Product Digest

Electrical Temperature Measuring Instruments

WIKA

Smart in sensing

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Ability to Meet any Challenge

As a family-run business acting globally, with over 9,300 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement. The company also sets the standard in the measurement of level, flow, force, and in calibration technology.

Founded in 1946, WIKA is a reliable partner for all the requirements of industrial measurement technology, thanks to a broad portfolio of high-precision instruments and comprehensive services. With manufacturing locations around the globe, WIKA ensures flexibility and the highest performance. Every year, over 50 million quality products in both standard or customer-specific configurations are delivered in batches of 1 to over 10,000 units.

With numerous wholly-owned subsidiaries and partners, WIKA reliably supports its customers worldwide. Our experienced engineers and sales experts are your competent and dependable contacts locally.

WIKA Product Lines

The WIKA program covers the following product lines for various fields of application.

Electronic pressure measurement

WIKA offers a complete range of electronic pressure measuring instruments: pressure sensors, pressure switches, pressure transmitters and process transmitters for the measurement of gauge, absolute and differential pressure. Our pressure measuring instruments are available in the measuring ranges 0.25 “WC to over 0 …200,000 psi. These instruments come supplied with standardized current or voltage output signals (also intrinsically safe per ATEX or with flameproof enclosure), interfaces and protocols for various field buses. Whether ceramic thick film, metal thin film or piezo-resistive, WIKA is the leading manufacturer worldwide that develops and produces the full range of today’s leading sensor technologies.

Mechatronic pressure measurement

As a result of the almost unlimited options for different combinations of mechanical and electrical connections, an extraordinary range of instrument variants is possible. Various digital and analogue output signals are also available for these measuring instruments.

For our measuring instruments we use latest sensors, tested in automotive applications millions of times over. They work without any kind of mechanical contact, consequently they are wear-resistant, and there’s absolutely no influence on the mechanics.

Mechanical pressure measurement

Indicating pressure gauges for gauge, absolute and differential pressure with Bourdon tube, diaphragm or capsule pressure elements have been tested millions of times over. These instruments cover scale ranges from 0 … 0.2 “WC to 0 … 100,000 psi and indication accuracies of up to 0.1%.

Diaphragm seals

WIKA diaphragm seals, mounted with pressure gauges, pressure transducers, pressure transmitters etc., are recognized and valued internationally for the most difficult of measuring tasks. The measuring instruments can therefore be used at extreme temperatures -130 … +400 °C, -202 … +752 °F, and with aggressive, corrosive, heterogeneous, abrasive, highly viscous or toxic media. The optimal diaphragm seal designs, materials and filling media are available for each application.

Electrical temperature measurement

Our range of products includes thermocouples, resistance thermometers (also with on-site display), temperature switches as well as analogue and digital temperature transmitters for all industrial applications. Measuring ranges from 200 … +1,700 °C, -328 … +3,092 °F are covered.

Mechatronic temperature measurement

As a result of the integration of switch contacts and output signals into our mechanical temperature measuring instruments, we can offer a wide variety of combined instruments. With switch contacts the pointer position triggers a change-over. Electrical output signals are realized via an additional, independent sensor circuit (resistance thermometer or thermocouple).

Mechanical temperature measurement

The mechanical temperature measuring instruments work on the bimetal, expansion or gas actuation principle and cover scale ranges from -200 … +700 °C, -328 … +1292 °F. All thermometers are suited for operation in a thermowell if necessary.

Level measurement

WIKA has a comprehensive range of level measuring instruments available for temperatures up to 540 °C, 1000 °F, specific gravity from .35 and pressure ranges up to 5000 psi. This includes standard instruments and customized products.

Flow measurement

Orifice plates, meter runs, flow nozzles, Venturi tubes and pitot tubes are part of our portfolio of primary flow elements and restriction orifices. The wide range of our products is able to cover the majority of industrial applications. Customized solutions can be developed to meet your special needs.

Calibration technology

WIKA offers a broad product range of calibration instruments for the physical units of measurement for pressure, temperature and electrical measurements. Numerous patents ensure unmatched performance from many of our calibration instruments. The range of services covers the calibration of pressure and temperature measuring instruments in our accredited DKD/DAkkS calibration laboratories and a mobile service to calibrate your instruments on site.

Resistance Temperature Sensors

Resistance temperature sensors (RTD's) are equipped with platinum sensor elements which change their electrical resistance as a function of temperature. In our range of products you will find resistance temperature sensors with connected cable as well as versions with a connection head. A temperature transmitter can also be installed directly in the connection head.

RTD's are suitable for applications between -200 ... +600 °C, -328 ... +1,112 °F, (dependent on instrument model, sensor element and materials coming into contact with the medium).

Accuracy classes AA, A and B apply to all RTD's. They are available with a sensor limiting error to DIN EN 60751.

Resistance Temperature Sensors

TR57-M

Pipe surface resistance thermometer, for clamping

Sensor element	1 x Pt100
Measuring range	-20 … +150 °C, -4 … +302 °F
Connection method	Pt100 3-wire, 4 … 20 mA
Data sheet	TE 60.57

TR10-2

Industrial RTD assembly, spring loaded (head internal)

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire

TR10-3

Industrial RTD assembly, fixed (direct mount into process)

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire

TR10-4

Industrial RTD assembly, spring loaded (neck extension external)

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire

TR12-B

Process RTD, for additional thermowell

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire
Option:	Ex i, Ex d
Data sheet:	TE 60.17

TR12-M

Process RTD, basic module

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire
Option:	Ex i, Ex d
Data sheet:	TE 60.17

TR12-A

Measuring insert for process RTD

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... 1,112 °F
Connection method:	2-, 3- and 4-wire
Data sheet:	TE 60.16

TR15-2

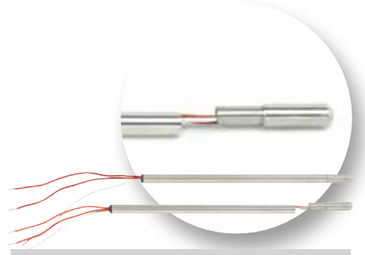
Remote mount industrial RTD assembly

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire

TR40

Cable resistance temperature sensor

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-200 … +600 °C, -328 ... +1,112 °F
Connection method:	2-, 3- and 4-wire
Cable:	PVC, silicone, PTFE
Data sheet:	TE 60.40



TR45

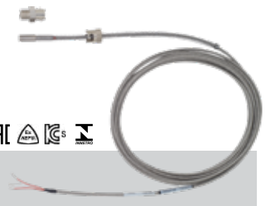
Cut to length RTD sensor

Sensor element:	1 x Pt100
Measuring range:	-50 … +450 °C, -58 ... 842 °F
Connection method:	2-, 3- and 4-wire

