

GÜNTHER GmbH

Temperature Measurement Technology

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45 Years of Precision

Starting with the founding year in 1968, the name GÜNTHER remains symbolic of state-of-the-art solutions in temperature measuring technology. Having started with the production of electronic temperature sensors for industrial furnaces, we have continually developed and expanded our expertise, offering our services to an increasing variety of industry sectors.

Today, we are standing on a foundation built on 45 years of experience, based on cooperation with numerous partners and the development of efficient solutions for their individual applications.
In every instance where precise measuring data in high temperature environments are essential, GÜNTHER Temperaturmesstechnik (Temperature Measurement Technology) has established itself as a morn, reliable and leading partner.

Success Through Preparation

At our four international production sites, we are able to manufacture almost any required, customized component for our customers. Industry standard dimensions of rare/noble metal thermowells, thermocouple wiring, metal and ceramic tubing are always in stock, allowing a prompt and flexible fulfilment of our partners' individual requirements.

Sophisticated logistics network and optimised production processes are the prerequisites for timely order fulfilment and worldwide product delivery.

Note: Apart from buying and trading precious metals for our sensors, we offer our customers the option of opening a precious metals account.

Diversity Through Progress

Moreover, the continuous expansion of our expertise on an international scale remains as a firm cornerstone of our company philosophy.

Always on the cutting edge, with an eye on the future, we go beyond providing our customers morn and precise solutions, leading the way in the field of temperature measurement.

Only in this fashion, are we able to meet a variety of application scenarios and offer customized temperature sensors, while keeping an eye on the future and sustaining preparedness in meeting the varying, growing demands of the market.

Combined, these two elements form the philosophy of our company and drive the motor in maintaining both the diversity and highest standard in quality of our products.



Our main office in Schwaig near Nuremberg

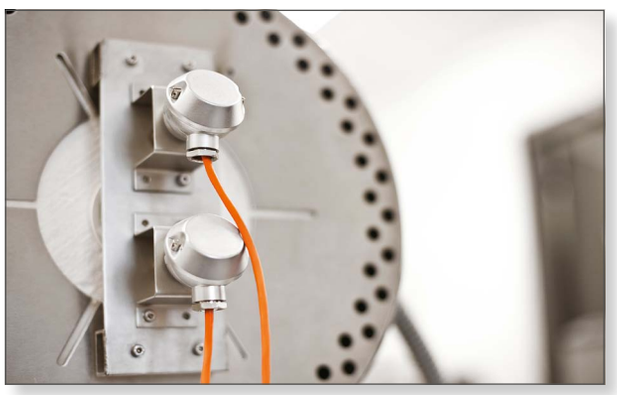
Quality Through Standards

Our quality management system has been established for many years and, along with our internal calibration laboratory, allows us to guarantee the highest possible standards in quality for every process of our operation. Certification pursuant to DIN EN ISO 9001:2000, constant input and output control, the permanent training and development of our staff and high delivery performance reliability underscore our quality and reliability standards.

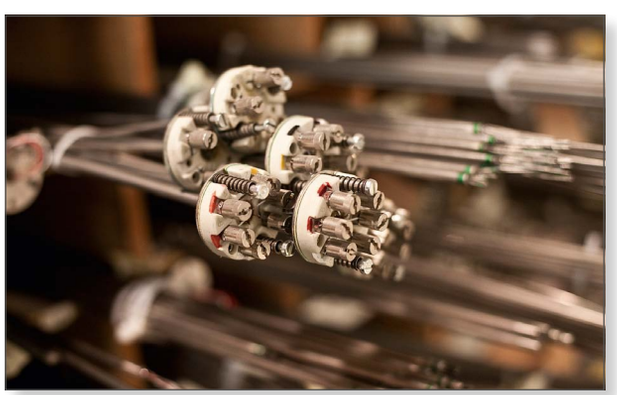
Our experience – gathered over decades, a future-oriented and sound business structure, as well as the highest quality standards, create the environment necessary in order to provide you with premium products.

Products that guarantee security and result-oriented operation.

We measure our performance against your goals. Together with our highly qualified staff, we will find ideas and solutions to ensure you receive good and reliable results.



Our long-established QM System and internal calibration laboratory ensure the highest standard in quality.



GÜNTHER GmbH is able to manufacture nearly every desired, customized configuration in-house.

GÜNTHER Temperature Sensors in Action

Our temperature sensors find application in a diversity of industry sectors all around the world, wherever their exact measurements are required, all throughout the various stages of manufacturing processes.
This is a summary of the most common sectors and areas of application:

Waste Recycling / Incineration

Applied Sensors:

00-TMT / 05-TKT / 10-TMM / 12-THD
13-TFL / 14-TES / 15-TKM / 20-TOM
53-WHD / 54-WFL / 55-WES

Glass Industry

Applied Sensors:

00-TMT / 05-TKT / 08-TMP
10-TMM / 20-TOM

Plant and Machine Construction

Applied Sensors:

00-TMT / 05-TKT / 10-TMM / 12-THD
13-TFL / 14-TES / 15-TKM / 18-TKL
20-TOM / 50-WMS / 52-WOS
53-WHD / 54-WFL / 55-WES

Steel and Iron industry

Applied Sensors:

00-TMT / 05-TKT / 10-TMM
12-THD / 13-TFL / 18-TKL
30-WTE / 35-WGG

Automobile Industry

Applied Sensors:

00-TMT / 05-TKT / 10-TMM / 12-THD
13-TFL / 14-TES / 15-TKM / 18-TKL
20-TOM / 30-WTE / 35-WGG / 50-WMS
52-WOS / 53-WHD / 54-WFL / 55-WES



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Heat Treatment

Applied Sensors:

05-TKT / 18-TKL / 20-TOM
30-WTE / 35-WGG

Chemicals Industry

Applied Sensors:

12-THD / 13-TFL / 14-TES /
18-TKL / 50-WMS / 53-WHD /
54-WFL / 55-WES

Laboratories

Applied Sensors:

05-TKT / 10-TMM / 12-THD / 13-TFL
18-TKL / 20-TOM / 52-WOS / 53-WHD
54-WFL / 55-WES / 72-KFW

Industrial Furnace Construction

Applied Sensors:

00-TMT / 05-TKT / 10-TMM
15-TKM / 18-TKL / 20-TOM
55-WES

Aluminium and Nonferrous Metal Industry

Applied Sensors:

00-TMT / 05-TKT / 10-TMM
20-TOM / 30-WTE / 35-WGG

Cement and Building Material Industry

Applied Sensors:

00-TMT / 05-TKT / 10-TMM
15-TKM / 20-TOM

Energy Production

Applied Sensors:

00-TMT / 05-TKT / 10-TMM / 12-THD
13-TFL / 14-TES / 15-TKM / 20-TOM
50-WMS / 52-WOS / 53-WHD
54-WFL / 55-WES / 72-KFW

Plastic Industry

Applied Sensors:

20-TOM / 52-WOS
60-WTH / 72-KFW



Principals of Temperature Measurement

Essentially, there are several physically different possibilities of measuring temperature, such as gas or liquid thermometers, bimetallic strip thermometers, pyrometers, thermal imaging and of course thermocouple and resistance thermometers

The last two are examples of what is referred to as “touching” measurement, due to the instruments having direct contact with the measured material.

Principals of Thermocouples

Pursuant to the Seebeck effect, the junction of two different metals results in an amount of contact voltage at the point of junction, which is dependent upon the temperature. The gauge slide of a thermocouple assembly possesses two of these touching points.

If there is no difference in temperature, both of these contact voltages cancel each other out. If the points of contact have different temperatures, a measurable thermoelectric current starts flowing.

Principals of Resistance Thermometers

In contrast to the thermoelectric principals of thermocouples, resistance thermometers use metals that alter their electrical resistance when heated. A differentiation is made between metals with a negative temperature coefficient (NTC), whose resistance declines when heated, and metals with a positive temperature coefficient (PTC), whose resistance increases when heated. For example, platinum’s electrical resistance increases when heated.

Both principals share the property that the thermometer can only indicate the temperature that exists at the point of measurement. In order to receive precise measurements, it is essential for the point of measurement to have acquired an identical temperature to the medium being measured. At first glance, this appears quite logical. In practice, this is one of the main reasons for reduced quality, regulation errors and measurement deviations between different points of measurement on the same medium. An unsuitable protective fitting or construction can lead to the measured temperature differing from the actual temperature of the measured medium.

For this reason, the main challenge in constructing a suitable temperature sensor is finding the optimal compromise between reaction time, holding time, measurement precision and economy.

With over 45 years of experience, GÜNTHER GmBH is happy to advise you in finding the best suited format for your required temperature sensor. Using our extensive inventory and sophisticated logistics, we will supply you with your custom, high quality instruments quickly and reliably.

Composition of Thermocouples and Resistance Thermometers

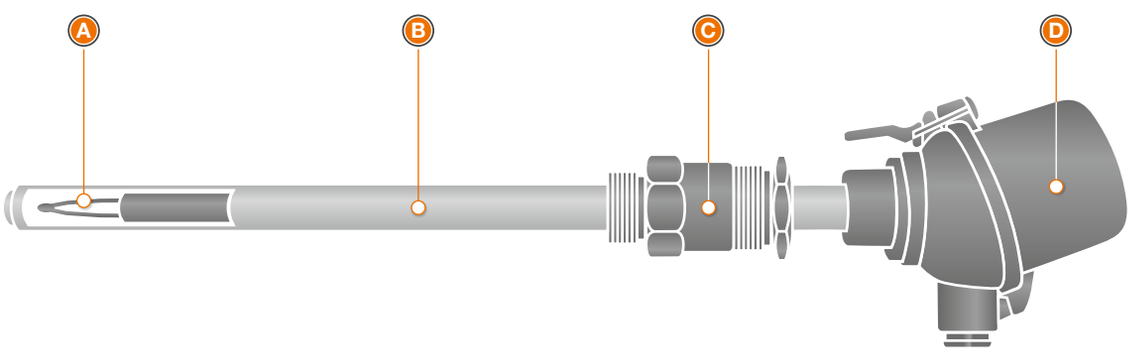
In most cases, the components of thermocouple assemblies and resistance thermometers are described as follows:

A Gauge Slide
This insert is usually not visible from the outside and contains the actual point of measurement.

B Protective Fitting
Its primary function is to protect the point of measurement from outside chemical and mechanical factors within the application environment.
Important aspects include the type of material used, its dimensions and much more.

C Process Connector
Used to affix the thermometer, for instance, to an oven wall, forging die, etc.
Differentiation is made between detachable/adjustable pro cess connectors (threaded sleeves, stop flanges, etc.) and sealed/welded connectors (i.e. blank flanges or screw necks welded to a protective fitting).

D Connection Head
These casing, mostly cast from light metal, contain a ceramic connection socket through which the compensation or copper wires are connected to the upper end of the gauge slide.
The connection head may also contain a measurement converter (transducer), that – mounted inside the connection head - converts the measurement result into a stable signal.



Temperature Measurement Using Thermocouples

The actual temperature measurement is made at the thermocouple within the thermocouple assembly. With a heat increase, the resulting difference in temperature between the different metals results in a measurable electrical current, allowing for exact and standardized deduction of the adjoining temperature.



The various standardized thermocouples in Europe are:

- NiCr-Ni, Type K, Colour Code Green (DIN EN 584-2)
- NiCroSil-NiSil, Type N, Colour Code Pink (DIN EN 584-2)
- Fe-CuNi, Type J, Colour Code Black (DIN EN 584-2)
- NiCr-CuNi, Type E, Colour Code Violet (DIN EN 584-2)
- Cu-CuNi, Type T, Colour Code Brown (DIN EN 584-2)
- Pt10%Rh-Pt, Type S, Colour Code Orange (DIN EN 584-2)
- Pt13%Rh-Pt, Type R, Colour Code Orange (DIN EN 584-2)
- Pt30%Rh-Pt6%Rh/B, Typ B, Colour Code Grey (DIN EN 584-2)
- Fe-CuNi, Type L, Colour Code Blue (DIN 43710)
- Cu-CuNi, Type U, Colour Code Brown (DIN 43710)

For further information regarding colour codes and tolerances of the various thermocouples, please take a look at the chapter **Technical Information**, page 62.

Temperature Measurement Using Resistance Thermometers

The central component here is the precision resistor, which is mounted inside the the sensor tip instead of a thermocouple. This resistor is traversed by an auxiliary current with anywhere between 0,1 and 10 mA and then the adjoining electrical resistance is measured.



This then, pursuant to DIN EN 60751, which standardizes resistances from -200° C up to +850° C, allows for an exact deduction of the resistor's ambient temperature. A sensor tip may contain up to three different precision resistors. The enclosed construction of the resistance thermometer enables use of all three without a protective fitting. Today, industrial temperature measurement commonly relies on resistance thermometers with platinum precision resistors.

Protective Fittings

If possible, thermocouples whose conductor pairs are insulated against each other, are applied in pure, dry conditions and up to certain temperatures without protective fitting. With a fast reaction time, quick through heating and minor heat dissipation this approach is - when possible - quite advantageous.

Most often, a protective tube has to be utilized to protect the thermocouple from the aggressive environmental conditions inside the measuring site.





Metal Protective Tubes

Depending on the circumstances, several different stainless steels with high nickel and chrome content for reductive or oxidizing environments, heat resistant steels, nickel-chrome-molybdenum alloys, enamelled steel pipes, commercially pure iron, sheaths made of platinum-rhodium alloys and much more may find application.
The upper temperature range for metallic protection tubes is somewhere between a maximum of 1150°C and 1200°C depending on the application scenario, or a maximum of 1700°C for platinum-rhodium alloys.

Ceramic Protection Tubes

These are divided into oxide ceramic protection tubes with varying oxide content (i.e. C799, C610 and C530) and furthermore into ceramic protection tubes with gas-tight and porous structures.
The aluminium oxide content of a ceramic protection tube defines the temperature resistance of the sensor. The higher the content, the higher the temperatures the substance is able to withstand.
Moreover, the gas-tight or porous structure of the ceramic substance will influence its resistance to temperature fluctuations. The tighter the structure, the higher its resistance.
Ceramic sheaths are suited for higher temperatures than metallic protection tubes, however ceramics react more sensitively to abrupt temperature fluctuations.



00-TMT
Thermocouple Assemblies with Metal Protective Tube

Straight line thermocouple assemblies with metal protective tubes are used, depending on the properties of the protective tube, for common temperature measurements in liquid, gaseous or plastic mediums up to a temperature of 1200°C.

The protective fittings of this product line are composed of seam welded or seamlessly drawn metal tubing. Depending on the application, GÜNTHER GmbH has over 40 different, partly high-alloyed materials in a large array of measurements in stock. The tips for the protective tubes are closed either through hot forming or welded shut with a bottom blank.
Tapered measuring tips may be used in this product line in order to shorten the reaction time. For prolonging the holding time, strengthening the wall thickness and utilization of ceramic inner tubing are possible.
All internationally prevalent thermocouple pairs, detachable process connectors (for example mobile flanges or threaded sleeves) and connection heads are employed.

The selected thermocouple and/or protective tube material with the lowest permissible operating temperature defines the maximum operating temperature of the entire thermocouple assembly.

