

# Technical Information

## TU51, TU52, TU53 and TU54

Heavy duty - general purpose thermowell made of drilled barstock material



### Application

The thermowell is designed for use with RTD and thermocouple assemblies mainly in heavy duty applications for process industries.

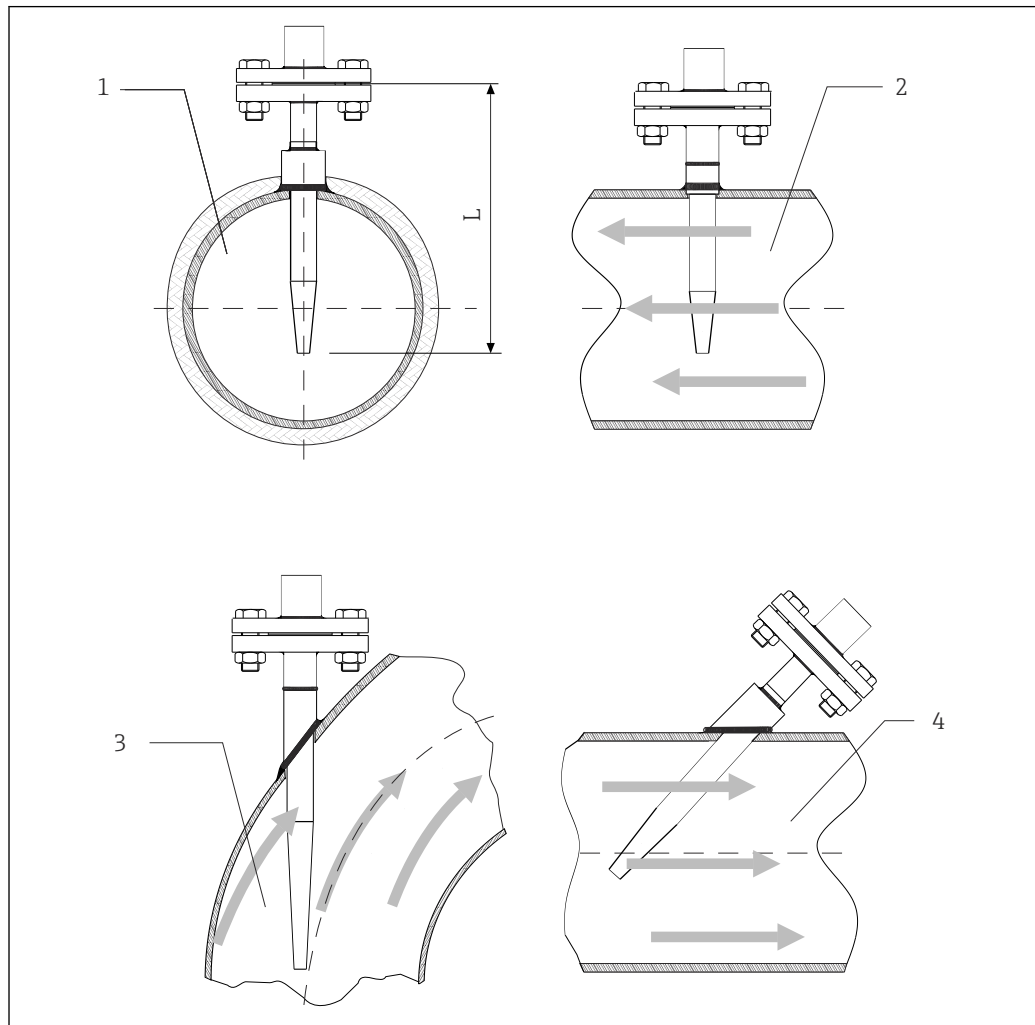
- Special versions can be manufactured according to specifications.

### Your benefits

- Industry standard thermowells manufactured from round barstock.
- The process connections can be weld-in, socket weld, threaded, or flanged with double sided standard or full penetration welds.
- The thermowell stem shape can be straight, stepped, or tapered.
- Variable lag and immersion lengths.
- CRN approved thermowells
- The standard material of construction is 316/316L

## Installation Conditions

### Installation instructions



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#### 1 Installation examples

1-2 In pipes with a small cross section the sensor tip should reach or extend slightly past the center line of the pipe (-L).