TR50

Surface resistance temperature sensor

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Connection method:	2-, 3- and 4-wire
Process connection:	Surface mounting
Data sheet:	TE 60.50



TR53

Bayonet resistance temperature sensor

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +400 °C, -58 ... +752 °F
Connection method:	2-, 3- and 4-wire
Process connection:	Bayonet
Data sheet:	TE 60.53

TR55

With spring-loaded tip

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-50 … +450 °C, -58 ... +842 °F
Connection method:	2-, 3- and 4-wire
Process connection:	Compression fitting
Data sheet:	TE 60.55

Resistance Temperature Sensors

TR33

Miniature design

Sensor element:	1 x Pt100, 1 x Pt1000
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, Pt1000, 4 … 20 mA
CSA:	Ordinary locations
Data sheet:	TE 60.33

TR34

Miniature design, explosion-protected

Sensor element:	1 x Pt100, 1 x Pt1000
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, Pt1000, 4 … 20 mA
CSA:	Hazardous locations
Data sheet:	TE 60.34

TR31

OEM miniature design

Sensor element:	1 x Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, 20mA
Data sheet:	TE 60.31

TR30

Compact version

Sensor element:	1 x Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, 4 … 20 mA, 0 … 10 V
Data sheet:	TE 60.30

Resistance Temperature Sensors

Sanitary Applications

TR20

Flush

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Connection method:	2-, 3- and 4-wire
Data sheet:	TE 60.20

TR21-A

Miniature design with flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Removable G ⅜"
CSA:	Ordinary and hazardous locations
Data sheet:	TE 60.26

TR21-B

Miniature design for orbital welding

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Removable G ⅜"
CSA:	Ordinary and hazardous locations
Data sheet:	TE 60.27

TR21-C

Miniature design with welded flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Output:	Pt100, 4 … 20 mA
Connection to thermowell:	Welded
CSA:	Ordinary and hazardous locations
Data sheet:	TE 60.28

TR22-A

With flange connection

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Connection to thermowell:	Removable M24
Data sheet:	TE 60.22

TR22-B

For orbital welding

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Connection to thermowell:	Removable M24
Data sheet:	TE 60.23

TR25

In-line resistance thermometer

Sensor element:	Pt100
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Connection method:	3- or 4-wire
Data sheet:	TE 60.25

Resistance
Temperature Sensors

TR60

Indoor and outdoor resistance temperature sensor

Sensor element:	1 x Pt100, 2 x Pt100
Measuring range:	-40 … +80 °C, -40 ... +176 °F
Connection method:	2-, 3- and 4-wire
Process connection:	Wall mounting
Data sheet:	TE 60.60

TR75

DiwiTherm® with digital indicator

Measuring range:	■ -40 … +199.9 °C, -40 ... +392 °F ■ +200 … +450 °C, +392 ... +842 °F
Power supply:	Battery operation
Data sheet:	TE 60.75

TSD-30

Electronic temperature switch

Sensor element:	Pt1000
Measuring range:	-20 … +80 °C, -4 ... +176 °F
Switching output:	1 or 2 (PNP or NPN), analogue output (optional)
Data sheet:	TE 67.03

TF35

OEM screw-in temperature sensor, with plug connection

Sensor element:	Pt100, Pt1000, NTC, KTY, Ni1000
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Special feature:	■ Compact design ■ High vibration resistance ■ Ingress protection IP 54 to IP 69K, depending on plug
Data sheet:	TE 67.10

TF40

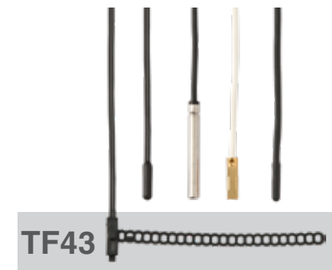
Duct temperature sensor

Sensor element:	Pt100, Pt1000, NTC
Measuring range:	-50 … +200 °C, -58 ... +392 °F
Special feature:	■ Smallest housing design, UV-resistant ■ Protected against dust and water jets IP 65 ■ Plastic mounting flange
Data sheet:	TE 67.16

TF41

Ambient temperature sensor

Sensor element:	Pt100, Pt1000, NTC
Measuring range:	-40 … +100 °C, -40 ... +212 °F
Special feature:	■ Smallest housing design, UV-resistant ■ Protected against dust and water jets IP 65 ■ Clip-on sun protector
Data sheet:	TE 67.17



TF43

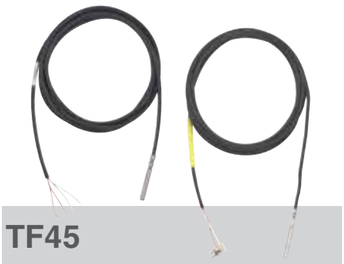
OEM Insertion temperature sensor for refrigeration

Sensor element:	Pt100, Pt1000, NTC
Measuring range:	-50 … +105 °C, -58 ... +221 °F
Special feature:	■ Plastic moulded measuring element ■ Waterproof ■ Compatible with customary refrigeration controllers
Data sheet:	TE 67.13

TF44

Strap-on temperature sensor with connecting cable

Sensor element:	Pt100, Pt1000, NTC, KTY
Measuring range:	-50 … +200 °C, -58 ... +392 °F
Special feature:	■ Connecting lead PVC, silicone ■ Aluminium sensor sleeve ■ Protected against dust and water jets, IP 65
Data sheet:	TE 67.14



TF45

OEM insertion temperature sensor with connecting cable

Sensor element:	Pt100, Pt1000, NTC, KTY, Ni1000
Measuring range:	-50 … +250 °C, -58 ... +482 °F
Special feature:	■ Connecting lead from PVC, silicone, PTFE ■ Stainless steel sensor sleeve ■ Protected against dust and water jets, IP 65
Data sheet:	TE 67.15

Thermocouples

Thermocouples generate a voltage directly dependent on temperature. They are particularly suitable for high temperatures up to 1,700 °C, 3,092 °F and at very high oscillating stresses. Accuracy classes 1 and 2 and standard and special limits apply to all thermocouples.

They are available with a sensor limiting error to DIN EN 60584 or ASTM E230.

In our range of products you will find resistance temperature sensors with connected cable as well as versions with a connection head. A temperature transmitter can be installed in the connection head.

