VOITH

Installation and Operating Manual

(Translation of the original installation and operating manual)

BTS-Ex

Non-contacting Thermal Switch Unit for limiting the maximum surface temperature on Voith Turbo Couplings

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Version 9, 2023-11-16
TCR3626019600EN, Protection Class 0: public

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TCR3626019600EN

This document describes the state of design of the product at the time of the editorial deadline on 2023-11-16.

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1 Possible Applications, BTS-Ex Characteristics

The non-contacting thermal switch unit (BTS-Ex) is a monitoring system for Voith turbo couplings.

- The BTS-Ex provides easy monitoring of the turbo coupling temperature.
- **In case of excess temperature, dependent on the application,**
  - the operator can be warned,
  - the drive motor shutdown can be initiated,
  - the load on the driven machine can be reduced.
- If excess temperature is identified in time, the discharge or loss of coupling filling through the fusible plugs can be avoided.
  Downtimes are reduced.
- After the turbo coupling has cooled down, the BTS-Ex resets automatically.
- The BTS-Ex can be used for Voith turbo couplings from **size 366**.

1.1 Use as safety device in potentially explosive atmospheres

The BTS-Ex can be used in potentially explosive atmospheres as safety device to limit the maximum permissible surface temperature of the turbo coupling. An ignition protection level IPL1 (SIL 1) is reached in a low requirement rate.

⚠ WARNING

Explosion hazard
When the permissible surface temperature is exceeded, there is the risk of explosion.

- In case of excess temperature, the drive motor has to be switched off within the specified time (→ installation and operating manual of turbo coupling).



The following electrical equipment belongs to the whole system:

- Switching element (will be fixed to the turbo coupling)
- Initiator to evaluate the switching element
- Evaluator with safety-related function.

The safety devices will be installed into/fixed to a master machine. Depending on the ingress protection level (IP), the interval for cleaning the operational equipment (dust deposits) has to be defined.

Switching element and initiator may be used as follows:

- In Zone 2 (gas-Ex, Category 3G, EPL Gc) in Explosion Groups IIA and IIB (initiator also IIC)
- In Zone 22 (dust-Ex, Category 3D, EPL DC) in Explosion Groups IIIA, IIIB and IIIC
- In Zone 1 (gas-Ex, Category 2 G, EPL Gb) in Explosion Groups IIA and IIB (initiator also IIC)
- In Zone 21 (dust-Ex, Category 2D, EPL Db) in Explosion Groups IIIA, IIIB and IIIC



⚠ WARNING

Explosion hazard
In case of non-compliance with the conditions for use, there is the risk of explosion.

- In case of explosive dust atmospheres of Explosion Group IIIC, the product may be used with organic dusts only.

It is only allowed to install the evaluator beyond potentially explosive atmospheres in housings that comply with the IP category of environmental requirements or in housings with own approval.

Qualification with regard to surface temperature depends on the ambient conditions; it applies to T4...T3: T4 means that for all gases, vapors, mists with an ignition temperature of > 135 °C, the equipment is not an ignition source.
In explosive dust atmospheres, the reference temperature T***°C (from 85 °C to 190 °C) is relevant for the further considerations with regard to safety distance to the smoldering temperature.

1.2 Special conditions for the use in potentially explosive atmospheres and as safety device in potentially explosive atmospheres

The devices are only approved for proper and intended use in accordance with the instructions. Contravention excludes any warranty and responsibility on the part of the manufacturer!



- Only use accessories in potentially explosive atmospheres which satisfy all requirements of European directives and national legislation.
- In case of explosive dust atmospheres of Explosion Group IIIC, the product may be used with organic dusts only.
- It is imperative to comply with the ambient conditions as specified in this operating manual.
- The provision of lightning protection measures have to be ensured by the operator.

→ Operating manual of turbo coupling

- Ensure that the fusible plugs required in addition are used on each turbo coupling which is operated with this safety device.
- If the maximal permissible surface temperature of the turbo coupling is ensured by this safety device, the type of protection "Protection by ignition source monitoring" also applies to the turbo coupling.
- Voith Turbo has to determine the response temperature.
- The ambient temperatures of individual elements must not exceed the respective limiting temperatures.
- Mechanical damage caused by ice formation must be reliably excluded.
- Locks need to be re-attached after opening and closing.
- Operation of the safety device is only allowed with undamaged housings and lines.
- Make sure to satisfy electromagnetic compatibility when installing the system.
- On installation, it is vital to observe the nationally applicable provisions governing installation of equipment.
- It is mandatory to provide an equipotential bonding. Compliance with provisions governing the installations into plants in the country of use must to be ensured.
- Avoid electrostatic charging.
- To ensure the discharge of electrostatic charging, please observe the national regulations.
  - Non-conductive parts must not exceed a surface of 100 cm² in IIB.
  - It is not allowed to use the BTS-Ex in equipment with electrical corrosion protection, or after consultation with the manufacturer and by taking special measures only. It is not permitted to route compensation currents through the construction.
- Protect the switching element and initiator against the ingress of liquids and/or impurities, if required. This depends on the operating conditions, e.g. heavy dust contamination or chemically aggressive fluids.
- For temperatures below -20 °C, install the initiators with mechanical protection.
- Keep a minimum distance of 3 mm between switching element and initiator (→ Chapter 6.3).

- After switching off, it is mandatory to eliminate all errors/faults before re-starting or switching on again the BTS-Ex.
- It is recommended designing the monitoring devices and monitoring circuits of the shutdown chain at least as per PL c according to EN ISO 13849-1 or SIL 1 according to EN 61508 or EN 62061.
- In case of existing explosive atmosphere, it is not permitted so loosen seized parts (caused e.g. by frost or corrosion) forcefully. Icing-up has to be avoided.
- The operator has to provide protective measures according to the explosion protection document, e.g. protection against external impact energy.
- In order to ensure explosion protection, electrical equipment and mechanical devices mounted in addition have to comply with the requirements of the zones applying on the jobsite and shall be inspected separately by the person installing the machine.
- Coatings / paintings are permissible up to a thickness of 0.2 mm in Explosion Group IIC. In IIB / I, it is never allowed to exceed a thickness of 2 mm; if necessary, a reduction of e.g. 0.5 to 1 mm has to be made dependent on the quality of the coating / painting. Operators are not allowed to perform any paintings.

1.3 Declaration of conformity

→ Annex (see declaration of conformity)

2 Function of BTS-Ex

The non-contacting thermal switch unit (BTS-Ex) consists of three components:

- **Switching element**
- **Initiator** with mounting flange
- **Evaluator**

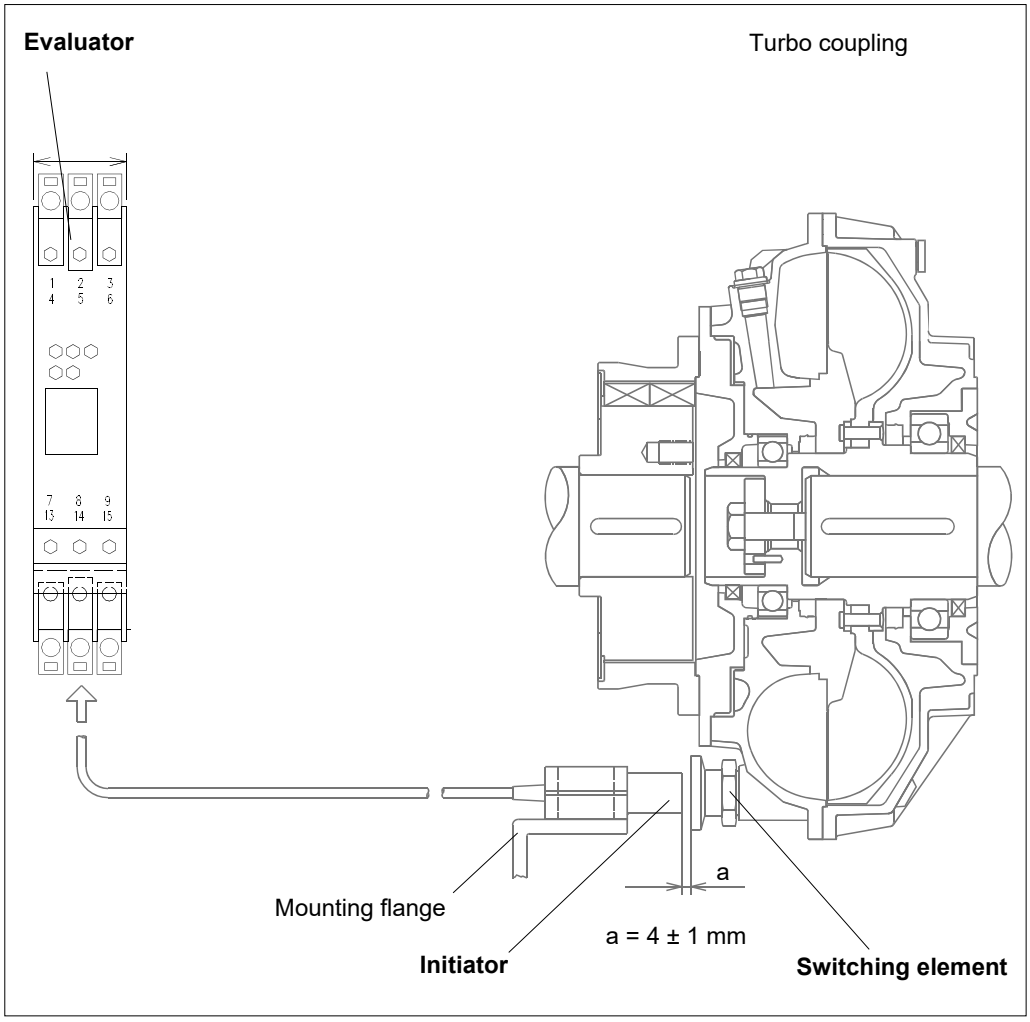


Fig. 1

2.1 Switching element

The switching element is a passive component (ordinary electrical equipment). It is inserted into the outer wheel or into the turbo coupling shell. The result is a thermal contact between the switching element and the turbo coupling with the operating fluid.
A coil and a thermostatic switch are integrated in the switching element. The switching point of the thermostatic switch corresponds to the response temperature of the switching element.

Nominal response temperature
→ Chapter 3.1

Below the nominal response temperature, the thermostatic switch is closed and bridges the coil. Above the nominal response temperature, the thermostatic switch opens and interrupts the circuit. When the temperature decreases, the thermostatic switch connects again the circuit. The BTS-Ex is again ready for service (it resets automatically).

2.2 Initiator

The initiator has been designed as intrinsically safe, polarized two-wire sensor. It works to the inductive sensor principle.
An electric oscillator is integrated in the initiator which produces a high-frequency oscillation. The oscillator has an oscillating circuit as element determining the frequency, comprising a coil and a capacitor.
The oscillating circuit coil is located in the sensor head. An electromagnetic alternating field leaves the sensor head via this coil.

2.3 Evaluator

The evaluator is an electronic unit recording the electric pulses and evaluating the period between the pulses (appropriate equipment with intrinsically safe circuit to the explosive atmosphere).
The evaluation starts by switching on the supply voltage.
After starting the evaluation, monitoring of pulses must be interrupted for an adjustable period of time (start-up bypass time).
A relay with changeover contact will be released if the number of pulses per unit of time drops below a certain value.

2.4 Interaction of BTS-Ex components

Instead of a blind screw, the switching element is screwed into the turbo coupling. The initiator with mounting flange is mounted parallel with the turbo coupling axis and is connected to the evaluator.

Installation, position
→ **Chapter 6.3**

The coil inside the switching element is coupled inductively with the coil inside the initiator if the switching element is located in front of the initiator head. When the thermostatic switch is closed, energy is transmitted from the initiator to the switching element. The oscillator is attenuated and has a lower current consumption.

If the coupling temperature exceeds the response temperature of switching element, the thermostatic switch will interrupt the circuit in the switching element. The switching element can no longer attenuate the oscillator in the initiator.

The evaluator recognizes the attenuation of initiator due to the initiator current consumption.

If the turbo coupling with screwed in switching element rotates, then the switching element will permanently pass the initiator, thus permanently creating attenuation pulses. Thus, permanently attenuation pulses are generated. The output relay in the evaluator is energized.

In case of excess temperature, these attenuation pulses are not given, i.e. the cutoff frequency set on the evaluator is not reached. The evaluator recognizes the missing pulses, the output relay is de-energized.

Cutoff frequency
→ **Chapter 3.3**

On startup of the turbo coupling, a start-up bypass time is set at the evaluator. As long as the start-up bypass is active, the output relay remains energized.
After this set time, the speed of the turbo coupling with the switching element must have exceeded the set cutoff frequency.

⚠ WARNING

Risk of personal injuries and damage to property
Following the shutdown, the control system has to be locked in a way that prevents automatic re-start.

- Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
- For all work performed on the turbo coupling and BTS-Ex ensure that both the drive motor and the driven machine have stopped running and that unintended starting is absolutely impossible!



Maximum allowable temperature
→ Operating manual of turbo coupling

⚠ WARNING

Explosion hazard
In case of non-compliance with the maximum permissible temperature, there is the risk of explosion.

- The coupling may only be restarted if the turbo coupling temperature is below the maximum permissible temperature allowed when switching on the motor!

3 Technical Data

3.1 Switching element

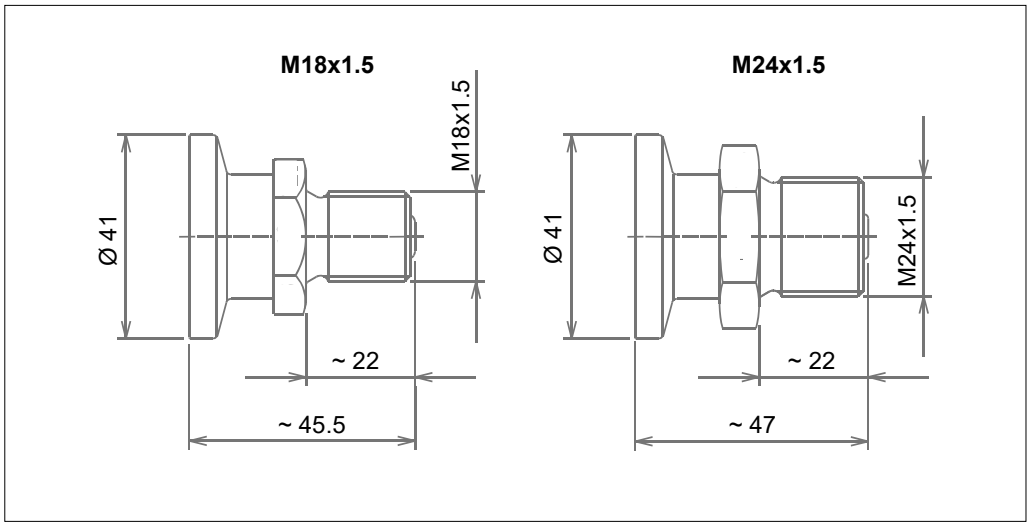


Fig. 2

The following switching elements are available for the different turbo coupling sizes:

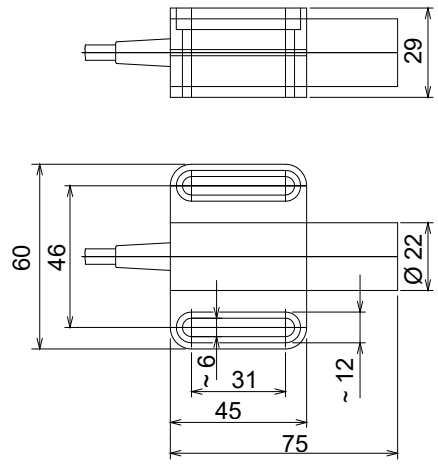
Dimension of thread	M18x1.5	M24x1.5
Nominal response temperature	85 / 90 / 100 / 110 / 125 / 140 /160 / 180 °C	85 / 125 / 140 / 160 / 180 °C
suitable for coupling size	366 – 650	750 – 1150
Response tolerance	± 5 °C	
Trip temperature	approx. 40 K below the response temperature	
Width across flats	27	32
Tightening torque	60 Nm	144 Nm
Classification is Ⓔx II 2G/2D	Ui = 10 V Ii = 50 mA Pi = 50 mW	
Service temperature in the coil area	-40 °C to +120 °C	
Service temperature in the area of the thermostatic switch	to 90 °C (T5), to 125 °C (T4), to 190 °C (T3)	

Table 1

SAFETY INFORMATION

- The type of switching element is stamped in on the housing indicating:
  - Voith
  - Nominal response temperature
  - Ex marking Ⓔx II Ex i X
  - Serial number (example: Voith 140 °C Ⓔx II Ex i X 1234 5678)
- The nominal response temperature of the switching element is determined in connection with the the coupling design.

3.2 Initiator, mounting flange



Initiator shown with mounting flange

Fig. 3

→ Annex Type: NJ 10-22-N-E93-Y245590 (2 m)
NJ 10-22-N-E93-Y246868 (5 m)
NJ 10-22-N-E93-Y246869 (10 m)

3.3 Evaluator

→ Annex Type: KFD2-SR2-Ex2.W.SM

4 User Information

This manual will support you in using the non-contacting thermal switch unit (**BTS-Ex**) in a safe, proper and economical way.

If you observe the information contained in this manual, you will
- increase the reliability and lifetime of the unit,
- avoid any risks
- reduce repairs and downtimes.

This manual must
- always be available at the BTS-Ex place of use,
- be read and used by every person who works on the unit or commissions the same.

You will find further documents which have to be regarded at any rate, in the annex.

The non-contacting thermal switch unit has been manufactured to the latest design standard and approved safety regulations. Nevertheless, the user's or third party's life may be endangered or the unit or other property impaired in case of improper handling or unintended use.

