

Heater with connected cold ends

All ThermSys heater sold by the meter can be manufactured with connected cold ends via a welded tube which is vacuum tight, heat resistant up to the max heater temperature, a lengths of 40 - 60mm and outside diameter 6 - 12mm.

This allows to lead out the cold ends on simple way through pressure fittings or out of chambers by welding into flanges. Even it's possible to realize at heaters which works at high temperatures the assembly of a electrical D - connector where usually , if any, only a high temperature ceramic connector can be used.

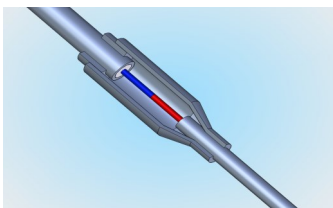
For heating application with high power densities, the use of cold ends is essential. Heater with laser welded cold ends can produced in very tight tolerances .

Encoding scheme for requests and orders:

1 - I - NC - 0,63 - 4,3 - 5000 - 2x - DL - 1 - I - Cu - 0,007 - 4,9 - 2000 - 2x - D - T - 2,5mm² - 1m

Example:

Single core heater, sheath: „I“ (Inconel600), core: Nicr80/20, line resistance: 0,63Ohm/m, 4,3mm sheath diameter, l=5000mm, 2x laser welded bushings DL on cold ends, single core cold ends, sheath “I” (Inconel600), inner gain copper, line resistance 0,007Ohm/m, 5,3mm sheath diameter, l=each 2000mm, 2x D electrical connector with 1m PTFE isolated copper wire 2,5mm².



Heater with connected cold ends)

Connection type hot- / cold part:

DL : (connection sleeve, metal, lasered)
DH : (connection sleeve, metal, hard brazed)

Connection method cold part:

D : wire contact with connection sleeve (see data sheet electrical connectors)
T / G : Teflon / glass fiber insulated wire (conductor cross section in mm²- lengths of wire in m)
K : Ceramic connectors (see data sheet electrical connectors)
M20x1,5 : Brass seal gland with 300mm electrical wire, one side incl. ground cable
FDE : free closed ends

Cold ends as standard available in sheath diameter 4,9mm, Inconel600 and 5,3mm, stainless steel.

Other diameters and sheath materials on request.

Technical data's / Handling:

- Resistance tolerance: +/-10% (standard)
- Hot part length tolerance (standard): +/-1% until 5m, below +/-5cm
- Bending radius: 2 - 3 x sheath-Ø
- Do not bend heater to often - depending from bending ratio and accumulated plastic deformations of the heater materials !
- Cold-hot connection sleeve
Bending protection: The area of the connection sleeve include 30mm before and after is not be subjected to bending or torsional moments. About constructive measure or training of employees who do the assembly customer has to take care.
Temperature: Regarding life time put in areas not higher than 400°C.
- Max. voltage / power over sheath depending on sheath diameter, temperature gradient heater to heated parts / thermodynamic max. possible flow energy from heater to heated part and heating up cycles. Please refer to our technical sheet "Handling and operation of ThermSys mineral insulated heaters and applications" we send on request or you can download on our website.
- Mineral insulation: Magnesium Oxide (MgO), other insulation on request
- Recommended use:
Stainless steel sheath up to 600°C,
Inconel600 sheath up to 1000°C

