Installation and Maintenance Instruction Manual

Bourdon tube pressure gauge with integrated transmitter, model T5500E

for industrial application

In the following configuration:

- 100=T5500E### bourdon tube pressure gauge with integrated transmitter

ASHCROFT
Trust the shield.

Table of contents:

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 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

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2 Safety

2.1 General sources of hazards

Pressure gauges are pressurized instruments where failure can result in hazardous situations. The selection of pressure gauge should be made in accordance with the rules set out in EN 837-2. A failure resulting in injury or damage may be caused by excessive overpressure, excessive vibration or pressure pulsation, excessive instrument temperature, corrosion of the pressure containing parts, or other misuse. Consult the manufacturer before installing if there are any questions or concerns.

2.1.1 Overpressure

Pressure spikes in excess of the rated overpressure capability of the transducer may cause irreversible electrical and/or mechanical damage to the pressure measuring and containing elements.

Fluid hammer and surges can destroy any pressure transducer and must always be avoided. A pressure snubber should be installed to eliminate the damaging hammer effects. Fluid hammer occurs when a liquid flow is suddenly stopped, as with quick closing solenoid valves. Surges occur when flow is suddenly begun, as when a pump is turned on at full power or a valve is quickly opened.

Liquid surges are particularly damaging to pressure transducers if the pipe is originally empty. To avoid damaging surges, fluid lines should remain full (if possible), pumps should be brought up to power slowly, and valves opened slowly. To avoid damage from both fluid hammer and surges, a surge chamber should be installed.

Symptoms of fluid hammer and surge's damaging effects:

- Pressure transducer exhibits an output at zero pressure (large zero offset).
- Pressure transducer output remains constant regardless of pressure
- In severe cases, there will be no output.

2.1.2 Freezing

Prohibit freezing of media in pressure port. Unit should be drained (mount in vertical position to prevent possible overpressure damage from frozen media.

2.1.3 Static electrical charges

Any electrical device may be susceptible to damage when exposed to static electrical charges. To avoid damage to the transducer observe the following:

- Operator/installer should follow the proper ESD (electrostatic discharge) protection procedures before handling the pressure transducer components.
- Ground the body of the device BEFORE making any electrical connections
- When disconnecting, remove the ground LAST!

The shield and drain wire in the cable (if supplied) is not connected to the transducer body, and is not a suitable ground.

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 overpressures, vacuum and compound pressure and for transmission of overpressures, vacuum and compound pressure into a standard electrical output signal.

For each use scenario, the corresponding set-up regulations must be respected.

The usage in explosion risk areas is not allowed.

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 9: Faults).

Field Modification or other-alterations to the instrument are not permitted and will void the warranty. 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 familiar with installation, start-up and operation of the product.

Specialist staff are defined as those individuals capable of assessing the work assigned to them on the basis of their specialist training, knowledge and experience of the relevant standards, and can identify possible risks.

2.5 Signs/Safety markings

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

- Advice on calibration
- Safety marking pursuant to EN 837-1
- Oil-can deleted (if used for oxygen service)
- Silicone-free (for use in the automotive industry)

2.6 Safety equipment

The window of model T5500E uses multi-layer safety glass.

This device has internal transient and reverse power protection.

2.7 Environmental protection

This device does not contain any environmental critical components.

3 Technical data

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

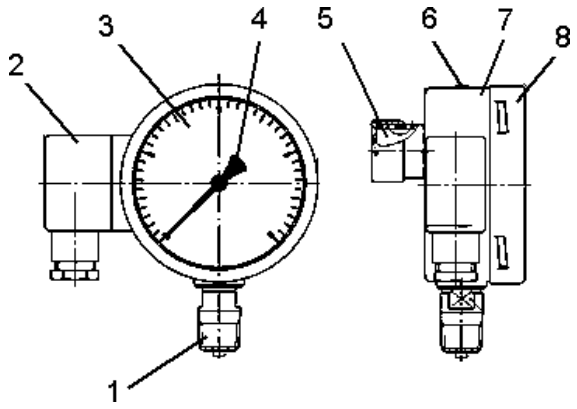
4 Labeling on the device

The label with the serial number and type designation is located on the outside of the housing. The materials identifier is encoded in the type designation.

5 Construction and function

5.1 Overview

1 Socket and instrument connection
2 Electrical termination
3 Dial
4 Pointer
5 Cap with access to PCB
6 Vent valve
7 Case
8 Bayonet ring



5.2 Description of function

The sensing element, a bourdon tube (C-form or helical) that is welded to the socket, will be exposed from inside with pressure. Under pressure the elastic tube is deflecting against the zero position. This deflection is proportional to the adjacent pressure. The movement transfers the deflection to the pointer.