Thermoelectric voltages and tolerances of our thermocouples are pursuant to DIN EN 60584, Class 1. For specialised thermal sensors, whose construction and components require technical clarification, we engineer customized solutions. Please contact us about your specific application requirements in reference to material and assembly and we will develop your optimized individual solution.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Application Examples for Thermocouple Assemblies with Metal Protective Tube:

- Waste Recycling / Incineration
- Glass Industry
- Plant- and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Industrial Furnace Construction
- Aluminium and Nonferrous Metal Industry
- Cement and Building Material Industry
- Energy Production

1 Connection Head (s. page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Protective Tube (Materials)

St. 35.8	Mat. No. 1.0305
Kanthal	
Stainless Steel	Mat. No. 1.4301
Stainless Steel	Mat. No. 1.4571
X18Cr N 28	Mat. No. 1.4749
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Heat Resistant Steel	Mat. No. 1.4893

3 Process Connector (Detachable)

Flange
Threaded Socket
Flange / Counter Flange

4 Ceramic Inner Tubing

C610	TEP
C799 (gas-tight)	Aluminium Oxide

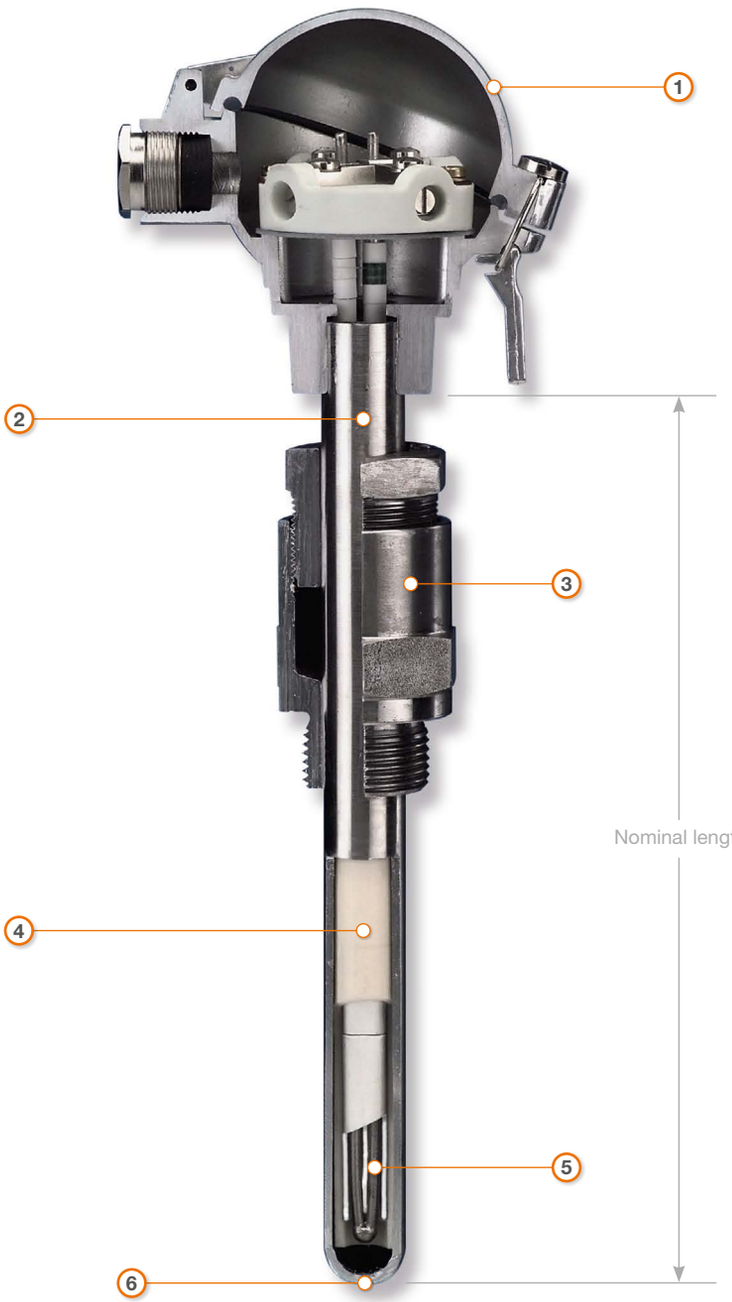
5 Thermocouple

Type R	PtRh13-Pt
Type S	PtRh10-Pt
Type B	PtRh30-PtRh6
Type K	NiCr-Ni
Type J	Fe-CuNi
Type L	Fe-CuNi
Type C	WRe5-WRe26
Type N	Nicrosil-Nisil
Type D	WRe3-WRe25

6 Configuration

Fast Response Time:
Tapered Protective Tube
Protective Sheath Diameter: 6-15 mm

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



05-TKT
Thermocouple Assemblies with Ceramic Protection Tube

Straight line thermocouple assemblies with ceramic protection tube (05-TKT) are mainly used for general temperature measurement in gaseous environments up to 1800°C.

Measurement and regulation processes can lead to strenuous operational demands through abrasion and corrosion. This is the reason for the protection tubes of these thermal sensors consisting of high grade heat-resistant ceramics. Metals often will not be able to bear the stress of this strain.

Aside from the industry customary oxide ceramics (purity of up to 99,8%), we offer non-oxide ceramics and individual solutions with a diversity of dimensions and materials. In most cases, GÜNTHER GmbH will have these items available from stock.

An overview of the individual properties of the most common ceramics can be found on page 63, in the chapter “Technical Information”.

The assemblies of this product line can be fitted with an additional ceramic inner tube, which, in most cases, considerably increases endurance strength and total durability.

The maximum operating temperature is dependent both upon the mounting orientation (vertical / horizontal) and the corrosiveness of the respective ambient media.
Thermoelectric voltages and tolerances of our thermocouples are pursuant to DIN EN 60584, class 1.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Application Examples for Thermocouple Assemblies with Ceramic Protection Tube:

- Waste Recycling / Incineration
- Glass Industry
- Plant and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Heat Treatment
- Laboratories
- Industrial Furnace Construction
- Aluminium and Nonferrous Metal Industry
- Cement and Building Material Industry
- Energy Production

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Holding Pipe (Materials)

Available in various lengths

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	

3 Process Connector (Detachable)

Flange
Threaded Socket
Flange / Counter Flange

4 Protective Tube (Materials)

C610	Quartz Glass
C799	Sapphire Glass
C530	SiN
SiC	

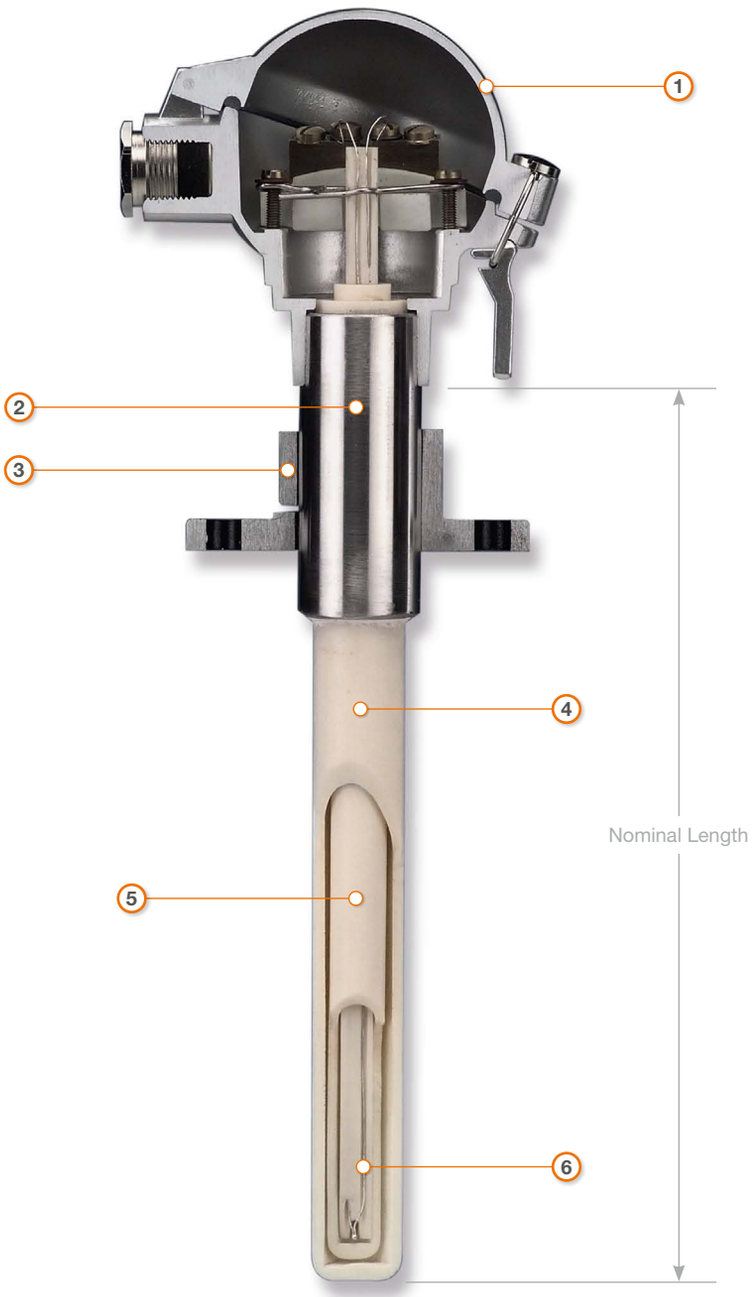
5 Innenrohr

C610	TEP
C799 (gas-tight)	Aluminium Oxide
C530	Porous Ceramic

6 Thermocouple

Type R	PtRh13-Pt
Type S	PtRh10-Pt
Type B	PtRh30-PtRh6
Type K	NiCr-Ni
Type J	Fe-CuNi
Type L	Fe-CuNi
Type C	WRe5-WRe26
Type N	Nicrosil-Nisil
Type D	WRe3-WRe25

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



08-TMP
Thermocouple Assemblies with Noble Metal Protective Tube

Straight line Thermocouple Assemblies with Noble Metal Protective Tube (08-TMP) are used in the glass industry for temperature measurement in glass melting. The applied protection tubes consist of alloyed noble metals. In order to meet the extreme environment conditions, only high grade materials are used in production.

A large selection of various dimensions and platinum alloys are available from stock in order to ensure fast delivery times.
Aside from alloying with other metals such as iridium and rhodium, we offer dispersion-hardened protection tubes and platinum coated ceramic pipes.

Thermocouples are available as required, in single, double or triple element version.
Also, GÜNTHER GmbH will deliver bubbler pipes or glass level probes in various versions according to customer specifications.

Thermoelectric voltages and tolerances are pursuant to DIN EN 60584, class 1 for thermocouple types S and R, class 2 for thermocouple type B.

GÜNTHER GmbH has been a supplier of Thermocouples for over 40 years to the following sectors of the glass industry:

- Container Glass
- Fibreglass
- Sheet Glass
- Glass Wool
- Dinnerware Glass
- Dinnerware Glass
- Medical Glass

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Operation temperature for platinum-rhodium/platinum thermocouples

Type	Diameter	Maximum Temperature
S	0,35 mm	1350 °C
S	0,50 mm	1600 °C
R	0,35 mm	1350 °C
R	0,50 mm	1600 °C
B	0,35 mm	1600 °C
B	0,50 mm	1800 °C

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Process Connector (detachable)

Flange
Threaded Socket
Flange / Counter Flange

3 Protection Tube (Materials)

C610
C799
C530

4 Inner Tube

C610	TEP
C799 (Gas-Tight)	Aluminium Oxide

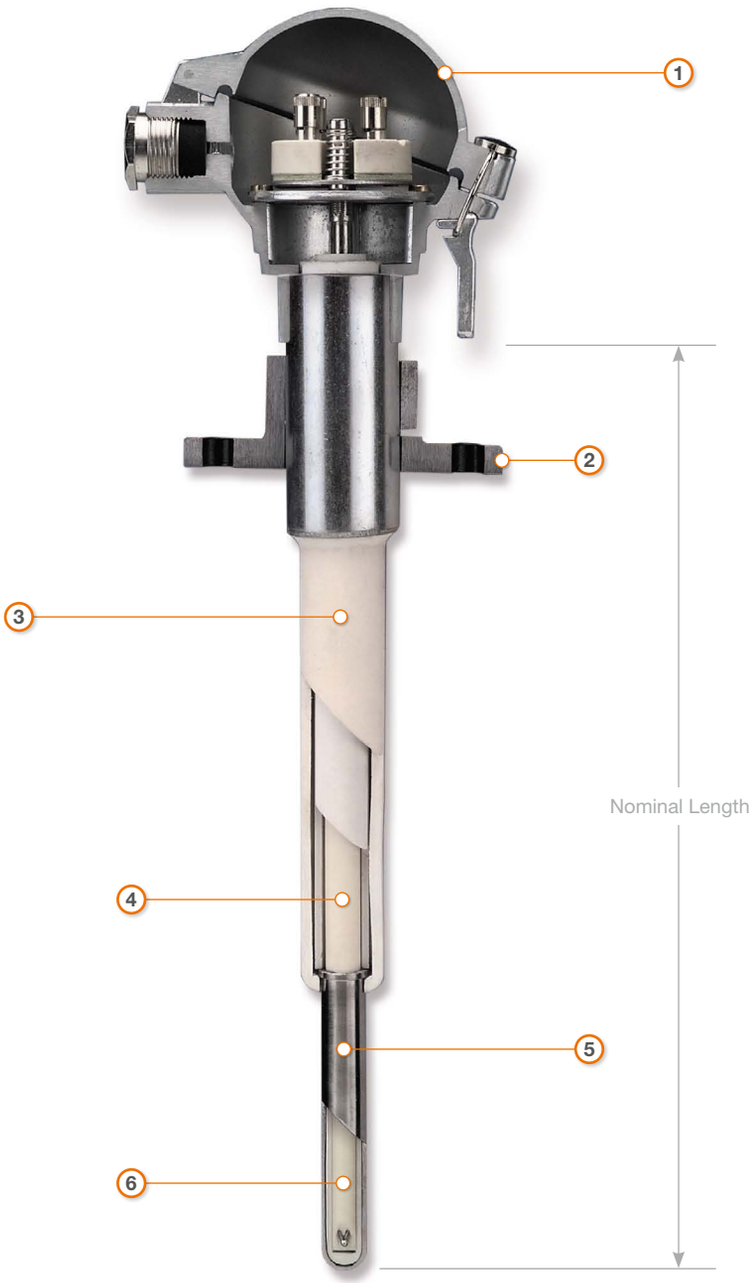
5 Noble Metal Protection Tube

PtRh90/10	9,1 x 0,3 mm
PtRh90/10	9,1 x 0,5 mm
PtRh90/10	6,5 x 0,5 mm
PtRh90/10	9,0 x 0,4 mm
PtRh85/15	7,3 x 0,4 mm
PtRh80/20	9,1 x 0,5 mm
PtRh90/10	9,0 x 0,5 mm

6 Thermocouple

Type R	PtRh13-Pt
Type S	PtRh10-Pt
Type B	PtRh30-PtRh6

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



10-TMM
Thermocouple Assemblies with Metal Protection Tube and Sheathed Mineral-Insulated Gauge Slide

Straight line thermocouples with metal protection tubes and sheathed mineral-insulated gauge slide (10-TMM) are used for general temperature measurement in liquid, gaseous and plastic media up to 1200°C.

The main difference to thermocouples with ceramic protection tubes (00-TMT) lies in the use of a sheathed mineral-insulated gauge slide. The thermocouple wires are fully embedded in a highly pure magnesium oxide with an additional metallic sheath.
The advantages compared to thermocouples with ceramic protection tubes include:

- Ease of Replacement
- Vibration and Impact Resistance
- Increased Holding Time
- Possibility for Test Bores

In order to achieve extra speed in measuring temperature changes, we also offer these temperature sensors with tapered sensor tip.

The thermoelectric voltages and tolerances of our mineral insulated sensor inserts are pursuant to standard DIN EN 60584, Class 1.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Application Examples for Thermocouple Assemblies with Metal Protection Tube and Sheathed Mineral-Insulated Gauge Slide

- Waste Recycling / Incineration
- Glass Industry
- Plant and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Laboratories
- Industrial Furnace Construction
- Aluminium and Nonferrous Metal Industry
- Cement and Building Material Industry
- Energy Production

(1) Connection Head (page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

(2) Protective Tube (Materials)

St. 35.8	Mat. No. 1.0305
Kanthal AF	
Stainless Steel	Mat. No. 1.4301
Stainless Steel	Mat. No. 1.4571
X18Cr N 28	Mat. No. 1.4749
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Heat-Resistant Steel	Mat. No. 1.4893

(3) Process Connector (Detachable)

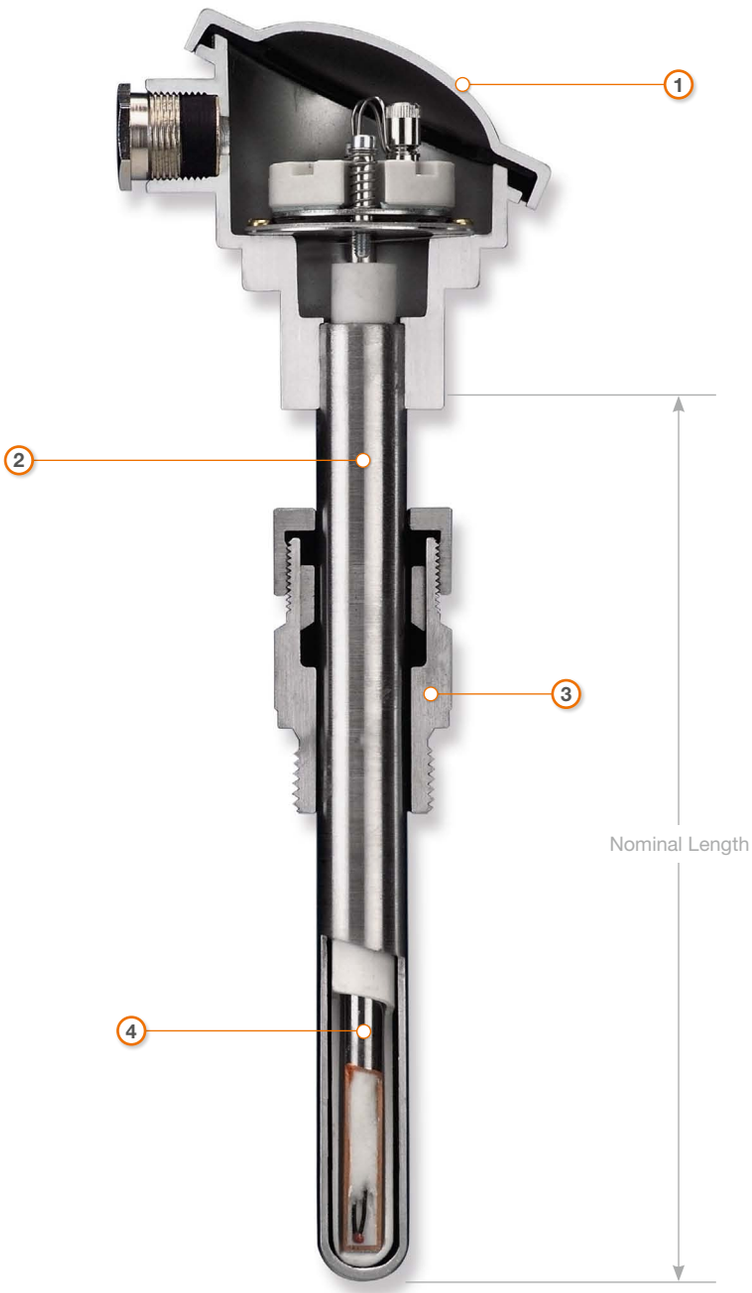
Flange
Threaded Socket
Flange / Counter Flange

(4) Mineral-Insulated Gauge Slide

Sheath Material:	Inconel 2.4816
	Mat. No. 1.4541
Thermocouple:	NiCr-Ni / K
	Fe-CuNi / L
	Fe-CuNi / J
	Nicrosil-Nisil / N
Diameter:	1,5 - 8 mm

The sheathed mineral-insulated gauge slide is available as required, in single, double or triple version and may be fitted, optionally, with a parallel test bore for inserting a reference thermometer.

