

## Installation and Operating Manual

(Translation of the original installation and operating manual)

### BTS

### Non-contacting Thermal Switch Unit

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Version 12, 2021-06-15

3626-011500 en, Protection Class 0: public

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

3626-011500 en

This document describes the state of design of the product at the time of the editorial deadline on 2021-06-15.

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# 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

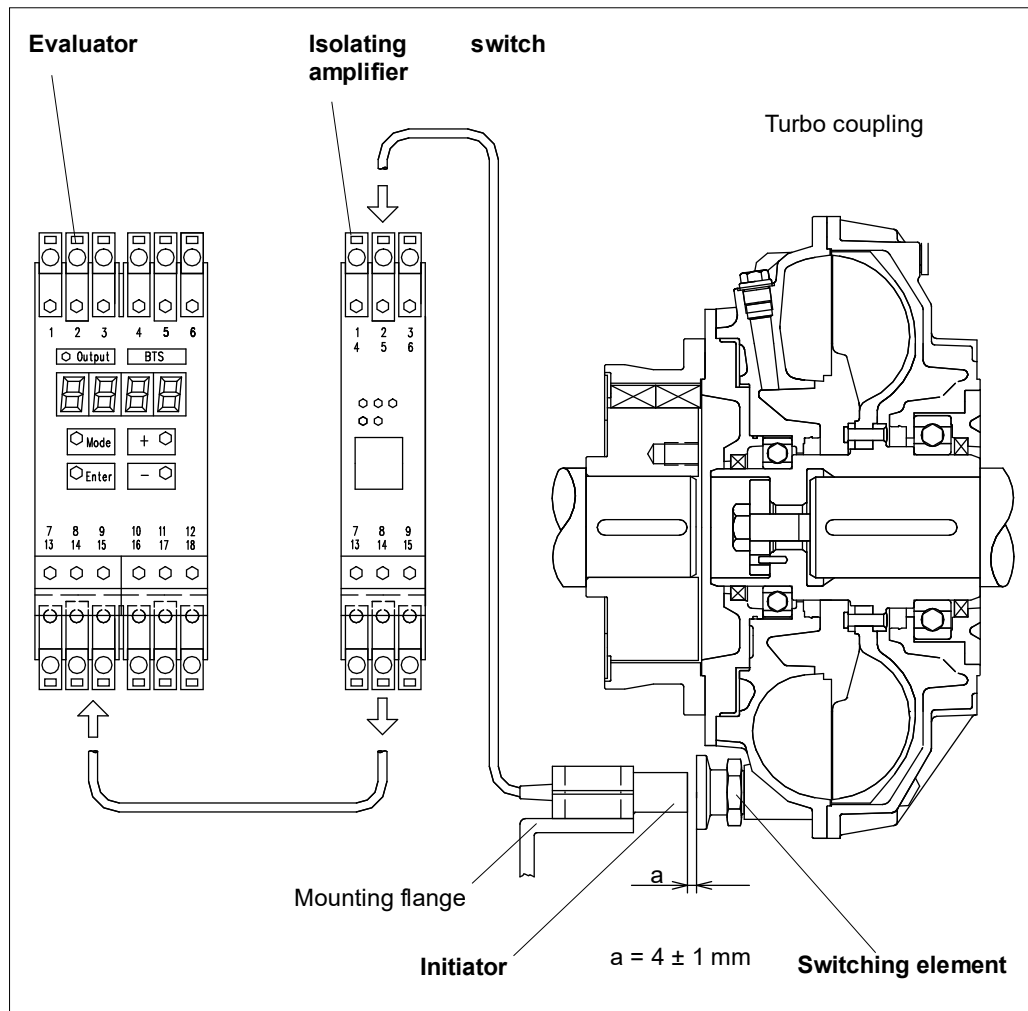


Fig. 1

## 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.

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



### **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 unintended starting 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!