The display of the measured value is provided on a 270° scale (dial arc.).

The sensing element, a thin film pressure sensor that is welded to the socket, will be exposed from outside with pressure. Under pressure the elastic diaphragm is deflecting against the zero position. This deflection is measured by resistors of a Wheatstone bridge located at the back side of diaphragm. The PCB transfers the output signal of the sensing element into a standard electric output signal.

5.3 Description of components

5.3.1 Scale with pointer

The pressure gauge is equipped with a dial face and pointer pursuant to EN 837-1, nominal size 100 mm.

5.3.2 Instrument connection

The instrument connection is located on the bottom side of the pressure gauge and is a threaded pressure connection.

5.3.3 Vent valve

The vent valve for the housing is located on the top side. If the nipple is pulled out, the housing is ventilated and the pressure which has built up in the housing due to the influence of temperature is discharged. With the valve closed, protection class IP 65 is achieved.

5.3.4 Thin film sensing element

The pressure transmitter incorporates polysilicon thin film technology. Modern low-pressure chemical vapor deposition methods provide simple, stable molecular bonds between the metal diaphragm and a polysilicon strain gage bridge. There are no epoxies or bonding agents to contribute to signal instability or drift. The integral metal diaphragm and polysilicon bridge are virtually unaffected by shock, vibration or mounting.

5.3.5 Printed circuit board

The PCB provides the signal conditioning and is equipped with pots for zero and span adjustment.

5.3.6 Electrical termination

The electrical termination is provided with standardized termination plug.

5.4 Accessories

Please contact the manufacturer regarding special tools and accessories.

6 Transport

6.1 Safety

The pressure gauge should be protected against the effects of knocks and impacts. The device should only be transported in the packaging provided to prevent damage. The device should only be transported in a clean condition (free of residues of measuring media).

6.2 Transport inspection

Delivery should be checked for completeness and potential damage due to transport. In the event damage, delivery must not be accepted, or only accepted subject to reservation of the scope of the damage being recorded.

6.3 Storage

The pressure gauge must be stored in dry, clean conditions, within a temperature range of -40 to +85 °C, protected against direct exposure to sunlight and protected against impact damage.

7 Assembly/Installation

7.1 Safety

To ensure safe working during installation and servicing, suitable shut-off valves must be installed in the plant (see 5.4 Accessories) prior to enabling the device:

- Relieve pressure to remove from operation;
- Disconnect power for repair or inspection within the relevant plant;
- Or to enable function tests of the device to be performed “on site”.

During preparation to mount/install the gauge, the plant must be protected against being switched back on.

7.2 Preparations (requirements for the installation location)

- A check on suitability of the device for the medium to be measured, the scope of the measurement range and of the protection against special conditions such as vibrations, pulsations and pressure spikes.
- A bracket must be installed to support the pressure gauge if the metering pipe is not able to provide adequate support.
- The installation location should be selected where no personnel operate the rear of the pressure gauge.

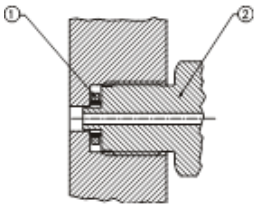
7.3 Mounting/Installation

7.3.1 Process connection

As standard, the device is equipped to be pipe mounted with a pressure connection shank pursuant to DIN EN 837-1. The device is calibrated ex-works for vertical installation.

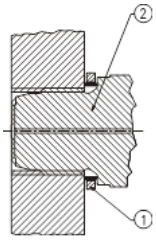
- Connection to be undertaken by authorized and qualified specialist staff only.
- Use only with the mechanical process connection provided – regarding the configuration, see order code on the device type label, with a matching threaded seal.
- When connecting the device, the pipes must be depressurized.
- The pressure metering pipe must be laid inclined in such a way that, for example, for measurements of fluids no air pockets can form, and for measurements of gases no water pockets. If the necessary incline is not achieved, then at suitable points water separators or air separators must be installed.
- The pressure metering pipe must be kept as short as possible and laid without sharp bends, to avoid the occurrence of irritating delays.
- With liquid measurement media, the pressurized connection pipe must be degassed, since any gas bubble inclusions result in measurement error.
- If water is used as the measurement medium, the device must be frost-protected.