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.
Please contact us for further information!



12-THD
Thermocouple Assemblies for Welding with Thermowell Form 4 (Formerly D-Sleeve) pursuant to DIN 43772

Thermocouple assemblies for welding (12-THD) are used in gaseous or liquid media such as air, steam, water, oil, etc. with high current speeds and pressure. The thermowell's material defines the operating temperature. Specialized assemblies for welding are suitable for up to 700 bar of pressure. The mountings of this product line are fitted with exchangeable gauge slides.

The main component is a thermowell crafted from high-grade or pressure-vessel steel, with which the thermocouple assembly is welded to the respective machine or measuring location.

Selection of the thermowell is dependent on spatial proportions at the point of installation, as well as demands as dictated by temperature, pressure, current flow and chemical attack.

Standard values for stress capacity can be found in the diagrams of DIN 43772.
In particular the question of chemical stress capacity must be examined carefully for each individual scenario. Often times, only field testing will yield authoritative information, as even minor impurities in the ambient media can have significant impact on the performance of the thermowell within the application environment.

Thermoelectric voltages and tolerances of our thermocouples and gauge slides are pursuant to DIN EN60584, class 1.

Application Examples for Thermocouple Assemblies for Welding with Thermowell Form 4 :

- Waste Recycling / Incineration
- Plant and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Chemical Industry
- Laboratories
- Energy Production

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (Page 55)

B (M24 x 1,5)	BBK
BUS	BUSH
BUZ	BUZH

2 Connection Tube Pursuant to DIN 43767

with threading:	
M24 x 1,5/M18 x 1,5	Zinc Coated Steel
M24 x 1,5/M14 x 1,5	or High-Grade Steel
also available without threading	

3 Thermowell Pursuant to DIN 43772

Cone Length:	40 - 125 mm
Shaft Length:	50 or 110 mm
Thermowell Length:	115 - 260 mm
Diameter:	18 or 24 mm
Material:	1.7335
	1.4571
	1.5415

4 Gauge Slide

Sheath Material:	Inconel 2.4816
	Mat. No. 1.4541
Thermocouple:	NiCr-Ni / K
	Fe-CuNi / L
	Fe-CuNi / J
	Nicrosil-Nisil / N
Diameter:	2 - 8 mm
Single or Double	

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



Application Examples for Thermocouple Assemblies with Welded Blank Flange:

- Waste Recycling / Incineration
- Plant and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Chemical Industry
- Laboratories
- Energy Production

13-TFL
Thermocouple Assemblies with Welded Blank Flange

Thermocouple assemblies with welded blank flange (13-TFL) are used to measure temperatures in gaseous or fluid media, such as air, steam, water or oil.

Distinctive characteristic of these sensors is a blank flange welded to or onto the protective sheath, most commonly pursuant to DIN EN 1092, enabling a tight connection of the sensor with the respective wall of an over- or under-pressure facility as can be found in power plants, for example.

Sensors in this component assembly contain either a thermocouple with ceramic insulation or an exchangeable mineral-insulated gauge slide.

Preferred Application Environments:

- Containers and Piping
- Instruments and Machinery
- Laboratories
- Testing Facilities
- Process Technology
- Energy Production und Heat Distribution
- Food and Beverage Industry
- Plant and Machine Construction

Thermoelectric voltages and tolerances of our thermocouples and mineral-insulated gauge slides are pursuant to DIN EN 60584, Class 1, for thermocouples and mineral-insulated gauge slides of Type L pursuant to DIN 43710.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (Page 55)

A	BUSH (M24 x 1,5)
B (M24 x 1,5)	BUZH (M24 x 1,5)
BUS (M24 x 1,5)	DL / MA (M10 x 1)
BUZ (M24 x 1,5)	

2 Blank Flange pursuant to DIN EN 1092

DN 10 - DN 100	PN 16
Material:	
Mat. No. St37-2	Mat. No. 1.4571
Mat. No. C22.8	Alloy C4

3 Mineral-Insulated Gauge Slide

Material:	NiCr-Ni
	Fe-CuNi
	Nicrosil-Nisil
Diameter:	3 - 8 mm
Single or Double	

4 Protective Tube Material / Dimensions

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	
Alloy C4	
Diameter:	6 - 22 mm
Wall:	0,75 - 3 mm

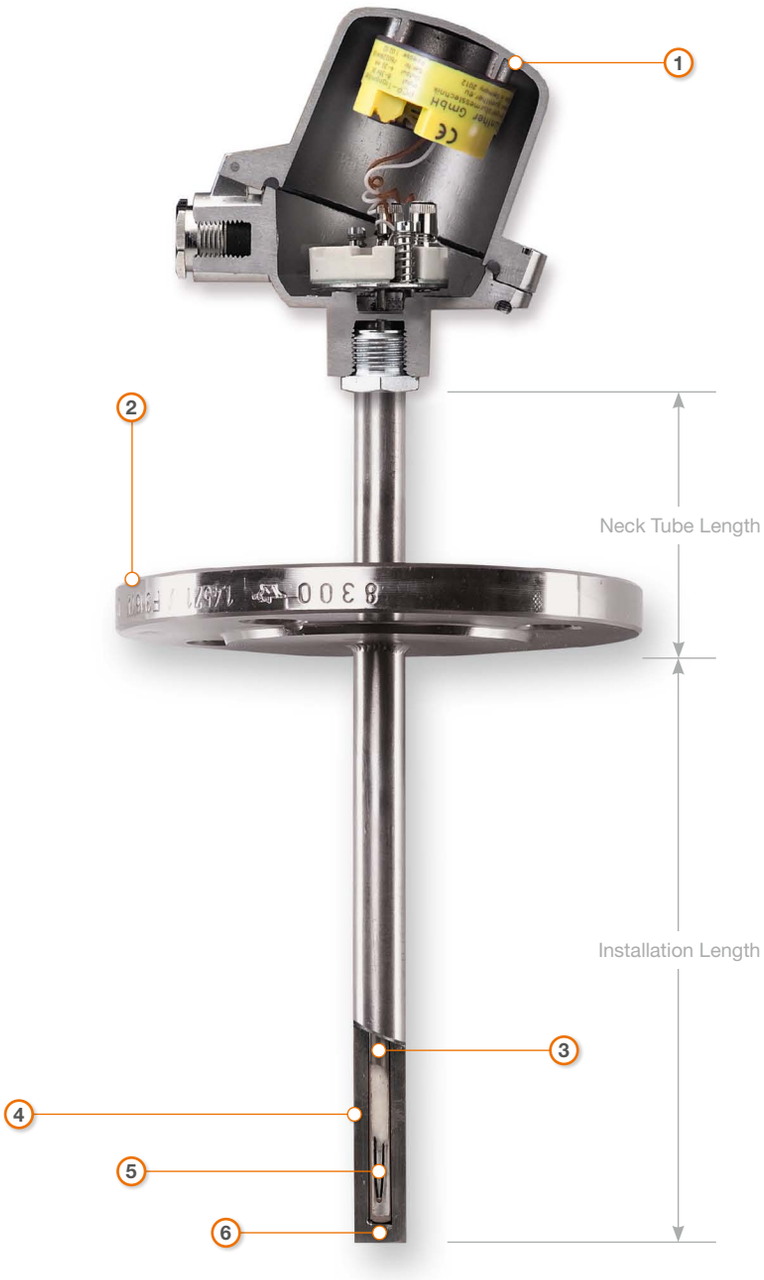
5 Thermocouple with Ceramic Insulation

Single or Double:	
NiCr-Ni/K	Fe-CuNi/J
Fe-CuNi/L	NiCrSi-NiSi/N
PtRh10-Pt/S	PtRh13-Pt/R
PtRh30-PtRh6/B	

6 Configuration

Normal (Straight Protective Tube)	
Fast Reacting	
(Tapered Protective Tube):	
Tube Tip Diameter: 6-15 mm	

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



14-TES
Thermocouple Assemblies with Threaded Socket

Thermocouple assemblies with threaded socket (14-TES) are used for common temperature measurement in low-pressure gaseous, liquid and plastic media environments, depending on the properties of protective tube and surrounding media up to a temperature of 1200°C.

A threaded socket is welded to the protective tube, providing for the stability of the process connector in this component assembly. Depending on the application, the socket is welded to the protective pipe either directly beneath the connection head or with a gap of 100 or 200 mm, for example.

The protective fittings are usually made from a single seamlessly drawn high-grade steel tube with a circular blank welded inside.

Optionally, our thermocouple assemblies with threaded sockets may be fitted with in an internal ceramic tube, which significantly increases the long-term stability and electrical insulation of the measuring thermocouple in many application scenarios.

Application Examples for Thermocouple Assemblies with Threaded Socket:

- Waste Recycling / Incineration
- Plant and Machine Construction
- Automobile Industry
- Chemical Industry
- Energy Production

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (Page 55)

B (M24 x 1,5)	BUSH
BUS	BUZH
BUZ	NA
BBK	DL / MA (M10 x 1)
other	

2 Process Connector

G 1 A	
G 1/2 A	
M18 x 1,5	
G 3/4 A	
M20 x 1,5	
Combined:	M24 x 1,5 / G 1/2 A
M10 x 1 / G 1/2 A	
Other	

3 Outer Protective Tube Material / Dimensions

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	

Diameter:	6 - 22 mm
Wall:	0,75 - 3 mm

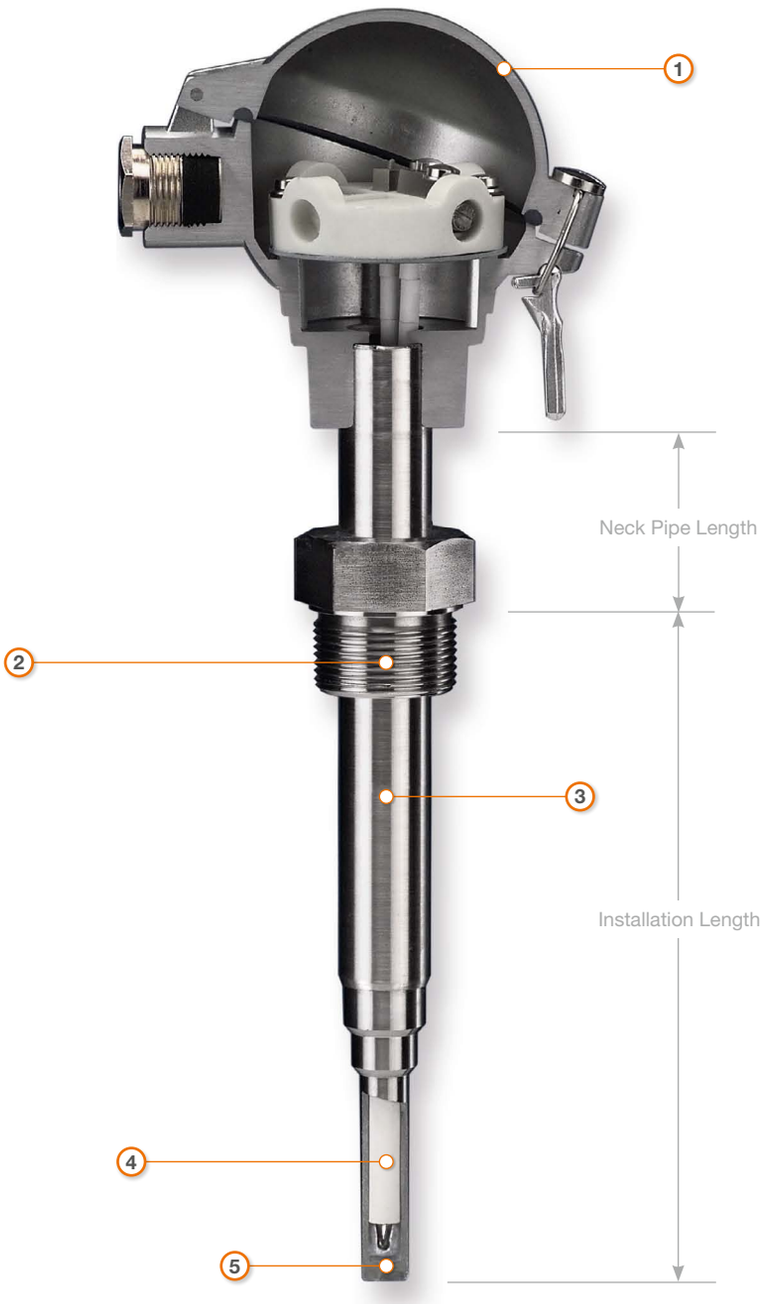
4 Mineral-Insulated Gauge Slide

Thermocouple Type / Mantle Material:	
Fe-CuNi / L	1.4541
Fe-CuNi / J	1.4541
Nicrosil-Nisil / K	Inconel 2.4816
Nicrosil-Nisil / N	Inconel 2.4816
Gauge Slide:	1,5 - 6 mm
Thermocouple:	1 - 3 mm
Single or Double	

5 Configuration

Normal (Straight Protective Tube)
Fast Reacting
(Tapered Protective Tube):
Tube Tip Diameter: 6-15 mm

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



Application Examples for Thermocouple Assemblies with Ceramic Protection Tube and Mineral-Insulated Gauge Slide:

- Waste Recycling / Incineration
- Plant and Machine Construction
- Automobile Industry
- Industrial Furnace Construction
- Cement and Building Material Industry
- Energy Production

15-TKM
Thermocouple Assemblies with Ceramic Protection Tube and Mineral-Insulated Gauge Slide

Straight line thermocouple assemblies with ceramic protection tube and mineral-insulated gauge slides (15-TKM) are used for common temperature measurement up to 1200°C, mainly in gaseous media.

For sensors of this product line, mainly base metal thermocouples are employed, combining the advantages of mineral-insulated gauge slides on one hand, and the advantages of technical ceramics on the other hand.

The individual properties of the most common ceramic types can be found on page 63, in the chapter “Technical Information”.

Additionally and in contrast to thermocouples, mineral-insulated gauge slides are easily exchangeable, they are resilient to temperature changes, vibration and impact resistant. In consequence of the compact and slender configuration of the mineral-insulated gauge slides, enough space usually remains to allow for the insertion of an additional mineral insulated thermocouple for measurement verification if necessary.

During measurement and control processes, often high operational wear occurs due to corrosion and abrasion, which even high grade metal protective tubes are not able to withstand. In these scenarios, thermal sensors with protective tubes made of heat-resistant, technical ceramics allow for increased holding time in many instances.

