



Consultation. Solution. Innovation.

STRAIGHT THERMOCOUPLES

IN ACCORDANCE WITH DIN EN 50 446 FOR HEAVY-DUTY INDUSTRIAL APPLICATIONS

Heat treatment and combustion processes play a key role in the production process and quality assurance of end products in several industry branches. Both of these applications have one thing in common: Straight thermocouples require protection from contamination, corrosion and abrasion from the surrounding environment.

Various designs with different protective tube materials made of metal or high-quality, heat-resistant technical ceramics are available to provide the required level of protection.

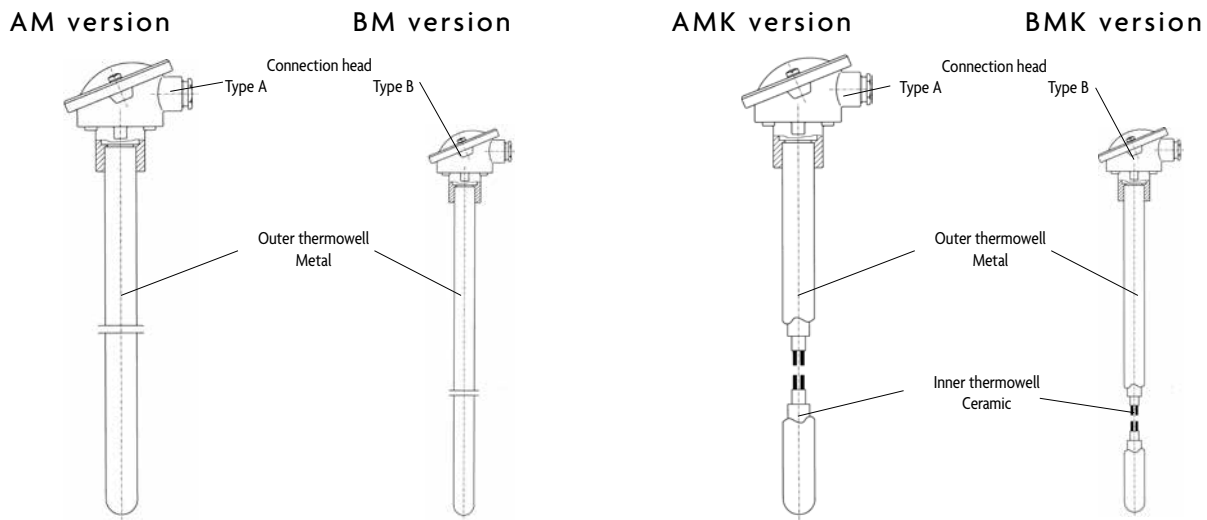
In addition to using industry-standard oxide ceramics (up to 99.8% purity), we also offer non-oxide ceramics and special ceramics, as well as custom protective alloys available in a wide range of dimensions and materials. Depending on the requirements, thermocouples can also be fitted with an additional ceramic inner tube. The maximum application temperature depends on the installation position and specific composition resulting from the ambient conditions during use.

These are covered below.

SPECIAL ADVANTAGES:

- ✓ Process-optimized thermowells
- ✓ Special versions to meet the requirements of CQI-9 and AMS 2750
- ✓ Customer-specific sensors
- ✓ Product refinement with functional coatings and calibrations

