

## Cartridge heaters

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### Basic values:

Parameter	Value
Dimensions	90 x 5.0 x 5.0 mm
Heated area	Ø 4.0 x 40 mm
T <sub>max</sub>	1 000 °C

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### Details of Standard:

#### Description

Cylindrical cartridges are an often-used form of heating element. They are usually inserted in a borehole in a metal part that is machined to fit, in order to heat larger machine parts. Also, Bach RC offers a large number of cartridge heaters. Compared with conventional metallic cartridge heaters, the ceramic heating elements are distinguished by having a very long lifespan, as well as a very high (achievable) power density (power output per surface unit). The dynamism of the heating process can thereby be improved and/or the number of the installed heating elements can be reduced. Machine failure times are minimised and so the productivity of your machines is increased. When installing the ceramic cartridge heaters in metal tools, the substantially lower thermal expansion of silicon nitride compared to metals must be taken into account.

\* The actual power depends on resistance, temperature and voltage.

Parameter	Value	
Article no.	HPT 100 048	HPT 100 066
Resistance @ 20 °C	105 Ω ±25 %	50 Ω ±25 %

## Basic Material

Parameter	Scale unit	Si <sub>3</sub> N <sub>4</sub>
max. temperature (T <sub>max</sub> )	°C	1 000
thermal conductivity (l)	W/mK	40
temperature shock resistance (ΔT)	K	500
emissivity (1 100 °C) (ε)	-	0.96
Young's modulus (E)	GPa	320
bending strength (δ <sub>BB</sub> )	MPa	400
compressive strength (δ <sub>D</sub> )	MPa	2 000
coefficient of thermal expansion (α)	10 <sup>-6</sup> K <sup>-1</sup>	3
density (g)	g/cm <sup>3</sup>	3.21
specific heat (c <sub>p</sub> )	J/kgK	750
porosity (100 - % t.D.)	%	0
critical stress intensity factor (K <sub>IC</sub> )	MPa m <sup>1/2</sup>	6
Weibull - modulus (m)	-	7.9

The thermal shock resistance depends on the geometric shape of the heater.

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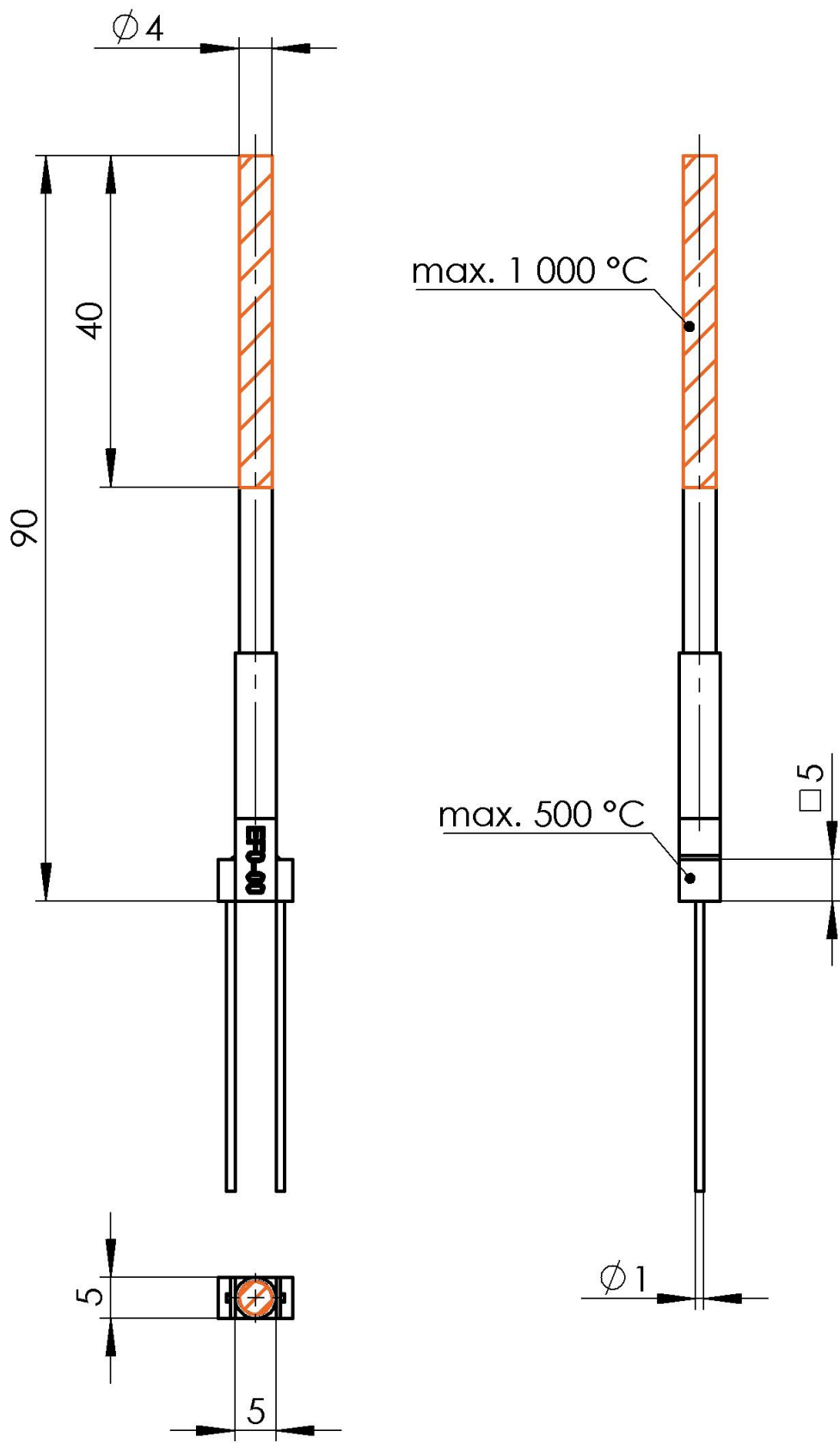
## Electrical parameters

