

# WIND SENSORS series and special solutions

0



# MAXIMUM PERFORMANCE IN SERIES

#### **OUR WIND SENSOR PORTFOLIO**

FSG-Wind Sensors are used to record and monitor wind speed and direction. In the robust versions with central mounting for base or standpipe mounting or with pendulum device, especially for mounting on crane jibs, the sensors can be used universally in all areas of application.

The Wind Sensors are usually equipped with a wear-free, magnetic measuring system, on request also in redundant design and with additional reed contact for wind detection even when the supply voltage is switched off, or available as a design with tachogenerator for the application without additional voltage supply.

# FUNCTIONALITY

- Measuring system magnetic, contactless
- Central fixing
- Pendulum version

# FLEXIBILITY

- Measuring range: 0–40 m/s
- Cup star: rigid, resilient (measuring range 0 - 20 m/s) or robust

# OPTIONS

- Integrated heating system
- Measuring range up to 50 m/s
- Tachogenerator without supply voltage
- Protective coating against seawater
- Redundant measuring principle

# COMPATIBILITY

- 4-20 mA
- 0-3,4 V / 0-10 V
- CAN / CANopen / CANopen-safety
- ProfiNet
- pulse output

# RELIABILITY

- IP code: IP65 (with vertical alignment)
- Explosion protection ATEX / IECEx

# ÷ġ.

Electrical and mechanical adaptations are also possible for **small quantities** at any time on request.



# OUR EXECUTIONS

# WIND SENSOR



Central fixing



Pendulum version

With Obstruction light **NEW** 

With Hazard Beacon NEW

# WIND DIRECTION INDICATOR





Pendulum version

# WIND SENSOR



# Wind Sensor with central fixing

# **OPTIONAL**

- ITEX / IECEx approval
- Shaft heating
- REED-Contact
- A Proof varnishing
- Certificate for calibration

Cup star >>





# available in following **VERSIONS**

Type designation	Signal output
AN-60-Z-MH-2L	4–20 mA / 2-wire technology
AN-60-Z-MH-2L-Ex	4-20 mA / Atex
AN-60-Z-MH-3L	4–20 mA / 3-wire technology
AN-60-Z-MH-SPA	0-10 V
AN-60-Z-MH-CAN	CAN-Bus / CANopen
AN-60-Z-MH-Pnet	Profinet
<b>AN-60-Z-GEN</b> with Tachogenerator	0-3,4 V / 2-wire technology
C€ – conform	

# **TECHNICAL DATA**

Housing material	aluminum, grey lacquered
Housing diameter	Ø 45 mm
Housing length	157 mm
IP code of housing	IP65
Measuring range	0-40 m/s (max. 50m/s)
Temperature range heated	- 40 °C up to + 70 °C
Temperature range normal	- 20 °C up to + 70 °C
Shock	50 g, 6 ms
Vibration	4 g Sinus, 5–100 Hz

Connection	plug or cable
Weight	800 g
Maximum load (Current output)	600 Ω
Optional	Atex approval IECEx approval
Accuracy	± 3 % + 0,5 m/s Offset
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4



WIND SENSOR

AN-60-P-MH

Wind Sensor in Pendulum version, especially for the use on moving objects

# **OPTIONAL**

- Shaft heating
- REED-Contact
- A Proof varnishing
- Certificate for calibration





available in following

Type designation	Signal output
AN-60-P-MH-2L	4–20 mA / 2-wire technology
AN-60-P-MH-3L	4–20 mA / 3-wire technology
AN-60-P-MH-SPA	0-10 V
AN-60-P-MH-CAN	CAN-Bus / CANopen
AN-60-P-MH-Pnet	Profinet
<b>AN-60-P-GEN</b> with Tachogenerator	0-3,4 V / 2-wire technology

 $C \in -$  conform

## **TECHNICAL DATA**

Housing material	aluminum, grey lacquered
Housing diameter	Ø 45 mm
Housing length	292 mm
IP code of housing	IP65
Measuring range	0-40 m/s (max. 50m/s)
Temperature range heated	- 40 °C up to + 70 °C
Temperature range normal	- 20 °C up to + 70 °C
Shock	50 g, 6 ms
Vibration	4 g Sinus, 5–100 Hz