Thermocouples

TC10-2

Industrial TC assembly spring loaded, head internal

Sensor element:	Type K, J, E, N or T
Measuring range:	0 … +1,260 °C, +32 ... +2,300 °F
Measuring point:	Ungrounded or grounded

TC10-3

Industrial TC assembly fixed, direct mount into process

Sensor element:	Type K, J, E, N or T
Measuring range:	0 … +1,260 °C, +32 ... +2,300 °F
Measuring point:	Ungrounded or grounded

TC10-4

Industrial TC assembly spring assembly, neck extension external

Sensor element:	Type K, J, E, N or T
Measuring range:	0 … +1,260 °C, +32 ... +2,300 °F
Measuring point:	Ungrounded or grounded

TC12-A

Measuring insert for process thermocouple

Sensor element:	Types K, J, N or T
Measuring range:	-40 … +1,200 °C, -40 ... +2,192 °F
Measuring point:	Ungrounded or grounded
Data sheet:	TE 65.16

TC12-B

Process thermocouple, for additional thermowell

Sensor element:	Types K, J, E, N or T
Measuring range:	-40 … +1,200 °C, -40 ... +2,192 °F
Measuring point:	Ungrounded or grounded
Option:	Ex i, Ex d
Data sheet:	TE 65.17

TC12-M

Process thermocouple, basic module

Sensor element:	Types K, J, E, N or T
Measuring range:	-40 … +1,200 °C, -40 ... +2,192 °F
Measuring point:	Ungrounded or grounded
Option:	Ex i, Ex d
Data sheet:	TE 65.17

TC40

Cable thermocouple

Sensor element:	Type K, J, E, N or T
Measuring range:	-200 … +1,260 °C, -328 ... +2,300 °F
Measuring point:	Ungrounded or grounded
Cable:	PVC, silicone, PTFE, glass fibre
Data sheet:	TE 65.40

TC50

Surface thermocouple

Sensor element:	Type K, J, E, N or T
Measuring range:	-200 … +400 °C, -328 ... +752 °F
Measuring point:	Ungrounded or grounded
Process connection:	Surface mounting
Data sheet:	TE 65.50

TC53

Bayonet thermocouple

Sensor element:	Type K, J, E, N or T
Measuring range:	-200 … +1,200 °C, -328 ... +2,300 °F
Measuring point:	Ungrounded or grounded
Special feature:	■ Single and dual thermocouples ■ Explosion-protected versions

TC46

Hot runner thermocouple

Sensor element:	Type J or K
Measuring range:	-25 … +400 °C, -13 ... +752 °F
Measuring point:	Ungrounded or grounded
Special feature:	■ Sensor diameter 0.5 … 3.0 mm, 0.020 ... 0.118" ■ Plastic-moulded transition
Data sheet:	TE 65.46

TC47

Plastics machinery thermocouple

Sensor element:	Type J or K
Measuring range:	-25 … +400 °C, -13 ... +752 °F
Measuring point:	Ungrounded or grounded
Special feature:	■ Various process connections ■ Connection cable fiberglass, Kapton
Data sheet:	TE 67.20

Thermocouples

TC80

High-temperature thermocouple

Sensor element:	Type S, R, B, K, N, E or J
Measuring range:	-200 … +1,700 °C, -328 ... +3,092 °F
Measuring point:	Recessed (exposed optional)
Process connection:	Stop flange, threaded bushing

TC85

Measuring insert for high temperature thermocouple

Sensor element:	Type S, R or B
Measuring range:	0 … +1,700 °C, +32 ... +3,092 °F
Measuring point:	Exposed or recessed

TC84

Sapphire-design thermocouple

Sensor element:	Types S, R, B
Measuring range:	0 … +1,700 °C, 32 … +3,092 °F
Protection tube:	Sapphire (monocrystalline)
Special feature:	Secondary seal with special pressure-tight feed-through
Data sheet:	TE 65.84

TC90

High-pressure thermocouple

Sensor element:	Types K, J, or E
Measuring range:	0 … +350 °C, 32 … +662 °F
Measuring point:	Ungrounded or grounded
Process connection:	Various high-pressure connections
Data sheet:	TE 65.90

Tubeskins & Multipoints

TC59-W

Weld pad thermocouple

Sensor element:	Type K, J, E, or N
Measuring range:	0 … +1,260 °C, +32 ... +2,300 °F
Measuring point:	Grounded or ungrounded
Process connection:	Surface mount welded
Data sheet:	TE 65.58

TC59-V

Tubeskin thermocouple V-Pad®

Sensor element:	Type K, J, E or N
Measuring range:	0 … +1,260 °C, 32 ... +2,300 °F
Measuring point:	Grounded
Process connection:	Surface mount welded
Data sheet:	TE 65.59

TC59-X

Tubeskin thermocouple assembly Xtracto-Pad®

Sensor element:	Type K, J, E or N
Measuring range:	0 … +1,260 °C, 32 ... +2,300 °F
Measuring point:	Grounded or ungrounded
Process connection:	Surface mount removable / shielded
Data sheet:	TE 65.57

TC59-R

Tubeskin thermocouple assembly Refracto-Pad®

Sensor element:	Type K, J, E or N
Measuring range:	0 … +1,260 °C, 32 ... +2,300 °F
Measuring point:	Grounded or ungrounded
Process connection:	Surface mount removable / shielded
Data sheet:	TE 65.56

TC95

Multipoint thermocouple in band design

Sensor element:	Types K, J, E, N or T
Measuring range:	0 … 1,200 °C, 32 … 2,192 °F
Measuring point:	Ungrounded or grounded
Process connection:	Various process connections
Data sheet:	TE 70.01

TC96-R

Flexible multipoint thermometer

Sensor element:	Types K, J, E, or N
Measuring range:	0 … 1,200 °C, 32 … 2,192 °F
Measuring point:	Ungrounded or grounded
Process connection:	Various process connections
Data sheet:	TE 70.10

TC96-O

Flexible multipoint thermometer with/without purge

Sensor element:	Types K, J, E, or N
Measuring range:	0 … 1,200 °C, 32 … 2,192 °F
Measuring point:	Ungrounded or grounded
Process connection:	Various process connections
Data sheet:	TE 70.11

Temperature Transmitters

TFT35

Compact temperature transmitter

Measuring range:	-50 … +200 °C
Special feature:	■ Output signal 4 … 20 mA, 0 … 10 V, 0.5 … 4.5 V ■ Factory configured ■ Measuring insert exchangeable ■ Electr. connection via plug connection
Data sheet:	TE 76.18

T15

Digital temperature transmitter

Input:	Resistance temperature sensors, potentiometers
Accuracy:	< 0.1 %
Output:	4 … 20 mA
Special feature:	Extremely easy and fast configuration
Data sheet:	TE 15.01