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



G ¼ B, G ½ B

1. Pressure connection
2. Gasket DIN 16258



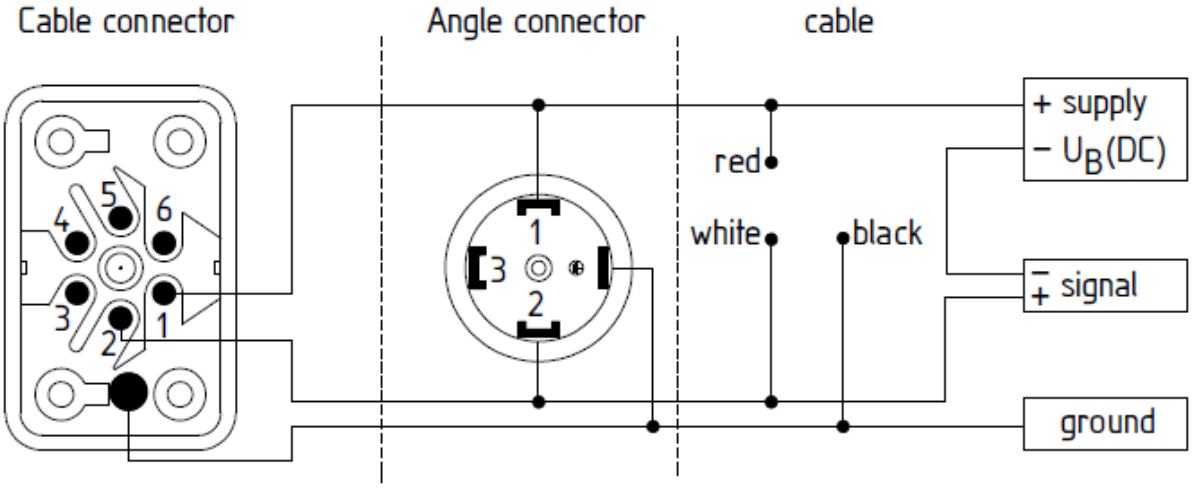
Other parallel threads

1. Pressure connection
2. Gasket (USIT)

7.3.2 Electrical connection

- 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.
- Power supply to be provided is 12-30 VDC
- Maximum loop resistance for 4 ... 20 mA: ≤ (UB – 9,5 V) / 0,02 A
- For minimum noise susceptibility, avoid running the transducer's cable in a conduit that contains high current AC power cables. Where possible avoid running the cable near inductive equipment.
- Units with shielded cable electrical termination, connect the drain wire to the guard terminal on the read out device or measuring instrument, if available. In all other cases connect to the ground or to the power supply negative terminal.

Wiring Diagrams:



7.4 Starting up

The precondition for start-up is proper installation of all electrical feed lines and metering pipes. All connecting lines must be laid such that no mechanical forces can act on the device.

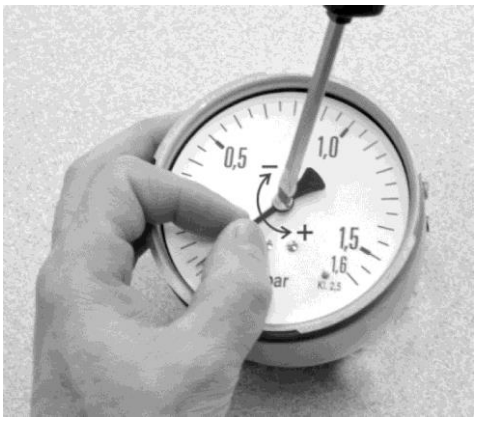
Before start-up, the seal on the pressurized connection line must be checked.

7.4.1 Zero point adjustment for pressure gauge

The pressure gauges are supplied calibrated ex works, so that as a rule there is no need for calibration works at the installation point.

For devices with Micrometer pointer (see. order code), zero point adjustment on site is possible. For this, proceed as follows:

- Depressurize the pressure metering pipe.
- Open the bayonet ring and remove ring and window.
- Hold the pointer in place while turning the screw, until the pointer (after releasing again) has the correct position.
- Close the case again and pay attention to correct fit of window, gasket and bayonet ring.



7.4.2 Zero point adjustment for transmitter

While Zero adjustment is not normally necessary, it may be desirable to trim out any offset in the system. However, proper Span calibration requires a pressure standard three to five times more accurate than the accuracy of the transducer, and there may also be interaction of Span on Zero. For detailed instruction see chapter 8.2.1. Zero and span adjustment for transmitter

7.5 Subsequent relocation of the gauge (by the customer)

Recommendation: Do not remove the pressure gauge from one metering point and fit it in a different place, as there is a risk of the measuring media being mixed, with unforeseeable chemical reactions.

8 Servicing

The device is maintenance-free. However, to ensure reliable operation and a long life, we recommend that it is checked periodically.

8.1 Safety

When undertaking service work on the device, the pressure lines must be depressurized and the plant secured against being switched on again.

