Installation and Operating Manual

(Translation of the original installation and operating manual)

BTM
Non-contacting Thermal Measuring Device

Version 6, 2017-03-23
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Contact

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1 Possible Applications, BTM Characteristics

The non-contacting thermal measuring device (BTM) is a monitoring system for Voith turbo couplings.

The BTM is used to measure the operating medium temperature of Voith turbo couplings of sizes **366 up to 1330** (measuring range: 0 °C to 180 °C).

The non-contacting signal transmission allows measuring the operating medium temperature during active operation and to draw conclusions to the actual coupling stress.

As the temperature is measured directly in the operating medium, changes of stress are quickly identified allowing to quickly react to possible overloads and to prevent excess temperatures.

The loss of coupling filling through the fusible plugs and associated downtimes can reliably be avoided.

Please note that the BTM, like any other temperature measuring system, indicates the temperature with some time delay.

For evaluation and further processing of the data in the machine control system, the time delay depending on the actual heating-up velocity of the operating fluid has to be considered.

Moreover, the input power available for machine operation can be optimally used. Please consult Voith Turbo.

**Benefits and reaction possibilities:**

- Temperature warning
- Switch-off of drive motor
- Reduction of engine speed (diesel engines)
- Reduction of load intake
- Optimization of load absorption of driven machine

Temperature drift
→ Chapter 3.4.2
Fusible plugs

The fusible plugs protect the turbo coupling against damage due to thermal overload.

⚠️ WARNING

Risk of personal injuries and damage to property

The turbo coupling will be damaged if operation is continued after a fusible plug responded.

• When the BTM is used, it is not allowed to replace the fusible plugs by blind screws or by fusible plugs with different nominal response temperatures.
• 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 BTM ensure that both the drive motor and the driven machine have stopped running and that a re-start is absolutely impossible.
• The coupling may only be restarted if the turbo coupling temperature is below the maximum permissible temperature allowed when switching on the motor!

1.1 Use, operation

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!

- 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 measuring system.
2 BTM Functioning

The non-contacting thermal measuring device (BTM) consists of four components:

- Temperature sensor (incl. temperature sensor with adapter)
- BTM blind screw (or BTM-X blind screw)
- Stationary aerial with holder
- Evaluator

Fig. 1

2.1 Temperature sensor (or temperature sensor with adapter)

The temperature sensor is a passive component. It is screwed into the turbo coupling outer wheel and its measuring tip projects directly into the operating medium.

The temperature sensor with adapter is used for retrofitting coupling sizes 487 to 650 of older models without rework.

The temperature sensor transmits the measuring signal without contact to the stationary aerial.
2.2 BTM blind screw (or BTM-X blind screw)

The BTM blind screw is provided to compensate the mass of the temperature sensor and it is mandatory to install the same opposite the temperature sensor. Without BTM blind screw, impermissible forces will occur due to unbalance which may damage the machine system.

The BTM-X blind screw serves as mass balance to the temperature sensor with adapter (retrofit to coupling sizes 487 to 650 of older models without rework).

2.3 Stationary aerial with holder

The stationary aerial sends a radar signal to the temperature sensor and receives the reflected measuring signal.

The measuring signal is routed to the evaluator via the connecting cable.

The holder is provided to fasten the stationary aerial.

2.4 Evaluator

The evaluator is an electronic controller with 4 measuring channels. The evaluator generates the radar signals and receives, evaluated and processed the reflected measuring signals.

The measured temperatures of every channel are displayed on the evaluator. In addition, the measured temperatures are output as 4-20 mA signals.

Furthermore, two relay outputs are available per measuring channel with switching thresholds (e.g. pre-warning, switch-off) adjustable via the keyboard on the evaluator.

Connect the evaluator to the machine controller by means of a screened multi-core connecting line. A separate terminal chamber allows connecting the necessary cores easily and safely.
3 Technical Data

3.1 Temperature sensor

The following temperature sensors are available for the different turbo coupling sizes.

<table>
<thead>
<tr>
<th>Dimension of thread</th>
<th>M10x1.5</th>
<th>M18x1.5</th>
<th>M24x1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for coupling sizes</td>
<td>274</td>
<td>366 – 650</td>
<td>750 - 1330</td>
</tr>
<tr>
<td>Width across flats</td>
<td>18</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>15 Nm</td>
<td>50 Nm</td>
<td>144 Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>39 ± 2 g</td>
<td>76 ± 2 g</td>
<td>183 ± 2 g</td>
</tr>
<tr>
<td>Protection to EN 60529</td>
<td>IP 67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor gap</td>
<td>Axial distance</td>
<td>10 ± 3 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. permissible radial displacement</td>
<td>± 3 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. permissible angular misalignment</td>
<td>± 3 °</td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>0 °C ... 180 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating medium temperature</td>
<td>max. 200 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring tolerance</td>
<td>± 2 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>-40 °C ... 100 °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1
3.1.1 Adapter

The adapter is used for retrofitting couplings sizes 487 to 650 of older models without rework.