Straight thermocouples with metal thermowell



Versions for straight thermocouples with metal thermowell			AM		AMK		BM		BMK			
Connection head as per DIN EN 50 446			Type A				Type B					
Thermowell $d_i \times s^1$			Metal outer thermowell		22 x 2		15 x 2					
			Ceramic inner thermowell		C 610	-	15 x 2	-	10 x 1.5			
					C 799	-	15 x 2.5	-	10 x 2			
Thermocouples as per DIN EN 60 584-1	Code letter	Diameter	1 TC = 1 thermocouple				2 TC = 2 thermocouples					
	E, J, K, N *	3.0	1 TC	2 TC	1 TC	-	-	-	-	-		
	E, J, K, N *	1.5	1 TC	2 TC	1 TC	2 TC	-	-	-	-		
	Conduits as per EN 50 113	E, J, K, N *	1.38	1 TC	2 TC	1 TC	2 TC	1 TC	2 TC	1 TC	2 TC	
		R, S, B **	0.5; 0.35	-	-	1 TC	2 TC	-	-	1 TC	2 TC	
Nominal length according to entered figures			-				355					
Note: Additional support must be provided on site for horizontal installation for nominal lengths of 1600 mm and longer. AM version: Custom lengths up to 6000 mm available on request AMK version: Custom lengths up to 2500 mm available on request			500				500					
			710				710					
			1000				1000					
			1400				1400		-		-	
			2000 ²				-		-		-	

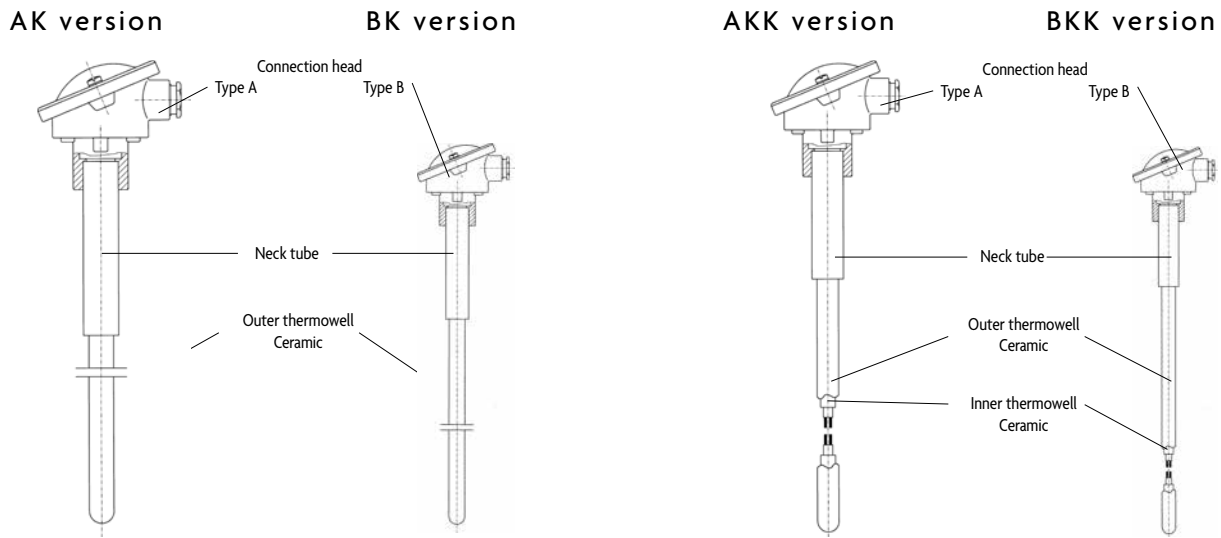
*) Thermocouple(s), preferably type A or B pursuant to EN 50 113

***) Thermocouple(s), preferably type C or B pursuant to EN 50 113

1) s = Thermowell wall thickness.

2) This nominal length is not suitable for vertical installation with built-in precious metal thermocouples.