Connection	plug or cable
Weight	800 g
Maximum load (Current output)	600 Ω
Accuracy	± 3 % + 0,5 m/s Offset
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4

# WIND DIRECTION INDICATOR

WR-Z-MH

# Wind direction indicator with central fixing

## **OPTIONAL**

Shaft heating

A Proof varnishing



6

40

# available in following **VERSIONS**

Type designation	Signal output
WR-Z-MH-2L	4−20 mA / 2-wire technology
WR-Z-MH-3L	4-20 mA / 3-wire technology
WR-Z-MH-SPA	0-10 V
WR-Z-MH-CAN	CAN-Bus / CANopen
WR-Z-MH-Pnet	Profinet

## $C \in -$ conform

# **TECHNICAL DATA**

Housing material	aluminum, grey lacquered
Housing diameter	Ø 45 mm
Housing length	229 mm
IP code of housing	IP65
Measuring range	0-360°
Resolution	1°
Temperature range heated	- 40 °C up to + 70 °C
Temperature range normal	- 20 °C up to + 70 °C
Shock	50 g, 6 ms

Vibration	4 g Sinus, 5–100 Hz
Connection	plug or cable
Weight	800 g
Maximum load (Current output)	600 Ω
Accuracy	2 %
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4



# WIND DIRECTION INDICATOR

WR-P-MH

Wind direction indicator in Pendulum version, specially designed for use on moving objects

#### **OPTIONAL**

- Shaft heating
- A Proof varnishing



# available in following **VERSIONS**

Type designation	Signal output
WR-Z-MH-2L	4–20 mA / 2-wire technology
WR-Z-MH-3L	4–20 mA / 3-wire technology
WR-Z-MH-SPA	0-10 V
WR-Z-MH-CAN	CAN-Bus / CANopen
WR-Z-MH-Pnet	Profinet

 $C \in -$  conform

## **TECHNICAL DATA**

Housing material	aluminum, grey lacquered
Housing diameter	Ø 45 mm
Housing length	320 mm
IP code of housing	IP65
Measuring range	0-360°
Resolution	1°
Temperature range heated	- 40 °C up to + 70 °C
Temperature range normal	- 20 °C up to + 70 °C
Shock	50 g, 6 ms

Vibration	4 g Sinus, 5–100 Hz
Connection	plug or cable
Weight	800 g
Maximum load (Current output)	600 Ω
Accuracy	2 %
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4



# Wind Sensor with integrated **Obstruction Light**

The new Wind Sensor with integrated Obstruction Light guarantees reliable measured values and shadow-free light intensity. The device complies with the lighting requirements according to AVV and the standards and recommendations of ICAO and has a redundant lighting concept.

This combination has many more advantages:

- · Optimal measurement results due to missing wind shading
- No maintenance costs and reduced assembly times
- Accurate positioning ensures reduced light pollution
- · Corrections of the vertical position with the pendulum

#### **OPTIONAL**

- REED-Contact
- Proof varnishing
- Certificate for calibration
- √ rigid ✓ robust
- Shaft heating
- ≽ Cup star ✓ resilient





The obstruction light disables the airflow and the wind sensor obstructs the uniform radiation of the light.

**ABSOLUTELY ACCURATE** 

WITHOUT SHADING

STANDARD SITUATION



Reliable, accurate readings and unrestricted light intensity by combining two systems.

#### LUMINOUS BODY

- Horizontal radiation angle of 360°
- Optionally with automatic twilight switch
- Redundant light concept

#### PENDULUM .....

The vertical position of the wind sensor and the obstruction light takes place independent of the angle of the carrier object (e.g. crane boom) by means of a pendulum.

