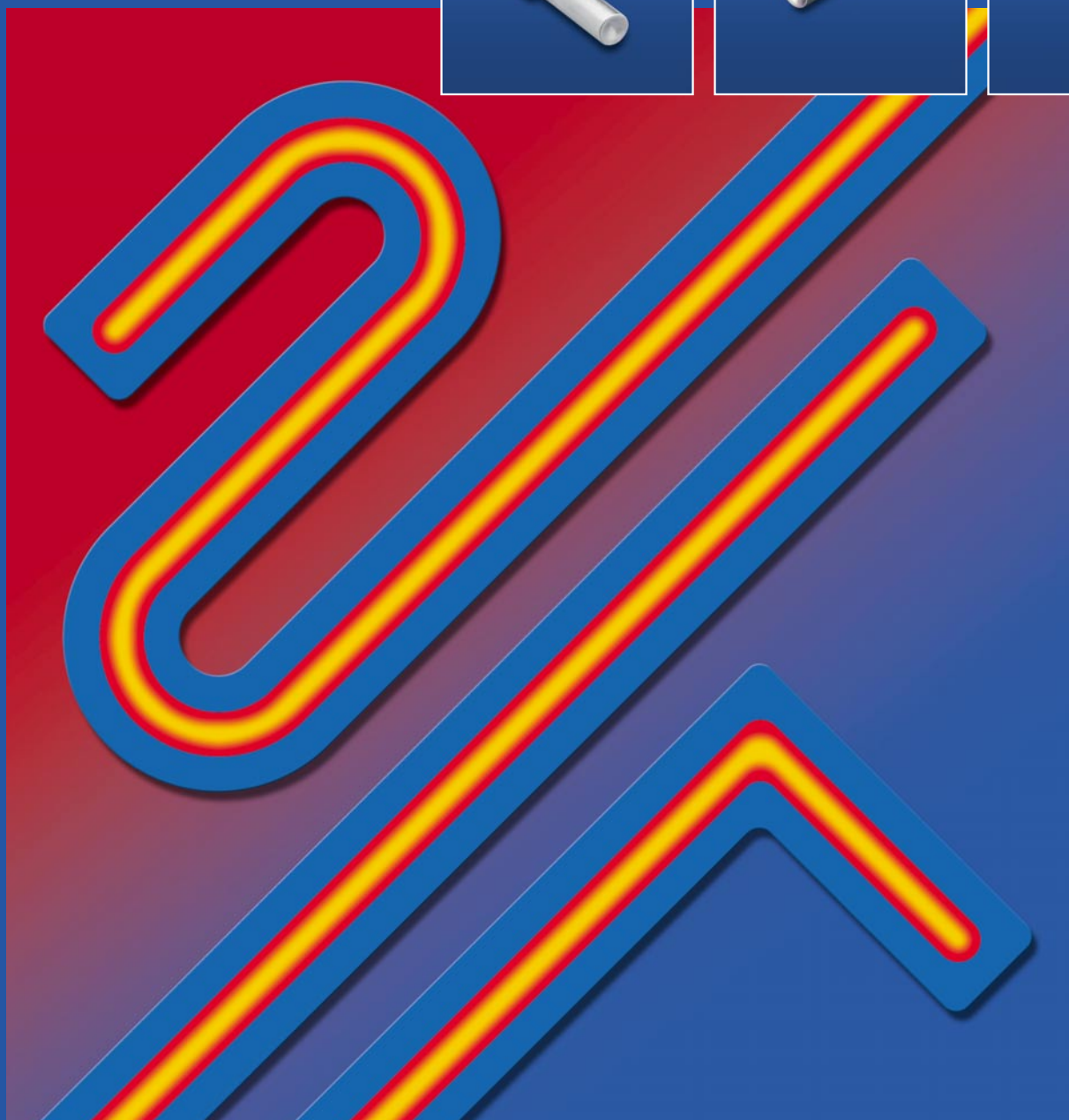


hotrod[®]

Cartridge heaters (type HHP and LHT)

Driving
quality!





Since the foundation in 1973 hotset has developed and produced heating elements and since then they have been on an expansion course. Oriented by customer demands hotset solves heating tasks for industrial applications.

With production plants in Lüdenscheid and on Malta hotset offers high production knowledge and innovation force for the future.

Starting with a large stock range via simple standard heating elements up to customer-specific developments: no matter whether hotrod[®] cartridge heaters, hotspring[®] coil heaters or innovative products such as hotflex[®] or hotslot[®] as well as excellent customer service, hotset offers the right solution – also customer-specific!

Thus, hotset can prove its high level of innovations and can offer heating elements which are of high quality, fully developed and are suitable for different applications.

In Germany and in more than 30 countries worldwide hotset is for its customers “always one step ahead”.

Motivated and qualified employees take care that hotset stands for proximity to customers, innovation, competence and reliability also in future.

You will see and experience it – promised!

Content

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4	hotrod [®] cartridge heaters (type HHP and LHT)
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11	hotrod [®] (type LHT)
12	hotrod [®] (type LHT) – bendable
13	hotrod [®] (type LHT) cartridge with integral cutting blade
14	hotrod [®] connection types <ul style="list-style-type: none"> - Connection lead types - Attachment parts connection leads - Sealed types - Connection types - Sleeving - Attachment parts - Fixing

hotrod[®] cartridge heaters (type HHP and LHT)

hotrod[®] cartridge heaters (type HHP and LHT) are the core products of the hotset production tradition. Outstanding know-how, high quality of materials used and the excellent production process all guarantee long durability and superb product characteristics.

