

technical documentation

operating manual

SE-H2-X



Documentation 2024-06-18

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|--------------------|--|
| SE-H2-XX | H2-Sensor standard measurement range |
| SE-H2-XX-AZ | H2-Sensor standard measurement range with Display |
| SE-H2-XX-ND | H2-Sensor for low pressure applications |

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1 General Information

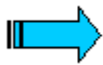
1.1 Notes on the operating instructions

These operating instructions describe the design, function and operation of all available variants of the H2 sensor.

The manufacturer guarantees that these operating instructions have been compiled in accordance with the functional and technical parameters of the H2 sensor supplied. These operating instructions are not subject to the modification service. If the manufacturer makes changes to the H2 sensor in line with technical progress, the user is responsible for categorising the additional or updated pages supplied.

Trouble-free and functional operation of the H2 sensor can only be guaranteed if these operating instructions are known.

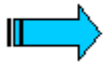
All brand and product names are trademarks or registered trademarks of their respective owners.



Note

Please read all sections of these operating instructions carefully before installing and connecting the H2 sensor.

Pages, tables and illustrations are numbered consecutively.




Note

Note Cross-references are included in the text to guide the reader to more detailed or supplementary information.

1.2 Symbols used


Important safety notes in these operating instructions are identified by symbols. Always follow the notes to avoid accidents, personal injury and damage to property.

Symbol for imminent danger

 DANGER!	<p>You will find this symbol on all occupational safety notes if there is an <u>immediate danger to life and health of persons</u>.</p>
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Failure to observe these notes can result in serious or fatal injuries.

Symbol for imminent danger

 ATTENTION!	<p>This symbol indicates situations in which <u>indirect hazards</u> occur. The degree and intensity of the injury depend on the sequence of events triggered and the behaviour of the person concerned.</p>
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Failure to observe these notes may result in damage to or destruction of the entire H2 sensor or individual components, other property and minor injuries.

Symbol for proper handling

 Note	<p>This symbol is used in places in these operating instructions where reference is made to compliance with guidelines, regulations and correct work procedures.</p>
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If these notes are not observed, the H2 sensor or its individual components may be damaged or destroyed.

1.3 Copyright protection

The operating instructions must be treated confidentially. They are intended exclusively for persons working on and with the device. The operating instructions may not be passed on to third parties without the written consent of the manufacturer. If required, please contact the manufacturer.

 Note!	<p>The content, texts, drawings, images and other illustrations are protected by copyright and are subject to other industrial property rights. Any misuse is punishable by law.</p>
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1.4 Warranty and liability

 Note	Guarantee and warranty claims are only accepted in accordance with the provisions of the manufacturer's "General Terms and Conditions of Delivery and Payment".
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Guarantee and warranty period for the measuring cell: 12 months after delivery

Warranty and liability claims for personal injury and/or damage to property are excluded if they are attributable to one or more of the following causes:

- **Natural wear and tear**
- **No intended use of the H2 sensor**
- **Disregarding the provisions of these operating instructions**
- **Improper installation, commissioning, operation and maintenance of the H2 sensor**
- **Operation of the H2 sensor with ineffective protective measures**
- **Unauthorised functional and technical modifications to the H2 sensor**
- **Removal of parts or installation of spare parts or additional devices that were not supplied or authorised by the manufacturer**
- **improperly carried out repairs or incorrect operation**
- **External influence and force majeure**
- **Damage to the seals**

All information and notes in these operating instructions have been compiled taking into account the applicable regulations, the current state of engineering development and our many years of knowledge and experience.

The actual scope of delivery may differ from the explanations and drawings described here in the case of special versions, the utilisation of additional ordering options or due to the latest technical changes. If you have any questions, please contact the manufacturer.

 Note	These operating instructions must be read carefully before starting any work on and with the appliance, especially before commissioning! The manufacturer accepts no liability for damage and malfunctions resulting from non-compliance with the operating instructions.
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The operating instructions must be kept directly on the device and accessible to all persons working on or with the device. The transfer of the operating instructions to third parties is not permitted and may result in compensation for damages. Further claims reserved.

We reserve the right to make technical changes to the device in order to improve its performance characteristics and for further development.

1.5 EU conformity

We, the company



**Rudolf-Diesel-Str. 17-19
51674 Wiehl
Germany**

declare under our sole responsibility that the product

Description: **Hydrogen sensor**
Type: **SE-H2-XX**

with the requirements of the standards

- | | |
|------------------------------------|------------------------------|
| • EN 61000-6-3:2007+A1:2011 | Emission |
| • EN 61000-6-2:2005 | Interference immunity |
| • EN 61326-1:2013-07 | Interference immunity |
| • EN61326-2-3:2013-07 | Transducer |

and therefore complies with the provisions of EC Directive 2014/30/EU (Electromagnetic Compatibility (EMC) Directive).