3-4 Tilted installation

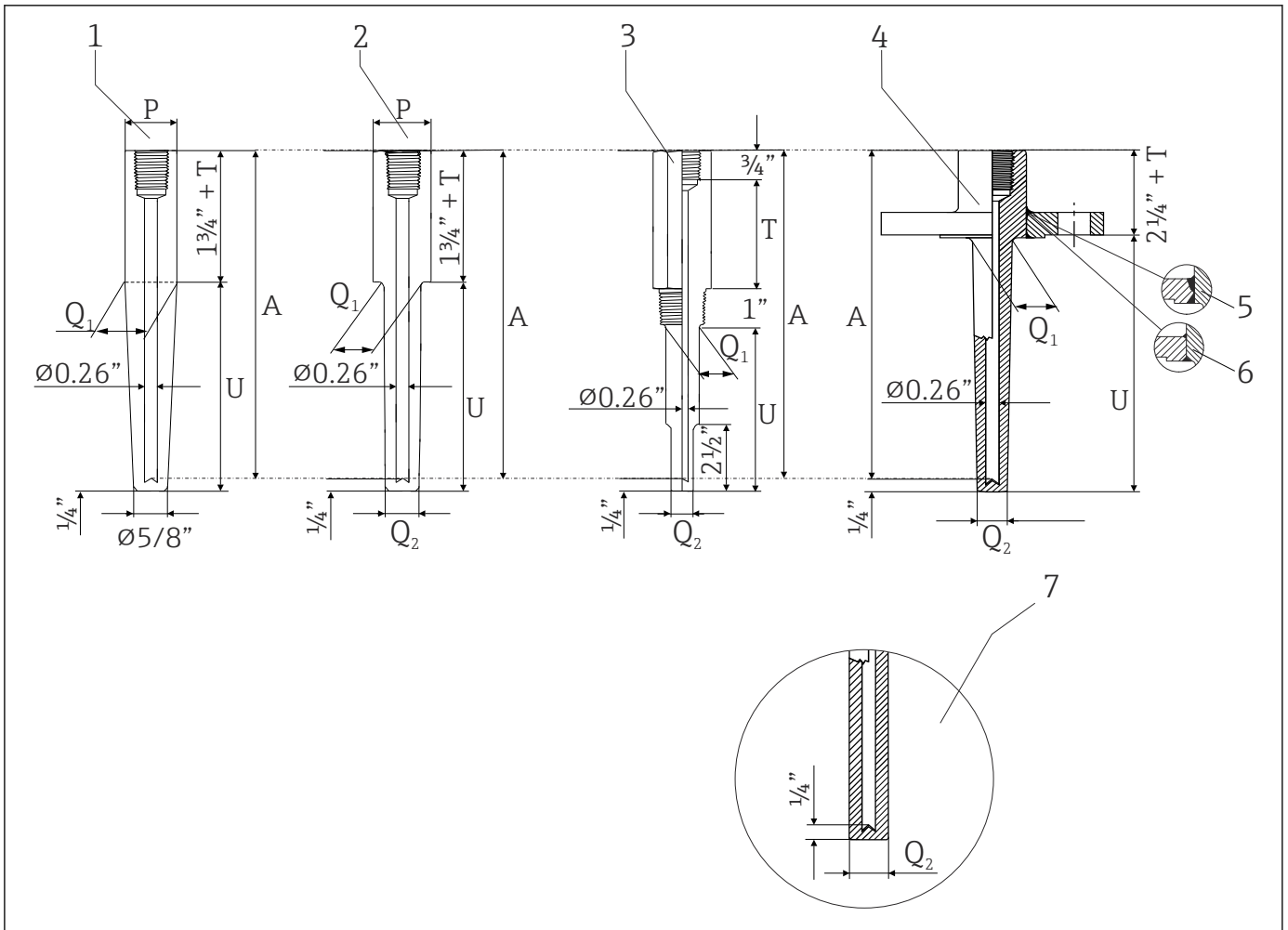
The immersion length of the thermometer influences the accuracy. If the immersion length is too short the measurement may be impacted by the pipe wall and process connection causing errors. If installing into a pipe then the ideal immersion length should extend to or slightly past the center line of the pipe, if possible (see 1 and 2), especially in laminar flow. A further solution could be an angled (tilted) installation (see 3 and 4). When determining the immersion length, take into account all process (e.g. flow velocity, viscosity, process pressure).

