

# 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 7, 2020-07-15

3626-019600ex en, Protection Class 0: public

## Contact

Voith Group  
St. Pöltener Str. 43  
89522 Heidenheim, GERMANY

Telefon: + 49 7951 32 1666  
E-Mail: [Industry.Service@voith.com](mailto:Industry.Service@voith.com)  
Internet: [www.voith.com/fluid-couplings](http://www.voith.com/fluid-couplings)

If you have questions regarding the product, please contact the Voith Service stating the serial number (see nameplate).

3626-019600ex en

This document describes the state of design of the product at the time of the editorial deadline on 2020-07-15.

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# Contents

<b>1</b>	<b>Possible Applications, BTS-Ex Characteristics</b>	<b>5</b>
<b>1.1</b>	<b>Use as safety device in potentially explosive atmospheres</b>	<b>5</b>
<b>1.2</b>	<b>Special conditions for the use in potentially explosive atmospheres and as safety device in potentially explosive atmospheres</b>	<b>7</b>
<b>1.3</b>	<b>Declaration of conformity</b>	<b>8</b>
<b>2</b>	<b>Function of BTS-Ex</b>	<b>9</b>
<b>2.1</b>	<b>Switching element</b>	<b>10</b>
<b>2.2</b>	<b>Initiator</b>	<b>10</b>
<b>2.3</b>	<b>Evaluator</b>	<b>10</b>
<b>2.4</b>	<b>Interaction of BTS-Ex components</b>	<b>11</b>
<b>3</b>	<b>Technical Data</b>	<b>13</b>
<b>3.1</b>	<b>Switching element</b>	<b>13</b>
<b>3.2</b>	<b>Initiator, mounting flange</b>	<b>14</b>
<b>3.3</b>	<b>Evaluator</b>	<b>14</b>
<b>4</b>	<b>User Information</b>	<b>15</b>
<b>5</b>	<b>Safety</b>	<b>17</b>
<b>5.1</b>	<b>Safety information</b>	<b>17</b>
5.1.1	Structure of safety information	17
5.1.2	Definition of safety symbols	18
<b>5.2</b>	<b>Intended use</b>	<b>18</b>
<b>5.3</b>	<b>Unintended use</b>	<b>18</b>
<b>5.4</b>	<b>General information as to dangerous situations</b>	<b>19</b>
<b>5.5</b>	<b>Remaining risks</b>	<b>22</b>
<b>5.6</b>	<b>What to do in case of accidents</b>	<b>22</b>
<b>5.7</b>	<b>Information with regard to operation</b>	<b>22</b>
<b>5.8</b>	<b>Qualification of staff</b>	<b>23</b>
<b>5.9</b>	<b>Product monitoring</b>	<b>24</b>
<b>5.10</b>	<b>Nameplate</b>	<b>24</b>

<b>6</b>	<b>Installation</b>	<b>25</b>
<b>6.1</b>	<b>As delivered condition</b>	<b>25</b>
<b>6.2</b>	<b>Scope of supply</b>	<b>26</b>
<b>6.3</b>	<b>Mounting - switching element and initiator</b>	<b>26</b>
<b>6.4</b>	<b>Mounting, connection - evaluator</b>	<b>29</b>
<b>7</b>	<b>Display and Setting of Evaluator</b>	<b>31</b>
<b>7.1</b>	<b>Design</b>	<b>31</b>
<b>7.2</b>	<b>Setting of DIP switches S1 and S2 (cutoff frequency)</b>	<b>31</b>
<b>7.3</b>	<b>Setting the S3 DIP switch - (start-up bypass)</b>	<b>32</b>
<b>7.4</b>	<b>Setting of start-up bypass time</b>	<b>32</b>
<b>8</b>	<b>Commissioning</b>	<b>34</b>
<b>9</b>	<b>Maintenance, Servicing</b>	<b>35</b>
<b>9.1</b>	<b>Outside cleaning</b>	<b>37</b>
<b>10</b>	<b>Disposal</b>	<b>38</b>
<b>11</b>	<b>Malfunctions - Remedial Actions, Troubleshooting</b>	<b>39</b>
<b>12</b>	<b>Queries, Orders Placed for Field Service Engineers and Spare Parts</b>	<b>42</b>
<b>13</b>	<b>Spare Parts Information</b>	<b>43</b>
<b>13.1</b>	<b>Switching elements</b>	<b>43</b>
<b>13.2</b>	<b>Initiator, mounting flange</b>	<b>44</b>
<b>13.3</b>	<b>Evaluator</b>	<b>44</b>
<b>14</b>	<b>Annex</b>	<b>45</b>
<b>14.1</b>	<b>EU Declaration of Conformity</b>	<b>45</b>
<b>14.2</b>	<b>Initiator NJ10-22-N-E93-Y106925</b>	<b>46</b>
<b>14.3</b>	<b>Initiator NJ10-22-N-E93-Y30627</b>	<b>47</b>
<b>14.4</b>	<b>Initiator NJ10-22-N-E93-Y30629</b>	<b>48</b>
<b>14.5</b>	<b>Initiator NJ10-22-N-E93-Y245590</b>	<b>49</b>
<b>14.6</b>	<b>Initiator NJ10-22-N-E93-Y246868</b>	<b>50</b>
<b>14.7</b>	<b>Initiator NJ10-22-N-E93-Y246869</b>	<b>51</b>
<b>14.8</b>	<b>Evaluator KFD2-SR2-Ex2.W.SM</b>	<b>52</b>



# 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.



- 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, such as EN 60079-14, EN 1127-1 and EN 1127-2.
- 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 (e.g. VDE 0100, part 540, IEC 364-5-54).
- 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 cm<sup>2</sup> 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.
- The evaluator is designed for use in Contamination Level 2, as per DIN EN 50178. 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.

→ Operating manual  
of turbo coupling

- 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**

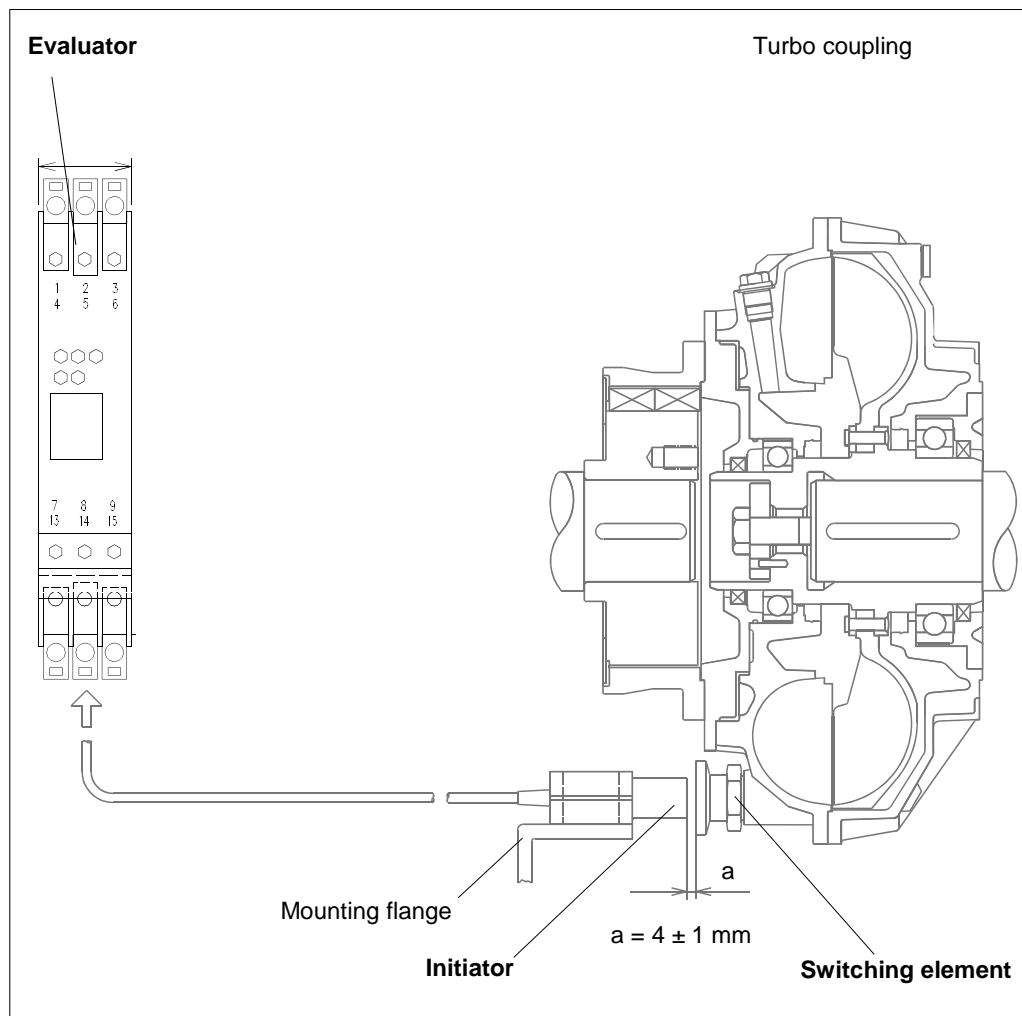


Fig. 1

**Nominal response  
temperature**  
→ Chapter 3.1

## 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.

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

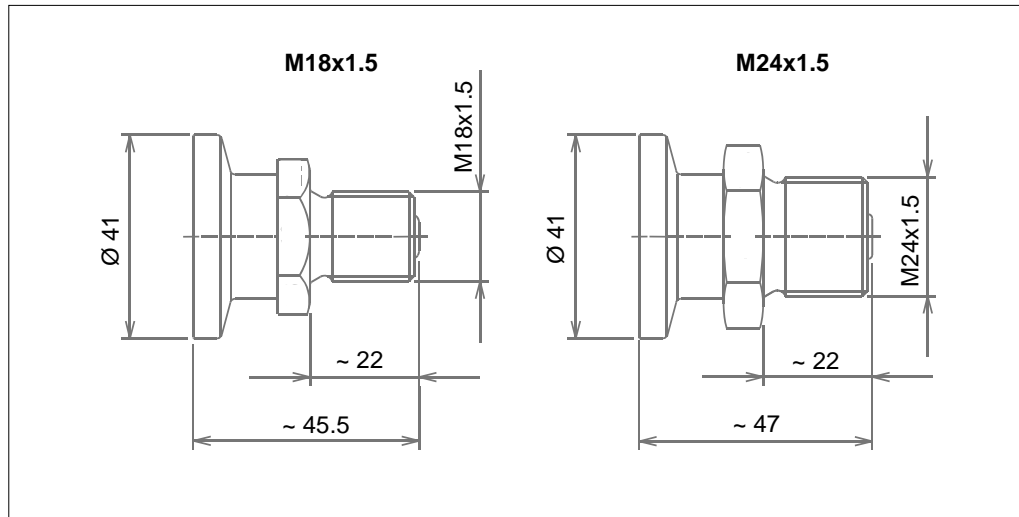


Fig. 2

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  II 2GD	Ui = 10 V	li = 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  II Ex i X
  - Serial number (example: Voith 140 °C  II Ex i X 1234 5678)
- The nominal response temperature of the switching element is determined in connection with the coupling design.