Gummersbach, 12.02.2015

Place and date of creating

P. Jaspert (Managing Director)

Name, legally binding signature

The device was tested in a typical situation.


Any changes not agreed with us will invalidate this declaration.


(This declaration corresponds to EN 45 014)


2 Safety instructions


The following safety notes provide general information on possible hazards when operating the H2 sensor. They must therefore be observed and strictly adhered to by the responsible personnel.

- Trouble-free and functional operation of the H2 sensor can only be guaranteed if you are familiar with these operating instructions. Therefore, please read all sections of these operating instructions thoroughly before installing and connecting the H2 sensor.
- The H2 sensor may only be used for its intended purpose (see chapter 4).
- The H2 sensor may only be connected, operated and maintained by trained personnel.

 DANGER!	<p>The sensor may only be used for the applications specified in the technical description and only in conjunction with third-party devices and components recommended or approved by STANGE.</p> <p>Correct and safe operation of the product requires proper transport, storage, installation and assembly as well as careful operation and maintenance.</p>
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 DANGER!	<p>The use of the H2 sensor in potentially explosive atmospheres and the introduction of explosive gas mixtures into the device is not permitted.</p> <p>An explosion-proof version is available.</p>
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 DANGER!	<p>Removing or damaging the seals or opening the housing cover of the H2 sensor is not permitted. (This will invalidate the warranty on the sensor and its function)</p>
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 DANGER!	<p>The sensor must be disconnected from the operating voltage before disassembly / assembly.</p>
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Special safety notes on possible hazards associated with a particular activity or sequence of activities are provided at the relevant point in the text.

2.1 Responsibility of the operator

The sensor may only be operated in a technically perfect and operationally safe condition.

In addition to the occupational safety notes in these operating instructions, the generally applicable safety and accident prevention regulations for the area of application of the sensor as well as the applicable environmental protection regulations must be observed and complied with.

The operator and the personnel authorised by him are responsible for the trouble-free operation of the sensor and for clearly defining the responsibilities for installation, operation, maintenance and cleaning.

Follow the information in the operating instructions completely and without restriction!

The operator must also ensure that

- all further instructions and safety notes resulting from the risk assessment of the workstations at the sensor are summarised in an operating manual in accordance with the German Ordinance on the Use of Work Equipment.
- these operating instructions are integrated into the system documentation.
- maintenance and inspection intervals are adhered to.
- The device, operating materials and waste products generated during production must be disposed of in an environmentally friendly manner and in accordance with legal regulations.

2.2 Repair

Repairs to the sensor may only be carried out by STANGE Elektronik GmbH. In this case, please contact the technical support of STANGE Elektronik GmbH.

No liability is accepted for any modifications to the device that are not described in this document.

2.3 Manufacturer address

Manufacturer:**STANGE Elektronik GmbH**

Rudolf-Diesel-Str. 17-19
51674 Wiehl
Germany

Tel.: +49 (0)2261 - 95790

Fax: +49 (0)2261 - 55212

e-mail: info@stange-elektronik.de

Homepage: www.stange-elektronik.de

Responsible**STANGE Elektronik GmbH Thuringia office**

Wandersleber Str. 1b
99192 Apfelstädt
Germany

Tel: +49 (0)36202 75090

Fax: +49 (0)36202 750991

2.4 Technical support

Support:

e-mail: support@stange-elektronik.de

3 Transportpackaging and storage

3.1 Waste disposal

Stange Elektronik GmbH is responsible for the environmentally friendly disposal of old appliances. We will dispose of the devices if they are delivered free to the manufacturer's address stated above. Alternatively, please contact a certified disposal company for electronic waste.

Materials:

- Housing: aluminium, stainless steel
- Printed circuit board: 1st quality

3.2 Transport

Check the delivery immediately upon receipt for completeness and transport damage.

In the event of externally recognisable transport damage, do not accept delivery or only accept delivery with reservations. Note the extent of the damage on the transport documents/delivery note of the carrier. Initiate a complaint.

Complain in writing about hidden defects as soon as they are recognised (at the latest within 8 days (date of receipt)), as claims for damages can only be asserted within the applicable complaint periods.