T16

Digital temperature transmitter for thermocouples

Input:	All commercially available thermocouples
Accuracy:	Typical < 2 K
Output:	4 … 20 mA
Special feature:	The fastest and simplest configuration on the market
Data sheet:	TE 16.01

T32

HART® transmitter

Input:	Universal for 1 or 2 sensors: Resistance thermometers (up to 2 x 3-wire), thermocouples, potentiometers, Reed chains
Accuracy:	< 0.1 %
Output:	4 … 20 mA, HART® protocol
Special feature:	TÜV certified SIL version (full Assessment)
Data sheet:	TE 38.01

T53

FOUNDATION™ Fieldbus and PROFIBUS® PA transmitter

Input:	Resistance temperature sensors, thermocouples, potentiometers
Accuracy:	< 0.1 %
Output:	Foundation Fieldbus™, Profibus® PA
Special feature:	PC configurable
Data sheet:	TE 53.01

T91

Analogue transmitter 3-wire, 0 … 10 V

Input:	Resistance temperature sensors, thermocouples
Accuracy:	< 0.5 or < 1 %
Output:	0 … 10 V, 0 … 5 V
Special feature:	Fixed measuring range
Data sheet:	TE 91.01, TE 91.02

TIF50, TIF52

HART® field temperature transmitter

Input:	Resistance temperature sensors, thermocouples, potentiometers
Accuracy:	< 0.1 %
Output:	4 … 20 mA, HART® protocol
Special feature:	PC configurable
Data sheet:	TE 62.01

Digital Indicators

Temperature Display

DI10

For panel mounting, current loop display, 96 x 48 mm

Input:	4 … 20 mA, 2-wire
Alarm output:	2 electronic contacts (optional)
Special feature:	Wall-mounting case (optional)
Power supply:	From the 4 … 20 mA current loop
Data sheet:	AC 80.06

DI25

For panel mounting, 96 x 48 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Alarm output:	■ 3 relays ■ 2 relays for instruments with integrated transmitter power supply DC 24 V
Power supply:	■ AC 100 … 240 V ■ AC/DC 24 V
Special feature:	Analogue output signal
Data sheet:	AC 08.02

DI30

For panel mounting, 96 x 96 mm

Input:	Standard signals
Alarm output:	2 relays
Special feature:	■ Integrated transmitter power supply ■ Wall-mounting case (optional)
Power supply:	AC 230 V or AC 115 V
Data sheet:	AC 80.05

DIH10

Connection head with digital indicator

Input:	4 … 20 mA
Power supply:	From the 4 … 20 mA current loop
Data sheet:	AC 80.11

DIH50, DIH52

For current loops with HART® communication

Dimensions:	150 x 127 x 127 mm
Case:	Aluminium, stainless steel
Special feature:	■ Adjustment of indication range and unit via HART® communication ■ Model DIH52 additionally suitable for multidrop operation and with local master function
Approval:	■ Intrinsically safe per ATEX ■ Flameproof enclosure
Data sheet:	AC 80.10

TF-LCD

Longlife digital thermometer

Measuring range:	-40 … +120 °C
Feature:	■ Dust and waterproof case, IP68 ■ Battery or solar powered ■ Extremely long service life
Data sheet:	TE 85.01

DI32-1

For panel mounting, 48 x 24 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Alarm output:	2 electronic contacts
Power supply:	DC 9 … 28 V
Data sheet:	AC 80.13

DI35

For panel mounting, 96 x 48 mm

Input:	■ Multi-function input for resistance thermometers, thermocouples and standard signals ■ Alternatively double input for standard signals with calculation function (+ - x /) for two transmitters
Alarm output:	2 or 4 relays (optional)
Special feature:	■ Integrated transmitter power supply ■ Analogue output signal (optional)
Power supply:	■ AC/DC 100 … 240 V ■ DC 10 … 40 V, AC 18 … 30 V
Data sheet:	AC 80.03

Temperature Controllers

CS4M

For panel mounting, 48 x 24 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Control mode:	PID, PI, PD, P, ON/OFF (configurable)
Monitoring output:	Relay or logic level DC 0/12 V for 3-point control to control an electronic switch relay (SSR) or analogue current signal 4 … 20 mA
Power supply:	■ AC 100 … 240 V ■ AC/DC 24 V
Data sheet:	AC 85.06

CS4R

For rail mounting, 22.5 x 75 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Control mode:	PID, PI, PD, P, ON/OFF (configurable)
Monitoring output:	Relay or logic level DC 0/12 V to control an electronic switch relay (SSR) or analogue current signal 4 … 20 mA
Power supply:	■ AC 100 … 240 V ■ AC/DC 24 V
Data sheet:	AC 85.05

CS6S, CS6H, CS6L

For panel mounting, 48 x 48, 48 x 96, 96 x 96 mm

Input:	Multi-function input for resistance thermometers, thermocouples and standard signals
Control mode:	PID, PI, PD, P, ON/OFF (configurable)
Monitoring output:	Relay (AC 250 V, 3 A, (R) or 1 A (L)) or logic level DC 0/12 V for 3-point control to control an electronic switch relay (SSR) or analogue current signal 4 … 20 mA
Power supply:	■ AC 100 … 240 V ■ AC/DC 24 V
Data sheet:	AC 85.08

SC58

For panel mounting, 62 x 28 mm

Input:	Pt100 or PTC
Control mode:	Simple 2-point controller
Monitoring output:	Relay switching output 12 A, 250 V
Power supply:	■ AC 230 V ■ AC 12 … 24 V or DC 16 … 32 V
Data sheet:	AC 85.24

SC64

For panel mounting, 64 mm, round

Input:	Pt100 or PTC
Control mode:	Simple 2-point controller
Monitoring output:	Relay switching output 16 A, 250 V
Power supply:	■ AC 230 V ■ AC 12 … 24 V or DC 16 … 32 V
Data sheet:	AC 85.25

Thermowells

Whether in aggressive or abrasive process media, whether in high or low temperature ranges: For electrical or mechanical temperature sensors, to prevent direct exposure of the sensor to the medium, thermowells that suit each application are available. Thermowells can be machined from solid barstock or assembled from tube sections and can either be screw-, weld- or flange-fitted. They are offered in standard and special materials such as stainless steel 316L, 316 Ti, Hastelloy® or titanium. Each version, depending on its construction type and its mounting to the process, has certain advantages and drawbacks with respect to its load limits and the special materials that can be used.

In order to manufacture thermowells for flange mounting at low cost from special materials, the designs used differ from standard thermowells in accordance with ASME B40.9. Thus, only the wetted parts of the thermowell are manufactured from special materials, whereas the non-wetted flange is made of a lower cost material and is welded to the special material.