Spare parts:
Spare parts must comply with the technical requirements stipulated by Voith. This is ensured by using original spare parts.
Installation and/or use of non-original spare parts may negatively change the mechanical properties of the **BTS-Ex** and may thus impair safety.
Voith is not liable for any damages resulting from the use of non-original spare parts.

Use only appropriate workshop equipment for maintenance. Professional maintenance and/or repair can only be guaranteed by the manufacturer or an authorized specialist workshop.

This manual has been issued with utmost care. However, should you need any further information, please contact:

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5 Safety

5.1 Safety information

Safety information indicating the descriptions and symbols as described in the following are used in the operating manual.

5.1.1 Structure of safety information

⚠ DANGER WORD
Results of a hazardous situation Source of hazard • Warding off of danger

Danger word
The danger word divides the severity of the danger in several levels:

Danger word	Severity of danger
⚠ DANGER	Death or serious injury (irreversible personal injury)
⚠ WARNING	Death or serious injury possible
⚠ CAUTION	Minor or moderate injury possible
NOTICE	Possibly damage to property of - the product - its environment
SAFETY INFORMATION	General applications details, useful information, safe job procedure and proper safety measures

Table 2

Results of a hazardous situation
Hazard consequences indicate the kind of hazard.

Source of hazard
The source of hazard indicates the cause of hazard.

Warding off of danger
Warding off of danger describes the measures to be taken to ward off a danger.

5.1.2 Definition of safety symbols

Symbol	Definition
	Explosion hazard Marking with the Ex-symbol indicates possible hazards which have to be observed for the use in potentially explosive atmospheres.

Table 3

5.2 Intended use

- The non-contacting thermal switch unit **(BTS-Ex)** serves for the non-contacting temperature monitoring of Voith turbo couplings and has been designed for industrial applications. Any use beyond that described herein, e.g. for operating or application conditions that have not been agreed upon, is deemed unintended.
- Intended use also includes observing this installation and operating manual.
- The manufacturer is **not** liable for any damages resulting from unintended use. The risk has to be borne solely by the user.

5.3 Unintended use

Design range
→ Operating manual of turbo coupling

- Design range is not met.
- Any use beyond that described herein, e.g. for higher powers, higher speeds, or operating conditions that have not been agreed upon, is deemed unintended.
- Moreover, it is not permitted to use BTS-Ex non-contacting thermal switch units or spare parts from third parties.

5.4 General information as to dangerous situations

For all work performed on the non-contacting thermal switch unit, please observe the local regulations for the prevention of accidents as well as the regulations for installation of electrical equipment!



⚠ WARNING

Explosion hazard
In case of non-compliance with the regulations or impermissible change, there is the risk of explosion.

- When using the non-contacting thermal switch unit in potentially explosive atmospheres, observe the local regulations applicable to electrical equipment in potentially explosive atmospheres! Changes on electrical equipment for potentially explosive atmospheres, including connecting lines, are not permitted.

Hazards while working on the non-contacting thermal switch unit:

⚠ DANGER

Electric shock
On account of incorrectly mounted or incorrectly connected electrical components, and disconnected electric connections, persons could get an electric shock and be severely injured, possibly with fatal consequences.
Incorrectly mounted or incorrectly connected electrical components and disconnected electric connections may cause damages to the machinery.

- A qualified electrician has to properly carry out the connection to the electric supply network considering the system voltage and the maximum power consumption!
- The system voltage has to be in conformity with the system voltage indicated on the nameplate!
- There has to be a corresponding electrical protection by a fuse on the network side.

Electric shock:

DANGER

Electrostatic processes
Electrostatic charging may injure persons by an electric shock.
- Allow only a qualified electrician to install the equipment into which the turbo coupling is installed.
- The unit and the electrical installation are provided with ground connections.

Working on the turbo coupling:

WARNING

Risk of injury
While working on the turbo coupling, there is the risk of injury through cutting, crushing, burns and cold burns in case of minus degrees.
- Please observe the installation and operating manual of the turbo coupling!
- Never touch the turbo coupling without wearing protective gloves.
- Start to work on the turbo coupling only after it has cooled down.
- Ensure that there is sufficient light, a sufficiently large working space and good ventilation when working on the turbo coupling.
- Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
- For all work performed on the turbo coupling ensure that both the drive motor and the driven machine have stopped running and that unintended starting is absolutely impossible!

Noise:

Sound pressure level
→ cover sheet of operating manual of turbo coupling

WARNING

Hearing loss, permanent impairment of hearing
The turbo coupling generates noise during operation. If the A-classified equivalent sound pressure level $L_{PA,\ 1m}$ exceeds 80 dB(A), this may cause impairment of hearing!
- Wear ear protection.

Operating fluid which sprays off or leaks out:

⚠ WARNING

Risk of losing sight due to operating fluid spraying off, risk of burning

In case of thermal overload of the turbo coupling, the fusible plugs respond. Operating fluid leaks out through these fusible plugs.

This may happen only in case of unintended use.

- Persons close to the turbo coupling have to wear safety goggles.
- Please make sure that the spraying-off operating fluid cannot get in contact with persons.
- If the fusible plugs spray off, switch off the drive immediately.
- Electrical devices located near the turbo coupling need to be splash-guarded.

Unintended use
→ Chapter 5.3

⚠ WARNING

Fire hazard

After the fusible plugs responded, spraying off oil may ignite on hot surfaces causing fire, as well as releasing toxic gases and vapor.

- Make sure that spraying off operating fluid cannot get into contact with hot machine parts, heaters, sparks or open flames.
- Immediately switch off the driving machine when the fusible plugs respond.
- Please pay attention to the information contained in the safety data sheets.

⚠ CAUTION

Danger of slipping

Slipping hazard due to spraying off solder of fusible plugs and leaking out operating fluid.

- Please provide a catch pan of sufficient size.
- Immediately remove any leaking out solder and operating fluid.
- Please pay attention to the information contained in the safety data sheets.

5.5 Remaining risks

⚠ WARNING

Risk of personal injuries and damage to property
Unintended use or incorrect operation may cause death, serious injuries or minor injuries as well as damage to property and the environment.

- Only persons who are sufficiently qualified, trained and authorized are allowed to work on or with the turbo coupling and the non-contacting thermal switch unit.
- Please observe the warnings and safety information.

5.6 What to do in case of accidents

SAFETY INFORMATION

- In case of accidents, please observe the local regulations, the operating manuals and the operator's safety measures.

5.7 Information with regard to operation

SAFETY INFORMATION

- If irregularities are found during operation, immediately switch off the drive unit.

Monitoring devices:

NOTICE

Damage to property
Damage to turbo coupling due to monitoring devices not ready for service.

- Check whether existing monitoring devices are in a state ready for service.
- Repair any defective monitoring device immediately.
- Never bypass safety devices.

5.8 Qualification of staff

Only qualified and authorized professional staff are allowed to perform work, such as transportation, storage, installation, electrical connection, commissioning, operation, maintenance, servicing and repair.

Qualified professional staff in the sense of this installation and operating manual are persons who are familiar with transportation, storage, installation, electrical connection, commissioning, maintenance, service and repair, and who have the necessary qualifications for their job. Qualification has to be ensured by performing training and giving instructions.

Only specialists with respective qualification according to the Ordinance on Industrial Safety and Health or similar local regulations are allowed to commission the BTS-Ex, considering the electrical characteristic value in potentially explosive atmospheres of Zone 1 (Gas Ex, Category 2G) and Zone 21 (Dust Ex, Category 2D).
It is mandatory to observe the data indicated on the nameplate. Please also observe the information in this operating manual as well as the conditions for use and permissible data indicated on imprints / nameplates of the respective equipment.

This staff must be trained, instructed and authorized to:
- operate and service machines in a professional manner in accordance with the technical safety standards.
- use lifting appliances, slings (ropes, chains, etc.) and lifting points in a professional manner.
- properly dispose of media and their components, e.g. lubricating grease.
- service and use safety devices in a manner that ensures compliance with safety standards.
- prevent accidents and provide first aid.

Staff to be trained may only perform work on the turbo coupling and the non-contacting thermal switch unit under the supervision of a qualified and authorized person.

The staff in charge of any work to be done on the non-contacting thermal switch unit must
- be reliable,
- have the legal age,
- be trained, instructed and authorized with regard to the intended work.
- observe if the unit is installed in potentially explosive atmospheres use only tools which are approved for use in potentially explosive atmospheres. Avoid formation of sparks.



5.9 Product monitoring

We are under legal obligation to keep the performance of our products under observation, even after shipment.

Our address:
→ Page 2

Therefore, please inform us about anything that might be of interest to us. For example:

- Change in operating data,
- experience gained with the machine,
- recurring problems,
- problems experienced with this installation and operating manual.

5.10 Nameplate

The nameplate applies to the whole assembly group consisting of evaluator, initiator and switching element, and it will be fixed to the evaluator.

	Voith Group | Division Industry | J.M. Voith SE & Co. KG Voithstraße 1, 74564 Crailsheim, Germany	
BTS-Ex:	- evaluator (Voith ID 201.03905210) - initiator - switching element	CE
03 ATEX 0013 X	Year built: 2024	
Ⓔx II 3G Ex ic IIB T4/T3 Gc	SYST Ⓔx II 2G Ex ib IIB T4/T3 Gb	
Ⓔx II 3D Ex ic IIIC T125°C/T180°C Dc	SYST Ⓔx II 2D Ex ib IIIC T125°C/T180°C Db	

Fig. 4

Meaning of signs/symbols on the nameplate:

SYST:	Explosion protection marking for the whole safety device
Ⓔx :	Ex protection symbol
II:	Explosion Group
2G, 3G:	Equipment categories - Gas
2D, 3D:	Equipment categories - Dust
Ex ib/ic:	Types of protection
T:	Temperature and/or temperature classes
Gc, Gb:	Equipment protection level - Gas
Dc, Db:	Equipment protection level - Dust

SAFETY INFORMATION

- The temperature class (G) / max. surface temperature of the switching elements (D) depend on design and operational conditions of the turbo coupling. Therefore, the data will be indicated in the installation and operating manual for the turbo coupling.

6 Installation

⚠ WARNING

Risk of injury
Please observe, in particular, → Chapter 5 (Safety) when working on the non-contacting thermal switch unit!

- Before beginning with the installation, ensure that an isolation of all components is guaranteed.
- The fusible plugs protect the turbo coupling against damage due to thermal overload.
  Even when the BTS-Ex is used, it is not allowed to replace the fusible plugs by blind screws or by fusible plugs with different nominal response temperatures!
- Never operate the turbo coupling without fusible plugs!

Mounting and maintenance activities in potentially explosive atmospheres may be performed under certain conditions only. Among others, the following information has to be observed:

- Observe the local setting-up regulations.
- Any work necessary may only be performed in non-hazardous atmosphere.
- Take additional precautionary measures if the presence of hydrogen sulfide, ethylene oxide, carbon monoxide and/or other substances of Explosion Group C has to be expected. As these substances have a very low ignition power, in such a case, only non-sparking tools may be used.

6.1 As delivered condition

- Normally, the switching element with sealing ring,
- the initiator with mounting flange and
- the evaluator

are supplied as loose parts together with the turbo coupling.

6.2 Scope of supply

Standard combinations of switching elements and fusible plugs:

Nominal response temperatures		
Switching element	**Fusible plugs**	**Color coding**
160 °C	180 °C	blue
140 °C	160 °C	green
125 °C	160 °C	green
110 °C	140 °C	red

Table 4

Consultation with Voith Turbo → Ordering documents

The correlation between switching element and fusible plug may vary dependent on the project design. Deviating nominal response temperatures of the switching element (85 °C, 90 °C, 100 °C, 110 °C, 125 °C, 140 °C, 160 °C und 180 °C) are also available (→ Chapter 13).

6.3 Mounting - switching element and initiator

⚠ WARNING

Explosion hazard
Non-compliance with mounting instructions.

- To avoid any damages, switching element and initiator should be mounted after installation and prior to filling the turbo coupling.
- The switch unit and the connecting lines must not be damaged. Lay all lines protected against mechanical impact.
- It is not allowed to modify/change anything on equipment which is operated in potentially explosive atmospheres.
  It is not possible to carry out repairs on such equipment.
- Avoid any impact effects on the initiator. Work on the machine may only be performed in non-hazardous atmospheres.
- In order to prevent electrostatic charging, lay the connecting lines in accordance with EN 60079-14 and ensure that chafing during operation is not possible.



- Replace the blind screw by the switching element with the sealing ring in the turbo coupling outer wheel (item 0300).

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en / Protection class 0: public / 2023-11-16

Arrangement of switching element on the outer wheel side [1]:

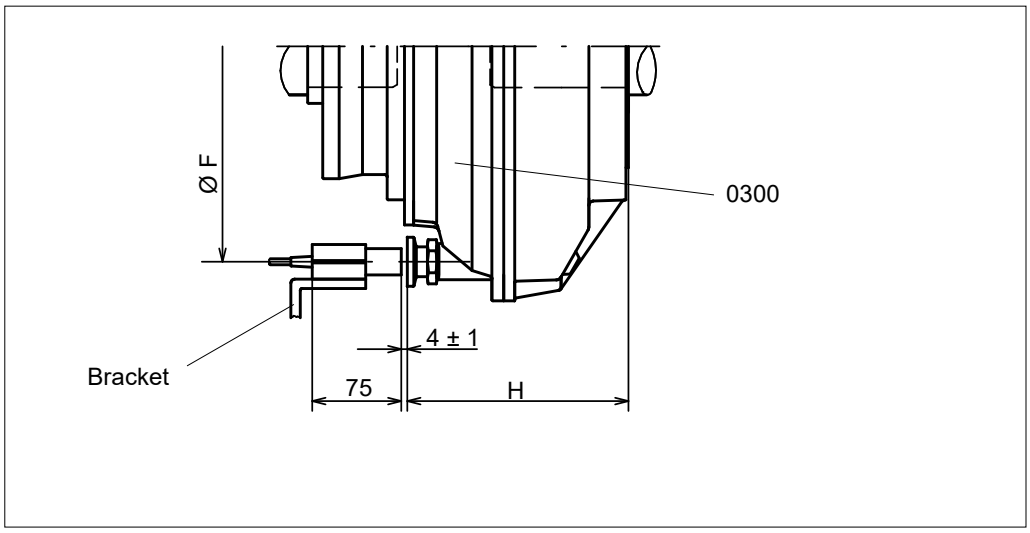


Fig. 5

1) For type DT, installation is also possible on the opposite outer wheel side.

Installation dimensions for switching element and initiator:

	Outer wheel side		
Turbo coupling type	**Pitch circle diameter Ø F [mm]**	**Distance ~ H [mm] T coupling**	**Distance ~ H [mm] DT coupling**
366 T	350 ± 1	193	-
422 T	396 ± 1	206	-
487 T	470 ± 1	228	-
562 T	548 ± 1	248	-
650 T	630 ± 1	289	-
750 T	729 ± 1	318	-
866 T / 866DT	840 ± 1	356	600
1000 T / 1000 DT	972 ± 1	369	672
1150 T / 1150 DT	1128 ± 1	458	783

Table 5

Please see the assembly plan of the turbo coupling for installation dimensions of deviating arrangements.

NOTICE

Damage to property
Non-compliance with mounting instructions.

- Ensure that the bracket is of sufficient stability (not included in Voith's scope of supply)!
- It is vital to avoid any vibrations as false signals might occur!
- Observe the metal-free area (15 mm) around the initiator head (→ schematic sketch below)!

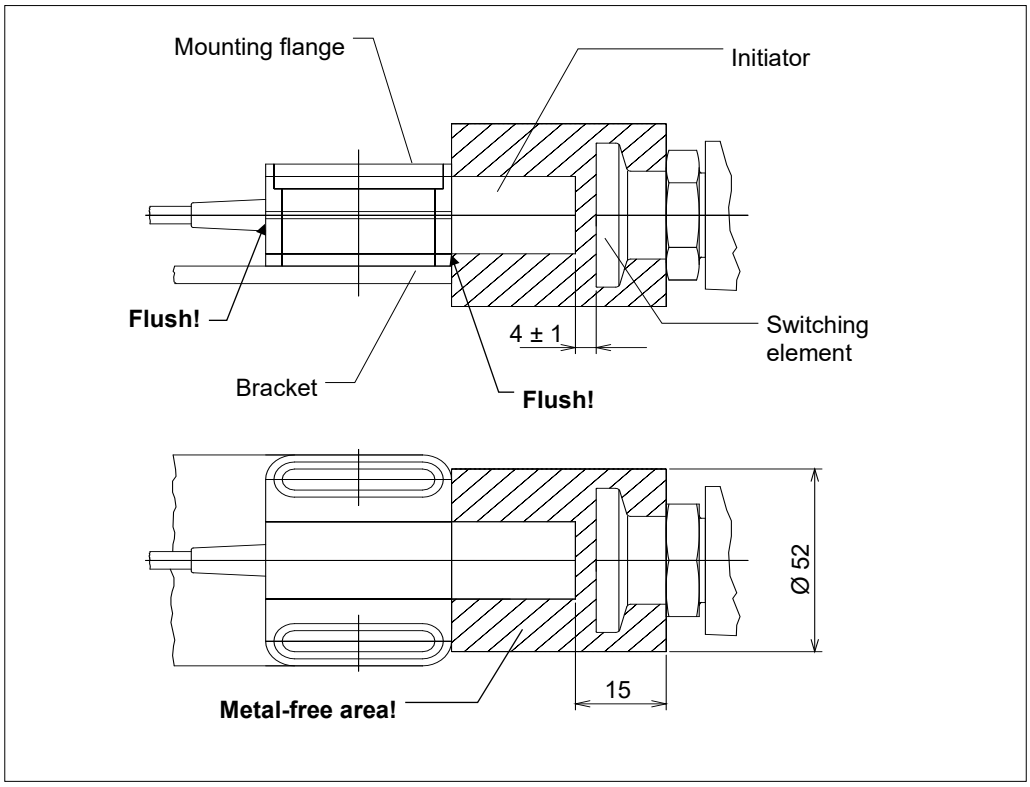


Fig. 6

- Mount the initiator with mounting flange on the pitch circle diameter of the switching element and on a bracket, in parallel with the turbo coupling axis.
- Mount the initiator end flush with the mounting flange. Mount the mounting flange front flush with the bracket.
- Set the distance between initiator head and switching element to **4 ± 1 mm**!

