VOITH

Installation and Operating Manual

(Translation of the original installation and operating manual)

BTS

Non-contacting Thermal Switch Unit

Version 10, 2017-12-15
3626-011500 en, Protection Class 0: public

Contact

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3626-011500 en

This document describes the state of design of the product at the time of the editorial deadline on 2017-12-15.

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Contents

1 Possible Applications, BTS Characteristics

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

- The BTS 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 resets automatically.
- The BTS can be used for Voith turbo couplings from **size 206**.

⚠ WARNING

Explosion hazard
If no isolating switch amplifier is used, there is the hazard of explosion.

- As the control circuit of the evaluator is **not** intrinsically safe, provide an appropriate isolating switch amplifier between evaluator and initiator!
- The BTS must not be used as safety device to limit the maximum permissible surface temperature of the turbo coupling in potentially explosive atmospheres!

2 BTS Functioning

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

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

Optionally, if an intrinsically safe control circuit is required:

- **Isolating switch amplifier,** two-channel for up to 2 initiators

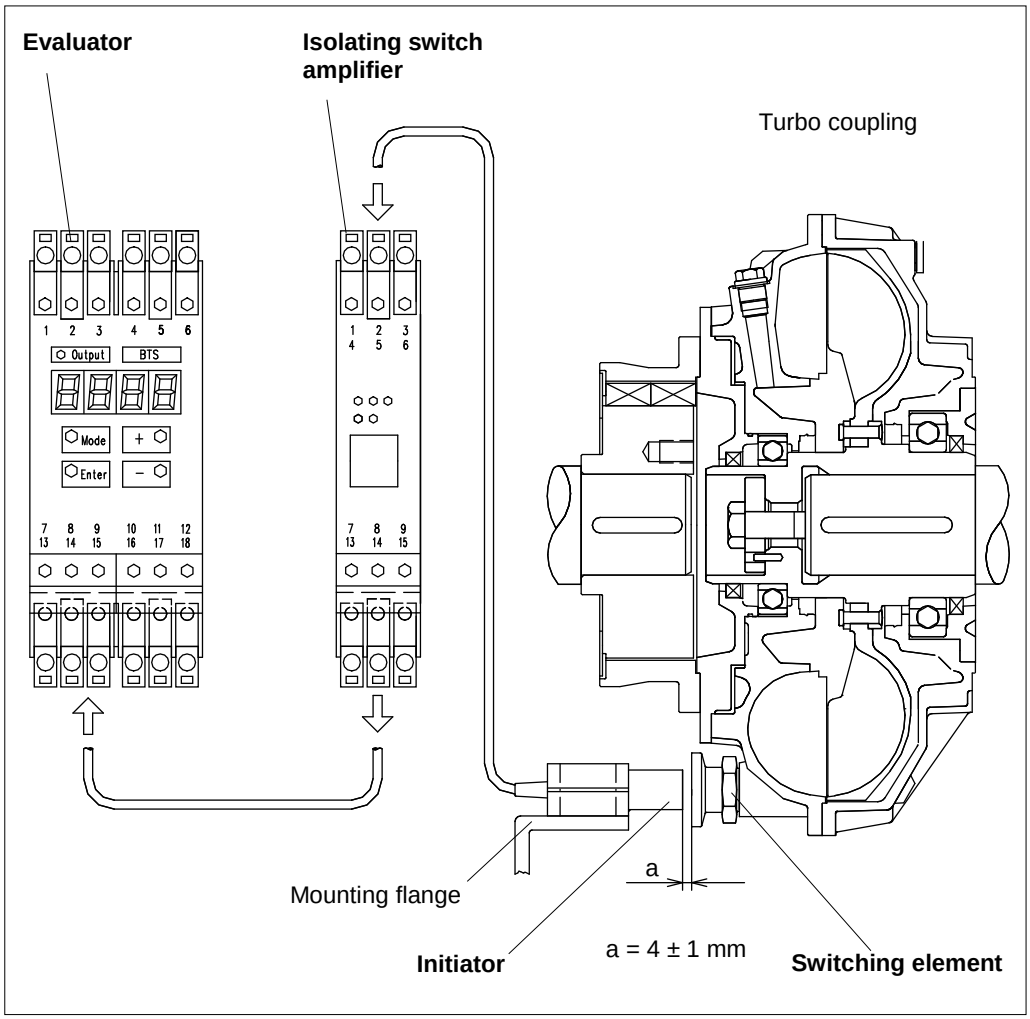

Fig. 1

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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 is again ready for service (it resets automatically).

Nominal response temperature
→ **Chapter 3.1**

2.2 Initiator

The initiator has been designed as 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.
The evaluation starts either by switching on the supply voltage or by an external trigger signal.
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 Isolating switch amplifier

The isolating switch amplifier transmits digital signals from the potentially explosive area.
Sensors or mechanical contacts may work as transducing sensor.
The intrinsically safe inputs are safely isolated from the output and power system.

2.5 Interaction of BTS components

Installation, position
→ Chapter 2

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.

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.

Cutoff frequency
→ Chapter 3.3.1

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.

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 ensure that both the drive motor and the driven machine have stopped running and that a re-start is absolutely impossible!
- The coupling may only be restarted if the turbo coupling temperature is below the maximum permissible temperature allowed when switching on the motor!

Maximum permissible temperature
→ Operating manual of turbo coupling

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3 Technical Data

3.1 Switching element

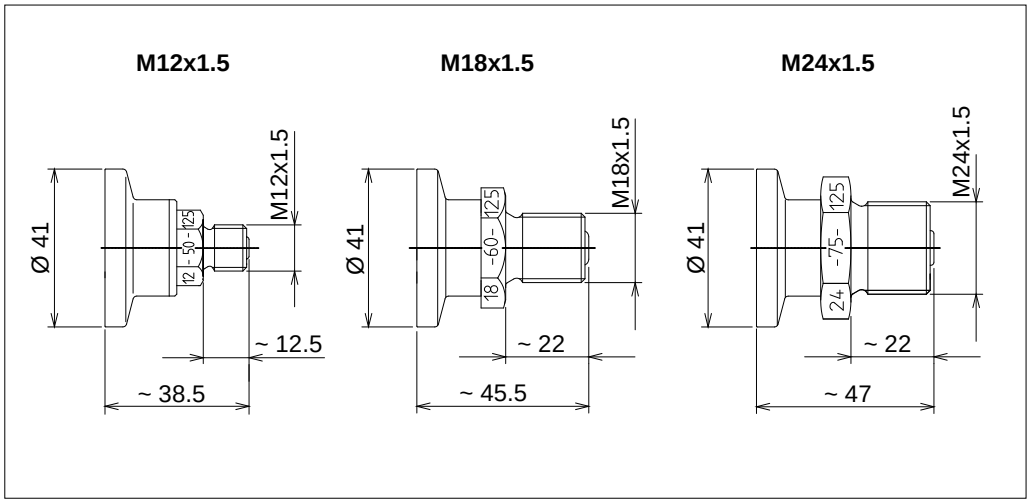


Fig. 2

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

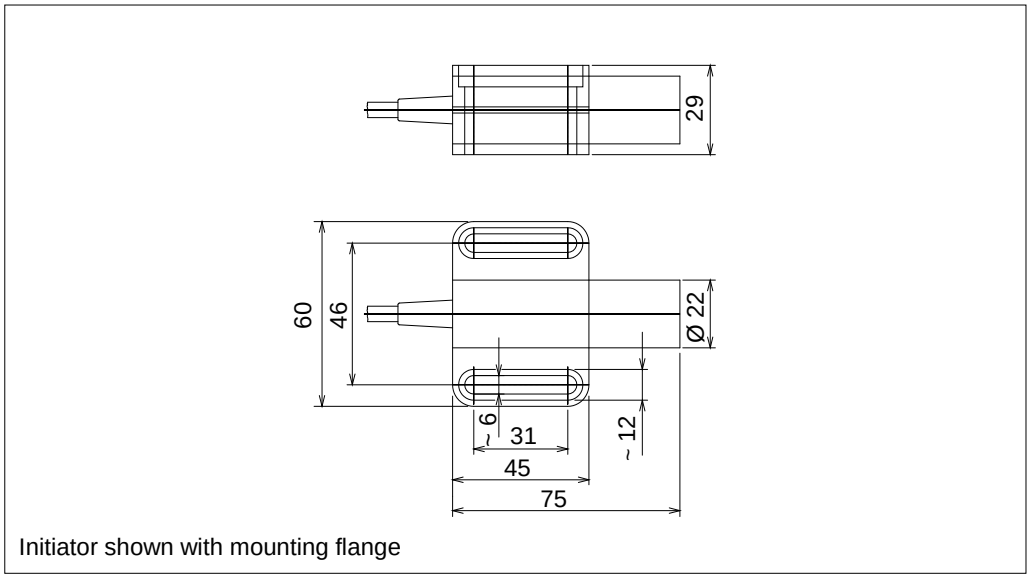
Dimension of thread	M12x1.5	M18x1.5	M24x1.5
Nominal response temperature	125 °C	85 / 90 / 100 / 110 /125 / 140 / 160 / 180 °C	85 / 125 / 140 / 160 / 180 °C
Suitable for coupling sizes ...	206 – 274	366 – 650	750 – 1330
Response tolerance	± 5 °C		
Trip temperature	approx. 40 K below the response temperature		
Width across flats	17	27	32
Tightening torque	22 Nm	60 Nm	144 Nm

Table 1

SAFETY INFORMATION

- The type of switching element is stamped in on the housing indicating:
  - Dimension of thread
  - Maximum peripheral speed
  - and nominal response temperature
- The nominal response temperature of the switching element is determined in connection with the the coupling design.

3.2 Initiator, mounting flange



Initiator shown with mounting flange

Fig. 3

→ Annex Type: NJ 10-22-N-E93-Y106925
NJ 10-22-N-E93-Y30627
NJ 10-22-N-E93-Y30629

3.3 Evaluator and isolating switch amplifier

3.3.1 Evaluator

→ Annex Type: KFU8-DW-1.D-Y209869

3.3.2 Isolating switch amplifier 230 V AC

→ Annex Type: KFA6-SOT2-Ex2

3.3.3 Isolating switch amplifier 20…30 V DC

→ Annex Type: KFD2-SOT2-Ex2

4 User Information

This manual will support you in using the non-contacting thermal switch unit (**BTS**) 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 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** and may thus impair safety.
Voith is not liable for any damages resulting from the use of non-original spare parts.

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

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

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Voith Turbo reserves the right for modifications.

5 Safety

5.1 Safety information

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

5.1.1 Structure of safety information

⚠ DANGER WORD
Hazard consequences Source of hazard • Warding off of danger

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

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

Table 2

Hazard consequences
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
	Danger of explosion 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)** serves for the non-contacting temperature monitoring of Voith turbo couplings. 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 non-contacting thermal switch units 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 danger 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 machine.

- 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.
- Machine and electric installation are provided with grounding 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 golves.
- 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 a re-start 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.

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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 must 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.

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.

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.

Our address:
→ Page 2

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 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!

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

Please contact Voith Turbo in case of a subsequent installation of the BTS for turbo coupling sizes 206 and 274!

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

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

Please consult Voith Turbo
→ order documents

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.
- Equipment which is operated in potentially explosive atmospheres must not be modified.
  It is not possible to carry out repairs on such equipment.
- Avoid any impact effects on the initiator. Working on the machine is permitted only in non-explosive atmospheres.
- In order to prevent electrostatic charging, lay the connecting lines in accordance with EN 50281-1-2 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) or shell (item 0190) [1].

Arrangement of switching element on the outer wheel side [2]:

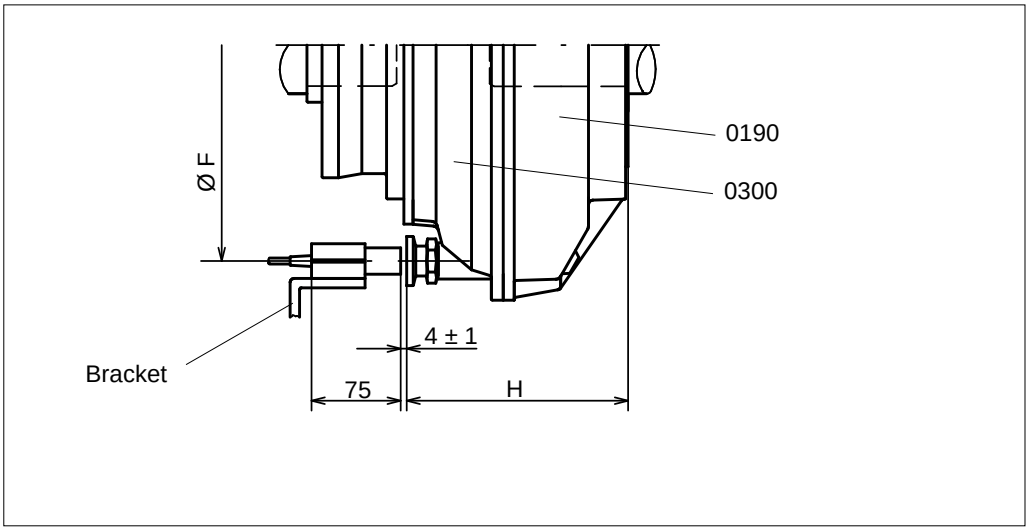

Fig. 4

1) Not for turbo couplings of type DT.
2) For turbo couplings of type DT, installation is also possible on the opposite outer wheel side.

Installation dimensions for switching element and initiator:

	Outer wheel side	
Turbo coupling type	**Pitch circle diameter Ø F [mm]**	**Distance ~ H [mm]**
206 T	196 ± 1	111.5
206 DT	196 ± 1	151.5
274 T	268 ± 1	152
274 DT	268 ± 1	190
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	840 ± 1	356
866 DT	840 ± 1	600
1000 T	972 ± 1	369
1000 DT	972 ± 1	672
1150 T	1128 ± 1	458
1150 DT	1128 ± 1	783
1330 DT	1302 ± 1	912

Table 5

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

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Arrangement of switching element on the shell side (not for turbo coupling type DT and/or T…S):

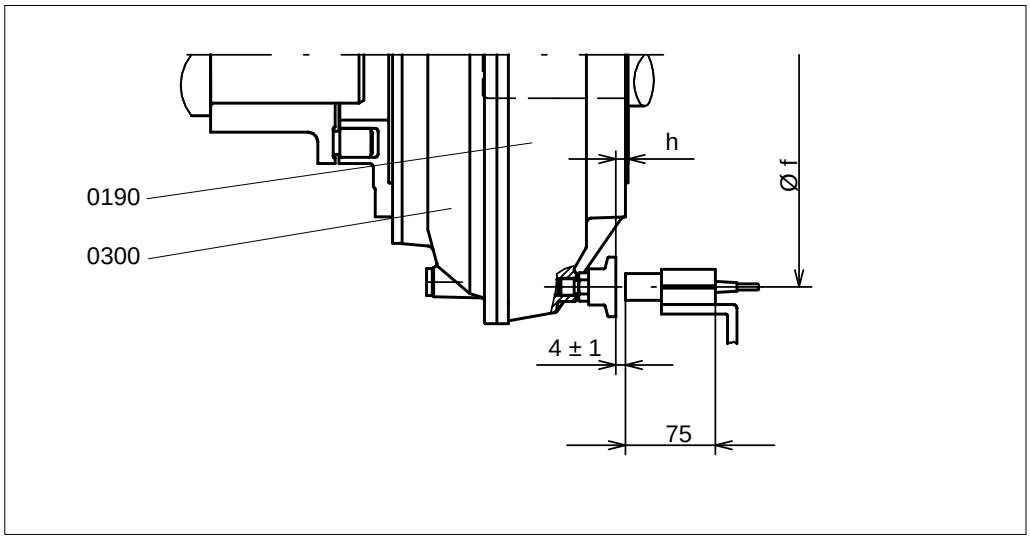

Fig. 5

Arrangement of switching element on the shell side (only for turbo coupling type T…S):

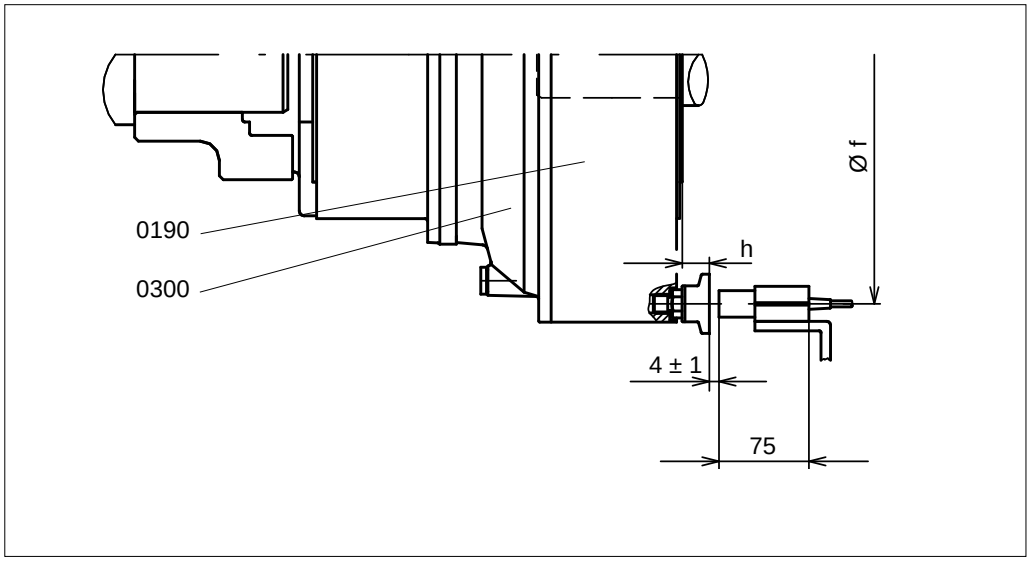

Fig. 6

Installation dimensions for switching element and initiator:

	Shell side			
	Not turbo coupling type DT and T…S:		**Only turbo coupling type T…S:**	
Turbo coupling type	**Pitch circle diameter Ø f [mm]**	**Distance ~ h [mm]**	**Pitch circle diameter Ø f [mm]**	**Distance ~ h [mm]**
206 T	200 ± 1	-16	–	–
274 T	264 ± 1	2.5	–	–
366 T	355 ± 1	16	–	–
422 T	398 ± 1	9	–	–
487 T	480 ± 1	29	–	–
562 T	556 ± 1	28.5	–	–
650 T	649 ± 1	51.5	–	–
750 T	742 ± 1	52.5	815 ± 1	25
866 T	862 ± 1	65	954 ± 1	25
1000 T	990 ± 1	54	1092 ± 1	25
1150 T	1140 ± 1	86	1250 ± 1	25

Table 6

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)!

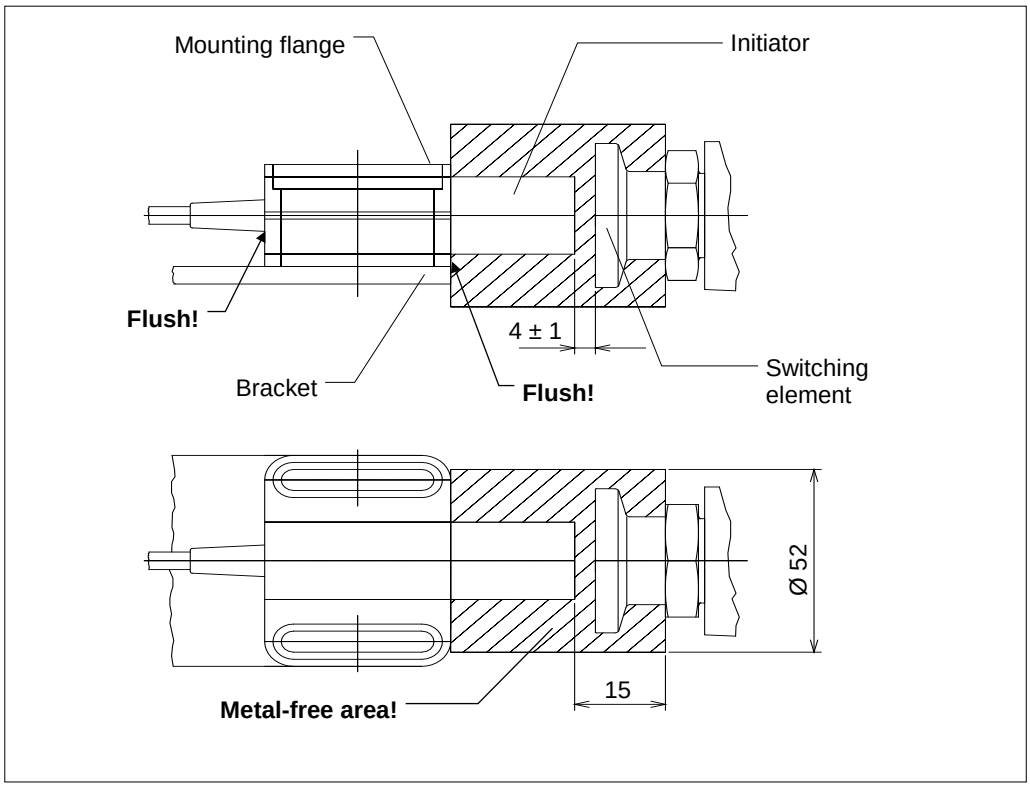

Fig. 7

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

6.4 Mounting, connection - evaluator, isolating switch amplifier

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

- Install the evaluator and, if necessary, the isolating switch amplifier into an appropriate cubicle and connect it/them in accordance with the wiring diagram.

Wiring diagram:

Evaluator
KFU8-DW-1.D-Y209869
→ Chapter 15.4

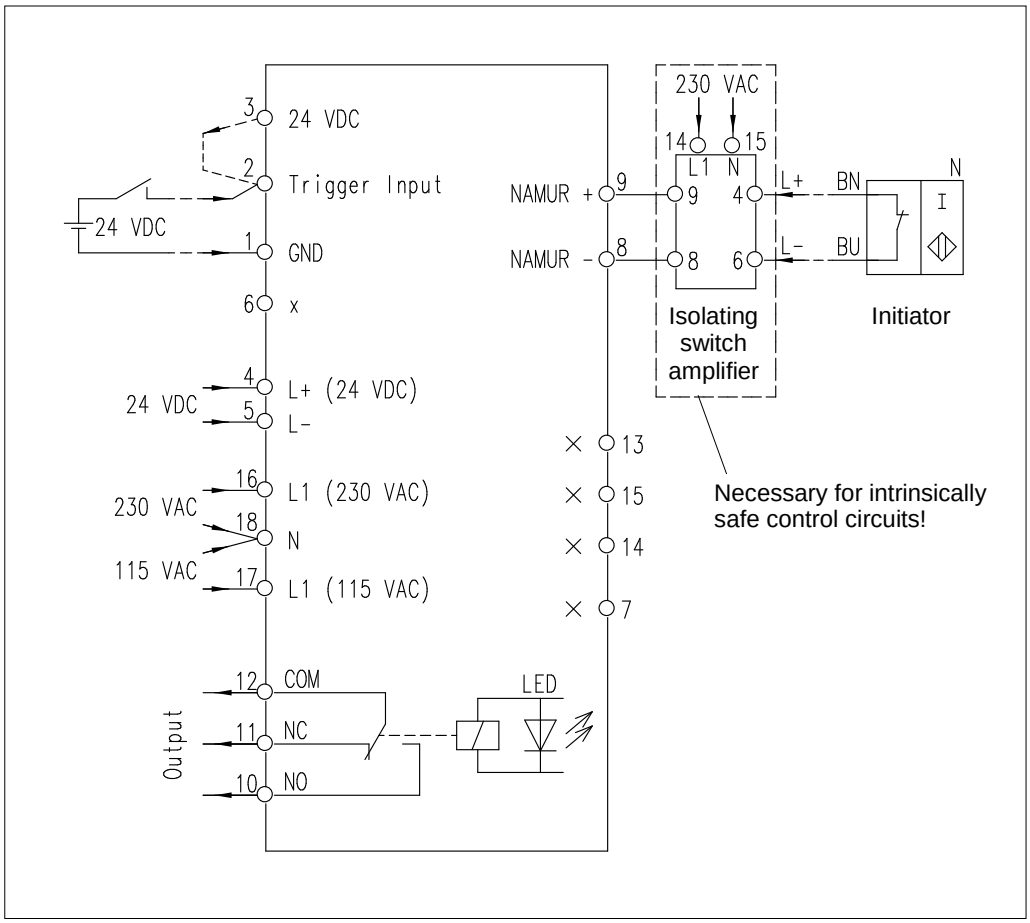

Fig. 8

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Terminal assignment: Evaluator

Terminal No.	Description
1	GND for trigger input
2	Trigger input for start-up bypass, +24 V DC
3	Power supply for trigger input. When triggering by switching on the supply voltage, provide a bridge between terminals 3 and 2 (as delivered condition!).
4	Supply voltage, +24 V DC
5	Supply voltage, GND
6	Do not connect!
7	Do not connect!
8	NAMUR input, L-
9	NAMUR input, L+
10	Output relay, make contact, NO
11	Output relay, break contact, NC
12	Output relay, root, COM
13	Do not connect!
14	Do not connect!
15	Do not connect!
16	Supply voltage, 230 V AC, L1
17	Supply voltage, 115 V AC, L1
18	Supply voltage, N

Table 7

⚠ WARNING

Explosion hazard

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

- The control circuit of the evaluator is not intrinsically safe!
- If an intrinsically safe control circuit is required, provide an appropriate isolating switch amplifier between evaluator and initiator!

Terminal assignment: Isolating switch amplifier

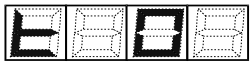
Terminal No.	Description
1+	NAMUR input 1, L+
2+	Do not connect!
3-	NAMUR input 1, L-
4+	NAMUR input 2, L+
5+	Do not connect!
6-	NAMUR input 2, L-
7	Output 1 +
8	Output 1/2 -
9	Output 2 +
14+	Supply voltage, 230 V AC, L1
15-	Supply voltage, N

Table 8

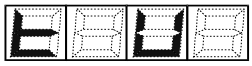
7 Display and Setting of Evaluator

7.1 Display - evaluator

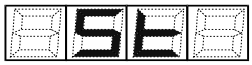
Operating mode:



- Temperature OK
- normal operating mode



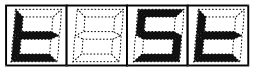
- Excess temperature
- Speed of switching element < 60 rpm



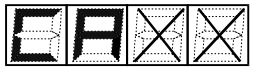
- Start-up bypass active
- No temperature monitoring!

Fig. 9

Setting mode:



- Setting of start-up bypass time



- Number of software version

Fig. 10

7.2 Setting - evaluator

- If required, set the start-up bypass time; setting at the factory: **10 s**! The pushbuttons on the front are used to set the time (see schematic sketch below).

WARNING

Risk of personal injuries and damage to property
During the start-up bypass time, an excess temperature of the turbo coupling is **not** recorded!

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

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 should have clearly exceeded **60 rpm**!
- Factory setting of the start-up bypass time: **10 s**.

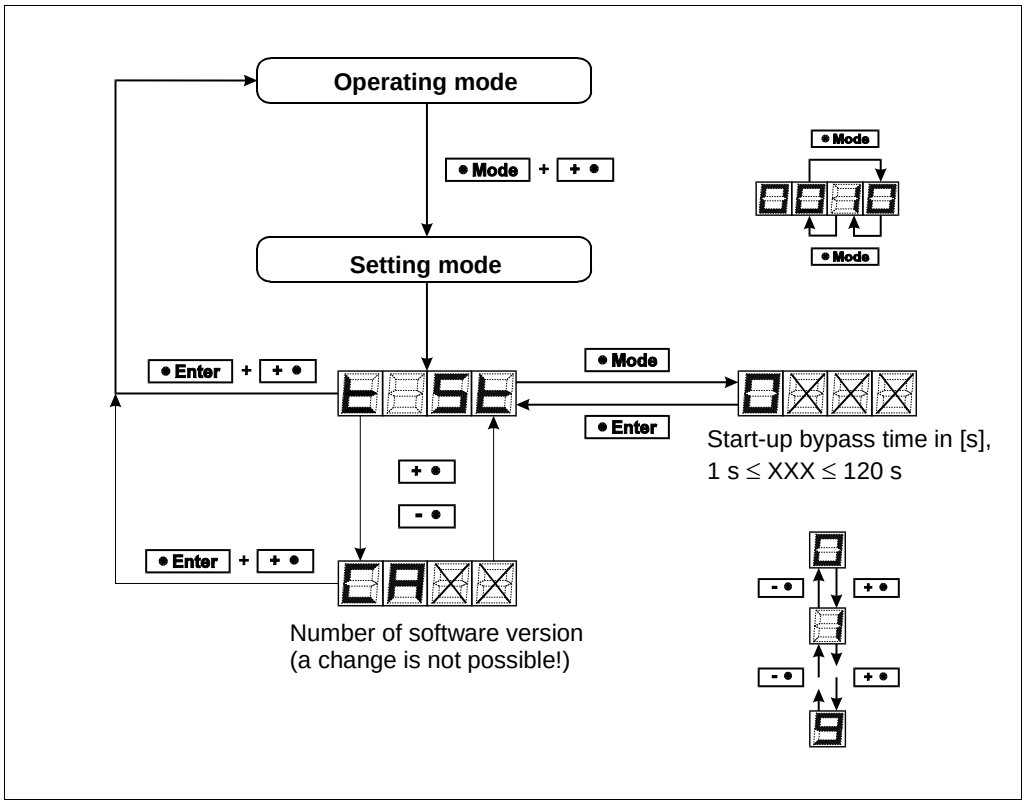


Fig. 11

Installation and Operating Manual / Version 10 / 3626-011500
en / Protection Class 0: public / 2017-12-15

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. While the start-up by pass is active, the device displays  .
  The output relay is energized and the front LED lights up.
- After the start-up bypass time, the device displays  .
  The output relay is de-energized and the front LED extinguishes.
- If necessary, set the start-up bypass time according to → Chapter 7.2.
- In case of external triggering, remove the bridge that was fixed at the factory between terminals 2 and 3 on the evaluator.
- Start the BTS 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 **60 rpm**. The evaluator will display  if there is no excessive temperature. The output relay remains energized and the front LED lights up.
- Switch off the drive with the turbo coupling, leave the BTS in the mode ready for operation. If the speed of the turbo coupling with switching element drops below **60 rpm**, the evaluator displays  . The output relay is de-energized and the front LED extinguishes.
- Normal operation can start now. In case of malfunctions, → Chapter 10.

9 Maintenance, Servicing

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

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

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

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

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

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

⚠ WARNING

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

Qualification
→ Chapter 5.8

- Skilled and authorized persons only are allowed to carry out maintenance and repair work! Qualification is ensured by performing training and giving instructions on the turbo coupling.
- Possible consequences of improper servicing and maintenance could be death, serious or minor injuries, damage to property and harm to the environment.

- Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
- For all work performed on the turbo coupling ensure that both the drive motor and the driven machine have stopped running and that a re-start is absolutely impossible!
- Components may only be replaced by original spare parts.

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 1000 operating hours every 6 months at the latest	Inspect the machine for irregularities (visual inspection, dust deposits).
6 months after commissioning, at the latest, then every 2 years	Check the electrical system for sound condition (detailed inspection).
In case of impurities	Cleaning (→ Chapter 9.1).

Table 9

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

Report samples → Operating manual of turbo coupling

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

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

Table 10

WARNING

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

9.1 Outside cleaning

NOTICE

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

- Clean the BTS with a grease solvent, 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
Dispose of the BTS according to the local regulations.

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

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

Table 11

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

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!

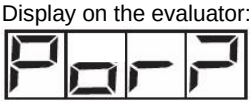
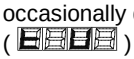
WARNING

Explosion hazard
It is not allowed to modify anything on apparatus/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
Display of the evaluator does not work.	No supply voltage is applied to the evaluator.	Apply supply voltage.	Chapter 6.4
	The evaluator is defective.	Replace the evaluator.	
Triggering of the start-up bypass by applying supply voltage does not work.	The bridge between terminals 3 and 2 of the evaluator was removed.	Insert the bridge.	Chapter 6.4
Triggering of the start-up by-pass by means of an external signal does not work.	The bridge between terminals 3 and 2 of the evaluator was not removed.	Remove the bridge.	Chapter 6.4
	The external triggering signal was too short.	The triggering signal should at least be applied during the start-up bypass time.	

Malfunction	Possible cause(s)	Remedial action	See
Display on the evaluator:  Display appears again after switching OFF and ON.	Electronic error.	Switch OFF and ON the supply voltage.	
	Defective evaluator.	Replace the evaluator.	
After the start-up bypass time, excessive temperature () is always displayed although there is no excessive temperature.	A too short start-up bypass time was selected.	After the start-up bypass time, the speed of the turbo coupling with switching element should have clearly exceeded 60 rpm. Increase the start-up bypass time accordingly.	
	The initiator poles are reversed.	Check the initiator connection.	Chapter 6.4
	The distance between initiator head and switching element is too large.	Set the distance to 4 ± 1 mm.	Chapter 6.4
	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.	
After the start-up bypass time, excessive temperature is occasionally displayed () although there is no excessive temperature.	The distance between the initiator head and the switching element is too large.	Set the distance to 4 ± 1 mm.	Chapter 6.4
	The bracket for the initiator is not sufficiently stable. Vibrations may cause false signals.	Ensure that the bracket is of sufficient stability.	Chapter 6.4
While the start-up bypass is active, operating fluid is leaking through the fusible plugs.	A too long 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.	

Malfunction	Possible cause(s)	Remedial action	See
After the start-up by-pass time, operating fluid is leaking through the fusible plugs, the BTS 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 9 and 8).	Clear deviation from the setpoints: - no-load voltage 8.2 V DC - short-circuit current 6.5 mA	Defective evaluator.
Connect the initiator to the evaluator. Measure the current consumption of the initiator which is not attenuated.	Current consumption > 6.0 mA or < 2.1 mA	Defective initiator.
Connect the initiator to the evaluator. Measure the current consumption of the initiator which is attenuated. **Note:** The initiator can, for example, be attenuated with a metal plate which is held directly in front of the initiator head.	Current consumption > 1.2 mA or < 0.1 mA	Defective initiator.
Attenuate the initiator, after proper installation, with the switching element, with the turbo coupling not being overheated.	Current consumption > 1.2 mA and < 6.0 mA	Defective switching element.

Table 13

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

For

- queries
- ordering a field service representative
- spare parts orders
- commissionings

we need:

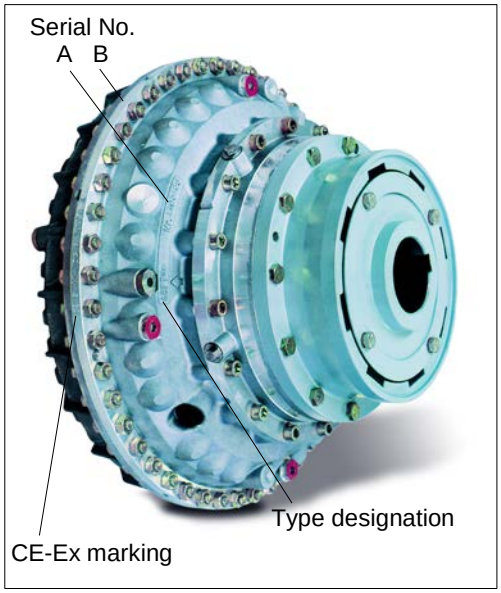


Fig. 12

the **Serial No.** and **type designation** of the turbo coupling on which the BTS 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.

When placing a **spare parts order**, we need, in addition,
- the destination for the spare parts shipment.

Please contact the local Voith representative
(outside business hours: the emergency hotline).

Representatives
→ Chapter 15.7

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 switching elements					Sealing ring
Use for turbo coupling size	**Dimension of thread**	**Nominal response temperature**	**Type of switching element**	**Material No.**	**Material No.**
206 - 274	M12x1.5	125 °C	12-50-125	TCR.10498440	TCR.03658012
366 - 650	M18x1.5	85 °C	18-60-085	TCR.10672470	TCR.03658018
		90 °C	18-60-090	TCR.10642650	
		110 °C	18-60-110	TCR.10642630	
		125 °C	18-60-125	TCR.10499540	
		140 °C	18-60-140	TCR.10499550	
		160 °C	18-60-160	TCR.10499560	
		180 °C	18-60-180	TCR.10499570	
750 - 1330	M24x1.5	85 °C	24-75-085	TCR.11973940	TCR.03658024
		125 °C	24-75-125	TCR.10488230	
		140 °C	24-75-140	TCR.10653470	
		160 °C	24-75-160	TCR.10633550	
		180 °C	24-75-180	TCR.10488220	

Table 14

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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
Mounting flange BF22	TCR.03668170

Table 15

13.3 Evaluator

Type of evaluator	Material No.
KFU8-DW-1.D-Y209869	201.01630810

Table 16

13.4 Isolating switch amplifier

Type of isolating switch amplifier	Material No.
KFA6 – SOT2 / Ex2	TCR.11952640
KFD2 – SOT2 / Ex2	TCR.11975630

Table 17

14 Index

S

T

U

W

15 Annex

15.1 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	Ex II 2G Ex ia IIC T6…T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ex 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 dismounting 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.
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.

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.

0102

Model Number

NJ10-22-N-E93-Y106925

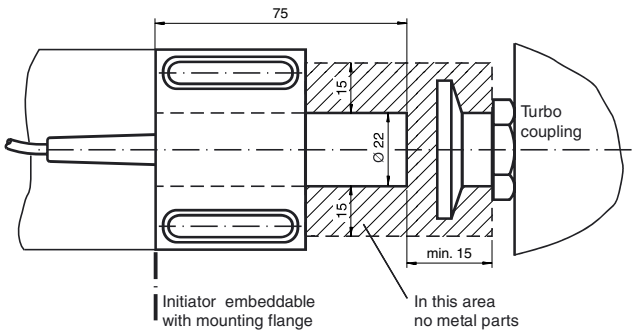
Features

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

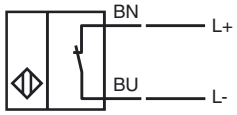
Technical Data

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		≥ 3 mA
Measuring plate detected		≤ 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 mm²
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



Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116696_eng.xml

Equipment protection level Gb

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 2G		for use in hazardous areas with gas, vapour and mist
EC-Type Examination Certificate		PTB 00 ATEX 2048 X
CE marking		CE 0102
ATEX marking		II 2G Ex ia IIC T6…T1 Gb
Standards		EN 60079-0:2012, EN 60079-11:2012 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N...
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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.
Maximum permissible ambient temperature T_{amb}		The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116696_eng.xml

Equipment protection level Da

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 1D		for use in hazardous areas with combustible dust
EC-Type Examination Certificate		ZELM 03 ATEX 0128 X
CE marking		CE 0102
ATEX marking		II 1D Ex iaD 20 T 85 °C (185 °F)
Standards		IEC 61241-11:2002: draft; prEN61241-0:2002 type of protection intrinsic safety "iD" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N-E93-Y106925
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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!
Maximum housing surface temperature		The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116696_eng.xml

EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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

PEPPERL+FUCHS

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*

CE 0102

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
Ex II 2 G	PTB 00 ATEX 2048 X	0102
Ex 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.

15.2 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	Ex II 2G Ex ia IIC T6…T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ex 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 dismounting 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.
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.

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.

0102

Model Number

NJ10-22-N-E93-Y30627

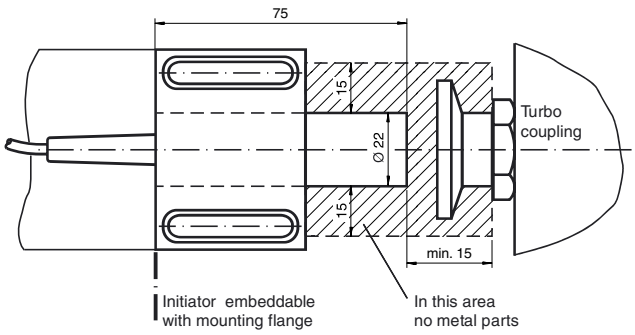
Features

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

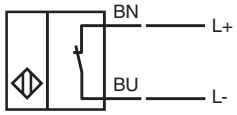
Technical Data

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		≥ 3 mA
Measuring plate detected		≤ 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^2
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



Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116697_eng.xml

Equipment protection level Gb

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 2G		for use in hazardous areas with gas, vapour and mist
EC-Type Examination Certificate		PTB 00 ATEX 2048 X
CE marking		CE 0102
ATEX marking		II 2G Ex ia IIC T6…T1 Gb
Standards		EN 60079-0:2012, EN 60079-11:2012 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N...
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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.
Maximum permissible ambient temperature T_{amb}		The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116697_eng.xml

Equipment protection level Da

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 1D		for use in hazardous areas with combustible dust
EC-Type Examination Certificate		ZELM 03 ATEX 0128 X
CE marking		CE 0102
ATEX marking		II 1D Ex iaD 20 T 108 °C (226.4 °F)
Standards		IEC 61241-11:2002: draft; prEN61241-0:2002 type of protection intrinsic safety "iD" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N...
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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!
Maximum housing surface temperature		The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Special conditions		
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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116697_eng.xml

EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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

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

PEPPERL+FUCHS

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*

CE 0102

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
Ex II 2 G	PTB 00 ATEX 2048 X	0102
Ex 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.

15.3 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	Ex II 2G Ex ia IIC T6…T1 Gb
ATEX 1D	ZELM 03 ATEX 0128 X	Ex 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 dismounting 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.
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.

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.

0102

Model Number

NJ10-22-N-E93-Y30629

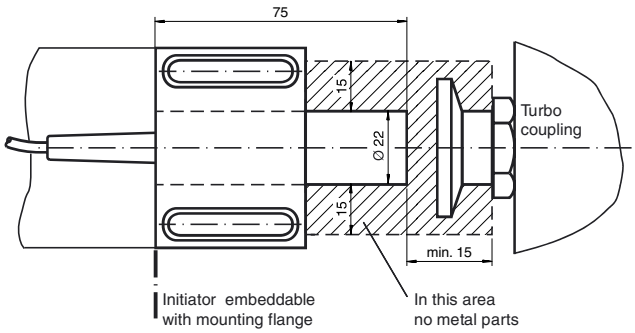
Features

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

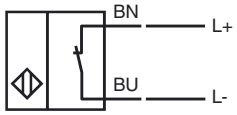
Technical Data

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		≥ 3 mA
Measuring plate detected		≤ 1 mA
Functional safety related parameters		
$MTTF_d$		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^2
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



Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116698_eng.xml

Equipment protection level Gb

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 2G		for use in hazardous areas with gas, vapour and mist
EC-Type Examination Certificate		PTB 00 ATEX 2048 X
CE marking		CE 0102
ATEX marking		II 2G Ex ia IIC T6…T1 Gb
Standards		EN 60079-0:2012, EN 60079-11:2012 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N...
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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.
Maximum permissible ambient temperature T_{amb}		The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116698_eng.xml

Equipment protection level Da

Instruction		**Manual electrical apparatus for hazardous areas**
Device category 1D		for use in hazardous areas with combustible dust
EC-Type Examination Certificate		ZELM 03 ATEX 0128 X
CE marking		CE 0102
ATEX marking		II 1D Ex iaD 20 T 85 °C (185 °F)
Standards		IEC 61241-11:2002: draft; prEN61241-0:2002 type of protection intrinsic safety "iD" Use is restricted to the following stated conditions
Appropriate type		NJ 10-22-N-E93-Y30629
Effective internal inductivity	C_i	≤ 130 nF ; a cable length of 10 m is considered.
Effective internal inductance	L_i	≤ 100 µH ; a cable length of 10 m is considered.
General		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!
Maximum housing surface temperature		The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.
Installation, commissioning		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.
Maintenance		No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Special conditions

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.

Release date: 2016-11-08 17:36 Date of issue: 2016-11-08 116698_eng.xml

EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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

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

PEPPERL+FUCHS

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*

CE 0102

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
Ex II 2 G	PTB 00 ATEX 2048 X	0102
Ex 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.

15.4 Evaluator KFU8-DW-1.D-Y209869

Technical Data	Pepperl+Fuchs
Declaration of Conformity	Pepperl+Fuchs

Model Number

KFU8-DW-1.D-Y209869

Evaluation unit

Features

- Rotational speed monitoring up to 10 kHz
- 1 pre-select value with relay output and LED indicator
- Multi-range power pack
- NAMUR sensors connectable
- Adjustable start-up override
- Menu driven operation via 4 front keys
- Period measurement

Technical data

General specifications		
Pre-selection		single
Functional safety related parameters		
$MTTF_d$		100 a
Supply		
Rated voltage	U_r	200 ... 230 V AC ; 100 … 130 V AC; 50 Hz 20 VDC ... 30 VDC
Fusing		external fusing 4 A
Power consumption		AC: < 5 VA DC: < 5 W
Indicators/operating means		
Type		7-segment LED display, red
Number of digits		4
Display value		digit height 7 mm, in Hz or 1/min
LED yellow		switching state
Accuracy		± 1 digit
Input		
Control input		NAMUR: 1,2 mA ≤ x ≤ 2,1 mA (terminal 8, 9), max. 8.2 V and 6.5 mA, impedance 1.2 kOhm
Trigger input		12 V (terminal 2), max. 30 V, impedance 2.8 kOhm
Pulse duration		20 µs
Input 1		
Switching point		1.2 ... 2.1 mA Switching hysteresis approx. 0.2 mA
Input frequency		0.002 ... 10000 Hz, pulse length/duration: ≥ 20µs
Impedance		1.2 kΩ
Input 3		
Start-up override		Triggering by external signal 16 ... 30 V or Place jumper between terminals 2/3 or by switching on supply voltage (terminal 2 and terminal 3 permanently bridged)
Jumpering time		1 ... 9999 s (External trigger signal)
Output		
Relay		1 changeover contact
Sensor supply		24 V DC ± 10 %, 30 mA , short-circuit protected
Contact loading		250 V AC/2 A/ cos ϕ ≥ 0.7 40 V DC/2 A
Delay times		
Time delay before availability		≤ 400 ms
Start-up override		1 ... 9999 s
Relay		≤ 20 ms
Transfer characteristics		
Measuring error		0 ... 10 kHz: ≤ ±0.1% Display: ±1 digit
Standard conformity		
Electromagnetic compatibility		acc. to EN 50081-2 / EN 50082-2
Ambient conditions		
Ambient temperature		-25 ... 40 °C (-13 ... 104 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		max. 80 %, not condensing
Altitude		0 ... 2000 m
Operating conditions		The device has only to be used in an indoor area.
Mechanical specifications		
Connection assembly		**Caution:** Please be aware that the device may only be connected to a switchable power supply. The switch or circuit breaker must be easy to reach and identified as the separator for the device.
Degree of protection		IP20
Connection		coded, removable terminals , max. core cross-section 0.34 ... 2.5 mm^2
Construction type		modular terminal housing in Makrolon, System KF For use in the switch cabinet/switch cabinet module
Mounting		snap-on to 35 mm standard rail or screw fixing
Life span		30 x 10^6 switching cycles

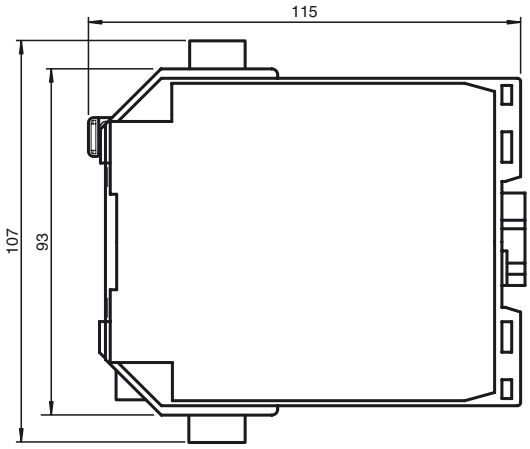
Release date: 2016-11-25 08:28 Date of issue: 2016-12-05 209869_eng.xml

Function

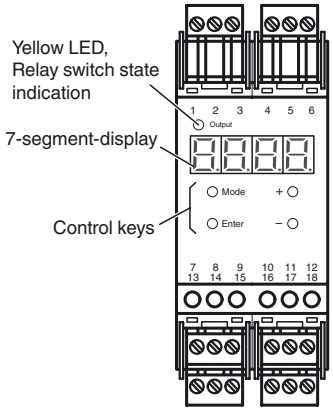
The KFU8-DW-1.D Speed Monitor is a device used to indicate and monitor periodic signals (frequencies and rotational speeds) which occur in almost all areas of automation and process engineering.
The input signals are evaluated in accordance with the cycle method. That is, by measuring the duration of a period and then converting it with a very fast micro controller to a frequency or rotational speed.
The Speed Monitor can be supplied with 115 V AC, 230 V AC or by a 24 V DC supply and when connected to an alternating voltage it provides a 24 V DC source to supply the signal sensor.

Release date: 2016-11-25 08:28 Date of issue: 2016-12-05 209869_eng.xml

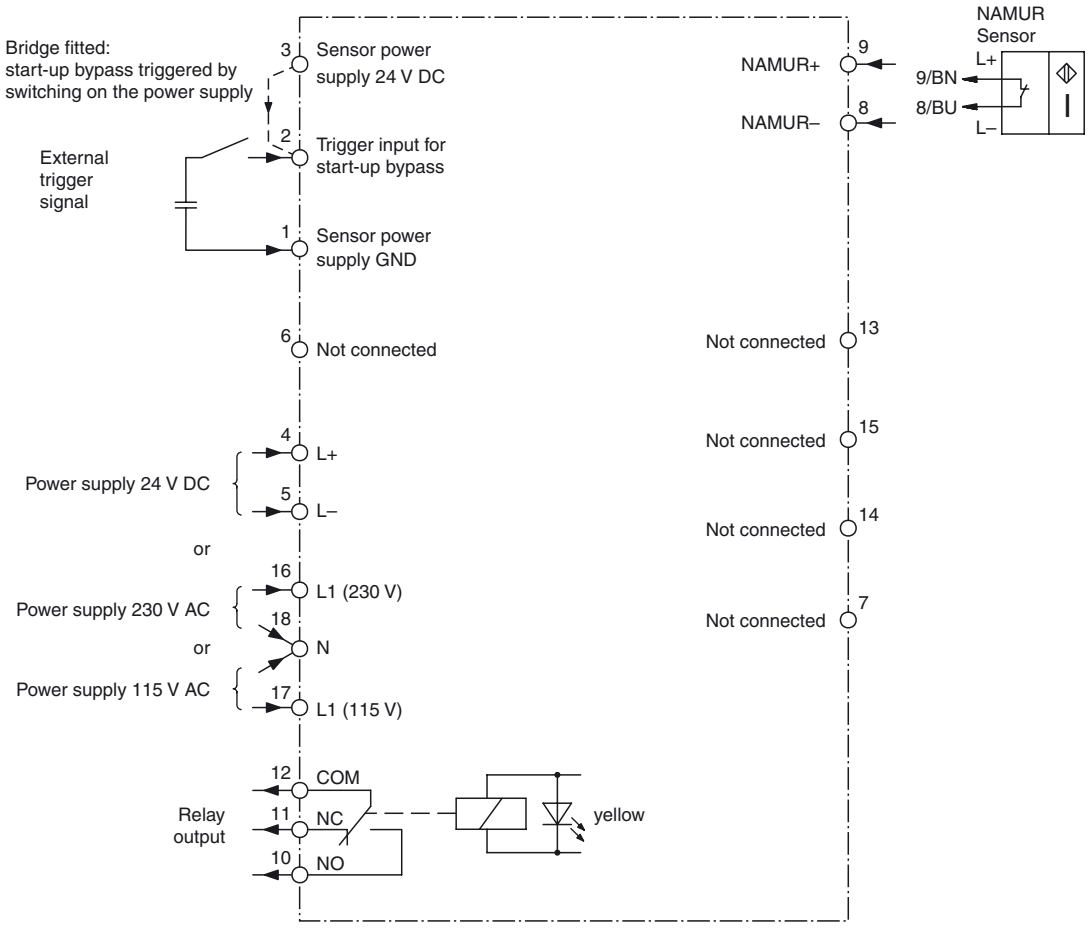
Dimensions



Indicators/operating means



Electrical connection



Release date: 2016-11-25 08:28 Date of issue: 2016-12-05 209869_eng.xml

EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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

No. / *Nr.*: DOC-1838A
Date / *Datum*: 2016-12-01

PEPPERL+FUCHS

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*
KFU8-FSSP-1.D	181191	Frequency voltage current converter
KFU8-FSSP-1.D-Y180599	180599	Frequency voltage current converter
KFU8-DW-1.D	190149	Overspeed/underspeed Monitor
KFU8-DW-1.D-Y209869	209869	Overspeed/underspeed Monitor

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	**Standards** *Normen*
2014/30/EU (EMC) (L96/79-106)	EN 61326-1:2013
2014/35/EU (LV) (L96/357-374)	EN 61010-1:2010

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE

Signatures / *Unterschriften*

Mannheim, 2016-12-01

ppa. Dr. Thomas Sebastiany
Director Business Unit SYSTEMS

i.V. Erwin Schmidt
Product Manager

15.5 Isolating switch amplifier KFD2-SOT2-Ex2

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

Instruction Manual

Marking

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

table 1

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

Pepperl+Fuchs GmbH Lilienthalstrasse 200, 68307 Mannheim, Germany

table 2

Target Group, Personnel

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

Reference to Further Documentation

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

Intended Use

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

Improper Use

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

Mounting and Installation

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

Requirements for Cables and Connection Lines

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

Requirements for Usage as Associated Apparatus

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

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

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

Requirements for Equipment Protection Level Gc

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

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

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

Operation, Maintenance, Repair

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

Requirements for Equipment Protection Level Gc

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

Delivery, Transport, Disposal

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

Features

- 2-channel isolated barrier
- 24 V DC supply (Power Rail)
- Dry contact or NAMUR inputs
- Passive transistor output, non-polarized
- Line fault detection (LFD)
- Reversible mode of operation
- Up to SIL 2 acc. to IEC 61508

Function

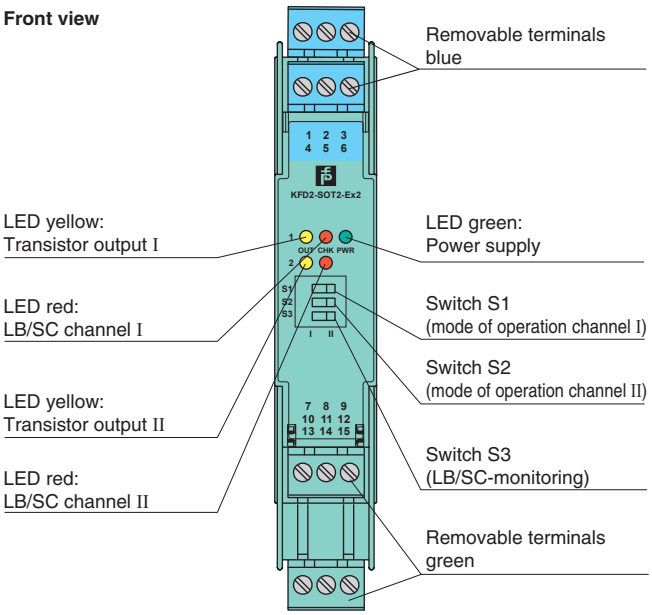
This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

Each proximity sensor or switch controls a passive transistor output for the safe area load. The normal output state can be reversed using switch S1 for channel I and switch S2 for channel II. Switch S3 enables or disables line fault detection of the field circuit.

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

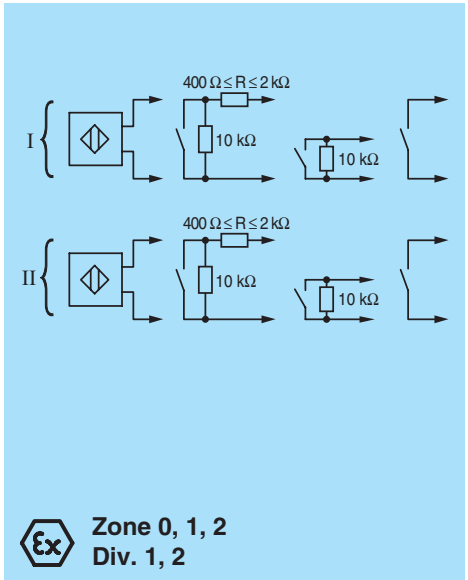
A unique collective error messaging feature is available when used with the Power Rail system.

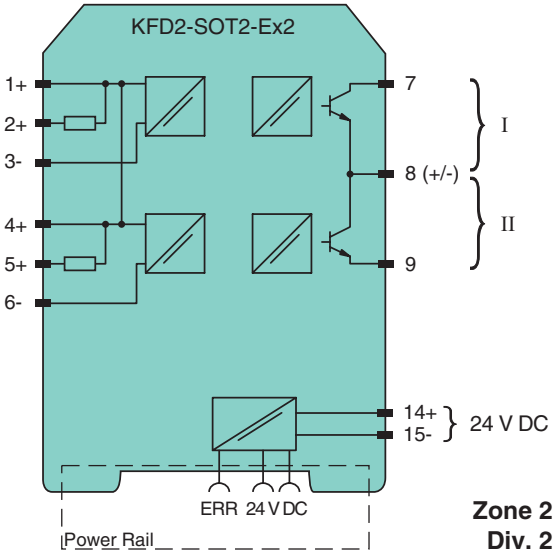
Assembly



CE Ex SIL 2

Connection





Release date 2016-05-15 23:28 Date of issue 2016-05-16 181005_eng.xml

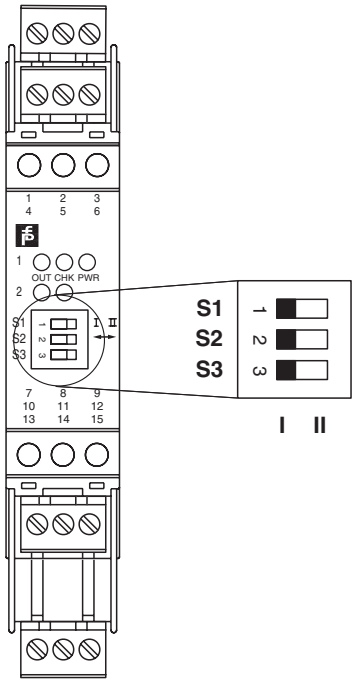
General specifications		
Signal type		Digital Input
Supply		
Connection		Power Rail or terminals 14+, 15-
Rated voltage	U_n	20 ... 30 V DC
Ripple		≤ 10 %
Rated current	I_n	≤ 50 mA
Input		
Connection		terminals 1+, 2+, 3-; 4+, 5+, 6-
Rated values		acc. to EN 60947-5-6 (NAMUR), see system description for electrical data
Open circuit voltage/short-circuit current		approx. 8 V DC / approx. 8 mA
Switching point/switching hysteresis		1.2 ... 2.1 mA / approx. 0.2 mA
Line fault detection		breakage I ≤ 0.1 mA , short-circuit I > 6 mA
Output		
Connection		output I: terminals 7, 8 ; output II: terminals 8, 9
Switching voltage		≤ 30 V
Switching current		≤ 100 mA , short-circuit protected
Signal level		1-signal: switching voltage - 2.5 V max. at 10 mA switching current or 3 V max. at 100 mA switching current 0-signal: switched off (off-state current ≤ 10 µA)
Output I, II		signal ; electronic output, passive
Collective error message		Power Rail
Transfer characteristics		
Switching frequency		≤ 5 kHz
Electrical isolation		
Input/Output		reinforced insulation acc. to IEC 62103, rated insulation voltage 300 V_{rms}
Input/power supply		reinforced insulation acc. to IEC 62103, rated insulation voltage 300 V_{rms}
Output/power supply		basic insulation according to IEC 62103, rated insulation voltage 50 V_{eff}
Input/input		not available
Output/Output		not available
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Conformity		
Electrical isolation		IEC 62103:2003
Electromagnetic compatibility		NE 21:2004
Degree of protection		IEC 60529:2001
Input		EN 60947-5-6:2000
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
Degree of protection		IP20
Mass		approx. 150 g
Dimensions		20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in) , housing type B2
Mounting		on 35 mm DIN mounting rail acc. to EN 60715:2001
Data for application in connection with Ex-areas		
EC-Type Examination Certificate		PTB 00 ATEX 2035
Group, category, type of protection		⟨Ex⟩ II (1) G [Ex ia] IIC ⟨Ex⟩ II (1) D [Ex ia] IIIC
Input		Ex ia IIC, Ex ia IIIC
Voltage	U_o	10.5 V
Current	I_o	13 mA
Power	P_o	34 mW (linear characteristic)
Supply		
Maximum safe voltage	U_m	40 V DC (Attention! The rated voltage can be lower.)
Output		
Maximum safe voltage	U_m	40 V DC (Attention! The rated voltage can be lower.)
EC-Type Examination Certificate		DMT 01 ATEX E 133
Group, category, type of protection		⟨Ex⟩ I (M1) [Ex ia] I
Statement of conformity		TÜV 99 ATEX 1499 X
Group, category, type of protection, temperature class		⟨Ex⟩ II 3G Ex nA II T4
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

Release date 2016-05-15 23:28 Date of issue 2016-05-16 181005_eng.xml

Directive conformity	
Directive 2014/34/EU	EN 60079-0:2012+A11:2013 , EN 60079-11:2012 , EN 60079-15:2010 , EN 50303:2000
International approvals	
FM approval	
Control drawing	116-0035
CSA approval	
Control drawing	116-0047
IECEx approval	IECEx PTB 05.0011
Approved for	[Ex ia] IIC , [Ex ia] I , [Ex ia] IIIC
General information	
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 www.pepperl-fuchs.com.

Release date 2016-05-15 23:28 Date of issue 2016-05-16 181005_eng.xml

Configuration



Switch position

S	Function		Position
1	Mode of operation Output I active	with high input current	I
		with low input current	II
2	Mode of operation Output II active	with high input current	I
		with low input current	II
3	Line fault detection	ON	I
		OFF	II

Operating status

Control circuit	Input signal
Initiator high impedance/ contact opened	low input current
Initiator low impedance/ contact closed	high input current
Lead breakage, lead short-circuit	Line fault

Factory settings: switch 1, 2 and 3 in position I

Accessories

Power feed module KFD2-EB2

The power feed module is used to supply the devices with 24 V DC via the Power Rail. The fuse-protected power feed module can supply up to 150 individual devices depending on the power consumption of the devices. Collective error messages received from the Power Rail activate a galvanically-isolated mechanical contact.

Power Rail UPR-03

The Power Rail UPR-03 is a complete unit consisting of the electrical insert and an aluminium profile rail 35 mm x 15 mm. To make electrical contact, the devices are simply engaged.

Profile Rail K-DUCT with Power Rail

The profile rail K-DUCT is an aluminum profile rail with Power Rail insert and two integral cable ducts for system and field cables. Due to this assembly no additional cable guides are necessary.

Power Rail and Profile Rail must not be fed via the device terminals of the individual devices!

Release date 2016-05-15 23:28 Date of issue 2016-05-16 181005_eng.xml

EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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Fax +49 621 776-1000

No. / *Nr.*: DOC-0030B
Date / *Datum*: 2016-04-06

PEPPERL+FUCHS

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-SOT2-Ex1.LB	181002	Switch Amplifier
KFD2-SOT2-Ex1.LB.IO	181004	Switch Amplifier
KFD2-SOT2-Ex1.N	195092	Switch Amplifier
KFD2-SOT2-Ex1.R1	238071	Switch Amplifier
KFD2-SOT2-Ex2	181005	Switch Amplifier
KFD2-SOT2-Ex2.IO	181007	Switch Amplifier
KFD2-SOT2-Ex2.IO-Y181008	181008	Switch Amplifier
KFD2-ST2-Ex1.LB	180997	Switch Amplifier
KFD2-ST2-Ex2	181000	Switch Amplifier

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	Standards *Normen*
2004/108/EC (EMC) valid until 2016-04-19 (L390/24-37) **2014/30/EU (EMC)** valid from 2016-04-20 (L96/79-106)	EN 61326-1:2013 (industrial locations)
94/9/EC (ATEX) valid until 2016-04-19 (L100/1-29) **2014/34/EU (ATEX)** valid from 2016-04-20 (L96/309-356)	EN 60079-0:2012+A11:2013 EN 60079-11:2012 EN 60079-15:2010 EN 50303:2000

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2016-04-06

ppa. Michael Kessler
Vice President Business Unit
Components and Technology

i.V. Friedrich Füß
Product Portfolio Manager
Product Group Interface

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 Certificate PTB 00 ATEX 2035 was performed in accordance with the following standards:
Die EG-Baumusterprüfbescheinigung PTB 00 ATEX 2035 wurde nach den folgenden Normen durchgeführt:
EN 60079-0:2009
EN 60079-11:2007
EN 61241-11:2006

The EC-Type-Examination Certificate DMT 01 ATEX E 133 was performed in accordance with the following standards:
Die EG-Baumusterprüfbescheinigung DMT 01 ATEX E 133 wurde nach den folgenden Normen durchgeführt:
EN 60079-0:2009
EN 60079-11:2007
EN 50303:2000

The Type-Examination TÜV 99 ATEX 1499 X and the marking as category 3 G equipment was performed in accordance with the following standards:
Die Baumusterprüfung TÜV 99 ATEX 1499 X und die Kennzeichnung als Kategorie 3 G Betriebsmittel wurden nach den folgenden Normen durchgeführt:
EN 60079-0:2006
EN 60079-15:2005

Marking and Certificates / *Kennzeichnung und Zertifikate*

Products / *Produkte*	**KFD2-SOT2-Ex1.LB KFD2-SOT2-Ex1.LB.IO KFD2-SOT2-Ex2 KFD2-SOT2-Ex2.IO KFD2-SOT2-Ex2.IO-Y181008**	
Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller* ID
Ex II (1) G Ex II (1) D	PTB 00 ATEX 2035	0102
Ex I (M1)	DMT 01 ATEX E 133	0158
Ex II 3 G	TÜV 99 ATEX 1499 X	TÜV

Products / *Produkte*	**KFD2-SOT2-Ex1.N KFD2-SOT2-Ex1.R1**	
Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller* ID
Ⓔx II (1) G Ⓔx II (1) D	PTB 00 ATEX 2035	0102
Ⓔx I (M1)	DMT 01 ATEX E 133	0158
Ⓔx II 3 G	PF11CERT1046X	PF

Products / *Produkte*	**KFD2-ST2-Ex1.LB KFD2-ST2-Ex2**	
Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller* ID
Ⓔx II (1) G Ⓔx II (1) D	PTB 00 ATEX 2035	0102
Ⓔx II 3 G	TÜV 99 ATEX 1499 X	TÜV

Key for Issuer ID / *Schlüssel zur Aussteller ID*

ID	**Issuer / *Aussteller***
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany
0158	DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany
TÜV	TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen Germany
PF	Pepperl + Fuchs GmbH Lilienthalstraße 200 68307 Mannheim Germany

15.6 Isolating switch amplifier KFA6-SOT2-Ex2

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

Instruction Manual

Marking

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

table 1

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

Pepperl+Fuchs GmbH Lilienthalstrasse 200, 68307 Mannheim, Germany

table 2

Target Group, Personnel

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

Reference to Further Documentation

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

Intended Use

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

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.
The device must be installed outside of the hazardous area.
The device fulfills a degree of protection IP20 according to IEC/EN 60529.
The device must be installed and operated only in an environment that ensures a pollution degree 2 (or better) according to IEC/EN 60664-1.
If used in areas with higher pollution degree, the device needs to be protected accordingly.
All circuits connected to the device must comply with the overvoltage category II (or better) according to IEC/EN 60664-1.
Only use power supplies that provide protection against electric shock (e. g. SELV or PELV) for the connection to power feed modules.
Observe the installation instructions according to IEC/EN 60079-14.