With an extensive stock range, hotset offers proven technology based on long-term experience, high production security and short delivery times.

hotset guarantees an international quality standard with the VDE stamp for its hotrod[®] cartridge heaters.

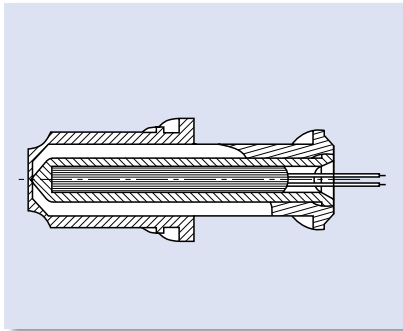
By means of intensive cooperation with customers – even with special applications – hotset always manages to give its hotrod[®] cartridge heaters innovative impulses with new technical properties (e. g. moisture-protected connection area).

hotrod[®] cartridge heaters offer peak functionality and a high level of production security – in brief:

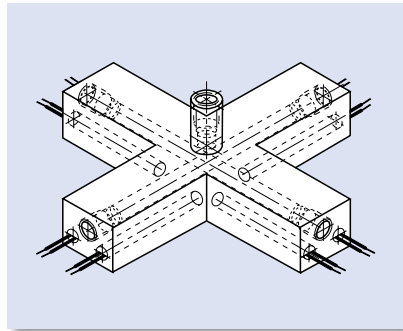
“Driving quality!”



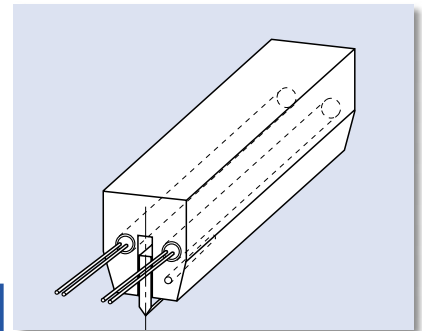
Application examples for the use of hotrod® cartridge heaters



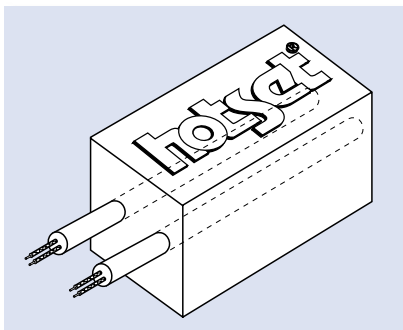
Injection moulding
Internal heating of nozzles



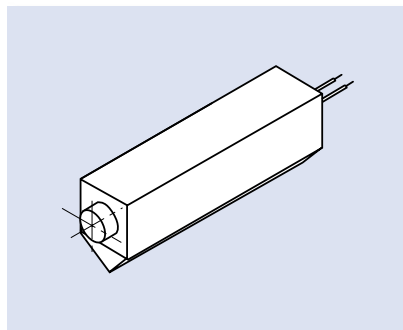
Hot runner systems
Heating of manifolds



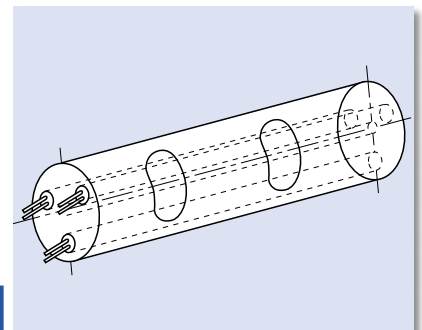
Packaging industry
Heating of welding bars



Packaging industry
Heating of hot stamps



Textile industry
Heating of cutting knives



Paper industry
Heating of stamping rolls

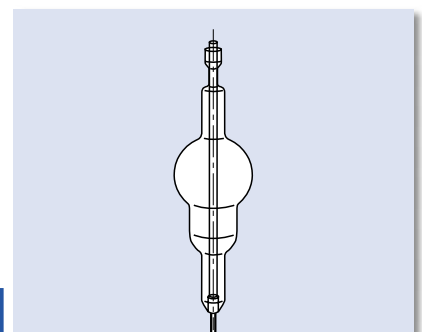
Sheath surface load [W/cm²]

Approximation equation

$$\text{Surface load [W/cm}^2\text{]} = \frac{\text{Power x 1.1}}{\text{Circumference x heated length [cm]}}$$

$$\text{Circumference} = \pi \times \text{diameter [cm]}$$

$$\text{Heated length} = \text{length [cm]} - 0.1 \times \text{length [cm]}$$



Laboratories
Heating of analytical equipment

hotrod® (type HHP)



Technical data

- Profile Ø [mm] (for stock hotrod®): 6.5; 8.0; 10.0; 12.5; 16.0; 20.0
- Profile Ø ["]: 1/4; 3/8; 1/2; 5/8
- Maximum total length:
Ø ≥ 6.0 mm (grinded) 1500 mm
Ø ≥ 6.0 mm (ungrinded) 3000 mm
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 750 °C
- Heating conductor material: NiCr 8020
- High voltage proof (cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 1500 V-AC
- Insulation resistance (cold): ≥ 5 MΩ at 500 V-DC
- Maximum leakage current (cold): ≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %, min. ± 1 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance:
metric -0.02/-0.06 mm
inch ± 0.02 mm/± 0.08 mils
- Maximum supply voltage: 480 V for stock hotrod® 230 V (Standard)
- Connection options: see page 14

Other dimensions and product variants upon request.

We reserve the right to change technical details.

Stock dimensions for hotrod® can be found in the stock range brochure.

Please note the installation and storage instructions.

Please talk to our specialists regarding UL/CSA certification.

