

Installation and Maintenance Instruction Manual

Pressure transmitter model KX1, KXD, KXF und KXK

for industrial application

In the following configuration:

- KX1###, KXD### and KXK### pressure transmitter with internal diaphragm
- KXF### pressure transmitter with flush diaphragm



KX1



KXD



KXF



KXK

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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 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

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 with electrical termination upward) 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.
- Ground the body of the transducer 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 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.

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).

Conversion works or other technical alterations to the device by the customer are not permitted. This also applies to installation of spare parts. Possible conversions 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 pressure transmitter and its surrounding packaging carry markings. These markings show the article number, measurement range and manufacturer. The pressure transmitter can be provided with additional signs and safety markings advising on special conditions:

- Safety advice for flush diaphragm
- Advice on calibration
- Oil-can deleted (cleaned for gaseous Oxygen or other strong oxidizing agents)
- Silicone-free (for use in painting applications)

2.6 Safety equipment

This device has internal transient and reverse power protection.

2.7 Environmental protection

This device (KXF only) contains a small amount of filling liquid (e.g. Halocarbon 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 of the housing. The materials identifier is encoded in the type designation.

5 Construction and function

5.1 Overview

This pressure transmitter consists of following major components:

- Process connection (in case of KXF with flush diaphragm and internal filling fluid)
- Thin film pressure sensing element, welded to process connection
- Printed circuit board for signal conditioning, placed in a stainless steel housing
- Electrical termination

5.2 Description of function

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 Process connection

The pressure transmitter has a threaded process connection. Model KXF is equipped with flush diaphragm. Transducers with HT option are equipped with an integrated cooling tower for higher media temperature.

5.3.2 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.

5.3.3 Printed circuit board

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

5.3.4 Electrical termination

The electrical termination is provided cable style, with standardized termination plug or with a terminal block located in a stainless steel field housing.

5.4 Accessories

Please contact the manufacturer regarding special tools and accessories. Suitable weld in adapters are available for model KXF.

6 Transport

6.1 Safety

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

6.2 Transport inspection

The delivery must be checked for completeness and damage during transport. In the event of damage during transport, the delivery must not 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 pressure transmitter must be stored in dry, clean conditions, within a temperature range of -40 to +100 °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), enabling the device:

- To be depressurized or taken out of operation;
- To be disconnected from the mains supply for repair or checks within the relevant plant;
- Or to enable function tests of the device to be performed "on site".

During the works to mount/install the transmitter, 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, pressure spikes and freezing.
- Although the unit can withstand normal vibration without damage or significant output effects, it is always good practice to mount the transducer where there is minimum vibration.

7.3 Mounting/Installation

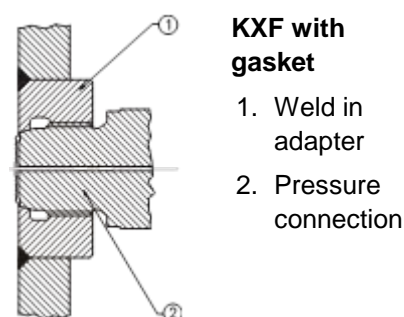
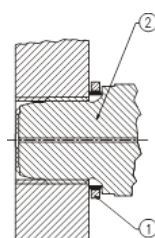
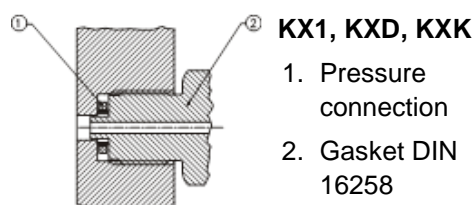
7.3.1 Process connection

The transmitter requires no special mounting hardware, and can be mounted in any plane with negligible position error.

- 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.
- For units with NPT type pressure fittings apply Teflon® tape or an equivalent sealant to the threads before installing.
- For model KXF sealing by metal cone or a gasket at the hexagon. Lubricate sealing cone with a suitable lubricant (e. g. Molykote, Vaseline) according to application and torque thread with approx. 70 Nm.
- When connecting the device, the pipes must be depressurized.
- If water is used as the measurement medium, the device must be frost-protected.



