Operating manual
Thermophant T TTR31, TTR35
Temperature switch
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Endress+Hauser
1 Safety instructions

1.1 Designated use
The Thermophant T is a temperature switch for monitoring, displaying and regulating process temperatures. The device has been safely built with state-of-the-art technology and meets the applicable requirements and EC Directives. It can, however, be a source of danger if used incorrectly or for anything other than the designated use.

1.2 Installation, commissioning and operation
Installation, electrical connection, commissioning, operation and maintenance of the measuring system must be carried out by trained, qualified specialists authorised to perform such work by the facility’s owner-operator. The specialist must have read and understood these Operating Instructions and must follow the instructions they contain. The device may only be modified and repair work carried out if this is explicitly permitted in the Operating Instructions. Damaged devices which could be a source of danger may not be commissioned and must be labelled and identified as defective.

1.3 Operational safety
- Functional safety
  The Thermophant T temperature switches were developed according to the standards IEC 61508 and IEC 61511-1 (FDIS). The device version with PNP switch output and additional analog output is equipped with fault detection and fault prevention facilities within the electronics and software. This device version can therefore be used to monitor temperature up to SIL 2 (Safety Integrity Level). The attainable SIL value is determined by the safety technical characteristics of probability of failure, hardware fault tolerance and the safe failure fraction. Details on this may be found in the Functional Safety Manual (in development).
- Ex-area
  The Thermophant T is not approved for use in Ex-areas.

1.4 Return
The following procedures must be carried out before a device is returned to Endress+Hauser:
- Always enclose a fully completed “Declaration of Contamination” form with the device. Only then can Endress+Hauser transport and examine a returned device. A copy of the “Declaration of Contamination” can be found on the second last page of these Operating Instructions.
- Remove all fluid residues. This is particularly important if the fluid is hazardous to health, e.g. flammable, toxic, caustic, carcinogenic, etc.

⚠️ Warning!
Do not return a measuring device if you are not absolutely certain that all traces of hazardous substances have been removed, e.g. substances which have penetrated crevices or diffused through plastic.
## 2 Device identification

### 2.1 Nameplate

To identify your device, compare the complete order code and the version information on the delivery papers with the data on the nameplate.

![Nameplate for device identification (as example)](image.png)

**Fig. 1: Nameplate for device identification (as example)**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Order code</td>
<td>8</td>
<td>Connection diagram</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Serial number</td>
<td>7</td>
<td>Measuring range</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TAG number</td>
<td>6</td>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Release number (change status)</td>
<td>5</td>
<td>Degree of protection</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Connection values</td>
<td>4</td>
<td>Approvals</td>
<td></td>
</tr>
</tbody>
</table>

Note!
The release number indicates the change status of the device. A change in the last two figures does not have any affect on the compatibility - see also → Chap. 7.
3 Installation

3.1 Incoming acceptance, storage

- Incoming acceptance:
  Check the packaging and the device for damage. Check that the goods delivered are complete and nothing is missing.

- Storage:
  Storage temperature −40 °C to +85 °C (−40 °F to +185 °F).

3.2 Dimensions

Fig. 2: Dimensions in mm (inches)

Version L in 100 and 200 mm (3.94 and 7.87”), version L* = 50 mm (1.97”) with reduced sensor tip
M 12x1 connector as per IEC 60947-5-2
M 16x1.5 or ½ NPT valve plug as per DIN 43650A/ISO 4400
### 3.3 Process connection

The following table illustrates the versions of Thermophant T.

<table>
<thead>
<tr>
<th>Field of application</th>
<th>TTR31</th>
<th>TTR35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring, display and control of process temperatures</td>
<td><img src="image1" alt="TTR31" /></td>
<td><img src="image2" alt="TTR35" /></td>
</tr>
<tr>
<td>Monitoring, display and control of process temperatures in hygienic processes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Item A</th>
<th>Item B</th>
<th>Item C</th>
<th>Item D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version without process connection ('w'). Suitable welding bosses and coupling (see Section 6)</td>
<td></td>
<td></td>
<td></td>
<td>Adapter concept - version with M24x1.5 thread for adapters with process connection for hygienic processes (see Section 6.1.2)</td>
</tr>
<tr>
<td>Version with thread process connection ANSI ¾&quot; NPT (f = AF14) and ½&quot; NPT (f = AF27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version with thread process connection G ¾A (f = AF14) and G ½A (f = AF27) as per ISO 228</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor length L</th>
<th>Version L in 100 and 200 mm (3.94 and 7.87&quot;), version L = 50 mm (1.97&quot;) only with reduced sensor tip</th>
</tr>
</thead>
</table>

| Measuring range | -50 °C to +150 °C (-58 °F to 302 °F) |
3.4 Installation instructions