Order data

hotrod® (type HHP)

Application:
 + Article No. (if known):
 + Ø:
 + Length:
 + Wattage:
 + Voltage:
 + Connection length:
 + Connection option:
 + Quantity:

hotrod® (type HHP) with thermocouple



Technical data

In those areas where precise temperature control is essential, hotset offers hotrod® cartridge heaters with inbuilt thermocouple. Together with a control unit from the hotcontrol® C series, you can ensure precise temperatures.

- Profile Ø [mm] (for stock hotrod®): 6.5; 8.0; 10.0; 12.5
- Profile Ø ["]: 1/4; 3/8; 1/2; 5/8
- Maximum total length:
Ø ≥ 6.0 mm (grinded) 1500 mm
Ø ≥ 6.0 mm (ungrinded) 3000 mm
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 750 °C
- Heating conductor material: NiCr 8020
- High voltage proof (cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 1500 V-AC
- Insulation resistance (cold): ≥ 5MΩ at 500 V-DC
- Maximum leakage current (cold): ≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %, min. ± 1 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance:
metric -0.02/-0.06 mm
inch ± 0.02 mm/± 0.08 mils
- Maximum supply voltage: 480 V
for stock hotrod® 230 V (Standard)
- Connection options: see page 14
- Thermocouple: Fe-CuNi (type J/standard), Fe-CuNi (type L) up to 300 °C operating temperature or NiCr-Ni (type K) up to 750 °C operating temperature, potential-free, measurement points: at the bottom or central

Other dimensions and product variants upon request.

We reserve the right to change technical details.

Stock dimensions for hotrod® with thermocouples can be found in the stock range brochure.

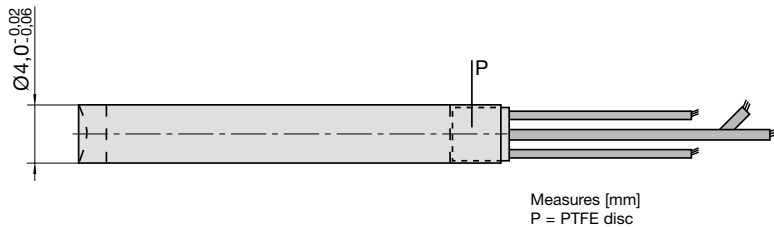
Please note the installation and storage instructions.

Order data

hotrod® (type HHP)

Application:
+ Article No. (if known):
+ Ø:
+ Length:
+ Wattage:
+ Voltage:
+ Connection length:
+ Connection option:
+ Thermocouple:
+ Measurement point:
+ Quantity:

hotrod[®] (type HHP) Ø 4.0 mm



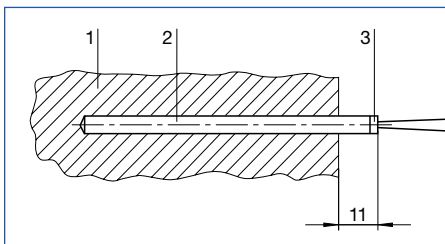
Technical data

Particularly suitable for heating of small components.

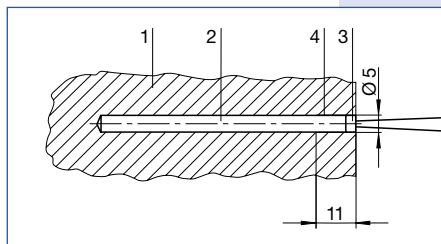
- Profile Ø: 4.0 mm
- Maximum total length: 350 mm
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 275 °C
- Heating conductor material: NiCr 8020
- High voltage proof (cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 800 V-AC
- Insulation resistance (cold):
≥ 5 MΩ at 500 V-DC
- Maximum leakage current (cold):
≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 2.5 %, min. ± 1.5 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance: -0.02/-0.06 mm
- Maximum supply voltage:
250 V at max. 1.6 A
- Maximum sheath surface load:
20 W/cm²
- Length of unheated zone connection area:
13 mm
- Length of unheated zone bottom area:
6 mm
- Connection options:
PTFE insulated Ni leads (multicore)
PTFE disc

Installation instructions for higher tool temperatures

PTFE disc
outside tool



PTFE disc
inside tool with ring gap



- 1 = tool
- 2 = cartridge heater
- 3 = PTFE disc
- 4 = ring gap

Order data

hotrod[®] (type HHP) 4.0 mm

Application:
+ Article No. (if known):
+ Ø:
+ Length:
+ Wattage:
+ Voltage:
+ Connection length:
+ Connection option:
+ Thermocouple:
+ Measurement point:
+ Quantity:

Options (upon request)

- With application-specific power distribution
With Fe-CuNi (type J/standard, optional type L),
or NiCr-Ni (type K) thermocouple, potential-free,
measurement points:
at the bottom or central

Other dimensions and product variants
upon request.

We reserve the right to change technical details.