#### **TECHNICAL DATA** WIND SENSOR

Housing material	aluminum, grey lacquered
Housing	Ø 60 mm
Housing length	386 mm
IP code of housing	IP65
Measuring range	0-40 m/s (max. 50m/s)
Temp. range heated	- 40 °C up to + 58 °C
Temp. range normal	- 20 °C up to + 58 °C
Shock	25 g, 6 ms
Vibration	3 g Sinus, 5–1000 Hz

Connection	plug or cable
Weight	ca. 1,7 kg
Maximum load (Current output)	600 Ω
Accuracy	± 3 % + 0,5 m/s Offset
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4

#### AVAILABLE SIGNAL OUTPUTS

Type designation	Signal output	
AN-60-P-MH-2L	4-20 mA / 2-wire technolog	
AN-60-P-MH-3L	4-20 mA / 3-wire technolog	
AN-60-P-MH-SPA	0-10 V	
AN-60-P-MH-CAN	CAN-Bus / CANopen	
AN-60-P-MH-Pnet	Profinet	

#### $C \in -$ conform



The anemometer is made of aluminum, anodized and equipped with rigid cup star as standard. The electrical connection is freely selectable.

## SHAFT HEATING

The electronically controlled heater switches on automatically at a temperature of +5 °C and ensures the operating range of both devices down to -40 °C.

# FAIL-SAFE DUE TO REDUNDANT LED CONCEPT

The minimum luminous intensity of 10 cd is guaranteed at all times. Since all LED's only work with reduced power in normal operation, the power of functioning LED's can be increased to such an extent that the required luminous intensity is still guaranteed in case of LED failures.



NORMAL OPERATION all LED's work with reduced power

IN CASE OF MALFUNCTION Power of each LED is adjusted to guarantee the minimum luminous intensity

NORMAL OPERATION SAILURE



# TECHNICAL DATA OBSTRUCTION LIGHT

Illuminants	2 x LED-Array
Minimum luminous intensity	10 cd (red) 32 cd (red)
Power input	5,6 W without heating
Electronic	redundant
Lifetime (LM80 (17 k)	> 36.000 h (LED)
AVV	at 10 cd – yes ES – yes (extended specification)
ICAO	at 10 cd – Low-intensity, Typ A at 32 cd – Low-intensity, Typ B
WSV-Certificate	at 10 cd – yes at 32 cd – no



# **First Wind Sensor with** integrated Hazard Beacon

Two in one - FSG combines the Wind Sensor and the Hazard Beacon in one sensor. This unique combination ensures perfect measurement values of the Wind Sensor and optimal light scattering of the Hazard Beacon. The redundant concept of the Hazard Beacon fulfills all requirements of the AVV for Hazard beacons.

This combination has many more advantages:

- · Optimal measurement results due to lack of wind shading
- Reduced maintenance costs and assembly time
- Precise positioning ensures reduced light pollution
- Reliable vertical positioning due to motorized leveling

#### **OPTIONAL**

- REED-Contact
- Proof varnishing
- Certificate for calibration

- Shaft heating
- ≽ Cup star ✓ rigid
  - ✓ robust
- ✓ resilient

- LUMINOUS BODY
- Horizontal beam angle of 360°
- · Automatic twilight switch is possible
- · Extension with infrared beacon is possible

#### Fail-safe due to redundant LED concept

The minimum luminous intensity of 2,000 cd is guaranteed at all times. Since all LEDs operate in normal mode only with reduced power, the power of functioning LEDs can be increased to such an extent that the luminous intensity of 2,000 cd is still guaranteed in the event of LED failures.





### **TECHNICAL DATA** WIND SENSOR

Housing material	aluminum, grey lacquered	
Housing	Ø 150 mm	
Housing length	351 mm	
IP code of housing	up to IP65	
Measuring range	0-40 m/s (max. 50m/s)	
Temp. range heated	- 40 °C up to + 55 °C	
Temp. range normal	- 20 °C up to + 55 °C	
Shock	15 g, 6 ms	
Vibration	5 g Sinus, 10–2000 Hz	

Connection	plug or cable
Weight	6 kg
Maximum load	600 Ω
Accuracy	± 3 % + 0,5 m/s Offset
Supply	18-36 V DC
Shaft heating <5°C	18-33 V DC max. 0,4 A
Current consumption	< 80 mA without heating
Immunity standard	EN61000-6-2
Emission standard	EN61000-6-4

#### AVAILABLE SIGNAL OUTPUTS

Type designation	Signal output	
AN-60-Z-MH-2L	4-20 mA / 2-wire technology	
AN-60-Z-MH-3L	4-20 mA / 3-wire technology	
AN-60-Z-MH-SPA	0-10 V	
AN-60-Z-MH-CAN	CAN-Bus / CANopen	
AN-60-Z-MH-Pnet	Profinet	

## $C \in -$ conform

### WIND SENSOR

The wind sensor is made of aluminum, anodized and equipped with rigid cup star as standard. The electrical connection is freely selectable. Various mounting options can be realized after consultation.