### 3.2 Initiator, mounting flange

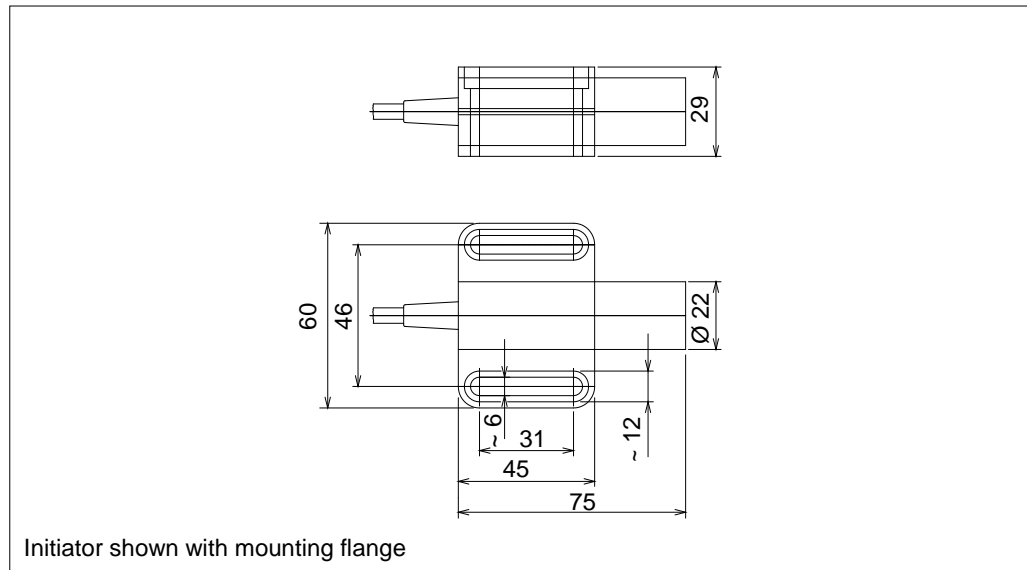


Fig. 3

- Annex      Type: NJ 10-22-N-E93-Y106925  
NJ 10-22-N-E93-Y30627  
NJ 10-22-N-E93-Y30629  
NJ 10-22-N-E93-Y245590 (new design, cable length 2 m)  
NJ 10-22-N-E93-Y246868 (new design, cable length 5 m)  
NJ 10-22-N-E93-Y246869 (new design, cable length 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:

Voith Group  
St. Pöltener Str. 43  
89522 Heidenheim, GERMANY

Telefon: + 49 7951 32 1666  
E-Mail: [Industry.Service@voith.com](mailto:Industry.Service@voith.com)  
Internet: [www.voith.com/fluid-couplings](http://www.voith.com/fluid-couplings)

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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

 <b>DANGER WORD</b>
<b>Results of a hazardous situation</b> Source of hazard <ul style="list-style-type: none"> <li>Warding off of danger</li> </ul>

#### 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 <ul style="list-style-type: none"> <li>- the product</li> <li>- its environment</li> </ul>
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 **EN 1127-1 Annex A** and **EN 1127-1 Section 7** 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.



Our address:  
→ Page 2

## 5.9 Product monitoring

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

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		
<b>BTS-Ex:</b>	- evaluator (Voith ID 201.03905210) - initiator - switching element	
03 ATEX 0013 X	Year built: 2020	
E II 3G Ex ic IIB T4/T3 Gc	SYST E II 2G Ex ib IIB T4/T3 Gb	
E II 3D Ex ic IIIC T125°C/T180°C Dc	SYST E 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

 : 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).



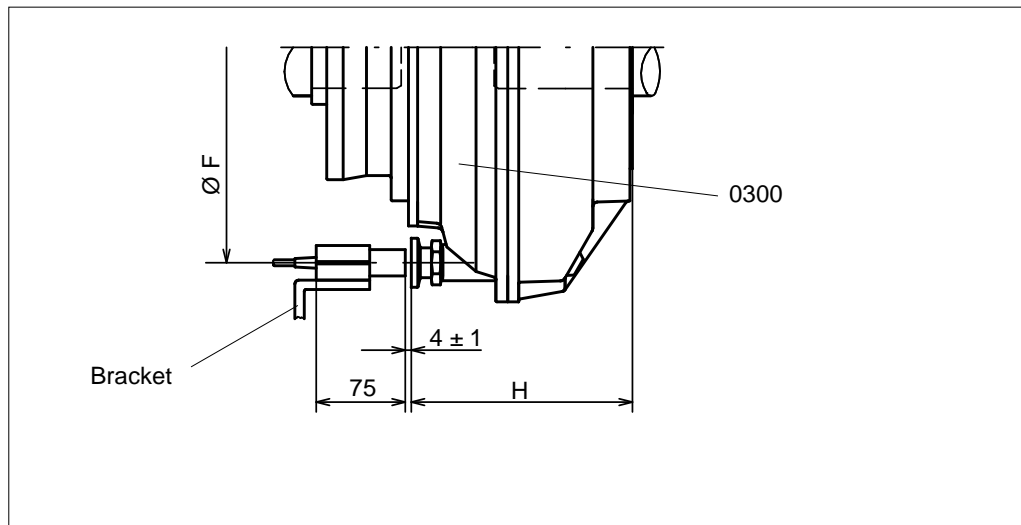
**Arrangement of switching element on the outer wheel side <sup>1)</sup>:**


Fig. 5

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

**Installation dimensions for switching element and initiator:**

Turbo coupling type	Outer wheel side		
	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)!

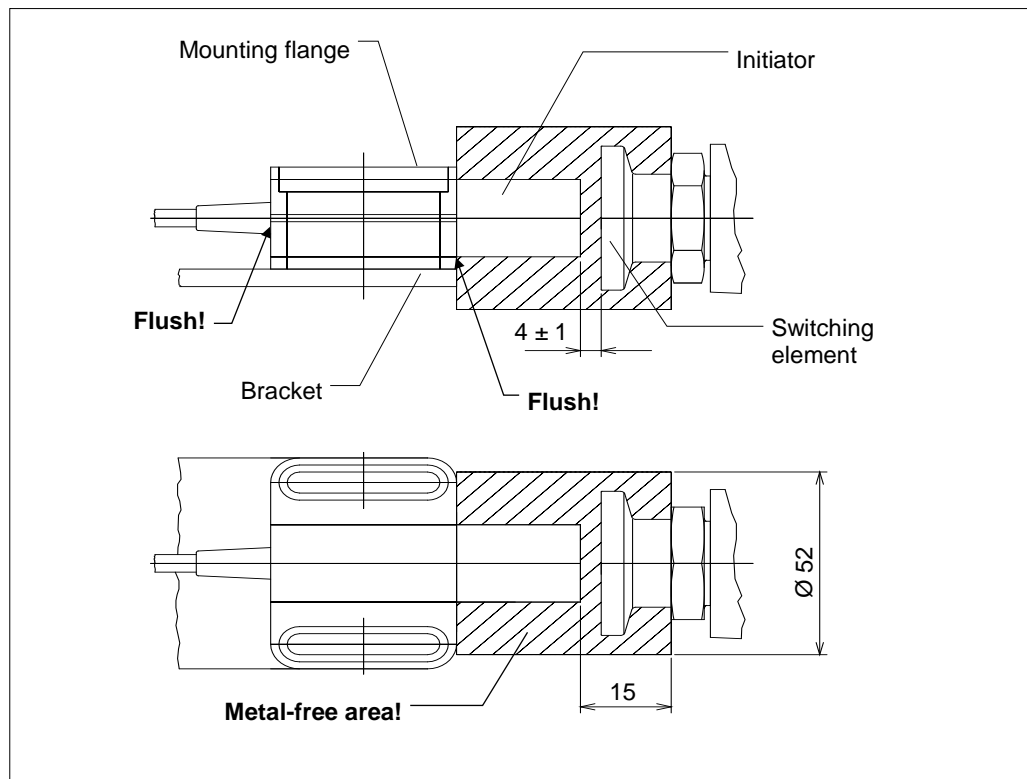


Fig. 6

- 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  $4 \pm 1$  mm!