This design is used both for fabricated and solid-machined thermowells. With tantalum as special material a removable sheath is used, which is slid over the supporting thermowell from stainless steel.

Thermowells
Sanitary Applications

TW10
Flanged (solid machined)

Thermowell form:	Tapered, straight or stepped
Nominal size:	ASME 1 … 4 inch DIN/EN DN 25 … 100
Pressure rating:	ASME to 2,500 lbs (DIN/EN to PN 100)

TW15
Threaded (solid machined)

Thermowell form:	Tapered, straight or stepped
Head version:	Hexagon, round with hexagon, or round with spanner flats
Process connection:	1/2, 3/4 or 1 NPT
Data sheet:	TW 95.15

TW20
Socket weld (solid-machined)

Thermowell form:	Tapered, straight or stepped
Welding diameter:	1.050, 1.315 or 1.900 inch (26.7, 33.4 or 48.3 mm)
Class:	3,000 or 6,000
Data sheet:	TW 95.20

TW60
Socket weld, for sanitary connection

Process connection:	Tri clamp, bevel seat
Nominal width:	1 … 3 inch

TW22
Fabricated with flange connection for sanitary applications

Aseptic connection:	■ Tri-clamp ■ DIN 32676 ■ DIN 11851 ■ VARIVENT® ■ BioControl®
Thermowell material:	Stainless steel 316L, 1.4435
Data sheet:	TW 95.22

TW61
For orbital welding for sanitary applications

Tube standard:	DIN 11866 series A, B, C
Material:	Stainless steel 316L, 1.4435
Data sheet:	TW 95.61

TW25
Weld–in (solid-machined)

Thermowell form:	Tapered, straight or stepped
Head diameter:	Up to 2 inch (50.8 mm)
Data sheet:	TW 95.25

TW30
Vanstone (solid-machined) for lap flanges

Thermowell form:	Tapered, straight or stepped
Nominal size:	ASME 1, 1 1/2 or 2 inch
Pressure rating:	ASME up to 2,500 lbs
Data sheet:	TW 95.30

TW70
Flanged/threaded/weld-in protection tube

Thermowell form:	Flanged, threaded or weld-in
Pipe size:	1/4, 1/2, 3/4, or 1 NPS
Pipe schedule:	40, 80, 160 or XXH

VARIVENT® is a registered trademark of the company GEA Tuchenhagen
BioControl® is a registered trademark of the company NEUMO

Temperature Accessories

magWIK

Magnetic quick connector

- For accelerated connection for all configuration and calibration processes
- Connection of 2-mm plug contacts or 4-mm plug contacts with adapter
- Data sheet AC 80.15

905

Contact protection relay for model 821 switch contacts

Application:	For optimal contact protection and highest switching reliability
Data sheet:	AC 08.01

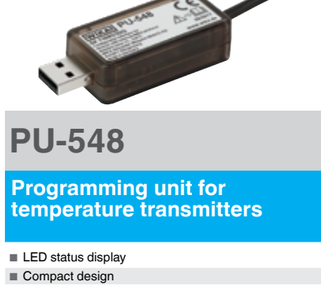
904

Control unit for inductive contacts

Application:	For operating measuring instruments with inductive contacts
Data sheet:	AC 08.01

Coupler connector

Fittings



Wires & cables

Installation Services

Electrical Temperature Measurement Engineering Installation Services

WIKA USA specializes in custom-designed and traditional electronic temperature measurement solutions, including thermocouples, RTDs, multipoint and furnace assemblies, and accessories. In addition, the WIKA USA services team provides onsite engineering, shutdown planning, supervision, and installation services worldwide to ensure you have the support you need whether you are in the initial design stages or preparing for startup.

The WIKA USA services team has installed products on reactors, columns, contractors, fractionators, regenerators, furnaces, boilers, and exchangers. The average professional experience of our installation supervisors exceeds 10 years. With this expertise, our team will ensure your solutions are implemented as the engineers intended.

Technical
Information

Measuring resistors

- Industrial resistance thermometers are equipped with platinum temperature sensors which change their electrical resistance as a function of temperature.

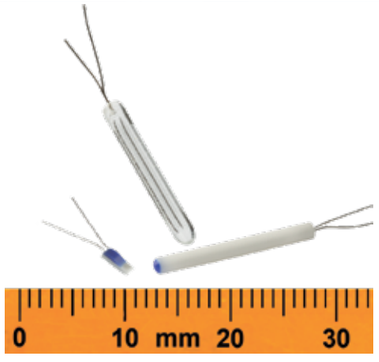


Fig. left: Thin-film resistor
Fig. centre: Glass resistor
Fig. right: Ceramic resistor

- In accordance with IEC 60751, resistance thermometers and measuring resistors are divided into accuracy classes. For wire-wound resistors and film resistors, these accuracy classes are assigned to the corresponding temperature ranges.

Class	Temperature range Wire-wound (W)	Thin-film (F)	Tolerance value
B	-196 … +600 °C (-320.8 ... +1,112 °F)	-50 … +500 °C (-58 ... +932 °F)	±(0.30 + 0.0050 l t l) [1]
A	-100 … +450 °C (-148 ... +842 °F)	-30 … +300 °C (+22 ... 572 °F)	±(0.15 + 0.0020 l t l) [1]
AA	-50 … +250 °C (-58 ... +482 °F)	0 … 150 °C (+32 ... 302 °F)	±(0.10 + 0.0017 l t l) [1]

1) l t l is the value of the temperature in °C without consideration of the sign.

- The electrical resistance of a resistance thermometer's sensor changes with the temperature.
  The resistance increases when temperature is raised. This is known as PTC (Positive Temperature Coefficient).

Resistance Values and Tolerance Values with Selected Temperatures (Pt100)

Temperature (ITS 90)	Resistance value in Ω Tolerance class B	Tolerance class A	Tolerance class AA
-196 °C (-320.8 °F)	19.69 … 20.80	-	-
-100 °C (-148 °F)	59.93 … 60.58	60.11 … 60.40	-
-50 °C (-58 °F)	80.09 … 80.52	80.21 … 80.41	80.23 … 80.38
-30 °C (-22 °F)	88.04 … 88.40	88.14 … 88.30	88.16 … 88.28
0 °C (32 °F)	99.88 … 100.12	99.94 … 100.06	99.96 … 100.04
20 °C (68 °F)	107.64 … 107.95	107.72 … 107.87	107.74 … 107.85
100 °C (212 °F)	138.20 … 138.81	138.37 … 138.64	138.40 … 138.61
150 °C (302 °F)	156.93 … 157.72	157.16 … 157.49	157.91 … 157.64
250 °C (482 °F)	193.54 … 194.66	193.86 … 194.33	193.91 … 194.29
300 °C (572 °F)	211.41 … 212.69	211.78 … 212.32	-
450 °C (842 °F)	263.31 … 265.04	263.82 … 264.53	-
500 °C (932 °F)	280.04 … 281.91	-	-
600 °C (1,112 °F)	312.65 … 314.77	-	-

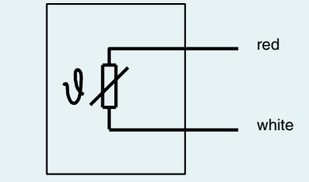
Sensor Connection Methods

2-wire connection

The lead resistance to the sensor is recorded as an error in the measurement. For this reason, this connection type is not recommended when using Pt100 measuring resistors for accuracy classes A and AA, since the electrical resistance of the connection lines and their own temperature dependence are fully included in the measurement result and thus falsify it.

