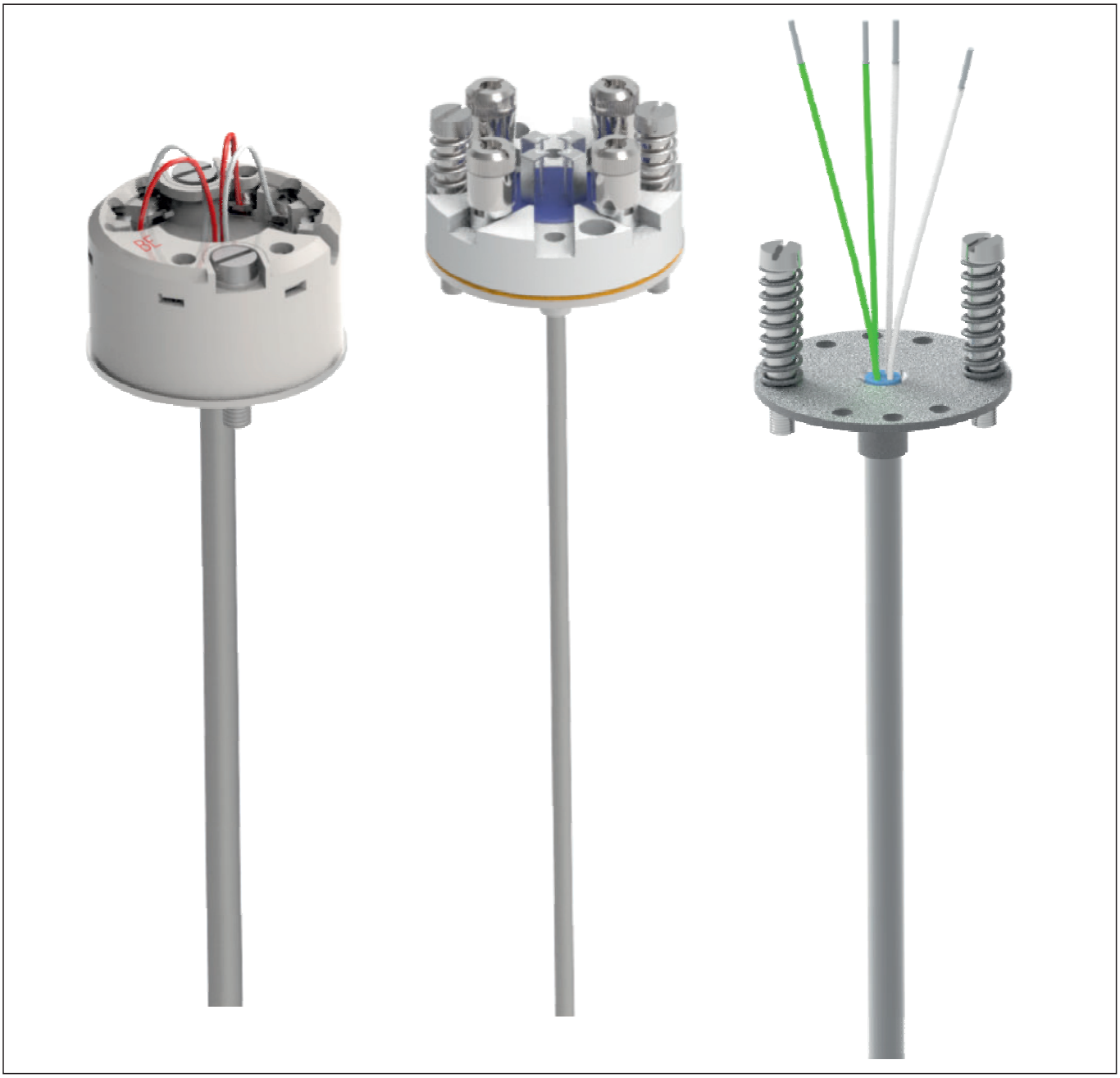
Boehme + Ewert
EXPERT TEMPERATURE SOLUTIONS

Product group: Thermometer Components (B)

Component series measuring inserts: BMM



Areas of application

– Replacement measuring insert for service and maintenance
– Laboratory applications

Features

– Mineral insulated sheathed cable– Proven in operation
– Compliance with DIN 43735
– Explosion protection when installed in approved thermometers

Approvals:

– optional ATEX
– optional IECEx

Component series measuring inserts: BMM

1. General information

1.1 Description

The measuring inserts of the BMM series presented here are designed for installation in a protective fitting, e.g. B+E product group “TEM”. They essentially comply with the DIN 43735 standard for measuring inserts, but many variants exceed the scope of the standard.
However, if the insert is to be used without a protective fitting, e.g. for laboratory purposes, no explosion protection is possible.The measuring inserts are made of mineral-insulated sheathed cable and are therefore robust and highly vibration-resistant.A spring-loaded bearing ensures better heat transfer, reduces vibrations of the measuring insert and compensates for thermal expansion.

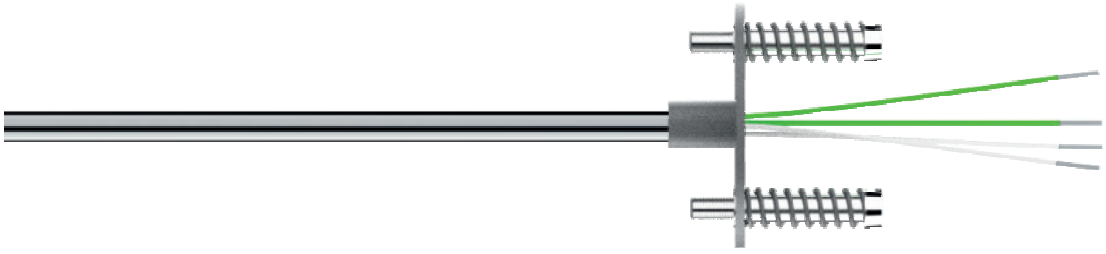
1.2. Type overview

The types are categorized according to the type of electrical connection and the sensor type.
The respective combination determines the type.