## 6.4 Mounting, connection - evaluator

### NOTICE

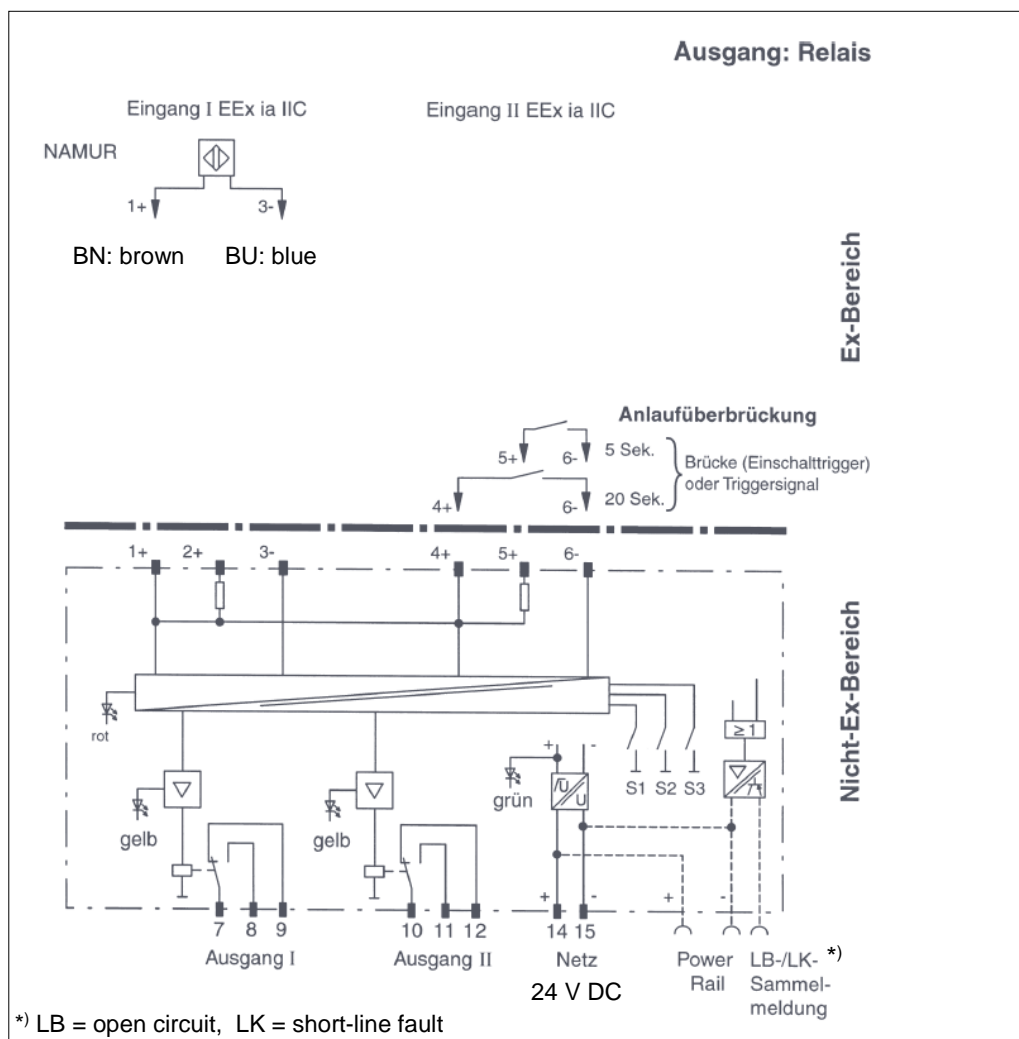
#### Damage to property

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  $\Omega$ .

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

#### Wiring diagram:



Evaluator  
KFD2-SR2-Ex2.W.SM  
→ Chapter 15.5

Fig. 7

### 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

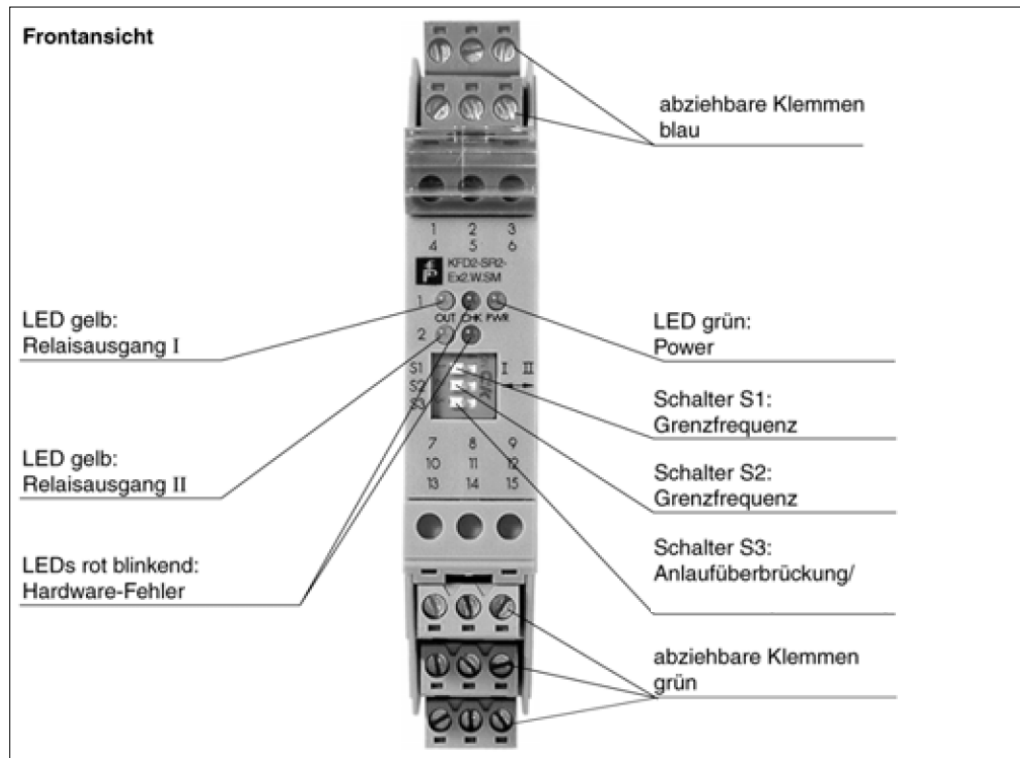


Fig. 8

### 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
<b>0.5 Hz</b>	<b>30 rpm</b>	<b>0.1 Hz</b>	<b>I</b>	<b>II</b>
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 <sup>1)</sup>
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.

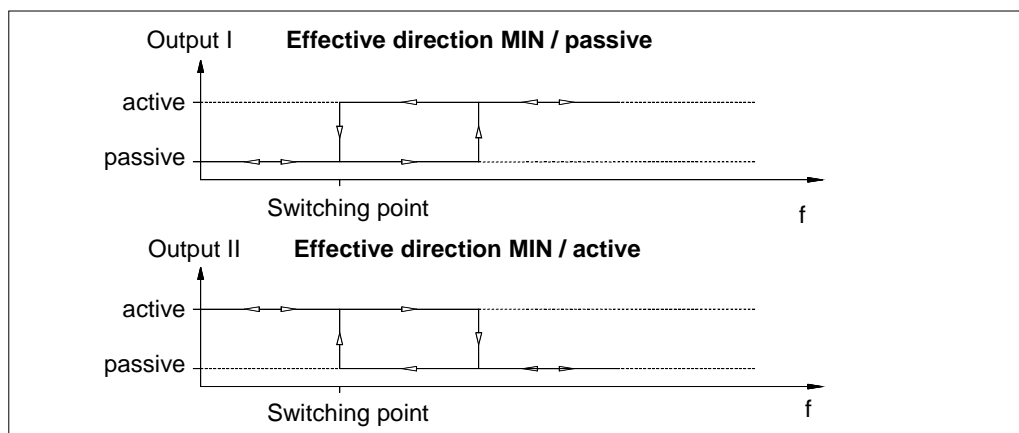


Fig. 9

## 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

**Definition of the maintenance work described in the following (as per IEC 60079-17):**

**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!

- 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.

**Qualification**  
→ Chapter 5.8

- 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
<b>In case of impurities or dusting:</b> 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:

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

Table 11

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

# 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 $4 \pm 1$ 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. <b>Note:</b> 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:

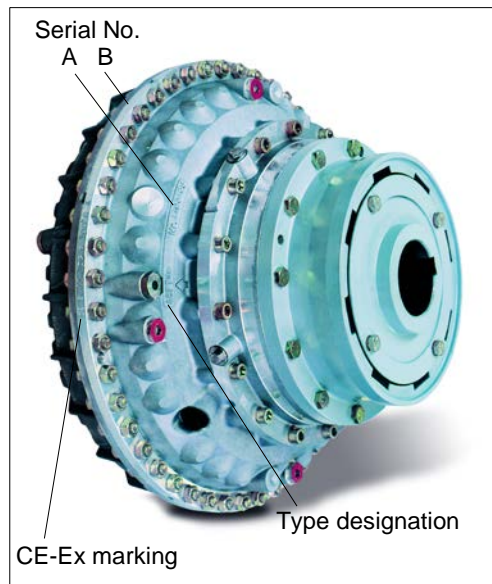


Fig. 10

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 temperature	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-Y30629-70	TCR.10678650
NJ 10-22-N-E93-Y30627-100	TCR.10678670
NJ 10-22-N-E93-Y106925	TCR.11960550
NJ 10-22-N-E93-Y245590 (new design, cable length 2 m) <sup>1)</sup>	201.02171810
NJ 10-22-N-E93-Y246868 (new design, cable length 5 m) <sup>1)</sup>	201.02171910
NJ 10-22-N-E93-Y246869 (new design, cable length 10 m) <sup>1)</sup>	201.02172010
Mounting flange BF22	TCR.03668170

Table 15

1 New design with permissible ambient temperature from -40 °C to 100 °C.  
The initiators differ only regarding the various cable length.

## 13.3 Evaluator

Type of evaluator	Material No.
KFD2-SR2-Ex2.W.SM	TCR.11975610
KFD2-SR2-Ex2.W.SM (new Ex marking)	201.03905210

Table 16



## 14 Annex

### 14.1 EU Declaration of Conformity

Declaration of Conformity

Voith

## 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	 II Ex i X		1234	5678
Voith	140 °C	 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  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-Y30629-70  
 NJ 10-22-N-E93-Y30627-100  
 NJ 10-22-N-E93-Y106925  
 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

**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:**

Crailsheim  
**Place:**

2020-07-21  
**Date**

Bernhard Ludas (Vice President CCE Hydrodynamic Couplings)  
**Name, position, signature**

## **14.2 Initiator NJ10-22-N-E93-Y106925**

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

# Instruction manual

## Marking

Inductive sensor
NJ10-22-N-E93-Y106925
116696
Pepperl+Fuchs GmbH
Lilienthalstraße 200, 68307 Mannheim, Germany

Range of application	Certification	Group, category, type of protection
ATEX 2G	PTB 00 ATEX 2048 X	Ⓔ II 2G Ex ia IIC T6...T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ⓔ II 1D Ex iaD 20 T 85 °C (185 °F)

## Validity

Specific processes and instructions in this document require special precautions to guarantee the safety of the operating personnel.

## Target group, personnel

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

Mounting, installation, commissioning, operation, maintenance and disassembly of any devices may only be carried out by trained, qualified personnel. The instruction manual must be read and understood.

## 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, declarations of conformity, EC-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](http://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](http://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.

