg
	electronics	0.8 kg

5 Installation and connection



5.1 Signal processing 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 DIG 2
Pin 3 DIG 3
Pin 4 GND digital
Pin 5 free
Pin 6 free
Pin 7 ANALOG 1
Pin 8 ANALOG 2
Pin 9 GND analog

SENSOR, 9-pin D-Sub-socket
Pin 1 channel 1 (brown)
Pin 2 channel 2 (white)
Pin 3 free
Pin 4 free
Pin 5 free
Pin 6 ± 8 V (blue)
Pin 7 GND analog (black)
Pin 8 - 8 V (grey)
Pin 9 free

SWITCH, 9-pin D-Sub-plug
Pin 1 free
Pin 2 free
Pin 3 free
Pin 4 power + 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 power supply + (10.5 ... 15 V DC)
Pin 2 power supply +
Pin 3 GND power supply
Pin 4 GND power supply

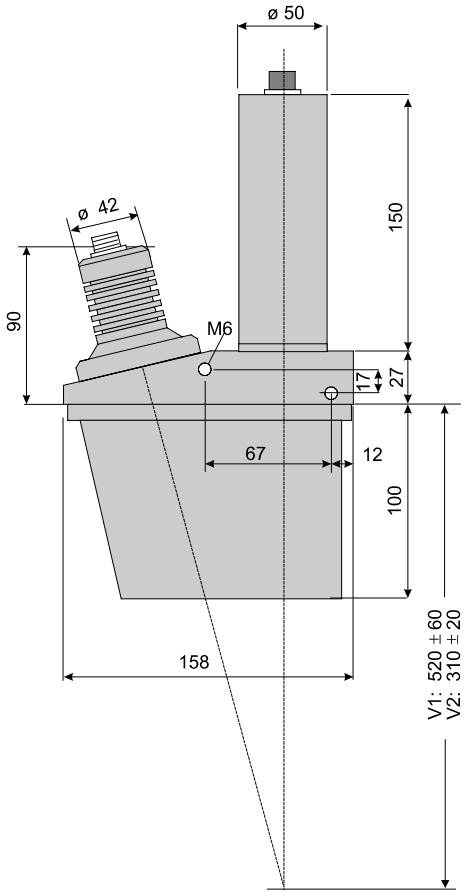
POWER OUT, 4-pin Binder-socket
Pin 1 power supply + switchable output 5 A ($U_{OUT} = U_{IN}$)
Pin 2 power supply + switchable output 5 A
Pin 3 GND power supply
Pin 4 GND power supply

FUSE: T 6.3 Amp.

Signification of LED display

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 on channel 1
CH 2	extinguished, if motion signal is detected on channel 2
FILTER	will blink in the rhythm of selected filter period
SWITCH	active, if switch signal is detected