Types:

BMM130 - Ceramic terminal block with screw terminals

BMM230 - free wire ends and flange plate for mounting a transmitter



BMM330 - Permanently mounted transmitter

Sensors (= type suffix):
T – thermocouples
W – resistance thermometers

Component series measuring inserts: BMM

Types:

BMM130T/BMM130W; BMM230T/BMM230W; BMM330T/BMM330W
Explosion-proof versions are given an index depending on the type of protection:
- iA – Ex i (intrinsically safe)
- ec - (non-sparking) (previously nA)
- d - Ex d (pressure-resistant enclosure)

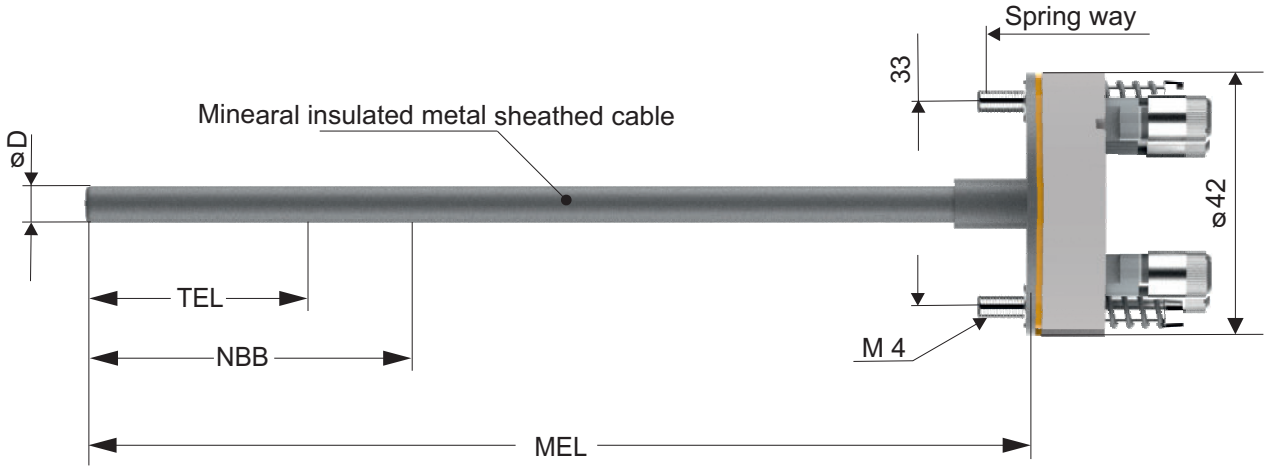
1.3. Structure

- Standardized sensors (IEC 60751 platinum resistance thermometers, IEC 60584 thermocouples, international standards such as ASTM, Gost, JIS)
- B+E-Form 0 of sheathed cable; sheath of austenitic steel or highly heat-resistant alloys; insulator of highly compressed magnesium oxide
- Single, double and triple sensors possible
- Suspension travel (ST) 10 mm

2. Technical data

2.1 Resistance thermometers

The design of the sheathed cable and the precise encapsulation of the measuring resistors provide a high degree of vibration resistance. The acceleration values of 3 g defined in IEC 60751 are exceeded when wire-wound measuring resistors are used.
The vibration resistance achieved in the standard version is 10g, in the “increased vibration resistance” version it is at least 20 g.



Legend:
D - measuring insert diameter
TEL - temperature-sensitive length
NBB- non-bendable area
MEL- measuring insert length

Measuring inserts in the diameter range from 2 - 8 mm can be supplied.

Sheathing materials for resistance thermometer inserts:

1.4404; 1.4541; 1.4571
Other materials on request

Component series measuring inserts: BMM

Overview of measuring resistors

Type of construction	Temperature range	PT10	PT100	PT1000
Thin film resistance element	-50 ... 400 °C (Standard)		●	●
	-50 ... 600 °C (extended)		●	●
	-200 ... +150 °C (cryo)		●	
Wire ceramics	-200 ... 600 °C (Standard)	●	●	
	-200 ... 800 °C (high temperature)	●	●	

Tolerance classes according to DIN EN 60751 and specific to Boehme + Ewert GmbH:
(apply within a sub-range of the temperature range, the validity range)

Class	Scope of validity (°C)		Limit deviation (K) *1)	DIN EN	B+E - specific
	Thin film resistor	Wire-ceramic measuring resistor			
AA	0 ... 150	-50 ... 250	±(0,1 + 0,0017|t|)	●	
A	-30 ... 300	-100 ... 450	±(0,15 + 0,002|t|)	●	
B	-50 ... 500	-196 ... 600	±(0,3 + 0,005|t|)	●	
C	-50 ... 600	-196 ... 600	±(0,6 + 0,005|t|)	●	
AC	-	-196 ... 200	±(0,15 + 0,002|t|)		●
BH	-	0 ... 800	±(0,3 + 0,005|t|)		●

The possible combinations of the number of measuring circuits and connections depend on the diameter of the measuring insert. For single measuring circuits, all switching modes are possible for all diameters.
It should be noted that only tolerance classes B and C are recommended for two-wire circuits. For multiple measuring circuits, the following applies:

Diameter (mm)	2 Measuring circuits			3 Measuring circuits	
	2 - weir	3 - weir	4 - weir	2 - weir	3 - weir
3 - 4,5	●	●			
6 - 6,4	●	●	●	●	●
8	●	●	●	●	●

Component series measuring inserts: BMM

Recalibration

The recalibration intervals depend heavily on the maximum operating temperature. The higher the operating temperature, the shorter the recalibration intervals. In cryogenic applications, the measuring resistor is not subject to aging, so recalibration is not necessary.
The following guide values apply for maximum sustained operating temperatures:
- 600 °C – 1 year
- 400 °C – 2 years
- 200 °C – 5 years
- 100 °C – longer than 10 years

Special system or process requirements may require shorter recalibration intervals.

2.2 Thermocouple measuring inserts

The thermocouples comply with the IEC-based standard DIN EN 60584. Thermocouples can also be supplied that comply with other international standards such as JIS C 1602 or ASTM E230. Furthermore, a limited selection is also available that complies with the no longer valid German standard DIN 43710.
Thermocouples can be electrically insulated or connected to the sheath to improve the response time.
In practice, insulated measuring inserts are mainly used. The sheath material depends on the thermocouple used and the associated maximum temperature.
The following table provides an overview:

Thermocouple	**Maximum operating temperature (°C)** (tolerance range according to standard)	**Sheath material**
E J (L) T (U)	900 750 350	1.4571, 1.4541, 1.4404
K N B R S	1200 1200 1600 1600 1600	2.4816

Other sheath materials can also be used on request (e.g. Pyrosil-D for type N).
Other materials on request.

The vibration resistance of the thermocouple measuring inserts is essentially determined by the stability of the sheathed cable wires. This is very high due to the design.
The vibration resistance is at least 60 g.

Insulation resistances

The insulation resistance for all sheath element measuring inserts is:
Riso >500MΩ at ambient temperature and a relative humidity of <80 %.
Re-calibration intervals are both thermocouple and temperature dependent.

As a general recommendation, recalibration should be carried out after 2 years at the latest.

The tolerances of the thermocouple inserts correspond to the tolerance classes of the DIN EN 60584 (IEC 60584) standard.
International standards such as ASTM-E230 can also be supplied.

The tables on the following page provide an overview.