## Range of application

**Manual electrical apparatus for hazardous areas**

### Range of application 1D

for use in hazardous areas with combustible dust

### Range of application 2G

for use in hazardous areas with gas, vapour and mist

## Improper use

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

## Mounting and installation

Prior to mounting, installation and commissioning of the device you should make yourself familiar with the device and carefully read the instruction manual.

Mount the device so that it is not exposed to any mechanical hazard. For example, mount the device in a protective housing.

### Range of application 1D

#### Electrostatic charge

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.

### Range of application 2G

#### Protection from mechanical danger

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

## Operation, maintenance, repair

The device must not be repaired, changed or manipulated.

In the event of a fault, always return the device to Pepperl+Fuchs.

If there is a defect, the device must always be replaced with an original device from Pepperl+Fuchs.

## 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 (see datasheet) must be considered.

Disposing of device, packaging material, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



### Model Number

NJ10-22-N-E93-Y106925

### Features

- Comfort series
- 10 mm non-flush

## 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

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 1000 Hz
Hysteresis	$H$	typ. 5 %
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA

### Ambient conditions

Ambient temperature	-40 ... 70 °C (-40 ... 158 °F)
---------------------	--------------------------------

### Mechanical specifications

Connection type	cable silicone , 2 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
Category	2G; 1D

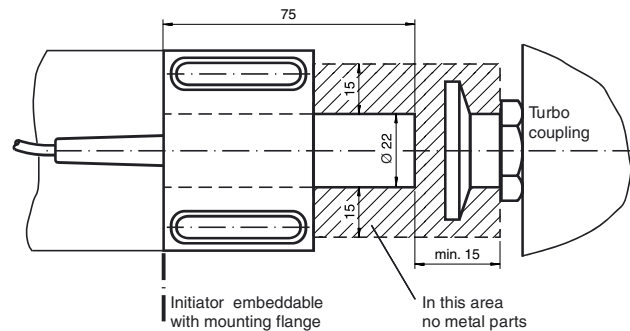
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

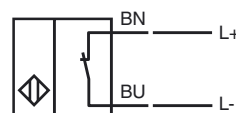
### Approvals and certificates

UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose

## Dimensions



## Electrical Connection



Equipment protection level Gb

Instruction

Device category 2G

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity C<sub>i</sub>

Effective internal inductance L<sub>i</sub>

General

Maximum permissible ambient temperature T<sub>amb</sub>

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PTB 00 ATEX 2048 X

CE 0102

II 2G Ex ia IIC T6...T1 Gb

EN 60079-0:2012, EN 60079-11:2012

Ignition protection "Intrinsic safety"

Use is restricted to the following stated conditions

NJ 10-22-N...

≤ 130 nF ; a cable length of 10 m is considered.

≤ 100 μH ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EU-type examination certificate has to be observed. The special conditions must be adhered to!

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

No changes can be made to apparatus, which are operated in hazardous areas.

Repairs to these apparatus are not possible.

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

**Equipment protection level Da**

Instruction

**Device category 1D**

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity  $C_i$ Effective internal inductance  $L_i$ 

General

Maximum housing surface temperature

Installation, commissioning

Maintenance

**Special conditions**

Electrostatic charge

**Manual electrical apparatus for hazardous areas**

for use in hazardous areas with combustible dust

ZELM 03 ATEX 0128 X

CE 0102

II 1D Ex iaD 20 T 85 °C (185 °F)

IEC 61241-11:2002: draft; prEN61241-0:2002

type of protection intrinsic safety "iD"

Use is restricted to the following stated conditions

NJ 10-22-N-E93-Y106925

 $\leq 130 \text{ nF}$  ; a cable length of 10 m is considered. $\leq 100 \text{ }\mu\text{H}$  ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The EU-type examination certificate has to be observed.

The special conditions must be adhered to!

The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

The associated apparatus must satisfy at least the requirements of category ia IIB or iaD. Because of the possibility of the danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation in the power supply and signal circuits is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met. The intrinsically safe circuit has to be protected against influences due to lightning.

When used in the isolating wall between Zone 20 and Zone 21 or Zone 21 und Zone 22 the sensor must not be exposed to any mechanical danger and must be sealed in such a way, that the protective function of the isolating wall is not impaired. The applicable directives and standards must be observed.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.



## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-1582  
Date / Datum: 2017-04-11

Copyright Pepperl+Fuchs  
www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y106925	116696	Inductive sensor
NJ10-22-N-E93-Y30627	116697	Inductive sensor
NJ10-22-N-E93-Y30629	116698	Inductive sensor
NJ10-22-N-E93-Y52737	116699	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01 prEN 61241-0:2002-04
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
RoHS 2011/65/EU (L174/88-110)	EN 50581:2012-09

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-04-11

ppa. Wolfgang Helm  
Director Business Unit 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
II 2 G	PTB 00 ATEX 2048 X	0102
II 1 D	ZELM 03 ATEX 0128 X	0820

## Key for Issuer ID / Schlüssel zur Aussteller ID

ID	Issuer / Aussteller
0820	ZELM ex Siekgraben 56 38124 Braunschweig Germany
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

Pepperl+Fuchs GmbH declares that the products are only affected by minor or formal changes with respect to the new edition of the standards. These changes are not relevant for compliance with the essential health and safety requirements. The products still comply with the ATEX Directive. This declaration is also valid if the marking and the certificates of the listed devices correspond to previous editions of standards.

Die Pepperl+Fuchs GmbH erklärt hiermit, dass die Produkte nur von kleineren oder formalen Änderungen in Bezug auf die neue Ausgabe der Normen betroffen sind. Diese Änderungen sind nicht relevant für die Konformität mit den wesentlichen Gesundheits- und Sicherheitsanforderungen. Die Produkte erfüllen nach wie vor die ATEX-Richtlinie. Diese Erklärung gilt auch, wenn die Kennzeichnung und die Zertifikate der aufgeführten Geräte vorangegangenen Normenständen entsprechen.

### 14.3 Initiator NJ10-22-N-E93-Y30627

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

# Instruction manual

## Marking

Inductive sensor
NJ10-22-N-E93-Y30627
116697
Pepperl+Fuchs GmbH
Lilienthalstraße 200, 68307 Mannheim, Germany

Range of application	Certification	Group, category, type of protection
ATEX 2G	PTB 00 ATEX 2048 X	Ⓔ II 2G Ex ia IIC T6...T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ⓔ II 1D Ex iaD 20 T 108 °C (226.4 °F)

## Validity

Specific processes and instructions in this document require special precautions to guarantee the safety of the operating personnel.

## Target group, personnel

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

Mounting, installation, commissioning, operation, maintenance and disassembly of any devices may only be carried out by trained, qualified personnel. The instruction manual must be read and understood.

## 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, declarations of conformity, EC-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](http://www.pepperl-fuchs.com).

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## Intended use

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## Range of application

**Manual electrical apparatus for hazardous areas**

### Range of application 1D

for use in hazardous areas with combustible dust

### Range of application 2G

for use in hazardous areas with gas, vapour and mist

## Improper use

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

## Mounting and installation

Prior to mounting, installation and commissioning of the device you should make yourself familiar with the device and carefully read the instruction manual.

Mount the device so that it is not exposed to any mechanical hazard. For example, mount the device in a protective housing.

### Range of application 1D

#### Electrostatic charge

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.

### Range of application 2G

#### Protection from mechanical danger

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

## Operation, maintenance, repair

The device must not be repaired, changed or manipulated.

In the event of a fault, always return the device to Pepperl+Fuchs.

If there is a defect, the device must always be replaced with an original device from Pepperl+Fuchs.

## 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 (see datasheet) must be considered.

Disposing of device, packaging material, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



### Model Number

NJ10-22-N-E93-Y30627

### Features

- Comfort series
- 10 mm non-flush

## 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 ... 9 mm

### Nominal ratings

Nominal voltage	$U_o$ 8 V
Switching frequency	$f$ 0 ... 1300 Hz
Hysteresis	$H$ typ. 5 %
Current consumption	
Measuring plate not detected	$\geq 3$ mA
Measuring plate detected	$\leq 1$ mA

### Ambient conditions

Ambient temperature	-25 ... 100 °C (-13 ... 212 °F)
---------------------	---------------------------------

### Mechanical specifications

Connection type	cable silicone , 2 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
Category	2G; 1D

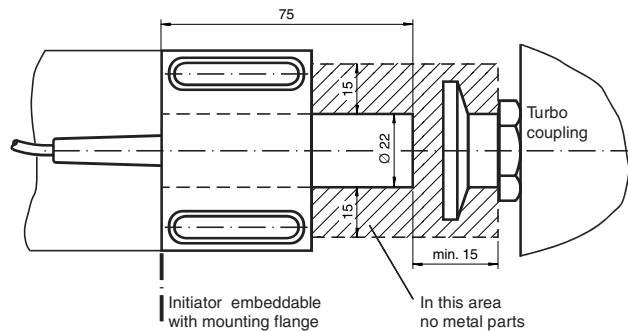
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

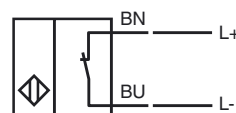
### Approvals and certificates

UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose

## Dimensions



## Electrical Connection



Equipment protection level Gb

Instruction

Device category 2G

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity  $C_i$

Effective internal inductance  $L_i$

General

Maximum permissible ambient temperature  $T_{amb}$

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PTB 00 ATEX 2048 X

CE 0102

II 2G Ex ia IIC T6...T1 Gb

EN 60079-0:2012, EN 60079-11:2012

Ignition protection "Intrinsic safety"

Use is restricted to the following stated conditions

NJ 10-22-N...

$\leq 130 \text{ nF}$  ; a cable length of 10 m is considered.

$\leq 100 \text{ }\mu\text{H}$  ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EU-type examination certificate has to be observed. The special conditions must be adhered to!

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of  $> 60 \text{ }^\circ\text{C}$  was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

No changes can be made to apparatus, which are operated in hazardous areas.

Repairs to these apparatus are not possible.

When used in the temperature range below  $-20 \text{ }^\circ\text{C}$  the sensor should be protected from knocks by the provision of an additional housing.

**Equipment protection level Da**

Instruction

**Device category 1D**

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity  $C_i$ Effective internal inductance  $L_i$ 

General

Maximum housing surface temperature

Installation, commissioning

Maintenance

**Special conditions**

Electrostatic charge

**Manual electrical apparatus for hazardous areas**

for use in hazardous areas with combustible dust

ZELM 03 ATEX 0128 X

CE 0102

II 1D Ex iaD 20 T 108 °C (226.4 °F)

IEC 61241-11:2002: draft; prEN61241-0:2002

type of protection intrinsic safety "iD"

Use is restricted to the following stated conditions

NJ 10-22-N...