# 3 Technical data

## 3.1 Switching element

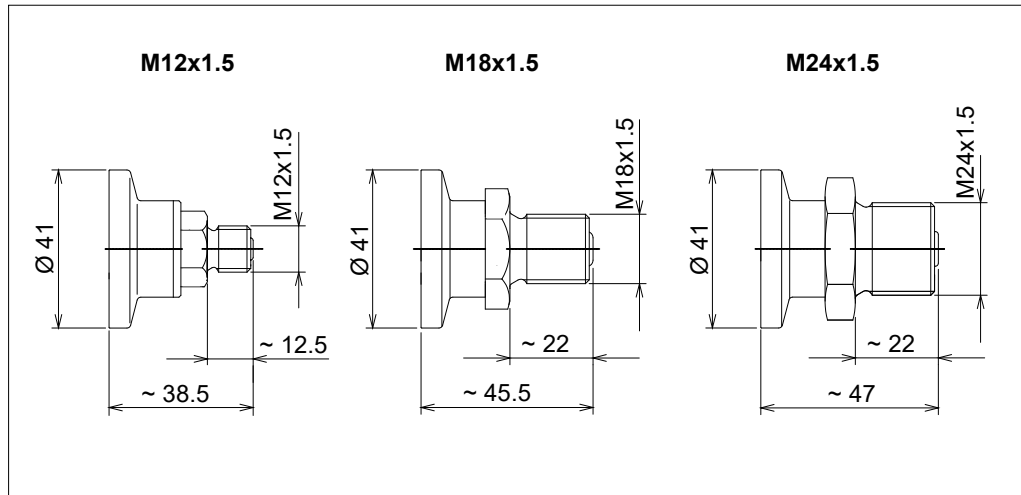


Fig. 2

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 size	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
Classification is $\text{Ex}$ II 2GD	U <sub>i</sub> = 10 V	I <sub>i</sub> = 50 mA	P <sub>i</sub> = 50 mW
Service temperature in the coil area	-40 °C to +120 °C		
Service temperature in the area of the thermostatic switch	to 90 °C (T5), to 125 °C (T4), to 190 °C (T3)		

Table 1

### SAFETY INFORMATION

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



## 3.2 Initiator, mounting flange

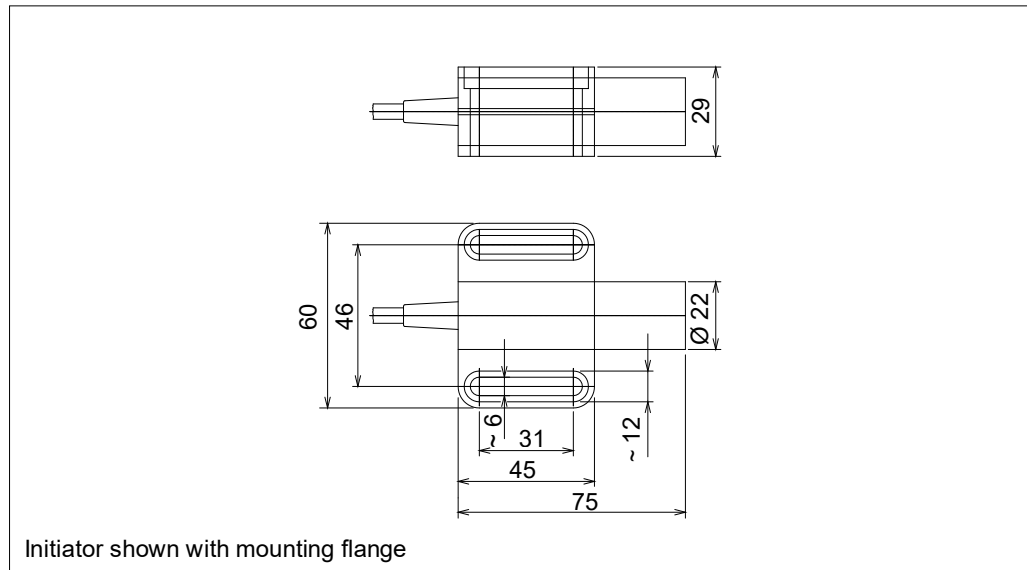


Fig. 3

- Annex Type: NJ 10-22-N-E93-Y245590 (2 m)
- NJ 10-22-N-E93-Y246868 (5 m)
- NJ 10-22-N-E93-Y246869 (10 m)
- NJ 10-22-N-E93-Y245590 (2 m, new dust-Ex-marking)
- NJ 10-22-N-E93-Y246868 (5 m, new dust-Ex-marking)
- NJ 10-22-N-E93-Y246869 (10 m, new dust-Ex-marking)

## 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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# 5 Safety

## 5.1 Safety information

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

### 5.1.1 Structure of safety information

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

#### Danger word

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




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

Table 2

#### Results of a hazardous situation

Hazard consequences indicate the kind of hazard.