Thermoelectric voltages and tolerances of our mineral-insulated gauge slides are pursuant to DIN EN 60584, Class 1.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Holding Tube (Materials)

Available in various lengths

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	

3 Process Connector (Detachable)

Flange
Threaded Socket
Flange / Counter Flange

4 Protective Tube (Materials)

C610	Quartz Glass
C799	Sapphire Glass
C530	SiN
SiC	

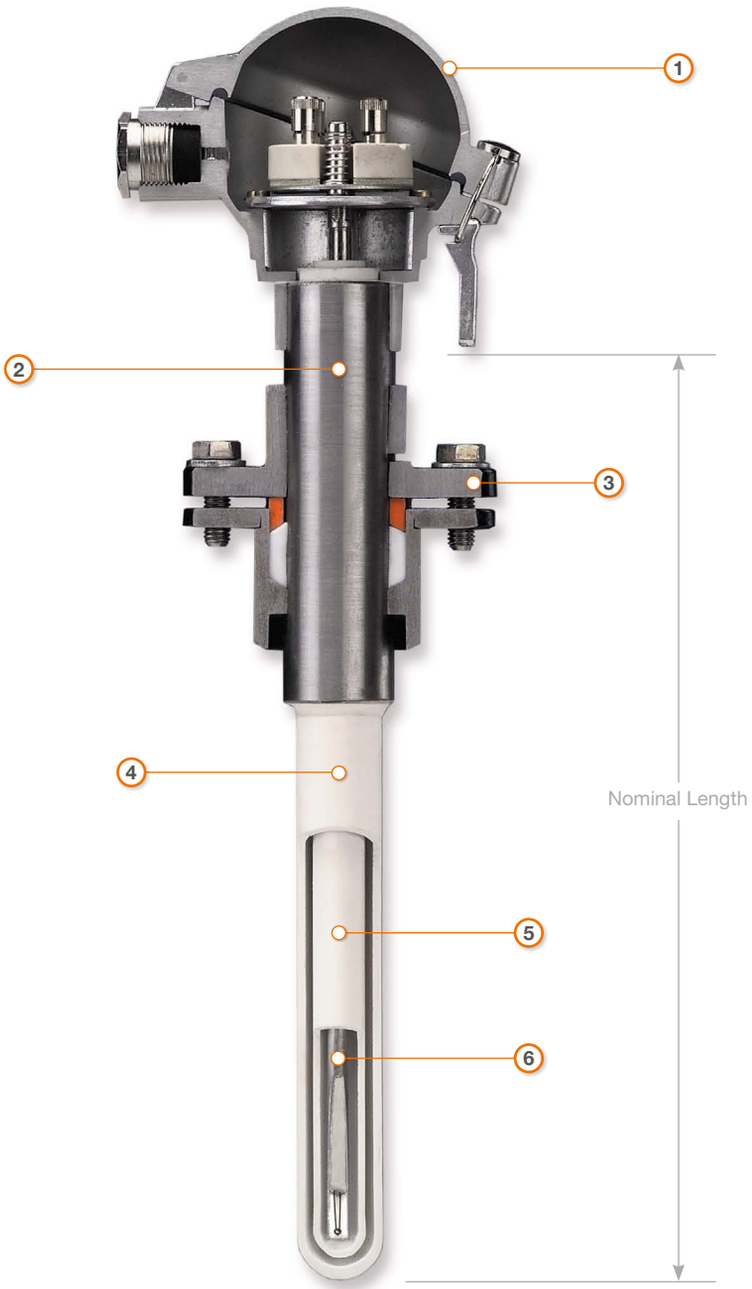
5 Inner Tube

C530	Porous Ceramic
C610	TEP
C799	Aluminium Oxide

6 Mineral Insulation Mantle / Thermocouple

Thermocouple / Mantle Material:	
Fe-CuNi / L	1.4541
Fe-CuNi / J	1.4541
Nicrosil-Nisil / K	Inconel 2.4816
Nicrosil-Nisil / N	Inconel 2.4816
Mantle-Diameter:	1,5 - 8 mm
Single or Double Testable	

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



The individual properties of the most common ceramic types can be found on page 63, in the chapter “Technical Information”.

Application Examples for Micro- and Laboratory Thermocouple Assemblies:

- Plant and Machine Construction
- Steel and Iron Industry
- Automobile Industry
- Heat Treatment
- Chemical Industry
- Laboratories
- Industrial Furnace Construction

18-TKL
Micro- and Laboratory Thermocouple Assemblies

Micro- and laboratory thermocouple assemblies (18-TKL) are preferentially used for technical temperature measurements in liquid and gaseous media within a temperature range between 200°C and 1800°C.

Micro- and laboratory thermocouple assemblies differ from conventional thermocouple assemblies in their very small dimensions, light weight and variable mounting options. They also warrant exact temperature measurements within a constrained installation space. In consequence of design, these sensors also have very short reaction times.

There is a notable danger of “poisoning” noble metal thermocouples in micro- and laboratory thermocouple assemblies by substances diffusing through the protective fitting, such as those to be found in flue gas, for example. In order to avoid these types of influences, we recommend using a version employing gas-tight ceramic.

Operation Temperature for Platinum-Rhodium / Platinum Thermocouples:

Type	Diameter	Maximum Temperature
S	0,35 mm	1350°C
S	0,50 mm	1600°C
R	0,35 mm	1350°C
R	0,50 mm	1600°C
B	0,35 mm	1600°C
B	0,50 mm	1800°C

The thermal materials used by GÜNTHER GmbH for micro- and laboratory thermocouple assemblies are pursuant to DIN EN 60584.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Types

Head B
Head DL
Head L
Connection Socket Type S

The following listed connection types are fitted with welded holding tubes and connection socket type S.

Head L with Tube 1.4571
Connection Clip 55x20 mm
Flanged Plate 60x60 mm
Connection Socket Type S

2 Holding Tube (Materials)

St. 35.8	Mat. No. 1.0305
Brass	
Stainless Steel	Mat. No. 1.4571
Inconel	Mat. No. 2.4816

3 Process Connector (Detachable)

Flange
Threaded Socket
Flange / Counter Flange

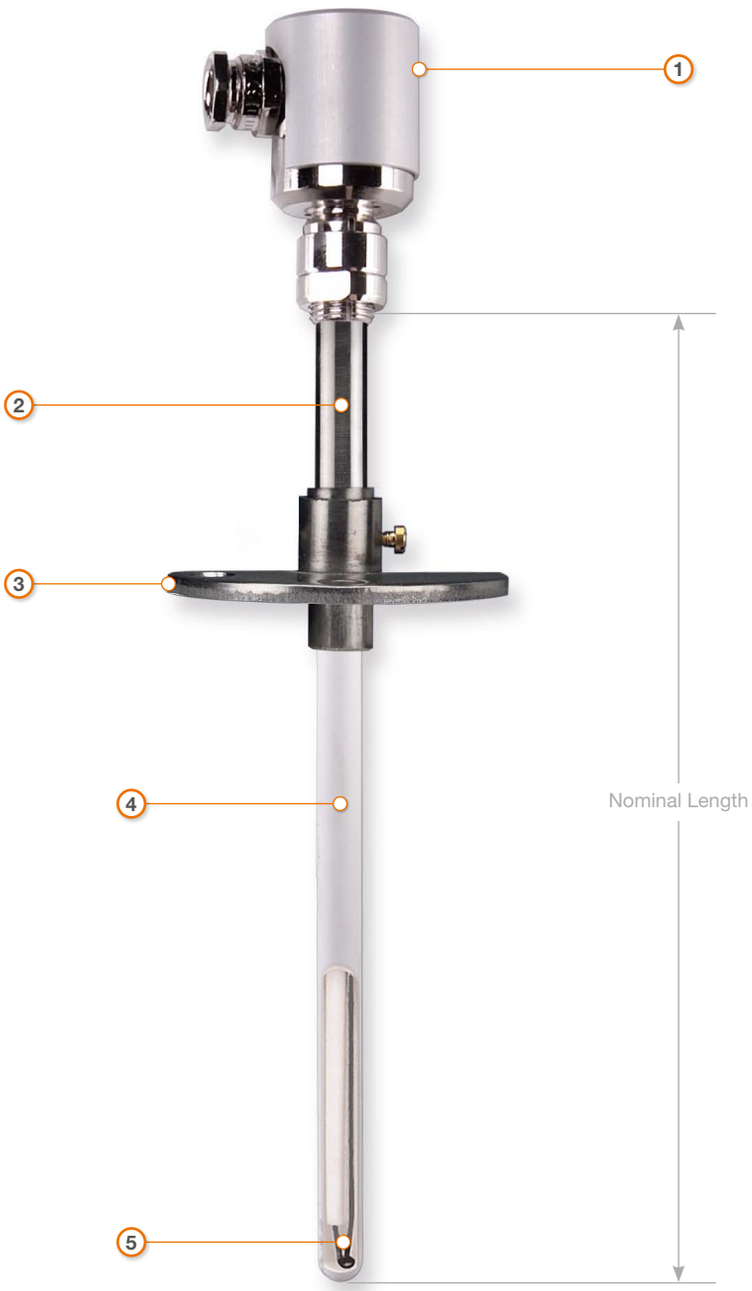
4 Protective Tube (Materials)

C610
C799

5 Thermocouple (Single, Double or Triple)

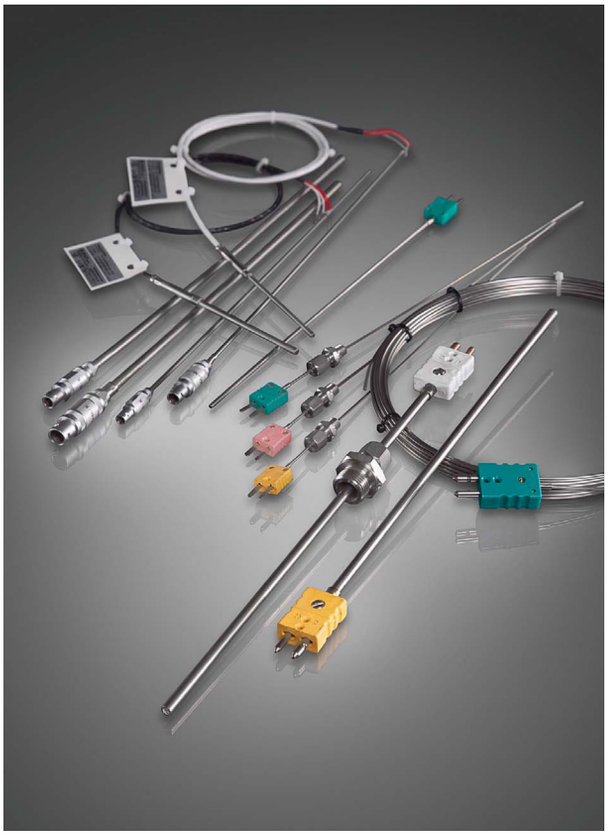
Type R	PtRh13-Pt
Type S	PtRh10-Pt
Type B	PtRh30-PtRh6
Type K	NiCr-Ni
Type J	Fe-CuNi
Type L	Fe-CuNi
Type C	WRe5-WRe26
Type N	Nicrosil-Nisil
Type D	WRe3-WRe25

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



20-TOM
Sheathed Thermocouple Assemblies without Protection Tube

Sheathed thermocouple assemblies without protection tube (20-TOM) are used in almost every branch of industry up to a temperature of 1100°C, with a platinum-rhodium-mantle up to 1300°C. Sheathed thermocouple assemblies essentially consist of thermo wires (inner conductors) insulated with high-purity, condensed magnesium oxide powder and an external mantle (sheath) of heat-resistant high-grade steel or nickel alloy (e.g. Inconel 600®). Sheathed thermocouple assemblies are available in single, double or triple element version. The outer diameter lies somewhere between 0,25 mm and 8,0 mm depending on technical assembly and customer preference. As a result of their structure, sheathed thermocouple assemblies offer numerous advantages when compared to their conventional counterparts.

- Small dimensions for temperature measurements at measuring sites with difficult accessibility (any desired length available)
- Short response time for exact measurements of temperature fluctuations
- Vibration and pressure resistant
- Optimal protection of inner conductors against corrosion, oxidation, mechanical damage and chemical contamination
- Increased stability of electric insulation compared to ceramic insulated thermocouples
- Simple and sealed assembly

Availability

We are able to deliver every current design and diameter of sheathed thermocouple assemblies with mounted sockets, connection heads, compensation cables, as well as accessories and mounting structures of every type.
For specialised requirements and standards (such as AMS, CQI-9, etc.), we offer sheathed thermocouple assemblies available with exceptionally narrow tolerances, often referred to as “better class 1”. Thermoelectric voltages and tolerances of our mineral-insulated gauge slides are pursuant to DIN EN 60584, class 1.

Application Examples for Sheathed Thermocouple Assemblies without Protection Tube:

- Waste Recycling / Incineration
- Glass Industry
- Plant and Machine Construction
- Automobile Industry
- Heat Treatment
- Laboratories
- Industrial Furnace Construction
- Aluminium and Nonferrous Metal Industry
- Cement and Building Material Industry
- Energy Production
- Plastic Industry

1 Connectors (Plug/Socket)

LEMO Size 0 - 3	
Standard	
Miniature	
High-Temp.-Standard	
High-Temp.-Miniature	
Ceramic-Standard	
Ceramic-Miniature	

2 Connection Head (Page 55)

With connecting thread	
B	(M24 x 1,5)
BUS	(M24 x 1,5)
BUZ	(M24 x 1,5)
BUZH	(M24 x 1,5)
BBK	(M24 x 1,5)
DL (MA)	(M10 x 1)

or with thread diameter of 15,3 mm

3 Process Connector (Detachable)

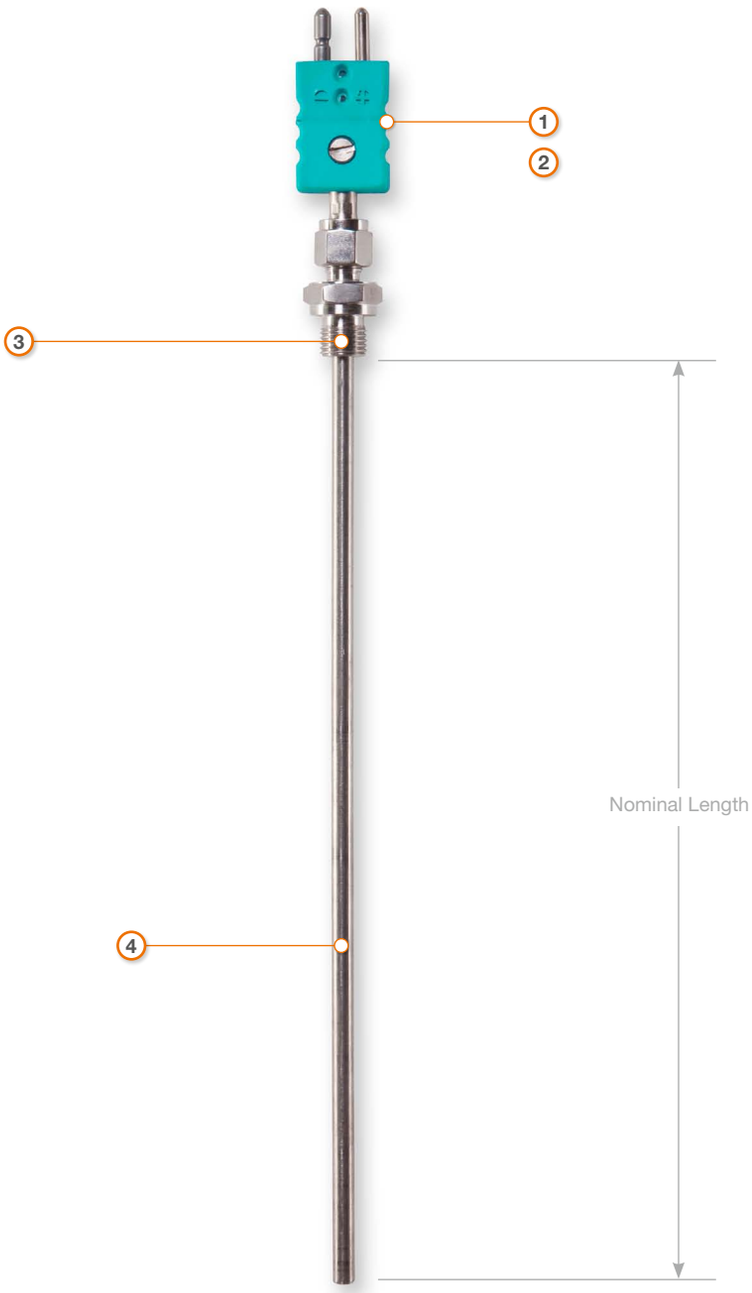
Clamp Connectors	Steel/High-Grade Steel
Pressure Ring	Teflon
Cutting Ring	High-Grade Steel

M 8x1 for Mantle Diameter 1,0-3,0 mm
G 1/8 A for Mantle Diameter 1,0-3,0 mm
G 1/4 A for Mantle Diameter 4,5-8,0 mm
G 1/2 A for Mantle Diameter 4,5-8,0 mm

4 Sheathed Thermocouple (Thermocouple/Mantle Materials)

NiCr-Ni/K	Inconel 2.4816
Fe-CuNi/L	1.4541/2.4816
Fe-CuNi/J	1.4541/2.4816
PtRh-Pt/S	Inconel 2.4816
Nicrosil-Nisil/N	Inconel 2.4816
Mantle Diameter:	0,5 - 8 mm
Single, Double or Triple	

Example of a common implementation in this product line



Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.
Please contact us for further information!

30-WTE
Angled Thermocouple Assemblies with Threaded Elbow Tubing



Recommended Protection Tube Materials in Salt Baths

Smelter	Maximum Temperature	Materials
Tenifer®	600°C	Titanium NT
Saltpetre-, Chloride- & Cyanogen containing Annealing, Tempering and Hardening Baths	1000°C 1300°C	Pure Iron 1.4821

Recommended Protection Tube Materials in Metal Smelting:

Aluminium	700°C	SiN SiC
Magnesium Al/Mg-Alloys	700°C	Pure Iron SiN
Lead	600°C	SiN
Zinc	600°C	Pure Iron / Steel / SiN
Copper	1200°C	1.4762 Graphite
Brass	900°C	1.4762 / Graphite / SiN

30-WTE
Angular Thermocouple Assemblies with Threaded Elbow Tubing

Angular thermocouple assemblies with threaded elbow tubing (30-WTE) are primarily used for temperature measurement in metal smelting and salt baths.