Component series measuring inserts: BMM

Tolerance values for thermocouples acc. IEC 60584-1

CLASS 1

Type	Name	Temperature Range	Tolerance values
E	NiCr-CuNi	-40 to 375 °C 375 to 800 °C	±1,5 °C ±0,004 (t)
T	Cu-CuNi	-40 to 125 °C 125 to 350 °C	±0,5 °C ±0,004 (t)
J	Fe-CuNi	-40 to 375 °C 375 to 750 °C	±1,5 °C ±0,004 (t)
K/N	NiCr-Ni / NiCrSi-NiSi	-40 to 375 °C 375 to 1000 °C	±1,5 °C ±0,004 (t)
R/S	Pt 13 Rh-Pt / Pt 10 Rh-Pt	0 to 1100 °C 1100 to 1600 °C	±1,0 °C ±[1+0,003(t-1100)

CLASS 2

Type	Name	Temperature Range	Tolerance values
E	NiCr-CuNi	-40 to 375 °C 375 to 800 °C	±2,5 °C ±0,0075 (t)
T	Cu-CuNi	-40 to 125 °C 125 to 350 °C	±1 °C ±0,0075 (t)
J	Fe-CuNi	-40 to 375 °C 375 to 750 °C	±2,5 °C ±0,0075 (t)
K/N	NiCr-Ni / NiCrSi-NiSi	-40 to 375 °C 375 to 1000 °C	±2,5 °C ±0,0075 (t)
R/S	Pt 13 Rh-Pt / Pt 10 Rh-Pt	0 to 1100 °C 1100 to 1600 °C	±1,5 °C ±[1+0,003(t-1100)
B	Pt 30 Rh-Pt 6 Rh	600 to 1700 °C	±0,0025(t)

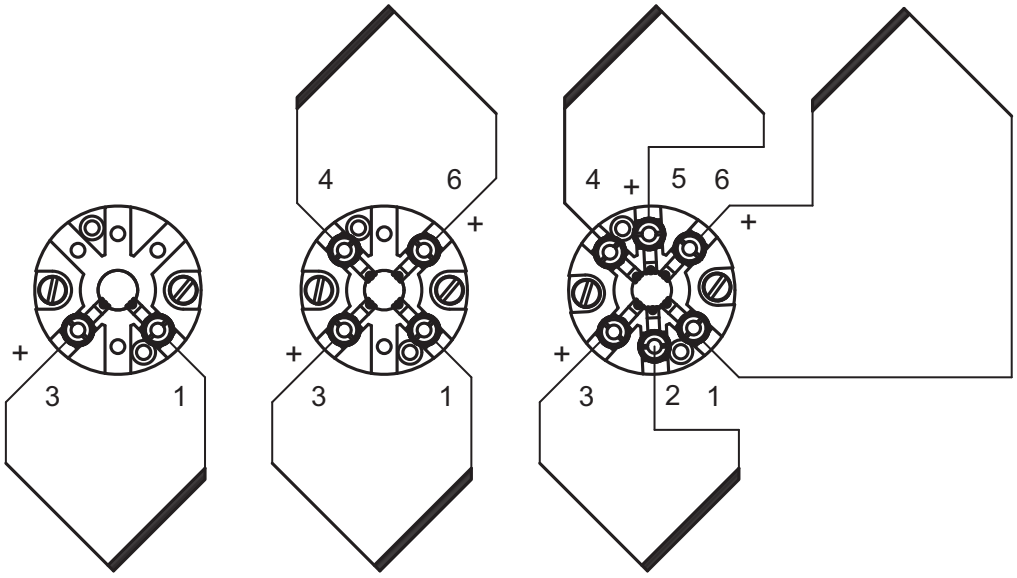
CLASS 3

Type	Name	Temperature Range	Tolerance values
E	NiCr-CuNi	-167 to 40 °C -200 to -167 °C	±2,5 °C ±0,015 (t)
T	Cu-CuNi	-67 to 40 °C -200 to -67 °C	±1 °C ±0,015 (t)
K/N	NiCr-Ni / NiCrSi-NiSi	-167 to 40 °C -200 to -167 °C	±2,5 °C ±0,015 (t)
B	Pt 30 Rh-Pt 6 Rh	600 to 800 °C 800 to 1700 °C	±4 ±0,005(t)

Component series measuring inserts: BMM

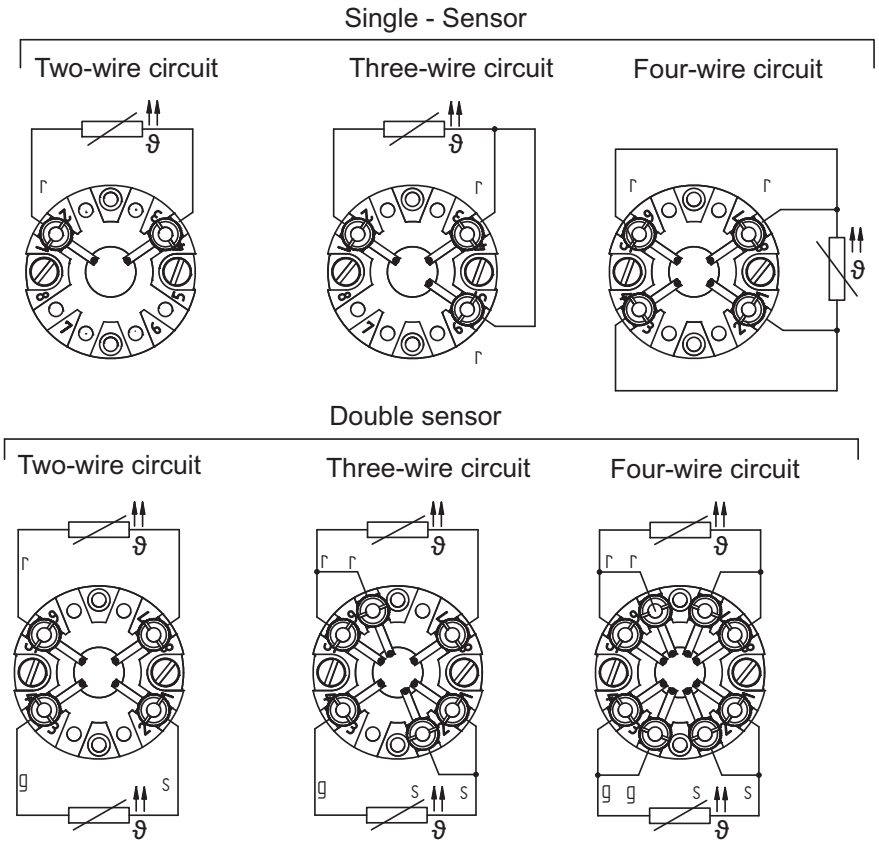
2.3 Connection diagrams for types BMM130 (with ceramic block)