- Installation possibilities: Pipes, tanks or other plant components
- A general rule of thumb is to design the insertion length to be 10 times the diameter of the thermowell.

## Mechanical Construction

### Design, dimensions

All dimensions in inches. For values related to the graphics please refer to the tables and equations below.



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2 Dimensions of the thermowells

- 1 TU51 weld-in thermowell (tapered)
- 2 TU52 socket weld thermowell (tapered)
- 3 TU53 threaded thermowell (stepped)
- 4 TU54 flange thermowell (tapered)
- 5 Full penetration weld thermowell
- 6 Standard weld thermowell
- 7 Straight thermowell tip
- P Pipe size
- Q1 Thermowell root diameter
- Q2 Thermowell tip diameter
- T Lag dimension
- U Thermowell immersion length
- A Drill depth of thermowell

**Dimensional Details**

*General Dimensions*

	TU51	TU52	TU53	TU54
Type	Weld-in	Socket-weld	Threaded	Flanged
Process Connections	3/4" and 1"	3/4" and 1"	1/2", 3/4" and 1"	1", 1-1/2", 2" ANSI Flange 150 to 1500 RF
Immersion Length	2" to 24"			
Lag Length	Up to 6" (in 1/2" increments)			
Instrument Connection	1/2" NPT			

	TU51	TU52	TU53	TU54
Bore Diameter	0.26"			
Tip Thickness	0.25"			
Roughness	32µin (0.8µm)			

*TU51 Weld-in Thermowells*

NPS	¾"	1"
P	1.050"	1.315"
Q1 (root)	1.050"	1.315"
Q2 (tip)	5/8"	5/8"

*TU52 Socket-weld Thermowells*

	Stepped		Straight		Tapered	
NPS	¾"	1"	¾"	1"	¾"	1"
P	1.050"	1.315"	1.050"	1.315"	1.050"	1.315"
Q1 (root)	¾"	7/8"	¾"	1"	7/8"	1"
Q2 (tip)	½"	½"	¾"	1"	5/8"	5/8"

*TU53 Threaded Thermowells*

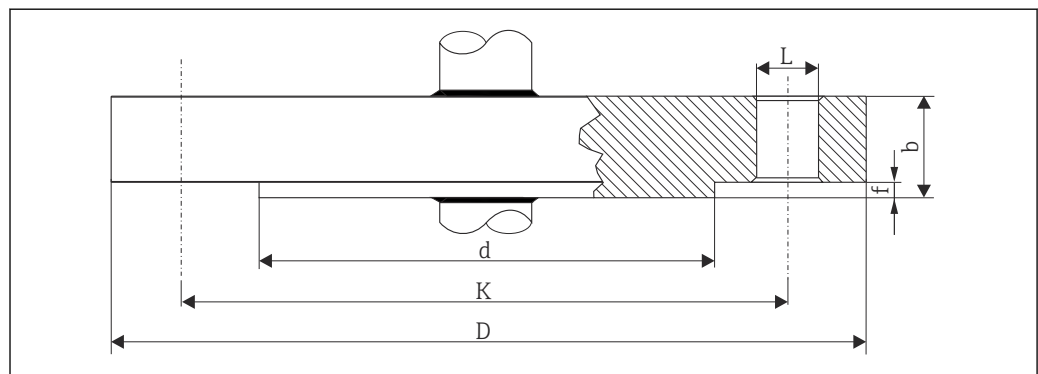
	Stepped*			Straight			Tapered	
NPT	½"	¾"	1"	½"	¾"	1"	¾"	1"
Q1 (root)	5/8"	¾"	7/8"	5/8"	¾"	7/8"	7/8"	1-1/16"
Q2 (tip)	½"	½"	½"	5/8"	¾"	7/8"	5/8"	5/8"

\*Stepped versions with U < 3" will have Q = V = ½"

*TU54 Flanged Thermowells*

	Stepped	Straight	Tapered	
Flange	1" and larger	1" and larger	1"	1-½" and larger
Q1 (root)	¾"	¾"	7/8"	1-1/16"
Q2 (tip)	½"	¾"	5/8"	5/8"

**Flange**



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For detailed information on the flange dimensions refer to the following flange standard: ANSI/ASME B16.5.