The following adapter is available:

<table>
<thead>
<tr>
<th>Dimension of thread</th>
<th>M18x1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for coupling sizes</td>
<td>487 – 650</td>
</tr>
<tr>
<td>Width across flats</td>
<td>24</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>50 Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>58 ± 2 g</td>
</tr>
<tr>
<td>Peripheral speed</td>
<td>max. 50 ms⁻¹</td>
</tr>
<tr>
<td>Speed</td>
<td>max. 1500 rpm</td>
</tr>
</tbody>
</table>

Table 2
3.2 BTM blind screws

![Diagram of BTM blind screws](image)

The following BTM blind screws are available for the different turbo coupling sizes:

<table>
<thead>
<tr>
<th>Dimension of thread</th>
<th>M14x1.5</th>
<th>M18x1.5</th>
<th>M24x1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for coupling sizes</td>
<td>274</td>
<td>366 – 650</td>
<td>750 – 1330</td>
</tr>
<tr>
<td>Width across flats</td>
<td>8</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>30 Nm</td>
<td>50 Nm</td>
<td>144 Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>39 ± 2 g</td>
<td>76 ± 2 g</td>
<td>183 ± 2 g</td>
</tr>
</tbody>
</table>

Table 3
3.2.1 BTM-X blind screw

The BTM-X blind screw serves as mass balance to the temperature sensor with adapter (retrofit to coupling sizes 487 to 650 of older models without rework).

The following BTM-X blind screw is available:

<table>
<thead>
<tr>
<th>Dimension of thread</th>
<th>M18x1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for coupling sizes</td>
<td>487 – 650</td>
</tr>
<tr>
<td>Width across flats</td>
<td>24</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>50 Nm</td>
</tr>
<tr>
<td>Weight</td>
<td>134 ± 2 g</td>
</tr>
<tr>
<td>Peripheral velocity</td>
<td>max. 50 ms</td>
</tr>
<tr>
<td>Speed</td>
<td>max. 1500 rpm</td>
</tr>
</tbody>
</table>

Table 4
3.3 Stationary aerial

![Diagram of stationary aerial](image)

**Dimension of thread**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>M12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width across flats</td>
<td>19 / 30</td>
</tr>
<tr>
<td>Tightening torque</td>
<td>50 Nm</td>
</tr>
<tr>
<td>Cable length</td>
<td>25 m</td>
</tr>
<tr>
<td>Min. bending radius</td>
<td></td>
</tr>
<tr>
<td>Static</td>
<td>15 mm</td>
</tr>
<tr>
<td>Dynamic</td>
<td>45 mm</td>
</tr>
<tr>
<td>Cable material</td>
<td>PTFE</td>
</tr>
<tr>
<td>Protection to EN 60529</td>
<td>IP 67</td>
</tr>
<tr>
<td>Sensor gap</td>
<td></td>
</tr>
<tr>
<td>Axial distance</td>
<td>10 ± 3 mm</td>
</tr>
<tr>
<td>Max. permissible radial displacement</td>
<td>± 3 mm</td>
</tr>
<tr>
<td>Max. permissible angular displacement</td>
<td>± 3 °</td>
</tr>
<tr>
<td>Measuring range</td>
<td>0 °C … 200 °C</td>
</tr>
<tr>
<td>Measuring tolerance</td>
<td>± 2 K</td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>-40 °C … 100 °C</td>
</tr>
</tbody>
</table>

Table 5

**NOTICE**

**Damage to property**

For technical reasons, it is not possible to extend a cable or to repair a damaged cable.

- When running the aerial cable, observe the directive for electromagnetic compatibility (EMC).
3.3.1 Holder

![Diagram of Holder]

Fig. 7

3.4 Evaluator

![Diagram of Evaluator]

Fig. 8
### Technical Data

#### Evaluator type GBP-733

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
<td>Silumin</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>4250 g</td>
</tr>
<tr>
<td><strong>Protection to EN 60529</strong></td>
<td>IP 65</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VDC (18 … 36 VDC)</td>
</tr>
<tr>
<td><strong>Max. rated current consumption</strong></td>
<td>approx. 330 mA at 18 VDC</td>
</tr>
<tr>
<td><strong>Max. current consumption</strong></td>
<td>2 A (inrush current)</td>
</tr>
<tr>
<td><strong>Initialization time</strong></td>
<td>approx. 10 s</td>
</tr>
<tr>
<td><strong>Min. operating speed</strong></td>
<td>300 rpm</td>
</tr>
<tr>
<td><strong>Automatic signal calibration</strong></td>
<td>approx. 1 s</td>
</tr>
<tr>
<td><strong>Automatic signal calibration after the Voith turbo coupling (VTC) was cooled down with water</strong></td>
<td>approx. 5 s</td>
</tr>
<tr>
<td><strong>Measuring range</strong></td>
<td>0 °C … 200 °C</td>
</tr>
<tr>
<td><strong>Displays</strong></td>
<td>4x 3-digit 7-segment displays</td>
</tr>
<tr>
<td><strong>Analog outputs:</strong></td>
<td></td>
</tr>
<tr>
<td>Signal</td>
<td>Value</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>&lt; 0.5 mA</td>
<td>Defect</td>
</tr>
<tr>
<td>3.5 mA</td>
<td>Error (e.g. standstill)</td>
</tr>
<tr>
<td>4x 4.0 mA</td>
<td>≤ 0 °C</td>
</tr>
<tr>
<td>4…20 mA</td>
<td>0 °C … 200 °C</td>
</tr>
<tr>
<td>&gt; 20 mA</td>
<td>undefined (e.g. &gt; 200 °C)</td>
</tr>
<tr>
<td>Load resistance</td>
<td>4x max. 200 Ω</td>
</tr>
<tr>
<td><strong>Switching outputs:</strong></td>
<td></td>
</tr>
<tr>
<td>Signal</td>
<td>8x Changeover contact (NC and NO)</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>8x 125 VAC / 110 VDC, max. 1 A</td>
</tr>
<tr>
<td>Temp thresholds</td>
<td>8x Adjustable via keyboard</td>
</tr>
<tr>
<td><strong>Measuring tolerance</strong></td>
<td>± 2 K</td>
</tr>
<tr>
<td><strong>Permissible ambient temperature</strong></td>
<td>-40 °C … 65 °C</td>
</tr>
</tbody>
</table>

