

Operating instructions

coupling elements for connection to Zone 0

Type series KF1, KF2, KF3, KF4, KF5, KF6, KF7

Introduction

These operating instructions refer to installation, commissioning, servicing and adjustment. Statutory regulations, valid standards, additional technical details in the relevant data sheet and any additional certificates are to be observed along with these operating instructions.



Safety instructions

- Installation, operation and maintenance of the instrument may be executed by authorized personnel, only, using suitable equipment.
- Warning: If the instrument is used incorrectly it is possible that serious injuries or damage can occur!
- Prior to the disassembly of the pressure transmitter the impulse ducts between the measuring transmitter and the process have to be locked and relieved from pressure.
- The standard nominal pressure rating should be observed for all process connections.
- Pressure instruments that are mechanically defective can cause injuries or give rise to process faults. Suitable precautions should be taken to avoid this.
- Electrical equipment in hazardous areas should only be installed and commissioned by competent personnel. Modifications to devices and connections destroy the operating safety, the explosion-proofing and the guarantee.

Mounting and operating

- Before mounting the instrument ensure that pressure range, overpressure resistance, media compatibility, thermostability and pressure port are suitable for the process at hand.
- Conduct process installation before electrical installation.
- To avoid soiling and damage remove protective cap or wrapping in front of the separating diaphragm just before mounting.
- Do not touch the flush mounted separating diaphragm, as there is a danger of deformation at measuring ranges to 10 bar / 150 psi. Instrument zero point and measuring characteristics could also be affected.
- Be sure to install and securely fasten the capillary to avoid vibrations. Roll up overlengths with a minimum radius of approx. 50 cm. Shock and changes in temperature can impact on measurements.

The following capillaries can be connected:

inside Ø	length	volume
0.8 mm	1 m	0.0005 dm ³
1.3 mm	20 m	0.027 dm ³
2 mm	20 m	0.063 dm ³

- Measuring instruments that should not have any oil or grease residues in the pressure port are marked „Free of oil and grease“.
- Gaskets must be chosen that are suited to the process connection and resistant to the measured medium.
- Check for pressure tightness when commissioning the transmitter.
- Do not insulate the temperature decoupler, as this would reduce the decoupling effect. Follow DIN 32676.
- Wire up the instrument with power switched off.

Introduction for operating

Operation in Zone 1, for connection of category 2 instruments to Zone 0. Connect intrinsically safe circuits category "ia", only.

marking IIG IIC



CE marking

The CE marking on the instruments certifies compliance with valid EU directives for bringing products to market within the European Union. The following directives are met: PED 97/23/EC, ATEX 94/9 EG.

PED: Pressure transmitters are pressure accessories in line with the Pressure Equipment Directive. The CE marking is granted after classification in the relevant categories. Unmarked instruments satisfy the Pressure Equipment Directive and are manufactured in accordance with "sound engineering practice".

Direct coupling

The diaphragm seal and measuring device are connected together by means of a coupler element. The coupler element contains a flame arrester in the form of a capillary hole and is welded to the body of the diaphragm seal. The device can be connected by means of a threaded or welded joint.

Coupling via capillary

The body of the diaphragm seal is welded to a coupler element. The coupler element contains a flame arrester in the form of an erosion capillary hole. The device can be connected by means of a threaded or welded joint.

Diaphragm seals: design, type designation

design	type	applicable
flange type	DA	DN25 to 125/PN 6 to 400
ditto, diaphr. ext.	DB	DN25 to 125/PN 6 to 400
cell-type	DC	DN25 to 125/PN 6 to 400
inline diaphr. seals	DP	DN25 to 125/PN 6 to 400
screw-in thread	DE	G1/4 to G2/PN6 to 400
variable connections	DD1	DN25 to 125/PN 6 to 400
for food industry	DL	DN25 to 80/PN to 25

The thicknesses of the flange-type diaphragm seals are the same as the thicknesses of the standard flanges. The cellular diaphragm seal is at least 20 mm thick. The surface profiles set down in the standards are not exceeded.

Coupling elements: design

All coupling elements have a flame arrester in the form of an erosion capillary hole (erosion pin 0.5 mm):

bore $\varnothing \leq 0,5^{+0,05}$ mm	
capillary hole length for deflagration	≥ 30 mm
capillary hole length for detonation	≥ 57 mm

The dimensions of the erosion capillary hole comply with the conditions of explosion categories IIA, IIB and IIC.

	type	
*KF1	connection piece capillary/diaphr. seal	welded / welded
KF2	capillary	screwed / welded
KF3	direct connection	screwed / welded
KF4	temperature decoupler	screwed / welded
KF5	necktube	screwed / welded
KF6	threaded connection	screwed / screwed
KF7	other instrument	screwed / welded

(*KF= coupling element with prevention of flame transmission)

Instruments

The designs of diaphragm seals stated can be coupled with the following instruments of category 2, volume ≤ 1.7 dm³ :

- pressure gauges
- pressure gauges with electrical equipment
- electronic pressure transmitters



(1) **EC-TYPE-EXAMINATION CERTIFICATE**
(Translation)

(2) Equipment and Protective Systems Intended for Use in
Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 03 ATEX 4032 X



(4) Protective System: Deflagration and detonation flame arresters types KF1 to KF7

(5) Manufacturer: LABOM Mess- und Regeltechnik GmbH

(6) Address: Im Gewerbepark 13, D-27798 Hude

(7) This protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.