3.3 Packaging

The packaging is an essential part of the product. The packaging is developed by the manufacturer individually for each product. In the event that you need to send your device for servicing or customer service during the warranty period or thereafter, only use the original packaging to transport the device. For this reason, you should keep the original packaging for as long as you have the appliance in your possession. If you wish to dispose of the packaging, we are obliged to take it back in accordance with the provisions of the German Packaging Ordinance and must ensure that it is either recycled or reused.

3.4 Storage

Keep the packages closed until assembly and observe the external installation and storage markings.

When not in use, the appliance must be stored in a dry, dust-free room.


4 Intended use

The main area of application for the H2 sensor is hydrogen measurement in furnace atmospheres and exhaust gases as well as in protective gases and generator gases.

Typical applications of the H2 sensor are

- **Continuous measurement of the hydrogen content in gases and gas components**
- **Signalling the deviation of the hydrogen concentration from a specified target value**
- **Control of the flow of certain production processes**
- **Monitoring the purity of gases**

 Note	<p>Any other use is considered improper use!</p>
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 DANGER!	<p>Any use of the sensor that goes beyond the intended use and/or any other use is prohibited and is considered improper use. In particular, the use of the sensor as a replacement for protective devices as defined in the Machinery Directive (DIN EN ISO 13849-1) is not permitted.</p> <p>Claims of any kind against the manufacturer and/or its authorised representatives due to damage resulting from improper use of the sensor are excluded.</p> <p>The operator alone is liable for any damage caused by improper use.</p>
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Suitable protective measures must be taken for special applications where a hazard could arise or for media that could damage the H2 sensor!

Include the sections that may take place before and after the actual process!

In special cases, talk to the manufacturer about possible special solutions!

The use of the H2 sensor is not permitted in connection with:

- **Special requirements for explosion protection**
- **Soot and dust pollution**

The requirements and limit values specified in the technical data must be complied with at all times.

5 Structure and function

5.1 Basic structure

The H2 sensor consists of the sensor element and downstream electronics in a common housing.

The sensor element consists of four measuring cells with electrically heated resistance wires, which are interconnected to form a Wheatstone bridge.

Two opposing cuvettes are exposed to the sample gas.

A KF16 flange is provided for connecting the H2 sensor to the medium to be measured.

5.2 Function

The H2 sensor utilises the principle of the thermal conductivity detector (WLD).

The bridge voltage is standardised in the electronics to the desired measuring range and output as a standard signal.

4-20 mA is provided.

If a display is available, the value is shown in % hydrogen by volume.

The transport of the sample gas to the sensor element takes place by convection / diffusion. This process is patented.

This method means that only a single free gas access to the sample gas atmosphere is required. A flow through the sensor and the associated possible contamination are avoided!

5.3 Measuring accuracy

Before delivery, the H2 sensor is tested with a highly accurately measured, certified test gas (H2 in N2).

The relative measurement error is specified as 0.5 % in relation to the upper range value.

Ensure high measuring accuracy:

- **Tightness of the gas supply line (connection line)**
- **Suitable mounting location (installation location), see also 6.1 Installation**
- **Compliance with the maximum permitted flange temperature at the sensor, see Fehler! Verweisquelle konnte nicht gefunden werden. Measurement data**

Depending on the specific operating conditions and accuracy requirements for the measurement, it is recommended to have the sensor checked by the manufacturer approximately once a year.

6 Start-up

6.1 Installation

The preferred operating position of the H2 sensor is vertical (housing facing upwards/connection flange facing downwards). In a horizontal installation position, the sensor should be installed with an inclination of at least 3° to prevent the ingress of condensation..

The H2 sensor is attached directly to the gas chamber or as close as possible to the process using a suitable KF16 counterflange and pipe section / convection pipe. directly to the gas chamber or as close as possible to the process. This requires a centring ring (also known as a sealing ring) and a clamping ring. are required.

It must be ensured that the sensor opening has free access to the gas chamber so that the convection flow can form from the sensor inlet to the internal measuring cell.

Ensure that the vacuum flange is tight! The pipework should only be vacuum-tight. design.

The installation location must be selected so that no harmful turbulence occurs at the sensor inlet that could impair or prevent the formation of the convection flow.

Particularly when installing the sensor in exhaust gas pipes convection can be disturbed or prevented by the Venturi effect.

There must be no heat sources or devices that generate strong magnetic fields (e.g. powerful electric motors, transformers) in the vicinity of the installation site.

The conditions at the place of use must comply with protection class IP 20.