Table 6

### CSA requirements

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approvals</strong></td>
<td>CSA Certificate of Compliance No.1968359</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VDC ± 10 %</td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Installation category</strong></td>
<td>II</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>2000 m</td>
</tr>
<tr>
<td><strong>Humidity max</strong></td>
<td>80 %; non-condensing</td>
</tr>
</tbody>
</table>

Table 7
### 3.4.1 Terminal assignment

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Description</th>
<th>Channel 1</th>
<th>Channel 2</th>
<th>Channel 3</th>
<th>Channel 4</th>
<th>Channels 1 - 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply voltage, +24 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27 4 … 20 mA output CH.1</td>
</tr>
<tr>
<td>2</td>
<td>Supply voltage, 0 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28 4 … 20 mA output CH.2</td>
</tr>
<tr>
<td>3</td>
<td>CH.1 Output relay, break contact NC (2) Prewarning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CH.1 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CH.1 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>CH.1 Output relay, break contact NC (2) Trip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>CH.1 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>CH.1 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>CH.2 Output relay, break contact NC (2) Prewarning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>CH.2 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>CH.2 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>CH.2 Output relay, break contact NC (2) Trip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>CH.2 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>CH.2 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>CH.3 Output relay, break contact NC (2) Prewarning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>CH.3 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>CH.3 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>CH.3 Output relay, break contact NC (2) Trip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>CH.3 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>CH.3 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>CH.4 Output relay, break contact NC (2) Prewarning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>CH.4 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>CH.4 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>CH.4 Output relay, break contact NC (2) Trip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>CH.4 Output relay, base C (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>CH.4 Output relay, make contact NO (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>0 V basis (GND) for terminals 27 to 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Abbreviations:
- **GND** = Signal ground
- **CH** = Channel
- **NC** = normally closed (break contact)
- **NO** = Normally open (make contact)
- **C** = Basis
- **L** = Low (Prewarning)
- **H** = High (Trip)
3.4.2 Temperature drift

The measuring error of the BTM depends on the heating rate.

Without knowing the drive and turbo coupling design in detail, the following limit temperatures provide a reliable thermal monitoring of the coupling:

During nominal operation:

\[ \vartheta_{B_{\text{max}}} = \begin{cases} \vartheta_{\text{B}}, & \text{with NBR seals (Perbunan)} \\ 105 \degree C, & \text{with FPM seals (Viton)} \end{cases} \]

Temporarily while the driven machine starts or in case of blocking:

\[ \vartheta_{\text{SP}_{\text{max}}} = \vartheta_{\text{SSS}} - 45 \degree C \]

If more details of the drive and turbo coupling are known, it is possible to optimize these limit temperatures. Please consult Voith Turbo.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \vartheta_{B_{\text{max}}} )</td>
<td>Maximum operating temperature</td>
<td>\degree C</td>
</tr>
<tr>
<td>( \vartheta_{\text{SP}_{\text{max}}} )</td>
<td>Maximum peak temperature</td>
<td>\degree C</td>
</tr>
<tr>
<td>( \vartheta_{\text{SSS}} )</td>
<td>Nominal response temperature of fusible plugs</td>
<td>\degree C</td>
</tr>
</tbody>
</table>

3.4.3 Temperature drift for temperature sensor with adapter

The temperature sensor with adapter is used for retrofitting coupling sizes 487 to 650 of older models without rework.

Temporarily while the driven machine starts or in case of blocking:

\[ \vartheta_{\text{SP}_{\text{max}}} = \vartheta_{\text{SSS}} - 60 \degree K \]

In all other respects, please \( \rightarrow \) Chapter 3.4.2 Temperature drift.
4 User Information

This manual will support you in using the non-contacting thermal measuring device (BTM) 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 BTM place of use,
- be read and used by every person who works on the unit or commissions the same.

The non-contacting thermal measuring device 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 characteristics of the BTM 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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Division Industry
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Tel. +49 7951 32 599
Fax +49 7951 32 554
vtcr-ait.service@voith.com
www.voith.com/fluid-couplings

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Voith Turbo reserves the right for modifications.
5 Safety

5.1 Safety information

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

5.1.1 Structure of safety information

<table>
<thead>
<tr>
<th>DANGER WORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard consequences</td>
</tr>
<tr>
<td>Source of hazard</td>
</tr>
<tr>
<td>• Warding off of danger</td>
</tr>
</tbody>
</table>

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

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

Table 9

Hazard consequences
Hazard consequences indicate the kind of hazard.

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

Warding off of danger
Warding off of danger describes the measures to be taken to ward off a danger
5.2 Intended use

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

5.3 Unintended use

- Design range 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 BTM mechanical thermal switch units from third parties.