2.3.1 Thermocouples, according to IEC DIN EN 60584



single doublex triplex

2.3.2 Resistance thermometers, according to IEC DIN EN 60751



r - rot, red
g - gelb, yellow
s - schwarz, black

Component series measuring inserts: BMM

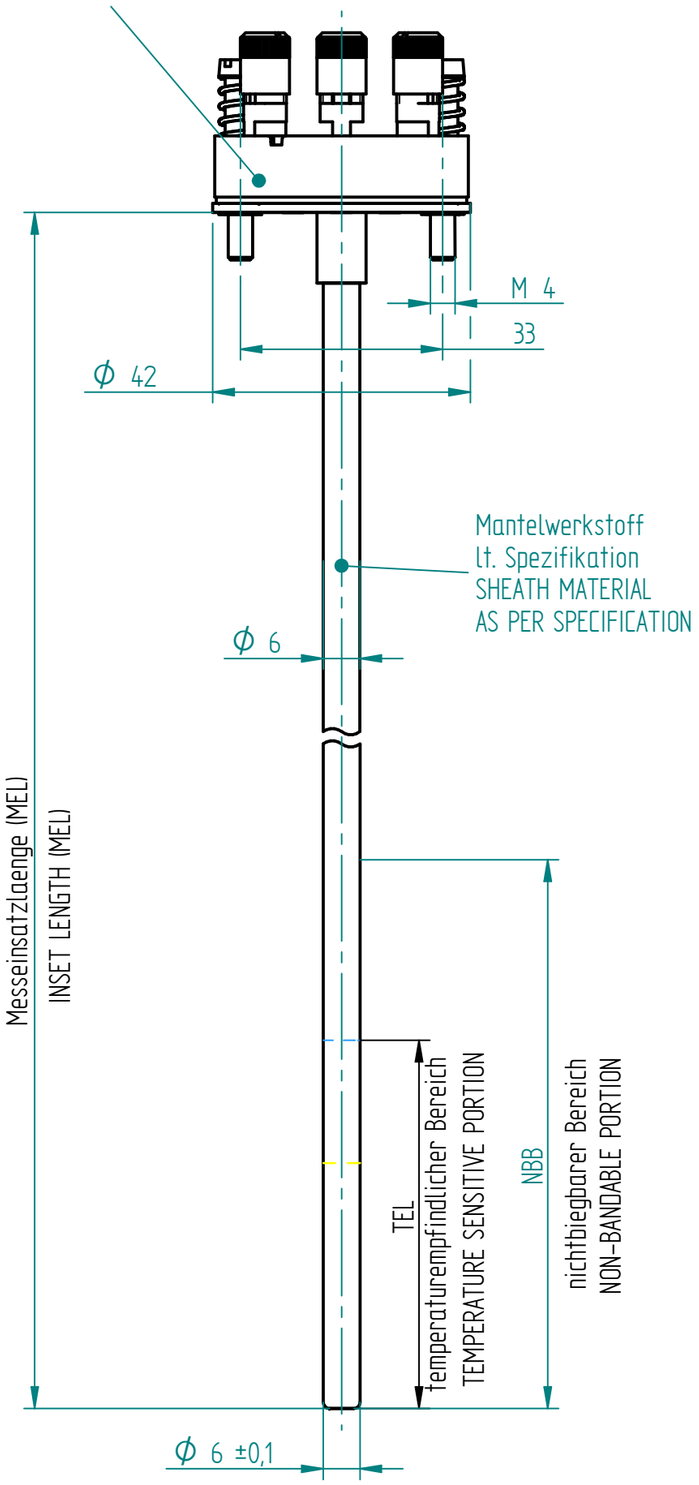
3. Tests and certificates

Inspection certificate according to DIN EN 10204 3.1 for:

– comparative measurement (factory calibration)
– DAkkS calibration via an accredited partner laboratory
– official preliminary test (only PT100)
– X-ray inspection of the sensor

Böhme + Ewert GmbH
Am Spielacker 4
63571 Gelnhausen
Federal Republic of Germany
Tel.: +49 (0)6051 916656 0
Fax: +49 (0)6051 916656 9
E-Mail: sales@be-temp.de
www.be-temp.com

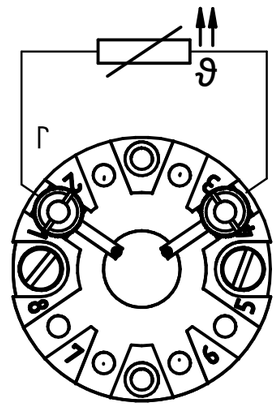
B-Sockel, Keramik
TERMINAL BLOCK "B", CERAMIC



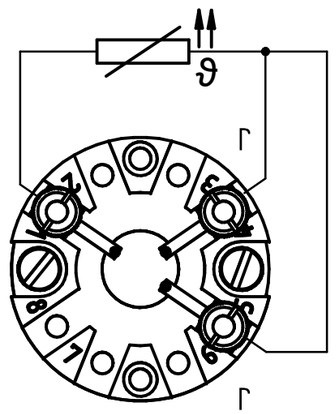
Messwiderstand Draht-Keramik
RTD-element WIRE WOUNDED-CERAMIC

Einfach - Sensor / SINGLE

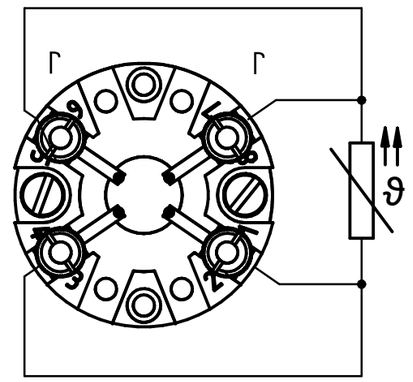
Zweileiterschaltung
2-WIRE-CIRCUIT



Dreileiterschaltung
3-WIRE-CIRCUIT

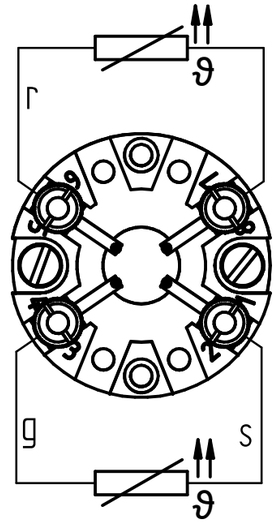


Vierleiterschaltung
4-WIRE-CIRCUIT

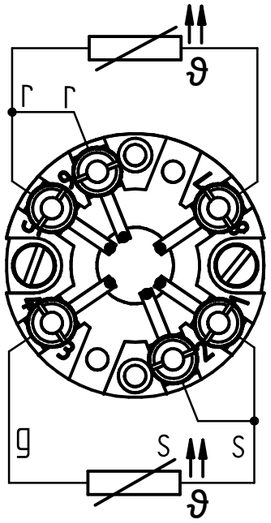


Doppel - Sensor / DUPLEX

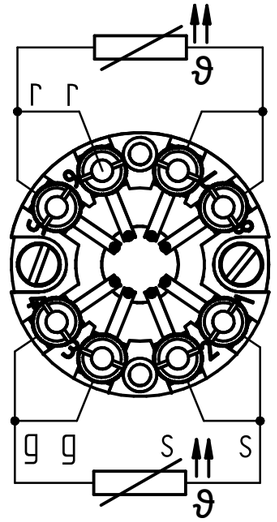
Zweileiterschaltung
2-WIRE-CIRCUIT



Dreileiterschaltung
3-WIRE-CIRCUIT



Vierleiterschaltung
4-WIRE-CIRCUIT



Farbcode nach
DIN EN 60751:
COLOR CODE ACC.
DIN EN 60751:

r - rot, red
g - gelb, yellow
s - schwarz, black

Varainten / Variations		
Sensorcharakteristik	NBB	TEL
Standard	60	40
kurz	40	25
bodenempfindlich	25	8

Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

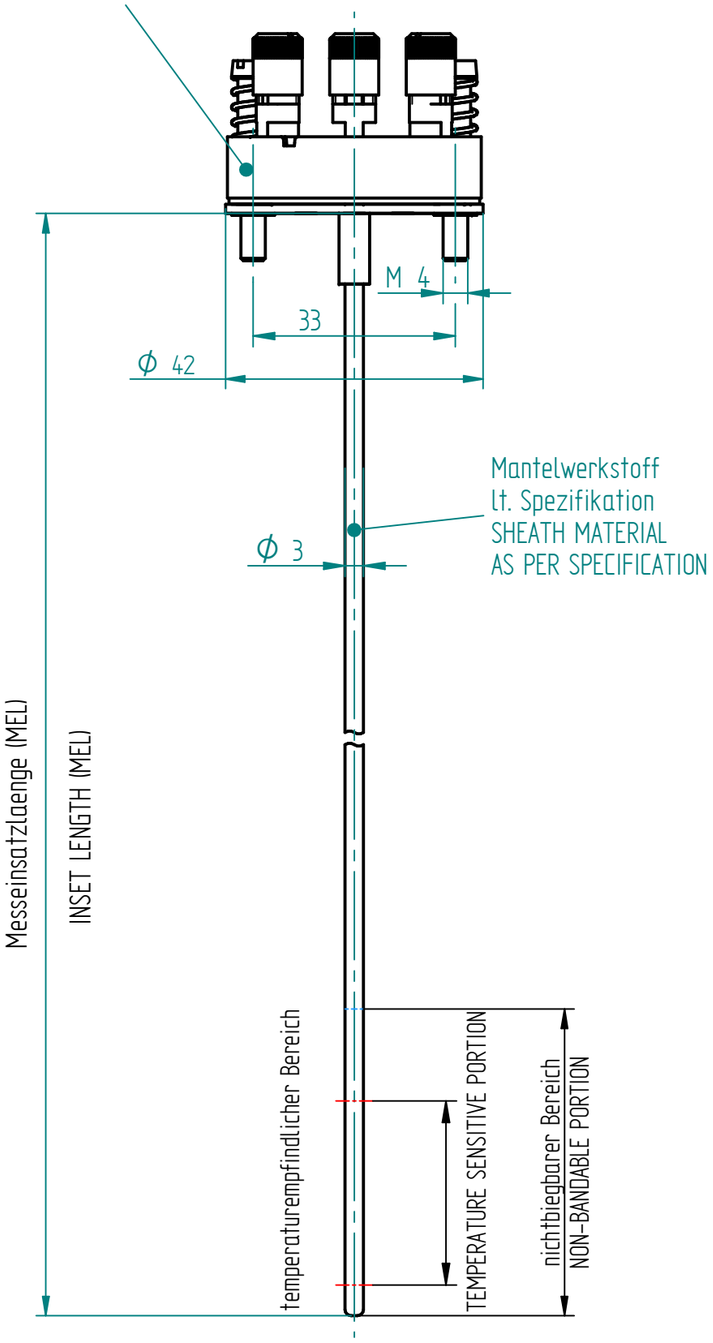
Entspricht Kennzahl 61 nach DIN 43735
CORRESPONDS TO CODE NUMBER 61 ACCORDING TO DIN 43735

Boehme + Ewert

Maßstab 1:1	Werkstoff		Allgemeintoleranz / GENERAL TOLERANCE: DIN ISO 2768-m
Erstellt durch: Michael Boehme	Genehmigt von: MichaelBoehme		Dokumentenart
Titel, Zusätzlicher Titel: Messeinsatz, Typ BMM130-W INSET, TYPE BMM130-W			Sachnummer: 2101113-0001
		Änd. 0 / Ausgabedatum 20.08.2021 / Spr. / Blatt 1/1	

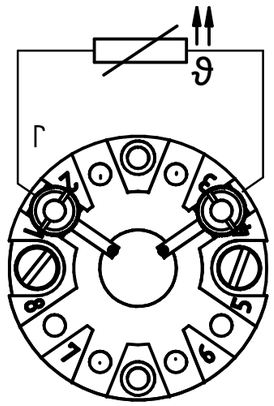
A3

B-Sockel, Keramik
TERMINAL BLOCK "B", CERAMIC

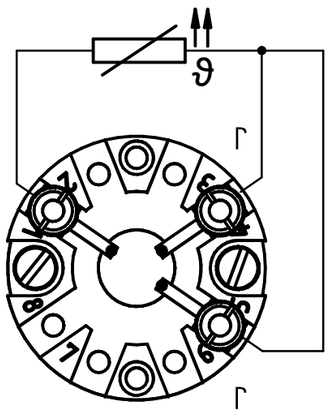


Einfach – Sensor / SINGLE

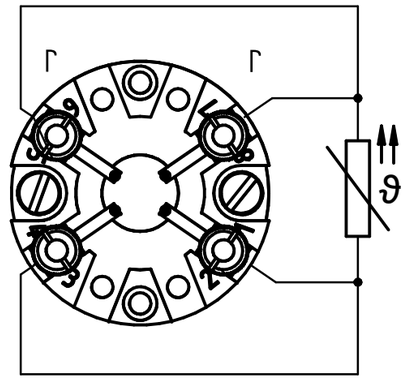
Zweileiterschaltung
2-WIRE-CIRCUIT



Dreileiterschaltung
3-WIRE-CIRCUIT

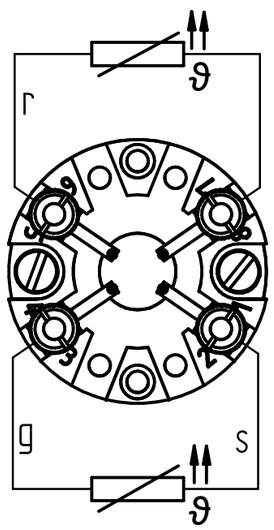


Vierleiterschaltung
4-WIRE-CIRCUIT

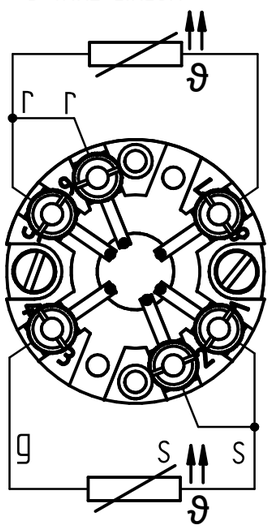


Doppel – Sensor / DUPLEX

Zweileiterschaltung
2-WIRE-CIRCUIT



Dreileiterschaltung
3-WIRE-CIRCUIT



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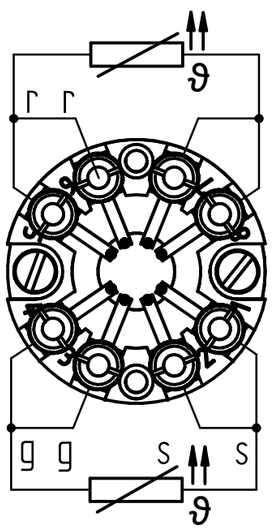
4-WIRE-CIRCUIT