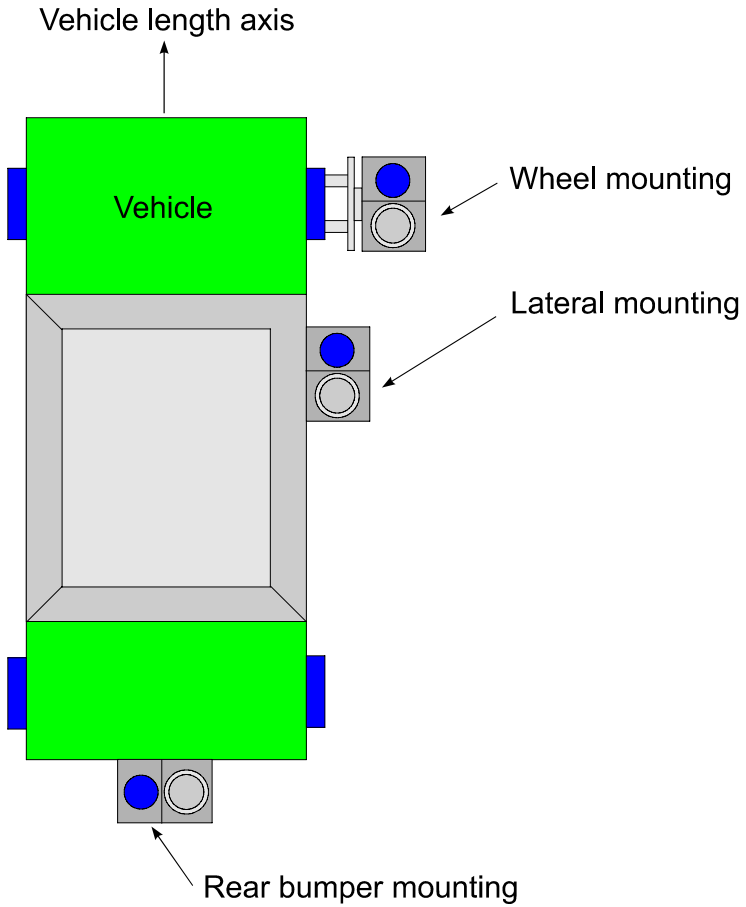
5.2 Dimensioned drawing of sensor



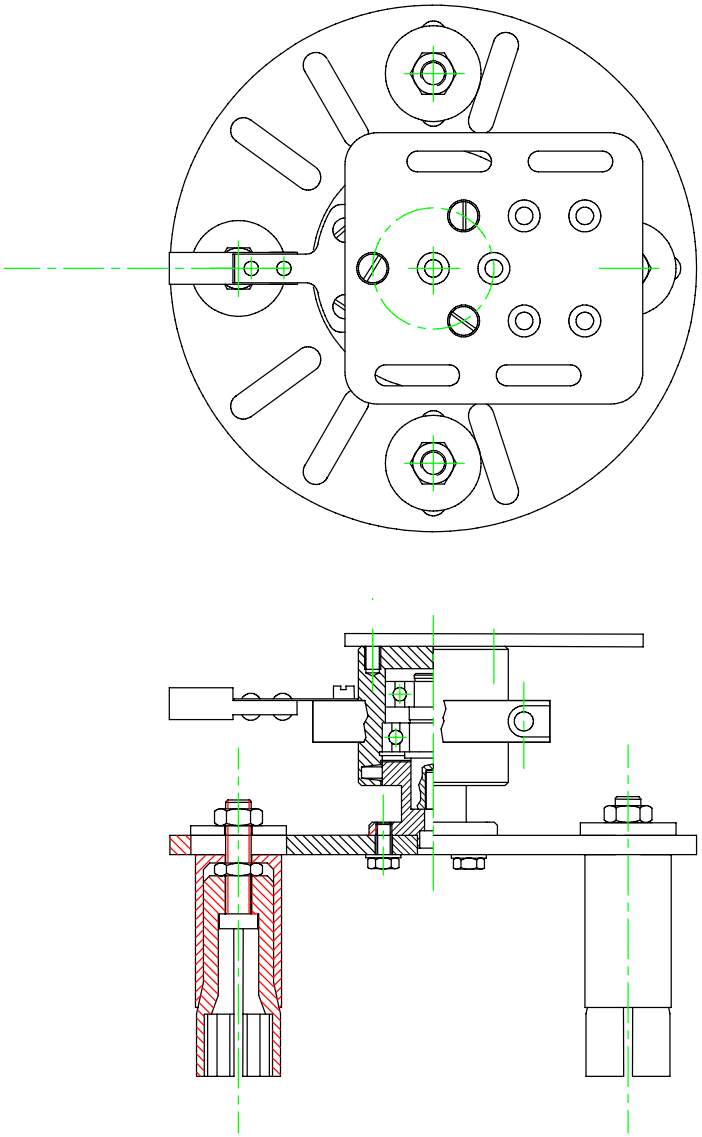
Caution
The longitudinal and transversal measuring directions of the sensor head are symmetrically adjusted with respect to the mounting flange.

The opto-mechanical adjustment can be checked by moving the sensor exactly in normal direction to the flange and comparing the two speed vectors: The difference between both vectors should not exceed 10%.

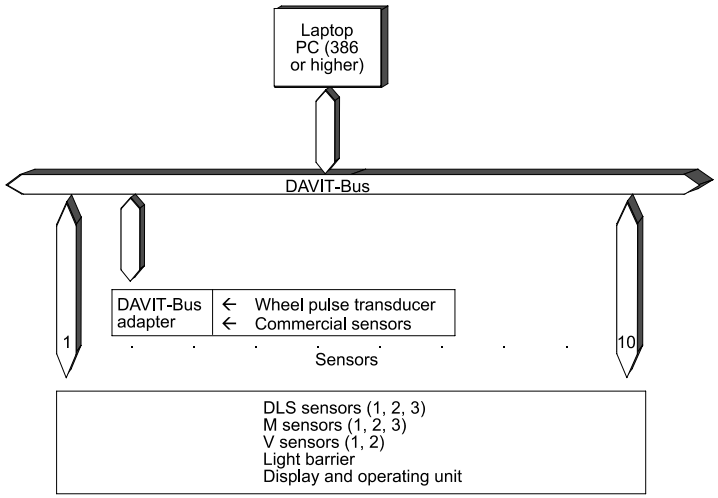
5.3 Sensor fixing on the test vehicle



5.4 Ball borne wheel mounting kit



5.5 DAVIT-Bus structure



7 Warranty and service

Maintenance and care

- The measuring head is wear-free since it has no mechanically moving parts.
- The function of the halogen lamp in the illumination unit has to be checked from time to time (average lifetime approx. 2000 hours, continuous wave mode and 5 % undervoltage can increase the lifetime up to 4000 hours).
- The evaluation electronics are wear-free and long-time stable.
- A yearly recalibration by DATRON-MESSTECHNIK is recommended.
- Cleaning of all housing parts is allowed by means of cloths that are dry or slightly moistened by detergents.
- The front lens and the front of the measuring head must only be cleaned 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:

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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.

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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.