5.4 General information as to dangerous situations

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

Hazards while working on the non-contacting thermal measuring device:

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
</table>

**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.
- 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!
Arc welding near the BTM:

**NOTICE**

**Damage to property**
Damage to electronic components in the evaluator by non-compliance with the specifications.
- Before beginning with any welding work near the BTM (5 m distance to evaluator, aerial cables or the multi-core connecting cable), disconnect all lines from the evaluator (all 4 aerial cables, 0 V and 24 VDC power supply, all relay outputs, all 4 - 20 mA outputs).
- It is not necessary to remove the evaluator.

Noise:

**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.

**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 measuring device.
- 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.

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 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 measuring device under the supervision of a qualified and authorized person.

The staff in charge of any work to be done on the non-contacting thermal measuring device must
- be reliable,
- have the legal age,
- be trained, instructed and authorized with regard to the intended work.

5.9 Product monitoring

We are under legal obligation to keep the performance of our products under observation, even after shipment. Therefore, please inform us about anything that might be of interest to us. For example:
- Change in operating data,
- experience gained with the machine,
- recurring problems,
- problems experienced with this installation and operating manual.

5.10 Nameplate

![Nameplate](image-url)
6 Installation

WARNING

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

- 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 BTM 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, scope of supply

- Temperature sensor with sealing ring (or temperature sensor with adapter)
- BTM blind screw (counterweight; or BTM-X blind screw)
- Stationary aerial
- Holder for stationary aerial
- Evaluator

The connecting line running from the machine control system to the BTM evaluator is not part of Voith's scope of supply!

In case of a subsequent installation of a BTM into the following turbo coupling sizes, please contact Voith Turbo:

<table>
<thead>
<tr>
<th>Coupling size</th>
<th>Date of manufacture</th>
</tr>
</thead>
<tbody>
<tr>
<td>487</td>
<td>until 2007-06</td>
</tr>
<tr>
<td>562</td>
<td>until 2007-06</td>
</tr>
<tr>
<td>650</td>
<td>until 2006-08</td>
</tr>
<tr>
<td>1000</td>
<td>until 2005-06</td>
</tr>
</tbody>
</table>

Table 10
6.2 Installation - temperature sensor and stationary aerial

**NOTICE**

**Damage to property**
Non-compliance with mounting instructions.
- In order to avoid any damages, mount the temperature sensor and the stationary aerial after installation of and before filling the turbo coupling.
- Please observe the tightening torques for temperature sensors (→ Chapter 3.1) and the stationary aerial (→ Chapter 3.3).

6.2.1 Temperature sensor

- Replace the blind screw by the temperature sensor with the sealing ring in the turbo coupling outer wheel (item 0300) ¹).

Fig. 10

¹) For turbo couplings of type DT, installation is also possible on the opposite outer wheel side.
Installation dimensions for temperature sensors and stationary aerial:

<table>
<thead>
<tr>
<th>Turbo coupling type</th>
<th>Pitch circle diameter Ø F [mm]</th>
<th>Distance ~ H [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>274 T</td>
<td>268 ± 1</td>
<td>151</td>
</tr>
<tr>
<td>274 DT</td>
<td>268 ± 1</td>
<td>189</td>
</tr>
<tr>
<td>366 T</td>
<td>350 ± 1</td>
<td>190.5</td>
</tr>
<tr>
<td>422 T</td>
<td>396 ± 1</td>
<td>203.5</td>
</tr>
<tr>
<td>487 T</td>
<td>470 ± 1</td>
<td>225.5</td>
</tr>
<tr>
<td>562 T</td>
<td>548 ± 1</td>
<td>245.5</td>
</tr>
<tr>
<td>650 T</td>
<td>630 ± 1</td>
<td>286.5</td>
</tr>
<tr>
<td>750 T</td>
<td>729 ± 1</td>
<td>317</td>
</tr>
<tr>
<td>866 T</td>
<td>840 ± 1</td>
<td>355</td>
</tr>
<tr>
<td>866 DT</td>
<td>840 ± 1</td>
<td>599</td>
</tr>
<tr>
<td>1000 T</td>
<td>972 ± 1</td>
<td>368</td>
</tr>
<tr>
<td>1000 DT</td>
<td>972 ± 1</td>
<td>671</td>
</tr>
<tr>
<td>1150 T</td>
<td>1128 ± 1</td>
<td>457</td>
</tr>
<tr>
<td>1150 DT</td>
<td>1128 ± 1</td>
<td>782</td>
</tr>
<tr>
<td>1330 DT</td>
<td>1302 ± 1</td>
<td>911</td>
</tr>
</tbody>
</table>

Table 11

Please see the assembly plan of the turbo coupling for installation dimensions of deviating arrangements.
6.2.2 Temperature sensor with adapter

The temperature sensor with adapter is used for retrofitting coupling sizes 487 to 650 of older models without rework.

- Replace the blind screw by the temperature sensor with adapter and sealing ring in the turbo coupling outer wheel (item 0300).

![Diagram](image)

**Fig. 11**

### Installation dimensions for temperature sensors with adapter and stationary aerial:

<table>
<thead>
<tr>
<th>Turbo coupling type</th>
<th>Pitch circle diameter Ø F [mm]</th>
<th>Distance ~ H [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>487 T</td>
<td>470 ± 1</td>
<td>248</td>
</tr>
<tr>
<td>562 T</td>
<td>548 ± 1</td>
<td>268</td>
</tr>
<tr>
<td>650 T</td>
<td>630 ± 1</td>
<td>309</td>
</tr>
</tbody>
</table>

Table 12

Please see the assembly plan of the turbo coupling for installation dimensions of deviating arrangements.
6.2.3 BTM blind screws

**WARNING**

Risk of personal injuries and damage to property
Impermissible unbalance.
- Always use a BTM blind screw.
- When retrofitting turbo coupling sizes 487 to 650 of older models without rework (temperature sensor with adapter), always use a BTM-X blind screw.