The examination and test results are recorded in the confidential report PTB Ex 03-43032.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 12874 "Flame arresters"

(10) If the sign "X" is placed after the certificate number, it indicates that the protective system is subject to special conditions for safe use specified in the schedule to this certificate.

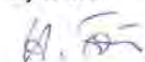
(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this protective system. These are not covered by this certificate.

(12) The marking of the protective system shall include the following:

 **II G IIC**

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, 2003-09-30



Dr. H. Förster
Regierungsdirektor



sheet 1/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 4032 X

(15) Description of the protective system

The coupling elements of the pressure transmitters are conceived to prevent, as pre-volume deflagration flame arrester of types KF1, KF3, KF6 and KF7 and/or as detonation flame arrester of types KF2, KF4 and KF5, a flame transmission if deflagrations and/or detonations of explosive vapour/air and/or gas/air mixtures of explosion groups IIA, IIB and IIC occur under atmospheric conditions.

The pressure transmitters, coupling elements and transmission lines are usually filled with a pressure-transmitting liquid. In case of a loss of transmission liquid or of an ignition from outside (connected measuring transducer), the pressure transmitter, together with the coupling element and the integrated arrester element, shall prevent flame transmission.

The arrester element consists of a cylindrical metal housing with a capillary hole $\leq 0,505$ mm in diameter and a capillary length of ≥ 30 mm (deflagration arrester) or ≥ 58 mm (detonation arrester), through which the vapour/air and/or gas/air mixtures can flow. Flame transmission is, however, to be prevented. Both types of arrester elements are mounted into different "coupling elements."

The following type variants have been specified:

Type	Kind of protection	Connection to device/pressure transmitter
KF1	Pre-volume deflagration flame arrester	welded / welded
KF2	Detonation arrester	screwed / welded
KF3	Pre-volume deflagration flame arrester	screwed / welded
KF4	Detonation arrester	screwed / welded
KF5	Detonation arrester	screwed / welded
KF6	Pre-volume deflagration flame arrester	screwed / welded
KF7	Pre-volume deflagration flame arrester	screwed / welded

Type, materials and dimensions are specified in the drawings and the Technical Description listed in Test Report PTB Ex 03-43032.

Requirements for explosion protection:

Prevention of flame transmission in the case of

- detonations of mixtures of air and flammable gases/vapours of explosion groups IIA, IIB and IIC with a maximum experimental safe gap $< 0,5$ mm under atmospheric conditions (pressure $\leq 1,1$ bar, temperature $\leq 60^{\circ}\text{C}$) in a preceding ignition volume of ≤ 1700 cm³ and a

sheet 2/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 4032 X

capillary line ≤ 20 m arranged behind, with an inside diameter of the capillary line of ≤ 2 mm and an arresting element with a bore $\leq 0,505$ mm and a bore length of ≥ 58 mm.

- deflagrations of mixtures of air and flammable gases/vapours of explosion groups IIA, IIB and IIC with a maximum experimental safety gap $\leq 0,5$ mm under atmospheric conditions (pressure $\leq 1,1$ bar, temperature $\leq 60^\circ\text{C}$) in a preceding ignition volume of ≤ 1700 cm³ and an arresting element arranged behind with a bore $\leq 0,505$ mm and a bore length of ≥ 30 mm;

(16) **Test report** PTB Ex 03-43032 (comprising of 4 pages, 9 drawings and 1 Technical Description)

Result: The types comply with the provisions of Directive 94/9/EC for Protective Systems (Subdivision IIC according to EN 50014). The arresters fulfill the requirements for explosion protection as described under point (15).

(17) **Special conditions for safe use**

When the pre-volume deflagration flame arrester and/or detonation arrester of type KF is used, the following operating conditions must be complied with and/or provided:

- The flammable gases and liquids formed during operation must belong to explosion groups IIA, IIB or IIC with a maximum experimental safe gap $\leq 0,5$ mm.
- The operating temperature must not exceed 60°C .
- The operating pressure in the case of ignition must be $\leq 1,1$ bar.

When the pre-volume deflagration flame arrester of type KF1, KF3, KF6 and KF7 are used, the following conditions must be complied with and/or provided:

- The possible ignition volume must not exceed 1700 cm³.
- The bore diameter of the arresting element must not exceed $0,505$ mm.
- The bore length of the arresting element must not be smaller than 30 mm.
- The coupling element with the arresting element must be directly attached to the device (measuring transducer, indicating device etc.).

When the detonation arrester of type KF2, KF4 and KF5 is used, the following conditions must be complied with and/or provided:

- The possible ignition volume must not exceed 1700 cm³.
- The inside diameter of the capillary line of the unprotected side between the possible source of ignition and the arrester must not exceed 2 mm.
- The tube length L (capillary line) of the unprotected side between the possible source of ignition and the arrester must not exceed 20 m.
- The bore length of the arresting element must not be smaller than 58 mm.

The conditions mentioned are to be included in the operating instructions for the pressure transmitter with the coupling element as deflagration volume arresting device and/or as detonation arrester and must be fulfilled and/or observed by the user.

sheet 3/4

EC-type-examination: Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 4032 X

(18) **Essential Health and Safety Requirements**
The essential requirements of ATEX are complied with.

Zertifizierungsstelle Explosionsschutz

Braunschweig, 2003-09-30

By order:

Dr. H. Förster
Regierungsdirektor



sheet 4/4

EC-type-examination: Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig