

Installation and Operating Manual

(Translation of the original installation and operating manual)

BTS-Ex

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

Version 6, 2016-01-11

3626-019600ex en, Protection Class 0: public

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3626-019600ex en

This document describes the state of design of the product at the time of the editorial deadline on 2016-01-11.

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1 Conformity Declaration

EC Conformity Declaration as per Directive 94/9/EC (valid until April 19, 2016),
EU Conformity Declaration as per Directive 2014/34/EU (valid from April 20, 2016)

The manufacturer Voith Turbo GmbH & Co. KG,
 Voithstraße 1
 74564 Crailsheim / Germany

hereby declares that the assembly described below

designation **BTS-Ex**, comprising

1. Switching element and

12-50-85	18-60-85	24-75-85
12-50-90	18-60-90	24-75-90
12-50-100	18-60-100	24-75-100
12-50-110	18-60-110	24-75-110
12-50-125	18-60-125	24-75-125
12-50-140	18-60-140	24-75-140
12-50-160	18-60-160	24-75-160
12-50-180	18-60-180	24-75-180

2. Initiator and

NJ 10-22-N-E93-Y30629-70
NJ 10-22-N-E93-Y30627-100
NJ 10-22-N-E93-Y106925

3. Evaluator

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

Production number: see the shipping documents

Marking:   II 2GD TX

complies with the provisions of the following harmonized standards in the version valid
on the date of signature:

EN 1127-1	Explosive atmospheres, explosion protection, Part 1: Basic concepts and methodology
EN 13463-1	Non-electrical equipment for use in potentially explosive atmospheres, Part 1: Basic method and requirements
EN 13463-5	Non-electrical equipment intended for use in potentially explosive atmospheres, Part 5: Protection by constructional safety 'c'
EN 13463-6	Non-electrical equipment for use in potentially explosive atmospheres, Part 6: Protection by ignition source monitoring 'b'
EN 60079 ff	Electrical apparatus for potentially explosive atmospheres, general provisions and more
EN 61241 ff	Electrical apparatus for use in atmospheres with combustible dust, general provisions and more

as well as with the following European and national standards and technical specifications in the version valid on the date of signature:

TRBS 2153	Technical rules for industrial safety and health, avoidance of ignition hazards resulting from electrostatic charges
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The assembly may be used as safety, control, and regulating device as per Article 1 Section 2 on the turbo couplings.

Issued in	Crailsheim, Germany
On	25 November 2015
Name of the undersigned	Mr. J. Hagedorn, General Manager - Start-up Components

2 Possible Applications, BTS-Ex Characteristics

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

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

2.1 Use as safety device in potentially explosive atmospheres

The BTS-Ex can be used in potentially explosive atmospheres as safety device to limit the maximum permissible surface temperature of the turbo coupling.



WARNING

Explosion hazard

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

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



The following electrical equipment belongs to the whole system:

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

The safety devices will be installed into/fixated to a master machine. Depending on the IP protection, the time for cleaning the operating equipment (dust deposits) has to be determined.

Switching element and initiator may be used as follows:

- In Zone 2 (gas-Ex, Category 3G) in Explosion Groups IIA, IIB and IIC
- In Zone 22 (Dust-Ex, Category 3D) for dusts with a minimum ignition energy > 3mJ
- In Zone 1 (gas-Ex, Category 2 G) in Explosion Groups IIA, IIB and IIC
- In Zone 21 (Dust-Ex, Category 2D) for dusts with a minimum ignition energy > 3 mJ.

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

Qualification with regard to surface temperature depends on the ambient conditions; it applies to T4...T3: T4 means that for all gases, vapors, mists with an ignition temperature of > 135 °C, the equipment is not an ignition source.

In explosive dust atmospheres, the reference temperature T***°C (from 85 °C to 190 °C) is relevant for the further considerations with regard to safety distance to the smoldering temperature.

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

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



→ Operating manual
of turbo coupling

- Only use accessories in potentially explosive atmospheres which satisfy all requirements of European directives and national legislation.
- Use in explosive dust atmospheres is permitted for dusts with a minimum ignition energy of > 3 mJ.
- It is imperative to comply with the ambient conditions as specified in this operating manual.
- The provision of lightning protection measures have to be ensured by the operator.
- Ensure that the fusible plugs required in addition are used on each turbo coupling which is operated with this safety device.
- If the maximal permissible surface temperature of the turbo coupling is ensured by this safety device, marking of the type of protection "Protection by ignition source monitoring" 'b' must be added to the turbo coupling.
- Voith Turbo has to determine the response temperature.

- The ambient temperatures of individual elements must not exceed the respective limiting temperatures.
- Mechanical damage caused by ice formation must be reliably excluded.
- Locks need to be re-attached after opening and closing.
- Operation of the safety device is only allowed with undamaged housings and lines.
- Make sure to satisfy electromagnetic compatibility when installing the system.
- On installation, it is vital to observe the nationally applicable provisions governing installation of equipment, such as EN 60079-14 and EN 50281-1-2.
- The evaluator is designed for use in Contamination Level 2, as per DIN En 50178. Protect the switching element and initiator against the ingress of liquids and/or impurities, if required. This depends on the operating conditions, e.g. heavy dust contamination or chemically aggressive fluids.
- For temperatures below -20 °C, install the initiators with mechanical protection.
- Keep a minimum distance of > 3 mm between switching element and initiator (→ Chapter 7.3).
- The trip circuit should at least satisfy SIL1 and act directly on the motor contactor.

3 Function of BTS-Ex

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

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

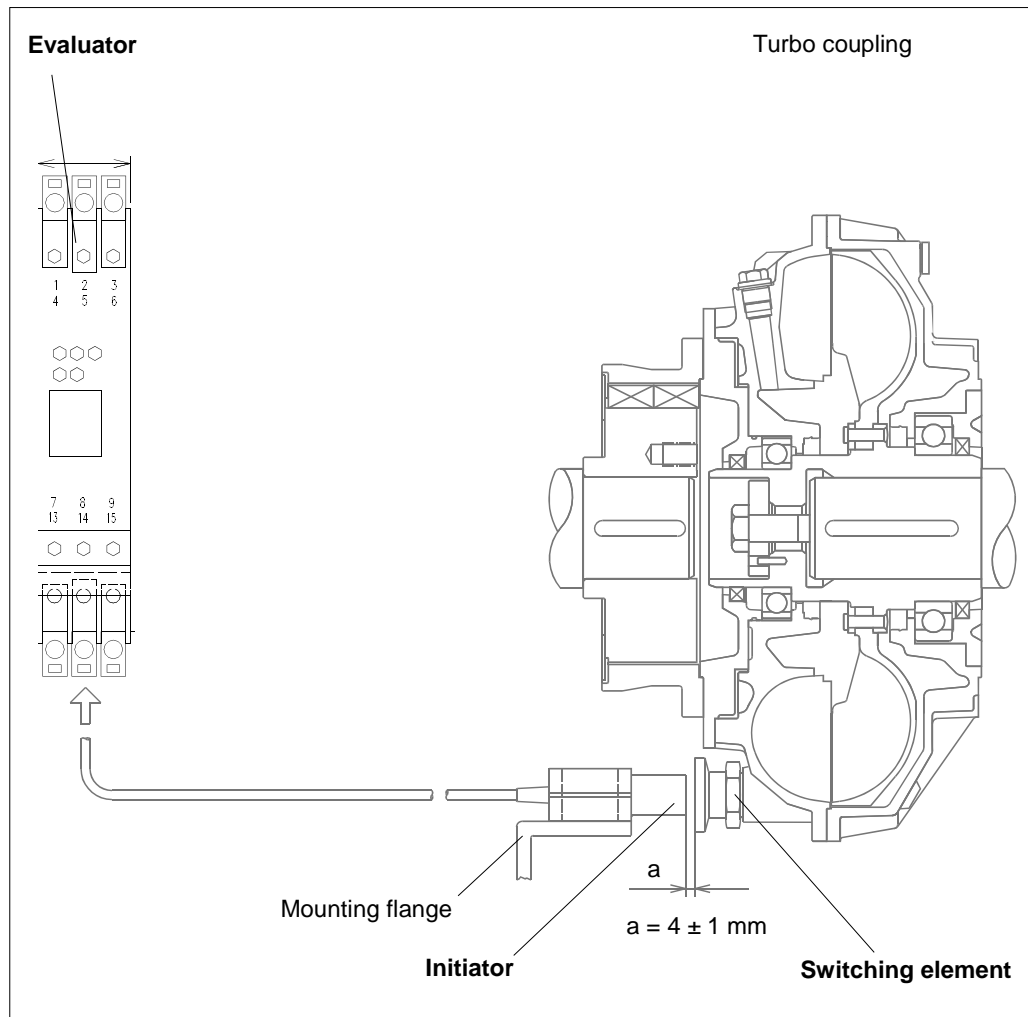


Fig. 1

3.1 Switching element

The switching element is a passive component (ordinary electrical equipment to EN 60079-14 section 12.2.1). It is inserted into the outer wheel or into the turbo coupling shell. The result is a thermal contact between the switching element and the turbo coupling with the operating fluid.

A coil and a thermostatic switch are integrated in the switching element. The switching point of the thermostatic switch corresponds to the response temperature of the switching element.

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

Nominal response temperature
→ Chapter 4.1

3.2 Initiator

The initiator has been designed as intrinsically safe, polarized two-wire sensor to DIN EN 60947-5-6 (NAMUR). 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.

3.3 Evaluator

The evaluator is an electronic unit recording the electric pulses and evaluating the period between the pulses (appropriate equipment with intrinsically safe circuit to the explosive atmosphere).

The evaluation starts by switching on the supply voltage.

After starting the evaluation, monitoring of pulses must be interrupted for an adjustable period of time (start-up bypass time).

A relay with changeover contact will be released if the number of pulses per unit of time drops below a certain value.

The evaluator is equipped with a connection for NAMUR sensors to DIN EN 60947-5-6 (NAMUR).

3.4 Interaction of BTS-Ex components

Installation, position
→ Chapter 7.3

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. Das Schaltelement kann den Oszillator im Initiator nicht mehr bedämpfen.

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 4.3,
Table 5

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-Ex ensure that both the drive motor and the driven machine have stopped running and that a re-start is absolutely impossible!

**WARNING****Explosion hazard**

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

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



Maximum permissible temperature
→ **Operating manual of turbo coupling**

4 Technical Data

4.1 Switching element

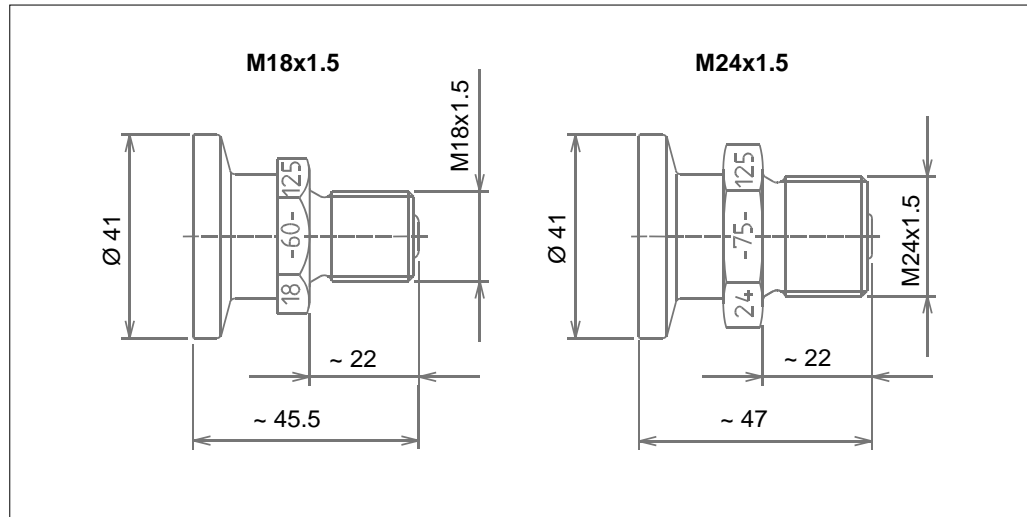


Fig. 2

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

Dimension of thread	M18x1.5	M24x1.5
Nominal response temperature	85 / 90 / 100 / 110 / 125 / 140 / 160 / 180 °C	85 / 125 / 140 / 160 / 180 °C
To suit coupling sizes ...	366 – 650	750 – 1150
Reponse tolerance	± 5 °C	
Reset temperature	approx. 40 K below the response temperature	
Width across flats	27	32
Tightening torque	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.

4.2 Initiator, mounting flange

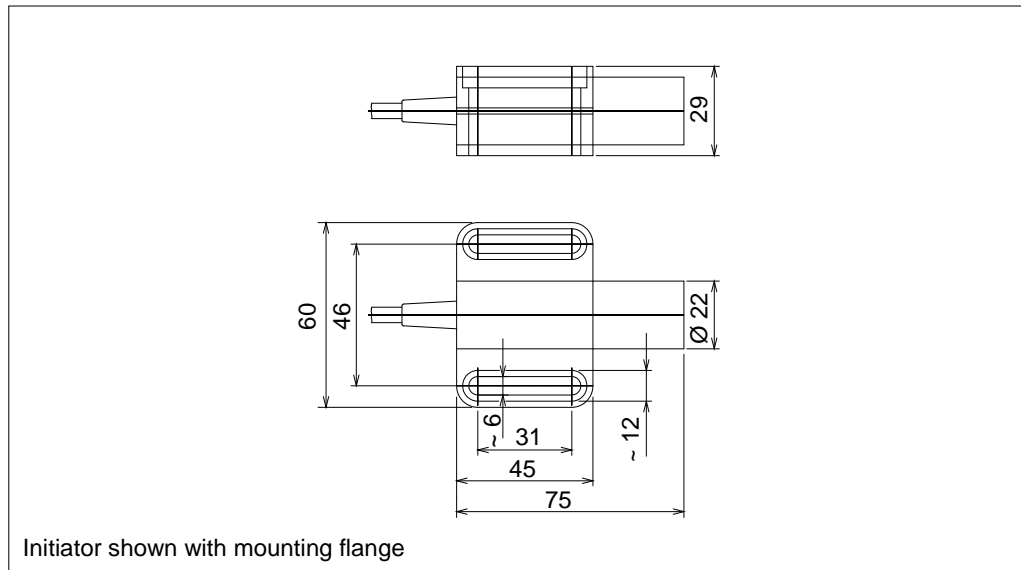


Fig. 3

Initiator type	NJ 10-22-N-E93-Y30629	NJ 10-22-N-E93-Y30627	NJ 10-22-N-E93-Y106925
Safe switching distance with Voith switching element	5 mm		
Design	to DIN EN 60947-5-6 (NAMUR)		
Operating voltage	Nominal 8.2 V DC		
Current consumption	safe attenuation: ≥ 0.1 mA / ≤ 1.2 mA		
	safe non-attenuation: ≥ 2.1 mA / ≤ 6.0 mA		
Reverse voltage protection	yes		
Permissible ambient temperature ¹⁾	-25 °C ... 70 °C	-25 °C ... 100 °C	-40 °C ... 70 °C
Protection to EN 60529	IP 68		
Type of protection to EN 60079-0 and EN 60079-11	II 2G EEx ia IIC T6 (PTB 00 ATEX 2048X)		
	II 1D Ex iaD 20 T x °C (ZELM 03 ATEX 0128X)		
	x: T 85 °C	T 108 °C	T 85 °C
EMC according to	IEC / EN 60947-5-2		
Stress due to shocks	a < 30 g, T = 11 ms, to IEC 68-2-27		
Vibration strain	f = 55 Hz, s = 1 mm, to IEC 68-2-6		
Connecting line	Y30629: 2 m, PVC 2 x 0.75 mm ² free line ends	Y30627: 2 m, SIHF 2 x 0.75 mm ² free line ends	Y106925: 2 m, SIHF 2 x 0.75 mm ² free line ends
Certificates	CSA – 1007121 (LR 96321-2)		
Dimensions	Ø 22 x 75		
Wiring diagram	<p>(BN: brown / BU: blue)</p>		



Table 2

- 1) For temperatures below -20 °C, install initiators with mechanical protection.



Electrical equipment for potentially explosive atmospheres



Equipment Category 2G	For use in potentially explosive atmospheres with gas, vapor and mist.
Conformity with directives	ATEX Directives: Directive 94/9/EC (valid until April 19, 2016), Directive 2014/34/EU (valid from April 20, 2016)
Conformity to standards	EN 60079-0, EN 60079-11 Ignition protection 'Intrinsic safety' Use is restricted to the conditions stated in the following.
CE marking	 0102
Ex marking	 II 2G EEx ia IIC T6
EC Type Examination Certificate Allocated type	PTB 00 ATEX 2048 X NJ 10-22-N ...
Effective internal capacitance Ci	≤ 130 nF; a cable length of 10 m is considered.
Effective internal inductance Li	≤ 100 µH; a cable length of 10 m is considered.
General	<p>The equipment has to be operated in accordance with the data indicated and this description. The EC type examination certificate has to be observed. It is vital to adhere to the special conditions!</p> <p>ATEX Directive and hence also EC type examination certificates apply in general only to the use of electrical equipment under atmospheric conditions.</p> <p>The use in ambient temperatures of > 60 °C was checked with regard to hot surfaces by the respective certification authority. If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be considered.</p>
Ambient temperature	For the temperature ranges, which depend on the temperature class, please see the data indicated.
Installation, Commissioning	The respective statutory regulations and directives governing the application or intended use should be observed. Intrinsic safety is only ensured in connection with a respective equipment, and according to the proof/verification of intrinsic safety.
Servicing, Maintenance	It is not allowed to modify/change anything on equipment which is operated in potentially explosive atmospheres. It is not possible to carry out repairs on such equipment.
Special conditions Protection against mechanical hazards	The sensor must not be mechanically damaged. When used in a temperature range below -20 °C, protect the sensor against impacts by providing an additional housing.

Table 3

Electrical equipment for potentially explosive atmospheres



Equipment Category 1D	For use in potentially explosive atmospheres with combustible dust.
Conformity with directives	ATEX Directives: Directive 94/9/EC (valid until April 19, 2016), Directive 2014/34/EU (valid from April 20, 2016)
Conformity to standards	IEC 61241-11:2002: draft; prEN61241-0:2002 Ignition Protection "iD" Use is restricted to the conditions stated in the following.
CE marking	CE 0102
Ex marking	Ex II 1D Ex iaD 20 T 85 °C or T 108 °C
EC Type Examination Certificate Allocated type	ZELM 03 ATEX 0128 X NJ 10-22-N-E93-Y30629
Effective internal capacitance Ci	≤ 130 nF; a cable length of 10 m is considered.
Effective internal inductance Li	≤ 100 µH; a cable length of 10 m is considered.
General	The equipment has to be operated in accordance with the data indicated and this description. The EC type examination certificate has to be observed. It is vital to adhere to the special conditions! ATEX Directive and hence also EC type examination certificates apply in general only to the use of electrical equipment under atmospheric conditions. The use in ambient temperatures of > 60 °C was checked with regard to hot surfaces by the respective certification authority. If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be considered.
Maximum housing surface temperature	For maximum housing surface temperature, please see the data indicated.
Installation, Commissioning	The respective statutory regulations and directives governing the application or intended use should be observed. Intrinsic safety is only ensured in connection with a respective equipment, and according to the proof/verification of intrinsic safety. The respective equipment has to satisfy at least the requirements of Category ia IIB or iaD. On account of possible ignition hazards which may arise due to faults and/or transient currents in the equipotential bonding system, electrical isolation should be preferably used in power supply and signal circuits. Related equipment without electrical isolation may only be used if the respective requirements of IEC 60079-14 are met. The intrinsically safe circuit has to be protected against influences due to lightning. When used in the partition wall between Zone 20 and Zone 21 or Zone 21 and Zone 22, the sensor must not be exposed to any mechanical danger and has to be sealed so that the protective function of the partition wall is not impaired. Applicable directives and standards have to be observed.
Servicing, Maintenance	It is not allowed to modify/change anything on equipment which is operated in potentially explosive atmospheres. It is not possible to carry out repairs on such equipment.
Special conditions Electrostatic charging	Lay the connecting lines in accordance with EN 50281-1-2, and prevent chafing during operation.

Table 4

4.3 Evaluator

Intended use

- Observe the respective statutory regulations and directives governing the application or intended use.
- Apparatuses/devices that were operated in general electric installations must not be used afterwards in electric installations which are related to potentially explosive atmospheres.
- Intrinsically safe circuits that were operated with circuits of other types of protection, may afterwards no longer be used as intrinsically safe circuits.
- Circuits in "nL" type of protection which were operated with circuits of other types of protection (except intrinsically safe circuits) may afterwards no longer be used in "nL" type of protection.



Installation and commissioning in potentially explosive atmospheres

Only specifically trained qualified staff is allowed to perform installation and commissioning.

- The devices have been designed to satisfy IP20 protection as per EN 60529, and have to be protected accordingly in case of extreme environmental conditions, such as splash water or dirt exceeding pollution severity level 2.
- The apparatus/devices **must** be installed outside the hazardous area!
- For devices with intrinsically safe circuits, dependent on the type of protection, the protected circuit (light blue identification on the device) may be located in the hazardous area. It is especially important to ensure that all non-intrinsically safe circuits are safely isolated.
- Installation of the intrinsically safe circuits has to be carried out in accordance with the applicable installation regulations.
- The respective peak values of the field device and the associated device with regard to explosion protection should be observed when connecting intrinsically safe field devices with intrinsically safe circuits of the K-system devices (proof of intrinsic safety).

In this connection, please observe EN 60079-14 / IEC 60079-14. In addition, please observe the "National Foreword" of EN 60079-14 / VDE 0165, Part 1 for the Federal Republic of Germany.

- If more channels of one device are connected in parallel, ensure that the parallel connection is made directly at the terminals. For the proof of intrinsic safety, regard the maximum values of the parallel connection.
- When intrinsically safe circuits are used in explosive dust atmospheres "D", only field devices with respective certification may be connected.
- Please observe EC certificates of conformity or EC type examination certificates. It is of importance to adhere to the possibly contained "Special conditions".

Servicing, Maintenance

The transmission behavior of the devices is stable even for long periods of time, thus an adjustment or similar in regular intervals is not necessary. Nor is any other maintenance work necessary.

Troubleshooting

It is not allowed to modify anything on apparatus/devices which are operated in potentially explosive atmospheres.

Moreover, it is also not allowed to perform any repairs on the apparatus/device.

Isolation coordinates for apparatus with Ex certificate to EN 50020

Apparatus are assessed for Pollution Degree 2 and Overvoltage Category II to EN 50178.

Isolation coordinates for the indication of galvanic isolations to EN 50178 and EN 61140

Apparatus of the K-system are installation devices or electronic equipment for the use in secluded electrical operating sites where only skilled staff or electrically instructed staff have admission or access to.

Apparatus are assessed for Pollution Degree 2 and Overvoltage Category II to EN 50178.

Ambient conditions

- Ambient temperature: see data sheet
- Storage temperature: -40 °C ... 90 °C (233 K ... 363 K)
- Humidity: max. 75% rel. humidity without moisture condensation

Electrical connection

The removable terminals simplify considerably the connection and control cabinet construction.

In case of service, they allow an easy and trouble-free replacement of the device.

These screwed, self-opening terminals allow space for the connection of lines with core cross sections of up to 2.5 mm². The connectors are coded, so that it is not possible to make an incorrect connection.

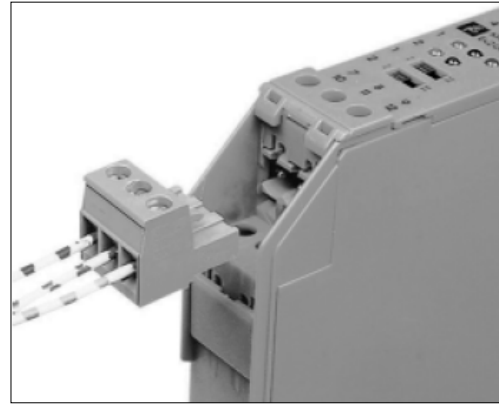


Fig. 4

Intrinsically safe field circuits are connected to the **blue** terminals. These may be led into the hazardous area using DIN EN 60079-14-compliant lines.

Non-intrinsically safe field circuits are connected to the **green** terminals.