- Replace the opposite blind screw by a BTM blind screw.
- When retrofitting turbo coupling sizes 487 to 650 of older models without rework (temperature sensor with adapter), replace the opposite blind screw by a BTM-X blind screw.

6.2.4 Stationary aerial

**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!
- Please ensure a proper alignment.
- Alignment of aerial and temperature sensors has to be ensured for all operating conditions.
- Pay attention to possible displacements due to changes in temperature.
• Mount the stationary aerial on a bracket using a holder, on the pitch-circle diameter of the temperature sensor and parallel to the turbo coupling axis.
• Set the distance between stationary aerial and temperature sensor to **10 ± 3 mm**! 
6.3 Mounting, connection - evaluator

**NOTICE**

**Damage to property**
Damage to the system by electric components not connected properly.
- The connecting from the machine control system to the BTM evaluator is not part of Voith’s scope of supply.
- The maximal line length is limited by the voltage loss of the 24 V power supply for the BTM evaluator. A connecting line with core cross-sections of 0.5 mm² may be up to 100 m long without the power supply for the BTM evaluator becoming insufficient.
- Moreover, please ensure that the outer line diameter is between 13 mm and 18 mm, and that the connecting line is screened.
- In order to ensure the EMC standard, correctly connect the screening of the connecting line to the cable gland of the BTM evaluator (see mounting instruction for cable gland).
- Maximum distance between stationary aerial and evaluator is defined by the cable length of the stationary aerial and cannot be changed.

- Fix the evaluator to a suitable place where the connecting lines and the housing are protected against damage and direct solar radiation.
- Mount a multi-core connecting cable in the cable gland:
  - Strip the insulation of the connecting line and uncover the braided screen
  - Pass the connecting line through the union nut
  - Insert the connecting line in the clamp
  - Pull the braided screen over the clamp
    (the braid has to cover the O-ring by about 2 mm)
  - Insert the clamp into the intermediate piece
  - Fit the union nut
- Connect the cables according to the terminal assignment list.

Terminal assignment  
→ Chapter 3.4.1
7 Display and Setting of Evaluator

Fig. 13

Keys F1 to F4 are not assigned to a function!

SAFETY INFORMATION

Default temperature thresholds:  
L = 80 °C (LOW)  
H = 90 °C (HIGH)

Provided that the device is used as intended and the aerials are connected, the current temperatures are indicated.  
The display flashes after the set temperature thresholds are exceeded.  
If there is no measuring signal (channel not assigned, speed below 300 rpm, standstill of coupling and sensor not in front of the aerial), message "E 2" is displayed.
7.1 How to display limit values

1. Select the channel by pressing the arrow keys “↑” or “↓”. The current selection is marked by a decimal point.
2. Press key “H” or “L” to display the respective value of the upper and lower limit. The limit value will be displayed for 3 seconds. Then the system switches automatically back to the current temperature display and/or message “E 2” is displayed. This message appears if there is no measuring signal.

![Diagram of how to display limit values](image-url)

Fig. 14
7.2 How to set limit values

1. Select the channel by pressing the arrow keys “↑” or “↓”. The current selection is marked by a decimal point.
2. Press and hold key “L” to set the lower limit The flashing display indicates the current lower limit value.
3. Press key “↑” or “↓” until the lower limit value to be set newly is reached.
4. Release keys “L” and “↑”. The display will indicate the newly set lower limit for 3 seconds. Then the system switches to the current temperature indication and/or message “E 2” is displayed. This message appears if there is no measuring signal. The new lower limit is set.
5. Repeat steps 2-4 to set the upper limit for the current channel, but press key “H” instead of key “L”.
6. Repeat steps 1-5 to adjust the remaining channels.
7. As soon as the decimal point disappears and the currently measured temperature is displayed, all temperature limits are set.

![Fig. 15](image)

- Select the channel (decimal point appears)
- Press and hold
- Set the limit value
- Release
8 Commissioning

**WARNING**

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

- 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!
- The BTM needs an initialization time of 10 s; only then the BTM is ready for operation and the turbo coupling may be started.

---

**Terminal assignment**

→ Chapter 3.4.1

- Check the wiring according to terminal assignment table. Please pay special attention to the proper wiring of the supply voltage!
- Apply supply voltage to the evaluator.
- The BTM needs an initialization time of 10 s.
- After max. 10 s (initialization time) the measuring device displays “E 2”. If the temperature sensor and the stationary aerial are opposite each other, the current temperature is displayed.
- Normal operation can start now. In case of malfunctions, → Chapter 11
- The minimum speed required for an accurate temperature measurement is indicated in (→ Chapter 3). The temperature will not be measured until this speed has been reached. About 1 second after exceeding the minimum speed, the accurate temperature will be measured. If the turbo coupling was cooled down with water after the drive was switched off, the accurate temperature is measured about 5 seconds after the minimum speed was exceeded. A corresponding start-up bypass time (1 s or 5 s) has to be realized in the machine control system.
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 measuring device!