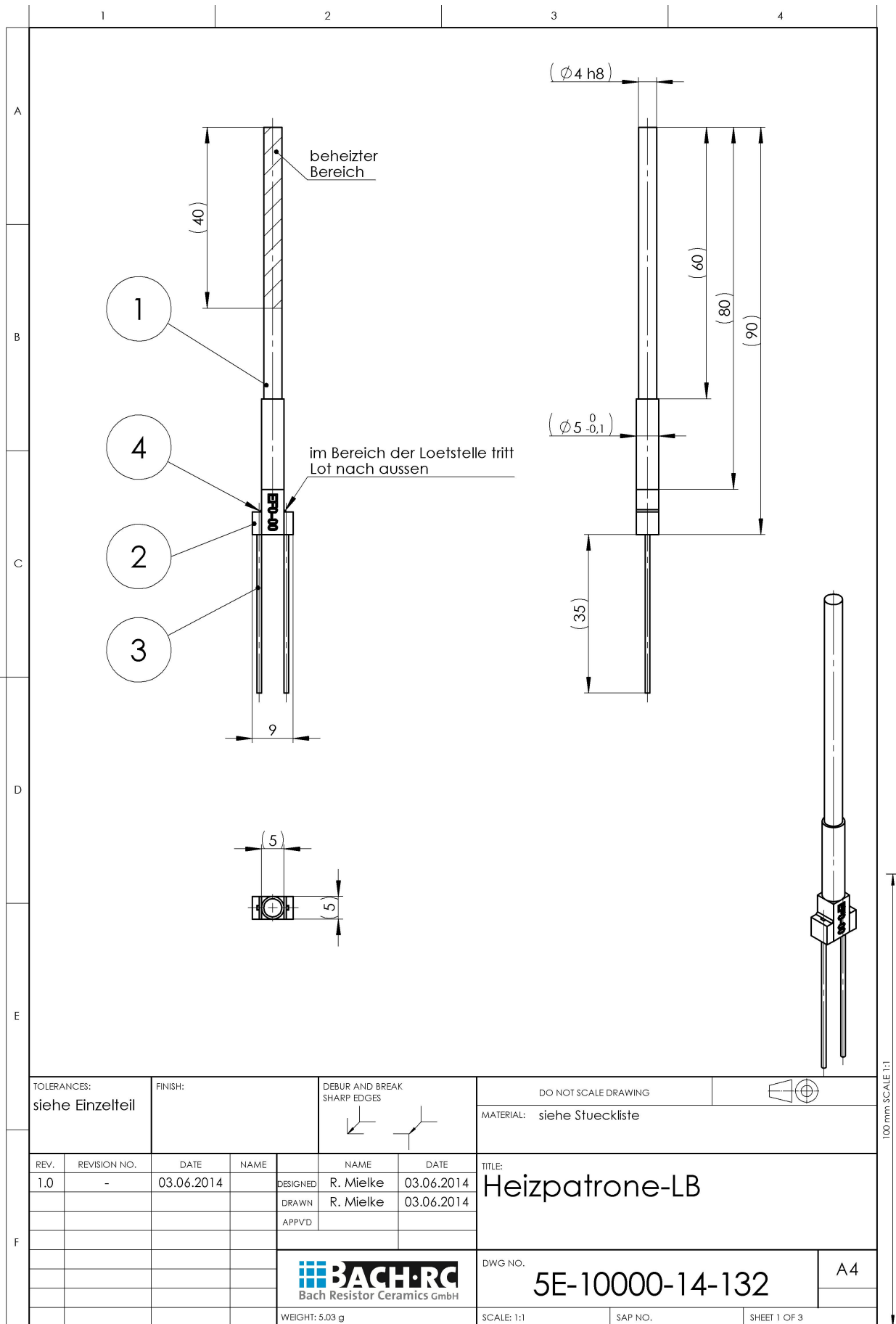
Parameter	Scale unit	Si <sub>3</sub> N <sub>4</sub>
resistivity	Ω cm	5 · 10 <sup>-3</sup> - 5 · 10 <sup>-1</sup>
isolation resistivity	Ω mm (20 °C)	10 <sup>13</sup>
dielectric strength	kV/mm	25

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## Emission spectrum

Fully ceramic heating elements are long-wave infrared heaters with a maximum emission of 5 to 10 μm and a radiation coefficient of ε > 0.9.





TOLERANCES: siehe Einzelteil		FINISH:		DEBUR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		MATERIAL: siehe Stueckliste	
REV.	REVISION NO.	DATE	NAME	DESIGNED	NAME	DATE	TITLE: <b>Heizpatrone-LB</b>		
1.0	-	03.06.2014		DRAWN	R. Mielke	03.06.2014			
				APPVD	R. Mielke	03.06.2014			
				 Bach Resistor Ceramics GmbH		DWG. NO.		A4	
						5E-10000-14-132			
				WEIGHT: 5.03 g		SCALE: 1:1		SAP NO.	
						SHEET 1 OF 3			