Evaluator

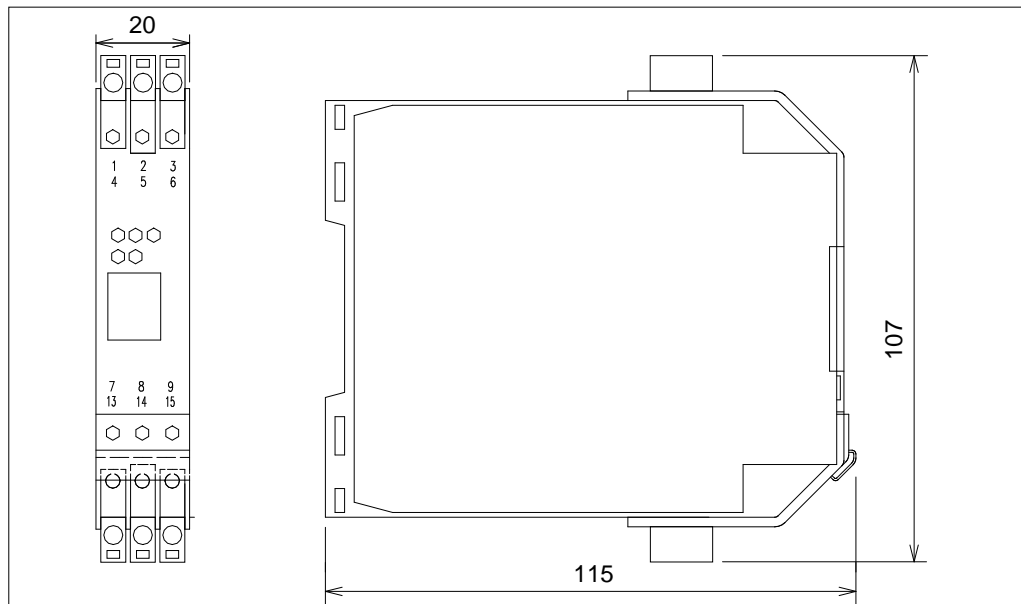


Fig. 5

	Evaluator type KFD2-SR2-Ex2.W.SM
Supply voltages	20 ... 30V DC, ≤ 1.5 W
Signal input	to DIN EN 60947-5-6 (NAMUR): Open-circuit voltage: approx. 8 V DC Short-circuit current: approx. 8 mA Switching point / hysteresis: 1.2 ... 2.1 mA / approx. 0.2 mA
Output relay	2 changeover contacts, contact rating: - 253 V AC, 2 A, cosφ > 0.7 - 40 V DC, 2 A resistive load
Start-up bypass	Triggering by switching on the supply voltage or by an external signal (16...30 V DC, signal duration > start-up bypass time)
Start-up bypass time	5 or 20 s, set at the factory: 5 s
Ready delay	≤ 400 ms
Cutoff frequency	0.1; 0.5; 2; 10 Hz (correspond to 6; 30; 120; 600 rpm) set at the factory: 0.5 Hz
Display	LED, yellow, for switching condition of output relay
Design	Modular terminal housing
Mounting	- by clipping onto 35 mm -standard rail acc. to DIN EN 50022 - or to be screwed by pull-out clips with 90mm - grid
Stress due to shocks	as per EN 60028-2-27, 15 g, 11 ms, half sinus
Stress due to vibration	as per EN 60028-2-6, 10 Hz ... 150 Hz, 1 g, high transition frequency
Connecting terminals	Coded plug, max. 2.5 mm ²
Permissible ambient temperature	-25 °C ... 60 °C
Relative air humidity	max. 95%, no condensation
Protection to EN 60529	IP 20
EMC according to	EN 61326-1
Certificates	CSA - 1029981 (LR 36087-19)
Weight	approx. 300 g

Table 5



Data for use in connection with potentially explosive atmospheres

EC-Type Examination Certificate	PTB 00 ATEX 2080		
Group, class, type of protection	Ex II (1) G D [EEx ia] IIC [circuits in zones 0/1/2]		
Input	EEx ia IIC		
Voltage	U _o = 10.5 V		
Current	I _o = 13 mA		
Power	P _o = 34 mW (linear characteristic curve)		
Supply			
Maximum safety voltage	U _m = 253 V AC / 125 V DC (Attention! U _m is not a rated voltage)		
Type of protection			
Explosion group	IIA	IIB	IIC
Outer capacity	75 µF	16.8 µF	2.41 µF
Outer inductivity	1000 mH	840 mH	210 mH
Electrical isolation of output	Reinforced insulation according to IEC 61140, rated insulation voltage 300 V _{eff}		
Output: Contact rating	253 V AC / 2 A / cos φ > 0.7 126.5 V AC / 4 A / cos φ > 0.7 40 V DC / 2 A resistive load 130 V DC / 20 mA resistive load		
Insulation coordination for devices with Ex certificate according to EN 50020	The devices are designed for use in Contamination Level 2 in accordance with EN 50178.		
Conformity with directives	ATEX Directive: EN 50014, EN 50020, EN 50021		

Table 6

5 User information

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

If you observe the information contained in this manual, you will

- increase the reliability and lifetime of the unit,
- avoid any risks
- reduce repairs and downtimes.

This manual must

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

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 requirements determined by Voith. This is guaranteed when original spare parts are used.

Installation and/or use of non-original spare parts may negatively change the mechanical properties of the **BTS-Ex** and may thus impair safety.

Voith is not liable for any damages resulting from the use of non-original spare parts.

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

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

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www.voith.com/fluid-couplings

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6 Safety

6.1 Safety information

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

6.1.1 Structure of safety information

 DANGER WORD
<p>Hazard consequences</p> <p>Source of hazard</p> <ul style="list-style-type: none"> • 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 7

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

6.1.2 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 8

6.2 Intended use

- The non-contacting thermal switch unit (**BTS-Ex**) 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.

6.3 Unintended use

Design range
 → operating manual
 of turbo coupling

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

6.4 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 areas (initiator type NJ 10-22-N-E93), observe the local regulations applicable to electrical equipment in potentially explosive areas! It is not permitted to do any modifications on the initiator, including the connecting line.

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 gloves.
- Start to work on the turbo coupling only after it has cooled down to below 44 °C!
- 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.

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 6.3

**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.

6.5 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.

6.6 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.

6.7 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.

6.8 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 operating manual are persons who are familiar with transportation, storage, installation, electrical connection, commissioning, maintenance, servicing and repair and who have got the necessary qualifications relevant to their job performed. 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 areas. Avoid formation of sparks.



6.9 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

6.10 Nameplate

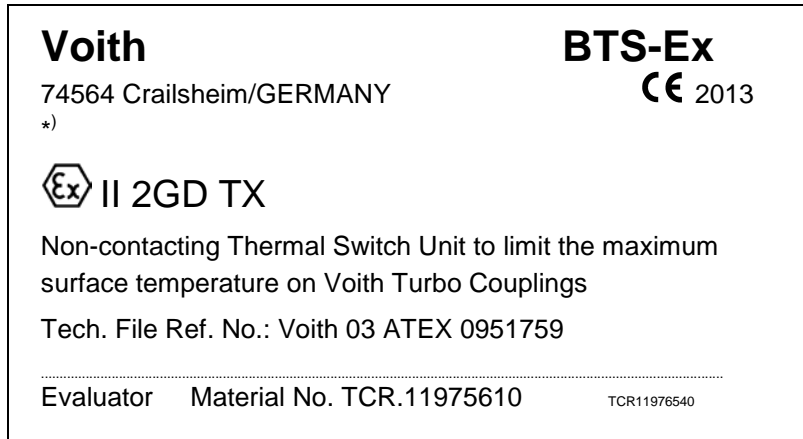



Fig. 6

*) actual year of manufacture

Meaning of signs/symbols on the nameplate:

-  : Ex-protection marking
- II : Explosion Group II
- 2 : Equipment Category
- G : Gas
- D : Dust
- TX : Temperature depends on the switching element used

SAFETY INFORMATION

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

7 Installation



WARNING

Risk of injury

Please observe, in particular, → Chapter 6 (Safety) when working on the non-contacting thermal switch unit!