- 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 5.8
– Switch off the unit in which the turbo coupling is installed and secure the switch against inadvertent switch-on.
– For all work performed on the turbo coupling ensure that both the drive motor and the driven machine have stopped running and that 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:**

<table>
<thead>
<tr>
<th>Time</th>
<th>Maintenance work</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months after commissioning, at the latest, then every year</td>
<td>Inspect the machine for irregularities (visual inspection).</td>
</tr>
<tr>
<td></td>
<td>Check the electrical system for sound condition (detailed inspection).</td>
</tr>
<tr>
<td>In case of impurities</td>
<td>Cleaning (⇒ Chapter 9.1).</td>
</tr>
</tbody>
</table>

Table 13

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

### 9.1 Outside cleaning

**NOTICE**

**Damage to property**
Damage to the BTM due to an improper, unsuitable outside cleaning.
• Ensure that the cleaning agent is compatible with the plastic housing of the BTM 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 BTM with a grease solvent, as and when required.
## 10 Disposal

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

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

**How to dispose of the BTM**  
Dispose of the BTM according to the local regulations.

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

<table>
<thead>
<tr>
<th>Material / substance</th>
<th>Reuse</th>
<th>Residual waste</th>
<th>Special waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>x</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cables</td>
<td>x</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seals</td>
<td>-</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Plastics</td>
<td>x ¹)</td>
<td>(x)</td>
<td>-</td>
</tr>
<tr>
<td>Operating media</td>
<td>-</td>
<td>-</td>
<td>x ²)</td>
</tr>
<tr>
<td>Packaging</td>
<td>x</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 14

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 measuring device!

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

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause(s)</th>
<th>Remedial action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display of the evaluator does not work.</td>
<td>Power supply is missing, incorrect or poles are reversed.</td>
<td>Check the power supply and wiring. Properly apply/switch on the power supply.</td>
<td>Chapter 3.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display unit is defective</td>
<td></td>
<td>Check the current outputs: ≤ 0.5 mA: evaluator defective or no measuring signal, restricted operation is possible. ¹ Replace the evaluator. ≥ 0.5 mA: measuring signal is available, restricted operation is possible. ¹ Replace the evaluator.</td>
<td></td>
</tr>
<tr>
<td>The evaluator is defective</td>
<td></td>
<td>Replace the evaluator.</td>
<td></td>
</tr>
</tbody>
</table>

¹ Restricted operation means that a correct temperature measurement is possible, but full functionality of the evaluator is not guaranteed (e.g. only 3 of 4 measuring channels are working, 4 - 20 mA output signals are working, but display does not, ...).
<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause(s)</th>
<th>Remedial action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display “E 2” on the evaluator</td>
<td>Measuring channel is not assigned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temperature sensor is not installed.</td>
<td>Install the temperature sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standstill of coupling and temperature sensor not in front of the aerial (no system malfunction).</td>
<td>Align the temperature sensor with the aerial (for temperature measurement at standstill).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating speed ≤ 300 rpm.</td>
<td>Observe and do not fall below the minimum speed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Faulty alignment of aerial</td>
<td>Check the alignment. Correct the alignment.</td>
<td>Chapter 6.2</td>
</tr>
<tr>
<td></td>
<td>Bracket for aerial is instable</td>
<td>Provide a stable bracket. Avoid any vibrations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measuring channel is defective</td>
<td>Perform a reset by switching off and on the power supply. Use another measuring channel, restricted operation is possible. Replace the evaluator.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aerial is defective</td>
<td>Check the aerial, cable and plugs for damages, check the aerial using another temperature sensor. Replace the aerial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temperature sensor is defective</td>
<td>Check the temperature sensor for damage; check the temperature sensor using another aerial. Replace the temperature sensor.</td>
<td></td>
</tr>
</tbody>
</table>

1) Restricted operation means that a correct temperature measurement is possible, but full functionality of the evaluator is not guaranteed (e.g. only 3 of 4 measuring channels are working, 4 - 20 mA output signals are working, but display does not, ...).
<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause(s)</th>
<th>Remedial action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature output is incorrect.</td>
<td>Load impedance at the current output (4 - 20 mA) is too high</td>
<td>Check the load resistor. Use a permissible load resistor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(maximum value of output signal is limited).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring channel is defective.</td>
<td></td>
<td>Perform a reset by switching off and on the power supply. Use another measuring channel, restricted operation is possible. ¹)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace the evaluator.</td>
<td></td>
</tr>
<tr>
<td>Temperature sensor is defective</td>
<td></td>
<td>Functional check: Set the switching thresholds to L = 80 °C and H = 90 °C. Cause the temperature to rise (water bath or with VTC). Compare the relay switch points with the analog output (4 - 20 mA) and the reference temperature. Replace the temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>Loss of operating medium through the fusible plugs.</td>
<td>Temperature &lt; 0°C Measuring underrange</td>
<td>Wait until the temperature is ≥ 0 °C. In case of measuring underrange it is possible that any temperatures are output between 0 °C and 200 °C.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initialization time for the evaluator was not considered. Check the equipment control system. Observe the initialization time.</td>
<td></td>
</tr>
</tbody>
</table>