Applications

- Connecting cables up to 250 mm
- Standard when using Pt1000 measuring resistors
- Class B

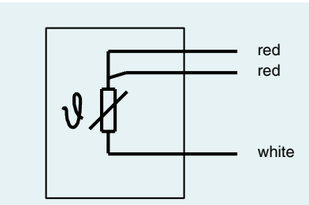


3-wire connection (standard version)

The influence of the lead resistance is compensated using a second red wire. The maximum length of the connecting cable depends on the conductor cross-section and the compensation options of the electronic evaluation system (transmitter, display, controller or process control system).

Applications

- Connecting cables up to approx. 30 m
- Class B, A, AA

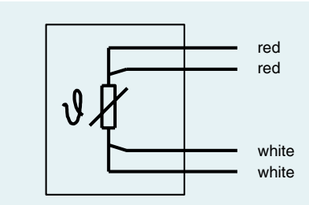


4-wire connection

The influence of the connecting cable on the result of measurement is completely eliminated since any possible asymmetries in the connecting cable's lead resistance are compensated. The maximum length of the connecting cable depends on the conductor cross-section and the compensation options of the electronic evaluation system (transmitter, display, controller or process control system). A 4-wire connection can also be used as a 2-wire or 3-wire connection by disconnecting the unnecessary conductors.

Applications

- Laboratory technology
- Calibration technology
- Tolerance class A or AA
- Connecting cables up to approx. 1,000 m



Dual sensors

In the standard version a single sensor is fitted. The combination of black and yellow is reserved for an optional second measuring resistor. For certain combinations (e.g. small diameter) dual sensors are not possible for technical reasons.

Further data see Technical Information IN.00.17

Technical Information

- Thermocouples generate a voltage directly dependent on temperature. Suited to the corresponding measurement temperature, you can choose from a variety of thermocouple models.
- Thermocouples are particularly suited for high temperatures (up to 1,700 °C or 3,092 °F). Instrument designs from mineral-insulated sheathed cable are very resistant against extremely high vibration loads (depending on instrument model, sensor element and wetted materials).

Information on the application of thermocouples

Base-metal thermocouples

- **Type K**

+ leg		- leg
NiCr	-	NiAl
Nickel-Chromium	-	Nickel-Aluminum (ferromagnetic)

NiCr-NiAl thermocouples are suitable for use in oxidizing or inert gas atmospheres up to 1,200 °C, 2,192 °F (ASTM E230: 1,260 °C, 2,300 °F) with the largest wire size. Protect thermocouples from sulphurous atmospheres. Since they are less susceptible to oxidation than thermocouples made of other materials, they are mostly used for applications at temperatures above 550 °C, 1,022 °F up to the maximum working pressure of the thermocouple.

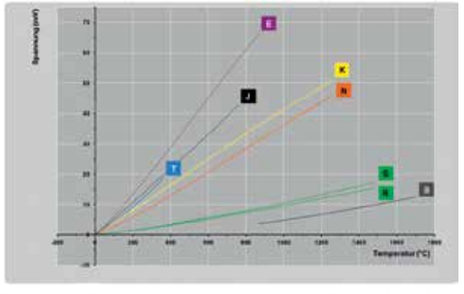
- **Type J**

+ leg		- leg
Fe	-	CuNi
Iron (ferromagnetic)	-	Copper-Nickel

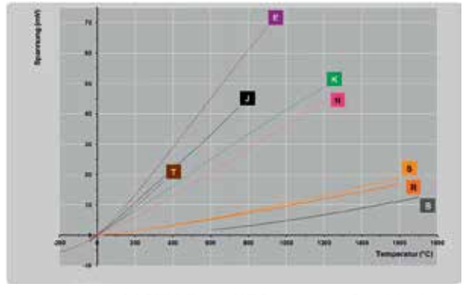
Fe-CuNi thermocouples are suitable for use in vacuum, in oxidising and reducing atmospheres or inert gas atmospheres. They are used for temperature measurements up to 750 °C, 1,382 °F (ASTM E230: 760 °C, 1,400 °F) with the largest wire size.

Thermoelectric voltage curves

- **ASTM E230**



- **IEC 60584-2**



The charts illustrate the curves corresponding to the relevant temperature ranges of ASTM E230 / IEC 60584-2. Outside these temperature ranges, the permissible tolerance value is not standardized.

Operating Limits and Accuracies of Thermocouples (IEC 60584, ASTM E230)

Tolerance values of the thermocouples per IEC 60584-1 / ASTM E230 (Reference temperature 0 °C)