Fig. 3: Possible installation options for temperature monitoring in pipes

1. TTR31
2. TTR35 for use in hygienic processes

Mounting instructions:
- Installation at angle pieces, against the direction of flow (Fig. 3, Item A)
- Installation in smaller pipes, inclined against the direction of flow (Fig. 3, Item B)
- Installation vertical to the direction of flow (Fig. 3, Item C)
- The on-site display can be rotated electronically 180° – see Section 5.1 "On-site operation"
- The housing can be rotated up to 310°
4  Wiring

4.1  DC voltage version with M12 connector

Fig. 4: Thermophant T with M12x1 connector

A1: 1x PNP switch output
A2: PNP switch outputs R1 and (diagnosis/break contact with adjustment "DESINA")
A3: PNP switch output with additional analog output
A3': PNP switch output with additional analog output (PIN assignment with "DESINA" setting)

Note!
DESINA (→ Chap. 5.1.3 Basic settings):
R2 = Diagnosis/break contact (more informations about DESINA see www.desina.de)

4.2  DC voltage version with valve connector

Fig. 5: Thermophant T with M 16x1.5 or ½ NPT valve plug

B: 1x PNP switch output
5 Operation

5.1 On-site operation

The Thermophant T is operated by means of three keys. The digital display and the light emitting diodes (LED) support navigation in the operating menu.

Fig. 6: Position of operating elements and possibilities for display

Background illumination of the digital display:
- White = OK status
- Red = error status
5.1.1 Navigating in the operating menu

Fig. 7: Navigating in the operating menu

A Function group selection

B Function selection

1. Enter the operating menu
   – Press the E key for longer than 3 s

2. Select the "Function group" with the + or – key

3. Select the "Function" with the E key

4. Enter or change parameters with the + or – key
   – Then return to "Function" with the E key
   Note: If software locking is enabled, it must be disabled before
   making entries or changes

5. Press the E key several times to return to the "Function group"

6. Jump back to the measuring position (Home position)
   – Press the E key for longer than 3 s

7. Query to save data (select "YES" or "NO" with the + or – key)
   – Confirm with the E key

Note!
Changes to the parameter settings only become effective if you choose ‘YES’ when asked to
save data.
5.1.2 Structure of the operating menu

The structure below shows all the possible fields of the operating menu.

![Operating menu diagram](image_url)

Fig. 8: Operating menu: A function groups, B functions, C settings
## 5.1.3 Basic settings

<table>
<thead>
<tr>
<th>Base</th>
<th>Basic settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASE</strong></td>
<td><strong>UNIT</strong></td>
</tr>
<tr>
<td><strong>ZERO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>GET 'Z</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DISP</strong></td>
<td>Display</td>
</tr>
<tr>
<td><strong>TAU</strong></td>
<td>Damping: display value, output signal</td>
</tr>
<tr>
<td><strong>DESI</strong></td>
<td>DESINA</td>
</tr>
<tr>
<td><strong>SAFC</strong></td>
<td>Safety confirmation</td>
</tr>
<tr>
<td><strong>SAFR</strong></td>
<td>Safety release code</td>
</tr>
</tbody>
</table>
5.1.4 Output setting

- Hysteresis function
  The hysteresis function enables two-point control via a hysteresis. Depending on the temperature \( T \), the hysteresis can be set via the switch point \( SP \) and the switch-back point \( RSP \).

- Window function
  The window function enables the monitoring of a process temperature range.

- NO contact or NC contact
  This switch function is freely selectable.