¹) Restricted operation means that a correct temperature measurement is possible, but full functionality of the evaluator is not guaranteed (e.g. only 3 of 4 measuring channels are working, 4 - 20 mA output signals are working, but display does not, …).
<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause(s)</th>
<th>Remedial action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of operating medium through the fusible plugs.</td>
<td>Equipment monitoring is not correctly matched to the response temperature or fusible plugs (SSS), temperature drift of BTM is not regarded properly.</td>
<td>Check the temperature monitoring of the equipment control system. Properly regard the temperature drift of the BTM. If necessary, please consult Voith Turbo.</td>
<td>Chapter 3.4.2</td>
</tr>
<tr>
<td>Temperature of Voith turbo coupling (VTC) is too high on motor start-up.</td>
<td></td>
<td>Observe the cooling down time, measure the temperature prior to motor start-up, if necessary.</td>
<td>Chapter 12</td>
</tr>
<tr>
<td>Overload; which has not been regarded when designing the VTC.</td>
<td></td>
<td>Ensure the proper operation, avoid impermissible overload.</td>
<td></td>
</tr>
<tr>
<td>Start-up time of driven machine in case of inner wheel drive is too high due to overload.</td>
<td></td>
<td>Ensure the proper operation, avoid impermissible overload. If the temperature signal is missing, immediately switch off the system.</td>
<td></td>
</tr>
<tr>
<td>Blocking of driven machine in case of inner wheel drive.</td>
<td></td>
<td>Ensure the proper operation, avoid blocking. If the temperature signal is missing, immediately switch off the system.</td>
<td></td>
</tr>
<tr>
<td>Load reduction in case of excess temperature too low or too late.</td>
<td></td>
<td>Determine the reaction of the system in case of load changes. Optimize the load reduction (software).</td>
<td></td>
</tr>
<tr>
<td>Switch-off too late in case of excess temperature.</td>
<td></td>
<td>Determine the reaction of the system to a switch-off. Optimize the switch-off (software).</td>
<td></td>
</tr>
<tr>
<td>Temperature output is too low.</td>
<td></td>
<td>See malfunction “Temperature output is incorrect”.</td>
<td></td>
</tr>
</tbody>
</table>
## Malfunctions - Remedial Actions, Troubleshooting

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause(s)</th>
<th>Remedial action</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of operating medium through the fusible plugs, BTM did not signal excess temperature (relay outputs).</td>
<td>Output relay is wired incorrectly.</td>
<td>Check the wiring. Correct the wiring.</td>
<td>Chapter 3.4.1</td>
</tr>
<tr>
<td></td>
<td>Temperature thresholds are set too high.</td>
<td>Check the settings. Set the temperature thresholds correctly.</td>
<td>Chapter 3.4.2</td>
</tr>
<tr>
<td></td>
<td>Output relay is defective.</td>
<td>Functional check: Set the switching thresholds to $L = 80 , ^\circ!C$ and $H = 90 , ^\circ!C$. Cause the temperature to rise (water bath or with VTC). Compare the relay switch points with the analog output (4 - 20 mA) and the reference temperature. Use another measuring channel, restricted operation is possible. 1) Replace the evaluator.</td>
<td></td>
</tr>
</tbody>
</table>

Please consult Voith Turbo (→ Chapter 12), in case of a malfunction which is not included in this table.

### Table 15

1) Restricted operation means that a correct temperature measurement is possible, but full functionality of the evaluator is not guaranteed (e.g. only 3 of 4 measuring channels are working, 4 - 20 mA output signals are working, but display does not, …).
12 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 BTM 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. 16](image)

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.

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

<table>
<thead>
<tr>
<th>Temperature sensor</th>
<th>Sealing ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use for turbo coupling size</td>
<td>Dimension of thread</td>
</tr>
<tr>
<td>274</td>
<td>M10x1.5</td>
</tr>
<tr>
<td>366 - 650</td>
<td>M18x1.5</td>
</tr>
<tr>
<td>750 - 1330</td>
<td>M24x1.5</td>
</tr>
</tbody>
</table>

Table 16

13.1.1 Adapter

The temperature sensor with adapter is used for retrofitting coupling sizes 487 to 650 of older models without rework.

<table>
<thead>
<tr>
<th>Adapter</th>
<th>Sealing ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use for turbo coupling size</td>
<td>Dimension of thread</td>
</tr>
<tr>
<td>487 – 650</td>
<td>M18x1.5</td>
</tr>
</tbody>
</table>

Table 17
13.2 BTM blind screws

<table>
<thead>
<tr>
<th>Blind screw</th>
<th>Sealing ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use for turbo coupling size</td>
<td>Dimension of thread</td>
</tr>
<tr>
<td>274</td>
<td>M14x1.5</td>
</tr>
<tr>
<td>366 - 650</td>
<td>M18x1.5</td>
</tr>
<tr>
<td>750 - 1330</td>
<td>M24x1.5</td>
</tr>
</tbody>
</table>

Table 18

13.2.1 BTM-X blind screw

The BTM-X blind screw serves as mass balance to the temperature sensor with adapter (retrofit to coupling sizes 487 to 650 of older models without rework).