The angular shape allows for placement of the connector head away from the actual bath/smelt in order to avoid direct exposure to high temperatures and aggressive vapours.

Angular thermocouple assemblies with threaded elbow tubing offer the advantages of an exchangeable immersion tube and the possibility of using more economic material for the supporting tube due to reduced ambient stress factors.

GÜNTHER GmbH has all prevalent angular thermocouples used in smelting and foundry technology. Standard assemblies with immersion tubes made of steel, pure iron, heat-resistant steels and special alloys are applied, as well as silicon nitride, graphite, SIC or special metal ceramics.
Optionally, these thermocouple assemblies may be fitted with in an internal ceramic tube, which significantly increases the long-term stability and electrical insulation in many application scenarios.
As an alternative to the installed thermocouple, numerous angular thermocouple assemblies may be fitted with a mineral-insulated gauge slide, which yields several crucial advantages, such as optimal protection of the inner conductors from corrosion, oxidation, physical damage, and chemical contamination due to the enclosed structure of the outer insulation.
In order to ensure functionality of the thermocouple assembly during a suitable timeframe, careful consideration should be used when selecting the materials for thermocouple and protective tube depending on the operating conditions.

Thermoelectric voltages and tolerances of our thermocouples and mineral-insulated gauge slides are pursuant to DIN EN 60584, class 1, for thermocouples and mineral-insulated gauge slides of type L pursuant to DIN 43710.

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Supporting Tube (Materials)

ST 35.8
1.4571

3 Insertion Tube

Pure Iron (Techn. Pure)	with Prot. Sleeve
Steel SL 25	Tapered Tip
Cast Iron GG-22	
Graphite	
Titanium	
Enamelled Steel	

Materials:	
High-Grade Steel	1.4541
X10CrAl24	1.4762
X15CrNiSi 25 20	1.4841
Inconel	2.4816
SiN (Silicon Nitride)	
SiC (Silicon Carbide)	
Metal-Ceramic	
Quartz Glass	

4 Inner Tube

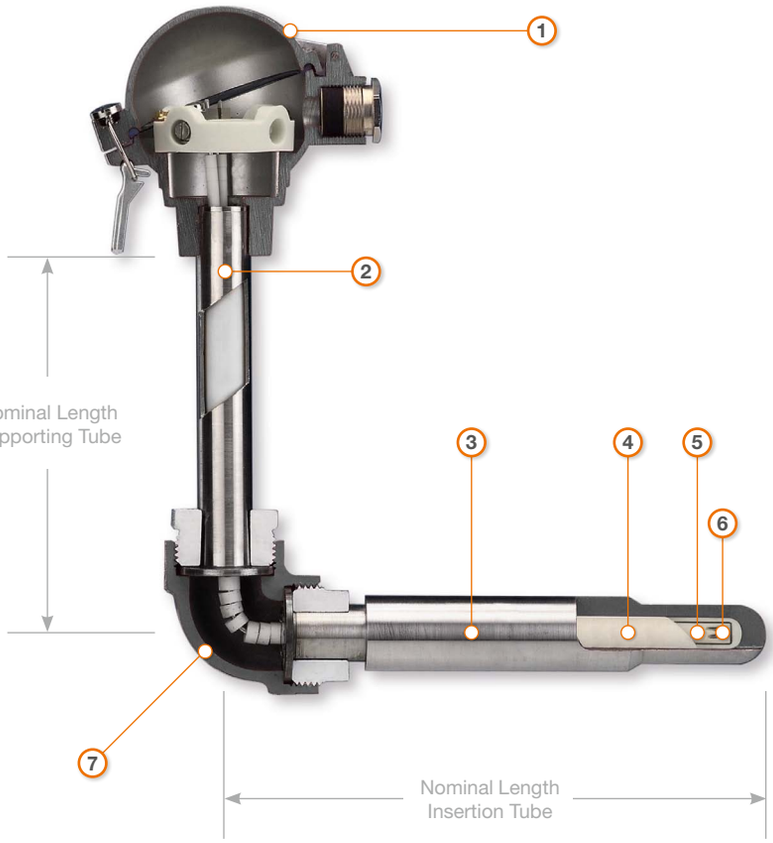
C610
C799

5 Mineral-Insulated Gauge Slide

NiCr-Ni	Typ KI
Fe-CuNi	Typ LV
Fe-CuNi	Typ JV
Nicrosil-Nisil	Typ NI
Mantle Diameter:	3,0 - 8,0 mm
Single or Double	

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Example of a common implementation in this product line



6 Ceramic Insulated Thermocouple

NiCr-Ni/K
Fe-CuNi/L
Fe-CuNi/J
Nicrosil-Nisil/N
PtRh10-Pt/S
PtRh13-Pt/R
PtRh30-PtRh6/B
Single or Double

7 Angular Section

Elbow Pipe	3/4”
	3/8”
	1 1/4”
	1/2”



35-WGG
Angular Thermocouple Assemblies with Bent or Welded Protection Tube

Angular thermocouple assemblies with bent or welded protection tube (35-WCG) are primarily used for temperature measurement in metal smelting and salt baths.

The angular shape allows for placement of the connector head away from the actual bath/melt in order to avoid direct exposure to high temperatures and aggressive vapours.

As an alternative to the installed thermocouple, numerous angular thermocouple assemblies may be fitted with a mineral-insulated gauge slide, which can have several crucial advantages:

- Optimal protection of the inner conductors from corrosion, oxidation, physical damage, and chemical contamination due to the enclosed structure of the outer insulation.
- Increased stability of the electrical insulation compared to ceramic insulated thermocouples.

In order to ensure functionality of the thermocouple assembly during a suitable timeframe, careful consideration should be used when selecting the materials for thermocouple and protective tube depending on the operating conditions.

Thermoelectric voltages and tolerances of our thermocouples and mineral-insulated gauge slides are pursuant to DIN EN 60584, class 1, for thermocouples and mineral-insulated gauge slides of type L pursuant to DIN 43710.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Recommended Protective Tube Materials for Salt Baths:

Smelter	Maximum Temperature	Materials
Tenifer®	600°C	Titanium NT
Saltpetre-, Chloride- & Cyanogen containing Annealing, Tempering and Hardening Baths	1000°C 1300°C	Pure Iron 1.4821

Recommended Protective Tube Materials for Metal Smelting:

Aluminium	700°C	SiN SiC
Magnesium Al/Mg-Alloys	700°C	Pure Iron SiN
Lead	600°C	SiN
Zinc	600°C	Pure Iron / Steel / SiN
Copper	1200°C	1.4762 Graphite
Brass	900°C	1.4762 / Graphite / SiN

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Protection Tube/Supporting Tube (Materials)

High-Grade Steel	1.4571
	1.4541
	1.4404
Heat-Resistant Steels	1.4762
	1.4841
	1.4893
	1.4749
Pure Iron	

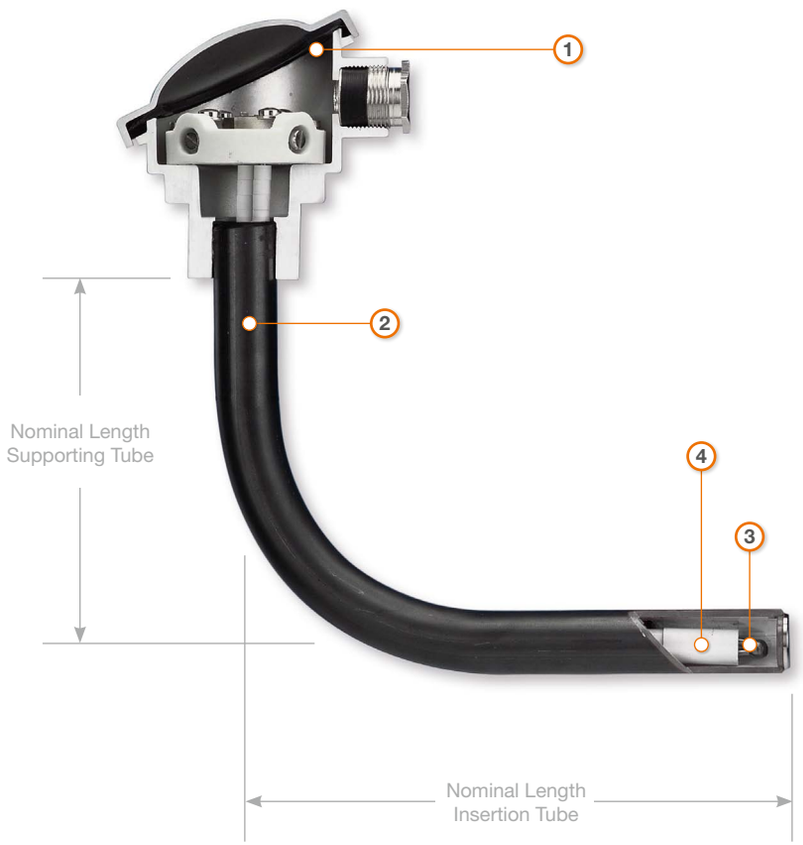
3 Ceramic Insulated Thermocouple

NiCr-Ni/K
Fe-CuNi/L
Fe-CuNi/J
Nicrosil-Nisil/N
Single or Double

4 Mineral insulated Gauge Slide

NiCr-Ni	
Fe-CuNi	
Fe-CuNi	
Nicrosil-Nisil	
Mantle Diameter:	3,0 - 8,0 mm
Single or Double	

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



Due to their structure, protected resistance thermometers offer a number of advantages when compared to regular thermocouple assemblies:

- Small physical dimensions with maximum flexibility for tem perature measurement at sites with difficult accessibility (diameter 1,5 – 6,0 mm).
- Short response time for exact measurements of temperature variations
- Optimal protection for the sensor system by the enclosed structure

Application Examples for Resistance Thermometers with Metal Protection Tube:

- Plant and Machine Construction
- Automobile Industry
- Chemical Industry
- Energy Production

50-WMS
Resistance Thermometers with Metal Protection Tube

Sensors of this type are used for general temperature measurement, mostly in liquid and gaseous media at temperatures up to 600°C, on rare occasions up to 800°C. Typical applications include refrigeration and air conditioning technology, heating, oven and apparatus construction, as well as chemical industry.

Protective fittings in this product line consist of seam welded or seamlessly drawn metal tubes. Depending on the application, GÜNTHER GmbH has over 40 different, partly high-alloyed materials in a large array of measurements in stock.The tips for the protective tubes are either closed through hot forming or welded shut with a bottom blank.
Tapered measuring tips may be used in this product line in order to shorten the reaction time. For prolonging the holding time, strengthening the wall thickness and utilization of ceramic inner tubing are possible.
All internationally prevalent precision resistors, detachable process connectors (for example mobile flanges or threaded sleeves) and connection heads are used.

Depending on the connection type (2-wire, 3-wire or 4-wire – in turn depending on the required measurement precision and connector length), resistance thermometers consist of 2, 4 or 6 feed lines (inner conductors), surrounded by a thin metallic protective mantle, usually made of high-grade steel. The inner conductors are firmly press-fitted and insulated in ceramic powder. The precision resistor inside the sensor tip is connected through the inner conductors.
The gauge slide in serial-production is fitted with a Pt 100 temperature sensor pursuant to DIN 60751, however versions with Pt 500 or Pt 1000 sensors are possible. The gauge slide is hermetically sealed.
For specialised applications (precision, long-term stability, etc.) we recommend the application of precision resistors with narrowed tolerance.
The resistance values and tolerances of our resistance thermometers are pursuant to DIN EN 60751.

1 Connection Head (Page 55)

A	B
AUS	BUS
AUZ	BUZ
AUZH	BUZH
AUSH	BBK

2 Process Connector (Detachable)

Flange
Threaded Socket
Flange / Counter Flange

3 Outer Protective Tube

Materials:	
St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Heat-Resistant Steel	Mat. No. 1.4893

4 Sensor Tip

Straight
or Tapered to 6 - 15 mm

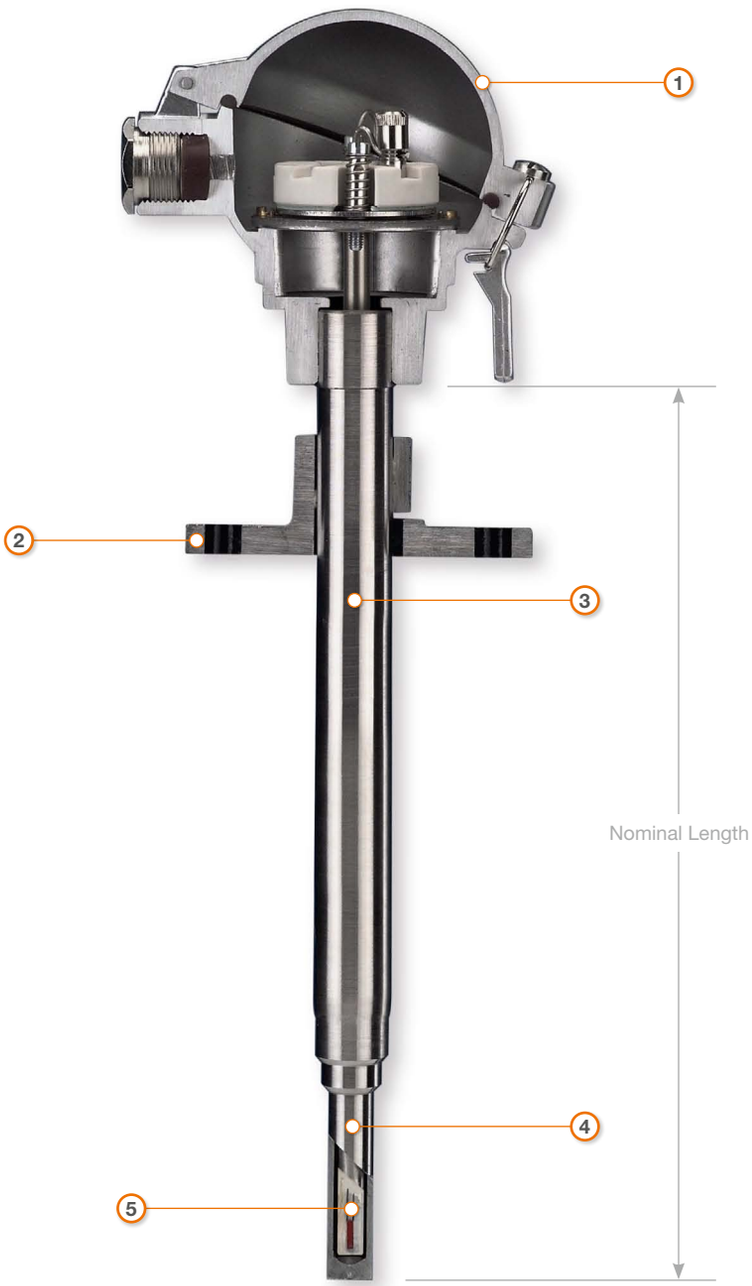
5 Mineral-Insulated Gauge Slide

Mantle Diameter:	1,5 - 8,0 mm
Tip Diameter:	2,0 - 10,0 mm
Connection:	
1 x Pt100 up to 3 x Pt100 Ohm	
2-Wire up to 4-Wire	

Our resistance thermometers are also available in explosion protected ATEX models. (see page 50)

Further technical information for this product line is available to download on our website. www.guenther.eu/downloads

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.
Please contact us for further information!



52-WOS
Mineral Insulated Resistance Thermometers without Protection Tube

Sensors of this type are used for general temperature measurement up to 600°C, on rare occasions up to 800°C. They are suited for surface temperature measurement as well as measurements of liquids and gases.

Depending on the connection type (2-wire, 3-wire or 4-wire – in turn depending on the required measurement precision and connector length), resistance thermometers consist of 2, 4 or 6 copper feed lines (inner conductors), surrounded by a thin metallic protective mantle, usually made of high-grade steel. The inner conductors are firmly press-fitted and insulated in ceramic powder. The precision resistor inside the sensor tip is connected through the inner conductors.
As a result of their structure, mineral insulated resistance thermometers have the following advantages:

- Small physical dimensions with maximum flexibility for temperature measurement at sites with difficult accessibility (diameter 1,5 – 6,0 mm).
- Short response time for exact measurements of temperature variations
- Optimal protection for the sensor system against corrosion, oxidation, phyiscal damage and chemical contamination as a result of the enclosed structure
- The enclosed structure also facilitates application of these sensors without additional protective fitting

Application Examples for Mineral Insulated Resistance Thermometers without Protection Tube:

- Plant and Machine Construction
- Automobile Industry
- Laboratories
- Plastic Industry

Availability:

We offer every current version and diameter of mineral insulated resistance thermometer with mounted plug-and-socket connectors, connector heads, compensation lines with or without specialised contacts, as well as accessories and every type of mounting.