- Factory setting (if no customer-specific settings have been ordered):
  Switch point \( SP \) 1: 45%; Switch-back point \( RSP \) 1: 44.5%
  Switch point \( SP \) 2: 55%; Switch-back point \( RSP \) 2: 54.5%

- Range of adjustment
  \( LRL = \) Lower Range Limit
  \( URL = \) Upper Range Limit
  \( LRV = \) Lower Range Value
  \( URV = \) Upper Range Value

---

![Diagram](image.png)

Fig. 9: ① Hysteresis function, ② Window function, ③ NO contact switch status, ④ NC contact switch status \( SP \) Switch point; \( RSP \) Switch-back point
### Output/output 2 (optional)

<table>
<thead>
<tr>
<th>OUT/OUT2</th>
<th>Switching characteristic</th>
<th>WINC: window/NC contact</th>
<th>HYNC: hysteresis/NC contact</th>
<th>WINO: window/NO contact</th>
<th>HYNO: hysteresis/NO contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP SP2</td>
<td>Switch point value</td>
<td>0.0</td>
<td>Switch point -49.5 to 150 °C (-57.1 to 302 °F) in increments of 0.1 °C (0.18 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSP RSP2</td>
<td>Switch-back point value</td>
<td>0.0</td>
<td>Switch-back point -50 to 149 °C (-58 to 300.2 °F) in increments of 0.1 °C (0.18 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSP TSP2</td>
<td>Switch point delay</td>
<td>0.0</td>
<td>Delay time 0...99 s in increments of 0.1 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRSP TRS2</td>
<td>Switch-back point delay</td>
<td>0.0</td>
<td>Delay time 0...99 s in increments of 0.1 s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Min. distance between SP and RSP: 0.5 °C/K (0.9 °F)
<table>
<thead>
<tr>
<th>OUT/OUT2</th>
<th>Output/output 2 (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4-20</strong></td>
<td><strong>SETL</strong></td>
</tr>
<tr>
<td></td>
<td>Value for 4 mA (LRV)</td>
</tr>
<tr>
<td></td>
<td>0 - 0</td>
</tr>
<tr>
<td></td>
<td>-50 to 130 °C (-58 to 266 °F) Lower range value in increments of 0.1 °C (0.18 °F)</td>
</tr>
<tr>
<td><strong>SETU</strong></td>
<td>Value for 20 mA (URV)</td>
</tr>
<tr>
<td></td>
<td>0 - 0</td>
</tr>
<tr>
<td></td>
<td>-30 to 150 °C (-22 to 302 °F) Enter upper range value in increments of 0.1 °C (0.18 °F)</td>
</tr>
<tr>
<td><strong>GET'L</strong></td>
<td>Temperature applied for 4 mA (LRV)</td>
</tr>
<tr>
<td></td>
<td>0 - 0</td>
</tr>
<tr>
<td></td>
<td>Take temperature value as lower range value (not via PC software)</td>
</tr>
<tr>
<td><strong>GET'U</strong></td>
<td>Temperature applied for 20 mA (URV)</td>
</tr>
<tr>
<td></td>
<td>0 - 0</td>
</tr>
<tr>
<td></td>
<td>Take temperature value as upper range value (not via PC software)</td>
</tr>
<tr>
<td><strong>FCUR</strong></td>
<td>Error current</td>
</tr>
<tr>
<td></td>
<td>MIN MAX HOLD</td>
</tr>
<tr>
<td></td>
<td>Current value in event of error: MIN = ≤ 3.6 mA MAX = ≥ 21.0 mA HOLD = last value</td>
</tr>
</tbody>
</table>

Min. distance between SETL and SETU: 20 °C/K (36 °F)
### 5.1.5 Service function setting

<table>
<thead>
<tr>
<th>SERV</th>
<th>Service functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK</td>
<td>Locking code</td>
</tr>
<tr>
<td>CODE</td>
<td>Change locking code</td>
</tr>
<tr>
<td>PRES</td>
<td>Reset</td>
</tr>
<tr>
<td>REV</td>
<td>Revision counter</td>
</tr>
<tr>
<td>STA</td>
<td>Last device status</td>
</tr>
<tr>
<td>SIM</td>
<td>Simulation output 1 or 2</td>
</tr>
<tr>
<td>MAX</td>
<td>Max. indicator</td>
</tr>
<tr>
<td>MIN</td>
<td>Min. indicator</td>
</tr>
</tbody>
</table>
5.2 Operation with PC and Readwin® 2000

In addition to the operating options listed in the previous "On-site operation" section, the Readwin® 2000 configuration software provides further information on the Thermophant T:

<table>
<thead>
<tr>
<th>Function group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERV</td>
<td>Number of switch changes for output 1</td>
</tr>
<tr>
<td></td>
<td>Number of switch changes for output 2</td>
</tr>
<tr>
<td></td>
<td>Device status</td>
</tr>
<tr>
<td>INFO</td>
<td>Tag number</td>
</tr>
<tr>
<td></td>
<td>Order code</td>
</tr>
<tr>
<td></td>
<td>Limit switch serial number</td>
</tr>
<tr>
<td></td>
<td>Sensor serial number</td>
</tr>
<tr>
<td></td>
<td>Electronics serial number</td>
</tr>
<tr>
<td></td>
<td>Device release (change status)</td>
</tr>
<tr>
<td></td>
<td>Hardware version</td>
</tr>
</tbody>
</table>

Fig. 10: Operation with PC
5.2.2 Operating Instructions for Readwin® 2000
Comprehensive information on the ReadWin® 2000 configuration software may be found in the Operating Instructions BA 137R/09/en.

6 Accessories
All dimensions in the drawings are given in mm (inches).

6.1 Adapter concept for TTR35
The process connection is an adapter and the sensor module has an adapter thread (see Section 3.3, process connection). As a result, the process connection can easily be changed at a later stage.

6.1.1 Adapter change
The adapter can be changed on TTR35.

<table>
<thead>
<tr>
<th>Function group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO</td>
<td>Software version</td>
</tr>
</tbody>
</table>

Fig. 11: Changing the adapter
① Sensor module with adapter thread
② Standard O-ring
③ Adapter
Please note the following when changing the adapter:

- Use a new O-ring. Diameter 15.54 x 2.62 mm (0.612” x 0.103”). EPDM 70 Shore FDA 3-A approved.
- The device (sensor module) can be fixed in place with an open-ended wrench AF 27.
- The adapter can be screwed on with an open-ended wrench AF 27 or AF 32 (depending on the process connection, (see Section 6.1.2 adapter versions)). The maximum torque is 80 Nm. The thread can become loose if exposed to severe strain through pressure and temperature. For this reason, the air-tightness must be checked regularly and the thread tightened if necessary.
- When changing the adapter, make sure that the sensor tube of the sensor is not damaged.

Note!
We recommend to change the O-ring in the same time frame as of all other sealings in your process.

6.1.2 Adapter versions
TTR35: order numbers for clamp adapter versions.
Version DB: order no. 52023994
Version DL: order no. 52023995
6.1.3 O-ring for adapter change
O-ring 15.54 x 2.62 mm (0.612" x 0.103"), EPDM 70 Shore FDA, order number 52024267

6.2 Welding bosses and coupling

6.2.1 Welding boss with sealing taper
Collar welding boss
Seal, moveable coupling, material of parts in contact with process: 316L, PEEK
Order number: 51004751
6.2.2 Collar welding boss
Material of parts in contact with process: 316L
Order no. 51004752

6.2.3 Coupling with sealing taper
G 1/4” process connection
Seal, moveable coupling, material of parts in contact with process: 316L
Order no. 51004753

6.3 Electrical connection

6.3.1 Plug-in jack
M 12x1 plug-in jack
Self-made connection to M 12x1 housing connector
Order number: 52006263

6.3.2 Elbow plug
Elbow plug
4-pole M12 connector for customised cable construction, elbowed, IP67, PG7
Order number: 51006327
6.3.3 Connecting cable

- Cable, 4 x 0.34 mm² (22 AWG) with M12 socket, elbowed, screw plug, length 5 m (16.4 ft), PVC cable – Order number: 52010285

- Cable, 4 x 0.34 mm² (22 AWG) with M12 socket, with LED, elbowed, 316L screw plug, length 5 m (16.4 ft), PVC cable, special for hygiene applications, order number: 52018763

Display:
- gn: device operational
- ye1: switch status 1
- ye2: switch status 2

Core colours:
- 1 = BN brown
- 2 = WH white
- 3 = BU blue
- 4 = BK black

6.4 Configuration kit

- Configuration kit for PC-programmable transmitters – ReadWin® 2000 setup program and interface cable for PCs with USB port; Adapter for transmitters with 4-pole post connector

Order code: TXU10-AA

- ReadWin® 2000 can be downloaded free of charge directly from the internet at the following address: www.endress.com/readwin
7  Trouble-shooting

7.1  Errors and warnings

If an error in the device occurs, the colour of the status LED changes from green to red and the background illumination of the digital display changes from white to red. The display shows:

- **E-code for errors**  
  In the event of an error message, the measured value is uncertain.