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en / Protection class 0: public / 2023-11-16

6.4 Mounting, connection - evaluator

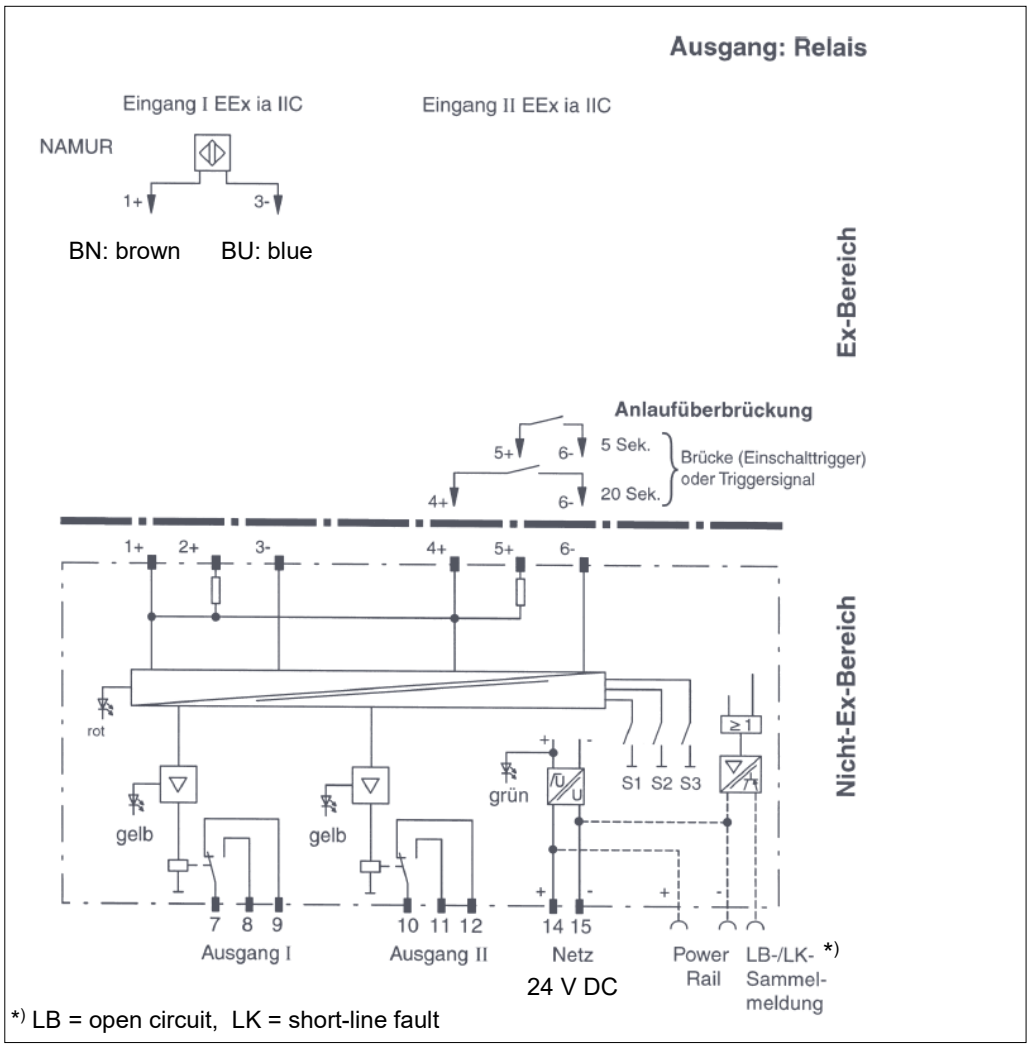
NOTICE

Damage to property
Damage to the system by electric components not connected properly and/or not complying with the mounting instructions.

- Wiring of the BTS-Ex is not included in Voith's scope of supply!
- In case of longer distances between initiator and evaluator, we recommend using a shielded cable for extension purposes.
- Total resistance of an extension cable between initiator and evaluator to be less than 100 Ω.

- Install the evaluator into an appropriate cubicle and connect it in accordance with the wiring diagram.

Wiring diagram:



*) LB = open circuit, LK = short-line fault

Fig. 7

Evaluator KFD2-SR2-Ex2.W.SM
→ Chapter 14.5

Terminal assignment: Evaluator

Terminal No.	Description	Data
1+	Input I	Input I: Ex ia IIC BN initiator
2+	Input I	-
3-	Input I	Input I: Ex ia IIC BU initiator
4+	Input II	Input II: Ex ia IIC 20 s start-up bypass
5+	Input II	- 5 s start-up bypass
6-	Input II	Input II: Ex ia IIC COM start-up bypass
7	Output I	COM (normally closed / normally open)
8	Output I	Contact: normally closed (NO)
9	Output I	Contact: normally closed (NC)
10	Output II	COM (normally closed / normally open)
11	Output II	Contact: normally closed (NO)
12	Output II	Contact: normally closed (NC)
13	-	-
14	Grid	24 V DC +
15	Grid	24 V DC -

Table 6

7 Display and Setting of Evaluator

7.1 Design

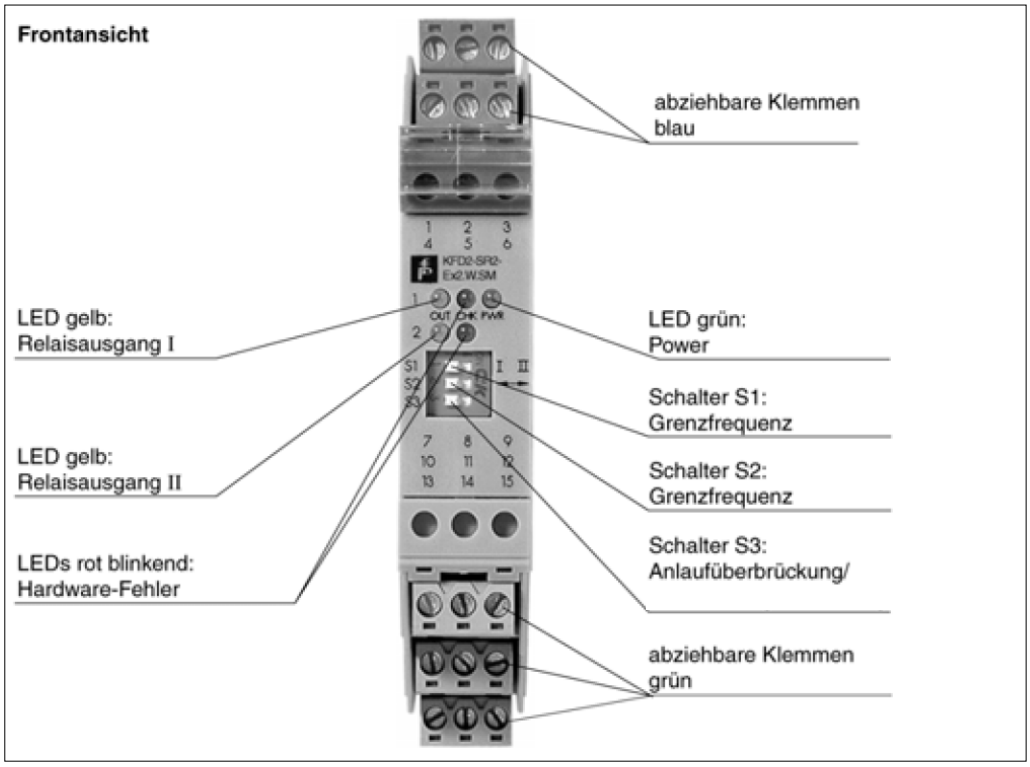


Fig. 8

7.2 Setting of DIP switches S1 and S2 (cutoff frequency)

Set DIP switches to **S2 = I** and **S1 = II**:

Cutoff frequency	Limit speed	Hysteresis	Switch S2	Switch S1
0.1 Hz	6 rpm	0.02 Hz	I	I
0.5 Hz	**30 rpm**	**0.1 Hz**	**I**	**II**
2.0 Hz	120 rpm	0.4 Hz	II	I
10.0 Hz	600 rpm	2.0 Hz	II	II

Table 7

When using a switching element, the limit speed is **30 rpm**.

7.3 Setting the S3 DIP switch - (start-up bypass)



⚠ WARNING

Explosion hazard
Do not adjust the S3 DIP switch to position II as otherwise functioning of the safety device is not guaranteed!

- Adjust the S3 DIP switch correctly.
- Perform a functional check during commissioning.

Set the DIP switch to **S3 = I**:

Switch S3	Position I
Function	**Evaluator with start-up bypass**
Input I	Signal input 1 (NAMUR): It is mandatory to connect the original Voith sensor.
Input II	Start-up bypass: Contact - terminals 4 + 6: 20 sec Contact - terminals 5 + 6: 5 sec [1)]
Output I	MIN / passive
Output II	MIN / active

Table 8

1) Standard setting unless specified otherwise in the operating manual of Voith Turbo Coupling, Technical Data.

7.4 Setting of start-up bypass time



⚠ WARNING

Explosion hazard
During the start-up bypass time, an excess temperature of the turbo coupling is **not** recorded!

- The coupling may only be restarted if the turbo coupling temperature is below the maximum permissible temperature allowed when switching on the motor!
- Perform a functional check during commissioning.

SAFETY INFORMATION

- The start-up bypass time begins with triggering the start-up bypass.
- After the start-up bypass time, the speed of the turbo coupling with switching element must have clearly the set cutoff frequency.
- Factory setting of the start-up bypass time: **5 s**.

Evaluator with start-up bypass (S3 = I)
The evaluator with start-up bypass switches output I in a passive state, output II in an active state when falling below the cutoff frequency adjusted by means of DIP switches S1 and S2 (→ principle sketch below).

Input I
is monitored for open circuit / short-line fault.
It is mandatory to connect the original Voith sensor.

Input II
has to be used to trigger the start-up bypass. There is no monitoring for open circuit / short-line fault. Duration of the start-up bypass can be selected via bridge (switch-on trigger) or an external trigger signal between 5 and 20 seconds.

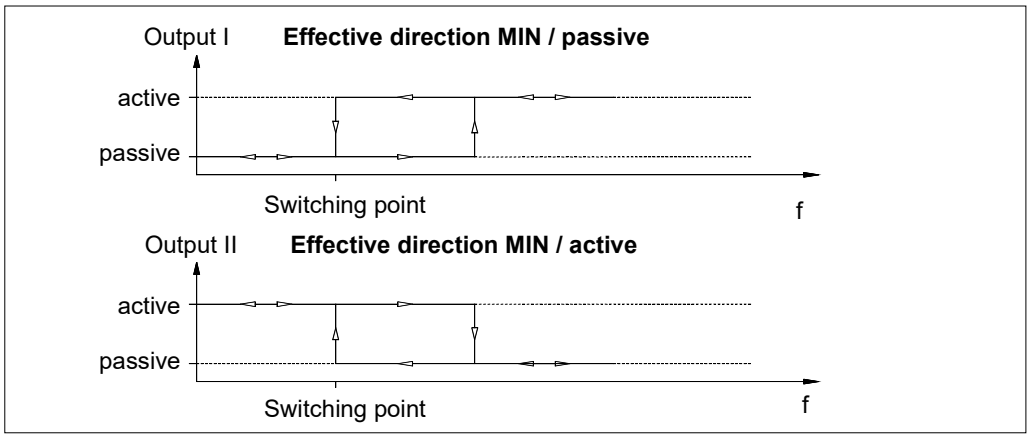


Fig. 9

8 Commissioning

⚠ WARNING

Risk of injury
Please observe, in particular, → Chapter 5 (Safety) when working on the non-contacting thermal switch unit!

- A commissioning not performed properly could cause injury to persons, or harm to property and the environment!
- Experts only are allowed to perform commissioning, in particular, first starting of the turbo coupling!
- Secure the machine against unintentional switching on!

- Check the wiring according to **wiring diagram** (→ Chapter 6.4).
- Please pay special attention to the proper wiring of the supply voltage!
- Apply supply voltage to the evaluator, first without starting the turbo coupling. As long as the start-up bypass is active, the output relay remains energized and the front LED lights up.
- At the end of the start-up bypass time, the output relay is de-energized and the front LED extinguishes.
- If necessary, set the start-up bypass time according to → Chapter 7.3.
- In case of external triggering, remove the bridge that was fixed at the factory between the terminals for the start-up bypass on the evaluator.
- Start the BTS-Ex with turbo coupling in a normal way. After the start-up bypass time, the speed of the turbo coupling with switching element must have clearly exceeded the set cutoff frequency. If there is no excess temperature, the output relay remains energized and the front LED lights.
- Switch off the drive with the turbo coupling, leave the BTS-Ex in the mode ready for operation. If the speed of the turbo coupling with switching element falls below the set cutoff frequency, the output relay is de-energized and the front LED extinguishes.
- Normal operation can start now. In case of malfunctions, → Chapter 11.

9 Maintenance, Servicing

Maintenance and Servicing: A combination of all activities conducted in order to maintain an object in a condition or to re-store it to such a condition which meets the requirements of the respective specification and ensures performance of the required functions.

Inspection: An activity involving the thorough examination of an object in order to provide a reliable statement as to the condition of said object, performed without disassembly or, if necessary, with only partial disassembly, supplemented by measures such as the taking of measurements.

Visual inspection: A visual inspection is an inspection in which visible defects, such as missing screws or bolts, are identified without the use of access equipment or tools.

Close-up inspection: An inspection in which, in addition to the areas covered by the visual inspection, defects such as loose bolts, that can only be detected by using access equipment, e.g. mobile stair steps (if required) and tools are identified. For close-up inspections, usually a housing does not need to be opened or the power to the equipment be cut off.

Detailed inspection: An inspection in which, in addition to the areas covered by the close-up inspection, defects such as loose connections, that can only be detected by opening housings and/or using tools and test equipment (if required) are identified.

⚠ WARNING

Risk of injury
Please observe, in particular, → Chapter 5 (Safety) when working on the non-contacting thermal switch unit!
- Please always keep access paths free to the turbo coupling!

Qualification
→ Chapter 5.8

- Skilled and authorized persons only are allowed to carry out maintenance and repair work! Qualification is ensured by performing training and giving instructions on the turbo coupling.
- It is not allowed to modify/change anything on products which are operated in potentially explosive atmospheres.
- Possible consequences of improper servicing and maintenance could be death, serious or minor injuries, damage to property and harm to the environment.

- Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
- For all work performed on the turbo coupling ensure that both the drive motor and the driven machine have stopped running and that unintended starting is absolutely impossible!
- Only use accessories in potentially explosive atmospheres which satisfy all requirements of European directives and national legislation.
- Maintenance measures involving disassembly of the unit must only be carried out in non-explosive atmospheres.
- Components may only be replaced by original spare parts which are approved for use in potentially explosive atmospheres. The same applies to the lubricants and auxiliary media used.
- Regularly service and clean equipment used in potentially explosive atmospheres. The intervals are specified by the operator according to the environmental impact to which the equipment is exposed on the jobsite.
- After performing the maintenance and/or servicing work, re-fix all parts and instruction plates that were removed in their original position.
- After repairs, it is vital to prove the functioning of the equipotential bonding.
- Perform maintenance intervals according to the operating manual if not specified otherwise by the manufacturer.

Re-mount all protective covers and safety devices in their original position immediately after completion of the servicing and maintenance work. Check them for proper functioning.

Maintenance schedule:

Time	Maintenance work
Every 500 operating hours every month at the latest	Inspect the machine for irregularities (visual inspection, dust deposits).
Check for smooth running and warm-up using suitable measuring equipment every month / every 6 months	Visual inspection (monthly), Close-up inspection (6 months)
3 months after commissioning at the latest, then every year	Check the electrical system for sound condition (detailed inspection).
In case of impurities	Cleaning (→ Chapter 9.1).

Table 9

Report samples → Operating manual of turbo coupling

- Carry out any maintenance work and routine inspections according to the report.
- Record the maintenance work carried out.

The tripping system has to be checked every 12 months at the latest if it is used as safety, check and control device.

For explosion-proof turbo couplings, the following maintenance work needs to be carried out in addition:



Maintenance intervals	Maintenance work
In case of impurities or dusting: Regularly clean equipment used in potentially explosive atmospheres. The intervals are specified by the operator according to the environmental impact to which the equipment is exposed on the jobsite, e.g. in case of a dust accumulation of approx. 0.2 ... 0.5 mm or more.	Cleaning (→ Chapter 9.1).

Table 10

⚠ WARNING

Explosion hazard
Explosion hazard due to maintenance work not performed according to schedule.
It is vital to carry out all maintenance work according to the schedule in order to guarantee proper operation within the meaning of explosion-protection.
- Immediately remove any combustible layers of dust on the devices.

9.1 Outside cleaning

NOTICE

Damage to property
Damage to the BTS-Ex due to an improper, unsuitable outside cleaning.
- Ensure that the cleaning agent is compatible with the plastic housing of the BTS-Ex and the rubber seal of the cable connection!
- Do not use high-pressure cleaning equipment!
- Be careful with gaskets. Do not apply a water and compressed-air jet.