Our resistance thermometers are also available in explosion protected ATEX models. (see page 50)

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Components (Plug/Socket)

LEMO Size 0 - 3	
Standard	
Miniature	
High-Temp.-Standard	
High-Temp.-Miniature	
Ceramic-Standard	
Ceramic-Miniature	

2 Connection Head (Page 55)

with connecting thread	
B	(M24 x 1,5)
BUS	(M24 x 1,5)
BUZ	(M24 x 1,5)
BUZH	(M24 x 1,5)
BBK	(M24 x 1,5)
DL (MA)	(M10 x 1)
or with thread diameter of 15,3 mm	

3 Process Connector (Detachable)

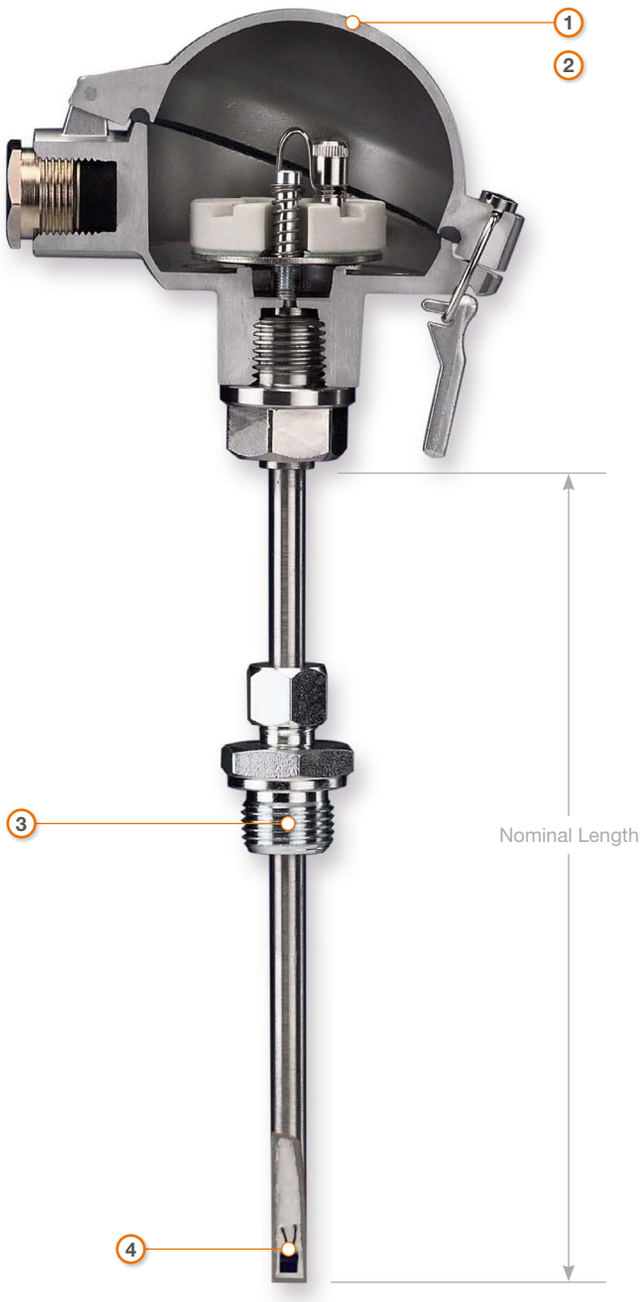
Clamp Connectors	Steel/High-Grade Steel
Pressure Ring	Teflon
Cutting Ring	High-Grade Steel

M 8x1 for Mantle Diameter 1,0-3,0 mm
G 1/8 A for Mantle Diameter 1,0-3,0 mm
G 1/4 A for Mantle Diameter 4,5-8,0 mm
G 1/2 A for Mantle Diameter 4,5-8,0 mm

4 Mineral-Insulated Gauge Slide

Mantle Diameter:	2,0 - 8,0 mm
Tip Diameter:	2,0 - 10,0 mm
Connection:	
1 x Pt100 up to 3 x Pt100 Ohm	
2-Wire up to 4-Wire	

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



53-WHD
Resistance Thermometer with Welding Thermowell Form 4 (Formerly D-Sleeve) pursuant to DIN 43772

Resistance thermometers with welding thermowell (53-WHD) are used for temperature measurement in gaseous and liquid media such as air, steam, water, oil, etc. with high current velocities and pressures. The material of the thermowell defines the operation temperature. Specialised thermowells are suitable up to 700 bar of pressure. The instruments of this product line are fitted with exchangeable mineral-insulated gauge slides.

The main construction component is a thermowell of high-grade or pressure-vessel steel, which is used to weld the thermometer into the respective machine.

Selection of the thermowell is dependent on spatial proportions at the point of installation, as well as demands as dictated by temperature, pressure, current flow and chemical attack.

Standard values for stress capacity can be found in the diagrams of DIN 43772.
In particular the question of chemical stress capacity must be examined carefully for each individual scenario. Often times, only field testing will yield authoritative information, as even minor impurities in the ambient media can have significant impact on the performance of the thermowell within the application environment.

For specialised applications (precision, long-term stability, etc.) we recommend the application of precision resistors with narrowed tolerance.
Resistance values and tolerances of our resistance thermometers are pursuant to DIN EN 60751.

Application Examples for Resistance Thermometers with Welding Thermowell

- Waste Recycling / Incineration
- Plant and Machine Construction
- Automobile Industry
- Chemical Industry
- Laboratories
- Energy Production

1 Connection Head (Page 55)

B (M24 x 1,5)	BUSH
BUS	BUZH
BUZ	NA
BBK	DL / MA

2 Neck Tube (Pursuant to DIN 43767)

with or without threading, made of
high grade steel or
zinc-plated steel

3 Thermowell (Pursuant to DIN 43763)

Cone Length:	40 - 125 mm
Shaft Length:	50 or 110 mm
Protective Tube Length:	115 - 260 mm
Diameter:	18 or 24 mm

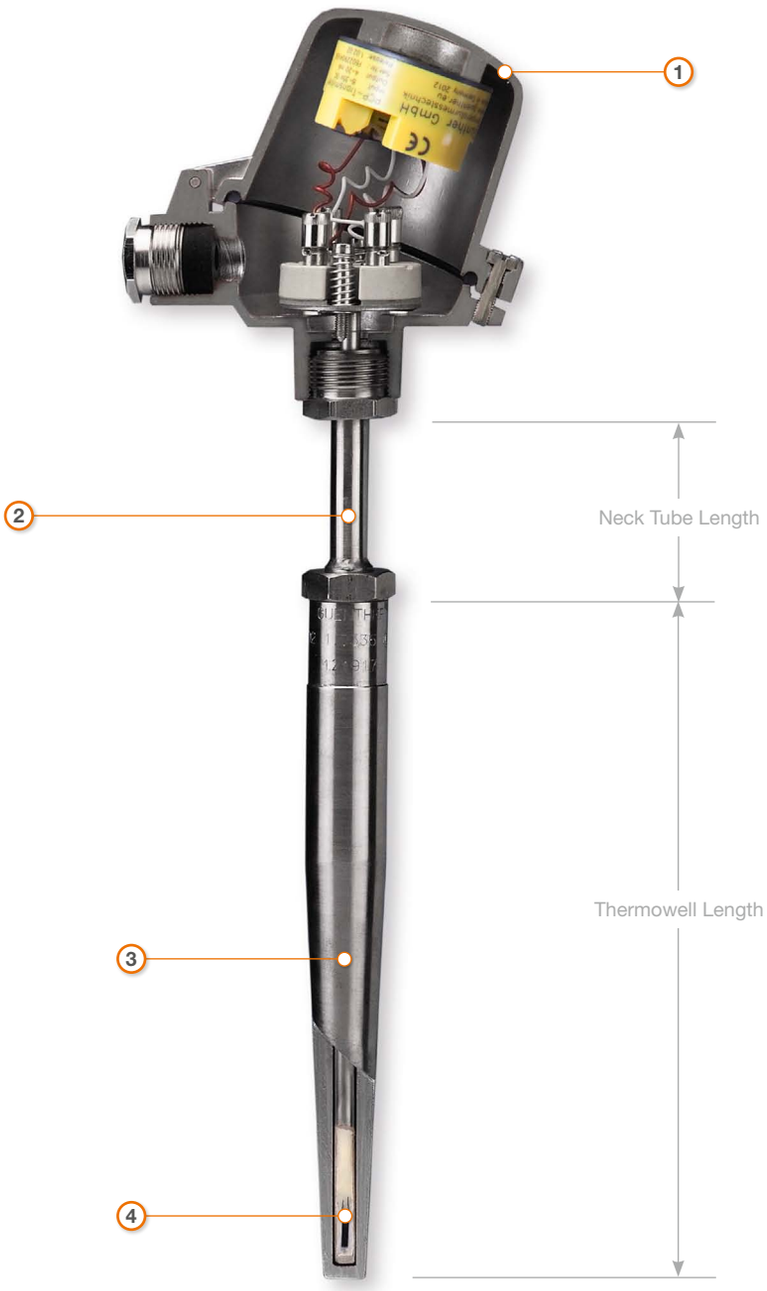
4 Mineral-Insulated Gauge Slide

Mantle Diameter:	1,5 - 8,0 mm
Tip Diameter:	2,0 - 10,0 mm
Connection:	
1 x Pt100 up to 3 x Pt100 Ohm	
2-Wire up to 4-Wire	

Our resistance thermometers are also available in explosion protected ATEX models. (see page 50)

Further technical information for this product line is available to download on our website. www.guenther.eu/downloads

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.
Please contact us for further information!



54-WFL
Resistance Thermometers with Welded Blank Flanges

Resistance thermometers with welded blank flanges (54-WFL) are used for temperature measurements in gaseous or fluid media such as air, steam, water or oil.

Distinctive characteristic of these sensors is a blank flange welded to or onto the protective tube, most commonly pursuant to DIN EN 1092, enabling a sealed connection of the sensor with the respective wall of an over- or under-pressure facility as can be found in power plants, for example.
Both the employed protection tube and the blank flanges should consist of the same material if possible.

When particularly quick recognition of temperature changes are required, we recommend the use of sensors with a tapered protective tube tip.

For specialised applications (precision, long-term stability, etc.) we recommend the application of precision resistors with narrowed tolerance.
Resistance values and tolerances of our resistance thermometers are pursuant to DIN EN 60751.

Application Examples for Resistance Thermometers with Welded Blank Flanges

- Waste Recycling / Incineration
- Plant and Machine Construction
- Automobile Industry
- Chemical Industry
- Laboratories
- Energy Production

Our resistance thermometers are also available in explosion protected ATEX models. **(see page 50)**

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (Page 55)

A	BUSH
B	BUZH
BUS	DL / MA
BUZ	

2 Blank Flanges Pursuant to DIN EN 1092

DN 10 - DN 100	PN 16
Material:	
Mat. No. St37-2	Mat. No. 1.4571
Mat. No. C22.8	Alloy C4

3 Protective Tube (Materials/Dimensions)

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	
Alloy C4	
Diameter:	6 - 22 mm
Wall:	0,75 - 3 mm

4 Mineral-Insulated Gauge Slide

Mantle Diameter:	2,0 - 8,0 mm
Tip Diameter:	2,0 - 10,0 mm
Connection:	
1 x Pt100 up to 3 x Pt100 Ohm	
2-Wire up to 4-Wire	

5 Configuration

Straight
or Tapered to between 6 and 15 mm

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



55-WES
Resistance Thermometers with Threaded Socket and Mineral-Insulated Gauge Slide

Resistance thermometers with threaded socket and mineral-insulated gauge slide (55-WES) are used for general temperature measurement in low-pressure gaseous, liquid and plastic media environments, depending on the properties of the protective tube and surrounding media, up to a temperature of 800°C.

A threaded socket is welded to the protective tube, providing for the stability of the process connector in sensors of this product line. Depending on the application, the socket is welded to the protective pipe, either directly beneath the connection head or with a gap of 100 or 200mm, for example.

The protective fittings are usually made from a single seamlessly drawn high-grade steel tube with a circular blank welded inside. In order to facilitate particularly quick temperature change measurements, we offer sensors with a tapered sensor tip.

For specialised applications (precision, long-term stability, etc.) we recommend the application of precision resistors with narrowed tolerance.
Resistance values and tolerances of our resistance thermometers are pursuant to DIN EN 60751.

Application Examples for Resistance Thermometers with Threaded Socket and Mineral-Insulated Gauge Slide:

- Waste Recycling / Incineration
- Plant and Machine Construction
- Automobile Industry
- Chemical Industry
- Laboratories
- Energy Production

Our resistance thermometers are also available in explosion protected ATEX models. (see page 50)

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Connection Head (s. Seite 55)

B	BUSH
BUS	BUZH
BUZ	NA
BBK	DL / MA

2 Process Connector (Detachable)

	G 1 A
	G 1/2 A
	M18 x 1,5
	G 3/4 A
	M20 x 1,5
Combined:	M24 x 1,5 / G 1/2 A
	M10 x 1 / G 1/2 A

3 Outer Protective Tube Materials/Dimensions

St. 35.8	Mat. No. 1.0305
Stainless Steel	Mat. No. 1.4571
X10Cr Al 24	Mat. No. 1.4762
X15CrNi Si 25 20	Mat. No. 1.4841
Inconel	Mat. No. 2.4816
Kanthal	
Diameter:	6 - 22 mm
Wall:	0,75 - 3 mm

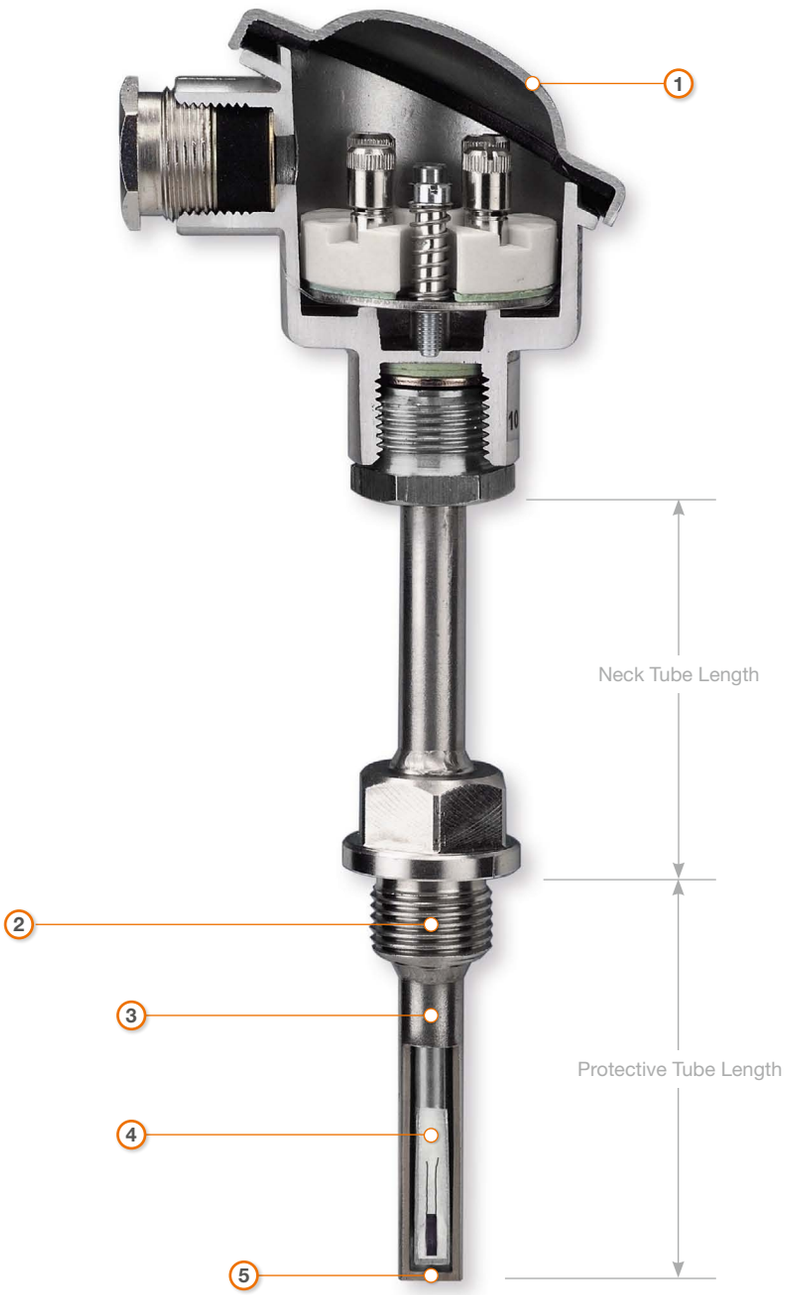
4 Mineral-Insulated Gauge Slide

Mantle Diameter:	1,5 - 8,0 mm
Tip Diameter:	2,0 - 10,0 mm
Connection:	
1 x Pt100 up to 3 x Pt100 Ohm	
2-Wire up to 4-Wire	

5 Configuration

Straight
or Tapered to between 6 and 15 mm

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



60-TE / 60-WTH
Thermocouple Assemblies and Resistance Thermometers with Bayonet Nut Connector

Sensors with bayonet nut connectors are recommended for measuring temperatures inside the blocks of machines, mechanisms and die cast forms, primarily in the plastic industry, at temperatures up to 400°C.

