# Installation and Maintenance Instruction Manual

## All Stainless Steel Gas Actuated Thermometer Model S5500

for industrial application

In the following configuration:

- ###S5500### gas actuated thermometer without switching contact
- ###S5500### #### gas actuated thermometer with magnetic spring or inductive proximity switches

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# 1 General remarks

## 1.1 Purpose of this Manual

This Operating Manual contains fundamental and essential advice to be followed for the installation, operation and servicing of the device. It must be read without fail before assembly and start-up of the device by the fitter, the operator and the specialist personnel responsible for the device. This Operating Manual must be available at the point of use of the device at all times.

The following sections about general Safety information (2) and also the following specific advice regarding the intended purposes (2.2) and through to disposal (10.3) contain important safety information which, if not followed, may result in risks for people and animals, or to property and buildings.

## 1.2 Symbols

**Warning!**
This indicates a possibly hazardous situation where failing to follow advice may result in risks to people, animals, the environment and buildings.

**Information!**
This emphasizes key information for efficient, fault-free operation.

## 1.3 Limits of liability

Failure to respect this safety information, the envisaged uses or the limit values relating to use indicated in the technical data for the device may result in risk or to injury to people, the environment or the plant.

Claims for compensation for damage against the device supplier are excluded in such an eventuality.

## 1.4 Copyright

This Operating Manual may only be copied and passed on as a complete document without the special permission of the publisher.

## 1.5 Warranty

For the product described here, we offer a warranty pursuant to Section 6 Guarantee in Respect of Defects in our General Terms and Conditions of Delivery and Payment.

## 1.6 Manufacturer's address, customer services

**Ashcroft Instruments GmbH**
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D-52477 Alsdorf, Germany

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E-mail: customer.service@ashcroft.com
Web: www.ashcroft.eu

# 2 Safety

## 2.1 General sources of hazards

Temperature gauges are generally a constituent part of a control and measurement system, and their failure can result in hazardous situations. The selection of temperature gauge should be made in accordance with the rules set out in EN 13190 or ASME B40.200.

## 2.2 Use in accordance with intended purpose

The devices are only to be used for the intended purpose as described by the manufacturer.

The devices are used for direct display of temperatures.

For each use scenario, the corresponding set-up regulations must be respected. The use in explosion risk areas is not permitted.

## 2.3 Operator's responsibility

Safety instructions for proper operation of the device must be respected. They are to be provided by the operator for use by the respective personnel for installation, servicing, inspection and operation. Risks from electrical energy and from the released energy of the medium, from escaping media and from improper connection of the device must be eliminated. The details for this are to be found in the corresponding applicable set of regulations, such as DIN EN,

UVV (accident prevention regulations) and in sector-specific instances of use (DVWG, Ex-. GL, etc.) the VDE guidelines and the regulations supplied by local utilities companies.

The device must be taken out of service and secured against inadvertently being restarted, if the presumption is that risk-free operation is no longer possible (see Chapter 10: Faults).

Conversion works or other technical alterations to the device by the customer are not permitted. This also applies to installation of spare parts. Possible conversations or alterations may only be carried out by the manufacturer.

The operational safety of the device is only guaranteed where it is used for its intended purpose. The specification of the device must be adapted to the medium used in the plant. The limit values indicated in the technical data must not be exceeded.

The safety information detailed in this Operating Manual, existing national regulations for accident prevention, and the operator's internal regulations regarding working, operations and safety must be respected.

The operator is responsible for all specified servicing, inspection and installation works being carried out by authorized and qualified specialists.

## 2.4 Staff qualifications (target group assessment)

The device may only be installed and started up by specialist staff who are familiar with installation, start-up and operation of the product.

Specialist staff are people who are able to assess the work assigned to them on the basis of their specialist training, their knowledge and experience and their knowledge of the relevant standards, and can identify possible risks.

## 2.5 Signs/Safety markings

The gauge and its surrounding packaging carry markings. These markings show the article number, measurement range and manufacturer. The gauge can be provided with additional signs and safety markings advising on special conditions:

- Advice on the filling liquid
- Advice on calibration

## 2.6 Environmental protection

This device may optionally contain a filling liquid (e.g. glycerin or silicone oil). The provisions set out in the REACH regulation on production and use of chemicals are to be respected, and the relevant safety data sheets from the manufacturers of the chemicals are available on our website for download.