Model	Thermocouple	Tolerance value per	Class	Temperature range	Tolerance value
K N	NiCr-NiAl (NiCr-Ni) NiCrSi-NiSi	IEC 60584-1	1	-40 … +1,000 °C (-40 ... +1,832 °F)	±1.5 °C or 0.0040 · | t | [1) 2)]
			2	-40 … +1,200 °C (-40 ... +2,192 °F)	±2.5 °C or 0.0075 · | t |
		ASTM E230	Special	0 … +1,260 °C (+32 ... +2,300 °F)	±1.1 °C or ±0.4 %
			Standard	0 … +1,260 °C (+32 ... +2,300 °F)	±2.2 °C or ±0.75 %
J	Fe-CuNi	IEC 60584-1	1	-40 … +750 °C (-40 ... +1,382 °F)	±1.5 °C or 0.0040 · | t |
			2	-40 … +750 °C (-40 ... +1,382 °F)	±2.5 °C or 0.0075 · | t |
		ASTM E230	Special	0 … +760 °C (+32 ... +1,400 °F)	±1.1 °C or ±0.4 %
			Standard	0 … +760 °C (+32 ... +1,400 °F)	±2.2 °C or ±0.75 %
E	NiCr-CuNi	IEC 60584-1	1	-40 … +800 °C (-40 ... +1,472 °F)	±1.5 °C or 0.0040 · | t |
			2	-40 … +900 °C (-40 ... +1,652 °F)	±2.5 °C or 0.0075 · | t |
		ASTM E230	Special	0 … +870 °C (+32 ... +1,600 °F)	±1.0 °C or ±0.4 %
			Standard	0 … +870 °C (+32 ... +1,600 °F)	±1.7 °C or ±0.5 %
T	Cu-CuNi	IEC 60584-1	1	-40 … +350 °C (-40 ... +662 °F)	±0.5 °C or 0.0040 · | t |
			2	-40 … +350 °C (-40 ... +662 °F)	±1.0 °C or 0.0075 · | t |
			3	-200 … +40 °C (-328 ... +104 °F)	±1.0 °C or 0.015 · | t |
		ASTM E230	Special	0 … +370 °C (+32 ... +700 °F)	±0.5 °C or ±0.4 %
			Standard	-200…0 °C (-328 ... +32 °F)	±1.0 °C or ±1.5 %
			Standard	0 … +370 °C (+32 ... +700 °F)	±1.0 °C or ±0.75 %
R S	Pt13%Rh-Pt Pt10%Rh-Pt	IEC 60584-1	1	0 … +1,600 °C (+32 ... +2,912 °F)	±1.0 °C or ±[1 + 0.003 (t - 1,100)] °C
			2	0 … +1,600 °C (+32 ... +2,912 °F)	±1.5 °C or ±0.0025 · | t |
		ASTM E230	Special	0 … +1,480 °C (+32 ... +2,700 °F)	±0.6 °C or ±0.1 %
			Standard	0 … +1,480 °C (+32 ... +2,700 °F)	±1.5 °C or ±0.25 %
B	Pt30%Rh-Pt6%Rh	IEC 60584-1	2	+600 … +1,700 °C (+1,112 ... +3,092 °F)	±0.0025 · | t |
			3	+600 … +1,700 °C (+1,112 ... +3,092 °F)	±4.0 °C or ±0.005 · | t |
		ASTM E230	Special	-	-
			Standard	+870 … +1,700 °C (+1,600 ... +3,100 °F)	±0.5 %

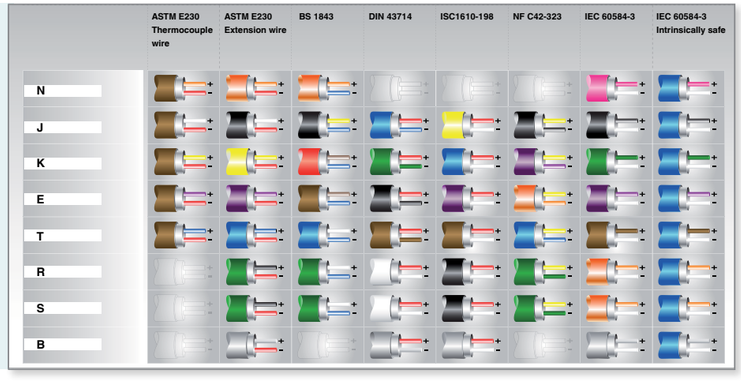
The above table contains permissible tolerance values of IEC 60584-1 incl. the tolerance values of ASTM E230 standard which is common in North America:

[1)] It| is the value of the temperature in °C without consideration of the sign
[2)] The greater value applies

There are different notations of type K thermocouples in Europe and North America:
- Europe: NiCr-NiAl or NiCr-Ni
- North America: Ni-Cr / Ni-Al

There is no physical difference, it is just the naming caused by historical reasons.

Thermocouple and Extension Wire Colour Codes



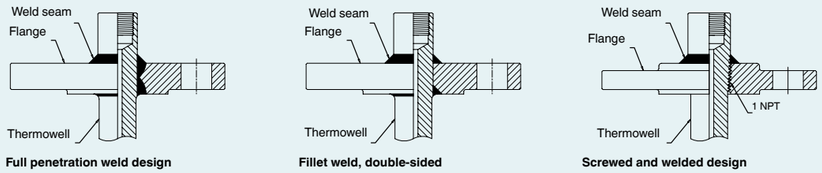
Further data see Technical Information IN.00.23

Welded joints

Internationally, the most common welded joint between flanges and thermowells is the full penetration weld of the flange (full penetration welding, FPW). As well as fulfilling the highest requirements of stability this welding method also meets all requirements of the American flange standard ASME B16.5 for the use of blind flanges.

WIKA manufactures thermowells to the widest range of welding procedure tests in accordance with ASME Sec. IX for full and partial penetration. Furthermore, for all common welded joints on fabricated or solid-machined standard thermowells, welding procedure tests are available according to ASME B31.3 or B31.1.

Welding options



Full penetration weld design | Fillet weld, double-sided | Screwed and welded design

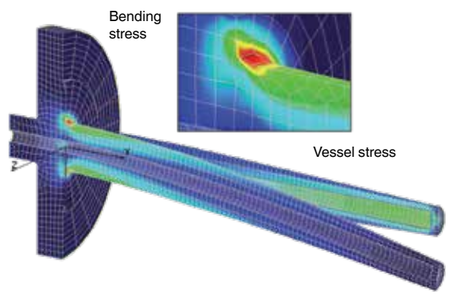
Calculation of the thermowell strength to ASME PTC 19.3 TW-2016

Calculations for establishing the stability of thermowells make it possible to minimise or eliminate the possibility of damage to the thermowells even before the plants where they are used are commissioned. The calculations can be made in accordance with ASME PTC 19.3/TW-2016 or Dittrich/Klotter. The following process parameters are required to complete the calculations:

- Flow rate in m/s or ft/s
- Medium density in kg/m³ or lb/ft³
- Temperature in °C or °F
- Pressure in bar or PSI

Independently of the thermowells' method of manufacture, the results of the thermowell strength calculation are always divided into two parts: Firstly, the dynamic view on vibration failures through operation at resonance and secondly, the static load through external pressure and bending.

In case of a calculation with negative results, the only constructive solution so far was to shorten the thermowell stem or to increase the root and tip diameter, accepting a longer response time of the thermometer. As alternatives, thermowells in ScrutonWell® or support collar design can be used.



Further data see Technical Information IN 00.15

ScrutonWell®

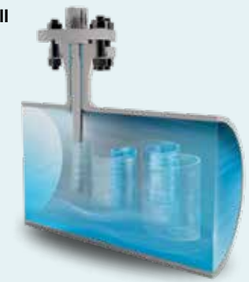
The ScrutonWell® design reduces the amplitude of oscillation by more than 90 % [1] and allows an easy and fast installation of the thermowell without support collar, and thus without expensive and time-consuming rework on site. The WIKA ScrutonWell® design has been tested and approven by the independent laboratories TÜV NEL (Glasgow) and the Institute for Mechanics and Fluid Dynamics (Technical University of Freiberg).