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

7.1 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.

7.2 Scope of supply

Standard combinations of switching elements and fusible plugs:

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

Table 9

Please contact
Voith Turbo
→ order documents

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 14).

7.3 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).

Arrangement of switching element on the outer wheel side ¹⁾:

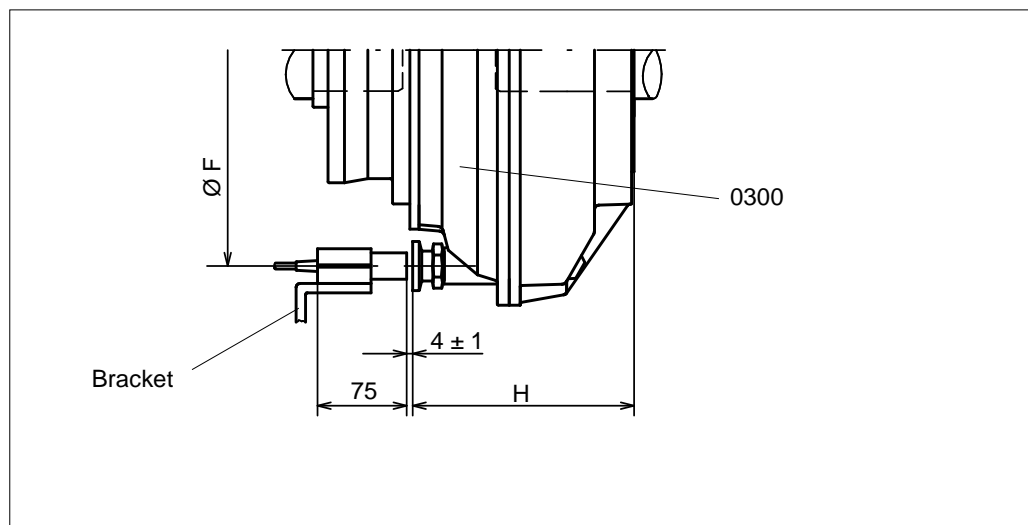


Fig. 7

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

Installation dimensions for switching element and initiator:

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

Table 10

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)!

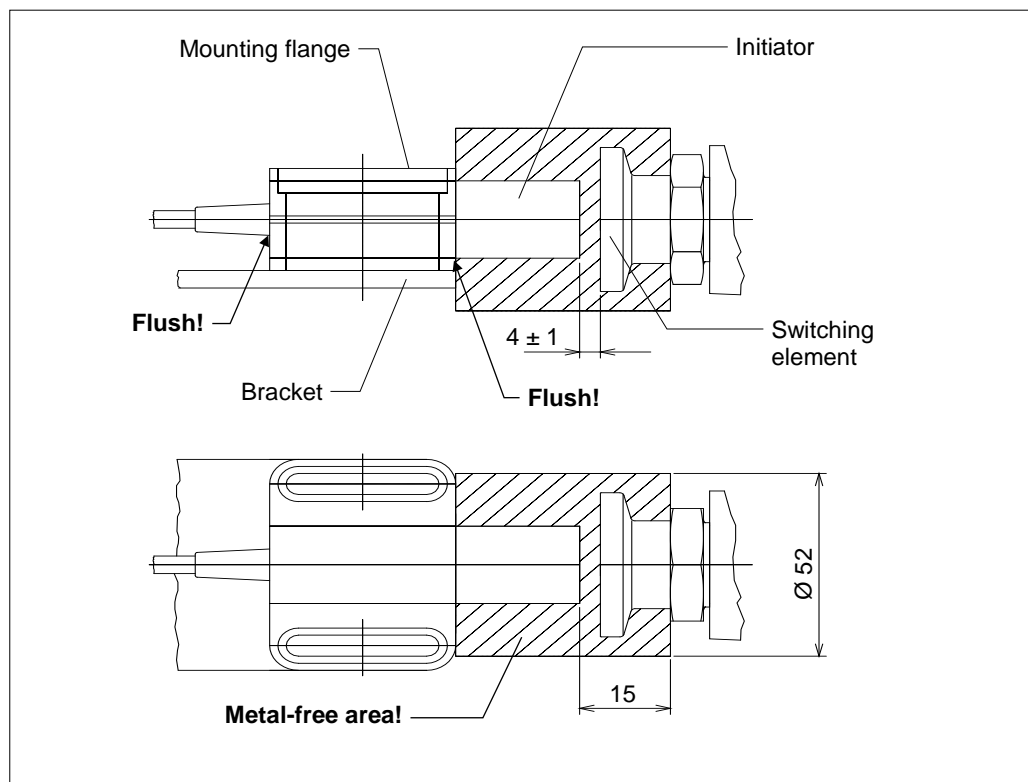


Fig. 8

- 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!

7.4 Mounting, connection - evaluator

NOTICE

Damage to property

Damage to the system by electric components not connected properly.

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

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

Wiring diagram:

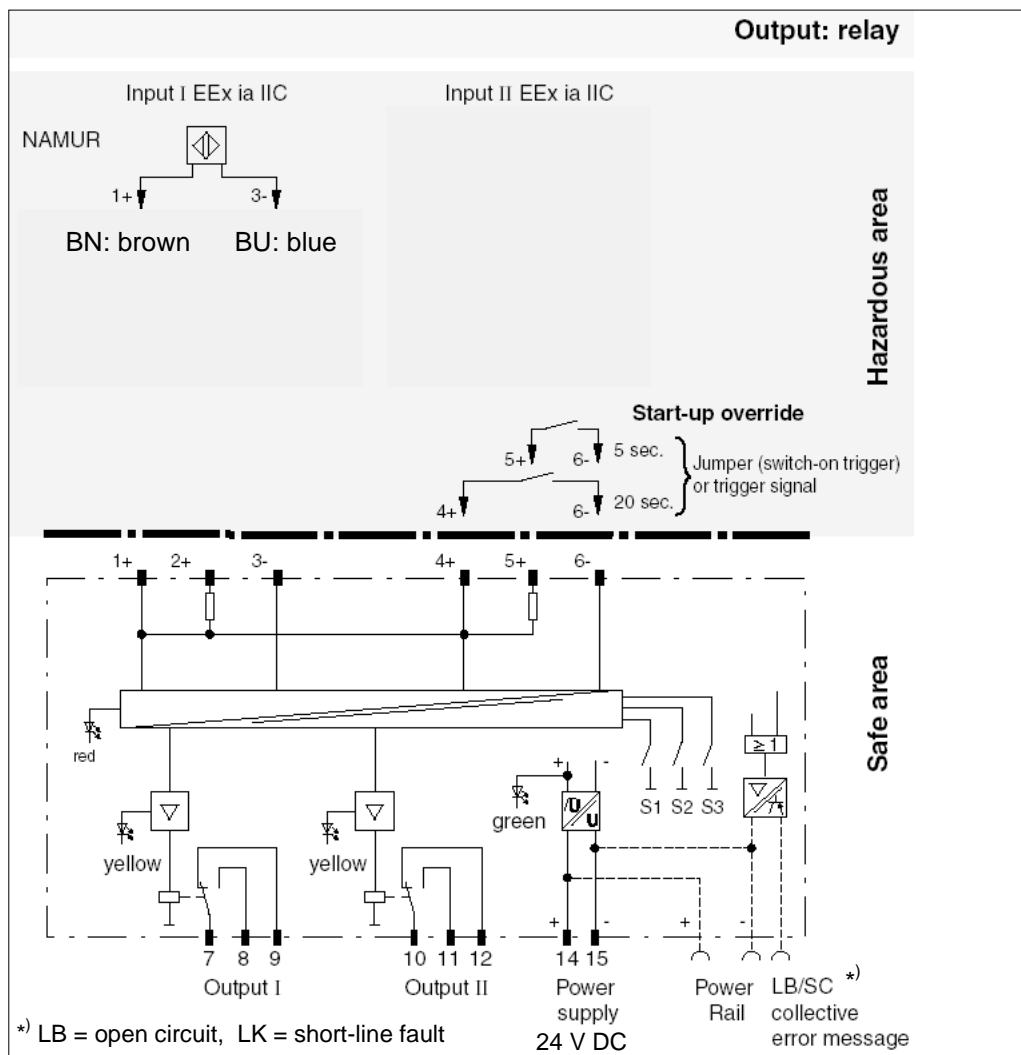


Fig. 9

Terminal assignment: Evaluator

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

Table 11

8 Display and Setting of Evaluator

8.1 Design

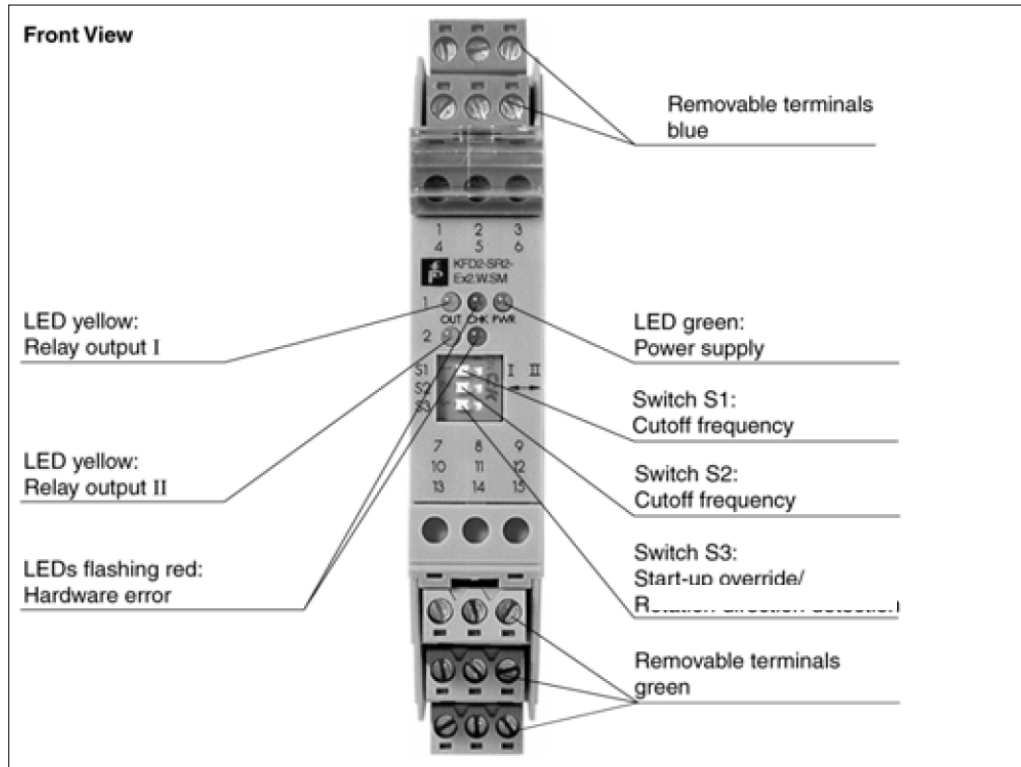


Fig. 10

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

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

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

Table 12

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

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



⚠ WARNING

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

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

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

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

Table 13

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

8.4 Setting of start-up bypass time



⚠ WARNING

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

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

SAFETY INFORMATION

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

Evaluator with start-up bypass (S3 = I)