Farbcode nach
DIN EN 60751:
COLOR CODE ACC.
DIN EN 60751:
r – rot, red
g – gelb, yellow
s – schwarz, black

Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

Schutzvermerk nach DIN ISO 16016 @ Böhme + Ewert
REFER TO PROTECTION NOTICE ISO 16016 @ Boehme + Ewert

Maßstab: 1:1
Werkstoff:
Allgemeintoleranz / GENERAL TOLERANCE: DIN ISO 2768-m

Boehme + Ewert

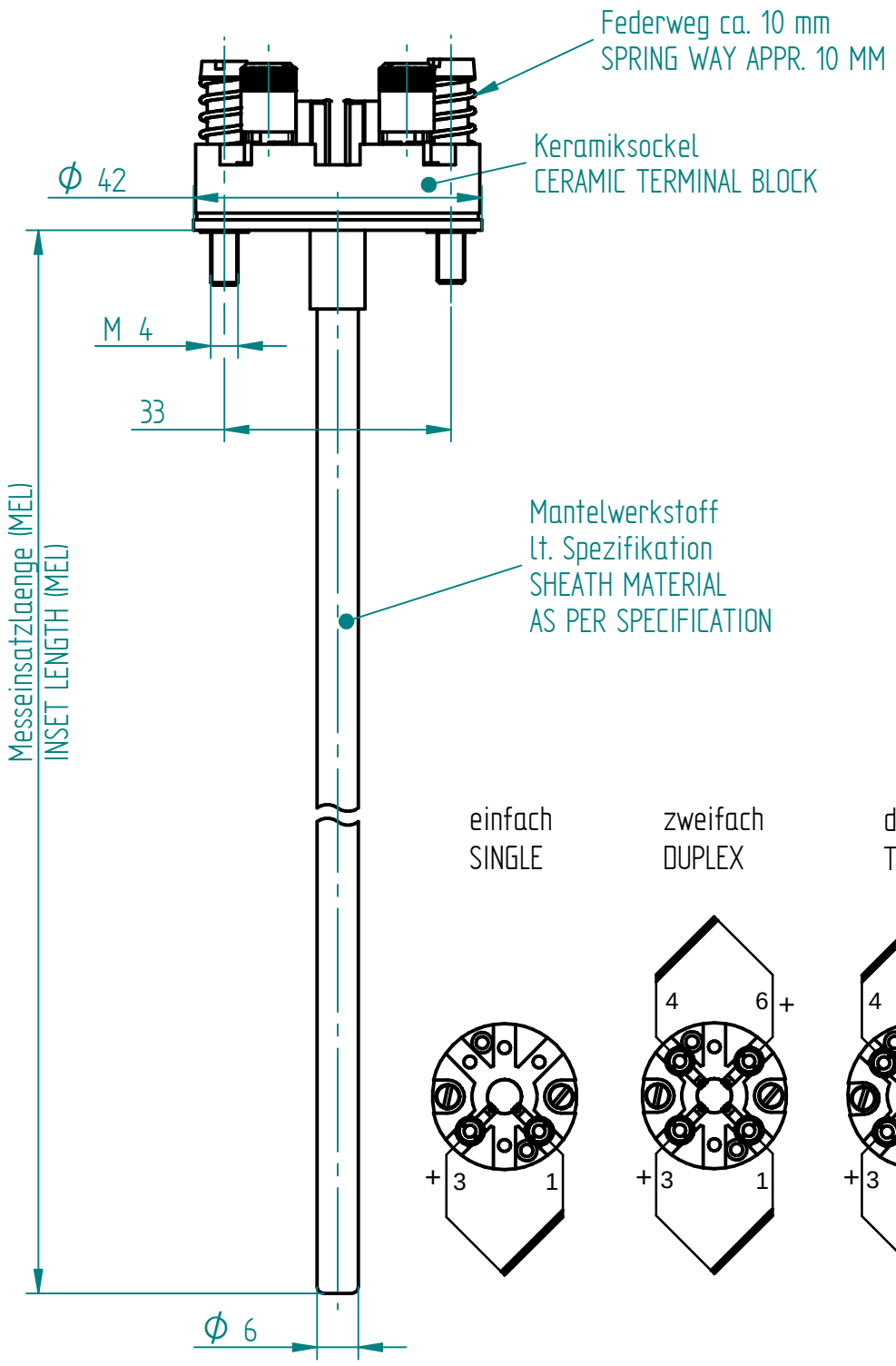
Erstellt durch: SergejEwert
Genehmigt von: MichaelBoehme
Dokumentenart:

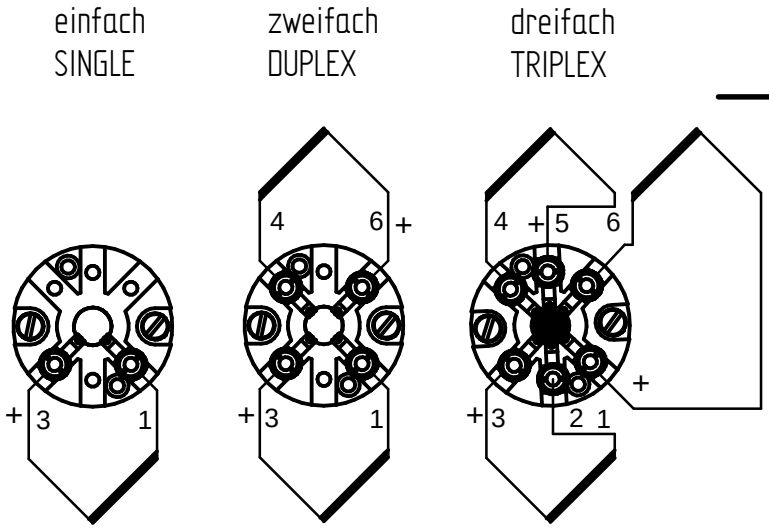
Titel, Zusätzlicher Titel: Messeinsatz, Typ BMM130W
INSET, TYPE BMM130W