#### Source of hazard

The source of hazard indicates the cause of hazard.

#### Warding off of danger

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

### 5.1.2 Definition of safety symbols


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

Table 3

### 5.2 Intended use

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

### 5.3 Unintended use


Design range  
→ Operating manual  
of turbo coupling

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

### 5.4 General information as to dangerous situations

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




WARNING

**Explosion hazard**

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

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

**Hazards while working on the non-contacting thermal switch unit:****DANGER****Electric shock**

On account of incorrectly mounted or incorrectly connected electrical components, and disconnected electric connections, persons could get an electric shock and be severely injured, possibly with fatal consequences.

Incorrectly mounted or incorrectly connected electrical components and disconnected electric connections may cause damages to the machinery.

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

**Electric shock:****DANGER****Electrostatic processes**

Electrostatic charging may injure persons by an electric shock.

- Allow only a qualified electrician to install the equipment into which the turbo coupling is installed.
- The unit and the electrical installation are provided with ground connections.

**Working on the turbo coupling:**

 **WARNING**

**Risk of injury**

While working on the turbo coupling, there is the risk of injury through cutting, crushing, burns and cold burns in case of minus degrees.

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

**Noise:**

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

 **WARNING**

**Hearing loss, permanent impairment of hearing**

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

- Wear ear protection.



**Operating fluid which sprays off or leaks out:****WARNING****Risk of losing sight due to operating fluid spraying off, risk of burning**

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

This may happen only in case of unintended use.

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

**Unintended use**  
→ Chapter 5.3

**WARNING****Fire hazard**

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

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

**CAUTION****Danger of slipping**

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

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

## 5.5 Remaining risks



### **WARNING**

#### **Risk of personal injuries and damage to property**

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

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

## 5.6 What to do in case of accidents

### **SAFETY INFORMATION**

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

## 5.7 Information with regard to operation

### **SAFETY INFORMATION**

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

### **Monitoring devices:**

### **NOTICE**

#### **Damage to property**

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

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

## 5.8 Qualification of staff

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

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

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

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



- Replace the blind screw by the switching element with the sealing ring in the turbo coupling outer wheel (item 0300) or shell (item 0190) <sup>1)</sup>.

#### Arrangement of switching element on the outer wheel side <sup>2)</sup>:

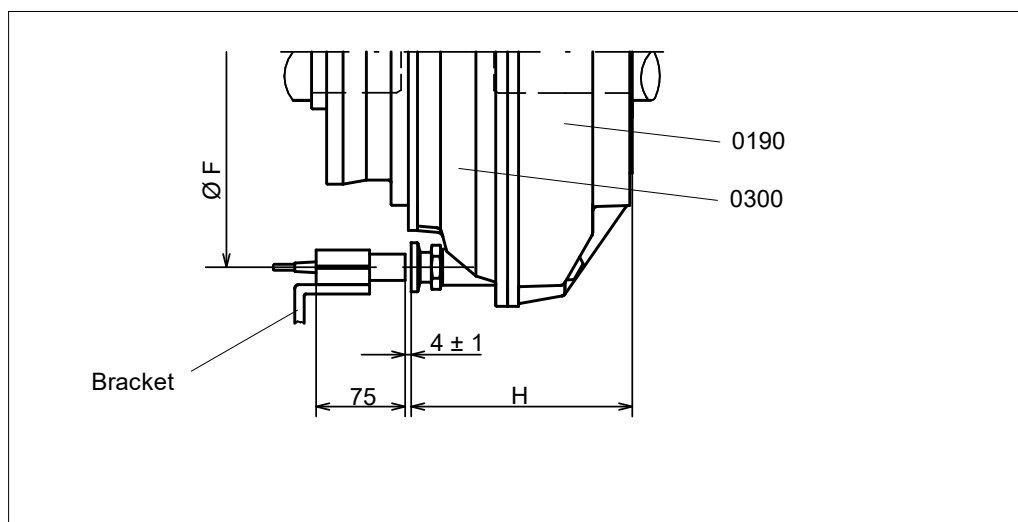


Fig. 4

- 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:**

Turbo coupling type	Outer wheel side	
	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.