Please note the installation and storage
instructions.

hotrod® (type HHP) Ex-protection




Technical data

- Profile Ø [mm]: 8.0; 10.0; 12.5; 16.0; 20.0
- Maximum total length:
Ø ≥ 8.0 mm (grinded) 1500 mm
Ø ≥ 8.0 mm (ungrinded) 2000 mm
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 750 °C
- Heating conductor material: NiCr 8020
- High voltage proof
(cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 1500 V-AC
- Insulation resistance (cold): ≥ 5 MΩ at 500 V-DC
- Maximum leakage current (cold):
≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %, min. ± 1 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance:
grinded -0.02/-0.06 mm
ungrinded ± 0.1 mm
- Maximum supply voltage: 400 V
- Thermocouple: Fe-CuNi (type J, standard),
optional Fe-CuNi (type L) und NiCr-Ni (type K)
- Connection options: mineral fibre insulated
Ni-lead, protective earth blank, 1500 mm
- Protective sheath: Stainless steel sleeving
(min. 1200 mm)
- Attachment parts: tube 40 mm
- Application areas:
in potentially explosive areas
with dust atmosphere
of category 3 (zone 22)
(for infrequent or temporary occurrence)

Options (upon request)

- Angular block + tube + stainless steel sleeving
- Right-angle exit + tube + stainless steel sleeving

Notes

- Certification according to EU ATEX 100a Explosion protection guideline (94/9/EU): e.g.  II 3 D IP 67, by Physikalisch-Technische Bundesanstalt (PTB)
- IP 67: Moisture protection for occasional immersion – the connection area must also be protected by the user against moisture to maintain the moisture protection.

Other dimensions and product variants
upon request.

We reserve the right to change technical details.

Please note the installation and storage instructions.

Order data

hotrod® (type HHP) Ex-protection

Application:
+ Article No. (if known):
+ Ø:
+ Length:
+ Wattage:
+ Voltage:
+ Connection length:
+ Connection option:
+ Thermocouple:
+ Connection pieces:
+ Quantity:

hotrod[®] (type HHP)

with heat conductive
copper bottom



C = copper bottom

Technical data

- Profile Ø [mm]: 6.0; 6.3; 6.5; 8.0; 9.46; 10.0; 11.0; 12.0; 12.5; 12.7; 15.81; 16.0; 19.0; 19.05; 20.0
- Maximum total length:
Ø ≥ 6.0 mm (grinded) 1500 mm
Ø ≥ 6.0 mm (ungrinded) 3000 mm
- Bottom: copper flat, copper tip (not with Ø 4.0)
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 750 °C
- Heating conductor material: NiCr 8020
- High voltage proof (cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 1500 V-AC
- Insulation resistance (cold): ≥5 MΩ at 500 V-DC
- Maximum leakage current (cold): ≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %, min. ± 1 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance:
metric -0.02/-0.06 mm
inch ± 0.02 mm/± 0.08 mils
- Maximum supply voltage: 480 V
- Connection options: see page 14
- Thermocouple: potential-free

Options (upon request)

- Copper bottom: tip (not with Ø 4.0 mm)
- Thermocouple:
Fe-CuNi (type J/standard, optional type L)
or NiCr-Ni (type K)
- Power distribution: application-specific
- flat copper bottom

Other dimensions and product variants upon request.

We reserve the right to change technical details.

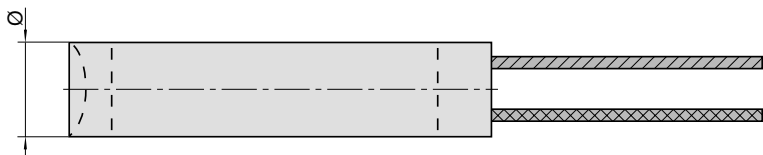
Please note the installation and storage instructions.

Order data

hotrod[®] (type HHP) with heat conductive copper bottom

Application:
+ Article No. (if known):
+ Ø:
+ Length:
+ Wattage:
+ Voltage:
+ Connection length:
+ Connection option:
+ Thermocouple (with potential or potential-free):
+ Quantity:

hotrod® (type LHT)



Order data

hotrod® (type LHT)

Application:
 + Article No. (if known):
 + Ø:
 + Length:
 + Wattage:
 + Voltage:
 + Connection length:
 + Connection option:
 + Quantity:

Technical data

Spiral cartridges

Compressed or non-compressed spiral cartridge heaters can be used everywhere where a surface load of 10 W/cm² is sufficient, based on the technical specifications.

In these cases, the simple construction of the spiral cartridge heaters enables cost-effective heating and long durability.

In the low voltage sector, the current can be fed back via the cartridge heater sheath on spiral heating cartridges so that just one connection is required. The spiral cartridge heater connections can also be attached at both ends.

Typical application areas for spiral cartridge heaters are the heating of sealing tools in the packaging industry, cutting of plastic foils or textiles especially with the integral cutting blade, heating of medical equipment or analytical equipment.

- Profile Ø [mm]: 6.5; 8.0; 10.0; 12.5; 16.0; 20.0
with connection at both ends or return via the cartridge heater sheath
- Stock Ø [mm]: 10.0; 12.5; 16.0; 20.0
- Maximum total length: 3000 mm
- Sheath material: stainless steel
- Cartridge heater sheath temperature: max. 750 °C
- Maximum sheath surface load: 10 W/cm²
- Heating conductor material: NiCr 8020
- High voltage proof
(cold in extended condition)
with nominal voltage ≤ 24 V: 500 V-AC
with nominal voltage > 24 V: 1500 V-AC
(not for return via the cartridge heater sheath)
- Insulation resistance (cold): ≥ 5 MΩ at 500 V-DC
- Maximum leakage current (cold):
≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %
- Power tolerance (cold): ± 10 %
- Diameter tolerance: ± 0.1 mm
- Maximum supply voltage: 480 V
- Connection: 250 mm glas silk insulated
Ni-leads from inside

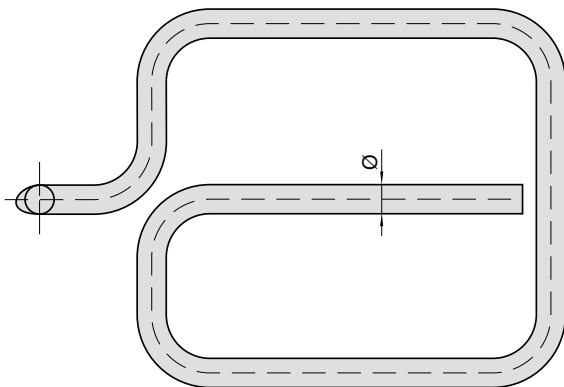
Other dimensions and product variants upon request.