- Clean the BTS-Ex with a degreasing agent, as and when required.

10 Disposal

Disposal of the packaging
Dispose of packaging material according to the local regulations.

How to dispose of operating fluids
On disposal, please observe the applicable laws and the producer's or supplier's instructions.

How to dispose of the BTS-Ex
Dispose of the BTS-Ex according to the local regulations.

For special information on the disposal of the substances and materials used, please see the following table:

	Kind of disposal		
Material / substance	**Reuse**	**Residual waste**	**Special waste**
Metals	x	-	-
Cables	x	-	-
Seals	-	x	-
Plastics	x [1)]	(x)	-
Operating media	-	-	x [1), 2)]
Packing	x	-	-

Table 11

1) If possible
2) Disposal according to the safety data sheet or the manufacturer's instructions

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en / Protection class 0: public / 2023-11-16

11 Malfunctions - Remedial Actions, Troubleshooting

⚠ WARNING

Risk of injury
Please observe, in particular, → Chapter 5 (Safety) when working on the non-contacting thermal switch unit!

⚠ WARNING



Explosion hazard
It is not allowed to modify/change anything on equipment/devices which are operated in potentially explosive atmospheres.

- Repairs are not permitted; repair the device.

The following table is intended to help finding the cause of malfunctions or problems quickly and to take remedial action, if necessary.

Malfunction	Possible cause(s)	Remedial action	See
Green LED off.	No supply voltage is applied to the evaluator.	Apply supply voltage.	Chapter 6.3
	The evaluator is defective.	Replace the evaluator.	
Yellow LED 1 (upper LED) displays incorrectly.	Incorrect position of DIP switch.	Check position of DIP switch.	Chapter 7.2 Chapter 7.3
	The initiator poles are reversed.	Check the initiator connection.	Chapter 6.3
	The distance between initiator head and switching element is too large.	Set the distance to 4 ± 1 mm.	Chapter 6.3

Malfunction	Possible cause(s)	Remedial action	See
Yellow LED 1 (upper LED) displays incorrectly.	The bracket for the initiator is not sufficiently stable. Vibrations may cause false signals.	Ensure that the bracket is of sufficient stability.	Chapter 6.3
	The initiator is defective.	Check the initiator, and replace it, if necessary.	
	The switching element is defective.	Check the switching element, and replace it, if necessary.	
	Incorrect relay output I.	Check relay output I.	
Yellow LED 2 (lower LED) displays incorrectly.	Incorrect relay output II.	Check relay output II.	
RED LEDs are flashing.	Hardware error.	Check devices.	
While the start-up bypass is active, operating fluid is leaking through the fusible plugs.	A too high start-up bypass time was selected.	Set a shorter start-up bypass time so that the speed of the turbo coupling with switching element will have clearly exceeded 60 rpm after the start-up bypass time.	
After the start-up by-pass time, operating fluid is leaking through the fusible plugs, the BTS-Ex did not display any excessive temperature.	The nominal response temperatures of switching element and fusible plugs do not match.	Please consult Voith Turbo.	Chapter 12
	The switching element is defective.	Check the switching element, and replace it, if necessary.	
Please consult Voith Turbo (→ Chapter 12), if a malfunction occurs which is not included in this table.			

Table 12

In order to determine the cause of failure more precisely, the following measures should be taken in the corresponding order:

Measurement	Result	Probable troubleshooting
Apply supply voltage to the evaluator. Measure the no-load voltage and the short-circuit current at the NAMUR input (terminals 1 and 3).	Clear deviation from the setpoints: - no-load voltage 8.0 V DC - short-circuit current 8.0 mA	Defective evaluator.
Connect the initiator to the evaluator. Measure the current consumption of the initiator which is not attenuated.	Current consumption > 6.0 mA or < 2.1 mA	Defective initiator.
Connect the initiator to the evaluator. Measure the current consumption of the initiator which is attenuated. **Note:** The initiator can, for example, be attenuated with a metal plate which is held directly in front of the initiator head.	Current consumption > 1.2 mA or < 0.1 mA	Defective initiator.
Attenuate the initiator, after proper installation, with the switching element, with the turbo coupling not being overheated.	Current consumption > 1.2 mA and < 6.0 mA	Defective switching element.

Table 13

12 Queries, Orders Placed for Field Service Engineers and Spare Parts

For

- queries
- Ordering a field service engineer
- Ordering spare parts
- commissionings

we need:

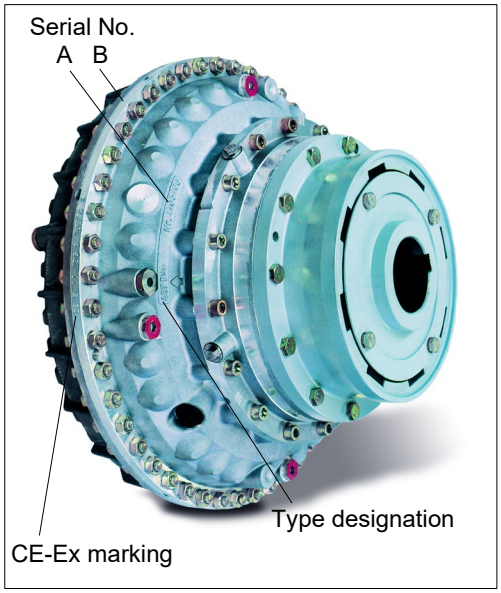


Fig. 10

the **Serial No.** and **type designation** of the turbo coupling on which the BTS-Ex is used.

→ You will find the serial number and type designation either on the outer wheel / coupling shell (A) or on the turbo coupling periphery (B).
→ The serial number is stamped in with figure stamps.
→ For turbo couplings, intended for the use in potentially explosive atmospheres, you will find the CE-Ex marking on the turbo coupling periphery.

When placing an order for a **field service representative**, **commissioning** or a **service**, we need, in addition

- the turbo coupling installation site,
- the name and address of a contact person,
- details of the malfunction/problem occurred.

Contact,
→ Page 2

When placing a **spare parts order**, we need, in addition,

- the shipping address for the spare parts shipment.

13 Spare Parts Information

NOTICE

Unauthorized changes or retrofits are not allowed to be performed on the coupling!
Do not retrofit accessories or equipment originating from other manufacturers!
Any changes or conversions performed without the prior written consent of Voith Turbo will result in the loss of any warranty! Any claims will forfeit!

- Professional maintenance or repair can only be guaranteed by the manufacturer!

13.1 Switching elements

BTS-Ex switching elements					Sealing ring
Use for turbo coupling size	**Dimension of thread**	**Nominal response temperatur e**	**Type of switching element**	**Material No.**	**Material No.**
366 - 650	M18x1.5	85 °C	Voith 85 °C	TCR.10672470	TCR.03658018
		90 °C	Voith 90 °C	TCR.10642650	
		110 °C	Voith 110 °C	TCR.10642630	
		125 °C	Voith 125 °C	TCR.10499540	
		140 °C	Voith 140 °C	TCR.10499550	
		160 °C	Voith 160 °C	TCR.10499560	
		180 °C	Voith 180 °C	TCR.10499570	
750 - 1150	M24x1.5	85 °C	Voith 85 °C	TCR.11973940	TCR.03658024
		125 °C	Voith 125 °C	TCR.10488230	
		140 °C	Voith 140 °C	TCR.10653470	
		160 °C	Voith 160 °C	TCR.10633550	
		180 °C	Voith 180 °C	TCR.10488220	

Table 14

13.2 Initiator, mounting flange

Type of initiator	Material No.
NJ 10-22-N-E93-Y245590 (2 m)	201.04312710
NJ 10-22-N-E93-Y246868 (5 m)	201.04312810
NJ 10-22-N-E93-Y246869 (10 m)	201.04312910
Mounting flange BF22	TCR.03668170

Table 15

13.3 Evaluator

Type of evaluator	Material No.
KFD2-SR2-Ex2.W.SM	201.03905210

Table 16

14 Annex

14.1 EU Declaration of Conformity

Declaration of Conformity	Voith

Translation of the original version

EU Declaration of Conformity

We,

J.M. Voith SE & Co. KG
Voithstraße 1
74564 Crailsheim / Germany

declare that the declaration of conformity is being issued in our sole responsibility and belongs to the following assembly:

Designation:	**Non-contacting Thermal Switch Unit to limit the maximum surface temperature on Voith Turbo Couplings**
Type:	**BTS-Ex**
Production numbers:	**according to the shipping documents**

The assembly consists of:

1. Switching element

Identification example: Voith 140 °C Ex i X 1234 5678

1st surface	2nd surface	3rd surface	4th surface	5th surface	6th surface
A	B	C	D	E	F
Voith	140 °C	Ex II Ex i X		1234	5678
Voith	140 °C	Ex II	Ex i X	1234	5678

A (1st stamp surface) = Voith
B (2nd stamp surface) = nominal response temperature: 85 °C 90 °C 100 °C 110 °C 125 °C 140 °C 160 °C 180 °C
C (3rd stamp surface) = Ex marking: II Ex X
D (4th stamp surface) = Ex marking: Reserve
E (5th stamp surface) = Serial number (figures 1 to 4)
F (6th stamp surface) = Serial number (figures 5 to 8)

2. Initiator

NJ 10-22-N-E93-Y245590
NJ 10-22-N-E93-Y246868
NJ 10-22-N-E93-Y246869

3. Evaluator

Pepperl + Fuchs KFD2-SR2-Ex2.W.SM

The above-described object of the declaration satisfies the relevant harmonization legislation of the union:

ATEX Directive 2014/34/EU, 29.3.2014 | EN | Official Journal of the European Union L 96/309
EMC Directive 2014/30/EU, 29.3.2014 | EN | Official Journal of the European Union L 96/79

The following harmonized standards (or parts thereof) have been applied:

- EN IEC 60079-0: 2018
- EN 60079-11: 2012
- EN 60079-25: 2010
- EN ISO 80079-36:2016
- EN ISO 80079-37:2016
- EN ISO/IEC 80079-38:2016

Other applied standards and technical specifications:

- TRGS 727: 2016

The assembly may be used as safety, control, and regulating device as per Article 1, Par. 1, Section b) of Directive 2014/34/EU on the manufacturer's turbo couplings.

The manufacturer is solely responsible for the issuance of this declaration of conformity.

You may request the relevant technical information from the person authorized for technical information at

J.M. Voith SE & Co. KG
Mr. Bernhard Ludas
Voithstraße 1
74564 Crailsheim

Signed for and on behalf of J.M. Voith SE & Co. KG:

Satyavolu, Ravi Krishna
Digitally signed by Satyavolu, Ravi Krishna
Date: 2021.09.13 17:40:32 +02'00'

Crailsheim	2021-09-13	Ravi Krishna Satyavolu (Vice President CCE HDC)
Place:	**Date**	**Name, position, signature**

BTS-Ex_KEK_Rev_1_EN.DOCX

14.2 Initiator NJ 10-22-N-E93-Y245590 (2 m)

Voith Material No.: 201.04312710

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs
Manufacturer´s declaration	Pepperl+Fuchs

Instruction Manual

1. Marking

Inductive sensor
NJ10-22-N-E93-Y245590
ATEX marking
⟨Ex⟩ II 2G Ex ia IIC T6...T1 Gb
⟨Ex⟩ II 1D Ex ia IIIC T_{200}135°C Da
IECEx marking
Ex ia IIC T6...T1 Gb
Ex ia IIIC T_{200}135°C Da
Ex ia I Mb

Pepperl+Fuchs Group
Lilienthalstraße 200, 68307 Mannheim, Germany
Internet: www.pepperl-fuchs.com

2. Validity

Specific processes and instructions in this instruction manual require special provisions to guarantee the safety of the operating personnel.

3. Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the device. The trained and qualified personnel must have read and understood the instruction manual.

4. Reference to Further Documentation

Observe laws, standards, and directives applicable to the intended use and the operating location. Observe Directive 1999/92/EC in relation to hazardous areas.

The corresponding datasheets, manuals, declarations of conformity, EU-type examination certificates, certificates, and control drawings if applicable (see datasheet) are an integral part of this document. You can find this information under www.pepperl-fuchs.com.

For specific device information, scan the QR code on the device or enter the serial number in the serial number search at www.pepperl-fuchs.com

Due to constant revisions, documentation is subject to permanent change. Please refer only to the most up-to-date version, which can be found under www.pepperl-fuchs.com.

5. Intended Use

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

Technical data provided in the datasheet may be partly restrained by the information given in this instruction manual.

Use the device only within the specified ambient and operating conditions.

The device is an electrical apparatus for hazardous areas.

The certificate applies only to the use of apparatus under atmospheric conditions.

If you use the device outside atmospheric conditions, consider that the permissible safety parameters should be reduced.

The device can be used in hazardous areas containing gas, vapor, and mist.

The device can be used in hazardous areas containing combustible dust.

The device can be used in underground parts of mines as well as those parts of surface installations of such mines containing firedamp and/or combustible dust.

5.1. Requirements for Equipment Protection Level Gb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.2. Requirements for Equipment Protection Level Da

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.3. Requirements for Equipment Protection Level Mb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

6. Improper Use

Protection of the personnel and the plant is not ensured if the device is not used according to its intended use.

7. Mounting and Installation

Observe the installation instructions according to IEC/EN 60079-14.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Attach the nameplate supplied in the immediate vicinity of the device. Attach the nameplate so that it is legible and indelible. Take the ambient conditions into account.

Do not mount a damaged or polluted device.

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

If you use the device in environments subject to adverse conditions, you must protect the device accordingly.

Do not remove the warning markings.

7.1. Requirements for Usage as Intrinsically Safe Apparatus

When connecting intrinsically safe devices with intrinsically safe circuits of associated apparatus, observe the maximum peak values with regard to explosion protection (verification of intrinsic safety). Observe the standards IEC/EN 60079-14 or IEC/EN 60079-25.

The type of protection is determined by the connected intrinsically safe circuit.

7.2. Specific Conditions of Use

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

7.2.1. Requirements in Relation to Electrostatics

Information on electrostatic hazards can be found in the technical specification IEC/TS 60079-32-1.

Do not mount the supplied nameplate in areas that can be electrostatically charged.

You can reduce the electrostatic hazards by minimizing the generation of static electricity. For example, you have the following options to minimize the generation of static electricity:

- Control the environmental humidity.
- Protect the device from direct airflow.
- Ensure a continuous drain off of the electrostatic charges.

7.2.1.1. Requirements for Equipment Protection Level Da

Avoid electrostatic charges which could result in electrostatic discharges while installing, operating, or maintaining the device.

7.2.2. Requirements to Mechanics

7.2.2.1. Requirements for Usage as Intrinsically Safe Apparatus

Protect the device from impact effects by mounting in a surrounding enclosure if it is used in the temperature range between the minimum permissible ambient temperature and -20 °C.

Mount the device with at least a degree of protection of IP20 according to IEC/EN 60529.

8. Operation, Maintenance, Repair

Observe the specific conditions of use.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Do not use a damaged or polluted device.

Do not repair, modify, or manipulate the device.

Modifications are permitted only if approved in this instruction manual and in the device-related documentation.

If there is a defect, always replace the device with an original device.

Do not remove the warning markings.

8.1. Requirements for Usage as Intrinsically Safe Apparatus

Only operate the device with intrinsically safe circuits according to IEC/EN 60079-11.

The type of protection is determined by the connected intrinsically safe circuit.

8.2. Requirements for Equipment Protection Level Gb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.3. Requirements for Equipment Protection Level Da

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.4. Requirements for Equipment Protection Level Mb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

9. Delivery, Transport, Disposal

Check the packaging and contents for damage.

Check if you have received every item and if the items received are the ones you ordered.

Keep the original packaging. Always store and transport the device in the original packaging.

Store the device in a clean and dry environment. The permitted ambient conditions must be considered, see datasheet.

The device, built-in components, packaging, and any batteries contained within must be disposed in compliance with the applicable laws and guidelines of the respective country.