6.2 Assembly example

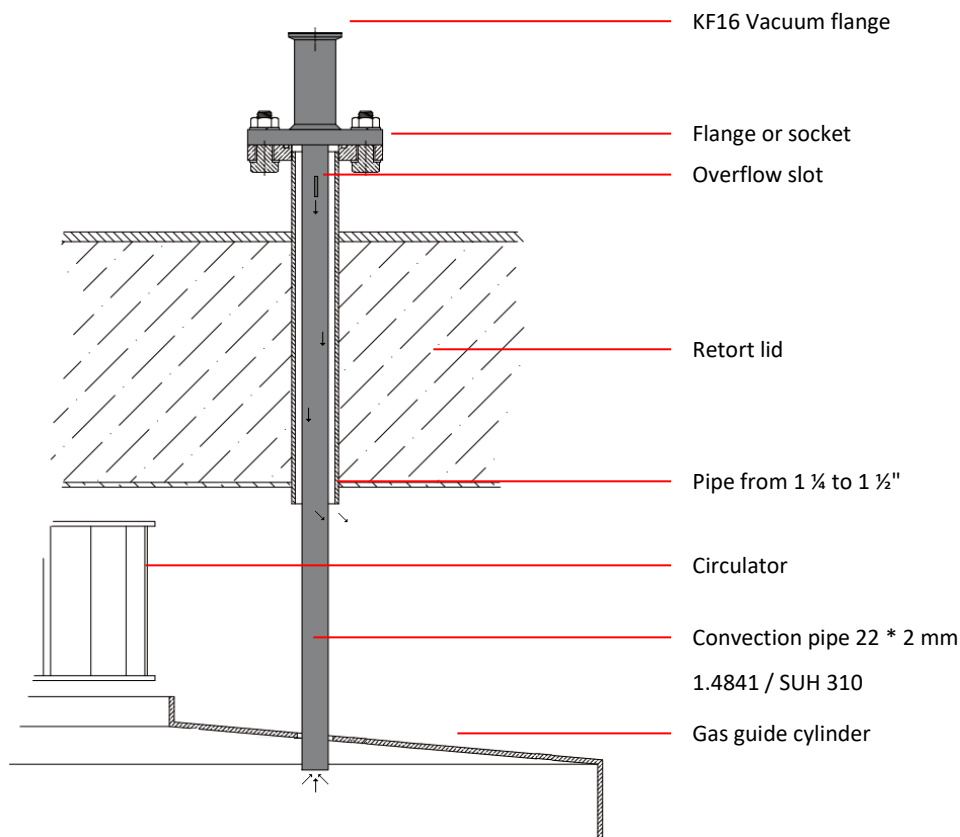


Illustration 1; Schematic mechanical connection via diffusion tube

6.3 Electrical connection

A corresponding 24V/2A power supply unit can be supplied for the H2 sensor.. We recommend using this power supply unit to supply the sensor. This is the only way to prevent mutual interference with other components of the system.

The H2 sensor is connected to the power supply via the 4-pin DIN 41524 round socket and the supplied plug (optionally with cable).

Table 1;Input voltage

Pin no.	Input voltage	Core colour
1	24 V _{DC}	Brown
2	GND	White

The standard output (4 to 20 mA) is connected to a suitable current input of the analyser.

Table 2;Voltage/current output

Pin no.	Output	Core colour
3	+ mA _{out}	Green
4	- mA _{out}	Yellow

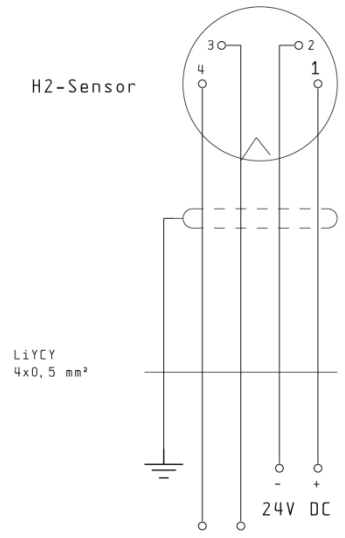


Illustration 2DIN socket connection

6.4 Function check

When transporting from a cold environment to a location with a higher ambient temperature or humidity, allow a waiting time of at least two hours for the temperature to equalise before switching on the H2 sensor.

After the operating voltage is applied, the H2 sensor requires a heat-up time of approx. 20 minutes. The heat-up phase is signalled by a red flashing LED on the sensor.

Once the set temperature range has been reached, the LED changes to solid green.

If a display is available, a status icon and the current sensor temperature are shown instead.