 $\leq 130 \text{ nF}$  ; a cable length of 10 m is considered. $\leq 100 \mu\text{H}$  ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The EU-type examination certificate has to be observed.

The special conditions must be adhered to!

The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

The associated apparatus must satisfy at least the requirements of category ia IIB or iaD. Because of the possibility of the danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation in the power supply and signal circuits is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met. The intrinsically safe circuit has to be protected against influences due to lightning.

When used in the isolating wall between Zone 20 and Zone 21 or Zone 21 und Zone 22 the sensor must not be exposed to any mechanical danger and must be sealed in such a way, that the protective function of the isolating wall is not impaired. The applicable directives and standards must be observed.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.

## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-1582  
Date / Datum: 2017-04-11

Copyright Pepperl+Fuchs  
www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y106925	116696	Inductive sensor
NJ10-22-N-E93-Y30627	116697	Inductive sensor
NJ10-22-N-E93-Y30629	116698	Inductive sensor
NJ10-22-N-E93-Y52737	116699	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01 prEN 61241-0:2002-04
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
RoHS 2011/65/EU (L174/88-110)	EN 50581:2012-09

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-04-11

ppa. Wolfgang Helm  
Director Business Unit 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
II 2 G	PTB 00 ATEX 2048 X	0102
II 1 D	ZELM 03 ATEX 0128 X	0820

## Key for Issuer ID / Schlüssel zur Aussteller ID

ID	Issuer / Aussteller
0820	ZELM ex Siekgraben 56 38124 Braunschweig Germany
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

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## **14.4 Initiator NJ10-22-N-E93-Y30629**

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs



# Instruction manual

## Marking

Inductive sensor
NJ10-22-N-E93-Y30629
116698
Pepperl+Fuchs GmbH
Lilienthalstraße 200, 68307 Mannheim, Germany

Range of application	Certification	Group, category, type of protection
ATEX 2G	PTB 00 ATEX 2048 X	Ⓔ II 2G Ex ia IIC T6...T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ⓔ II 1D Ex iaD 20 T 85 °C (185 °F)

## Validity

Specific processes and instructions in this document require special precautions to guarantee the safety of the operating personnel.

## Target group, personnel

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

Mounting, installation, commissioning, operation, maintenance and disassembly of any devices may only be carried out by trained, qualified personnel. The instruction manual must be read and understood.

## 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, declarations of conformity, EC-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](http://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](http://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.

## Range of application

**Manual electrical apparatus for hazardous areas**

### Range of application 1D

for use in hazardous areas with combustible dust

### Range of application 2G

for use in hazardous areas with gas, vapour and mist

## Improper use

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

## Mounting and installation

Prior to mounting, installation and commissioning of the device you should make yourself familiar with the device and carefully read the instruction manual.

Mount the device so that it is not exposed to any mechanical hazard. For example, mount the device in a protective housing.

### Range of application 1D

#### Electrostatic charge

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.

### Range of application 2G

#### Protection from mechanical danger

When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.

## Operation, maintenance, repair

The device must not be repaired, changed or manipulated.

In the event of a fault, always return the device to Pepperl+Fuchs.

If there is a defect, the device must always be replaced with an original device from Pepperl+Fuchs.

## 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 (see datasheet) must be considered.

Disposing of device, packaging material, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



### Model Number

NJ10-22-N-E93-Y30629

### Features

- Comfort series
- 10 mm non-flush

## 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

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 1500 Hz
Hysteresis	$H$	typ. 5 %
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA

### Functional safety related parameters

MTTF <sub>d</sub>	11260 a
Mission Time ( $T_M$ )	20 a
Diagnostic Coverage (DC)	0 %

### Ambient conditions

Ambient temperature	-25 ... 70 °C (-13 ... 158 °F)
---------------------	--------------------------------

### Mechanical specifications

Connection type	cable PVC, 2 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
Category	2G; 1D

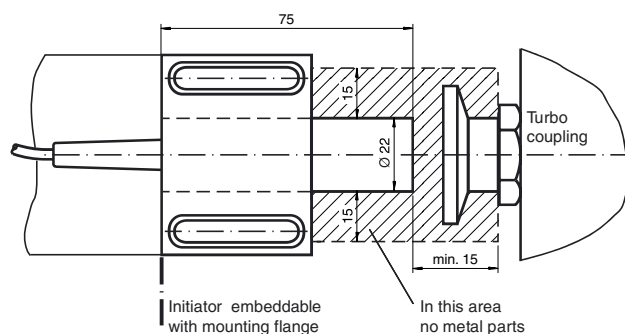
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

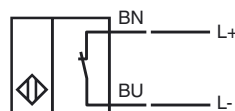
### Approvals and certificates

UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose

## Dimensions



## Electrical Connection



Equipment protection level Gb

Instruction

Device category 2G

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity  $C_i$

Effective internal inductance  $L_i$

General

Maximum permissible ambient temperature  $T_{amb}$

Installation, commissioning

Maintenance

Special conditions

Protection from mechanical danger

Manual electrical apparatus for hazardous areas

for use in hazardous areas with gas, vapour and mist

PTB 00 ATEX 2048 X

CE 0102

II 2G Ex ia IIC T6...T1 Gb

EN 60079-0:2012, EN 60079-11:2012

Ignition protection "Intrinsic safety"

Use is restricted to the following stated conditions

NJ 10-22-N...

$\leq 130 \text{ nF}$  ; a cable length of 10 m is considered.

$\leq 100 \text{ }\mu\text{H}$  ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EU-type examination certificate has to be observed. The special conditions must be adhered to!

The ATEX directive and therefore the EU-type examination certificates apply in general only to the use of electrical apparatus under atmospheric conditions.

The use in ambient temperatures of  $> 60 \text{ }^\circ\text{C}$  was tested with regard to hot surfaces by the mentioned certification authority.

If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.

The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

When used in the temperature range below  $-20 \text{ }^\circ\text{C}$  the sensor should be protected from knocks by the provision of an additional housing.

**Equipment protection level Da**

Instruction

**Device category 1D**

EC-Type Examination Certificate

CE marking

ATEX marking

Standards

Appropriate type

Effective internal inductivity  $C_i$ Effective internal inductance  $L_i$ 

General

Maximum housing surface temperature

Installation, commissioning

Maintenance

**Special conditions**

Electrostatic charge

**Manual electrical apparatus for hazardous areas**

for use in hazardous areas with combustible dust

ZELM 03 ATEX 0128 X

CE 0102

II 1D Ex iaD 20 T 85 °C (185 °F)

IEC 61241-11:2002: draft; prEN61241-0:2002

type of protection intrinsic safety "iD"

Use is restricted to the following stated conditions

NJ 10-22-N-E93-Y30629

 $\leq 130 \text{ nF}$  ; a cable length of 10 m is considered. $\leq 100 \mu\text{H}$  ; a cable length of 10 m is considered.

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The EU-type examination certificate has to be observed.

The special conditions must be adhered to!

The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.

The associated apparatus must satisfy at least the requirements of category ia IIB or iaD. Because of the possibility of the danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation in the power supply and signal circuits is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met.

The intrinsically safe circuit has to be protected against influences due to lightning.

When used in the isolating wall between Zone 20 and Zone 21 or Zone 21 und Zone 22 the sensor must not be exposed to any mechanical danger and must be sealed in such a way, that the protective function of the isolating wall is not impaired. The applicable directives and standards must be observed.

No changes can be made to apparatus, which are operated in hazardous areas.

Repairs to these apparatus are not possible.

The connection cables are to be laid in accordance with EN 50281-1-2 and must not normally be subjected to chaffing during use.

## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-1582  
Date / Datum: 2017-04-11

Copyright Pepperl+Fuchs  
www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y106925	116696	Inductive sensor
NJ10-22-N-E93-Y30627	116697	Inductive sensor
NJ10-22-N-E93-Y30629	116698	Inductive sensor
NJ10-22-N-E93-Y52737	116699	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01 prEN 61241-0:2002-04
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
RoHS 2011/65/EU (L174/88-110)	EN 50581:2012-09

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-04-11

ppa. Wolfgang Helm  
Director Business Unit 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
II 2 G	PTB 00 ATEX 2048 X	0102
II 1 D	ZELM 03 ATEX 0128 X	0820

## Key for Issuer ID / Schlüssel zur Aussteller ID

ID	Issuer / Aussteller
0820	ZELM ex Siekgraben 56 38124 Braunschweig Germany
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

Pepperl+Fuchs GmbH declares that the products are only affected by minor or formal changes with respect to the new edition of the standards. These changes are not relevant for compliance with the essential health and safety requirements. The products still comply with the ATEX Directive. This declaration is also valid if the marking and the certificates of the listed devices correspond to previous editions of standards.



Die Pepperl+Fuchs GmbH erklärt hiermit, dass die Produkte nur von kleineren oder formalen Änderungen in Bezug auf die neue Ausgabe der Normen betroffen sind. Diese Änderungen sind nicht relevant für die Konformität mit den wesentlichen Gesundheits- und Sicherheitsanforderungen. Die Produkte erfüllen nach wie vor die ATEX-Richtlinie. Diese Erklärung gilt auch, wenn die Kennzeichnung und die Zertifikate der aufgeführten Geräte vorangegangenen Normenständen entsprechen.

## 14.5 Initiator NJ10-22-N-E93-Y245590

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

# Instruction Manual

## 1. Marking

Inductive sensor NJ10-22-N-E93-Y245590
Equipment protection level: Gb ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 2G Ex ia IIC T6...T1 Gb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ib IIC T6
Equipment protection level: Da ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 1D Ex ia IIIC T135°C Da
Equipment protection level: Mb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ia I
Pepperl+Fuchs GmbH Lilienthalstraße 200, 68307 Mannheim, Germany

## 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 dismantling lies with the plant operator. The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismantling 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](http://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](http://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 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.

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.

### 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.

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

### 7.2. Special Conditions

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.

##### 7.2.1.1. Requirements for Equipment Protection Level Da

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

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

#### 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 special conditions.

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.

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.

Disposing of device, packaging, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.