# 3 Technical data

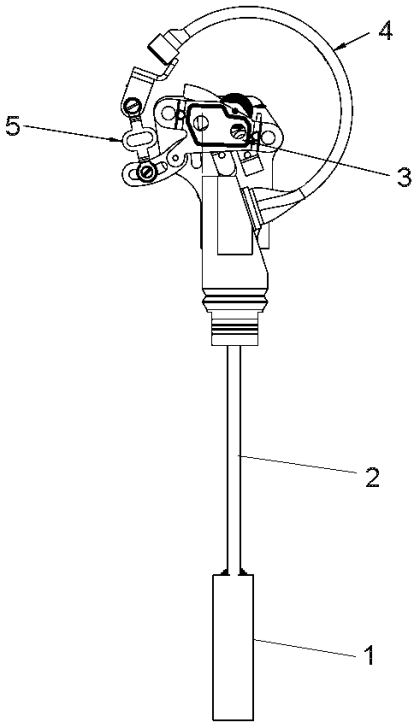
The detailed technical information can be found in the documents in the Appendix, Chapter 11.

# 4 Labeling on the device

The label with the serial number and type designation is located on the outside right of the housing. The nature of the subject characteristics is encoded in the type designation.

# 5 Construction and function

## 5.1 Overview




1 Bulb
2 Capillary line
3 Movement
4 Bourdon tube
5 Link

## 5.2 Description of function

The temperature is transferred via thermal conduction to a compressed inert gas inside the sensor. The properties of gases mean that any temperature change brings about a change in pressure, and this is transferred via a capillary tube (in the fixed stem or executed as a flexible capillary line) to the Bourdon tube on the gauge. This produces a deflection of the Bourdon tube that is proportional to the change in pressure. A rotary movement is produced via a connecting rod and a movement, which is transferred to the indicator arm using an arbor. The angle of rotation for the complete range is approx. 270°.

## 5.3 Description of components

### 5.3.1 Bulb

The temperature sensor has a diameter of 6-10 mm and a length of 55-1000 mm, and contains the inert gas under pressure. Its active length is 55-190 mm, depending on the diameter. The temperature sensor must not be subjected to pressure without a supplementary thermowell.

### 5.3.2 Capillary line

The capillary tube is located in a protected position within the stem, or is executed as a flexible part with or without additional flexible armor or a plastic sheathing.

### 5.3.3 Case

The window uses multi-layer safety glass. This device is fitted with a rear plug capable of being blown out.

### 5.3.4 Dial with pointer

The gauge is equipped with a dial and pointer pursuant to EN 13190.

### 5.3.5 Instrument connection

The instrument connection is located on the underside of the gauge and can be executed as a threaded or flanged connector. Union instrument connections permit the case to be oriented according to the point of installation.

## 5.4 Accessories

Please contact the manufacturer regarding special tools and accessories.

# 6 Transport

## 6.1 Safety

The thermometer should be protected against the effects of knocks and impacts. The device should only be transported in the packaging provided, to protect against glass breakage. The device should only be transported in a clean condition (free from residues of measuring media).

## 6.2 Transport inspection

The delivery is to be checked for completeness and damage during transport. In the event of damage during transport, the delivery is not to be accepted, or only accepted subject to reservation of the scope of the damage being recorded and, if necessary, a complaint initiated.

## 6.3 Storage

The gauge is to be stored in dry, clean conditions, within a temperature range of -20 to +60 °C, protected against direct exposure to sunlight and protected against impact damage.

# 7 Mounting/Installation

## 7.1 Safety

Thermowells must be used for all processes and flowing media subjected to pressure. They protect the thermometer stem against corrosion and mechanical damage, and permit the thermometer to be removed without leaks.