8.2 Check on function, and recalibration

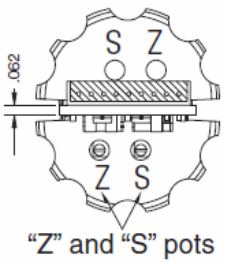
Inspection of function and recalibration should be at regular intervals. The precise testing cycles should be adjusted in line with the operating conditions and ambient conditions. In the event of various device components interacting, the operating instructions for all other devices should also be taken into account.

- Check display.
- Check function, in conjunction with downstream components.
- Check pressurized connection pipes for seal condition.

8.2.1 Zero and span adjustment for transmitter

While Zero adjustment is not normally necessary, it may be desirable to trim out any offset in the system. However, proper Span calibration requires a pressure standard three to five times more accurate than the accuracy of the transducer, and there may also be interaction of Span on Zero.

Access to “Z” and “S” pots via the electrical termination or screw cap at the back of the unit is standard. Access is gained by removing the black threaded cap, once removed you will see the pots indicated by “Z” and “S” respectively as shown below. Using a small trim pot tool, you can adjust zero ±10% of full scale and span ±10% of full scale.



“Z” and “S” pots

Recalibration Instructions:

1. Apply 0% full scale pressure.
2. Adjust the output using the zero adjust trim pot.
3. Apply 100% full scale pressure.
4. Adjust the output using the span adjustment trim pot.
5. Repeat steps 1 through 4 as necessary.

8.3 Cleaning and maintenance

Use a non-aggressive cleaning agent when cleaning; ventilation valve should be closed and in accordance with the protection category of the device.

9 Faults

9.1 Safety

Defective or faulty pressure 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 of faulty devices must be taken out of service. If a repair is required, the device must 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
- Pointer does not set to zero for pressure less display
- Indications that the measurement system seal is imperfect (discoloration of dial display)
- Bent or loose pointer
- Cracked window
- Damage to housing or electrical termination
- No or wrong output signal, Zero offset

Replacement of the pressure gauge is required in the event any of the above exist.

9.4 Conduct following fault rectification

See Chapter 7.3 Mounting/Installation

10 Removal, disposal

10.1 Safety

Residue from process media either within or on uninstalled gauges can constitute a risk to people, the environment and equipment. Adequate precautionary measures must be adopted. If necessary, the devices must be cleaned thoroughly (see advice in safety data sheets).

10.2 Removal

- When undertaking servicing of the device, the pressure lines must be depressurized, the electrical connections isolated from the mains supply, and the plant secured against being switched on again.
- Take care to uninstall the gauge using a suitable tool.

10.3 Disposal

Please help protect the environment by disposing or recycling the device in accordance with the applicable regulations.

11 Appendix

11.1 Data sheet for Bourdon tube pressure gauge with integrated transmitter T5500E

Detailed data sheet is available from supplier's website (see 1.6 Manufacturer's address, customer services)
This table refers to specific documents:

Model	Description	Document
T5500E	Stainless steel pressure gauge with integrated transmitter model T5500E	G1.T5500E

11.2 CE Declaration of conformity

CE

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Konformitätserklärung
EG - Richtlinien

Declaration of Conformity
EC - direction

Ashcroft Instruments GmbH
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D-52499 Baesweiler

Wir erklären hiermit in alleiniger Verantwortung, daß die folgenden Produkte in Übereinstimmung mit den Bestimmungen der benannten EG-Richtlinien sind und die aufgeführten Normen und technischen Spezifikationen zur Anwendung gelangt sind.	We hereby declare under sole responsibility that following products are in conformity with the provisions of the following EC-directives and the listed standards and technical specifications have been applied.

Bezeichnung : Specification :	Druckmeßumformer Pressure Transducer	
Typ / Artikel-Nr. / Baureihe : Type / Part-No. / Series :	KX1, KXK, KXD, KXF, T55E	
Serien-Nr. : Serial No. :	Ab Lieferdatum 01.05.2001 Supplied from 01.05.2001	
EG-Richtlinie :	2004 / 108 / EG (EMV / EMC), 92 / 31 / EWG, 93 / 68 / EWG, DGRL 97/23/EG (P>200 bar und V<0,1 l)	
EC-directive :	PED 97/23/EC (P>200 bar and V<0,1 l)	
Angewandte Normen : Applied standards :	EN 55024 (2003) EN 55022 (2008)	Störfestigkeit Immunity Störaussendung Emission

Hersteller-Unterschrift :
Signature of manufacturer :

Funktion des Unterzeichners :
Function of signer : Operation Manager

Datum : 21.11.2013
Date :

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