



# Coil Heaters type WRP







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# **Application Examples**



Hot runner systems WRP — Heating of manifolds



Hot runner systems WRP — Heating of hot runner nozzles



Packaging industry WRP — Heating of heat sockets



# **General Information**

Whether for the plastic processing or the packaging industry, for mechanical engineering, the chemical industry or in medical devices — Coil Heaters are nearly irreplaceable for these and many other applications. Everywhere, where a precisely controlled and exactly managed heating wattage is needed, the Coil Heater (type WRP) offers a mature solution with far reaching possibilities to suit individual requirements.

**hotset** can look back on years of experience in the development and manufacturing of powerful Coil Heaters. Capability as a basis for innovative products, which stand out due to their high manufacturing quality, an over average durability, extremely high loading capacity and a great flexibility.

**hotset**-Coil Heaters can be delivered from stock in many different measurements and wattage data to cover most applications. All heaters are earthed as standard. The length of the leads as well as their protection (e.g. braided metal) against mechanical damages are added according to customers' requirements.

**hotset**-Coil Heaters without reflection tube are manufactured with a minus tolerance of the inside diameter as a matter of fact. With individual customer requirements very much in mind, the **hotset**-Coil Heaters stand out due to the wide range of further options:

- voltage and wattage according to application
- choice of lengths of the heated resp. unheated zones at a maximum total length of 3000 mm
- delivery straight and bendable or coiled to specifications (considering the possible bending radius)
- additional covering with clamping band or reflection tube
- casted in brass, also with additionally integral cooling\*\*
- delivery with integral thermocouple (except WRP / Mini)\*

\* At Coil Heaters with integral thermocouple, the unheated zone of approx. 12 mm at the bottom is used for placing the thermocouple (standard). At low operation temperatures this type of temperature measuring has been proved as the most reliable. At a higher operation temperature the last winding with the integral thermocouple will be lifted up due to the heat expansion and the thermocouple will then indicate only the temperature of the heater. Therefore it is recommended to use a separated sensor e.g. the sheath surface thermocouple MT 1,5.

Optionally the **hotset**-Coil Heaters (except WRP / Mini) offer the possibility to place the measuring point of the thermocouple insulated from the sheath in any area of the heated zone. \*\* When manufacturing the Coil Heaters casted in brass, there is the optional possibility of an integral cooling to achieve temperature tolerances under 5 °C at the medium which is to be heated. The present applications are the processing of duroplastics and the control of expansion bolts. The integral cooling tube is manufactured from stainless steel, it is placed beneath the heating element.

#### Safety instructions:

- Heating elements with a not grounded thermocouple (insulated from heater sheath) have to be earthed at the input side of the temperature controller by the customer himself.
- The length of the connection head add. 5 mm of the unheated zone is not bendable.
- The minimum bending radius has to be considered.
- Heaters which have been formed once must not be formed again.
- The head of the heater must not be touched.
- Temperature on tool must be below the corrosion temperature with heaters that are manufactured with current return via heater sheath, this ensures a smooth current transfer. The corresponding connection (welded, soldered) must be provided if this is not possible.

# Exits





Tangential exit

Axial exit

Radial exit



# WRP / Mini / F / 1.3 x 2.3





## Standard details for stock heaters

- Coil Heater with flat cross-section 1.3 x 2.3 mm
- for inside diameter, coiled length and wattage see table
- voltage: 230 V
- exit axial, radial or tangential (see page 3)
- unheated zone: 65 mm
- common connection head: 25 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

## Options

- with or without thermocouple (e.g. wrapped up) available
- with or without reflection tube available
- other types on request considering the technical data (see page 14ff.)

## Order details

WRP / Mini / F / 1.3 x 2.3

- + inside-Ø: .....
- + coiled length: .....
- + wattage: .....
- + voltage: .....
- + exit: .....
- + connection length: .....
- + thermocouple: .....
- + reflection tube: .....
- + number of pieces: .....

# Stock heaters

inside-Ø	inside-Ø		coiled length L in mm									
in mm	in inch	30-40	30-50	40-60	40-70	60-80						
8,0		120		160		250						
10,0		140		200		300						
12,0		160		230		350						
16,0			210		300							
19,0	3/4"		250		450							
		wattage in watt at 230 V										





# Stock heaters

for nozzle-Ø	for nozzle-Ø		length o	f clampii	ng band	L in mm						
in mm	in inch	25.4	25.4 30.5									
19,05	3/4"	*125	125									
19,05	3/4"	250	250									
22,20	7/8"		125									
22,20	7/8"		250									
			wattage in watt at 230 V									

# WRP / Mini / F / 1.3 x 2.3

with clamping band with tangential screwing



## Standard details for stock heaters

- Coil Heater with flat cross-section 1.3 x 2.3 mm with clamping band with tangential screwing
- for corresponding nozzle diameter, length of clamping band and wattage see table
- voltage: 230 V
- unheated zones: ca. 130/180 mm (\* ca. 25/75 mm, see table)
- separated connection heads
- connection option: 1000 mm teflon • insulated leads
- code data imprinted

#### Options

• other types on request considering the technical data (see page 14ff.)