<table>
<thead>
<tr>
<th>BTM-X blind screw</th>
<th>Sealing ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use for turbo coupling size</td>
<td>Dimension of thread</td>
</tr>
<tr>
<td>487 – 650</td>
<td>M18x1.5</td>
</tr>
</tbody>
</table>

Table 19

13.3 Stationary aerial

<table>
<thead>
<tr>
<th>Stationary aerial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use for turbo coupling size</td>
</tr>
<tr>
<td>366 – 1330</td>
</tr>
</tbody>
</table>
### 13.3.1 Holder

<table>
<thead>
<tr>
<th>Use for turbo coupling size</th>
<th>Material No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>366 – 1330</td>
<td>201.01333510</td>
</tr>
</tbody>
</table>

Table 21

### 13.4 Evaluator

<table>
<thead>
<tr>
<th>Use for turbo coupling size</th>
<th>Material No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>366 – 1330</td>
<td>201.01236310</td>
</tr>
</tbody>
</table>

Table 22
14 Representatives -
Voith Turbo GmbH & Co. KG

→ Annex (see List of Voith Representatives)
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List of Voith - Representatives

West-Europe:

Germany (VTCR):
Voith Turbo GmbH & Co. KG
Industrie
Voithstr. 1
74564 CRAILSHEIM
GERMANY
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Fax: +49-7951 32-480
e-mail: startup.components@voith.com
www.voithturbo.com/fluid-couplings

Service:
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Fax: +49 7951 32-554
e-mail: vtc-ait.service@voith.com

Emergency Hotline (24/7):
Phone: +49 7951 32-599

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Fax: +43-2252-81118-99
e-mail: info@indukont.at

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BELGIUM
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Fax: +32-2-7626159
e-mail: voithturbo.be@voith.com

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Fax: +32-2-7626159
e-mail: voithfrance@voith.com

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Fax: +33-1-4815 6901
e-mail: voithfrance@voith.com

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Phone: +44-20-8667 0333
Fax: +44-20-8667 0403
e-mail: Turbo.UK@voith.com

Emergency Hotline (24/7):
Phone: +44-20-8667 0333

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see Germany (VTCR)

Greenland:
see Denmark (VTDK)

Ireland:
see Great Britain (VTGB)

Italy (VTIV):
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ITALY
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Fax: +39-05-2235-6790
e-mail: info.voithturbo@voith.com

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Luxembourg:
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Fax: +31-571-2764-45
e-mail: voithnederland@voith.com

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2013 SKJETTEN
NORWAY
Phone: +47 6384 7020
Fax: +47 6384 7021
e-mail: info.turbo.norway@voith.com

Portugal:
see Spain (VTEV)

Spain (VTEV):
Voith Turbo S. A.
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P. A. L. Coslada
28820 COSLADA (MADRID)
SPAIN
Phone: +34-91-6707800
Fax: +34-91-6707840
e-mail: info.voithturbospain@voith.com

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Voith Turbo AB
Finspångsgratan 46
16335 SPÅNGA- STOCKHOLM
SWEDEN
Phone: +46-8-564-755-50
Fax: +46-8-564-755-60
e-mail: voithturbo.sweden@voith.com

Switzerland:
see Germany (VTCR)
<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>East-Europe:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Albania</td>
<td></td>
<td>see Hungary (VTHU)</td>
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<tr>
<td>Bosnia Herzegovina</td>
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<td>see Hungary (VTHU)</td>
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<tr>
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<tr>
<td>Croatia</td>
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</tr>
<tr>
<td>Czech Republic (VTCZ)</td>
<td></td>
<td>Voith Turbo s.r.o.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Hviezdoslavova 1a</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>62700 BRNO CZECH REPUBLIC</td>
<td>+420-548-226070</td>
<td>+420-548-226051</td>
<td><a href="mailto:info@voith.cz">info@voith.cz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phone: +420-548-226070</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Fax: +420-548-226051</td>
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<td>e-mail: <a href="mailto:info@voith.cz">info@voith.cz</a></td>
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<tr>
<td></td>
<td>Estonia</td>
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<tr>
<td></td>
<td>Hungary (VTHU)</td>
<td>Voith Turbo Kft.</td>
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<tr>
<td></td>
<td></td>
<td>Felvég Útca 4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2051 BIATORBÁGY HUNGARY</td>
<td>+36-23-312-431</td>
<td>+36-23-310-441</td>
<td><a href="mailto:vthu@voith.com">vthu@voith.com</a></td>
</tr>
<tr>
<td></td>
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<td>Phone: +36-23-312-431</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Fax: +36-23-310-441</td>
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<tr>
<td></td>
<td>Kosovo</td>
<td>see Hungary (VTHU)</td>
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<tr>
<td></td>
<td>Latvia</td>
<td>see Poland (VTPL)</td>
<td></td>
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<td>+48-44 646 8848</td>
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<td><a href="mailto:voith.romania@voith.com">voith.romania@voith.com</a></td>
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<td>Branch Office Moskau</td>
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<td>+7 495 915-3816</td>
<td><a href="mailto:volm@turbo.ru">volm@turbo.ru</a></td>
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<td>Degtaryvska Sr. 25, building 1</td>
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<td>Voith Turbo Inc.</td>
<td>+1-905-670-3122</td>
<td>+1-905-670-867</td>
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<td>171 Ambassador Drive, Unit 1</td>
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<td>Mexico (VTX)</td>
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<td>+52-55-5543 2885</td>
<td><a href="mailto:voithmexico@voith.com">voithmexico@voith.com</a></td>
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<td>U.S.A. (VTI)</td>
<td>Voith Turbo Inc.</td>
<td>+1-717-767 8419</td>
<td>+1-717-767 9201</td>
<td><a href="mailto:VTIServiceCenter@voith.com">VTIServiceCenter@voith.com</a></td>
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<td>Voith Turbo Ltd.</td>
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