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

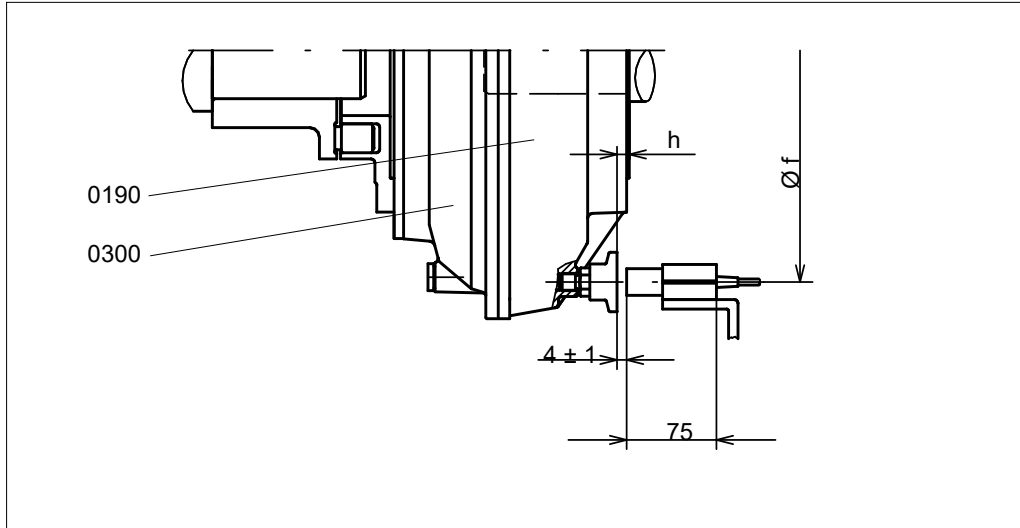


Fig. 5

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

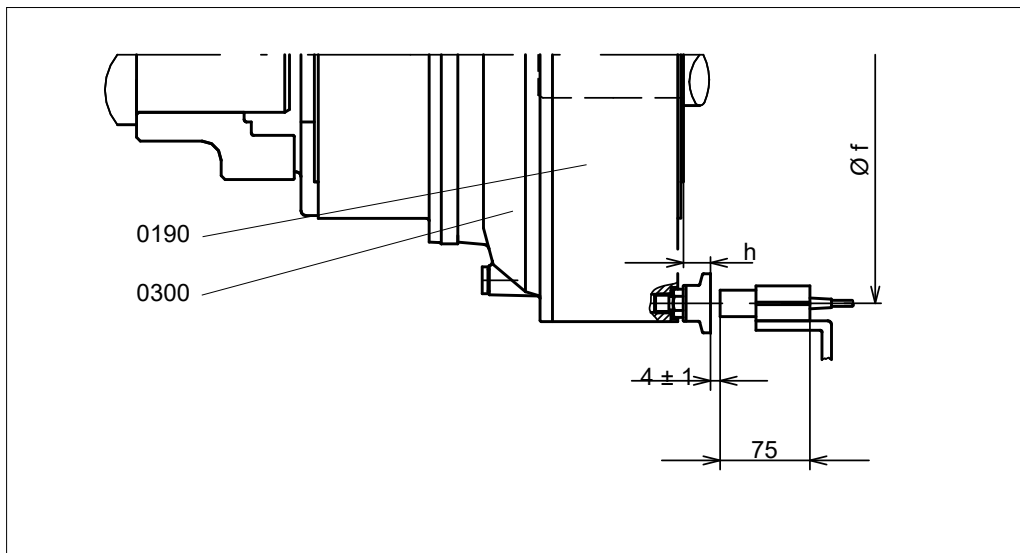


Fig. 6