10. National Ex approvals

EAC-EX:	TC RU C-DE.AA87.B.00394

11. Safety-Relevant Technical Data

11.1. Equipment protection level Gb

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 2G Ex ia IIC T6...T1 Gb
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIC T6...T1 Gb
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW T6: 73 °C T5: 88 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW T6: 69 °C T5: 84 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW T6: 51 °C T5: 66 °C T4: 80 °C T3: 80 °C T2: 80 °C T1: 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW T6: 39 °C T5: 54 °C T4: 61 °C T3: 61 °C T2: 61 °C T1: 61 °C

11.2. Equipment protection level Da

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 1D Ex ia IIIC T_{200}135°C Da
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIIC T_{200}135°C Da
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 62 °C

11.3. Equipment protection level Mb

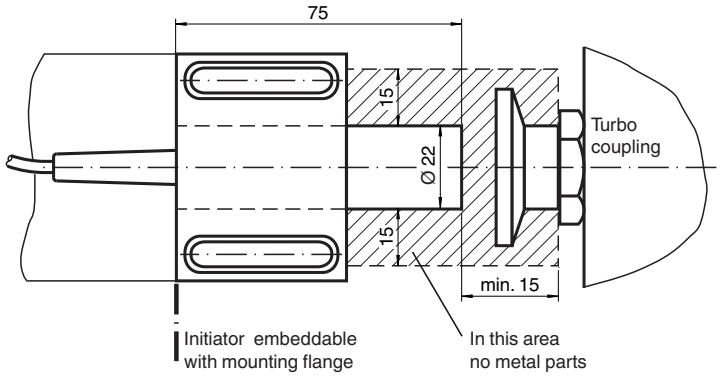
Type of protection	Intrinsic safety
Certificates	
Appropriate type	NJ10-22-N...
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia I Mb

IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW 61 °C

Inductive sensor
NJ10-22-N-E93-Y245590

■ Comfort series

Dimensions



Technical Data

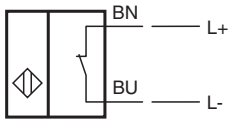
General specifications		
Switching function		Normally closed (NC)
Output type		NAMUR
Rated operating distance	s_n	10 mm
Installation		non-flush
Assured operating distance	s_a	0 ... 10 mm
Output type		2-wire
Nominal ratings		
Nominal voltage	U_o	8.2 V (R_i approx. 1 kΩ)
Switching frequency	f	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		min. 3 mA
Measuring plate detected		≤ 1 mA
Functional safety related parameters		
$MTTF_d$		3602 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		0 %
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000 IEC 60947-5-6:1999

Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133281_eng.pdf

Technical Data

Standards		EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012
Approvals and certificates		
IECEx approval		
Equipment protection level Gb		IECEx PTB 11.0037X
Equipment protection level Da		IECEx PTB 11.0037X
Equipment protection level Mb		IECEx PTB 11.0037X
ATEX approval		
Equipment protection level Gb		PTB 00 ATEX 2048 X
Equipment protection level Da		PTB 00 ATEX 2048 X
EAC conformity		TR CU 012/2011
UL approval		cULus Listed, General Purpose
Ambient conditions		
Ambient temperature		-40 ... 100 °C (-40 ... 212 °F) Also observe the maximum permissible ambient temperature stated in the data for application in connection with hazardous areas. Keep to the lower of the two values.
Mechanical specifications		
Connection type		cable
Housing material		PBT
Sensing face		PBT
Degree of protection		IP68
Cable		
Cable diameter		6 mm ± 0.2 mm
Bending radius		> 10 x cable diameter
Material		silicone
Core cross-section		0.75 mm^2
Length	L	2 m
General information		
Use in the hazardous area		see instruction manuals

Connection



Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133281_eng.pdf

EU-Declaration of conformity

EU-Konformitätserklärung

en/de

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Germany
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No. / *Nr.*: DOC-5073
Date / *Datum*: 2021-07-21

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www.pepperl-fuchs.com

PEPPERL+FUCHS

Declaration of conformity / *Konformitätserklärung*

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

*Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.*

Products / *Produkte*

Product / *Produkt*	Item number	Description / *Beschreibung*
NJ2-12GK-N-Y40110	70133235	Inductive sensor
NJ2-12GK-N-10M-Y89552	70133232	Inductive sensor
NJ2-12GK-N-25M	70133233	Inductive sensor
NJ2-12GK-N-5M	70133234	Inductive sensor
NJ2-12GM-N-Y08766	70133239	Inductive sensor
NJ2-12GM-N-Y10638	70133240	Inductive sensor
NJ2-14GM-N-C50	70133255	Inductive sensor
NJ2-14GM-N-V1-Y19784	70133256	Inductive sensor
NJ2,5-14GM-N-V1-Y21146	70133054	Inductive sensor
NJ25-50-N	70133327	Inductive sensor
NJ10-30GK-N-5M	70133311	Inductive sensor
NJ25-50-N-15M	70133328	Inductive sensor
NJ15-30GKK-N	70133073	Inductive sensor
NJ25-50-N-5M	70133329	Inductive sensor
NJ15-30GK-N	70133317	Inductive sensor
NJ15-30GK-N-Y08943	70133320	Inductive sensor
NJ15-30GK-N-10M	70133074	Inductive sensor
NJ15-30GK-N-20M	70133318	Inductive sensor
NJ15-30GK-N-30M	70133319	Inductive sensor
NJ20-40-N	70133323	Inductive sensor
NJ2-11-N-G-Y102883	70133198	Inductive sensor
NJ2-11-N-G-910	70133196	Inductive sensor
NJ10-22-N	70133280	Inductive sensor
NJ10-22-N-E93-Y245590	70133281	Inductive sensor
NJ10-22-N-E93-Y246868	70133282	Inductive sensor
NJ10-22-N-E93-Y246869	70133283	Inductive sensor
NJ10-22-N-G	70133284	Inductive sensor
NJ10-22-N-G-5M	70133285	Inductive sensor
NJ10-30GKK-N	70133308	Inductive sensor
NJ10-30GK-N	70133309	Inductive sensor
NJ10-30GK-N-15M	70133310	Inductive sensor
NJ2-11-N-Y14235	70133202	Inductive sensor
NJ2-12GK-N	70133049	Inductive sensor

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	Standards *Normen*
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 EN IEC 60079-0:2018-07
EMC 2014/30/EU (L96/79-106)	EN 60947-5-2/A1:2012-11 EN 60947-5-2:2007-12 EN 60947-5-6:2000-01 EN IEC 60947-5-2:2020-03
RoHS 2011/65/EU (L174/88-110)	EN IEC 63000:2018-12

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2021-07-21

i.V. Ulrich Ehrenfried
Head of Innovation Unit Electromagnetic Sensors

i.V. Tobias Dittmer
Global Product Manager

ANNEX ATEX

Notified Body QM-System / Notifizierte Stelle des QM-Systems
Physikalisch Technische Bundesanstalt (0102)
Bundesallee 100
38116 Braunschweig
Germany

Marking and Certificates / *Kennzeichnung und Zertifikate*

Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller ID*
Ex II 1 D Ex II 2 G	PTB 00 ATEX 2048 X	0102

Key for Issuer ID / *Schlüssel zur Aussteller ID*

ID	Issuer / *Aussteller*
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

PEPPERL+FUCHS Your automation, our passion.

Pepperl+Fuchs SE • 68307 Mannheim • Germany

Customer: DE164472
J.M. Voith SE & Co. KG | VTA

Mannheim, November 24, 2023

We, Pepperl+Fuchs SE at 68307 Mannheim hereby declare that the listed product/s have been produced conform to the Regulation (EC) No 1907/2006 (REACH). Used SVHC according Article 33 of the regulation are noted.

Manufacturer Declaration

Item/s		
Item Number	Item Description	*Your Item No*
SCIP No.		
SVHC		
70133281	NJ10-22-N-E93-Y245590	
1a8b87c8-f50d-4cf1-b772-699892f52066		
-4,4'-isopropylidenediphenol (Bisphenol A), EC 201-245-8, CAS 80-05-7		
-Lead (Pb) EC 231-100-4, CAS 7439-92-1		

This document is generated automatically and valid without signature. The document represents the present status of knowledge.

Department Global Compliance
24.11.2023 Mannheim

Pepperl+Fuchs SE
Lilienthalstraße 200 • 68307 Mannheim • Germany • Phone: +49 621 776-0 • Fax: +49 621 776-1000 • www.pepperl-fuchs.com • info@de.pepperl-fuchs.com
Board Members: Dr.-Ing. Gunther Kegel (Chairman), Werner Guthier (Deputy Chairman), Lutz Liebers, Reiner Müller, Florian Ochs
Chairwoman of the Supervisory Board: Monika Mueller-Michael • Registration Court: AG Mannheim HRB 737016 • VAT reg. no.: DE 143877372
Bank Account: Commerzbank AG • IBAN: DE89670800500685472200 • BIC: DRESDEFF670 • Deutsche Bank AG • IBAN: DE73670700100553270000 • BIC: DEUTDESMXXX

14.3 Initiator NJ 10-22-N-E93-Y246868 (5 m)

Voith Material No.: 201.04312810

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs
Manufacturer´s declaration	Pepperl+Fuchs

Instruction Manual

1. Marking

Inductive sensor
NJ10-22-N-E93-Y246868
ATEX marking
⟨Ex⟩ II 2G Ex ia IIC T6...T1 Gb
⟨Ex⟩ II 1D Ex ia IIIC T_{200}135°C Da
IECEx marking
Ex ia IIC T6...T1 Gb
Ex ia IIIC T_{200}135°C Da
Ex ia I Mb

Pepperl+Fuchs Group
Lilienthalstraße 200, 68307 Mannheim, Germany
Internet: www.pepperl-fuchs.com

2. Validity

Specific processes and instructions in this instruction manual require special provisions to guarantee the safety of the operating personnel.

3. Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the device. The trained and qualified personnel must have read and understood the instruction manual.

4. Reference to Further Documentation

Observe laws, standards, and directives applicable to the intended use and the operating location. Observe Directive 1999/92/EC in relation to hazardous areas.

The corresponding datasheets, manuals, declarations of conformity, EU-type examination certificates, certificates, and control drawings if applicable (see datasheet) are an integral part of this document. You can find this information under www.pepperl-fuchs.com.

For specific device information, scan the QR code on the device or enter the serial number in the serial number search at www.pepperl-fuchs.com

Due to constant revisions, documentation is subject to permanent change. Please refer only to the most up-to-date version, which can be found under www.pepperl-fuchs.com.

5. Intended Use

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

Technical data provided in the datasheet may be partly restrained by the information given in this instruction manual.

Use the device only within the specified ambient and operating conditions.

The device is an electrical apparatus for hazardous areas.

The certificate applies only to the use of apparatus under atmospheric conditions.

If you use the device outside atmospheric conditions, consider that the permissible safety parameters should be reduced.

The device can be used in hazardous areas containing gas, vapor, and mist.

The device can be used in hazardous areas containing combustible dust.

The device can be used in underground parts of mines as well as those parts of surface installations of such mines containing firedamp and/or combustible dust.

5.1. Requirements for Equipment Protection Level Gb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.2. Requirements for Equipment Protection Level Da

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.3. Requirements for Equipment Protection Level Mb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

6. Improper Use

Protection of the personnel and the plant is not ensured if the device is not used according to its intended use.

7. Mounting and Installation

Observe the installation instructions according to IEC/EN 60079-14.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Attach the nameplate supplied in the immediate vicinity of the device. Attach the nameplate so that it is legible and indelible. Take the ambient conditions into account.

Do not mount a damaged or polluted device.

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

If you use the device in environments subject to adverse conditions, you must protect the device accordingly.

Do not remove the warning markings.

7.1. Requirements for Usage as Intrinsically Safe Apparatus

When connecting intrinsically safe devices with intrinsically safe circuits of associated apparatus, observe the maximum peak values with regard to explosion protection (verification of intrinsic safety). Observe the standards IEC/EN 60079-14 or IEC/EN 60079-25.

The type of protection is determined by the connected intrinsically safe circuit.

7.2. Specific Conditions of Use

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

7.2.1. Requirements in Relation to Electrostatics

Information on electrostatic hazards can be found in the technical specification IEC/TS 60079-32-1.

Do not mount the supplied nameplate in areas that can be electrostatically charged.

You can reduce the electrostatic hazards by minimizing the generation of static electricity. For example, you have the following options to minimize the generation of static electricity:

- Control the environmental humidity.
- Protect the device from direct airflow.
- Ensure a continuous drain off of the electrostatic charges.

7.2.1.1. Requirements for Equipment Protection Level Da

Avoid electrostatic charges which could result in electrostatic discharges while installing, operating, or maintaining the device.

7.2.2. Requirements to Mechanics

7.2.2.1. Requirements for Usage as Intrinsically Safe Apparatus

Protect the device from impact effects by mounting in a surrounding enclosure if it is used in the temperature range between the minimum permissible ambient temperature and -20 °C.

Mount the device with at least a degree of protection of IP20 according to IEC/EN 60529.

8. Operation, Maintenance, Repair

Observe the specific conditions of use.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Do not use a damaged or polluted device.

Do not repair, modify, or manipulate the device.

Modifications are permitted only if approved in this instruction manual and in the device-related documentation.

If there is a defect, always replace the device with an original device.

Do not remove the warning markings.

8.1. Requirements for Usage as Intrinsically Safe Apparatus

Only operate the device with intrinsically safe circuits according to IEC/EN 60079-11.

The type of protection is determined by the connected intrinsically safe circuit.

8.2. Requirements for Equipment Protection Level Gb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.3. Requirements for Equipment Protection Level Da

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.4. Requirements for Equipment Protection Level Mb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

9. Delivery, Transport, Disposal

Check the packaging and contents for damage.

Check if you have received every item and if the items received are the ones you ordered.

Keep the original packaging. Always store and transport the device in the original packaging.

Store the device in a clean and dry environment. The permitted ambient conditions must be considered, see datasheet.

The device, built-in components, packaging, and any batteries contained within must be disposed in compliance with the applicable laws and guidelines of the respective country.

10. National Ex approvals

EAC-EX:	TC RU C-DE.AA87.B.00394

11. Safety-Relevant Technical Data

11.1. Equipment protection level Gb

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 2G Ex ia IIC T6...T1 Gb
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIC T6...T1 Gb
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW T6: 73 °C T5: 88 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW T6: 69 °C T5: 84 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW T6: 51 °C T5: 66 °C T4: 80 °C T3: 80 °C T2: 80 °C T1: 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW T6: 39 °C T5: 54 °C T4: 61 °C T3: 61 °C T2: 61 °C T1: 61 °C

11.2. Equipment protection level Da

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 1D Ex ia IIIC T_{200}135°C Da
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIIC T_{200}135°C Da
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 62 °C

11.3. Equipment protection level Mb

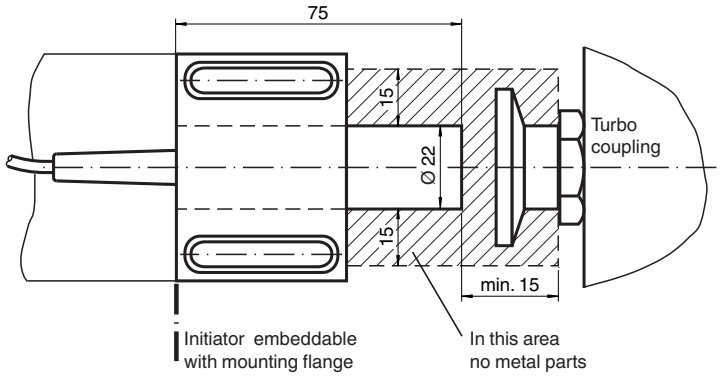
Type of protection	Intrinsic safety
Certificates	
Appropriate type	NJ10-22-N...
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia I Mb

IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW 61 °C

Inductive sensor
NJ10-22-N-E93-Y246868

■ Comfort series

Dimensions



Technical Data

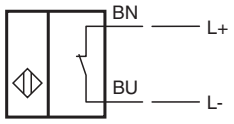
General specifications		
Switching function		Normally closed (NC)
Output type		NAMUR
Rated operating distance	s_n	10 mm
Installation		non-flush
Assured operating distance	s_a	0 ... 10 mm
Output type		2-wire
Nominal ratings		
Nominal voltage	U_o	8.2 V (R_i approx. 1 kΩ)
Switching frequency	f	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		min. 3 mA
Measuring plate detected		≤ 1 mA
Functional safety related parameters		
$MTTF_d$		3602 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		0 %
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000 IEC 60947-5-6:1999

Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133282_eng.pdf

Technical Data

Standards		EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012
Approvals and certificates		
IECEx approval		
Equipment protection level Gb		IECEx PTB 11.0037X
Equipment protection level Da		IECEx PTB 11.0037X
Equipment protection level Mb		IECEx PTB 11.0037X
ATEX approval		
Equipment protection level Gb		PTB 00 ATEX 2048 X
Equipment protection level Da		PTB 00 ATEX 2048 X
EAC conformity		TR CU 012/2011
UL approval		cULus Listed, General Purpose
Ambient conditions		
Ambient temperature		-40 ... 100 °C (-40 ... 212 °F) Also observe the maximum permissible ambient temperature stated in the data for application in connection with hazardous areas. Keep to the lower of the two values.
Mechanical specifications		
Connection type		cable
Housing material		PBT
Sensing face		PBT
Degree of protection		IP68
Cable		
Cable diameter		6 mm ± 0.2 mm
Bending radius		> 10 x cable diameter
Material		silicone
Core cross-section		0.75 mm^2
Length	L	5 m
General information		
Use in the hazardous area		see instruction manuals

Connection



Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133282_eng.pdf

EU-Declaration of conformity

EU-Konformitätserklärung

en/de

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Lilienthalstraße 200
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No. / *Nr.*: DOC-5073
Date / *Datum*: 2021-07-21

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PEPPERL+FUCHS

Declaration of conformity / *Konformitätserklärung*

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

*Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.*

Products / *Produkte*

Product / *Produkt*	Item number	Description / *Beschreibung*
NJ2-12GK-N-Y40110	70133235	Inductive sensor
NJ2-12GK-N-10M-Y89552	70133232	Inductive sensor
NJ2-12GK-N-25M	70133233	Inductive sensor
NJ2-12GK-N-5M	70133234	Inductive sensor
NJ2-12GM-N-Y08766	70133239	Inductive sensor
NJ2-12GM-N-Y10638	70133240	Inductive sensor
NJ2-14GM-N-C50	70133255	Inductive sensor
NJ2-14GM-N-V1-Y19784	70133256	Inductive sensor
NJ2,5-14GM-N-V1-Y21146	70133054	Inductive sensor
NJ25-50-N	70133327	Inductive sensor
NJ10-30GK-N-5M	70133311	Inductive sensor
NJ25-50-N-15M	70133328	Inductive sensor
NJ15-30GKK-N	70133073	Inductive sensor
NJ25-50-N-5M	70133329	Inductive sensor
NJ15-30GK-N	70133317	Inductive sensor
NJ15-30GK-N-Y08943	70133320	Inductive sensor
NJ15-30GK-N-10M	70133074	Inductive sensor
NJ15-30GK-N-20M	70133318	Inductive sensor
NJ15-30GK-N-30M	70133319	Inductive sensor
NJ20-40-N	70133323	Inductive sensor
NJ2-11-N-G-Y102883	70133198	Inductive sensor
NJ2-11-N-G-910	70133196	Inductive sensor
NJ10-22-N	70133280	Inductive sensor
NJ10-22-N-E93-Y245590	70133281	Inductive sensor
NJ10-22-N-E93-Y246868	70133282	Inductive sensor
NJ10-22-N-E93-Y246869	70133283	Inductive sensor
NJ10-22-N-G	70133284	Inductive sensor
NJ10-22-N-G-5M	70133285	Inductive sensor
NJ10-30GKK-N	70133308	Inductive sensor
NJ10-30GK-N	70133309	Inductive sensor
NJ10-30GK-N-15M	70133310	Inductive sensor
NJ2-11-N-Y14235	70133202	Inductive sensor
NJ2-12GK-N	70133049	Inductive sensor

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	Standards *Normen*
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 EN IEC 60079-0:2018-07
EMC 2014/30/EU (L96/79-106)	EN 60947-5-2/A1:2012-11 EN 60947-5-2:2007-12 EN 60947-5-6:2000-01 EN IEC 60947-5-2:2020-03
RoHS 2011/65/EU (L174/88-110)	EN IEC 63000:2018-12

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2021-07-21

i.V. Ulrich Ehrenfried
Head of Innovation Unit Electromagnetic Sensors

i.V. Tobias Dittmer
Global Product Manager

ANNEX ATEX

Notified Body QM-System / Notifizierte Stelle des QM-Systems
Physikalisch Technische Bundesanstalt (0102)
Bundesallee 100
38116 Braunschweig
Germany

Marking and Certificates / *Kennzeichnung und Zertifikate*

Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller ID*
Ex II 1 D Ex II 2 G	PTB 00 ATEX 2048 X	0102

Key for Issuer ID / *Schlüssel zur Aussteller ID*

ID	Issuer / *Aussteller*
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

PEPPERL+FUCHS Your automation, our passion.