Straight thermocouples with ceramic thermowell



Codes for straight thermocouples			AK		AKK		BK		BKK		
Connection head as per DIN EN 50 446			Type A				Type B				
			d ₂ x s / l ₂		32x2/200		22x2/150		22x2/150 or 15x2/80		
Thermowell d ₁ x s ¹	Ceramic outer thermowell	C 530	26 x 4		-		-				
		C 610	24 x 2.5		15 (16) x 2		15x2/10x1.5		15x2/10x1.5		
	C 799	24 x 3		15 x 2.5		15x2.5/10x2		15x2.5/10x2			
	Ceramic inner thermowell	C 610	15 (16) x 2		10 x 1.5		-		-		
C 799		15 x 2.5		10 x 2		-		10x2/6x1			
Thermocouples as per DIN EN 60 584-1	Code letter	Diameter	1 TC = 1 thermocouple				2 TC = 2 thermocouples				
	E, J, K, N *	3.0	1 TC	-	-	-	-	-	-	-	
	E, J, K, N *	1.5	1 TC	2 TC	1 TC	2TC ³	1 TC	2TC ³	-	-	
	Conduits as per EN 50 113	E, J, K, N *	1.38	1 TC	2 TC	1 TC	2 TC	1 TC	2 TC	-	-
		R, S, B **	0.5; 0.35	-	-	1 TC	2TC	-	-	1 TC	2TC ³
Nominal length according to stated figures			-				355				
			500				500				
			710				710				
			1000				1000				
			1400				1400		-		
			2000 ²				-		-		
Note: Additional support must be provided on site for horizontal installation for nominal lengths of 1500 and longer.											
AK version: Custom lengths up to 2000 mm available on request											

*) Thermocouple(s), preferably type A or B pursuant to EN 50 113

**) Thermocouple(s), preferably type C or B pursuant to EN 50 113

¹) s = Thermowell wall thickness.

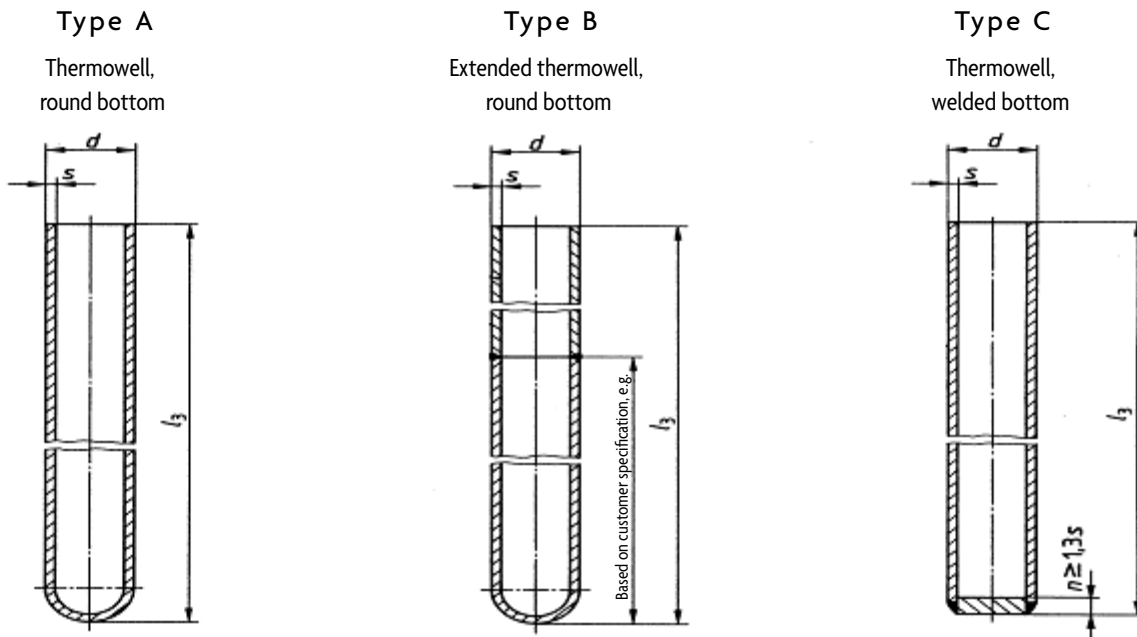
²) This nominal length is not suitable for vertical installation with built-in noble metal thermocouples.

³) 2 thermocouples cannot be installed in ceramic outer or inner thermowells 10 x 2 mm.

⁴) 2 thermocouples can only be installed with the wire diameter 0.35 mm.

⁵) This version is only available with an outer thermowell diameter of 15 mm.