**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)!

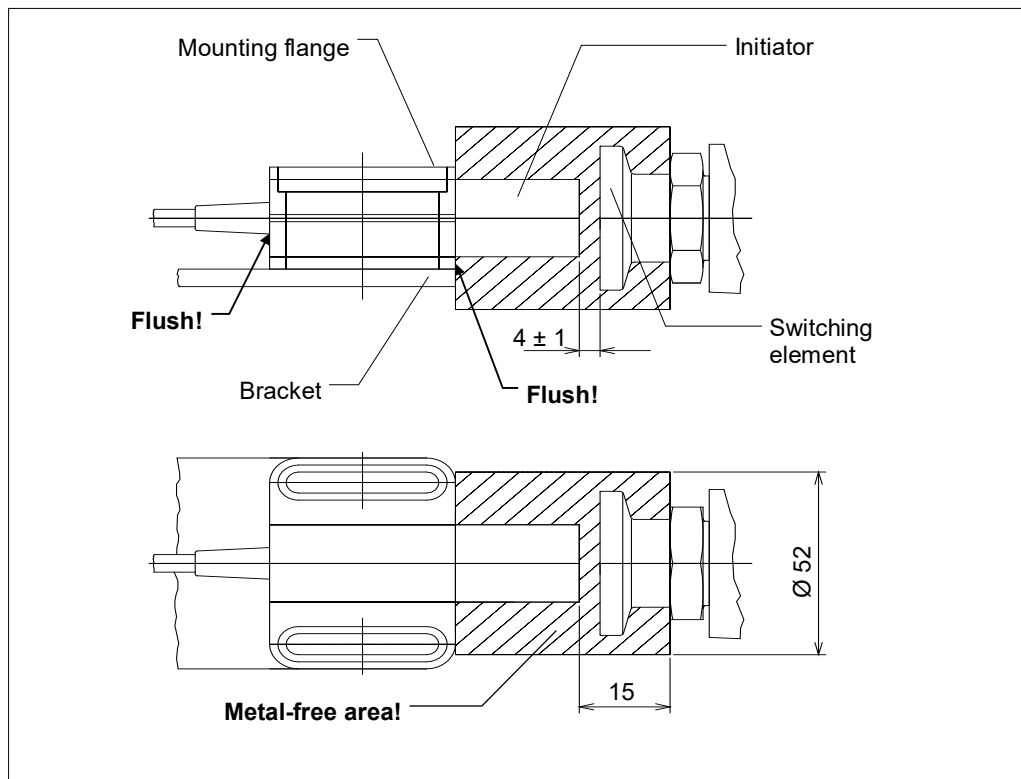


Fig. 7

- 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  $4 \pm 1$  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:

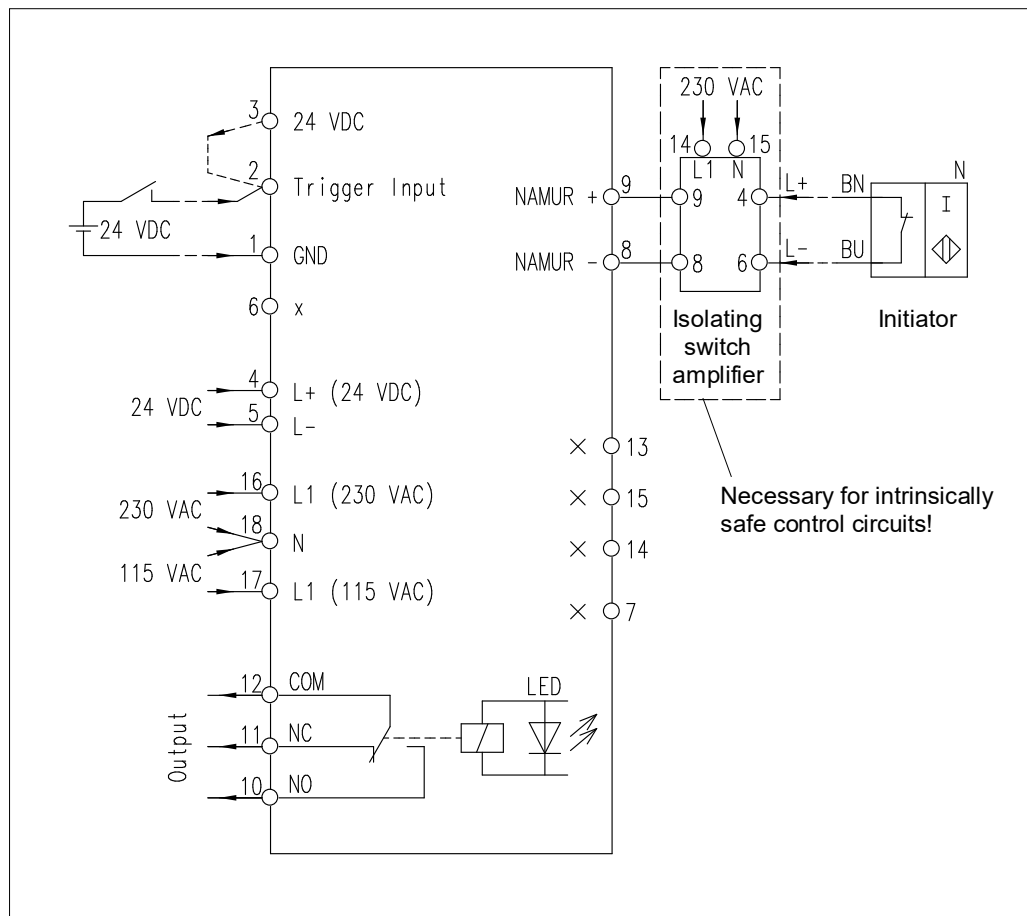


Fig. 8

**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:

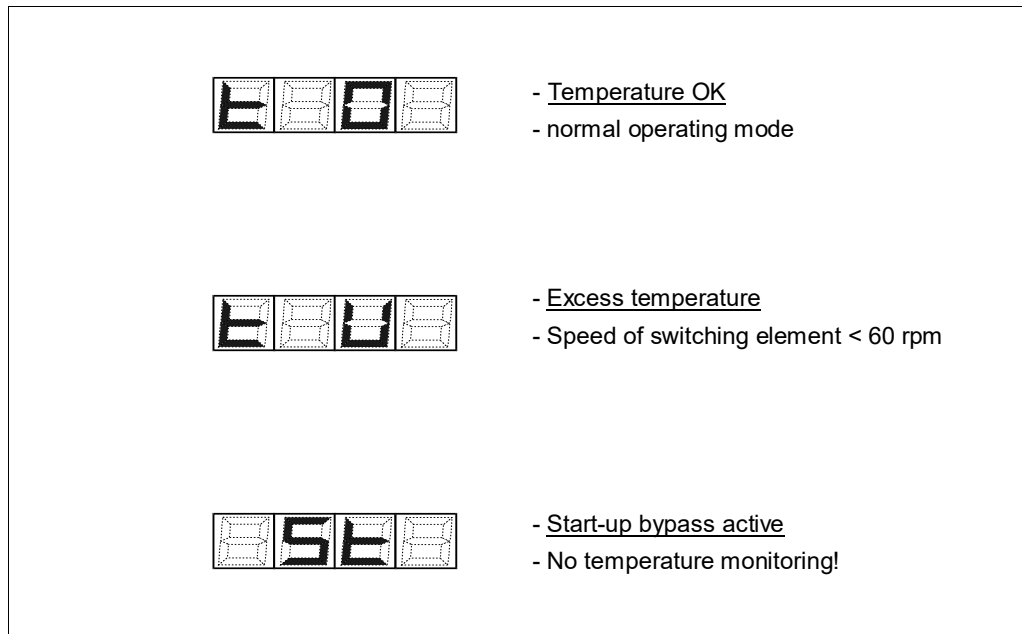


Fig. 9

Setting mode:

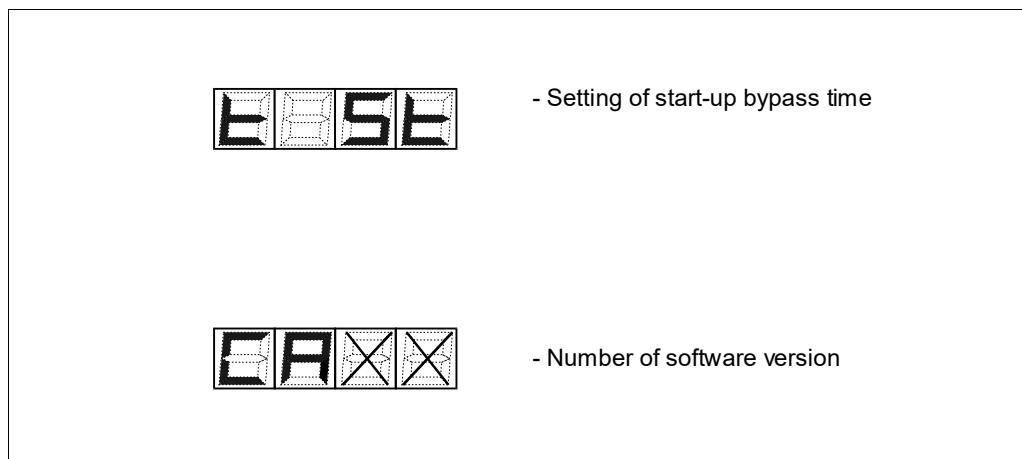


Fig. 10

## 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.**

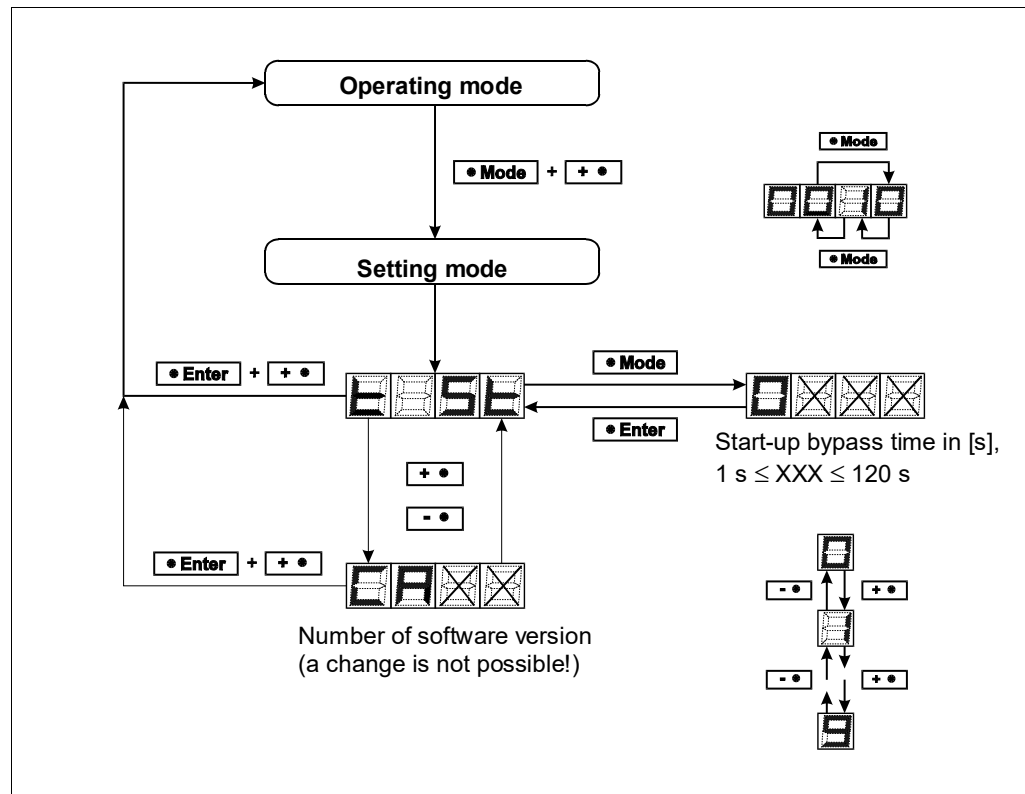


Fig. 11

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

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 degreasing agent, as and when required.

# 10 Disposal

## Disposal of the packaging

Dispose of packaging material according to the local regulations.

## How to dispose of operating fluids

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

## How to dispose of the BTS

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:

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

Table 11

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

# 11 Malfunctions - Remedial Actions, Troubleshooting



## WARNING

### Risk of injury

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



## WARNING

### Explosion hazard

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

- Repairs are not permitted; repair the device.