## 7.2 Preparations (requirements for the installation location)

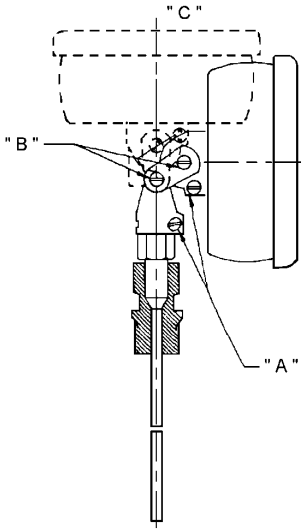
- A check on suitability of the device and of the thermowell that may be required for the medium to be measured, the arrangements in the scope of measurement range and the extent of the protection against special conditions such as vibrations.
- A bracket must be installed to support the gauge if the metering pipe is not able to provide adequate support.
- Devices with a blow-out require a minimum spacing to the rear (20 mm).
- The operating temperature range is -30°C to + 80 °C.

## 7.3 Mounting/Installation

- Using appropriate accessories, the device can be installed on flat walls, mounting plates, on pipes or in panels or boards.
- Ex works, the device is supplied and calibrated for vertical installation.
- If the installation location deviates from the vertical (max. ± 5°), the zero setting on the indicator must be corrected (see 7.4.1 Zero point adjustment).

### 7.3.1 Every angle connection (optional)

- Only adjust the every angle connection if this is necessary during fitting or removal.
- Use the every angle connection to place the sensor in the correct position prior to installation, proceeding as follows:
- Position the thermometer housing in a straight alignment (Position “C”)
- Using the screws marked “A”, loosen until the joint can be turned freely through 180° on the lower part of the housing and the sensor.
- Hold the thermometer housing firmly with one hand, and with the other hand turn the joint piece until the inner part of the joint is showing in the desired direction of bend.
- Firmly tighten the aforementioned Screws “A” again.
- Loose the screws marked “B” and move the joint into the desired direction of bend.
- Firmly tighten the aforementioned Screws “B” again.




### 7.3.2 Process connection

- Connection only to be undertaken by authorized and qualified specialist staff.
- Use only with the mechanical process connection provided – regarding the configuration, see order code on the device type label.
- When connecting the device without using a thermowell, the pipes must be depressurized.
- Do not allow any mechanical force to be applied to the stem; in particular, pay attention to matching the "S" lengths of the thermometer and the thermowell, to avoid contact against the base of the thermowell.
- A thermal transfer medium (heat conducting paste) in the thermowell improves the reaction time and reduces the measurement error caused by the thermal transfer.
- The minimum capillary line radius is 40 mm (1 ½”). Place it so that it will be protected from damage. Should the capillary line be too long, coil the surplus neatly at a convenient point but **“DO NOT CUT IT.”**
- The thermometer system (Bourdon tube, capillary line and temperature sensing bulb) must not, under any circumstances be taken apart, or the capillary line cut.

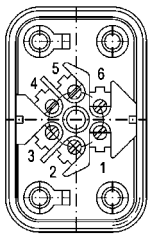
**Safety notice:** Only mount using the correct open-jawed wrench, and do not twist the device itself.

Do not insert moist or oily stems into hot thermowells.

### 7.3.3 Electrical connection

Take note of the electrical data in the EU design type test certification and the locally-applicable regulations and guidelines for installing and operating electrical plant in explosion risk areas (e.g. EN 60079-14, etc.).

- Connection to be undertaken by authorized and qualified specialist staff only.
- The electrical connection of the device is to be undertaken in accordance with the relevant regulations of the VDE and the regulations supplied by the local utilities company.
- Disconnect the plant from the mains supply before wiring electrical connections.
- Install appropriate fuses upstream.



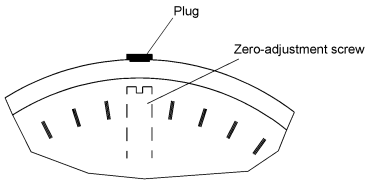

Please refer to type label for configuration of connections

## 7.4 Starting up

- The precondition for start-up is correct installation. All connecting lines must be laid such that no mechanical forces can act on the device.
- Before start-up, the seal on the thermowell in the pipe must be checked.