Pepperl+Fuchs SE • 68307 Mannheim • Germany

Customer: DE164472
J.M. Voith SE & Co. KG | VTA

Mannheim, November 24, 2023

We, Pepperl+Fuchs SE at 68307 Mannheim hereby declare that the listed product/s have been produced conform to the Regulation (EC) No 1907/2006 (REACH). Used SVHC according Article 33 of the regulation are noted.

Manufacturer Declaration

Item/s		
Item Number	Item Description	*Your Item No*
SCIP No.		
SVHC		
70133282	NJ10-22-N-E93-Y246868	
2cf50ea3-9289-4d6e-87b2-1e566cbb10ed		
-4,4'-isopropylidenediphenol (Bisphenol A), EC 201-245-8, CAS 80-05-7		
-Lead (Pb) EC 231-100-4, CAS 7439-92-1		

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Department Global Compliance
24.11.2023 Mannheim

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Board Members: Dr.-Ing. Gunther Kegel (Chairman), Werner Guthier (Deputy Chairman), Lutz Liebers, Reiner Müller, Florian Ochs
Chairwoman of the Supervisory Board: Monika Mueller-Michael • Registration Court: AG Mannheim HRB 737016 • VAT reg. no.: DE 143877372
Bank Account: Commerzbank AG • IBAN: DE89670800500685472200 • BIC: DRESDEFF670 • Deutsche Bank AG • IBAN: DE73670700100553270000 • BIC: DEUTDESMXXX

14.4 Initiator NJ 10-22-N-E93-Y246869 (10 m)

Voith Material No.: 201.04312910

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs
Manufacturer´s declaration	Pepperl+Fuchs

Instruction Manual

1. Marking

Inductive sensor
NJ10-22-N-E93-Y246869
ATEX marking
⟨Ex⟩ II 2G Ex ia IIC T6...T1 Gb
⟨Ex⟩ II 1D Ex ia IIIC T_{200}135°C Da
IECEx marking
Ex ia IIC T6...T1 Gb
Ex ia IIIC T_{200}135°C Da
Ex ia I Mb

Pepperl+Fuchs Group
Lilienthalstraße 200, 68307 Mannheim, Germany
Internet: www.pepperl-fuchs.com

2. Validity

Specific processes and instructions in this instruction manual require special provisions to guarantee the safety of the operating personnel.

3. Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the device. The trained and qualified personnel must have read and understood the instruction manual.

4. Reference to Further Documentation

Observe laws, standards, and directives applicable to the intended use and the operating location. Observe Directive 1999/92/EC in relation to hazardous areas.

The corresponding datasheets, manuals, declarations of conformity, EU-type examination certificates, certificates, and control drawings if applicable (see datasheet) are an integral part of this document. You can find this information under www.pepperl-fuchs.com.

For specific device information, scan the QR code on the device or enter the serial number in the serial number search at www.pepperl-fuchs.com

Due to constant revisions, documentation is subject to permanent change. Please refer only to the most up-to-date version, which can be found under www.pepperl-fuchs.com.

5. Intended Use

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

Technical data provided in the datasheet may be partly restrained by the information given in this instruction manual.

Use the device only within the specified ambient and operating conditions.

The device is an electrical apparatus for hazardous areas.

The certificate applies only to the use of apparatus under atmospheric conditions.

If you use the device outside atmospheric conditions, consider that the permissible safety parameters should be reduced.

The device can be used in hazardous areas containing gas, vapor, and mist.

The device can be used in hazardous areas containing combustible dust.

The device can be used in underground parts of mines as well as those parts of surface installations of such mines containing firedamp and/or combustible dust.

5.1. Requirements for Equipment Protection Level Gb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.2. Requirements for Equipment Protection Level Da

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

5.3. Requirements for Equipment Protection Level Mb

Refer to the relevant certificate to see the relationship between the connected circuit type, the maximum permitted ambient temperature, the effective inner reactances, and if applicable the surface temperature or the temperature class.

The suitability for use of the device at ambient temperatures >60 °C in conjunction with hot surfaces has been checked by the notified body.

6. Improper Use

Protection of the personnel and the plant is not ensured if the device is not used according to its intended use.

7. Mounting and Installation

Observe the installation instructions according to IEC/EN 60079-14.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Attach the nameplate supplied in the immediate vicinity of the device. Attach the nameplate so that it is legible and indelible. Take the ambient conditions into account.

Do not mount a damaged or polluted device.

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

If you use the device in environments subject to adverse conditions, you must protect the device accordingly.

Do not remove the warning markings.

7.1. Requirements for Usage as Intrinsically Safe Apparatus

When connecting intrinsically safe devices with intrinsically safe circuits of associated apparatus, observe the maximum peak values with regard to explosion protection (verification of intrinsic safety). Observe the standards IEC/EN 60079-14 or IEC/EN 60079-25.

The type of protection is determined by the connected intrinsically safe circuit.

7.2. Specific Conditions of Use

Mount the device so that it complies with the specified degree of protection according to IEC/EN 60529.

7.2.1. Requirements in Relation to Electrostatics

Information on electrostatic hazards can be found in the technical specification IEC/TS 60079-32-1.

Do not mount the supplied nameplate in areas that can be electrostatically charged.

You can reduce the electrostatic hazards by minimizing the generation of static electricity. For example, you have the following options to minimize the generation of static electricity:

- Control the environmental humidity.
- Protect the device from direct airflow.
- Ensure a continuous drain off of the electrostatic charges.

7.2.1.1. Requirements for Equipment Protection Level Da

Avoid electrostatic charges which could result in electrostatic discharges while installing, operating, or maintaining the device.

7.2.2. Requirements to Mechanics

7.2.2.1. Requirements for Usage as Intrinsically Safe Apparatus

Protect the device from impact effects by mounting in a surrounding enclosure if it is used in the temperature range between the minimum permissible ambient temperature and -20 °C.

Mount the device with at least a degree of protection of IP20 according to IEC/EN 60529.

8. Operation, Maintenance, Repair

Observe the specific conditions of use.

Safety-relevant markings are found on the nameplate of the device or the nameplate supplied.

Do not use a damaged or polluted device.

Do not repair, modify, or manipulate the device.

Modifications are permitted only if approved in this instruction manual and in the device-related documentation.

If there is a defect, always replace the device with an original device.

Do not remove the warning markings.

8.1. Requirements for Usage as Intrinsically Safe Apparatus

Only operate the device with intrinsically safe circuits according to IEC/EN 60079-11.

The type of protection is determined by the connected intrinsically safe circuit.

8.2. Requirements for Equipment Protection Level Gb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.3. Requirements for Equipment Protection Level Da

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

8.4. Requirements for Equipment Protection Level Mb

Observe the temperature table for the corresponding equipment protection level in the certificate.

Also observe the maximum permissible ambient temperature stated in the technical data. Keep to the lower of the two values.

9. Delivery, Transport, Disposal

Check the packaging and contents for damage.

Check if you have received every item and if the items received are the ones you ordered.

Keep the original packaging. Always store and transport the device in the original packaging.

Store the device in a clean and dry environment. The permitted ambient conditions must be considered, see datasheet.

The device, built-in components, packaging, and any batteries contained within must be disposed in compliance with the applicable laws and guidelines of the respective country.

10. National Ex approvals

EAC-EX:	TC RU C-DE.AA87.B.00394

11. Safety-Relevant Technical Data

11.1. Equipment protection level Gb

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 2G Ex ia IIC T6...T1 Gb
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIC T6...T1 Gb
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW T6: 73 °C T5: 88 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW T6: 69 °C T5: 84 °C T4: 100 °C T3: 100 °C T2: 100 °C T1: 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW T6: 51 °C T5: 66 °C T4: 80 °C T3: 80 °C T2: 80 °C T1: 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW T6: 39 °C T5: 54 °C T4: 61 °C T3: 61 °C T2: 61 °C T1: 61 °C

11.2. Equipment protection level Da

Type of protection	Intrinsic safety
CE marking	CE-0102
Certificates	
Appropriate type	NJ10-22-N...
ATEX certificate	PTB 00 ATEX 2048 X
ATEX marking	Ex II 1D Ex ia IIIC T_{200}135°C Da
ATEX standards	EN IEC 60079-0:2018-07, EN 60079-11:2012-01
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia IIIC T_{200}135°C Da
IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 62 °C

11.3. Equipment protection level Mb

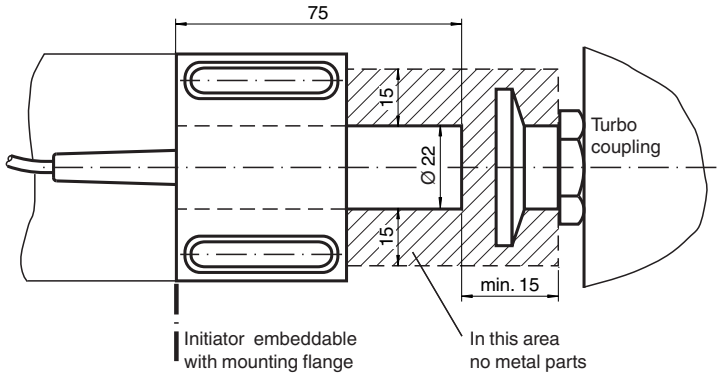
Type of protection	Intrinsic safety
Certificates	
Appropriate type	NJ10-22-N...
IECEx certificate	IECEx PTB 11.0037X
IECEx marking	Ex ia I Mb

IECEx standards	IEC 60079-0:2017-12, IEC 60079-11:2011-06
Effective internal capacitance C_i	max. 130 nF A cable length of 10 m is considered.
Effective internal inductance L_i	max. 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature in °C	Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. U_i = 16 V, I_i = 25 mA, P_i = 34 mW 100 °C U_i = 16 V, I_i = 25 mA, P_i = 64 mW 100 °C U_i = 16 V, I_i = 52 mA, P_i = 169 mW 80 °C U_i = 16 V, I_i = 76 mA, P_i = 242 mW 61 °C

Inductive sensor
NJ10-22-N-E93-Y246869

■ Comfort series

Dimensions



Technical Data

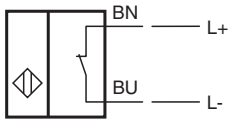
General specifications		
Switching function		Normally closed (NC)
Output type		NAMUR
Rated operating distance	s_n	10 mm
Installation		non-flush
Assured operating distance	s_a	0 ... 10 mm
Output type		2-wire
Nominal ratings		
Nominal voltage	U_o	8.2 V (R_i approx. 1 kΩ)
Switching frequency	f	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		min. 3 mA
Measuring plate detected		≤ 1 mA
Functional safety related parameters		
$MTTF_d$		3602 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		0 %
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000 IEC 60947-5-6:1999

Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133283_eng.pdf

Technical Data

Standards		EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012
Approvals and certificates		
IECEx approval		
Equipment protection level Gb		IECEx PTB 11.0037X
Equipment protection level Da		IECEx PTB 11.0037X
Equipment protection level Mb		IECEx PTB 11.0037X
ATEX approval		
Equipment protection level Gb		PTB 00 ATEX 2048 X
Equipment protection level Da		PTB 00 ATEX 2048 X
EAC conformity		TR CU 012/2011
UL approval		cULus Listed, General Purpose
Ambient conditions		
Ambient temperature		-40 ... 100 °C (-40 ... 212 °F) Also observe the maximum permissible ambient temperature stated in the data for application in connection with hazardous areas. Keep to the lower of the two values.
Mechanical specifications		
Connection type		cable
Housing material		PBT
Sensing face		PBT
Degree of protection		IP68
Cable		
Cable diameter		6 mm ± 0.2 mm
Bending radius		> 10 x cable diameter
Material		silicone
Core cross-section		0.75 mm^2
Length	L	10 m
General information		
Use in the hazardous area		see instruction manuals

Connection



Release date: 2021-06-21 Date of issue: 2021-06-21 Filename: 70133283_eng.pdf

EU-Declaration of conformity

EU-Konformitätserklärung

en/de

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No. / *Nr.*: DOC-5073
Date / *Datum*: 2021-07-21

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Declaration of conformity / *Konformitätserklärung*

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

*Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.*

Products / *Produkte*

Product / *Produkt*	Item number	Description / *Beschreibung*
NJ2-12GK-N-Y40110	70133235	Inductive sensor
NJ2-12GK-N-10M-Y89552	70133232	Inductive sensor
NJ2-12GK-N-25M	70133233	Inductive sensor
NJ2-12GK-N-5M	70133234	Inductive sensor
NJ2-12GM-N-Y08766	70133239	Inductive sensor
NJ2-12GM-N-Y10638	70133240	Inductive sensor
NJ2-14GM-N-C50	70133255	Inductive sensor
NJ2-14GM-N-V1-Y19784	70133256	Inductive sensor
NJ2,5-14GM-N-V1-Y21146	70133054	Inductive sensor
NJ25-50-N	70133327	Inductive sensor
NJ10-30GK-N-5M	70133311	Inductive sensor
NJ25-50-N-15M	70133328	Inductive sensor
NJ15-30GKK-N	70133073	Inductive sensor
NJ25-50-N-5M	70133329	Inductive sensor
NJ15-30GK-N	70133317	Inductive sensor
NJ15-30GK-N-Y08943	70133320	Inductive sensor
NJ15-30GK-N-10M	70133074	Inductive sensor
NJ15-30GK-N-20M	70133318	Inductive sensor
NJ15-30GK-N-30M	70133319	Inductive sensor
NJ20-40-N	70133323	Inductive sensor
NJ2-11-N-G-Y102883	70133198	Inductive sensor
NJ2-11-N-G-910	70133196	Inductive sensor
NJ10-22-N	70133280	Inductive sensor
NJ10-22-N-E93-Y245590	70133281	Inductive sensor
NJ10-22-N-E93-Y246868	70133282	Inductive sensor
NJ10-22-N-E93-Y246869	70133283	Inductive sensor
NJ10-22-N-G	70133284	Inductive sensor
NJ10-22-N-G-5M	70133285	Inductive sensor
NJ10-30GKK-N	70133308	Inductive sensor
NJ10-30GK-N	70133309	Inductive sensor
NJ10-30GK-N-15M	70133310	Inductive sensor
NJ2-11-N-Y14235	70133202	Inductive sensor
NJ2-12GK-N	70133049	Inductive sensor

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	Standards *Normen*
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 EN IEC 60079-0:2018-07
EMC 2014/30/EU (L96/79-106)	EN 60947-5-2/A1:2012-11 EN 60947-5-2:2007-12 EN 60947-5-6:2000-01 EN IEC 60947-5-2:2020-03
RoHS 2011/65/EU (L174/88-110)	EN IEC 63000:2018-12

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2021-07-21

i.V. Ulrich Ehrenfried
Head of Innovation Unit Electromagnetic Sensors

i.V. Tobias Dittmer
Global Product Manager

ANNEX ATEX

Notified Body QM-System / Notifizierte Stelle des QM-Systems
Physikalisch Technische Bundesanstalt (0102)
Bundesallee 100
38116 Braunschweig
Germany

Marking and Certificates / *Kennzeichnung und Zertifikate*

Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller ID*
Ex II 1 D Ex II 2 G	PTB 00 ATEX 2048 X	0102

Key for Issuer ID / *Schlüssel zur Aussteller ID*

ID	Issuer / *Aussteller*
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

PEPPERL+FUCHS Your automation, our passion.

Pepperl+Fuchs SE • 68307 Mannheim • Germany

Customer: DE164472
J.M. Voith SE & Co. KG | VTA

Mannheim, November 24, 2023

We, Pepperl+Fuchs SE at 68307 Mannheim hereby declare that the listed product/s have been produced conform to the Regulation (EC) No 1907/2006 (REACH). Used SVHC according Article 33 of the regulation are noted.