Advantages of Sensors with Bayonet Nut Connectors

- Reliable construction
- Bending resistant cabling
- Class 1 for type J and type K
  (High measurement precision)

The form of the measuring tip is mostly half-round, planar or with a point angle of 118°. The latter aligns itself very well into a standard bore hole.
The sensors are fitted with a pressure spring that, in combination with the correct installation length, respectively contact pressure at the installation point, protects the cable from deflexion. The installation length is variable, limited by the length of the pressure spring.

Please find the standardised inner diameter of bayonet nut connectors in the table on the right. Please note, that we do offer customised versions.

The standard mounted measuring elements are Pt 100:
2-, 3- or 4-wire, accuracy class N pursuant to EN 60751 or thermocouple types J and K in class 1. Double versions or the application of special sensors are also possible.

Application Examples for Thermocouple Assemblies and Resistance Thermometers with Bayonet Nut Connector:

- Plant and Machine Construction
- Heat Treatment
- Plastic Industry

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Sensor Type

1xPt100-2L	
1xPt100-3L	
1xPt100-4L	
NiCr-Ni/K	
Fe-CuNi/J	
Fe-CuNi/L	

2 Sensor Tip

Ø 6 mm	planar
	118°-Angle
	other
Ø 8 mm	planar
	118°-Angle
	other

3 End Termination

Free Ended (Non Tin-Plated)
Soldered Ends
Ends with Cable End Sleeves
Plug / Socket (Standard)
Plug / Socket (Miniature)
Plug / Socket (LEMO)

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



71-KFT / 72-KFW
Cable Thermocouples and Cable Resistance Thermometers

Sensors of this type are primarily used for temperature measurement in liquid and gaseous media. However, there is a broad palette of configuration and construction options that can be adapted to specific applications. Due to their make-up, these sensors may be used in temperature ranges between -200°C and +400°C.

Advantages of Cable Thermocouples and Cable Resistance Thermometers

- Reliable, Partly Watertight Construction
- Broad Selection of Configuration Options

At the point where the sheath meets the cable, the sensors may be equipped with a teflon coating (moisture protection) and/or springs (cable break protection).

Other Types of temperature sensors, similar to plug-in resistance thermometers, are referred to by their construction or mounting type, respectively their area of application. For example:

- Surface Sensors
- Contact Sensors
- Pipe or Tube Sensors
- Threaded Sensors
- Welding Sensors
- Acid- and Oil-Tight Versions are Possible

Application Examples for Cable Thermocouples and Cable Resistance Thermometers:

- Piping
- Machines and Devices
- Heating Units
- Ovens
- Freezers
- Liquids

Our resistance thermometers are also available in explosion protected ATEX models. (see page 50)

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

1 Sensor Tip

Pt100 Class A
Pt100 Class B
Pt100 Class B 1/3
Pt100 Class B 1/5
Pt100 Class B 1/10
Pt1000 Class A
Pt1000 Class B
NiCr-Ni/K
Fe-CuNi/J
Fe-CuNi/L
Cu-CuNi / T
Cu-CuNi / U
Platinum
Nickel (Ni 100, ...)
NTC/PTC

2 Configuration

Room Sensor (Non-Watertight)
Heat Shrunk Insulated Measuring Point (Watertight)
2 Metal Sheath (Std.: High-Grade Steel)
Metal Sheath with Threaded Socket
Ceramic Sheath
1 Pipe / Tube Clamp
3 Small Welding Plate
4 Touch Sensor
5 Screw Threaded Sensor
6 Non Standard Construction (e.g. Magnet)

3 End Termination

Free Ended (Non Tin-Plated)
Soldered Ends
Ends with Cable End Sleeves
Standard Plug / Socket Connector
Miniature Plug / Socket Connector
HT-Standard Plug / Socket Connector
HT-Miniature Plug / Socket Connector
Ceramic Standard Plug /Socket Connector
LEMO Plug / Socket Connectors Sz. 0 to Sz. 3

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!



74-WTH
Resistance Thermometers with Machine Connectors

This type of resistance thermometers with threaded sockets are used for temperature measurement of liquids in regions with vibrations and challenging surrounding media up to a temperature of 200°C.

Advantages of Resistance Thermometers with Machine Connectors:

- Resistant to Vibrations
- Quick Connection of Cables and Sensors
- Constructed in High-Grade Steel (Sealed, Hygienic, etc.)

The most common application areas among others are machine construction, industrial, food and beverage systems. The electric machine connector M12x1 guarantees high-level protection (IP65) and comfortable connection of cables and sensors using a 4-pin plug.

Pt 100 2-wire measuring elements are standard implementation, tolerance class B pursuant to EN 60751. It is possible, however, to implement Pt 500, Pt 1000 or specialised sensors (also as double version). Also, a transducer may be fitted inside the connection head.

Further technical information for this product line is available to download on our website.
www.guenther.eu/downloads

Application Examples:

- Tanks and Containers
- Machine and Plant Construction
- Technological Processes
- Energy Production and Distribution
- Food and Beverage Industry

1 Machine Connector

M12 without Transducer	
Angled Plug	pursuant to DIN EN 175301
	without Transducer
Only 1xPt100 2-L Sensor:	
M12 With Transducer	
Angled Plug	pursuant to DIN EN 175301
	With Transducer

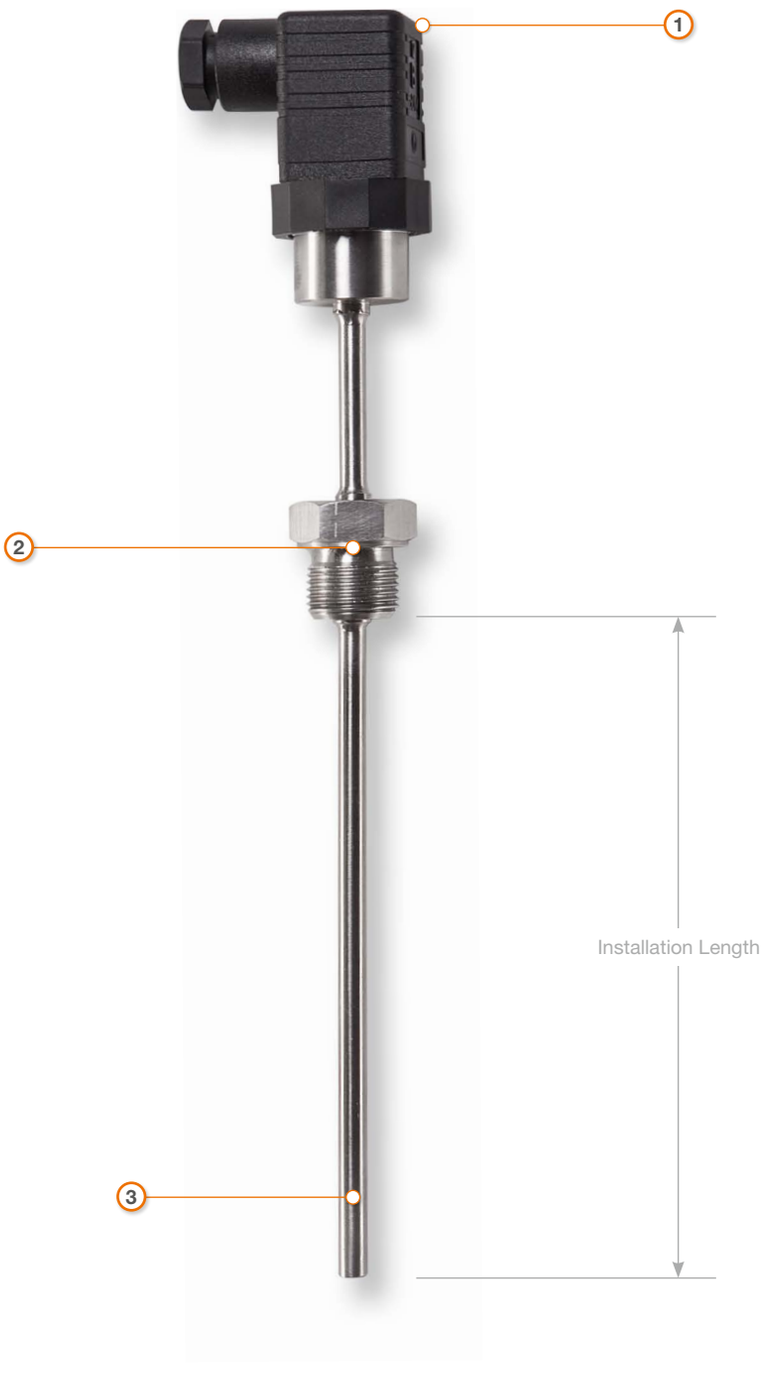
2 Process Connector (Detachable)

Without
Threading G 1/2 A
Threading G 1/4 A
Threading G 3/8 A
Threading M18 x 1,5
Threading M20 x 1,5
Mantle DN 25 KF
Other

3 Gauge Slide

Pt100 Class A	
Pt100 Class B	
Pt100 Class B 1/3	
Pt100 Class B 1/5	
Pt100 Class B 1/10	
Pt1000 Class A	
Pt1000 Class B	
Nickel (Ni 100, ...)	
NTC/PTC	
Connection:	
1 x 2 Wire	1 x 4 Wire
1 x 3 Wire	2 x 2 Wire

Example of a common implementation in this product line



Individual Solutions such as, for example materials, process connectors, accessories, etc.not listed here, are often viable.

Please contact us for further information!

Intrinsically Safe Thermocouple Assembly Pursuant
to ATEX Directive 94/9/EG



Intrinsically Safe Thermocouple Assembly Pursuant to ATEX Directive 94/9/EG

Starting in 2012, special resistance thermometers, in a diversity of implementations for all industry sectors, using explosion resistant measurement and controlling equipment, have become a part of our product line.

Certified Production Site

The requirement for the production of these type approved sensors was the institution of a quality management system pursuant to ATEX (ATmosphères Explosibles) directive 94/9/EG within our company in 2011.

In order to meet industry requirements in all their technical diversity in the future, constant development our products, as well as adaptation of their individual fields of application, are a matter of course. Starting in 2013, we will therefore expand our current product range with a variety of intrinsically safe thermocouple assemblies and resistance thermometers, both for the Gas EX- and the Dust EX-sector.

Function, Design and Application

GÜNTHER EX-temperature sensors are designed as resistance thermometers. They convert a temperature at a measuring site into an electrical measurement (resistance). In combination with a corresponding safety relay, they operate as measurement, recording and controlling instruments in temperature ranges between -200°C and +600°C.

The resistance thermometer series W1 to W6 are used as intrinsically safe equipment for temperature measurement in liquid and gaseous media. The temperature sensors W1 to W4 consist of a protective fitting with process connectors of varying design, a connection head and exchangeable gauge slide. The temperature sensors of series W5 and W6 are gauge slides with connection head/ connection box und a variety of process connectors, respectively precision sensors with simple protection tubes or mineral insulated leads and cable connectors.

All protective fittings (process touching parts) undergo leakage testing. Inside the fittings, Pt 100 precision sensors pursuant to DIN EN 60751 in tolerance classes a or b, in one- two- or four-wire system technology versions are employed. Version with two measuring circuits are also possible.
They are compliant with explosion group II, categories 1/2G and/or 2G and are suitable for application in potentially explosive areas of zone 1 for gas. The protective tube may also protrude into areas of zone 0 if the wall strength is ≥ 1mm.

At GÜNTHER GmbH a modular system of individual parts are available in order to manufacture customised ATEX temperature sensors designed to meet customer specifications. Our EX-sensors are employed in typical sectors such as chemical, petrochemical, machine and plant construction, petroleum and gas production.



Series W1



Series W2



Series W3



Series W4



Series W5



Series W6

certified for: *II 1/2 G Ex ia IIC T6* Ga / Gb*
II 2 G Ex ia IIC T6 Gb*



Thermoelectric and Compensation Cables

Compensation Cables

Compensation cables are the link from thermocouple assembly to reference junction. The wires consist of alternative materials, not identical to the individual appendant thermocouples, yet possessing the same thermoelectric properties within the permissible temperature range pursuant to DIN 43722.

Following the law of homogenous circuits, the material between measurement and reference junctions must not vary.

In theory, the thermocouple could lead all the way to the reference junction, which, mainly due to cost reasons, is not practised.

Compensation cables have either solid or litz wires and are produced with various strand counts, shielding and insulation.

They are marked with code letter C, which is placed after the code letter for the appendant thermocouple, e.g. SC for a platinum thermocouple type S.

Thermoelectric Cables

Thermoelectric cables are made of the same material as the appendant element.

By joining the wire at one end, thermoelectric cables become thermocouples, something that is practiced in drag measurement, for example.

Thermoelectric cables are available as litz or solid wires with various types of insulation. They are marked with the letter “X”, which is placed after the code letter of the thermocouple, e.g. “KX” thermocouple for NiCr-Ni-element, type K.

Coding of Thermoelectric and Compensation Cables

Colour coding of thermoelectric and compensation cables is standardised in DIN EN 60584-3. Standardisation contributes to minimising the danger of confusion and current reversal.
The maximum operating temperature is defined by the insulating material, therefore the corresponding data sheets should be observed.

Temperature resistances for different insulating materials of compensation and thermoelectric cables

PVC	105°C	MFA	235°C
TPE-0	130°C	PFA	260°C
ECTFE	135°C	E-Glass Fibre	400°C
ETFE	155°C	R-Glass Fibre	700°C
Silicone	180°C	Silica	1000°C
FEP	205°C	Nextel	1200°C

Tolerances and Limiting Deviations

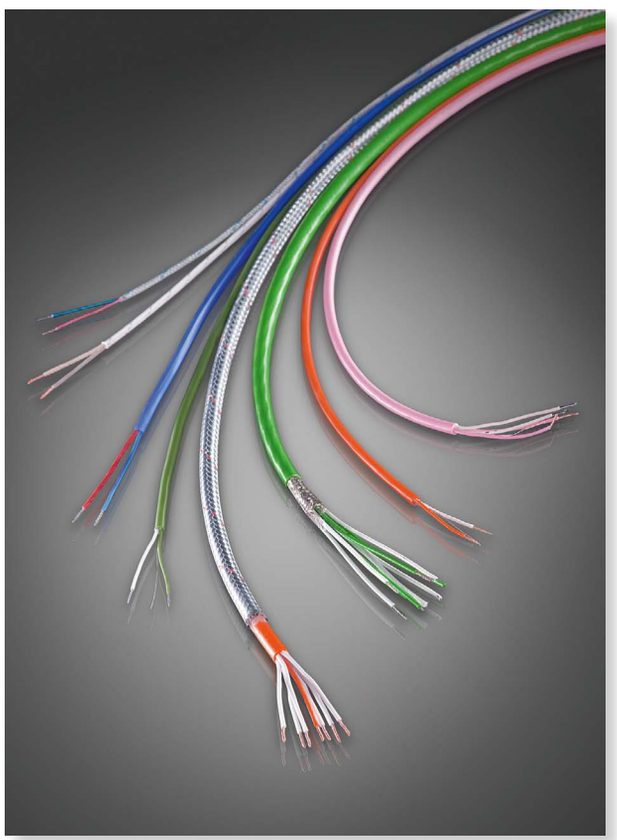
Wires for thermoelectric and compensation cables are standardised in DIN 43713. Thermoelectric voltages within the permissible temperature range correspond to the thermoelectric voltages of thermocouples pursuant to DIN EN 60584-1.
Tolerances for thermoelectric and compensation cables are defined in DIN 43722 (see “Tolerances pursuant to EN 60584-2, page 63).
There are two classes of accuracy:
The narrower class 1 is for thermoelectric cables only, meaning only those cables with the original materials.
Class 2 is for thermoelectric and compensation cables made from alternative materials.

GÜNTHER thermoelectric and compensation cables are consistent with the colour coding of DIN 43722, with the exception of thermoelectric cables type U and type L, which are colour coded pursuant to DIN 43714. Tolerances are consistent with accuracy class 2 pursuant to DIN 43722 (see Colour Coding for Thermoelectric and Compensation Cables, page 62).

For thermocouples type U and type L, the tolerance pursuant to DIN 43719 of ± 3°C applies.



We have over 200 types of compensation and thermoelectric cables available from stock.



For thermocouple type B, copper wires may be used within a temperature range of up to 100°C. For this reason , DIN 43722 contains no tolerance values for these compensation cables. If compensation cables for type B are required for temperatures above 100°C, the application of specialised compensation cables is necessary. These cables are available upon request.