#### Order details

WRP / Mini / F / 1.3 x 2.3 with tangential screwing

- + for nozzle-Ø: .....
- + length of clamping band: .....
- + wattage: .....
- + voltage: .....
- + unheated zones: .....
- + number of pieces: .....



# WRP / Mini / F / 1.3 x 2.3

with clamping band with axial screwing





length of clamping band in mm

wattage in watt at 240 V

## Standard details for stock heaters

- Coil Heater with flat cross-section 1.3 x 2.3 mm with clamping band with axial screwing
- for corresponding nozzle diameter, length of clamping band, wattage and voltage see table
- voltage: 230 V / 240 V (see tables)
- unheated zones: ca. 130/180 mm
- separated connection heads
- connection option:
   1830 mm teflon insulated leads

#### Options

 other types on request considering the technical data (see page 14ff.)

# Order details

WRP / Mini / F / 1.3 x 2.3 with axial screwing

		5	
+	for nozzle-Ø:		
+	length of clam	ping band:	

- + wattage: .....
- + voltage: .....
- + unheated zones: .....
- + number of pieces: .....

# Standard heaters

Stock heaters

for

nozzle-Ø

in mm

19,05

19,05

for

nozzle-Ø

in inch

3/4"

3/4"

30.5

149

268

for nozzle-Ø	for nozzle-Ø		length of clamping band in mm								
in mm	in inch	30.5									
22,20	7/8"	125									
22,20	7/8"	250									
			wattage in watt at 230 V								





# Stock heaters (straight) with and without thermocouple (Fe-CuNi)

total length (mm)	340	370	425	475	550	610	690	850	990
heated length (mm)	250	280	335	385	460	520	600	760	900
wattage (watt)	195	215	240	295	350	400	460	610	690

## Measurements which can be produced from stock heaters

insid	de-Ø				coile	d leng	th L ir	n mm			
mm	inch	20	40	60	80	100	120	140	160	180	200
10,0			195	240	350	350	350	400	460	460	610
12,0			215	295	400	400	400	460	610	610	610
12,5	1/2"		215	295	400	400	400	460	610	610	690
14,0			240	350	400	400	460	610	610	690	690
15,0			240	400	460	460	610	610	610	690	
16,0	5/8"		240	400	460	460	610	610	690	690	
18,0			295	400	610	610	610	690	690		
19,0	3/4"		295	400	610	610	610	690			
20,0			295	460	610	610	690	690			
22,0	7/8"	195	350	610	690	690	690				
24,0		195	400	610	690	690					
25,0	1"	215	400	610	690	690					
28,0		215	460	690							
30,0		240	460	690							
32,0	1 1/4"	240	460	690							
35,0		295	610								
38,0	1 1/2"	295	610								
40,0		295	610								
42,0		350	610								
45,0		350	690								
48,0		400	690								
50,0	2"	400	690								
					wattag	ge in w	vatt at	230 V			

# WRP / F / 2.2 x 4.2



# Standard details for stock heaters

- Coil Heater with flat cross-section 2.2 x 4.2 mm
- for total length, heated length, inside diameter, coiled length and wattage see tables
- voltage: 230 V
- exit axial, radial or tangential (see page 3)
- unheated zone: 65 mm
- connection head: 25 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

#### Options

- with or without thermocouple (grounded or not grounded) Fe-CuNi or NiCr-Ni available
- with or without reflection tube available
- other connection options (see page 13)
- other types on request considering the technical data (see page 14ff.)

#### Order details

M	/RP	/	F	/	2.2	х	4.2
---	-----	---	---	---	-----	---	-----

- + inside-Ø: .....
- + coiled length: .....
- + wattage: .....
- + voltage: .....
- + exit: .....
- + connection length: .....
- + thermocouple: .....
- + number of pieces: .....



# WRP / Q / 3.0 x 3.0



# Standard details for stock heaters

- Coil Heater with square crosssection 3.0 x 3.0 mm
- for total length, heated length, inside diameter, coiled length and wattage see tables
- voltage: 230 V
- exit axial, radial or tangential (see page 3)
- unheated zone: 65 mm
- connection head: 25 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

# Options

- with or without thermocouple (grounded or not grounded) Fe-CuNi or NiCr-Ni available
- with or without reflection tube available
- other connection options (see page 13)
- other types on request considering the technical data (see page 14ff.)