- **W-code for warnings**  
  In the event of a warning, the measured value is reliable.

<table>
<thead>
<tr>
<th>Code</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E011</td>
<td>Device configuration faulty</td>
</tr>
<tr>
<td>E012</td>
<td>Error in measurement or underreach/overreach in SIL mode</td>
</tr>
<tr>
<td>E015</td>
<td>Error in EEPROM</td>
</tr>
<tr>
<td>E019</td>
<td>Power supply has undervoltage/overvoltage</td>
</tr>
<tr>
<td>E020</td>
<td>Error in Flash</td>
</tr>
<tr>
<td>E021</td>
<td>Error in RAM</td>
</tr>
<tr>
<td>E022</td>
<td>USB supply voltage</td>
</tr>
<tr>
<td>E025</td>
<td>Switching contact 1 is not open although it should be</td>
</tr>
<tr>
<td>E026</td>
<td>Switching contact 2 is not open although it should be</td>
</tr>
<tr>
<td>E040</td>
<td>VCC (Controller voltage) is out of working area</td>
</tr>
<tr>
<td>E042</td>
<td>Output current cannot be generated</td>
</tr>
<tr>
<td>E044</td>
<td>Output current drifts too much (± 0.5 mA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>W107</td>
<td>Simulation active</td>
</tr>
<tr>
<td>W202</td>
<td>Temperature outside the sensor range (not SIL mode)</td>
</tr>
</tbody>
</table>
7.2 Repair
A repair is not planned.

7.3 Disposal
When disposing, ensure that the materials of the device components are separated and processed accordingly.

7.4 Change status (release)
The release number on the nameplate and in the Operating Instructions indicates the change status of the device: XX, YY, ZZ (example: 01.02.01).

XX Change in the main version.
   Compatibility no longer provided. Device and Operating Instructions change.
YY Change in functionality and operation.
   Compatibility provided. Operating Instructions change.
ZZ Trouble-shooting and internal modifications.
   Operating Instructions do not change.

7.5 Release history

<table>
<thead>
<tr>
<th>Date</th>
<th>Release no. device</th>
<th>Device and software-No. (Firmware/Software)</th>
<th>Changes</th>
<th>Operating manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>06.2004</td>
<td>1.00.00</td>
<td>1.00.00</td>
<td></td>
<td>KA174r/09/en (51008032)</td>
</tr>
<tr>
<td>12.2004</td>
<td>1.01.00</td>
<td>1.00.00</td>
<td>New analog electronics</td>
<td>BA201r/09/en (51009833)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>W209</td>
<td>Device starts</td>
</tr>
<tr>
<td>W210</td>
<td>Configuration modified</td>
</tr>
<tr>
<td>W212</td>
<td>Sensor signal outside the permitted range (not SIL mode)</td>
</tr>
<tr>
<td>W250</td>
<td>Number of switch cycles exceeded</td>
</tr>
<tr>
<td>W270</td>
<td>Short-circuit and overload at output 1</td>
</tr>
<tr>
<td>W280</td>
<td>Short-circuit and overload at output 2</td>
</tr>
</tbody>
</table>
8 The most important technical data

8.1 Power supply
Supply voltage
- DC voltage version 12...30 V DC
Current consumption
- Without load < 60 mA, with reverse polarity protection
Power supply failure
- Behaviour in case of overvoltage (> 30 V)
  The device works continuously up to 34 V DC without any damage. No damage is caused to
  the device in case of a short-term overvoltage up to 1 kV (as per IEC 61000-4-5). If the supply
  voltage is exceeded, the properties specified are no longer guaranteed.
- Behaviour in case of undervoltage
  If the supply voltage drops below the minimum value, the device switches off (status as if not
  supplied with power = switch open).