We reserve the right to change technical details.

Please note the installation and storage instructions.

hotrod® (type LHT)

bendable



Technical data

- Profile Ø [mm]: 6.5 or 8.0
- Maximum total length: 3000 mm
- Sheath material: Ni tubing
- Cartridge heater sheath temperature: max. 700 °C
- Maximum sheath surface load: 10 W/cm²
- Heating conductor material: NiCr 8020
- High voltage proof (cold in extended condition) with nominal voltage > 24 V: 1500 V-AC
- Insulation resistance (cold): ≥ 5 MΩ at 500 V-DC
- Maximum leakage current (cold): ≤ 0.5 mA at 253 V-AC
- Length tolerance: ± 1.5 %
- Power tolerance (cold): ± 10 %
- Diameter tolerance: ± 0.2 mm
- Maximum supply voltage: 480 V
- Connection options: Externally applied glass-silk insulated Ni-leads
- Minimum bending radius: 15.0 mm (internal)

Other dimensions and product variants upon request.

We reserve the right to change technical details.

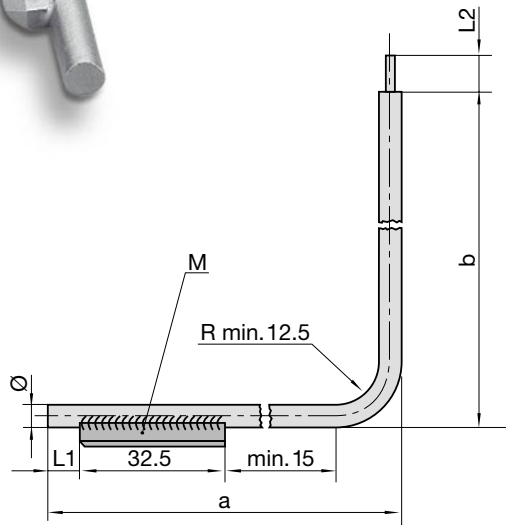
Please note the installation and storage instructions

Order data

hotrod® (type LHT)

Application:
 + Article No. (if known):
 + Ø:
 + Length:
 + Wattage:
 + Voltage:
 + Connection length:
 + Connection option:
 + Quantity:

hotrod[®] (type LHT) cartridge with integrated cutting blade



Measures [mm]
M = Cutting blade
a, b, L1, L2 = Lengths, variable

Technical data

The compressed spiral cartridge heater hotrod[®] with integrated cutting blade is suitable for cutting foils and synthetic textiles.

- Profile Ø: 5.0 mm
- Sheath material: Incoloy
- Cartridge heater sheath temperature: max. 950 °C
- Maximum sheath surface load: 15 W/cm²
- Heating conductor material: NiCr 8020
- Length tolerance: ± 1.5 %, min. ± 1 mm
- Power tolerance (cold): ± 10 %
- Diameter tolerance: ± 0.1 mm
- Maximum supply voltage: 24 V, with return via sheath
- Connection options: Connection pin
- Cutting blade: wear-resistant hard metal alloy, pre-formed, unsharpened
- Minimum bending radius: 12.5 mm (internal)
- Delivery: bent or straight

Notes

Nominal voltage must not be exceeded!

Other dimensions and product variants upon request.

We reserve the right to change technical details.

Please note the installation and storage instructions.

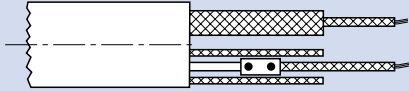
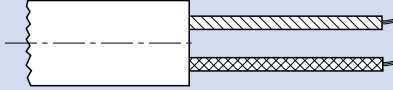
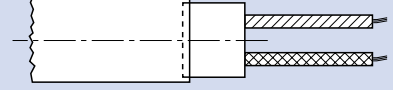
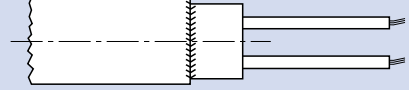
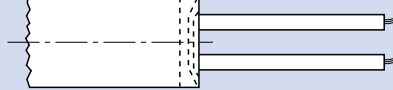
Order data

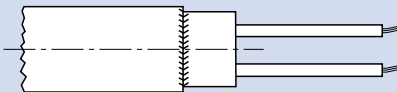
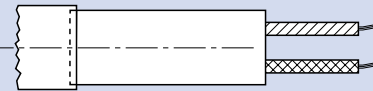
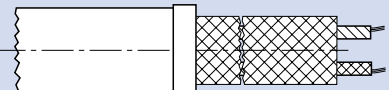
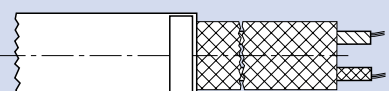
hotrod[®] (type HHP) cartridge with integrated cutting blade

Application:
+ Article No. (if known):
+ Ø:
+ Length a:
+ Length b:
+ Length L1:
+ Length L2:
+ Wattage:
+ Voltage:
+ Connection length:
+ Connection option:
+ Quantity:

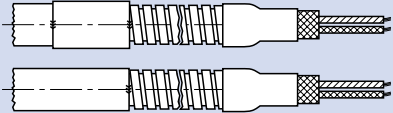
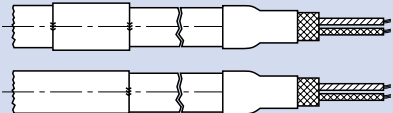
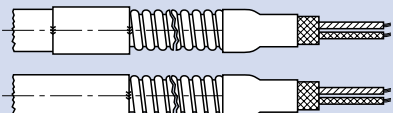
hotrod[®] Connection types