### SHAFT HEATING

The electronically controlled heater switches on automatically at a temperature of +5 °C and ensures the operating range of both devices down to -40 °C.

#### COOLING 🔺

The upper cooling fins ensure that heat is dissipated upwards. This ensures that the max. operating temperature is not exceeded.

## PRESSURE EQUALIZATION

The valve permanently equalizes the pressure that builds up due to temperature fluctuations. This prevents damage to the device.

## COOLING B

The lower cooling fins provide heat dissipation downwards and thus a trouble-free function of the device is guaranteed.

Ø 46

#### TECHNICAL DATA HAZARD BEACON

Illuminants	3 x 2 LED-Array	
Minimum luminous intensity	2000 cd	
Power input	30 W	
Electronic	redundant	
Lifetime (LM80 (17 k)	> 100.000 h (LED)	
AVV	Medium power beacon type E (Flashing light after ICAO)	
ICAO	medium-intensity, Type B+C	
WSV-Certificate	Certification procedure in progress	

A

0 0

B



# OPTIONS AND ACCESSORIES

# **CUP STARE**

### Cup stare for different requirements



#### **Rigid e Cup stare**

They are absolutely robust, made of stainless steel and are installed as standard in ESG Wind Sensors.

#### **Resilient Cup stare**

The rigid webs are replaced by springs to avoid mechanical loads, which can occur mainly in crane and excavator systems. They are mostly used in conjunction with Pendulum design. Note: Only suitable for wind speeds up to 20m/s.



#### **Robust Cup stare**

Durable aluminum cup star for use in extreme conditions.

## **ATEX / IECEx**



For use in potentially explosive atmospheres, our Wind Sensors have optional ATEX and IECEx approval.

### **PROTECTIVE COATING AGAINST SEAWATER**

# Long-lasting operational readiness in saltwater environment

When the wind sensors are used in permanently salty environments, an additional coating protects the devices from premature corrosion.

## SHAFT HEATING



## Increased operational readiness in extremely cold regions

The shaft heater is an electronically controlled heater which switches on at a temperature of + 5 °C. It is available for both wind meter designs. The heater, with an output of 5 W, can be supplied via the operating voltage or separately, depending on customer requirements.

# **CERTIFICATE FOR CALIBRATION**

## Measured values on the test stand

On request, we provide a calibration certificate with the delivery.

# **REED-CONTACT**



# Speed measurement in switched off state

Optionally, we offer an additional reed contact system for our wind sensors. This allows the wind speed to be recorded and evaluated even without operating voltage.

# **LIMIT INDICATOR**

This is an electronic comparator, designed as a surfacemounting plastic housing for screw or standard rail mounting according to DIN 46 277. A maximum of four limit value indicators can be integrated in one housing unit, the switching points of which can be set separately between 0 and 100 % of the input variable via trimming potentiometers. The output signal is provided via potential-free relay contacts, either as normally closed or normally open contacts.

### WIND SPEED INDICATOR WITH LIMIT INDICATOR

It contains an electronic LED circular band display with an externally adjustable max limit contact. The measured value is displayed in the form of a green light band. The limit mark can be selected in the diode chain via a setting potentiometer on the front. If the green illuminated actual display exceeds the red illuminated limit mark, the color of the actual display changes from green to red. At the same time, the limit relay switches and signals the exceeding of the maximum value by switching a potential-free contact.