Individual Parts

GÜNTHER GmbH has in excess of 40.000 individual and building components available from stock. As a result, we are able to respond precisely to the application scenarios and requests of our customers and internationally deliver our products quickly and reliably.
On the following pages, we will offer a small overview of the most common individual parts from our product line, alongside the corresponding technical information. Individual Solutions such as, for example materials, process connectors, accessories, etc. not listed here, are often viable.
Please contact us for further information!

Note: Apart from buying and trading precious metals for our sensors, we offer our customers the option of opening a precious metals account.



Connection Heads



Head Type A

Large, slanted head with unsecured, removable cover (bolted)

Matching Fit: Connection Socket Type A

Tube Connection	Protection Rating
Threading M24 x 1,5	IP 54
Bore Hole (in mm): 22,8 / 24,8 / 26,8 / 28,8 / 32,8	IP 53



Head Type AUZ / AUS

Spherical head with hinged cover and cylinder-head screw / quick-release fastener

Matching Fit: Connection Socket Type A

Tube Connection	Protective Rating
Threading M24 x 1,5	IP 65
Bore Hole (in mm): 22,8 / 24,8 / 26,8 / 28,8 / 32,8	IP 54



Head Type AUZH / AUSH

Elevated hinged cover for inclusion of a transducer
with cylinder-head screw / quick-release fastener

Matching Fit: Connection Socket Type A

Tube Connection	Protective Rating
Threading M24 x 1,5	IP 65
Bore Hole (in mm): 22,8 / 24,8 / 26,8 / 28,8 / 32,8	IP 54



Head Type B

Small, slanted head with with unsecured, removable cover (bolted)

Matching Fit: Connection Socket Type B

Tube Connection	Protective Rating
Threading M24 x 1,5	IP 54
Bore Hole (in mm): 10,8 / 15,8	IP 53



Head Type BUZ / BUS

Spherical head with hinged cover and cylinder-head screw / quick-release fastener

Matching Fit: Connection Socket Type B

Tube Connection	Protection Rating
Threading M24 x 1,5	IP 65
Bore Hole (in mm): 12,8 / 15,8	IP 54



Head Type BUZH / BUSH

Elevated hinged cover for inclusion of a transducer
with cylinder-head screw / quick-release fastener

Matching Fit: Connection Socket Type B

Tube Connection	Protection Rating
Threading M24 x 1,5	IP 65
Bore Hole (in mm): 12,8 / 15,8	IP 54



Head Type DL

Small spherical head with screw cap

Matching Fit: Connection Socket Type S

Tube Connection	Protection Rating
Inner Threading M10 x 1	IP 54
Outer Threading M20 x 0,75	IP 54
Bore Hole (in mm): 6,1	IP 54



Head Type NA

Small spherical head with hinged cover

Matching Fit: Connection Socket Type B

Tube Connection	Cable Inlet
Threading M24 x 1,5	M20 x 1,5 mm
Bore Hole (in mm): 15,8	M20 x 1,5 / M22 x 1,5 mm



Head Type L

Cylindrical head with slip lid

Matching Fit: Connection Socket Type S

Tube Connection	Cable Inlet
Clamp Socket Ø 8,2 mm	PG 7

Transsducers





These universal temperature transmitters (transducers) are mounted inside the Connection Head of a thermocouple assembly. Their purpose is to convert different incoming signals from measuring points in thermocouple assemblies or resistance thermometers into stable and standardised signals. Depending on the outgoing signal, the amperage lies between 4 – 20 mA.

In the past, transmitters were constructed with analogue technology. Today, digital technology has established itself, because it offers better measurement precision along with increased flexibility. Additionally, digital transmitters support expanded surrounding temperatures, typically in the range between -40°C and +85°C.

Every version is manually adjustable or computer programmable and is also consistent with the HART® protocol. Furthermore, all transducers meet the certification requirements for GL, UL, SiL2 and ATEX.

Socket Connectors



Socket connectors (plugs, sockets) are applicable in thermocouple assemblies and resistance thermometers. The contacts consist of the same material as the respective thermocouple or compensation material.

Advantages of the Mechanical Structure of Plug-and-Socket Connectors

- Contact pins and sockets are free of thermoelectric current
- Protection from voltage reversal due to different sized pins
- solid contact pins and spring mounted sockets
- Central cover attachment eases installation
- internally separated wire channels prohibit short circuiting
- Screw Terminals facilitate quick connection

We differentiate plug-and-socket connectors (of different sizes) into three categories:



1 Standard Plug / Socket

Plastic casing filled with glass fibre

Maximum Thermal Load: 200°C

Colour Coding of the Casing:

Every international colour coding is available

DIN IEC, DIN 43710, ANSI, NFE, BS, JIS, etc.



2 Standard High-Temperature Plug / Socket

Special temperature-resistant plastic casing for high ambient temperatures

Maximum Thermal Load: 350°C

Colour Coding of the Casing:

Casing colour brown with element identification mark



3 Standard Ceramic Plug / Socket

Ceramic casing for extremely high ambient temperatures

Maximum Temperature Load: 650°C

Colour Coding of the Casing:

Casing colour white with element identification mark

Stop and Counter Flanges



Flanges are used for the attachment of the thermal sensor to the wall of the installation location. The counter flange is welded to the wall of the installation location and so offers an uncomplicated and gas tight mounting point for the stop flange.

GÜNTHER GmbH offers a broad variety of flanges in different sizes (for protective tubes with diameters 15, 22, 26 and 32 mm) and materials (e.g. cast iron, steel, etc.).



We are frequently able to fulfil requests for individualised shapes, respectively materials upon request.
Please contact us for further information!



Threaded Sockets





Threaded sockets are used for gas-tight installation of thermocouple assemblies and resistance thermometers, usually with a larger protective tube diameter.

Sockets with nominal diameters between 15 and 32 mm, with connecting threads of G ½ A up to G 1 ¼ A, as well as various construction materials are always available from stock.

Clamp Connectors



Clamp connectors are also used for gas-tight installation of thermocouple assemblies and resistance thermometers.
Normally, these will have smaller dimensions, usually clamping nominal diameters between 1 and 12 mm, with connecting threads from G ½ A to G 1 ¼, or with metric fine thread.
For these, we also always have various materials, as well as different designs with additional teflon pressure ring or high-grade steel cutting ring, available from stock.

Certificates



IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and
DQS GmbH Deutsche Gesellschaft zur Zertifizierung von Managementsystemen
hereby certify that the company

Günther GmbH
Temperaturmesstechnik
Werk 1
Bauhofstraße 12
90571 Schwaig

Günther GmbH
Temperaturmesstechnik
Werk 2
Gewerbepark Birkenhain 30
63589 Linsengericht

With the following business unit

has implemented and maintains a **Quality Management System**.

Scope:
Production and Marketing of Thermocouples and Resistance Thermometers, Trading with all Conveniences

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2008

Date of certification 2011-06-08

Valid until 2014-06-07

Registration Number: 316880 QM08

Michael Drechsel
President of IQNet

Jan Bögh
Managing Director of DQS GmbH

IQNet Partners*:
AENOR Spain AFNOR Certification France AIB-Vincotte International Belgium ANCE Mexico APCER Portugal CCC Cyprus CISQ Italy CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany DS Denmark ELOT Greece FCAV Brazil FONDONORMA Venezuela ICONTEC Colombia IMNC Mexico Inspecta Certification Finland IRAM Argentina JQA Japan KFQ Korea MSZT Hungary Nemko AS Norway NSAI Ireland PCBC Poland Quality Austria Austria RR Russia SII Israel SIQ Slovenia SIRIM QAS International Malaysia SQS Switzerland SRAC Romania TEST St Petersburg Russia TSE Turkey YUQS Serbia
IQNet is represented in the USA by: AFNOR Certification, CISQ, DQS Holding GmbH and NSAI Inc.
* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com



IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **PRODUCTION QUALITY ASSURANCE NOTIFICATION**
according to Directive 94/9/EC, Annex IV

- Translation -

[2] Equipment or Protective Systems, intended for use in Potentially Explosive Atmospheres, **Directive 94/9/EC**

[3] Notification number: **IBExU13ATEX Q022**

[4] Product category: **Resistance thermometer and thermocouple elements**
Electrical equipment of the equipment group II,
Category 1 / 2 G, 1 / 2 D, 2 G and 2 D, Type of protection: i

[5] Manufacturer: Günther GmbH Temperaturmesstechnik

[6] Address: Bauhofstraße 12
90571 Schwaig
Germany

[7] Production sites: Günther GmbH Temperaturmesstechnik, Werk 1
Bauhofstraße 12
90571 Schwaig
Germany

Günther GmbH Temperaturmesstechnik, Werk 2
Gewerbepark 30
63589 Linsengericht
Germany

[8] IBExU Institut für Sicherheitstechnik GmbH, NOTIFIED BODY number 0637 for Annex IV in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994 notifies to the manufacturer that he applies in the production site according to [7] a quality assurance system for the production, final inspection and testing of the product category mentioned in [4] which complies with Annex IV of the Directive.

[9] This notification is based on audit report no. IB-13-6-036 issued of 20 January 2014. It is valid until 29 November 2016. This notification can be withdrawn if the manufacturer no longer satisfies the requirements of Annex IV. Results of surveillance audit of the quality assurance system are a part of this notification.

[10] According to Article 10 (1) of the Directive 94/9/EC the CE marking shall be followed by the identification number 0637, identifying the Notified Body involved in the production control stage.

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Fuchsmühlenweg 7 09599 Freiberg, Germany
☎ +49 (0) 3731 3805.0 🖷 +49 (0) 3731 23650

Authorized for certifications
-Explosion protection-

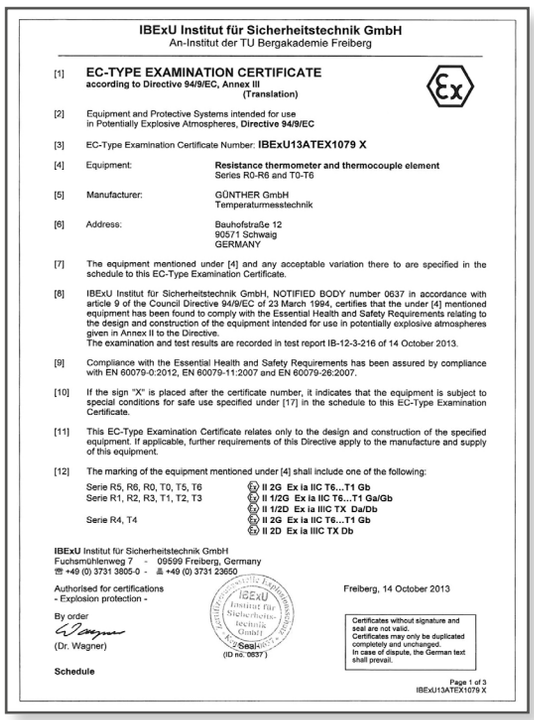
By order
(Dipl. Ing. Willamowski)

Freiberg, 29 January 2014

Seal
(ID-N°. 0637)

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Page 1 of 1
IBExU13ATEX Q022



IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **EC-TYPE EXAMINATION CERTIFICATE**
according to Directive 94/9/EC, Annex III
(Translation)

[2] Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres, **Directive 94/9/EC**

[3] EC-Type Examination Certificate Number: **IBExU13ATEX1079 X**

[4] Equipment: **Resistance thermometer and thermocouple element**
Series R0-R6 and T0-T6

[5] Manufacturer: GÜNTHER GmbH
Temperaturmesstechnik

[6] Address: Bauhofstraße 12
90571 Schwaig
GERMANY

[7] The equipment mentioned under [4] and any acceptable variation there to are specified in the schedule to this EC-Type Examination Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH, NOTIFIED BODY number 0637 in accordance with article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that the under [4] mentioned equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of the equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in test report IB-12-3-216 of 14 October 2013.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0:2012, EN 60079-11:2007 and EN 60079-26:2007.

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified under [17] in the schedule to this EC-Type Examination Certificate.

[11] This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

[12] The marking of the equipment mentioned under [4] shall include one of the following:

Serie R5, R6, R0, T0, T5, T6	Ⓔx II 2G Ex ia IIC T6...T1 Gb
Serie R1, R2, R3, T1, T2, T3	Ⓔx II 1/2G Ex ia IIC T6...T1 Ga/Gb
	Ⓔx II 1/2D Ex ia IIIC TX Da/Db
Serie R4, T4	Ⓔx II 2G Ex ia IIC T6...T1 Gb
	Ⓔx II 2D Ex ia IIIC TX Db

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Authorised for certifications
- Explosion protection -

By order
(Dr. Wagner)

Seal
(ID no. 0637)

Freiberg, 14 October 2013

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Schedule

Page 1 of 3
IBExU13ATEX1079 X



Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

Mitgliedschaft im Deutschen Kalibrierdienst

DKD

als Gremium der PTB

Das Kalibrierlaboratorium

Günther GmbH
Bauhofstrasse 12
90571 Schwaig

wird hiermit als ordentliches Mitglied in den Deutschen Kalibrierdienst (DKD) aufgenommen.

Die DKD Geschäftsstelle in der PTB Braunschweig,
vertreten durch den Vorsitzenden des DKD Vorstands
im Auftrag der PTB

(Dr.-Ing. Peter Ulbig)

Braunschweig, 31.05.2012

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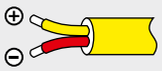
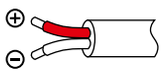
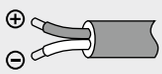
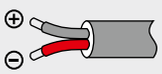
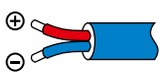
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Telefax: +49 531 592-9292
E-Mail: poststelle@ptb.de
Internet: http://www.ptb.de

Achtung – neue Bankverbindung ab 28. März 2011:
Deutsche Bundesbank, Filiale Leipzig
Kto.-Nr.: 860 010 40 BLZ 860 000 00
IBAN: DE58 8600 0000 0086 0010 40
BIC: MARKDEF1860, VAT-Nr.: DE 811 240 952

PTB Berlin-Charlottenburg
Abbestr. 2-12
10587 Berlin
DEUTSCHLAND

Colour Coding for Thermoelectric and Compensation Cables, as well as Thermal Socket Connectors

Thermocouple Type	DIN EN 60584	DIN 43714	ANSI MC 96.1
NiCr-Ni / K	 + green / - white Mantle: green	 + red / - green Mantle: green	 + yellow / - red Mantle: yellow
NiCrosil-Nisil / N	 + pink / - white Mantle: pink		
Pt10Rh-Pt / S	 + orange / - white Mantle: orange	 + red / - white Mantle: white	 + black / - red Mantle: green
Pt13Rh-Pt / R	 + orange / - white Mantle: orange	 + red / - white Mantle: white	 + black / - red Mantle: green
Pt30Rh-Pt6Rh / B	 + grey / - white Mantle: grey		 + grey / - red Mantle: grey
Fe-CuNi / J	 + black / - white Mantle: black		 + white / - red Mantle: black
Cu-CuNi / T	 + brown / - white Mantle: brown		
Fe-CuNi / L		 + red / - blue Mantle: blue	
Cu-CuNi / U		 + red / - brown Mantle: brown	

Tolerances Pursuant to EN 60584-2 (Reference Junction 0°C)

	Range	Class 1	Range	Class 2
K	-40 ... 1000°C	± 1,5°C or 0,004*(t)	-40 ... 1200°C	± 2,5°C or 0,0075*(t)
J	-40 ... 750°C	± 1,5°C or 0,004*(t)	-40 ... 750°C	± 2,5°C or 0,0075*(t)
S / R	0 ... 1600 °C	± 1,0°C or [1,0+0,003(t-1100)]°C	0 ... 1600 °C	± 1,5°C or 0,0025*(t)
B	---	---	600 ... 1700°C	± 1,5°C or 0,0025*(t)
N	-40 ... 1000°C	± 1,5°C or 0,004*(t)	-40 ... 1200°C	± 2,5°C or 0,0075*(t)
T	-40 ... 350°C	± 0,5°C or 0,004*(t)	-40 ... 350°C	± 1,0°C or 0,0075*(t)
E	-40 ... 800°C	± 1,5°C or 0,004*(t)	-40 ... 900°C	± 2,5°C or 0,0075*(t)

The higher value is valid (t = Numerical Temperature Value in °C)

Properties of the Most Prevalent Ceramic Types

	Unit	porous Ceramic	TE-Porcelain	Aluminium Oxide
Type Pursuant DIN	-	C530	C610	C799
Thermal Shock Resistance	-	Very Good	Moderate to Good	Moderate
Impermeability	-	Porous	Gas-Tight	Gas-Tight
Maximum Constant Temperature	°C	1650	1600	1850
Al_2O_3-Content	%	73-75	60	99,7
Volume Weight	$g*cm^3$	2,35	2,6	3,8-3,93
3-Point Bending Strength	MPa	35	120	300
C-Module	GPa	60	110	370



GÜNTHER GmbH

Temperature Measurement Technology

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Fax +49 (0)911 / 50 69 95-55

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GUENTHER Polska Sp. z o.o.

Technologie Pomiaru Temperatury

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Langkamp Technology

Temperature Sensors

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GÜNTHER HdmG

Temperature Measurement Technology