The H2 sensor is now ready for operation. With ambient air and normal pressure, the output current should be 4.00 mA or 0.0 % if the display is present.

7 Maintenance and troubleshooting

7.1 Maintenance

The electronics and the measuring cell are maintenance-free.

In the event of defects, the H2 sensor must be sent to the manufacturer for repair.

7.2 Troubleshooting

If the H2 sensor does not provide the required values, the user can carry out the following function tests. If these are not successful, the sensor must be returned to the manufacturer for inspection or repair.

In case of own repair attempts or damage to the seals the warranty claim expires.service.

Heatingpower supply:

After connecting the H2 sensor to the power supply, the power indicator should flash red.

If the display is present, it should switch on and show the heating symbol.

If this is not the case, it is recommended to check all connections between the H2 sensor and the power supply and to check the operating voltage of 24 V ... 26.4 V DC max.

After approx. 20 minutes of heating up, the operating indicator should change to a continuous green light.

When the display is on, the heating symbol changes to the ready symbol and the displayed temperature is

70°C +/-1 degree.

A clear warming should be noticeable in the area of the flange (warm to the touch).

Alternatively, the current consumption at the operating voltage connection can also be measured. It should be between approx. 400 and 900 mA.

If the operating indicator continues to flash red or the operating temperature is not reached, the operating voltage tolerance should be checked.

The measurement should be carried out with the H2 sensor connected both at the power supply and directly at the H2 sensor, if necessary at the open connector plug pins 1 and 2 of the H2 sensor in order to be able to detect any line losses. The operating voltage directly at the H2 sensor should not fall below 24 V ... 26.4 V DC max. and the polarity should be should correspond to the specifications under point 5.3. If necessary, the power supply must be adjusted.

Output signal:

If the expected values are not displayed on the evaluation unit during operation, the output signal of the H2 sensor should be re-measured.

To do this, use a multimeter to measure the mA output between pin3 and pin4 without an evaluation unit.

When the operating voltage is applied a signal of 20 mA must be measurable at the output of the sensor for a short time (approx. 2 seconds) (self-test of the electronics). After this, the output signal is 0 mA.

After the warm-up phase the output signal should be 4.00 mA in ambient air.

For safety reasons, the output signal may only be checked using H2 gas in closed systems. If you suspect that the sensor is measuring incorrectly in an H2 atmosphere, please return the device to the manufacturer.

Evaluation unit:

If the output signal (see above) can also be measured directly at the input of the evaluation unit in the correct polarity, the problem must be sought in the connected evaluation unit.

A frequent cause of errors is, for example, the lack of or poor contacting of the measuring resistor at the analogue input of the evaluation unit.

If necessary, please contact our support team or the relevant manufacturer of the evaluation unit.

8 Technical data

Table 3, Characteristic data

Designation	H2 sensor SE-H2-XX-YY Note: XX stands for the measuring range, usual measuring ranges are 60for 0 to 60 % by volume H2 75for 0 to 75 % by volume H2 100for 0 to 100 vol.-% H2 S for special measuring range, in coordination with the manufacturer YY (optional) stands for special version AZ for version with LCD display ND for low pressureapplication at 3 to 30 mbar abs, calibrated to 5 mbar abs.
Measurement data	
Measuring range	60, 75 or 100 % H2, others on request
Measuring pressure standard version	30 mbar to 10 bar absolute
Measuring pressure Low pressure version	3 to 30 mbar absolute (calibrated at 5 mbar)
Measuring accuracy at measuring pressure	rel. Measurement error < 0.5%
Permissible pressure of the sample gas	0 bar to 10 bar overpressure
Max. permissible temperature at the connecting flange	65 °C
Mechanical data	
Dimensions	105 x 66 x 240 mm (W x D x H)
Weight	1.0 kg
Gas inlet	DN 16 KF vacuum flange DIN 28403, ISO 2861
Degree of protection	IP 20
Electrical connection	
Tension	24 V ... 26.4 V DC max.
Power consumption	20 W
Heating up time	approx. 20 minutes
Direct current output	4 - 20 mA (0 mA for error)
Ambient conditions	
Ambient temperature	min. 5 °C, max. 45 °C
Relative humidity	up to 80 % at 20 °C
Storage conditions	min. -10 °C, max. 60 °C rel. humidity < 85 % at 20 °C

8.1 Materials of components in contact with sample gas

- **Glass**
- **Stainless steel**
- **Fluorine elastomer, Hastelloy, titanium***
- **Ceramics***

* for special designs

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