## **TECHNICAL DATA - DISPLAY**

Design	Panel mounting housing
Front frame	72 mm x 72 mm
Actual display	LED diode string, green
Scale	0-40 m/s, 2:2 m/s
Input	4–20 mA, Ri 50 Ω
Supply	18-33 V DC, < 200 mA
Limit value display	LED, red
Limit value output	potential-free changeover switch, max. 30 V, max. 500 mA
Temperature range	- 30 °C up to + 70 °C
Weight	0,5 kg

#### **TECHNICAL DATA – SWITCHGEAR**

Design	DIN standard rail housing
Input	4-20 mA, Ri 50Ω
Supply	18-33 V DC, < 100 mA
Output	2 normally closed or normally open contacts, max. 30 V, max. 500 mA
Switching point preselection	Separately via two trimmers each between 0 and 100%.
Temperature range	- 30 °C up to + 70 °C
Weight	0,3 kg

# MEASURING SYSTEMS

# **IN COMPARISON**





### THE MAGNETIC MEASURING SYSTEM

It enables absolutely wear-free and contactless measured value acquisition, which is also reliably used under extreme environmental conditions. The corrosion-protected permanent magnet driven via the cup star generates a signal change in the magnetic sensor, which is located under an aluminum housing closed on all sides. A downstream processor converts the magnetic pulses into an analog measurement signal of e.g. 4-20 mA or digitally into a pulse output or CAN signal

## **TACHOGENERATOR**

A tachogenerator built into the aluminum housing is driven by the wind strength. The output signal is proportional to the wind speed and is taken in the form of a voltage in a two-wire circuit.

Measuring systems	Magnetic	<b>Tachogenerator</b>
Housing protection type	IP66	IP64
Electric connection	Plug o. Cable	Plug o. Cable
Measuring range	0-40 m/s (up to max. 50 m/s on request)	0–40 m/s (up to max. 50 m/s on request)
Current output	4−20 mA, R ≤ 600 Ω L	
Voltage output	0−10 V, R ≥ 10 kΩ L	
Digital output	CANopen / Profinet	
Impulse output	customized	
DC-Generator		0-3,4 V at 0-40 m/s on R = 500
Supply	18-36 V DC	
Housing material	Aluminum, grey lacquered	Aluminum, grey lacquered
Cup cross	stainless steel	stainless steel
Shaft heating	with thermostat for temperatures up to - 50 $^{\circ}\mathrm{C}$	with thermostat for temperatures up to - 50 $^\circ  ext{C}$

## INDUSTRY SOLUTIONS

# ANYONE DEVELOPING FOR THE INDUSTRY MUST LEARN FROM THE INDUSTRY.

Every industrial sector has its own language and its own requirements, so there is no one-size-fits-all solution. It is therefore important to us to work with our customers to develop solutions for their individual needs, regardless of which industry they come from.

As a result, FSG has been able to develop trust and expertise in all key industries over the decades. Thanks to unconventional approaches, we have often been able to set standards that many industrial sectors cannot be imagined without to this day. Today our components are trademarks for quality and innovation in many branches of industry.

# THE RIGHT SOLUTION FOR EVERY INDUSTRY.



Construction machine



Medicine



Industry

Ship

;



Rails



Energy



Logistics



Automation



Offshore



We feel at home in every industry.

Therefore, we can answer any question about our products and together we will find solutions to your ideas. Contact us!

info@fsg-sensors.de

# QUALITY & RELIABILITY 🗊

# WE LEAVE NOTHING TO CHANCE.

When it comes to quality, there are no compromises for FSG – regardless of when and where our devices are in use worldwide. Maximum reliability and seamless readiness for action are our top priority. We will develop and manufacture all of our products for a long sensor life for every condition. All series devices go through an extensive 100% test in in-house laboratories and test stands. In this way we always have full control over the quality process. Our new developments pass a detailed type approval test and are certified by external institutes.

With us you are always on the safe side through:

La contraction













# OUR PRODUCT PORTFOLIO KNOWS NO LIMITS, ONLY POSSIBILITIES.

AS VERSATILE AS YOUR REQUIREMENTS - OUR PRODUCT PORTFOLIO

# Do you have any questions about our extensive product portfolio or are you looking for a solution for a special application?

No problem – all our product groups can be easily combined with each other and together with our technical support we will develop the optimal solution specifically for your application.