Metal thermowell designation and dimensions



Example: Thermowell A22D x 1020

Designation of a type A metal thermowell with $d = 22$ mm diameter and $l_3 = 1,020$ mm length from material 1,4841 DIN 17 442 (code letter D as per table 3.2)

Table 3.1 Metal thermowell dimensions and limit deviations without pipe screw joint									
Type	d +0.2/-0.1	s +/-0.1	For straight thermocouples with nominal length l (intermediate lengths possible)						
			250	355	500	710	1000	1400	2000
			Thermowell length l_3 Permissible deviation +3.0/-0				Thermowell length l_3 Permissible deviation +5.0/-0		
A / C	15	2	265	370	515	-	-	-	-
	22	2	-	-	520	730	1020	1420	2020
	24	3	-	-	520	730	1020	1420	2020
B	22	2	-	-	-	-	1020	1420	2020

Thermowell types A and C are technically identical.

The coatings for metal thermowells must be agreed between the manufacturer and user. Please observe deviating diameter.

Table 3.2 Code letters for metal thermowells		
Code letter	Symbol	Material no.
BF	St 35.8	1.0305
BL	C 22.8	1.0460
J	X6CrNiMo17-12-2	1.4571
DU	X18CrNi28	1.4749
R	X10CrAl24	1.4762
D	X15CrNiSi2520	1.4841
B	Inconel 600	2.4816
Y	Incoloy 800	1.4876
CS	Kanthal Super/AF/APM ¹⁾	-

Table 3.3 Code letters for ceramic thermowells	
Code letter	Material as per DIN 40 685 part 1 VDE 0335 part 1
CX	C 530 / K530
CY	C 610 / K 610
CZ	C 799 / K 710
RSiC ¹⁾	Silicon carbide, recrystallized ²⁾
SiSiC ¹⁾	Silicon carbide, reaction-bonded ²⁾

¹⁾ Deviating diameter

²⁾ Please get in touch for more detailed specifications

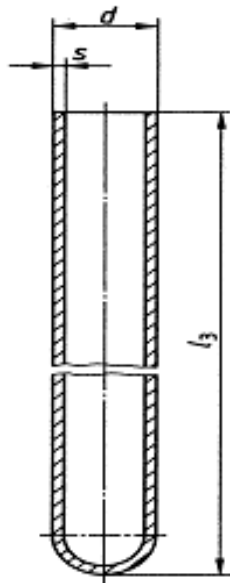
³⁾ ???

Table 3.4 Code letters for thermocouples	
Code letter	Thermocouple DIN EN 60 584-1
E	NiCr-CuNi
J	Fe-CuNi
K	NiCr-Ni
N	NiCrSi-NiSi
S	Pt10%Rh-Pt
R	Pt13%Rh-Pt
B	Pt30%Rh-Pt6%Rh
D (AO)	W3%Re-W25%Re
C ³⁾ (AE)	W5%Re-W26%Re
A ³⁾	W5%Re-W20%Re

Ceramic thermowell and retaining ring designation and dimensions

Thermowell A15CZ - 1030

Designation of a ceramic thermowell with $d_1=15$ mm diameter and thermowell length $l = 1030$ mm from ceramic insulating material K 710 (C 799). (Retaining ring for inner thermowell: see table 4.2)



Retaining ring (HR) - 24

Designation of a retaining ring (HR) for a ceramic thermowell with a diameter of $d_1 = 24$ mm. The retaining ring is fastened by pressing the indents together. Make sure that the retaining ring firmly encloses the thermowell, as it needs to support the entire weight of the thermowell when the thermocouple is installed vertically.