8.2 Output
Switching capacity
- Switch status ON: $I_a \leq 250$ mA
- Switch status OFF: $I_a \leq 1$ mA
- Switching cycles: > 10,000,000
- Voltage drop PNP: $\leq 2$ V
- Overload protection
  Automatic load testing of switching current; output is switched off in case of overcurrent, the
  switching current is tested again every 0.5 s; max. capacitance load: 14 $\mu$F for max. supply
  voltage (without resistive load).
Load (analog output)
- Max. $(V_{supply} - 6.5 \text{ V}) / 0.022 \text{ A}$
Signal on alarm
- Analog output: $\leq 3.6$ mA or $\geq 21.0$ mA adjustable
  (if setting $\geq 21.0$ mA the output is $\geq 21.5$ mA)
- Switch outputs: In safe state (switch normally open)

8.3 Operating conditions
- Any orientation
- Any position-dependent zero shift can be corrected
  Offset: $\pm 20$ % URL
Operating conditions: Environment
- Ambient temperature range
  $-40...+85$ °C ($-40...+185$ °F)
- Storage temperature
  $-40...+85$ °C ($-40...+185$ °F)
The most important technical data

TTR31, TTR35

Operating conditions: Process

- Process temperature limits
  -50 to 150 °C (-58 to 302 °F)

Caution!

Restrictions depending on process connection and ambient temperature:
- No restriction with coupling (see Accessories, → Chap. 6.2.1, → Chap. 6.2.3, order no. 51004751, 51004753) and neck tube length min. 20 mm.
- with process connection:

<table>
<thead>
<tr>
<th>max. ambient temperature</th>
<th>max. process temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 25 °C (77 °F)</td>
<td>no restriction</td>
</tr>
<tr>
<td>up to 40 °C (104 °F)</td>
<td>135 °C (275 °F)</td>
</tr>
<tr>
<td>up to 60 °C (140 °F)</td>
<td>120 °C (248 °F)</td>
</tr>
<tr>
<td>up to 85 °C (185 °F)</td>
<td>100 °C (212 °F)</td>
</tr>
</tbody>
</table>

- Process pressure limits
  p/T load diagram as per DIN 43763 or Dittrich

Fig. 12: p/T load diagram

- $L = \text{insertion length}$
- $v_l = \text{medium velocity air}$
- $v_w = \text{medium velocity water}$
9 Dangerous good sheet

**Declaration of Contamination**

*Endress+Hauser People for Process Automation*

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Contamination", with your signature, before your order can be handled. Please make absolutely sure to include it with the shipping documents, or - even better - attach it to the outside of the packaging.

Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination", bevor Ihr Auftrag bearbeitet werden kann. Legen Sie diese unbedingt den Versandpapieren bei oder bringen Sie sie idealerweise außen an der Verpackung an.

<table>
<thead>
<tr>
<th>Type of instrument / sensor</th>
<th>Serial number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geräte-/Sensortyp</td>
<td>Seriennummer</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Process data / Prozessdaten</th>
<th>Temperature / Temperatur</th>
<th>[°C]</th>
<th>Pressure / Druck</th>
<th>[Pa]</th>
<th>Conductivity / Leitfähigkeit</th>
<th>[S]</th>
<th>Viscosity / Viskosität</th>
<th>[m²/s]</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Medium and warnings</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warnhinweise zum Medium</td>
<td></td>
</tr>
<tr>
<td>* explosive; entzündlich; dannentwicklend; bedrohlich; radioaktiv*</td>
<td></td>
</tr>
</tbody>
</table>

Please tick should one of the above be applicable, include security sheet and, if necessary, special handling instructions.

Zum Inhaltsverzeichnis: marken einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beifügen.

**Reason for return** / Grund zur Rücksendung

________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________

We hereby certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free from any residues in dangerous quantities.

Hiermit bestätigen wir, dass die zurückgesandten Teile sorgfältig gereinigt wurden, und nach unserem Wissen frei von Rückständen in gefährbringender Menge sind.

______________________________________________
(Ort, Datum)

______________________________________________
(Firmenstempel und rechtsverbindliche Unterschrift)

**Company data** / Angaben zum Absender

<table>
<thead>
<tr>
<th>Company / Firma</th>
<th>Contact person / Ansprechpartner</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Address / Adresse</th>
<th>Phone number / Telefon</th>
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</table>

Fax / E-Mail _______________________________________

Y _______________________

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______________________________________________
(place, date / Ort, Datum)