Rotary Encoders 🛛 🗁



Potentiometers

Ö



Draw-Wire Sensors



Foot Pedals 🛛 🔔



Cable Drums 🛛 🛋



Wind Sensors 🛛 🖄

info@fsg-sensors.de

Inclination Sensors 🛛 🛱

P)

FSG-SENS



Joysticks &

#### DISTRIBUTION NETWORK

# DISTRIBUTION MEANS TRUST. THAT'S WHY WE ONLY TRUST THE BEST.

Through the international orientation of our company and the consistent expansion of new sales structures and opportunities, we offer our global customers a presence close to the market of specialists for measurement and sensor technology from FSG Fernsteuergeräte.

#### GERMANY

#### Headquarters

#### FERNSTEUERGERÄTE Kurt Oelsch GmbH

Jahnstraße 68 + 70 12347 Berlin +49 30 6291-1 sales@fsg-sensors.de

#### **EUROPE**

#### Finland FISEG Oy

•••••

+358 50 5726268 aki.luukkainen@fiseg.fi www.fiseg.fi

#### Netherlands

Batenburg Applied Technologies

+31 10 2928787 controllers-sensors@batenburg.nl www.batenburg-appliedtechnologies.nl

#### Switzerland

#### Omni Ray AG

+41 44 8022737 m.leemann@omniray.ch www.omniray.ch

## INTERNATIONAL

North and South America FSG Sensors Inc.

+1 207 480-3173 sales@fsg-sensors.com www.fsg-sensors.com

#### France ICA systèmes Motion

+33 390 226683 info@icacontact.fr www.icacontact.fr

#### Norway

Elteco AS

+47 35 562070 ha@elteco.no www.elteco.no

#### Spain Electromediciones Kainos, S.A.U.

+34 93 4742333 sballus@kainos.es www.kainos.es

#### South Africa Mecosa (Pty) Ltd.

+27 11 257-6100 measure@mecosa.co.za www.mecosa.co.za

#### Italy MILEXIA ITALIA S.p.A.

+39 24 81900 info@milexia.it www.milexia.com

#### Sweden

Pulsteknik AB

+46 31 7079544 magnus.andersson@pulsteknik.se www.pulsteknik.se

# Austria

Schmachtl GmbH

+43 732 7646-0 j.petschl@schmachtl.at www.schmachtl.at

#### India

#### Manglam Electricals

+91 11 23942222 karn.shanker@manglamelectricals.com www.manglamelectricals.com

# OUR DAY-TO-DAY BUSINESS: MAKING A DIFFERENCE.

**OUR FIVEFOLD PROMISE OF PERFORMANCE** 

#### 90% depth of production, 100% passion



Due to 90% vertical integration, we can customize our products 100% to your needs.

#### 4 plants, one location: Germany

# 

Every day, over 470 employees ensure that you are satisfied and that "Made in Germany" continues to stand for quality.

#### Our standard: customization



FSG products are not only excellent, they are always perfectly designed and customized for your requirements.

# 75 years of innovation is tradition



We will develop measurement sensors that are reliable and perfectly matched to their intended use. Our solutions often become industry innovations – and have been for 75 years.

### Always where our customers are



FSG is represented internationally and we guarantee you the best support, no matter when and where you need us.

#### **IMPRINT**

#### Publisher

FERNSTEUERGERÄTE Kurt Oelsch GmbH Jahnstraße 68 + 70, 12347 Berlin

#### Editing and responsible for content Carsten Schulz (gemäß § 18 Abs. 2 MStV)

#### Copyright

Kurt Oelsch GmbH.

All contents, in particular texts, photographs and graphics are protected by copyright. All rights, including reproduction, publication, editing and translation, are reserved by FERNSTEUERGERÄTE

#### Guarantee

The contents were created with the greatest possible care. However, FERNSTEUERGERÄTE Kurt Oelsch GmbH does not guarantee the accuracy, completeness and timeliness of the content provided.

© Fernsteuergeräte Kurt Oelsch GmbH







Fernsteuergeräte Kurt Oelsch GmbH Jahnstraße 68 + 70 12347 Berlin

Tel. +49 30 6291-1 Fax +49 30 6291-277

info@fsg-sensors.de www.fsg-sensors.de