Table 4.2

For thermowell d_1	d_2 +0.5/ +1
6	6
10	10
15	15
16	16

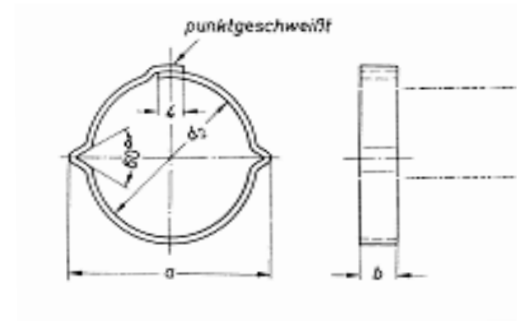


Table 4.1 For straight thermocouples, version AK, AKK, BK and BKK

d_1 ¹⁾	s min.	Thermowell length l_3						Thermowell material	Thermoshock resistance	Density ³⁾	Permissible constant temperature in °C ²⁾
		355	500	710	1000	1400	2000				
		Permissible deviation +3/-0			Permissible deviation +5/-0						
10	1.5	375	520	730	1020	-	-	C 610 (K 610)	average to good	gas-tight	1500
15/16	2	-	530	740	1030	1430	-				
24	2.5	-	530	740	1030	1430	2030				
10	2	375	530	740	1030	-	-	C 799 (K 710)	average	gas-tight	1500
15/16	2.5	-	530	740	1030	1430	-				
24	3	-	530	740	1030	1430	2030				
26	4	-	-	740	1030	1430	2030	C 530	excellent	porous	1500
20 ⁵⁾	5	-	530	740	1030	1430	-	SiSiC ⁴⁾	excellent	gas-tight	1350
22 ⁶⁾	5	-	530	740	1030	1430	2030				
25 ⁶⁾	5	-	530	740	1030	1430	2030				
20 ⁶⁾	3.5	-	530	740	1030	1430	-	RSiC ⁴⁾	good	porous	1600
22 ⁶⁾	3.5	-	530	740	1030	1430	2030				
25 ⁷⁾	3.5	-	530	740	1030	2030					

1) d_1 must be maintained with a permissible deviation of ± 0.5 mm over a length of 20 mm.

2) Precious metal thermocouples are generally used to measure temperatures above 1000 °C. When installed in thermowells and insulating tubes made of the ceramic insulating materials specified above, the thermocouples may be affected in a reducing atmosphere. Silicon and heavy metals have a particularly strong effect and reduce the continuous temperature.

3) At temperatures above approx. 1000 °C, gas tightness can no longer be assumed.

4) When using SiC thermowells in the AK version, only base metal thermocouples should be used. When using precious metal thermocouples in the AKK version, installation of an inner thermowell made of C 799 is strongly recommended.

5) AKK version: inner thermowell 6 x 1 mm

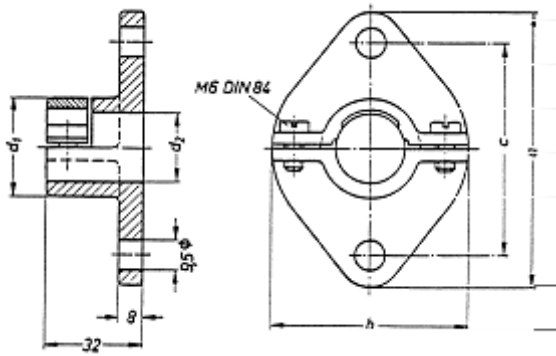
6) AKK version: inner thermowell 10 x 2 mm

7) AKK version: inner thermowell 15 x 2.5 mm

Threaded sleeves, stop flanges and counterflanges

Stop flange made from aluminum or malleable cast iron

Designation: e.g. Stop flange - nominal size (22) - material
materials: Al = Aluminum; GtW = Malleable cast iron



Threaded sleeves made from steel, zinc-plated

Designation: e.g. Threaded sleeve (TS) - thread (G1) - nominal size (22)

Application temperature: max. 400 °C. Cerafi fiber gasket.