## Model Number

NJ10-22-N-E93-Y245590

## Features

- Comfort series
- 10 mm non-flush

## Technical Data

### General specifications

Rated operating distance	$s_n$	10 mm
Installation		non-flush
Output polarity		NAMUR
Assured operating distance	$s_a$	0 ... 10 mm
Output type		2-wire

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA

### 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 silicone , 2 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
---------------------------	-------------------------

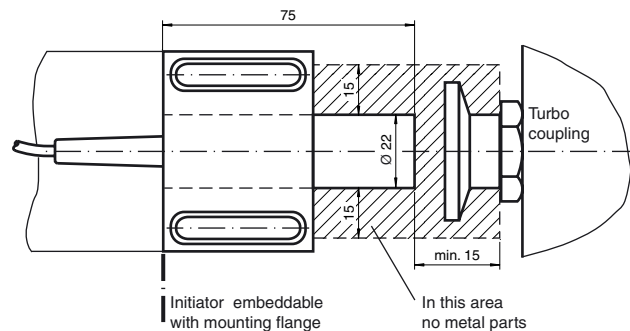
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012

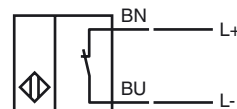
### Approvals and certificates

EAC conformity	TR CU 012/2011
UL approval	cULus Listed, General Purpose



## Dimensions





## Electrical Connection



**Data for application in connection with hazardous areas**

Equipment protection level		Gb , Da , Mb
<b>Equipment protection level Gb</b>		
Type of protection		intrinsic safety
CE marking		 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		 II 2G Ex ia IIC T6...T1 Gb
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ib IIC T6
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \text{ }\mu\text{H}$ A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{\text{amb}}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ , T6 : 73 °C (163.4 °F) T5 : 88 °C (190.4 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ , T6 : 69 °C (156.2 °F) T5 : 84 °C (183.2 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ , T6 : 51 °C (123.8 °F) T5 : 66 °C (150.8 °F) T4 : 80 °C (176 °F) T3 : 80 °C (176 °F) T2 : 80 °C (176 °F) T1 : 80 °C (176 °F) at $U_i = 16 \text{ V}$ , $I_i = 76 \text{ mA}$ , $P_i = 242 \text{ mW}$ , T6 : 39 °C (102.2 °F) T5 : 54 °C (129.2 °F) T4 : 61 °C (141.8 °F) T3 : 61 °C (141.8 °F) T2 : 61 °C (141.8 °F) T1 : 61 °C (141.8 °F)

**Equipment protection level Da**

Type of protection		intrinsic safety
CE marking		 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		 II 1D Ex ia IIIC T135°C Da
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \text{ }\mu\text{H}$ A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{\text{amb}}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ : 80 °C (176 °F) at $U_i = 16 \text{ V}$ , $I_i = 76 \text{ mA}$ , $P_i = 242 \text{ mW}$ : 61 °C (141.8 °F)

**Equipment protection level Mb**

Type of protection		intrinsic safety
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ia I
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \text{ }\mu\text{H}$ A cable length of 10 m is considered.



Maximum permissible ambient temperature  $T_{amb}$

Also observe the maximum permissible ambient temperature stated in the general technical data.  
Keep to the lower of the two values.  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 34\text{ mW}$  :  $100\text{ °C}$  ( $212\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 64\text{ mW}$  :  $100\text{ °C}$  ( $212\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 52\text{ mA}$  ,  $P_i = 169\text{ mW}$  :  $80\text{ °C}$  ( $176\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 76\text{ mA}$  ,  $P_i = 242\text{ mW}$  :  $61\text{ °C}$  ( $141.8\text{ °F}$ )

Release date: 2017-12-13 09:46 Date of issue: 2017-12-13 245590\_eng.xml

## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-3331  
Date / Datum: 2017-01-26

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www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y245590	245590	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01
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

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-01-26

ppa. Wolfgang Helm  
Director Business Unit 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
II 1 D 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

## **14.6 Initiator NJ10-22-N-E93-Y246868**

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

# Instruction Manual

## 1. Marking

Inductive sensor NJ10-22-N-E93-Y246868
Equipment protection level: Gb ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 2G Ex ia IIC T6...T1 Gb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ib IIC T6
Equipment protection level: Da ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 1D Ex ia IIIC T135°C Da
Equipment protection level: Mb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ia I
Pepperl+Fuchs GmbH Lilienthalstraße 200, 68307 Mannheim, Germany

## 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 dismantling lies with the plant operator.  
The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismantling 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](http://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](http://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 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.

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.

### 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.

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

### 7.2. Special Conditions

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.

##### 7.2.1.1. Requirements for Equipment Protection Level Da

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

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

#### 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 special conditions.

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.

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.

Disposing of device, packaging, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



## Model Number

**NJ10-22-N-E93-Y246868**

## Features

- **Comfort series**
- **10 mm non-flush**

## Technical Data

### General specifications

Rated operating distance	$s_n$	10 mm
Installation		non-flush
Output polarity		NAMUR
Assured operating distance	$s_a$	0 ... 10 mm
Output type		2-wire

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA

### 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 silicone , 5 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
---------------------------	-------------------------

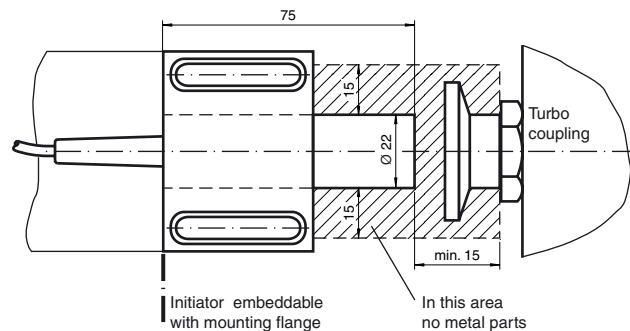
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012

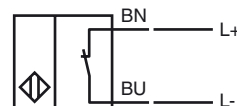
### Approvals and certificates

EAC conformity	TR CU 012/2011
UL approval	cULus Listed, General Purpose

## Dimensions





## Electrical Connection







**Data for application in connection with hazardous areas**

Equipment protection level		Gb , Da , Mb
<b>Equipment protection level Gb</b>		
Type of protection		intrinsic safety
CE marking		 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		 II 2G Ex ia IIC T6...T1 Gb
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ib IIC T6
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \mu\text{H}$ A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{\text{amb}}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ , T6 : 73 °C (163.4 °F) T5 : 88 °C (190.4 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ , T6 : 69 °C (156.2 °F) T5 : 84 °C (183.2 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ , T6 : 51 °C (123.8 °F) T5 : 66 °C (150.8 °F) T4 : 80 °C (176 °F) T3 : 80 °C (176 °F) T2 : 80 °C (176 °F) T1 : 80 °C (176 °F) at $U_i = 16 \text{ V}$ , $I_i = 76 \text{ mA}$ , $P_i = 242 \text{ mW}$ , T6 : 39 °C (102.2 °F) T5 : 54 °C (129.2 °F) T4 : 61 °C (141.8 °F) T3 : 61 °C (141.8 °F) T2 : 61 °C (141.8 °F) T1 : 61 °C (141.8 °F)

**Equipment protection level Da**

Type of protection		intrinsic safety
CE marking		 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		 II 1D Ex ia IIIC T135°C Da
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \mu\text{H}$ A cable length of 10 m is considered.
Maximum permissible ambient temperature $T_{\text{amb}}$		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 34 \text{ mW}$ : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 25 \text{ mA}$ , $P_i = 64 \text{ mW}$ : 100 °C (212 °F) at $U_i = 16 \text{ V}$ , $I_i = 52 \text{ mA}$ , $P_i = 169 \text{ mW}$ : 80 °C (176 °F) at $U_i = 16 \text{ V}$ , $I_i = 76 \text{ mA}$ , $P_i = 242 \text{ mW}$ : 61 °C (141.8 °F)

**Equipment protection level Mb**

Type of protection		intrinsic safety
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ia I
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	$C_i$	$\leq 130 \text{ nF}$ A cable length of 10 m is considered.
Effective internal inductance	$L_i$	$\leq 100 \mu\text{H}$ A cable length of 10 m is considered.



Maximum permissible ambient temperature  $T_{amb}$

Also observe the maximum permissible ambient temperature stated in the general technical data.  
Keep to the lower of the two values.  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 34\text{ mW}$  :  $100\text{ }^{\circ}\text{C}$  ( $212\text{ }^{\circ}\text{F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 64\text{ mW}$  :  $100\text{ }^{\circ}\text{C}$  ( $212\text{ }^{\circ}\text{F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 52\text{ mA}$  ,  $P_i = 169\text{ mW}$  :  $80\text{ }^{\circ}\text{C}$  ( $176\text{ }^{\circ}\text{F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 76\text{ mA}$  ,  $P_i = 242\text{ mW}$  :  $61\text{ }^{\circ}\text{C}$  ( $141.8\text{ }^{\circ}\text{F}$ )

Release date: 2017-12-13 09:46 Date of issue: 2017-12-13 246868\_eng.xml

## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-3336  
Date / Datum: 2017-01-26

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www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y246868	246868	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01
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

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-01-26

ppa. Wolfgang Helm  
Director Business Unit 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
II 1 D 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

## 14.7 Initiator NJ10-22-N-E93-Y246869

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

# Instruction Manual

## 1. Marking

Inductive sensor NJ10-22-N-E93-Y246869
Equipment protection level: Gb ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 2G Ex ia IIC T6...T1 Gb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ib IIC T6
Equipment protection level: Da ATEX certificate: PTB 00 ATEX 2048 X ATEX marking:  II 1D Ex ia IIIC T135°C Da
Equipment protection level: Mb IECEX certificate: IECEX PTB 11.0037X IECEX marking: Ex ia I
Pepperl+Fuchs GmbH Lilienthalstraße 200, 68307 Mannheim, Germany

## 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 dismantling lies with the plant operator.  
The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismantling 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](http://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](http://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 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.

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.

### 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.

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

### 7.2. Special Conditions

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.

##### 7.2.1.1. Requirements for Equipment Protection Level Da

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

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

##### 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 special conditions.

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.

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.