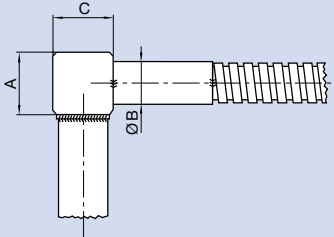
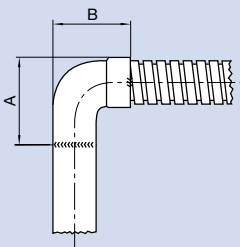
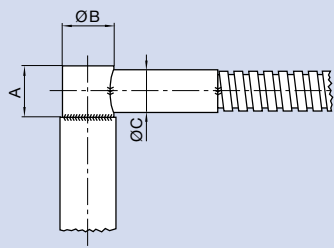
Connection lead types	up to
glass silk insulated Ni-lead	320 °C
silicon insulated Ni-lead	180 °C
PTFE insulated Ni-lead (multistranded)	260 °C
high-temperature resistant glass silk insulated Ni-lead	600 °C
bare lead, beaded (danger of breakage)	600 °C
multistranded silicon lead	180 °C

AS-Type Group	AS-Type		Term
Attachment parts connection leads	1		leads externally fixed
	2		leads from inside
	3		with ceramic head
	4		with tubing ● moisture protected
	5		PTFE disc ● moisture protected up to max. 260 °C

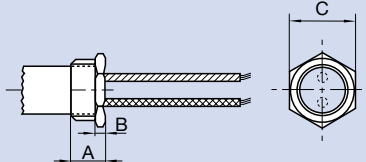
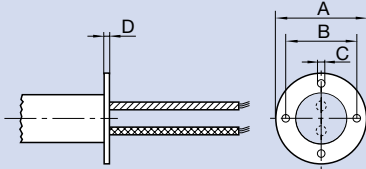
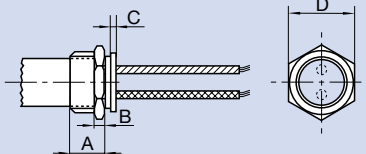
AS-Type Group	aAS-		Term
Sealed types	6		silicone ● moisture protected up to max. 180 °C
	7		epoxy ● moisture protected up to max. 250 °C
Connection types	8		in combination tube section
	9		ring section from outside
	10		ring section internally

hotrod[®] Connection types

AS-Type Group	AS-Type		Term
Sleeving Sleeving	11		flexible metal sleeving
	12		braided metal sleeving
	13		stainless steel conduit sleeving