Sachnummer: 2101113-0002

And.	Ausgabedatum	Spr.	Blatt
0	26.08.2021		1/1

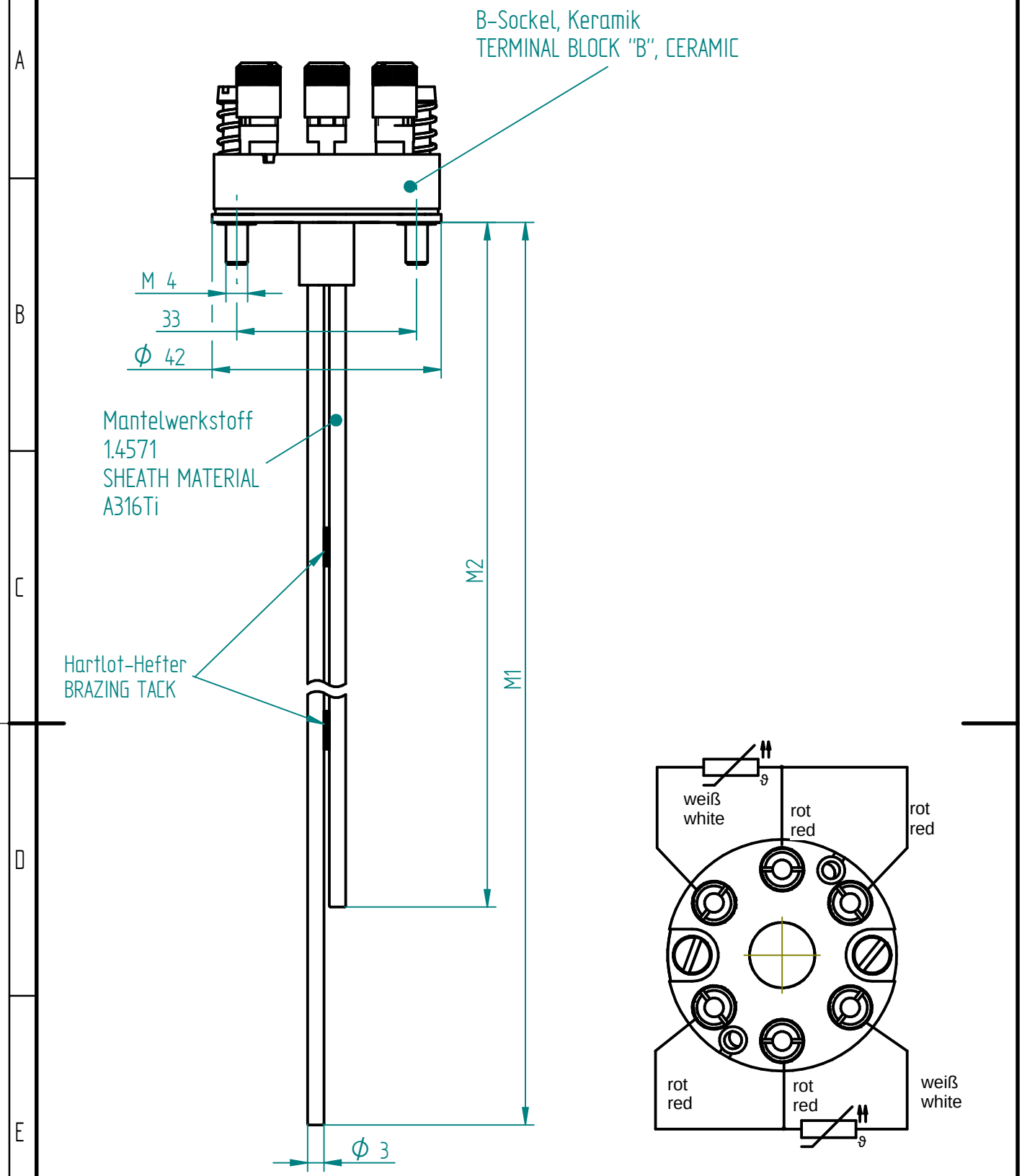
A3





Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

Schutzvermerk nach DIN ISO 16016 @ Böhme + Ewert REFER TO PROTECTION NOTICE ISO 16016 @ Boehme + Ewert	ISO 128	Maßstab 1:2	Werkstoff	Allgemeintoleranz / GENERAL TOLERANCE DIN ISO 2768-m
Boehme + Ewert		Erstellt durch Michael Boehme	Genehmigt von Michael Boehme	Dokumentart
		Titel, Zusätzlicher Titel Thermoelement-Messeinsatz THERMOCOUPLE INSET	Sachnummer 2101113-0004	
			Änd. 0 / 04.11.2021 / Spr. / Blatt 1	



Farbkennzeichnung nach
DIN EN 60751

Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

Schutzvermerk nach DIN ISO 16016 @ Böhme + Ewert
REFER TO PROTECTION NOTICE ISO 16016 @ Boehme + Ewert

ISO 128

Maßstab: 1:1

Werkstoff:

Allgemeintoleranz / GENERAL TOLERANCE: DIN ISO 2768-m

Boehme + Ewert

Erstellt durch: Michael Boehme

Genehmigt von: Michael Boehme

Dokumentart:

Titel, Zusätzlicher Titel: Messeinsatz Multilevel

Sachnummer: 2101113-0017

Änd.	Datum	Spr.	Blatt
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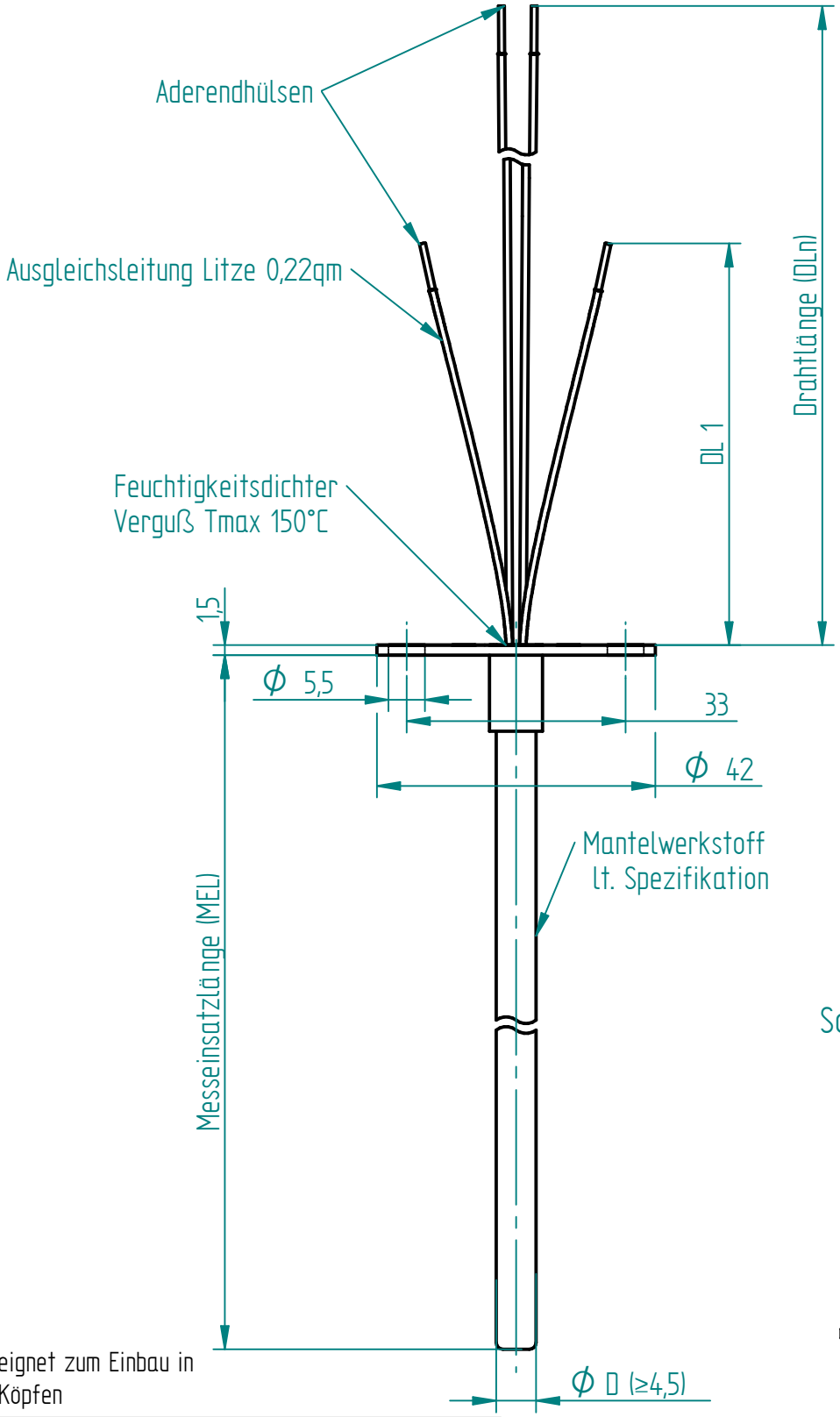
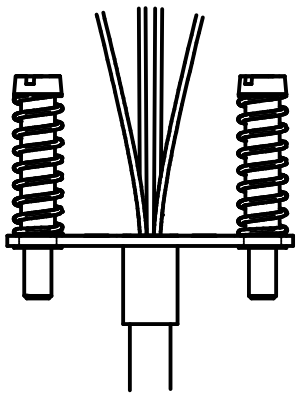