Disposing of device, packaging, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



## Model Number

**NJ10-22-N-E93-Y246869**

## Features

- **Comfort series**
- **10 mm non-flush**

## Technical Data

### General specifications

Rated operating distance	$s_n$	10 mm
Installation		non-flush
Output polarity		NAMUR
Assured operating distance	$s_a$	0 ... 10 mm
Output type		2-wire

### Nominal ratings

Nominal voltage	$U_o$	8 V
Switching frequency	$f$	0 ... 1000 Hz
Hysteresis	H	typ. 5 %
Current consumption		
Measuring plate not detected		$\geq 3$ mA
Measuring plate detected		$\leq 1$ mA

### 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 silicone , 10 m
Core cross-section	0.75 mm <sup>2</sup>
Housing material	PBT
Sensing face	PBT
Degree of protection	IP68
Cable	
Bending radius	> 10 x cable diameter

### General information

Use in the hazardous area	see instruction manuals
---------------------------	-------------------------

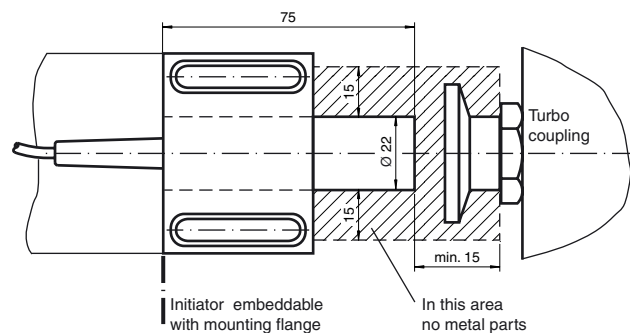
### Compliance with standards and directives

Standard conformity	
NAMUR	EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards	EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012

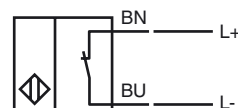
### Approvals and certificates

EAC conformity	TR CU 012/2011
UL approval	cULus Listed, General Purpose

## Dimensions



## Electrical Connection



**Data for application in connection with hazardous areas**

Equipment protection level		Gb , Da , Mb
<b>Equipment protection level Gb</b>		
Type of protection		intrinsic safety
CE marking		CE 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		II 2G Ex ia IIC T6...T1 Gb
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ib IIC T6
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	C <sub>i</sub>	≤ 130 nF A cable length of 10 m is considered.
Effective internal inductance	L <sub>i</sub>	≤ 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature T <sub>amb</sub>		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at U <sub>i</sub> = 16 V , I <sub>i</sub> = 25 mA , P <sub>i</sub> = 34 mW , T6 : 73 °C (163.4 °F) T5 : 88 °C (190.4 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 25 mA , P <sub>i</sub> = 64 mW , T6 : 69 °C (156.2 °F) T5 : 84 °C (183.2 °F) T4 : 100 °C (212 °F) T3 : 100 °C (212 °F) T2 : 100 °C (212 °F) T1 : 100 °C (212 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 52 mA , P <sub>i</sub> = 169 mW , T6 : 51 °C (123.8 °F) T5 : 66 °C (150.8 °F) T4 : 80 °C (176 °F) T3 : 80 °C (176 °F) T2 : 80 °C (176 °F) T1 : 80 °C (176 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 76 mA , P <sub>i</sub> = 242 mW , T6 : 39 °C (102.2 °F) T5 : 54 °C (129.2 °F) T4 : 61 °C (141.8 °F) T3 : 61 °C (141.8 °F) T2 : 61 °C (141.8 °F) T1 : 61 °C (141.8 °F)

**Equipment protection level Da**

Type of protection		intrinsic safety
CE marking		CE 0102
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
ATEX certificate		PTB 00 ATEX 2048 X
ATEX marking		II 1D Ex ia IIIC T135°C Da
Standards		EN 60079-0:2012+A11:2013 , EN 60079-11:2012
Effective internal inductivity	C <sub>i</sub>	≤ 130 nF A cable length of 10 m is considered.
Effective internal inductance	L <sub>i</sub>	≤ 100 µH A cable length of 10 m is considered.
Maximum permissible ambient temperature T <sub>amb</sub>		Also observe the maximum permissible ambient temperature stated in the general technical data. Keep to the lower of the two values. at U <sub>i</sub> = 16 V , I <sub>i</sub> = 25 mA , P <sub>i</sub> = 34 mW : 100 °C (212 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 25 mA , P <sub>i</sub> = 64 mW : 100 °C (212 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 52 mA , P <sub>i</sub> = 169 mW : 80 °C (176 °F) at U <sub>i</sub> = 16 V , I <sub>i</sub> = 76 mA , P <sub>i</sub> = 242 mW : 61 °C (141.8 °F)

**Equipment protection level Mb**

Type of protection		intrinsic safety
<b>Certificates</b>		
Appropriate type		NJ 10-22-N...
IECEX certificate		IECEX PTB 11.0037X
IECEX marking		Ex ia I
Standards		IEC 60079-0:2004 , IEC 60079-11:2006
Effective internal inductivity	C <sub>i</sub>	≤ 130 nF A cable length of 10 m is considered.
Effective internal inductance	L <sub>i</sub>	≤ 100 µH A cable length of 10 m is considered.





Maximum permissible ambient temperature  $T_{amb}$

Also observe the maximum permissible ambient temperature stated in the general technical data.  
Keep to the lower of the two values.  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 34\text{ mW}$  :  $100\text{ °C}$  ( $212\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 25\text{ mA}$  ,  $P_i = 64\text{ mW}$  :  $100\text{ °C}$  ( $212\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 52\text{ mA}$  ,  $P_i = 169\text{ mW}$  :  $80\text{ °C}$  ( $176\text{ °F}$ )  
at  $U_i = 16\text{ V}$  ,  $I_i = 76\text{ mA}$  ,  $P_i = 242\text{ mW}$  :  $61\text{ °C}$  ( $141.8\text{ °F}$ )

Release date: 2017-12-13 09:46 Date of issue: 2017-12-13 246869\_eng.xml

## EU-Declaration of conformity

en/de

## EU-Konformitätserklärung

Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-3335  
Date / Datum: 2017-01-26

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www.pepperl-fuchs.com



## Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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
NJ10-22-N-E93-Y246869	246869	Inductive sensor

## Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-0/A11:2013-11 EN 60079-0:2012-08 EN 60079-11:2012-01
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

## Affixed CE Marking / Angebrachte CE-Kennzeichnung



## Signatures / Unterschriften

Mannheim, 2017-01-26

ppa. Wolfgang Helm  
Director Business Unit 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
II 1 D 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

## **14.8 Evaluator KFD2-SR2-Ex2.W.SM**

Operating Instructions	Pepperl+Fuchs
Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs
Safety Instructions	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 dismantling lies with the plant operator. Mounting, installation, commissioning, operation, maintenance and dismantling 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](http://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  $\geq 1\%$  of the specified  $L_o$  value.

The total value of  $C_i$  (excluding cable) of the circuit is  $\geq 1\%$  of the specified  $C_o$  value.

The reduced capacitance for gas groups I, IIA and IIB must not exceed the value of 1  $\mu\text{F}$  (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.

## Features

- 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 61508

## Function

This isolated barrier is used for intrinsic safety applications. It is a zero speed/standstill monitor that accepts input frequency pulses and triggers an output when the frequency drops below a selected value.

Two startup override values are available. This unit can also be used to determine rotation direction.

During an error condition, relays revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

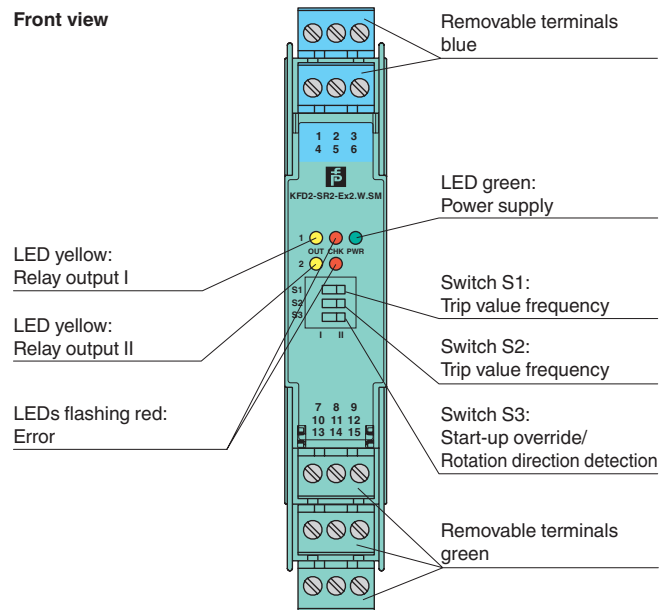
The available diagnostic LEDs show rotation detection, limit trip indicator, power on, and hardware error indication.

The unit is easily programmed via switches mounted on the front of the unit.

A unique collective error messaging feature is available when used with the Power Rail system.

For additional information, refer to [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