AS-Type Group	AS-Type		Term																																							
Attachment parts	14		Angular block																																							
			<table><tr><th>Cartridge-Ø in mm/inch</th><th>Ø B</th><th>A/C</th></tr><tr><td>6.5</td><td>7.5</td><td>10.0</td></tr><tr><td>8.0</td><td>9.0</td><td>10.0</td></tr><tr><td>10.0</td><td>11.0</td><td>14.0</td></tr><tr><td>12.5</td><td>11.0</td><td>14.0</td></tr><tr><td>16.0</td><td>14.0</td><td>18.0</td></tr><tr><td>20.0</td><td>18.0</td><td>25.0</td></tr><tr><td>1/4"</td><td>7.5</td><td>10.0</td></tr><tr><td>3/8"</td><td>11.0</td><td>14.0</td></tr><tr><td>1/2"</td><td>11.0</td><td>14.0</td></tr><tr><td>5/8"</td><td>14.0</td><td>18.0</td></tr><tr><td>3/4"</td><td>18.0</td><td>25.0</td></tr></table>	Cartridge-Ø in mm/inch	Ø B	A/C	6.5	7.5	10.0	8.0	9.0	10.0	10.0	11.0	14.0	12.5	11.0	14.0	16.0	14.0	18.0	20.0	18.0	25.0	1/4"	7.5	10.0	3/8"	11.0	14.0	1/2"	11.0	14.0	5/8"	14.0	18.0	3/4"	18.0	25.0			
		Cartridge-Ø in mm/inch	Ø B	A/C																																						
6.5	7.5	10.0																																								
8.0	9.0	10.0																																								
10.0	11.0	14.0																																								
12.5	11.0	14.0																																								
16.0	14.0	18.0																																								
20.0	18.0	25.0																																								
1/4"	7.5	10.0																																								
3/8"	11.0	14.0																																								
1/2"	11.0	14.0																																								
5/8"	14.0	18.0																																								
3/4"	18.0	25.0																																								
15		Tubular bent																																								
		<table><tr><th>Cartridge-Ø in mm/inch</th><th>A</th><th>B</th></tr><tr><td>6.5</td><td>17.3</td><td>14.3</td></tr><tr><td>8.0</td><td>18.0</td><td>15.0</td></tr><tr><td>10.0</td><td>22.0</td><td>19.0</td></tr><tr><td>12.5</td><td>25.0</td><td>22.3</td></tr><tr><td>16.0</td><td>33.0</td><td>29.0</td></tr><tr><td>20.0</td><td>39.0</td><td>35.0</td></tr><tr><td>1/4"</td><td>18.0</td><td>14.5</td></tr><tr><td>3/8"</td><td>22.0</td><td>18.8</td></tr><tr><td>1/2"</td><td>25.0</td><td>22.4</td></tr><tr><td>5/8"</td><td>33.0</td><td>29.0</td></tr><tr><td>3/4"</td><td>39.0</td><td>35.0</td></tr></table>	Cartridge-Ø in mm/inch	A	B	6.5	17.3	14.3	8.0	18.0	15.0	10.0	22.0	19.0	12.5	25.0	22.3	16.0	33.0	29.0	20.0	39.0	35.0	1/4"	18.0	14.5	3/8"	22.0	18.8	1/2"	25.0	22.4	5/8"	33.0	29.0	3/4"	39.0	35.0				
	Cartridge-Ø in mm/inch	A	B																																							
6.5	17.3	14.3																																								
8.0	18.0	15.0																																								
10.0	22.0	19.0																																								
12.5	25.0	22.3																																								
16.0	33.0	29.0																																								
20.0	39.0	35.0																																								
1/4"	18.0	14.5																																								
3/8"	22.0	18.8																																								
1/2"	25.0	22.4																																								
5/8"	33.0	29.0																																								
3/4"	39.0	35.0																																								
16		Right angle exit																																								
		<table><tr><th>Cartridge-Ø in mm/inch</th><th>A</th><th>Ø B</th><th>Ø C</th></tr><tr><td>8.0</td><td>12.0</td><td>7.5</td><td>7.5</td></tr><tr><td>10.0</td><td>12.0</td><td>9.0</td><td>9.0</td></tr><tr><td>12.5</td><td>13.0</td><td>12.0</td><td>11.0</td></tr><tr><td>16.0</td><td>16.0</td><td>15.0</td><td>14.0</td></tr><tr><td>20.0</td><td>18.0</td><td>19.5</td><td>16.0</td></tr><tr><td>3/8"</td><td>12.0</td><td>9.0</td><td>9.0</td></tr><tr><td>1/2"</td><td>13.0</td><td>12.0</td><td>11.0</td></tr><tr><td>5/8"</td><td>16.0</td><td>15.0</td><td>14.0</td></tr><tr><td>3/4"</td><td>18.0</td><td>18.5</td><td>16.0</td></tr></table>	Cartridge-Ø in mm/inch	A	Ø B	Ø C	8.0	12.0	7.5	7.5	10.0	12.0	9.0	9.0	12.5	13.0	12.0	11.0	16.0	16.0	15.0	14.0	20.0	18.0	19.5	16.0	3/8"	12.0	9.0	9.0	1/2"	13.0	12.0	11.0	5/8"	16.0	15.0	14.0	3/4"	18.0	18.5	16.0
	Cartridge-Ø in mm/inch	A	Ø B	Ø C																																						
8.0	12.0	7.5	7.5																																							
10.0	12.0	9.0	9.0																																							
12.5	13.0	12.0	11.0																																							
16.0	16.0	15.0	14.0																																							
20.0	18.0	19.5	16.0																																							
3/8"	12.0	9.0	9.0																																							
1/2"	13.0	12.0	11.0																																							
5/8"	16.0	15.0	14.0																																							
3/4"	18.0	18.5	16.0																																							