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

Malfunction	Possible cause(s)	Remedial action	See
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
<p>Display on the evaluator:</p> <p>Display appears again after switching OFF and ON.</p>	<p>Electronic error.</p> <p>Defective evaluator.</p>	<p>Switch OFF and ON the supply voltage.</p> <p>Replace the evaluator.</p>	
<p>After the start-up bypass time, excessive temperature (  ) is always displayed although there is no excessive temperature.</p>	<p>A too short start-up bypass time was selected.</p>	<p>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.</p>	
	<p>The initiator poles are reversed.</p>	<p>Check the initiator connection.</p>	<p>Chapter 6.4</p>
	<p>The distance between initiator head and switching element is too large.</p>	<p>Set the distance to <math>4 \pm 1</math> mm.</p>	<p>Chapter 6.4</p>
	<p>The initiator is defective.</p>	<p>Check the initiator, and replace it, if necessary.</p>	
	<p>The switching element is defective.</p>	<p>Check the switching element, and replace it, if necessary.</p>	
<p>After the start-up bypass time, excessive temperature is occasionally displayed (  ) although there is no excessive temperature.</p>	<p>The distance between the initiator head and the switching element is too large.</p>	<p>Set the distance to <math>4 \pm 1</math> mm.</p>	<p>Chapter 6.4</p>
	<p>The bracket for the initiator is not sufficiently stable. Vibrations may cause false signals.</p>	<p>Ensure that the bracket is of sufficient stability.</p>	<p>Chapter 6.4</p>
<p>While the start-up bypass is active, operating fluid is leaking through the fusible plugs.</p>	<p>A too long start-up bypass time was selected.</p>	<p>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.</p>	

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 contact Voith.	Chapter 12
	The switching element is defective.	Check the switching element, and replace it, if necessary.	

Please consult Voith (→ 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. <b>Note:</b> The initiator can, for example, be attenuated with a metal plate which is held directly in front of the initiator head.	Current consumption > 1.2 mA or < 0.1 mA	Defective initiator.
Attenuate the initiator, after proper installation, with the switching element, with the turbo coupling not being overheated.	Current consumption > 1.2 mA and < 6.0 mA	Defective switching element.

Table 13



# 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	Voith 125 °C	TCR.10498440	TCR.03658012
366 - 650	M18x1.5	85 °C	Voith 85 °C	TCR.10672470	TCR.03658018
		90 °C	Voith 90 °C	TCR.10642650	
		110 °C	Voith 110 °C	TCR.10642630	
		125 °C	Voith 125 °C	TCR.10499540	
		140 °C	Voith 140 °C	TCR.10499550	
		160 °C	Voith 160 °C	TCR.10499560	
		180 °C	Voith 180 °C	TCR.10499570	
750 - 1330	M24x1.5	85 °C	Voith 85 °C	TCR.11973940	TCR.03658024
		125 °C	Voith 125 °C	TCR.10488230	
		140 °C	Voith 140 °C	TCR.10653470	
		160 °C	Voith 160 °C	TCR.10633550	
		180 °C	Voith 180 °C	TCR.10488220	

Table 14



## 13.2 Initiator, mounting flange

Type of initiator	Material No.
NJ 10-22-N-E93-Y245590 (2 m)	201.02171810
NJ 10-22-N-E93-Y246868 (5 m)	201.02171910
NJ 10-22-N-E93-Y246869 (10 m)	201.02172010
NJ 10-22-N-E93-Y245590 (2 m, new dust-Ex-marking)	201.04312710
NJ 10-22-N-E93-Y246868 (5 m, new dust-Ex-marking)	201.04312810
NJ 10-22-N-E93-Y246869 (10 m, new dust-Ex-marking)	201.04312910
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 Annex

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

Voith Material No.: 201.02171810

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

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

Voith Material No.: 201.02171910

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

### 14.3 Initiator NJ 10-22-N-E93-Y246869 (10 m)

Voith Material No.: 201.02172010

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

## **14.4 Initiator NJ 10-22-N-E93-Y245590 (2 m, new dust-Ex-marking)**

Voith Material No.: 201.04312710

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

## **14.5 Initiator NJ 10-22-N-E93-Y246868 (5 m, new dust-Ex-marking)**

Voith Material No.: 201.04312810

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

## **14.6 Initiator NJ 10-22-N-E93-Y246869 (10 m, new dust-Ex-marking)**

Voith Material No.: 201.04312910

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

## 14.7 Evaluator KFU8-DW-1.D-Y209869

Technical Data

Pepperl+Fuchs

Declaration of Conformity

Pepperl+Fuchs



## 14.8 Isolating switch amplifier KFD2-SOT2-Ex2

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

## 14.9 Isolating switch amplifier KFA6-SOT2-Ex2

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

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