### 7.4.1 Zero point adjustment

- On thermometers with an external adjustment option, remove the plug at the top of the case and rotate using a screwdriver until the pointer is showing the desired temperature on the scale.



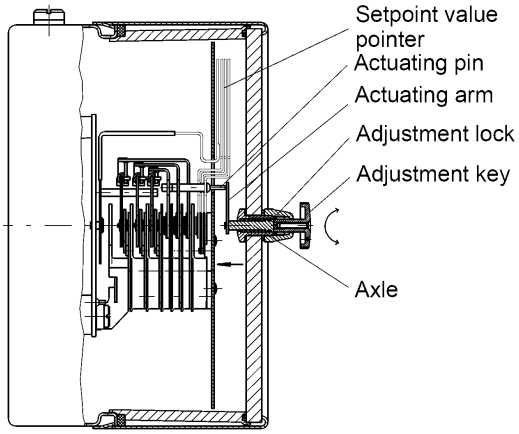

### 7.4.2 Setting the switch point

An adjustable lock is fitted in the front panel of the thermometer. Using the removable adjustment key, the contacts mounted on the target value indicators can be set to any point on the range covered by the scale.

For reasons relating to accuracy of switching and the lifetime of mechanical measurement systems, the switch points should be positioned between 10% and 90% of the range.

- Place the adjustment key on the axle of the adjustable lock.
- Press the axle inwards, until the carrier arm grips behind the adjuster pin on the target value indicator.
- By turning the key, adjust the target value indicator to the desired switch point.

Release the pressure on the axle, and remove the adjustment key.




# 8 Servicing

The device is maintenance-free. However, to ensure reliable operation and a long lifetime for the device, we recommend that it is checked regularly.

## 8.1 Safety

When undertaking servicing work on the device fitted without a thermowell, the lines must be depressurized and the plant secured against being switched on again.

## 8.2 Check on function, and recalibration

The check on function and recalibration is carried out at regular intervals, depending on the application. The precise testing cycles should be adjusted in line with the operating conditions and ambient conditions.

- Check on display.
- Check the thermowell for damage and seal.

### 8.3 Cleaning and maintenance

Cleaning is carried out using a non-aggressive cleaning agent, respecting the protection category of the device.

# 9 Faults

## 9.1 Safety

Defective or faulty gauges put the operational safety and process safety of the plant at risk, and can lead to a risk or injury to persons, the environment or the plant.

## 9.2 Conduct in the event of faults

All defective or faulty devices are to be taken out of service. If a repair is required, the device is to be sent directly to our Repairs Department. We request that all returns of devices are agreed with our Service Department.

## 9.3 Fault table

Possible situations indicating a fault:

- Jerky or random movement of the pointer
- No correspondence between the measured value being displayed and actual temperature
- Bent or loose pointer
- Cracked window
- Damage to housing
- Bended stem or bulb
- Sharp edged bended capillary line
- Extended storage at temperatures above 60 °C

In these instances, replacement of the gauge is always required.

## 9.4 Conduct following fault rectification

See Chapter 7 Mounting/Installation

# 10 Demounting, disposal

## 10.1 Safety

Residues of measuring media in and on removed gauges can constitute a risk to people, the environment and equipment. Adequate precautionary measures are to be adopted. If necessary, the devices are to be cleaned thoroughly (see advice in safety data sheets).

## 10.2 Demounting

- When undertaking servicing work on the device fitted without a thermowell, the lines must be depressurized and the plant secured against being switched on again.
- Demount the gauge using a suitable tool.

## 10.3 Disposal

Please help to protect the environment and dispose of or recycle the devices and components used in accordance with the applicable regulations.

# 11 Appendix, Datasheets All Stainless Steel Gas Actuated Thermometers

More detailed datasheets are available direct from the manufacturer (see 1.6 Manufacturer address, customer services).
The table below contains an overview of the individual documents.

| Model | Description | Document |
|---|---|---|
| S5500 | All stainless steel gas actuated thermometer, Model S5500 pursuant to EN 13190 | G2.S5500 |
| K5500 | Electrical contact devices for pressure and temperature gauges | G1.K55 |