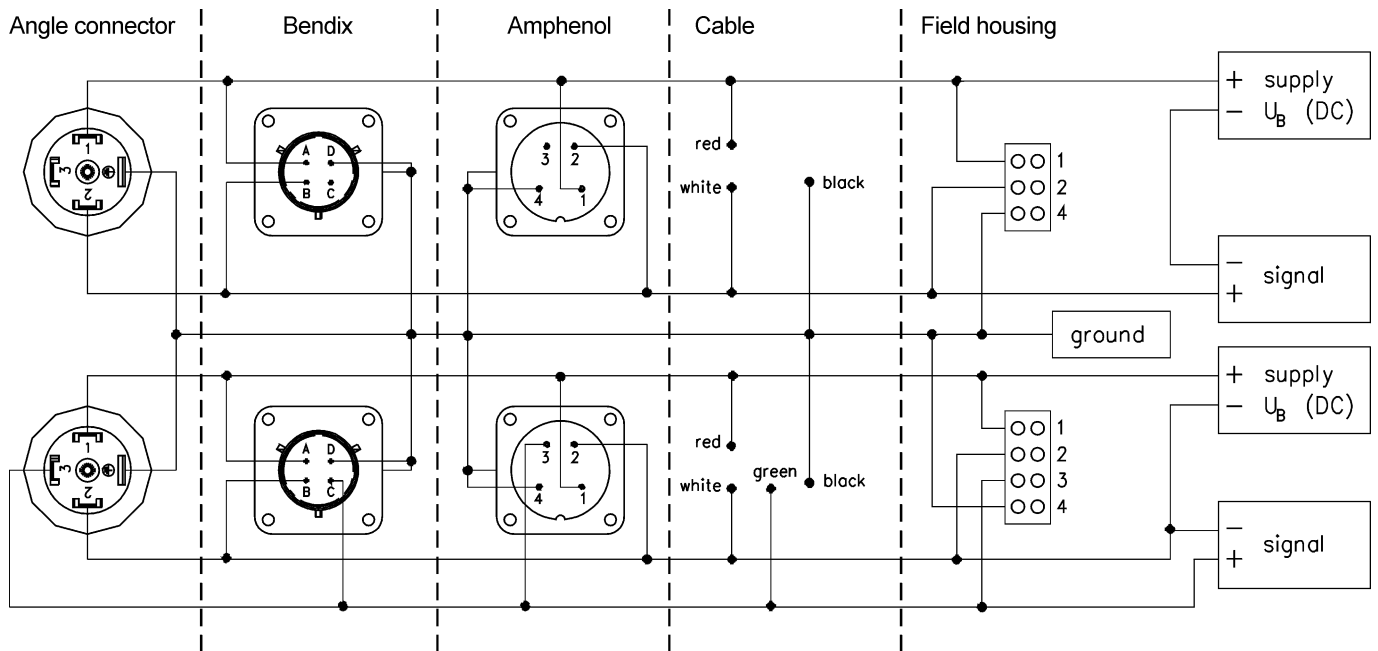
Safety notice: When tightening, apply a wrench to the hex wrench flats located just above the pressure fitting. DO NOT tighten by using a pipe wrench on the housing.



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: $\leq (U_B - 9 \text{ V}) / 0,02 \text{ A}$
- 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.
- In the case cable has a clear Teflon® vent tube, required at pressure ranges below 40 bar to provide atmospheric reference: The open end should be placed in a dry area.

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

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 Check on function and recalibration.

7.5 Subsequent relocation of the transmitter (by the customer)



Recommendation: Do not remove the pressure transmitter 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 lifetime for the device, we recommend that it is checked regularly.

8.1 Safety

When undertaking servicing work on 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.

8.2 Check on function and recalibration

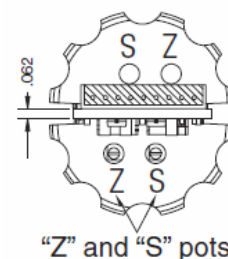
The check on function and recalibration is carried out at regular intervals, depending on the application. The precise testing cycles should be adjusted in line with the operating conditions and ambient conditions. In the event of various device components interacting, the operating instructions for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

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

8.2.1 Zero and span adjustment

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 top (electrical termination end) of the unit is standard for all transmitters with the exception of welded IP68 electrical termination. 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 $\pm 10\%$ of full scale and span $\pm 10\%$ of full scale.



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

Cleaning is carried out using a non-aggressive cleaning agent.