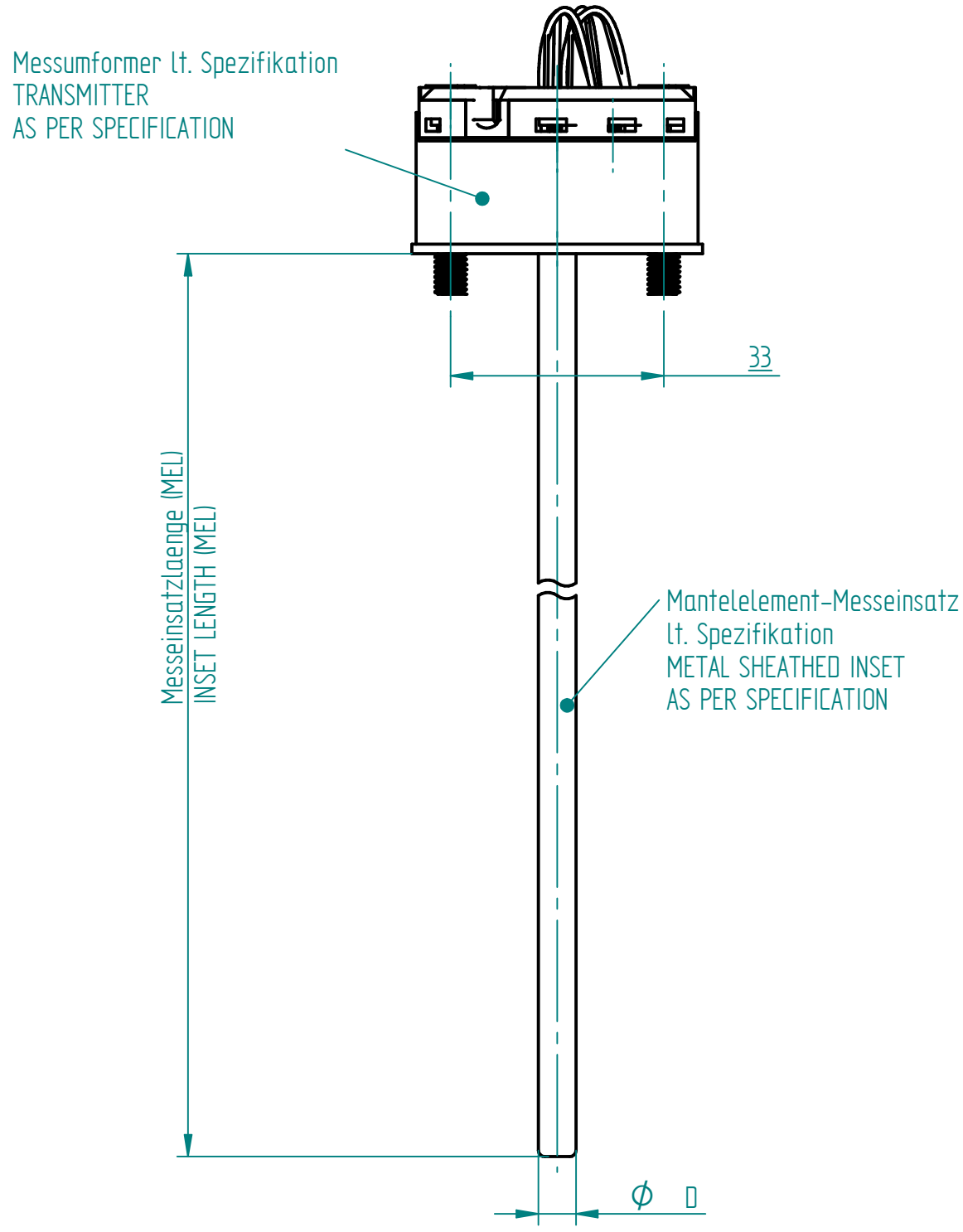
Option:
Sockelscheibe federnd



geeignet zum Einbau in
B-Köpfen

Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

Schutzvermerk nach DIN ISO 16016 @ Böhme + Ewert REFER TO PROTECTION NOTICE ISO 16016 @ Boehme + Ewert	ISO 128	Maßstab 1:1	Werkstoff	Allgemeintoleranz / GENERAL TOLERANCE DIN ISO 2768-m
Boehme + Ewert		Erstellt durch MichaelBoehme	Genehmigt von Michael Boehme	Dokumentart
		Titel, Zusätzlicher Titel Meßeinsatz mit Anschlussdrähten Typ BMM230		Sachnummer 2101123-0001
			Änd. 0	23.03.2022 / Spr. / Blatt 1



DRAFT!

Aend. / REVISIONS			
R	Aend. / CHANGE	Dat. / DATE	Name/NAME

Schutzvermerk nach DIN ISO 16016 @ Böhme + Ewert
REFER TO PROTECTION NOTICE ISO 16016 @ Boehme + Ewert

ISO 128

Maßstab: 1:1

Werkstoff:

Allgemeintoleranz / GENERAL TOLERANCE: DIN ISO 2768-m

Boehme + Ewert

Erstellt durch: Michael Boehme

Genehmigt von: Michael Boehme

Dokumentart:

Titel, Zusätzlicher Titel:
Messeinsatz, Typ BMM330
INSET; TYPE BMM330

Sachnummer: 2101133-0001

Änd.	Datum	Spr.	Blatt
0	24.05.2022		1