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

Input I

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

Input II

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

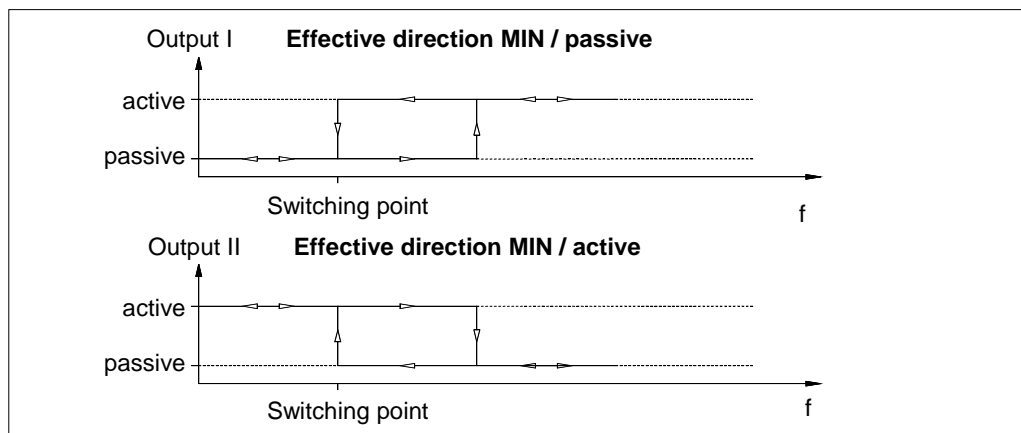


Fig. 11

9 Commissioning



WARNING

Risk of injury

Please observe, in particular, → Chapter 6 (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 7.4).
Observe, in particular, proper wiring of supply voltage!
- Apply supply voltage to the evaluator, first without starting the turbo coupling. As long as the start-up bypass is active, the output relay remains energized and the front LED lights up.
- At the end of the start-up bypass time, the output relay is de-energized and the front LED extinguishes.
- If necessary, set the start-up bypass time according to → Chapter 8.3.
- In case of external triggering, remove the bridge that was fixed at the factory between the terminals for the start-up bypass on the evaluator.
- Start the BTS-Ex with turbo coupling in a normal way. After the start-up bypass time, the speed of the turbo coupling with switching element must have clearly exceeded the set cutoff frequency. If there is no excess temperature, the output relay remains energized and the front LED lights.
- Switch off the drive with the turbo coupling, leave the BTS-Ex in the mode ready for operation. If the speed of the turbo coupling with switching element falls below the set cutoff frequency, the output relay is de-energized and the front LED extinguishes.
- Normal operation can start now. In case of malfunctions, → Chapter 12.

10 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 6 (Safety) when working on the non-contacting thermal switch unit!

- Please always keep access paths free to the turbo coupling!

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

Qualification
→ Chapter 6.8

- Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
- For all work performed on the turbo coupling ensure that both the drive motor and the driven machine have stopped running and that 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 500 operating hours every 3 months at the latest	Inspect the machine for irregularities (visual inspection, dust deposits).
3 months after commissioning at the latest, then every year	Check the electrical system for sound condition (detailed inspection).
In case of impurities	Cleaning (→ Chapter 10.1).

Table 14

**Report samples
 → Operating manual
 of turbo coupling**

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

The tripping system has to be checked every 2 years at the latest if it is used as safety coupling relay.

In category 3, the maintenance intervals may be doubled.

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



Maintenance intervals	Maintenance work
<p>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.</p>	<p>Cleaning (→ Chapter 10.1).</p>

Table 15

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.

10.1 Outside cleaning

NOTICE

Damage to property
Damage to the BTS-Ex due to an improper, unsuitable outside cleaning.

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

- Clean the BTS-Ex with a grease solvent, as and when required.

11 Disposal

Disposal of the packaging

Dispose of packaging material according to the local regulations.

How to dispose of operating fluids

On disposal, please observe the applicable laws and the producer's or supplier's instructions.

How to dispose of the BTS-Ex

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

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

Material / substance	Kind of disposal		
	Reuse	Residual waste	Special waste
Metals	x	-	-
Cables	x	-	-
Seals	-	x	-
Plastics	x ¹⁾	(x)	-
Operating media	-	-	x ^{1), 2)}
Packaging	x	-	-

Table 16

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

12 Malfunctions - Remedial Actions, Troubleshooting

⚠ WARNING

Risk of injury
Please observe, in particular, → Chapter 6 (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
Green LED off.	No supply voltage is applied to the evaluator.	Apply supply voltage.	Chapter 7.3
	The evaluator is defective.	Replace the evaluator.	
Yellow LED 1 (upper LED) displays incorrectly.	Incorrect position of DIP switch.	Check position of DIP switch.	Chapter 8.2 Chapter 8.3
	The initiator poles are reversed.	Check the initiator connection.	Chapter 7.3
	The distance between initiator head and switching element is too large.	Set the distance to 4 ± 1 mm.	Chapter 7.3

Malfunction	Possible cause(s)	Remedial action	See
Yellow LED 1 (upper LED) displays incorrectly.	The bracket for the initiator is not sufficiently stable. Vibrations may cause false signals.	Ensure that the bracket is of sufficient stability.	Chapter 7.3
	The initiator is defective.	Check the initiator, and replace it, if necessary.	
	The switching element is defective.	Check the switching element, and replace it, if necessary.	
	Incorrect relay output I.	Check relay output I.	
Yellow LED 2 (lower LED) displays incorrectly.	Incorrect relay output II.	Check relay output II.	
RED LEDs are flashing	Hardware error.	Check devices.	
While the start-up bypass is active, operating fluid is leaking through the fusible plugs.	A too high start-up bypass time was selected.	Set a shorter start-up bypass time so that the speed of the turbo coupling with switching element will have clearly exceeded 60 rpm after the start-up bypass time.	
After the start-up by-pass time, operating fluid is leaking through the fusible plugs, the BTS-Ex did not display any excessive temperature.	The nominal response temperatures of switching element and fusible plugs do not match.	Please consult Voith Turbo.	Chapter 13
	The switching element is defective.	Check the switching element, and replace it, if necessary.	

Please consult Voith Turbo (→ Chapter 13), in case of a malfunction which is not included in this table.

Table 17

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

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

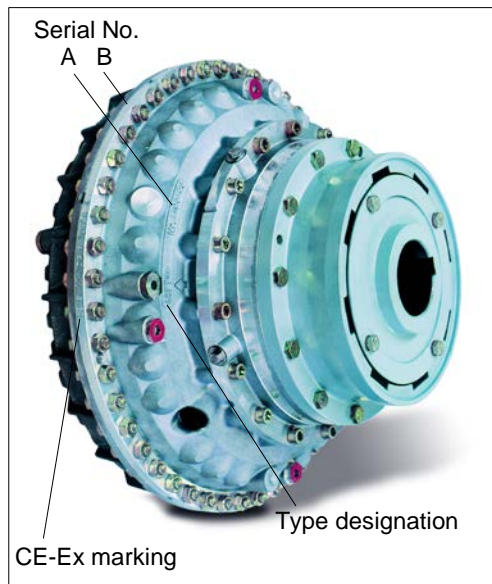
Table 18

13 Queries, Orders Placed for Service Engineers and Spare Parts

For

- Queries
- Ordering a service engineer
- Spare parts orders
- Commissionings

we need:



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

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

Fig. 12

When placing an order for a **service engineer**, **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.

Representatives
→ Chapter 15

In this respect, please contact the local Voith representative (outside business hours: the emergency hotline).

14 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!

14.1 Switching elements

BTS-Ex switching elements					Sealing ring
Use for turbo coupling size	Dimension of thread	Nominal response temperature	Type of switching element	Material No.	Material No.
366 - 650	M18x1.5	85 °C	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 - 1150	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 19

14.2 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 BF22/4	TCR.03668170

Table 20

14.3 Evaluator

Type of evaluator	Material No.
KFD2-SR2-Ex2.W.SM	TCR.11975610

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