Manufacturer Declaration

Item/s		
Item Number	Item Description	*Your Item No*
SCIP No.		
SVHC		
70133283	NJ10-22-N-E93-Y246869	
313df958-fb94-4948-91b4-843538f6e738		
-4,4'-isopropylidenediphenol (Bisphenol A), EC 201-245-8, CAS 80-05-7		
-Lead (Pb) EC 231-100-4, CAS 7439-92-1		

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Department Global Compliance
24.11.2023 Mannheim

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Chairwoman of the Supervisory Board: Monika Mueller-Michael • Registration Court: AG Mannheim HRB 737016 • VAT reg. no.: DE 143877372
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14.5 Evaluator KFD2-SR2-Ex2.W.SM

Voith Material No.: 201.03905210

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Safety Instructions	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs
Manufacturer´s declaration	Pepperl+Fuchs

Instruction Manual

Marking

K-System, Isolated barriers for Zone 2
Device identification
Model number
ATEX approval
Group, category, type of protection, temperature classification

table 1

The exact designation of the device can be found on the name plate on the device side.

Pepperl+Fuchs GmbH Lilienthalstrasse 200, 68307 Mannheim, Germany

table 2

Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.
Mounting, installation, commissioning, operation, maintenance and dismounting of the device may only be carried out by appropriate trained and qualified personnel. The instruction manual must be read and understood.
Prior to using the device you should make yourself familiar with the device and carefully read the instruction manual.

Reference to Further Documentation

Observe laws, standards, and directives applicable to the intended use and the operating location.
The corresponding datasheets, declarations of conformity, EC-type-examination certificates, certificates and control drawings if applicable supplement this document. You can find this information under www.pepperl-fuchs.com.

Intended Use

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.
The device is used in control and instrumentation technology (C&I technology) for the galvanic isolation of signals such as 20 mA and 10 V standard signals or alternatively for adapting or standardizing signals.
The device has intrinsically safe circuits that are used for operating intrinsically safe field devices in hazardous areas.
Use the device only within the specified ambient conditions.
The device is designed for mounting on a 35 mm DIN mounting rail according to EN 60715.
Only use the device stationary.
The device is an associated apparatus according to IEC/EN 60079-11.
The device is an electrical apparatus for hazardous areas of Zone 2.

Improper Use

Protection of the personnel and the plant is not ensured if the device is not being used according to its intended use.
The device is not suitable for isolating signals in power installations unless this is noted separately in the corresponding datasheet.

Mounting and Installation

Do not mount a damaged or polluted device.
Mount the device in a way that the device is protected against mechanical hazard. Mount the device in a surrounding enclosure for example.
Do not mount the device in the dust hazardous area.
The device fulfills a degree of protection IP20 according to IEC/EN 60529.
The device must be installed and operated only in an environment that ensures a pollution degree 2 (or better) according to IEC/EN 60664-1.
If used in areas with higher pollution degree, the device needs to be protected accordingly.
All circuits connected to the device must comply with the overvoltage category II (or better) according to IEC/EN 60664-1.
Only use power supplies that provide protection against electric shock (e. g. SELV or PELV) for the connection to power feed modules.
Observe the installation instructions according to IEC/EN 60079-14.

Requirements for Cables and Connection Lines

Observe the following points when installing cables and connection lines:
Observe the permissible core cross-section of the conductor.
If you use stranded conductors, crimp wire end ferrules on the conductor ends.
Use only one conductor per terminal.
When installing the conductors the insulation must reach up to the terminal.
Observe the tightening torque of the terminal screws.
If the rated voltage is greater than 50 V AC, proceed as follows:
1. Switch off the voltage.
2. Connect the terminal blocks or disconnect the terminal blocks.

Requirements for Usage as Associated Apparatus

If circuits with type of protection Ex i are operated with non-intrinsically safe circuits, they must no longer be used as circuits with type of protection Ex i.
Intrinsically safe circuits of associated apparatus can be led into hazardous areas. Observe the compliance of the separation distances to all non-intrinsically safe circuits according to IEC/EN 60079-14.
Observe the compliance of the separation distances between two adjacent intrinsically safe circuits according to IEC/EN 60079-14.
Observe the maximum values of the device, when connecting the device to intrinsically safe apparatus.
When connecting intrinsically safe devices with intrinsically safe circuits of associated apparatus, observe the maximum peak values with regard to explosion protection (verification of intrinsic safety). Observe the standards IEC/EN 60079-14 or IEC/EN 60079-25.
If no L_o and C_o values are specified for the simultaneous appearance of lumped inductances and capacitances, the following rule applies.

- The specified value for L_o and C_o is used if one of the following conditions applies:
  - The circuit has distributed inductances and capacitances only, e. g., in cables and connection lines.
  - The total value of L_i (excluding cable) of the circuit is < 1 % of the specified L_o value.
  - The total value of C_i (excluding cable) of the circuit is < 1 % of the specified C_o value.
- A maximum of 50 % of the specified value for L_o and C_o is used if the following condition applies:
  The total value of L_i (excluding cable) of the circuit is ≥ 1 % of the specified L_o value.
  The total value of C_i (excluding cable) of the circuit is ≥ 1 % of the specified C_o value.
  The reduced capacitance for gas groups I, IIA and IIB must not exceed the value of 1 µF (including cable).
  The reduced capacitance for gas group IIC must not exceed the value of 600 nF (including cable).

If more channels of one device are connected in parallel, ensure the parallel connection is made directly at the terminals of the device. When verifying the intrinsic safety, observe the maximum values for the parallel connection.

Requirements for Equipment Protection Level Gc

The device must be installed and operated only in surrounding enclosures that

- comply with the requirements for surrounding enclosures according to IEC/EN 60079-0,
- are rated with the degree of protection IP54 according to IEC/EN 60529.

Connection or disconnection of energized non-intrinsically safe circuits is only permitted in the absence of a potentially explosive atmosphere.
Provide a transient protection. Ensure that the peak value of the transient protection does not exceed 140 % of the rated voltage.
Place warning label "Warning – Do not remove or replace fuse when energized!" visibly on the housing.

Operation, Maintenance, Repair

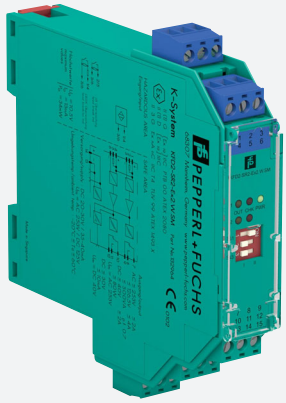
The devices must not be repaired, changed or manipulated. If there is a defect, the product must always be replaced with an original device.
If the rated voltage is greater than 50 V AC, proceed as follows:
1. Switch off the voltage.
2. Connect the terminal blocks or disconnect the terminal blocks.

Requirements for Equipment Protection Level Gc

Connection or disconnection of energized non-intrinsically safe circuits is only permitted in the absence of a potentially explosive atmosphere.
Only use operating elements in the absence of a potentially explosive atmosphere.
Only use the programming socket in the absence of a potentially explosive atmosphere.
Only change the replaceable fuse, when the device is de-energized.

Delivery, Transport, Disposal

Check the packaging and contents for damage.
Check if you have received every item and if the items received are the ones you ordered.
Always store and transport the device in the original packaging.
Store the device in a clean and dry environment. The permitted ambient conditions (see datasheet) must be considered.
Disposing of device, packaging, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



Standstill and Rotational Direction Monitor

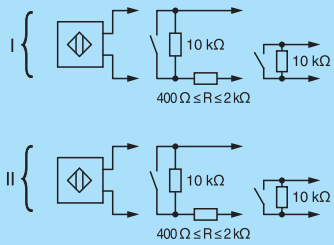
KFD2-SR2-Ex2.W.SM

- 2-channel isolated barrier
- 24 V DC supply (Power Rail)
- Dry contact or NAMUR inputs
- Selectable frequency trip values
- 2 relay contact outputs
- Start-up override
- Selectable mode of operation
- Line fault detection (LFD)
- Up to SIL 2 acc. to IEC/EN 61508

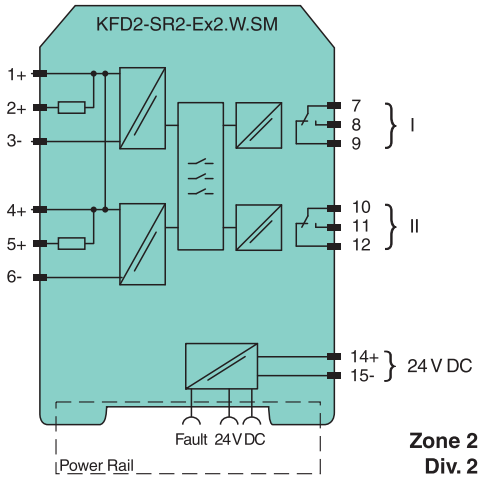
Function

This isolated barrier is used for intrinsic safety applications.
This device is a standstill monitor that accepts input frequency pulses and triggers an output when the frequency drops below a preselected limit value.
Two start-up override values are available. This unit can also be used to determine rotation direction.
During an error condition, the relay reverts to its de-energized state and the LEDs indicate the fault according to NAMUR NE 44.
The device has LED status indicators for direction of rotation detection, limit detection, supply, and hardware faults.
The device is easily configured by the use of DIP switches.
If the device is operated via Power Rail, additionally a collective error message is available.
For additional information, refer to www.pepperl-fuchs.com.

Connection



Zone 0, 1, 2
Div. 1, 2



Zone 2
Div. 2

Technical Data

General specifications		
Signal type		Digital Input
Programming		via DIP switch and programmable
Functional safety related parameters		
Safety Integrity Level (SIL)		SIL 2
Supply		
Connection		Power Rail or terminals 14+, 15-
Rated voltage	U_r	20 ... 30 V DC

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Technical Data

Power consumption		max. 1.5 W
Input		
Connection side		field side
Connection		Input I: terminals 1+, 2+, 3- ; Input II: terminals 4+, 5+, 6-
Rated values		acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current		approx. 8 V DC / approx. 8 mA
Switching point/switching hysteresis		1.2 ... 2.1 mA / approx. 0.2 mA
Line fault detection		breakage I ≤ 0.1 mA , short-circuit I > 6 mA
Control input		sensor power supply approx. 8.2 V, impedance 1.2 kΩ
Pulse duration		> 200 µs for standstill monitoring, > 250 µs for rotation direction detecion
Output		
Connection side		control side
Connection		output I: terminals 7, 8, 9 ; output II: terminals 10, 11, 12
Contact loading		250 V AC/2 A/cos ϕ > 0.75; 126.5 V AC/4 A/cos ϕ > 0.75; 40 V DC/2 A resistive load
Minimum switch current		2 mA / 24 V DC
Energized/De-energized delay		approx. 20 ms / approx. 20 ms
Mechanical life		10^7 switching cycles
Trip value	f_{max}	for standstill monitoring: 0.1 Hz; 0.5 Hz; 2 Hz; 10 Hz adjustable via DIP switch (S1 and S2)
Transfer characteristics		
Accuracy		5 % (S3 = I), 30 % (S3 = II)
Start-up override		5 seconds or 20 seconds, programmable
Frequency range		≤ 2 kHz
Rotation direction detection		90° phase difference between pulse input signal 1 and 2, overlapping ≥ 125 µs
Galvanic isolation		
Input/Output		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff}
Input/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff}
Output/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff}
Output/Output		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V_{eff}
Indicators/settings		
Display elements		LEDs
Control elements		DIP switch
Configuration		via DIP switches
Labeling		space for labeling at the front
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Low voltage		
Directive 2014/35/EU		EN 61010-1:2010
Conformity		
Electromagnetic compatibility		NE 21:2006
Degree of protection		IEC 60529:2001
Input		EN 60947-5-6:2000
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
Degree of protection		IP20
Connection		screw terminals
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 inch) (W x H x D) , housing type B2
Mounting		on 35 mm DIN mounting rail acc. to EN 60715:2001

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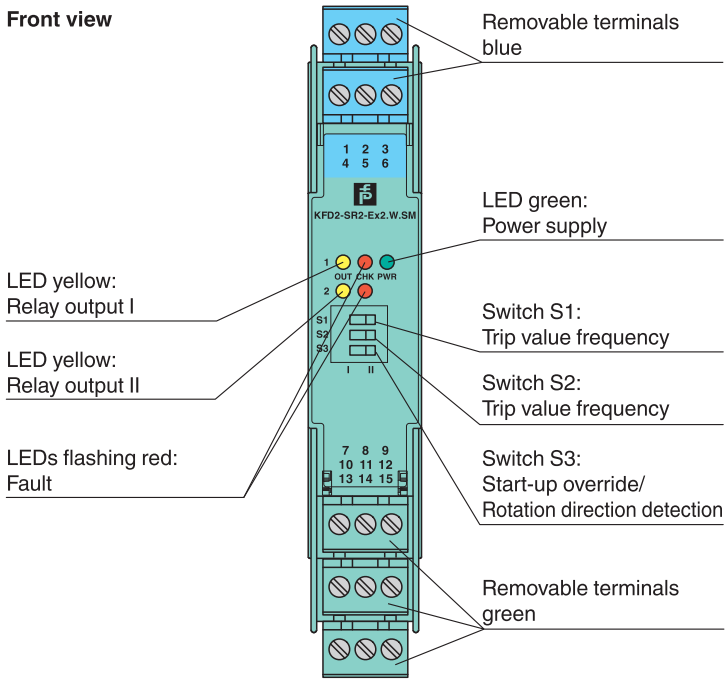
Technical Data

Data for application in connection with hazardous areas		
EU-type examination certificate		PTB 00 ATEX 2080
Marking		⟨Ex⟩ II (1)G [Ex ia Ga] IIC ⟨Ex⟩ II (1)D [Ex ia Da] IIIC ⟨Ex⟩ I (M1) [Ex ia Ma] I
Input		Ex ia
Voltage	U_o	10.5 V
Current	I_o	13 mA
Power	P_o	34 mW (linear characteristic)
Supply		
Maximum safe voltage	U_m	253 V AC / 125 V DC (Attention! U_m is no rated voltage.)
Output		
Maximum safe voltage	U_m	253 V AC (Attention! The rated voltage can be lower.)
Fault indication output		
Maximum safe voltage	U_m	40 V DC (Attention! U_m is no rated voltage.)
Certificate		TÜV 99 ATEX 1493 X
Marking		⟨Ex⟩ II 3G Ex ec nC IIC T4 Gc
Output		
Contact loading		50 V AC/4 A/cos ϕ > 0.7; 40 V DC/2 A resistive load
Galvanic isolation		
Input/Output		safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
Input/power supply		safe electrical isolation acc. to IEC/EN 60079-11, voltage peak value 375 V
Directive conformity		
Directive 2014/34/EU		EN IEC 60079-0:2018+AC:2020 , EN 60079-7:2015+A1:2018 , EN 60079-11:2012 , EN IEC 60079-15:2019
International approvals		
FM approval		
FM certificate		FM19US0207X
Control drawing		116-0035
UL approval		E106378
Control drawing		116-0145
Contact loading		250 V AC/2 A/cos ϕ > 0.75; 126.5 V AC/4 A/cos ϕ > 0.75; 30 V DC/2 A resistive load
CSA approval		
Control drawing		116-0047
IECEx approval		
IECEx certificate		IECEx PTB 11.0034 , IECEx TUN 19.0013X
IECEx marking		[Ex ia Ga] IIC [Ex ia Da] IIIC [Ex ia Ma] I Ex ec nC IIC T4 Gc
General information		
Supplementary information		Observe the certificates, declarations of conformity, instruction manuals, and manuals where applicable. For information see www.pepperl-fuchs.com.

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Assembly

Front view



Matching System Components

	**KFD2-EB2**	Power Feed Module
	**UPR-03**	Universal Power Rail with end caps and cover, 3 conductors, length: 2 m
	**UPR-03-M**	Universal Power Rail with end caps and cover, 3 conductors, length: 1,6 m
	**UPR-03-S**	Universal Power Rail with end caps and cover, 3 conductors, length: 0.8 m
	**K-DUCT-BU**	Profile rail, wiring comb field side, blue
	**K-DUCT-BU-UPR-03**	Profile rail with UPR-03- * insert, 3 conductors, wiring comb field side, blue

Accessories

	**F-NR3-Ex1**	NAMUR Resistor Network
	**KF-ST-5GN**	Terminal block for KF modules, 3-pin screw terminal, green
	**KF-ST-5BU**	Terminal block for KF modules, 3-pin screw terminal, blue
	**KF-CP**	Red coding pins, packaging unit: 20 x 6

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Additional Information

The function of standstill monitor with start-up override (S3 = I) or standstill monitor with rotation direction monitoring (S3 = II) can be selected by means of DIP switches.