The flange material must be the same as of the stem of the thermowell.

## Specification Tolerances

Item	Tolerance
Well up thickness	$\frac{1}{4} \pm 1/16$ "
Root/Tip Diameter	$\pm 0.01$ "
Insertion Length (A Dim.)	$\pm 1/16$ "
Bore Diameter	+ 0.005" / - 0.003"
Barstock Thermowell OD	Milling Standard: + 0.000" / - 0.031"

## Flanged Wells

Manufactured in accordance with ASME/ANSI B16.5

## Pipe Threads

Manufactured in accordance with ANSI B1.20.1

## Materials

In compliance with ASTM specifications (or other applicable National Standards)

Process connection and thermowell

The temperatures for continuous operation specified in the following table are only intended as reference values for use of the various materials in air and without any significant compressive load. The maximum operation temperatures are reduced considerably in some cases where abnormal conditions such as high mechanical load occur or in aggressive media.

Material name	Short form	Recommended max. temperature for continuous use in air	Properties
AISI 316L, complies with		650 °C (1202 °F) <sup>1)</sup>	<ul style="list-style-type: none"> <li>■ Austenitic, stainless steel</li> <li>■ High corrosion resistance in general</li> <li>■ Particularly high corrosion resistance in chlorine-based and acidic, non-oxidizing atmospheres through the addition of molybdenum (e.g. phosphoric and sulfuric acids, acetic and tartaric acids with a low concentration)</li> </ul>
1.4401 or	X5CrNiMo17-12-2		

Material name	Short form	Recommended max. temperature for continuous use in air	Properties
1.4404	X2CrNiMo17-13-2		
AISI A105/1.0460	C22.8	450 °C (842 °F)	<ul style="list-style-type: none"> <li>▪ Heat-resistant steel</li> <li>▪ Resistant in nitrogen-containing atmospheres and atmospheres that are low in oxygen; not suitable for acids or other aggressive media</li> <li>▪ Often used in steam generators, water and steam pipes, pressured vessels</li> </ul>

## Certificates and Approvals

### Test Reports

Standard Tests available

- Internal Hydrostatic Pressure
- Dye Penetrant
- Others available upon request

### Other Standards and Guidelines

- ASME B1.20.1
- FM 3615
- CSA C22.2 No 05
- ANSI/ASME B16.5
- ASME PTC 19.3 TW2016: Performance Test Codes

## Ordering information

### Product Configurator



Product Configurator - the tool for individual product configuration


Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

## Accessories

### Service-specific accessories

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> <li>▪ Calculation of all the necessary data for identifying the optimum measuring device: e.g. pressure loss, accuracy or process connections.</li> <li>▪ Graphic illustration of the calculation results</li> </ul> <p>Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</p> <p>Applicator is available:</p> <ul style="list-style-type: none"> <li>▪ Via the Internet: <a href="https://wapps.endress.com/applicator">https://wapps.endress.com/applicator</a></li> <li>▪ On CD-ROM for local PC installation.</li> </ul>

Configurator <sup>+temperature</sup>	<p>Software for selecting and configuring the product depending on the measuring task, supported by graphics. Includes a comprehensive knowledge database and calculation tools:</p> <ul style="list-style-type: none"> <li>▪ For temperature competence</li> <li>▪ Quick and easy design and sizing of temperature measuring points</li> <li>▪ Ideal measuring point design and sizing to suit the processes and needs of a wide range of industries</li> </ul> <p>The "Configurator" is available: On request from your Endress+Hauser sales office on a CD-ROM for local PC installation.</p>
W@M	<p>Life cycle management for your plant W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle. The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available:</p> <ul style="list-style-type: none"> <li>▪ Via the Internet: <a href="http://www.endress.com/lifecyclemanagement">www.endress.com/lifecyclemanagement</a></li> <li>▪ On CD-ROM for local PC installation.</li> </ul>
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p> <p> For details, see Operating Instructions BA00027S and BA00059S</p>

## Documentation

### Technical information

- T13, T14 and T15 Explosion proof RTD assembly in thermowell, TI00126R/09/EN
- TH13, TH14 and TH15 RTD assembly in thermowell, TI00110R/09/EN



[www.addresses.endress.com](http://www.addresses.endress.com)

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