hotrod[®] Connection types

AS-Type Group	AS-Type		Term																																																															
Fixing																																																																		
	17		Screw-in nipple																																																															
		<table><tr><th>Cartridge- Ø in mm/inch</th><th>A</th><th>B</th><th>C</th><th>Thread</th></tr><tr><td>6.5</td><td>10.0</td><td>4.0</td><td>12</td><td>M10 x 1.0</td></tr><tr><td>8.0</td><td>10.0</td><td>4.0</td><td>14</td><td>M12 x 1.0</td></tr><tr><td>10.0</td><td>12.0</td><td>4.0</td><td>17</td><td>M14 x 1.5</td></tr><tr><td>12.5</td><td>12.0</td><td>4.0</td><td>19</td><td>M16 x 1.5</td></tr><tr><td>16.0</td><td>12.0</td><td>4.0</td><td>24</td><td>M20 x 1.5</td></tr><tr><td>20.0</td><td>14.0</td><td>4.0</td><td>27</td><td>M26 x 1.5</td></tr><tr><td>1/4"</td><td>10.0</td><td>4.0</td><td>12</td><td>G 1/8"</td></tr><tr><td>3/8"</td><td>12.0</td><td>4.0</td><td>17</td><td>G 1/4"</td></tr><tr><td>1/2"</td><td>12.0</td><td>4.0</td><td>19</td><td>G 3/8"</td></tr><tr><td>5/8"</td><td>12.0</td><td>4.0</td><td>24</td><td>G 1/2"</td></tr></table>	Cartridge- Ø in mm/inch	A	B	C	Thread	6.5	10.0	4.0	12	M10 x 1.0	8.0	10.0	4.0	14	M12 x 1.0	10.0	12.0	4.0	17	M14 x 1.5	12.5	12.0	4.0	19	M16 x 1.5	16.0	12.0	4.0	24	M20 x 1.5	20.0	14.0	4.0	27	M26 x 1.5	1/4"	10.0	4.0	12	G 1/8"	3/8"	12.0	4.0	17	G 1/4"	1/2"	12.0	4.0	19	G 3/8"	5/8"	12.0	4.0	24	G 1/2"									
Cartridge- Ø in mm/inch	A	B	C	Thread																																																														
6.5	10.0	4.0	12	M10 x 1.0																																																														
8.0	10.0	4.0	14	M12 x 1.0																																																														
10.0	12.0	4.0	17	M14 x 1.5																																																														
12.5	12.0	4.0	19	M16 x 1.5																																																														
16.0	12.0	4.0	24	M20 x 1.5																																																														
20.0	14.0	4.0	27	M26 x 1.5																																																														
1/4"	10.0	4.0	12	G 1/8"																																																														
3/8"	12.0	4.0	17	G 1/4"																																																														
1/2"	12.0	4.0	19	G 3/8"																																																														
5/8"	12.0	4.0	24	G 1/2"																																																														
18		Flange																																																																
	<table><tr><th>Cartridge- Ø in mm/inch</th><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>6.5</td><td>18.0</td><td>13.0</td><td>2.2</td><td>1.0</td></tr><tr><td>8.0</td><td>18.0</td><td>13.0</td><td>2.2</td><td>1.0</td></tr><tr><td>10.0</td><td>27.0</td><td>20.0</td><td>3.2</td><td>1.5</td></tr><tr><td>12.5</td><td>27.0</td><td>20.0</td><td>3.2</td><td>1.5</td></tr><tr><td>16.0</td><td>33.0</td><td>25.6</td><td>3.2</td><td>1.5</td></tr><tr><td>20.0</td><td>33.0</td><td>25.6</td><td>3.2</td><td>1.5</td></tr><tr><td>1/4"</td><td>18.0</td><td>13.0</td><td>2.2</td><td>1.0</td></tr><tr><td>3/8"</td><td>27.0</td><td>20.0</td><td>2.2</td><td>1.5</td></tr><tr><td>1/2"</td><td>27.0</td><td>20.0</td><td>3.2</td><td>1.5</td></tr><tr><td>5/8"</td><td>33.0</td><td>25.6</td><td>3.2</td><td>1.5</td></tr></table>	Cartridge- Ø in mm/inch	A	B	C	D	6.5	18.0	13.0	2.2	1.0	8.0	18.0	13.0	2.2	1.0	10.0	27.0	20.0	3.2	1.5	12.5	27.0	20.0	3.2	1.5	16.0	33.0	25.6	3.2	1.5	20.0	33.0	25.6	3.2	1.5	1/4"	18.0	13.0	2.2	1.0	3/8"	27.0	20.0	2.2	1.5	1/2"	27.0	20.0	3.2	1.5	5/8"	33.0	25.6	3.2	1.5										
Cartridge- Ø in mm/inch	A	B	C	D																																																														
6.5	18.0	13.0	2.2	1.0																																																														
8.0	18.0	13.0	2.2	1.0																																																														
10.0	27.0	20.0	3.2	1.5																																																														
12.5	27.0	20.0	3.2	1.5																																																														
16.0	33.0	25.6	3.2	1.5																																																														
20.0	33.0	25.6	3.2	1.5																																																														
1/4"	18.0	13.0	2.2	1.0																																																														
3/8"	27.0	20.0	2.2	1.5																																																														
1/2"	27.0	20.0	3.2	1.5																																																														
5/8"	33.0	25.6	3.2	1.5																																																														
19		Screw-in nipple with removal aid																																																																
	<table><tr><th>Cartridge- Ø in mm/inch</th><th>A</th><th>B</th><th>C</th><th>D</th><th>Thread</th></tr><tr><td>6.5</td><td>10.0</td><td>4.0</td><td>2.5</td><td>12</td><td>M10 x 1.0</td></tr><tr><td>8.0</td><td>10.0</td><td>4.0</td><td>2.5</td><td>14</td><td>M12 x 1.0</td></tr><tr><td>10.0</td><td>12.0</td><td>4.0</td><td>2.5</td><td>17</td><td>M14 x 1.5</td></tr><tr><td>12.5</td><td>12.0</td><td>4.0</td><td>2.5</td><td>19</td><td>M16 x 1.5</td></tr><tr><td>16.0</td><td>12.0</td><td>4.0</td><td>2.5</td><td>24</td><td>M20 x 1.5</td></tr><tr><td>20.0</td><td>14.0</td><td>4.0</td><td>2.5</td><td>27</td><td>M26 x 1.5</td></tr><tr><td>1/4"</td><td>10.0</td><td>4.0</td><td>2.5</td><td>12</td><td>G 1/8"</td></tr><tr><td>3/8"</td><td>12.0</td><td>4.0</td><td>2.5</td><td>17</td><td>G 1/4"</td></tr><tr><td>1/2"</td><td>12.0</td><td>4.0</td><td>2.5</td><td>19</td><td>G 3/8"</td></tr><tr><td>5/8"</td><td>12.0</td><td>4.0</td><td>2.5</td><td>24</td><td>G 1/2"</td></tr></table>	Cartridge- Ø in mm/inch	A	B	C	D	Thread	6.5	10.0	4.0	2.5	12	M10 x 1.0	8.0	10.0	4.0	2.5	14	M12 x 1.0	10.0	12.0	4.0	2.5	17	M14 x 1.5	12.5	12.0	4.0	2.5	19	M16 x 1.5	16.0	12.0	4.0	2.5	24	M20 x 1.5	20.0	14.0	4.0	2.5	27	M26 x 1.5	1/4"	10.0	4.0	2.5	12	G 1/8"	3/8"	12.0	4.0	2.5	17	G 1/4"	1/2"	12.0	4.0	2.5	19	G 3/8"	5/8"	12.0	4.0	2.5	24
Cartridge- Ø in mm/inch	A	B	C	D	Thread																																																													
6.5	10.0	4.0	2.5	12	M10 x 1.0																																																													
8.0	10.0	4.0	2.5	14	M12 x 1.0																																																													
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1/4"	10.0	4.0	2.5	12	G 1/8"																																																													
3/8"	12.0	4.0	2.5	17	G 1/4"																																																													
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5/8"	12.0	4.0	2.5	24	G 1/2"																																																													

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