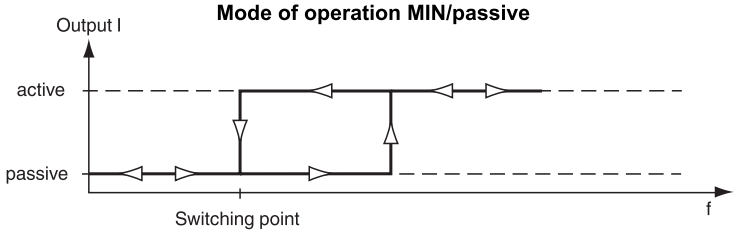
S3:	I	II
Function:	Standstill monitor with start-up override	Standstill monitor with rotation direction monitoring
Input I:	Pulse input 1: NAMUR contacts (bounce-free)	Pulse input 1: NAMUR contacts (bounce-free)
Input II:	Start-up override: contact terminal 4 + 6: 20 seconds contact terminal 5 + 6: 5 seconds	Pulse input 2: NAMUR contacts (bounce-free)
Output I:	MIN/passive	MIN/passive
Output II:	MIN/active	Direction of rotation/error

Standstill monitor with start-up override (S3 = I)

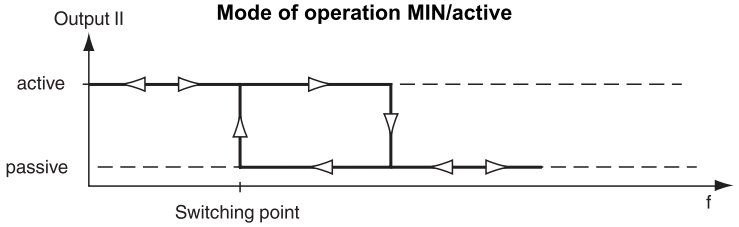
If the frequency falls below the trip value set with the DIP switches S1 and S2, the standstill monitor with start-up override switches the output I to passive and the output II to active. Input I is used to monitor the frequency of rising current edges. Signal transmitters can be sensors in accordance with EN 60947-5-6 (NAMUR) or contacts. Input I is monitored for lead breakage/short-circuiting. A start-up override can be initiated via input II. The duration of the start-up override can be selected between 5 and 20 seconds by means of a bridge (starting trigger) or an external trigger signal. During the start-up override time the outputs assume the "no standstill" state. In this case there is no lead breakage/short-circuit monitoring at input II.

Trip value	Hysteresis	Switch S2	Switch S1
0.1 Hz	**0.02 Hz**	**I**	**I**
0.5 Hz	**0.1 Hz**	**I**	**II**
2 Hz	**0.4 Hz**	**II**	**I**
10 Hz	**2 Hz**	**II**	**II**

Mode of operation MIN/passive



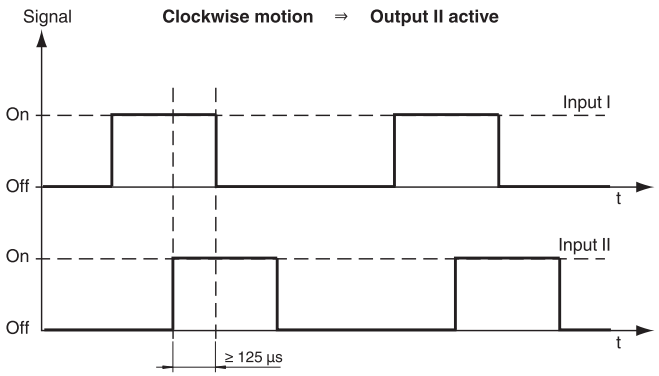
Mode of operation MIN/active

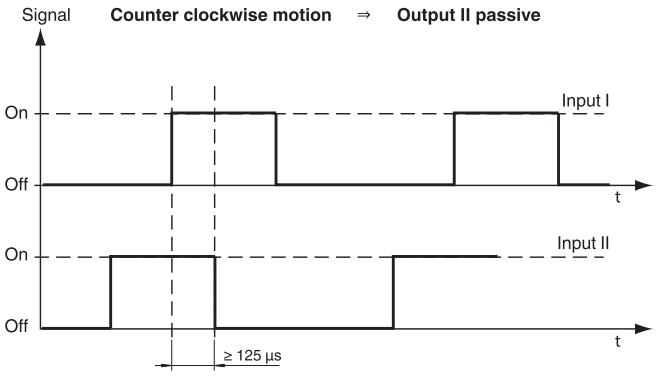


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Standstill monitor with rotation direction monitoring (S3 = II)

The device also offers stand still monitoring with direction of rotation monitoring as an alternative to stand still monitoring with start-up override. The trip values are identical to the standstill monitor with start-up override. At input II a signal that is offset by 90° to input I has to be applied; in this context minimum signal overlapping should be ensured. Signal transmitters at input I and input II can be sensors in accordance with DIN EN 60947-5-6 (NAMUR) or contacts. Both inputs are monitored for lead faults. Output I is used for standstill signalling and switches to a de-energized state (passive) in the event of a standstill. Output II is switched to active when the direction of rotation is clockwise. If a reverse rotation is detected or if a signal overlap is missing, output II switches to a de-energized state (passive). In this case it can be concluded, that the sensor is misadjusted or defective. If the sensor at input I is misadjusted or defective, input II is used for standstill monitoring.





Behaviour during malfunction:

- Monitoring for lead faults
- Continuous monitoring of the device for errors in internal memory

If an error occurs, both relays go into the secure state, the red LEDs indicate the error and a collective error message is generated via the Power Rail.

Advice on use in SIL2 applications (Functional safety)

Care should be taken to ensure that the relays are de-energized (passive) in the critical condition of the application. Then, in the event of a power failure (de-energized, passive relay) the safety-critical state (energized) relay cannot be achieved.

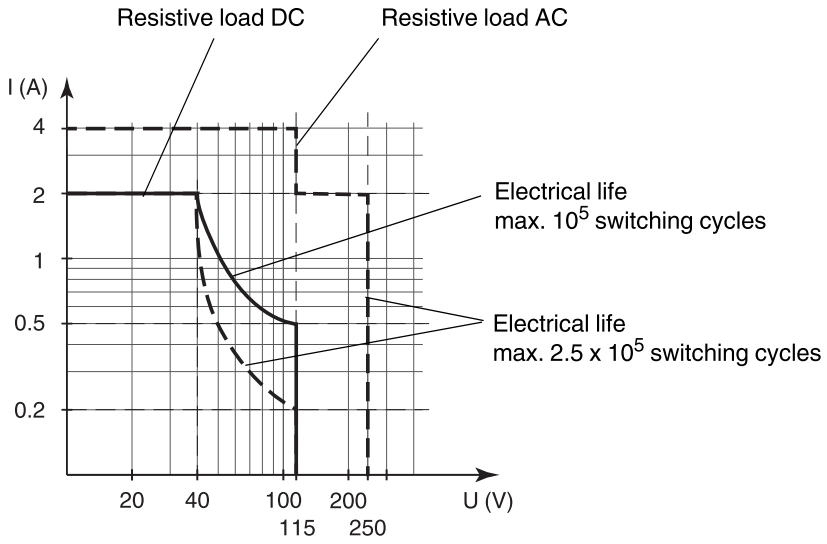
Example 1:
The protective guard for a rotating shaft must remain locked in position until the shaft has stopped rotating. The safety-critical condition is the rotation of the shaft (risk of injury).For this reason, the locking of the protective guard should be achieved by means of a de-energized (passive) relay. The relay shall be energized (active) only when the shaft has stopped (safe condition). This device function is only achieved with "Standstill monitoring with start-up override" (S3 = I) and control of the protective guard with relay 2.

Example 2:
The cooling of a critical process by means of fans/coolant pumps has to be monitored. The safety-critical condition is the standstill of the fans/pumps (overheating). For this reason an alarm must be triggered when a relay has de-energized (passive). As long as the fans or the pumps are running (safety condition) the relay is energized (active). This device function can be achieved with "Standstill monitoring with start-up override" (S3 = I) and "Standstill monitoring with direction of rotation signalling" (S3 = II) with relay 1.

Characteristic Curve

Maximum switching power of output contacts

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The maximum number of switching cycles is depending on the electrical load and may be higher when reduced currents and voltages are applied.

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1 Function description

The standstill monitor KFD2-SR2-**.W.SM can be operated with the function of a standstill monitor with start-up override or as a standstill monitor with direction of rotation signalling. The function is selected using DIP switch 3.

The limit values for standstill detection can be selected using DIP switches 1 and 2 (for details see data sheet).

The device is equipped with 2 inputs and has a maximum input frequency of 2000 Hz

- The current firmware version is 2v0.
- The current hardware version is 1v0.

Function start-up override

The input pulses at input 1 are used for the standstill monitoring. The input is monitored for lead faults (LB – lead breakage/SC – short-circuit) (for Ex version).

Input 2 is used to trigger the start-up override. Two time intervals are available (5 s and 20 s). In this case the device reverts to the "no standstill" condition for the duration of the start-up override. No lead monitoring takes place in this condition.

Function direction of rotation signal

In this case both inputs are used for the standstill monitoring. If one of the two channels fails, then the remaining functional input is used for the standstill monitoring. In addition, a direction of rotation is determined via the sequence of the input signals of the two overlapping input signals. This direction of rotation is output via relay 2. Both inputs are monitored for lead faults (in the Ex version).

Behaviour in the event of a fault

- Monitoring for lead faults (in the Ex version)
- Continuous monitoring of the device for internal memory faults

On the occurrence of a fault, both relays revert to the safe condition, the red LEDs signal the fault and a collective error is output via the Power Rail (Ex devices only).

2 Use of the KFD2-SR2-**2.W.SM in the context of SIL2 applications

Make sure, that in the critical condition of the application the relays have dropped out (are passive). Then, in the case of power failure (dropped out relay) a safety "GO state" (relay pulled in) cannot occur.

This behaviour shall be tested before commissioning the system.

Example 1

The protective screen of a rotating shaft should remain locked until the shaft is at a standstill. The safety-critical condition is the rotating shaft (risk of injury). For this reason the locking of the protective screen should be achieved by means of a dropped out (passive) relay. The relay does not pull in (become active) until the shaft has stopped (safety GO state). This device function is only achieved with "standstill monitoring with start-up override" (S3 = I) and control of the protective screen with relay 2.

Example 2

The cooling of a critical process by means of a fan/coolant pump is to be monitored. The safety-critical state is the standstill of the fan/pump (overheating). For this reason the triggering of an alarm is achieved by means of a dropped out (passive) relay. As long as the fan or the pump is running (safety GO state) the relay is pulled in (active). This device function can be achieved with "standstill monitoring with start-up override" (S3 = I) and "standstill monitoring with direction of rotation signal" (S3 = II) with relay 1.

Further information on boundary and ambient conditions is provided in the associated data sheet.

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3 Safety and installation instructions

The standstill monitor KFD2-SR2-**2.W.SM must only be operated by trained specialist personnel and in accordance with the data sheet.

The protection of the operating personnel and of the plant is only guaranteed when these devices are used for their intended application. Any other operation than that described in the data sheet and the safety instructions places the safety and function of the devices and connected systems in question.

In the event that faults cannot be eliminated, the devices should be switched off and protected against inadvertent restart. The devices must only be repaired by the manufacturer Pepperl+Fuchs. Interventions within the devices and modifications to them are dangerous and are therefore not permissible. Such actions will render any claims against the warranty null and void and will also negate the approval in accordance with SIL2.

Malfunctioning of the devices should be reported to the manufacturer Pepperl+Fuchs.

The standstill monitors are constructed to protection class IP21 and must accordingly be protected against adverse ambient conditions (water, small foreign bodies, etc.).

4 Failure rates

The failure rates and related characteristics are given in section 6 and the FMEDA. The mean probability of failure PFD is given in section 5.

The standstill monitor KFD2-SR2-**2.W.SM is categorised for the Safety Integrity Level SIL2. In the assessment of a complete system in which the standstill monitor is to be used, the failure rate of the complete loop must be considered.

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5 Product life and maintenance

Product life is limited by the following parameters:

- Mechanical life of the relay of at least 2.5 x 10^5 operating cycles at maximum permissible load (500 VA) in accordance with the data sheet.

  At a contact loading of approx. 50 mW the life is approx. 5 x 10^6 operating cycles.
- Life of the flash memory: approx. 12 years
- Life of the Elko: approx. 15 years

For devices, which are used in the "Low Demand Mode", the appraisal has to be made in the context of the maintenance of the total system, but after 5 years at the latest.

PFD for devices with lead breakage detection after 5 years: **5.62E-4**

PFD for devices without lead breakage detection after 5 years: **5.81E-4**

For the detection of random faults, which have been categorised by the FMEDA as "undetected dangerous", the following tests are to be carried out during the maintenance intervals:

- Application of a frequency smaller than 10 % of the set limit frequency -> the relay must switch in accordance with the data in the data sheet.
- Application of a frequency greater than 10 % of the set limit frequency + associated hysteresis -> relay must switch in accordance with the data in the data sheet.
- When examining the switching states of the relay, a check has to be made in the dropped out condition to check whether the normally closed contact (NC) has a low resistance and the normally open contact (NO) has a high resistance (welding of the contacts).
- When examining the switching states of the relay, a check has to be made in the pulled in condition to check whether the normally closed contact (NC) has a high resistance (welding of the contacts) and the normally open contact (NO) has a low resistance (only necessary in the sense that it is available).

By means of these tests 95 % of all faults that have been categorised as "undetected dangerous" can be detected.

An early fault detection is not included in the functionality of the KFD2-SR2-**2.W.SM.

Recalibration is not necessary.

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6 Validation

The validation of the SIL2 capability of the standstill monitor KFD2-SR2-**2.W.SM took place in the context of an assessment with EXIDA. The appropriate documents are available on the Internet or directly from Pepperl+Fuchs.

The value 0 has been taken as the hardware fault tolerance in accordance with Table B in EN 61508-2 (7.4.3.1.3).

The failure rates used are based on the "Basic Failure Rates" from the Siemens Standard SN29500.

In addition, the following assumptions have been made:

- Failure rates are constant, wear has not been taken into account.
- Fault propagations are not relevant.
- After a "Safe Failure" the repair time is 8 hours.
- The "Low Demand Mode" has been assumed.
- The failure rates of external power supplies have not been accounted for.
- Connected sensors have not been accounted for in the failure rates.
- Output 1 has been considered to be the safety-relevant output.
- Either the classification MIL-HNBK-217F or IEC 645-1 class C (max. temperature corresponds to the manufacturer's data) with an average ambient temperature of 40°C can be taken as the ambient condition.
- The test time, within which the logic control unit must react to a "Dangerous Detected" failures, is one hour.

The following SFF and failure rates have been determined for the standstill monitor KFD2-SR2-**2.W.SM:

With lead fault detection

λ_{sd} = 11 FIT

λ_{su} = 248 FIT

λ_{dd} = 90 FIT

λ_{du} = 26 FIT

SFF = 91.25 %

DC_S = 4.25 %

DC_D = 77.59 %

Without lead fault detection

λ_{sd} = 9 FIT

λ_{su} = 247 FIT

λ_{dd} = 90 FIT

λ_{du} = 27 FIT

SFF = 90.91 %

DC_S = 3.52 %

DC_D = 76.92 %

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EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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No. / *Nr.*: DOC-0170D
Date / *Datum*: 2021-05-11

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PEPPERL+FUCHS

Declaration of conformity / *Konformitätserklärung*

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

*Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.*

Products / *Produkte*

Product / *Produkt*	**Item number**	**Description** / *Beschreibung*
KFD2-SR2-EX1.W	132958	Switch amplifier
KFD2-SR2-EX1.W	203343	Switch amplifier
KFD2-SR2-EX1.W.LB	132959	Switch amplifier
KFD2-SR2-EX2.W	132960	Switch amplifier
KFD2-SR2-EX2.W.SM	132964	Standstill monitor

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	**Standards** *Normen*
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 EN 60079-15:2010-05 EN IEC 60079-0/AC:2020-02 EN IEC 60079-0:2018-07
EMC 2014/30/EU (L96/79-106)	EN 61326-1:2013-01
LVD 2014/35/EU (L96/357-374)	EN 61010-1:2010-10
RoHS 2011/65/EU (L174/88-110)	EN IEC 63000:2018-12

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2021-05-11

ppa. Michael Kessler
Executive Vice President
Components & Technology

i.V. Udo Körner
Continuation Manager
Value Engineering

ANNEX EMC

The products listed above fulfill the immunity test requirements for equipment intended for use in industrial locations.
Die oben gelisteten Produkte erfüllen die Störfestigkeits-Prüfanforderungen an Betriebsmittel, die zum Gebrauch in industriellen Bereichen vorgesehen sind.

ANNEX ATEX

Notified Body QM-System / Notifizierte Stelle des QM-Systems
Physikalisch Technische Bundesanstalt (0102)
Bundesallee 100
38116 Braunschweig
Germany

Marking and Certificates / ***Kennzeichnung und Zertifikate***

Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller ID*
Ex II (3) G	PF 08 CERT 0803	PF
Ex I (M1) Ex II (1) D Ex II (1) G	PTB 00 ATEX 2080	0102
Ex II 3 G	TÜV 99 ATEX 1493X	TUN

Key for Issuer ID / ***Schlüssel zur Aussteller ID***

ID	**Issuer** / *Aussteller*
TUN	TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen Germany
PF	Pepperl+Fuchs Lilienthalstrasse 200 68307 Mannheim Germany
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

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Pepperl+Fuchs SE • 68307 Mannheim • Germany

Customer: DE164472
J.M. Voith SE & Co. KG | VTA

Mannheim, November 24, 2023

We, Pepperl+Fuchs SE at 68307 Mannheim hereby declare that the listed product/s have been produced conform to the Regulation (EC) No 1907/2006 (REACH). Used SVHC according Article 33 of the regulation are noted.

Manufacturer Declaration

Item/s		
Item Number SCIP No. SVHC	Item Description	*Your Item No*
132964	KFD2-SR2-EX2.W.SM	*201.03905110*
84936ea3-e790-41fb-9ac6-76b25979f4bf		
-Lead titanium zirconium oxide (PZT) EC 235-727-4, CAS 12626-81-2		
-Hexahydromethylphthalic anhydride including cis- and trans stereo isomeric forms and all possible combinations of the isomers EC 247-094-1, CAS 25550-51-0,EC 243-072-0,CAS 19438-60-9, EC 256-356-4, CAS 48122-14-1, EC 260-566-1,CAS 57110-29-9		
-4,4'-isopropylidenediphenol (Bisphenol A), EC 201-245-8, CAS 80-05-7		
-Lead (Pb) EC 231-100-4, CAS 7439-92-1		

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Department Global Compliance
24.11.2023 Mannheim

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