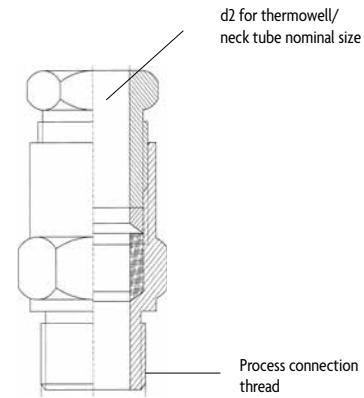


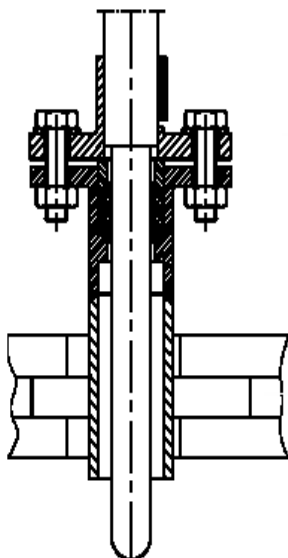
Table 5.1

Thermowell/ neck tube (nominal size) d ₂	Flange diam- eters		
	A	B	C
15	75	50	55
22	90	65	70
24	90	65	70
26	90	65	70
32	90	65	70

Table 5.2

Thermowell/ neck tube diameter in mm	d ₂ in mm	Process connection thread	Process connection thread	Process connection thread
10	10.5	M 20x1.5	T ¾	½" NPT
15	15.5	M 27	T ¾ / T 1	¾" NPT
22	22.5	M 36	T 1	1" NPT
24	24.5	M 42	T 1¼	1¼" NPT
26	26.5	M 42	T 1¼	1¼" NPT
32	32.5	M 48	T 1¼/T 1½	1¼/1½" NPT

Installation example
with counterflange for
welding



Order code

Example: **TE** - **AMK** - **15x2** - **1.4762 / K610** - **2 K** - **1.38** - **2000**

Connection head	Type A or B	
Outer thermowell	M Metal K Ceramic	Coatings available on request
Inner thermowell	K Ceramic No letter = no inner thermowell	
Outer thermowell diameter x wall thickness	Metal	Ceramic
	15x2 15 x 2 mm 22x2 22 x 2 mm 24x3 24 x 3 mm	10x1.5(2) 10 x 1.5 mm reinforced to 2.0 15x2(2.5) 15 x 2.0 mm reinforced to 2.5 24x2.5 24 x 2.5 mm 24x3 24 x 3.0 mm 26x4 26 x 4.0 mm
Standard - different diameters available on request		
Outer thermowell material	Metal	Ceramic
	1.0305 1.4749 1.4762 1.4841 1.4876	C530 Aluminum silicate C610 Multiceramic C799 Aluminum oxide
Custom materials available on request		
Inner thermowell material	C530 Aluminum silicate C610 Multiceramic C799 Aluminum oxide	Custom materials available on request
Thermocouples	without number = 1 thermocouple 2 = 2 thermocouples	
Type marking (EN 60 584-1)	E NiCr - CuNi	S Pt10%Rh - Pt
	J Fe - CuNi	R Pt13%Rh - Pt
K NiCr - Ni	B Pt30%Rh - Pt6%Rh	
N NiCrSi - NiSi		Custom types available on request
Thermowire diameter in mm	1.0 1.38 2.5 3.0 for type E/J/K/N 0.35 0.5 for type S/R/B	
Nominal length l in mm	2000	2,000 mm = Standard Custom lengths available on request



Hubert Topmüller
Furnace construction expert

Henry Hall (M.A.)
Managing director

Carsten Tillmann
Steel industry expert

Frank Elsenbach
Automotive expert

Jörg Reichelt
Managing director/semiconductor expert

RÖSSEL-MESSTECHNIK – YOUR CERTIFIED PARTNER

As a leading manufacturer of temperature measuring technology for industrial and research purposes, we meet the strictest production standards. With internationally recognized approvals and calibrations, we offer quality you can rely on around the globe.





GET TO KNOW US CONTACT





 RÖSSEL Messtechnik GmbH
Seidnitzer Weg 9
D-01237 Dresden



 +49 351 312 25-10

 info@roessel-messtechnik.de
 www.roessel-messtechnik.de



 RÖSSEL Messtechnik GmbH
Lohstraße 2
D-59368 Werne

 +49 2389 409-0

 info@roessel-messtechnik.de
 www.roessel-messtechnik.de