## Assembly

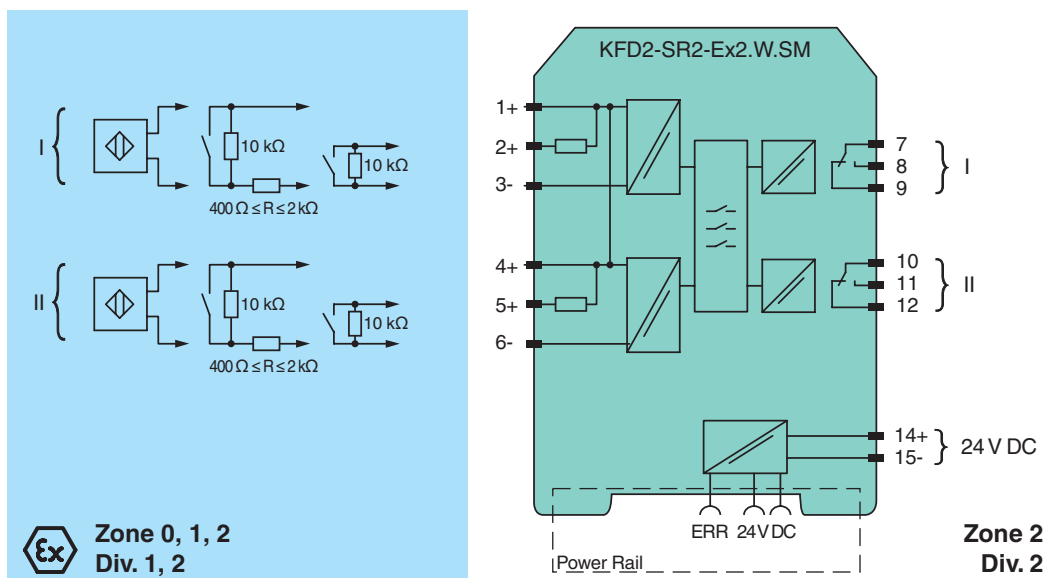





CE



SIL 2

## Connection



<b>General specifications</b>		
Signal type		Digital Input
Programming		via DIP switch and programmable
<b>Supply</b>		
Connection		Power Rail or terminals 14+, 15-
Rated voltage	$U_n$	20 ... 30 V DC
Power consumption		$\leq 1.5$ W
<b>Input</b>		
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 $I \leq 0.1$ mA , short-circuit $I > 6$ mA
Control input		sensor power supply approx. 8.2 V, impedance 1.2 k $\Omega$
Pulse duration		> 200 $\mu$ s for standstill monitoring, > 250 $\mu$ s for rotation direction detection
<b>Output</b>		
Connection		output I: terminals 7, 8, 9 ; output II: terminals 10, 11, 12
Relay		2 changeover contacts
Contact loading		253 V AC/2 A/cos $\phi > 0.7$ ; 126.5 V AC/4 A/cos $\phi > 0.7$ ; 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 <sup>7</sup> 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)
<b>Transfer characteristics</b>		
Accuracy		5 % (S3 = I), 30 % (S3 = II)
Start-up override		5 seconds or 20 seconds, programmable
Frequency range		$\leq 2$ kHz
Rotation direction detection		90° phase difference between pulse input signal 1 and 2, overlapping $\geq 125$ $\mu$ s
<b>Electrical isolation</b>		
Input/Output		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>
Input/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>
Output/power supply		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>
Output/Output		reinforced insulation according to IEC/EN 61010-1, rated insulation voltage 300 V <sub>eff</sub>
<b>Directive conformity</b>		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Low voltage		
Directive 2014/35/EU		EN 61010-1:2010
<b>Conformity</b>		
Electromagnetic compatibility		NE 21:2006
Degree of protection		IEC 60529:2001
Input		EN 60947-5-6:2000
<b>Ambient conditions</b>		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
<b>Mechanical specifications</b>		
Degree of protection		IP20
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 inch) , housing type B2
Mounting		on 35 mm DIN mounting rail acc. to EN 60715:2001
<b>Data for application in connection with hazardous areas</b>		
EC-Type Examination Certificate		PTB 00 ATEX 2080
Group, category, type of protection		 II (1)G [Ex ia Ga] IIC  II (1)D [Ex ia Da] IIIC  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)
<b>Supply</b>		
Maximum safe voltage	$U_m$	253 V AC / 125 V DC (Attention! $U_m$ is no rated voltage.)
<b>Output</b>		

Release date 2016-09-13 11:47 Date of issue 2016-09-13 132964\_eng.xml

Contact loading		253 V AC/2 A/cos $\phi$ > 0.7; 126.5 V AC/4 A/cos $\phi$ > 0.7; 40 V DC/2 A resistive load
Maximum safe voltage	$U_m$	253 V AC (Attention! The rated voltage can be lower.)
Error message output		
Maximum safe voltage	$U_m$	40 V DC (Attention! $U_m$ is no rated voltage.)
Statement of conformity		TÜV 99 ATEX 1493 X
Group, category, type of protection, temperature class		Ⓔ II 3G Ex nA nC IIC T4
Output		
Contact loading		50 V AC/4 A/cos $\phi$ > 0.7; 40 V DC/2 A resistive load
Electrical 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 60079-0:2012+A11:2013, EN 60079-11:2012, EN 60079-15:2010
<b>International approvals</b>		
FM approval		
Control drawing		116-0035
CSA approval		
Control drawing		116-0047
IECEX approval		IECEX PTB 11.0034
Approved for		[Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I
<b>General information</b>		
Supplementary information		EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a> .

## Operating principle

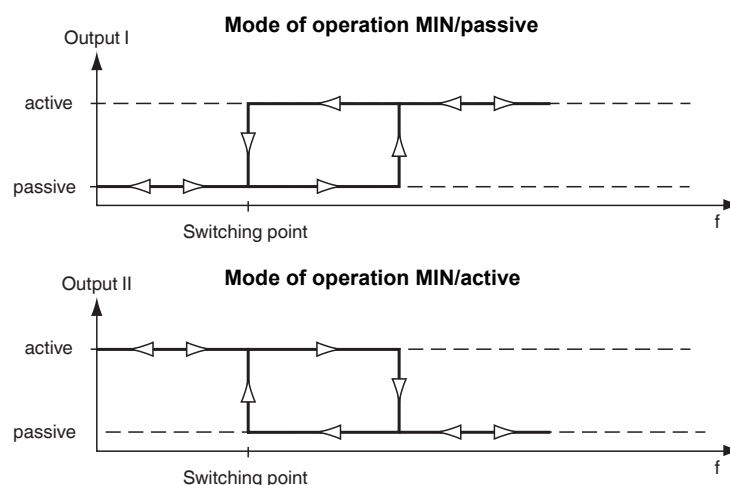
The function of standstill monitor with start-up override (S3 = I) or standstill monitor with rotation direction monitoring (S3 = II) can be selected by means of DIP switches.

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





Pepperl+Fuchs GmbH  
Lilienthalstraße 200  
68307 Mannheim  
Germany  
Phone +49 621 776-0  
Fax +49 621 776-1000

No. / Nr.: DOC-0170B  
Date / Datum: 2016-03-31

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www.pepperl-fuchs.com



### Declaration of conformity / Konformitätserklärung

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

Die Pepperl+Fuchs GmbH 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 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 and Rotational Direction Monitor

### Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
<b>2004/108/EC (EMC)</b> valid until 2016-04-19 (L390/24-37) <b>2014/30/EU (EMC)</b> valid from 2016-04-20 (L96/79-106)	EN 61326-1:2013 (industrial locations)
<b>94/9/EC (ATEX)</b> valid until 2016-04-19 (L100/1-29) <b>2014/34/EU (ATEX)</b> valid from 2016-04-20 (L96/309-356)	EN 60079-0:2012+A11:2013 EN 60079-11:2012 EN 60079-15:2010
<b>2006/95/EC (LV)</b> valid until 2016-04-19 (L374/10-19) <b>2014/35/EU (LV)</b> valid from 2016-04-20 (L96/357-374)	EN 61010-1:2010

### Affixed CE Marking / Angebrachte CE-Kennzeichnung



### Signatures / Unterschriften

Mannheim, 2016-03-31

ppa. Michael Kessler  
Vice President Business Unit  
Components and Technology

i.V. Friedrich Füll  
Manager  
Interface Technology

### ANNEX ATEX

#### Notified Body QM-System / Notifizierte Stelle des QM-Systems:

Physikalisch Technische Bundesanstalt (0102)  
Bundesallee 100  
38116 Braunschweig  
Germany

We, Pepperl+Fuchs GmbH declare that the products are only affected by minor or formal changes in respect to the new edition of the standards. These changes are not relevant for compliance with the EHSRs and consequently the products still comply with the ATEX Directive.

Die Pepperl+Fuchs GmbH erklärt hiermit, dass die Produkte nur von kleineren oder formalen Änderungen in Bezug auf die neue Ausgabe der Normen betroffen sind. Diese Änderungen sind nicht relevant für die Konformität mit den EHSRs, weshalb die Produkte nach wie vor die ATEX-Richtlinie erfüllen.

The EC-Type-Examination and the marking of the equipment was performed in accordance with the following standards:

Die EG-Baumusterprüfung und die Kennzeichnung des Betriebsmittels wurden nach den folgenden Normen durchgeführt:

EN 60079-0:2012  
EN 60079-11:2012

The marking as category 3 G apparatus is issued in acc. with the following standards:

Die Kennzeichnung als Kategorie 3 G Betriebsmittels ist nach den folgenden Normen durchgeführt:

EN 60079-0:2006  
EN 60079-15:2005

### Marking and Certificates / Kennzeichnung und Zertifikate

Products / Produkte	KFD2-SR2-Ex1.W KFD2-SR2-Ex1.W.LB KFD2-SR2-Ex2.W	
Marking Kennzeichnung	Certificate Zertifikat	Issuer ID Aussteller ID
Ex II (1) G Ex II (1) D Ex I (M1)	PTB 00 ATEX 2080	0102
Ex II (3) G	PF08 CERT 0803	PF
Ex II 3 G	TÜV 99 ATEX 1493 X	TÜV

Products / Produkte	KFD2-SR2-Ex2.W.SM	
Marking Kennzeichnung	Certificate Zertifikat	Issuer ID Aussteller ID
Ex II (1) G Ex II (1) D Ex I (M1)	PTB 00 ATEX 2080	0102
Ex II 3 G	TÜV 99 ATEX 1493 X	TÜV

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

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

## 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.

### 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.

## 5 Product life and maintenance

Product life is limited by the following parameters:

- Mechanical life of the relay of at least  $2.5 \times 10^5$  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.  $5 \times 10^6$  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.

## 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**

$$\lambda_{sd} = 11 \text{ FIT}$$

$$\lambda_{su} = 248 \text{ FIT}$$

$$\lambda_{dd} = 90 \text{ FIT}$$

$$\lambda_{du} = 26 \text{ FIT}$$

$$\text{SFF} = 91.25 \%$$

$$\text{DC}_S = 4.25 \%$$

$$\text{DC}_D = 77.59 \%$$

**Without  
lead fault detection**

$$\lambda_{sd} = 9 \text{ FIT}$$

$$\lambda_{su} = 247 \text{ FIT}$$

$$\lambda_{dd} = 90 \text{ FIT}$$

$$\lambda_{du} = 27 \text{ FIT}$$

$$\text{SFF} = 90.91 \%$$

$$\text{DC}_S = 3.52 \%$$

$$\text{DC}_D = 76.92 \%$$

Voith Group  
St. Pöltener Str. 43  
89522 Heidenheim, GERMANY

Telefon: + 49 7951 32 1666  
E-Mail: [Industry.Service@voith.com](mailto:Industry.Service@voith.com)  
Internet: [www.voith.com/fluid-couplings](http://www.voith.com/fluid-couplings)

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