The ScrutonWell® design can be used for all kind of solid-machined thermowells with flange connection, in Vanstone design or for weld-in or screwed process connection.

This helical design has been used successfully for decades in a wide variety of industrial applications to effectively suppress vortex-induced shrinkage excitation.

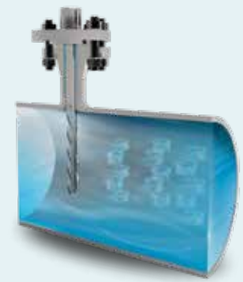
Model TW10 in ScrutonWell® design

Standard thermowell



In certain flow conditions, a Kármán vortex street can form behind the thermowell stem when it is subjected to a flow within a pipeline. This vortex street consists of two rows of vortices with opposite directions of rotation, which detach themselves to the left and the right of the thermowell out of phase, and this can instigate the thermowell to vibrate.

Thermowell in ScrutonWell® design



The helical coils, arranged around the thermowell stem of the ScrutonWell® design, break up the flow and thus impede the formation of a clearly defined Kármán vortex street. Through the reduced amplitudes of the diffused vortices, vibrational excitation of the thermowell is avoided.

Support collar

For the stabilisation of the stem in the flange nozzle a support collar is used. This variant requires an on-site machining of the collar to assure an interference fit in flange nozzles.
For further data see Technical Information IN 00.26.

1) Journal of Offshore and Mechanics and Arctic Engineering Nov 2011, Vol 133/041102-1 by ASME

Further technical data see data sheet SP 05.16

Technical Information

Coated thermowells for special applications

Special metallic coatings can be applied to the surface of a thermowell so it can be used in a process where there is a high risk of abrasion, due to a high flow of suspended solids. Polymer coatings, on the other hand, are used for highly corrosive processes in which, for example, sulphuric acid is involved.

Flange Sealing Faces On Thermowells

For flanges in accordance with the standards ASME B16.5, EN 1092-1 and DIN 2527 there are different sealing face forms and surface finishes in use. The most commonly-used sealing face of all the standards is the version with offset raised face with spiral phonographic grooves in the sealing face. The form and depth of the grooves is defined in the corresponding flange standards.

Less common in thermowells are flanges with smooth sealing faces without detectable grooves or designs with concentric, continuous grooves.

Flange form

Standard flange sealing faces to ASME B16.5		
	AARH (µinch)	Ra (µm)
Stock finish	125 … 250	3.2 … 6.3
Smooth finish	< 125	< 3.2
RTJ (Ring joint groove)	< 63	< 1.6
Tongue/groove	< 125	< 3.2

Standard flange sealing faces to DIN 2527		
	Ra (µm)	Rz (µm)
Form C	-	40 … 160
Form E	-	< 16

Standard flange sealing faces to EN 1092-1		
	Ra (µm)	Rz (µm)
Form B1	3.2 … 12.5	12.5 … 50
Form B2	0.8 … 3.2	3.2 … 12.5

Further data see Technical Information IN 00.15.

Non-Destructive Evaluation/Test

NDE or NDT

NDE/NDT are abbreviations for “Non-Destructive Examination”/“Non-Destructive Testing”. The abbreviations NDE or NDT stand for “Non-Destructive Examination” or “Non-Destructive Testing”, respectively. This is used to refer to non-destructive inspections or tests of components, in general.

Liquid penetrant inspection

With the penetrant test in accordance with DIN EN 571-1 or SNT-TC-1A, fine surface cracks and porosities in weld seams can be made visible. After cleaning the surface to be inspected, a contrast agent (red or fluorescent) is sprayed on. Through the capillary effect, this agent penetrates any surface defects there might be. After re-cleaning the surface, a developer (white) is then sprayed on, which extracts the contrast agent (from any hairline cracks, etc.) and through colour contrast, enables an easy evaluation of the defects.

X-ray testing

Through an X-ray test to EN 1435 or ASME Section V, Article 2, Edition 2004, for example, full penetration welds on thermowells can be investigated with respect to irregularities (cracks, voids, insufficient bonding). Here, depending on the dimensions of the thermowell, up to five X-ray images may be necessary to determine irregularities with sizes < .020” in the full-penetration weld. An X-ray examination can also be used to record the bore centrality in solid body material thermowells. For this purpose, two images of the thermowell tip at 90° to each other are required.

Pressure and stability tests

The hydrostatic pressure test is a pressure and stability test of the components of a thermowell following AD 2000 code of practice HP30. For the test, the thermowell is clamped into a testing device and subjected to a defined test pressure at room temperature for a certain period of time (e.g. three minutes). In general, a distinction is made between the outside and inside pressure test. A typical pressure is 1.5 times the nominal pressure of the flange as outside pressure or 7500 psig (500 bar) as inside pressure.

Helium leak test

For leak testing in accordance with DIN EN 1779 (1999)/ EN 13185, helium 4.6 is used as a test gas. The test is able to detect minimal leakage rates and is considered the most sensitive test method for leak testing. In general, one should distinguish between an integral and local test method. In the integral test, leak rates (e.g. 1x10-7 mbar * l / s) can be determined, while the local testing enables the location of the leak to be determined using a spray probe.

Ultrasonic test

Through an ultrasonic test in accordance with DIN EN ISO 17640, for example, full penetration weld seams on thermowells can be investigated with respect to irregularities (cracks, voids, insufficient bonding). For this, the reflections of a radiated ultrasound signal are measured at the interfaces of irregularities. To determine the position of the irregularities, the ultrasonic device is adjusted beforehand by means of a reference body. The ultrasonic test can also be used to measure the wall thicknesses of a thermowell from solid body material to determine the bore centrality.

Positive material identification test (PMI)

The PMI (positive material identification) test proves which alloy constituents exist in the material. There are various common test procedures. With optical emission spectroscopy (OES) in accordance with DIN 51008-1 and -2, an arc is generated between the thermowell surface and the test equipment, and the spectrum of this arc enables the alloy’s elements to be identified – both qualitatively and quantitatively. This process does leave a characteristic burn mark on the workpiece. A test procedure which doesn’t damage the surface is the X-ray analysis in accordance with DIN 51001; during the X-ray the atoms of the thermowell material are energised until they radiate themselves. The wavelength and intensity of the emitted radiation is again a measure of the alloy’s constituent elements and their concentrations.

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