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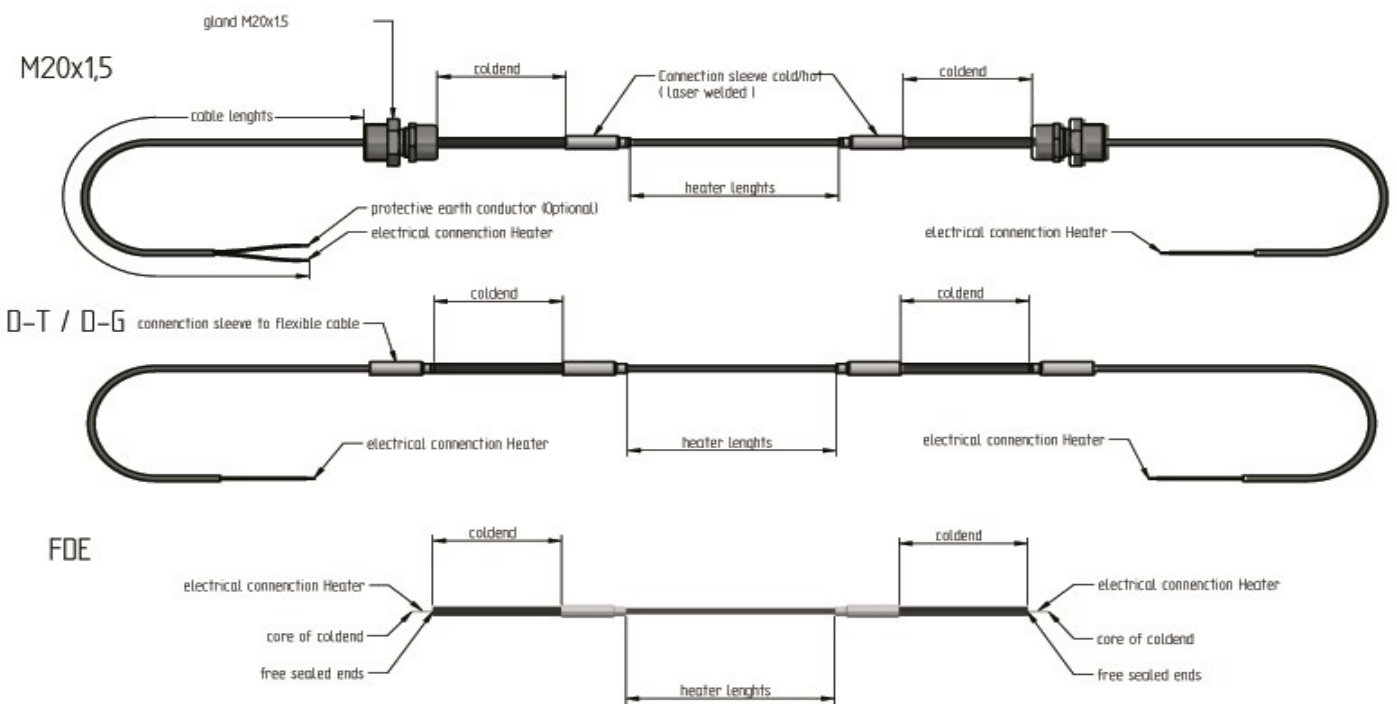
Heater with connected cold ends

Core material	K = Constantan	Ni=Nickel	NC= NiCr80/20	BA=NiFe70/30				
Sheath material	VA=AISI 304L	VA2=AISI 304	VA3=AISI 316L	VA4=AISI 321	VA5=AISI 316TI	VA6=AISI 314	VA7=AISI 309	VA8=AISI 310S
	I=Inconel600	I2=Inconel601	I3=Inconel625	I4=Inconel800	I5=Inconel825			

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Example: single core heater, sheath: „I“ (Inconel600), core: Nicr80/20, line resistance: 0,63Ohm/m, 4,3mm sheath diameter, l=5000mm, 2x laser welded bushings DL on cold ends, single core cold ends, sheath “I” (Inconel600), inner gain copper, line resistance 0,007Ohm/m, 5,3mm sheath diameter, l=each 2000mm, 2x D electrical connector with 1m PTFE isolated copper wire 2,5mm².



Cold ends

∅ [mm]	Line resistance [Ohm/m] at 20°C	Order Code	
		Sheath Inconel600	Sheath stainless steel AISI 321
4,90	<0,007	1-I-Cu-0,007-4,9	
5,30	<0,007		1-VA4-Cu-0,007-5,3

Heater (single core)

∅ [mm]	Line resistance [Ohm/m] at 20°C	Order Code	
		Sheath Inconel600	Sheath stainless steel AISI 321
3,20	10,00	1-I-NC-10,0-3,2	1-VA4-NC-10,0-3,2
3,20	6,30	1-I-NC-6,3-3,2	1-VA4-NC-6,3-3,2
3,20	4,00	1-I-NC-4,0-3,2	1-VA4-NC-4,0-3,2
3,40	2,50		1-VA4-NC-2,5-3,4
3,60	2,50	1-I-NC-2,5-3,6	
3,90	1,00	1-I-NC-1,0-3,9	1-VA4-NC-1,0-3,9
4,10	1,00	1-I-NC-1,0-4,1	
4,30	0,63	1-I-NC-0,63-4,3	1-VA4-NC-0,63-4,3
4,70	0,40	1-I-NC-0,40-4,7	1-VA4-NC-0,40-4,7
3,40	1,00	1-I-K-1,0-3,4	1-VA4-K-1,0-3,4
3,70	0,63	1-I-K-0,63-3,7	1-VA4-K-0,63-3,7
4,00	0,40	1-I-K-0,40-4,0	1-VA4-K-0,40-4,0

Other diameters and sheath materials on request.

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