9 Faults

9.1 Safety

Defective or faulty pressure transmitters 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 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:

- | | |
|---|--|
| ■ No output signal | ■ Cracked termination parts |
| ■ Zero offset | ■ Damage to housing |
| ■ Wrong output signal | ■ Humidity inside the transmitter (wrong sealing of termination) |
| ■ Indications that the measurement system seal is damaged (process media within the transducer) | |

In these instances, check proper installation, verify calibration or replace the pressure transmitter.

9.4 Conduct following fault rectification

See Chapter 7.3 Mounting/Installation

10 Removal, disposal

10.1 Safety



Residues of measuring media in and on removed transmitter 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 work on 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.
- Demount the transmitter 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




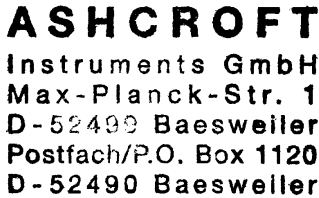
11.1 Data sheet for pressure transmitter KX1, KXD, KXF and KXK




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
KX1	Pressure transmitter model KX1	DS KX1 KXK
KXD	Pressure transmitter model KXD	DS KXD
KXF	Pressure transmitter with flush diaphragm model KX1	DS KXF
KXK	Pressure transmitter model KXK	DS KX1 KXK

11.2 CE Declaration of conformity

 	
Konformitätserklärung EG - Richtlinien	Declaration of Conformity EC - direction
Ashcroft Instruments GmbH Max-Planck-Straße 1 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 : Typ / Artikel-Nr. / Baureihe : Type / Part-No. / Series : Serien-Nr. : Serial No. : Spezifikation : Specification : EG-Richtlinie : EC-directive : Angewandte Normen : Applied standards :	Druckmeßumformer Pressure Transducer DXLdp, CXLdp, A2, KXD, KXF, XLdp (4-20 mA), RXLdp (4-20 mA) Ab Lieferdatum 02.01.2002 Supplied from 02.01.2002 2004 / 108 / EG (EMV / EMC), 92 / 31 / EWG, 93 / 68 / EWG, DGRL 97/23/EG (P>200 bar und V<0,1 l) PED 97/23/EC (P>200 bar and V<0,1 l) EN 61326-1 (1997) + A1
Hersteller-Unterschrift : Signature of manufacturer : Funktion des Unterzeichners : Function of signer : Datum : Date : Stempel Stamp	 Operation Manager 21.11.2013  ASHCROFT Instruments GmbH Max-Planck-Str. 1 D-52499 Baesweiler Postfach/P.O. Box 1120 D-52490 Baesweiler Tel. 024 01/78080 - Fax 024 01/7027

	
<p>Konformitätserklärung EG - Richtlinien</p> <p>Ashcroft Instruments GmbH Max-Planck-Straße 1 D-52499 Baesweiler</p>	<p>Declaration of Conformity EC - direction</p>
<p>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.</p>	<p>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.</p>
<p style="text-align: right;">Bezeichnung : Specification :</p> <p style="text-align: right;">Typ / Artikel-Nr. / Baureihe : Type / Part-No. / Series :</p> <p style="text-align: right;">Serien-Nr. : Serial No. :</p> <p style="text-align: right;">EG-Richtlinie :</p> <p style="text-align: right;">EC-directive :</p> <p style="text-align: right;">Angewandte Normen : Applied standards :</p>	<p>Druckmeßumformer Pressure Transducer</p> <p>KX1, KXX, KXD, KXF, T55E</p> <p>Ab Lieferdatum 01.05.2001 Supplied from 01.05.2001</p> <p>2004 / 108 / EG (EMV / EMC), 92 / 31 / EWG, 93 / 68 / EWG, DGRL 97/23/EG (P>200 bar und V<0,1 l) PED 97/23/EC (P>200 bar and V<0,1 l)</p> <p>EN 55024 (2003) Störfestigkeit Immunity EN 55022 (2008) Störaussendung Emission</p>
<p>Hersteller-Unterschrift : Signature of manufacturer :</p> <p>Funktion des Unterzeichners : Function of signer :</p> <p>Datum : Date :</p> <p>Stempel : Stamp :</p>	<p style="text-align: center;"></p> <p style="text-align: center;">Operation Manager</p> <p style="text-align: center;">21.11.2013</p> <p style="text-align: center;">ASHCROFT</p> <p style="text-align: center;">Instruments GmbH Max-Planck-Str. 1 D - 52499 Baesweiler Postfach/P.O. Box 1120 D - 52490 Baesweiler Tel. 02401/8880 • Fax 02401/7027</p>