Requirements for Cables and Connection Lines

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

1. Switch off the voltage.
2. Connect the terminal blocks or disconnect the terminal blocks.

Requirements for Usage as Associated Apparatus

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

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

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

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.

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
- 230 V AC supply
- Dry contact or NAMUR inputs
- Passive transistor output, non-polarized
- Line fault detection (LFD)
- Reversible mode of operation
- Up to SIL 2 acc. to IEC 61508

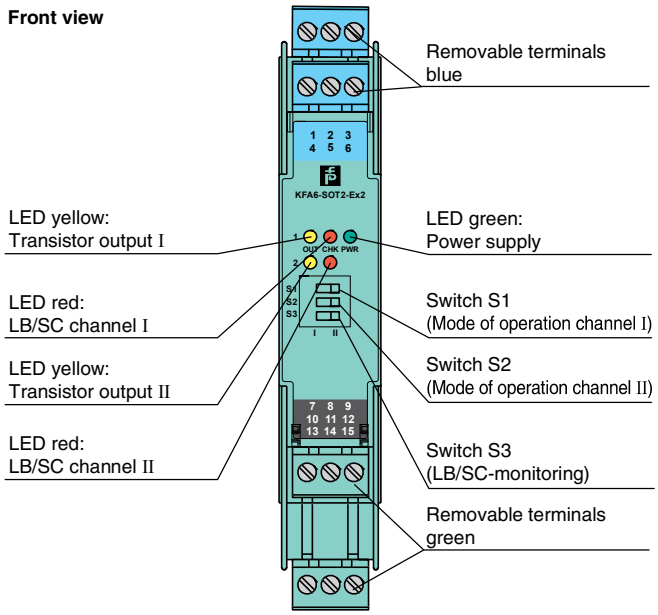
Function

This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

Each proximity sensor or switch controls a passive transistor output for the safe area load. The normal output state can be reversed using switch S1 for channel I and switch S2 for channel II. Switch S3 enables or disables line fault detection of the field circuit.

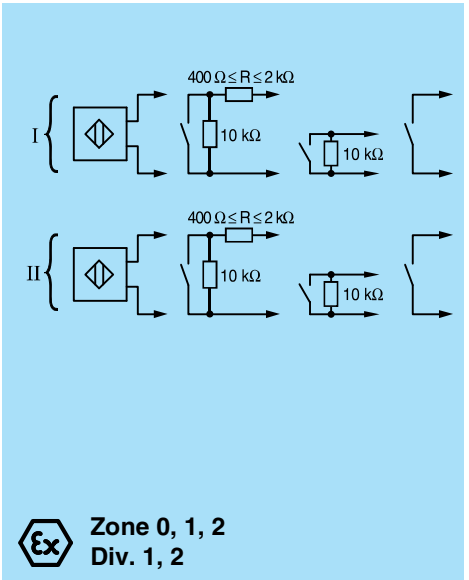
During an error condition, the transistors revert to their de-energized state and LEDs indicate the fault according to NAMUR NE44.

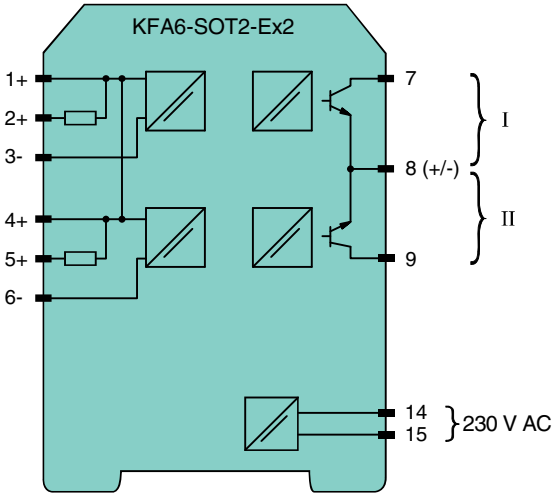
Assembly



CE Ex SIL 2

Connection





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General specifications		
Signal type		Digital Input
Supply		
Connection		terminals 14, 15
Rated voltage	U_r	207 ... 253 V AC
Power dissipation		1 W
Power consumption		≤ 1.5 W
Input		
Connection		terminals 1+, 2+, 3-; 4+, 5+, 6-
Rated values		acc. to EN 60947-5-6 (NAMUR), see system description for electrical data
Open circuit voltage/short-circuit current		approx. 8 V DC / approx. 8 mA
Switching point/switching hysteresis		1.2 ... 2.1 mA / approx. 0.2 mA
Line fault detection		breakage I ≤ 0.1 mA , short-circuit I > 6 mA
Output		
Connection		output I: terminals 7, 8 ; output II: terminals 8, 9
Switching voltage		≤ 40 V
Switching current		≤ 100 mA , short-circuit protected
Signal level		1-signal: switching voltage - 2.5 V max. at 10 mA switching current or 3 V max. at 100 mA switching current 0-signal: switched off (off-state current ≤ 10 µA)
Output I, II		signal ; electronic output, passive
Transfer characteristics		
Switching frequency		≤ 5 kHz
Galvanic isolation		
Output/power supply		reinforced insulation acc. to EN 50178, rated insulation voltage 300 V_{eff}
Output/Output		not available
Directive conformity		
Electromagnetic compatibility		
Directive 2014/30/EU		EN 61326-1:2013 (industrial locations)
Low voltage		
Directive 2014/35/EU		EN 61010-1:2010
Conformity		
Electromagnetic compatibility		NE 21
Degree of protection		IEC 60529
Protection against electrical shock		IEC 61140
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Mechanical specifications		
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
Data for application in connection with hazardous areas		
EC-Type Examination Certificate		PTB 98 ATEX 2164
Group, category, type of protection		II (1) G [Ex ia] IIC II (1) D [Ex ia] IIIC
Input		Ex ia IIC, Ex ia IIIC
Voltage	U_o	10.5 V
Current	I_o	13 mA
Power	P_o	34 mW (linear characteristic)
Supply		
Maximum safe voltage	U_m	253 V AC (Attention! U_m is no rated voltage.)
Output		
Maximum safe voltage	U_m	253 V AC (Attention! The rated voltage can be lower.)
Galvanic isolation		
Input/input		not available
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
International approvals		
UL approval		
Control drawing		116-0145
CSA approval		
Control drawing		116-0047

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General information	
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 www.pepperl-fuchs.com.

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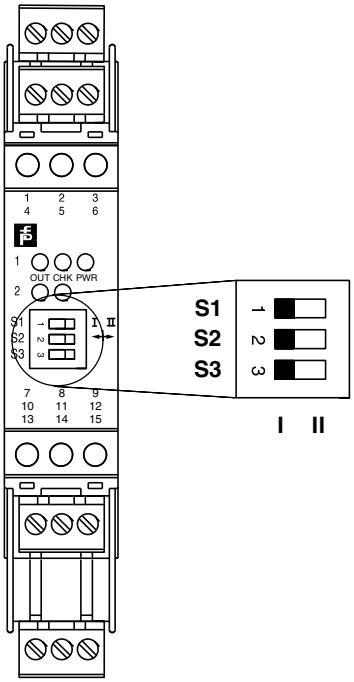
Configuration



Switch position

S	Function		Position
1	Mode of operation Output I active	with high input current	I
		with low input current	II
2	Mode of operation Output II active	with high input current	I
		with low input current	II
3	Line fault detection	ON	I
		OFF	II

Operating status

Control circuit	Input signal
Initiator high impedance/ contact opened	low input current
Initiator low impedance/ contact closed	high input current
Lead breakage, lead short-circuit	Line fault

Factory settings: switch 1, 2 and 3 in position I

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EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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No. / *Nr.*: DOC-0974
Date / *Datum*: 2016-10-24

PEPPERL+FUCHS

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*
KFA5-SOT2-EX2	233751	Switch amplifier
KFA6-SOT2-EX2	233753	Switch amplifier

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 61326-1:2013-01 (industrial locations)
LVD 2014/35/EU (L96/357-374)	EN 61010-1:2010-10

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2016-10-24

ppa. Michael Kessler
Executive Vice President Components & Technology

i.V. Friedrich Füß
Product Portfolio Manager Interface Technology

ANNEX ATEX

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

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

Marking *Kennzeichnung*	Certificate *Zertifikat*	Issuer ID *Aussteller* ID
Ex II (1) G	PTB 98 ATEX 2164	0102

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

ID	**Issuer** / ***Aussteller***
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.

15.7 List of VOITH representatives

Work Sheet ait 394.9 Voith Turbo

VOITH

Voith Turbo
Division Industry

Work Sheet ait394.9

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Division Industry

Work Sheet ait394.9

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VOITH

Voith Turbo
Division Industry

Work Sheet ait394.9

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Tunesia:
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Zambia:
see South Africa (VTZA)

Zimbabwe:
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see United Arabian Emirates (VTAE)

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Work Sheet ait394.9

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