#### Order details

WRP /	' Q /	3.0	Х	3.0
-------	-------	-----	---	-----

inside-Ø:
coiled length:
wattage:
voltage:
exit:
connection length:
thermocouple:
number of pieces:



#### Stock heaters (straight) with and without thermocouple (Fe-CuNi)

total length (mm)	390	540	740	940	1140		
heated length (mm)	300	450	650	850	1050		
wattage (watt)	215	325	470	610	630		

#### Measurements which can be produced from stock heaters

insi	de-Ø				coile	d leng	th L in	mm			
mm	inch	20	40	60	80	100	120	140	160	180	200
10,0			215	325	325	325	470	470	610	610	630
12,0			215	325	470	470	470	610	610	630	630
12,5	1/2"		215	325	470	470	470	610	610	630	
14,0			215	470	470	470	610	610	630		
15,0			325	470	610	610	610	630	630		
16,0	5/8"		325	470	610	610	610	630	630		
18,0		215	325	610	610	610	630				
19,0	3/4"	215	325	610	630	630	630				
20,0		215	325	610	630	630	630				
22,0	7/8"	215	325	610	630	630					
24,0		215	470	630							
25,0	1"	215	470	630							
28,0		325	470	630							
30,0		325	470								
32,0	1 1/4"	325	470								
35,0		325	610								
38,0	1 1/2"	325	610								
40,0		325	630								
42,0		470	630								
45,0		470	630								
48,0		470									
50,0	2"	470									
					wattag	ge in v	vatt at	230 V			



**WRP** Ø 3.3



# Stock heaters (straight) with and without thermocouple (Fe-CuNi)

total length (mm)	390	540	740	940	1140		
heated length (mm)	300	450	650	850	1050		
wattage (watt)	180	270	390	500	630		

## Measurements which can be produced from stock heaters

inside-Ø		coiled length L in mm									
mm	inch	20	40	60	80	100	120	140	160	180	200
10,0			180	270	390	390	500	500	500	630	630
12,0			180	270	390	390	500	500	630		630
12,5	1/2"		180	270	390	500	500	500	630		630
14,0			270	390	390	500	500	630			630
15,0			270	390	500	500	630				630
16,0	5/8"		270	390	500	500	630				630
18,0			270	390	500	630					
19,0	3/4"		270	390	500	630					
20,0			270	390	500	630					
22,0	7/8"	180	390	500	630						
24,0		185	390	500	630						
25,0	1"	185	390	630	630						
28,0		185	390	630							
30,0		185	500	630							
32,0	1 1/4"	185	500	630							
35,0		185	500								
38,0	1 1/2"	270	500								
40,0		270	630								
42,0		270	630								
45,0		270	630								
48,0		390									
50,0	2"	390									
	wattage in watt at 230 V										



## Standard details for stock heaters

- Coil Heater with round cross-section Ø 3.3 mm
- for total length, heated length, inside diameter, coiled length and wattage see tables
- voltage: 230 V
- exit axial, radial or tangential (see page 3)
- unheated zone: 65 mm
- connection head: 25 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

# Options

- with or without thermocouple (grounded or not grounded) Fe-CuNi or NiCr-Ni available
- with or without reflection tube available
- other connection options (see page 13)
- other types on request considering the technical data (see page 14ff.)

#### Order details

#### WRP Ø 3.3

- + inside-Ø: .....
- + coiled length: .....
- + wattage: .....
- + voltage: .....
- + exit: .....
- + connection length: .....
- + thermocouple:
- + number of pieces: .....



# WRP / Maxi / 4.6 x 8.6





# Standard details for stock heaters

- Coil Heater with flat cross-section 4.6 x 8.6 mm
- for total length, heated length, inside diameter, coiled length and wattage see tables
- voltage: 230 V
- exit axial, radial or tangential (see page 3)
- unheated zone: 65 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

#### Options

- with or without thermocouple (Fe-CuNi or NiCr-Ni) available
- with or without reflection tube available
- other types on request considering the technical data (see page 14ff.)

# Order details

WRP / Maxi / 4.6 x 8.6

- + inside-Ø: .....
- + coiled length: .....
- + wattage: .....
- + voltage: .....
- + exit: ...... + connection length: .....
- + thermocouple: .....
- + number of pieces: .....

# Stock heaters (straight) with and without thermocouple (Fe-CuNi)

total length (mm)	315	415	515	715	915		
heated length (mm)	250	350	450	650	850		
wattage (watt)	300	450	550	800	1000		

#### Measurements which can be produced from stock heaters

inside-Ø	coiled length L in mm								
in mm	20	40	60	80	100	120	140	160	
20	300	450	550	550	800	800	800		
22	300	450	550	800	800	800	800		
24	300	550	550	800	800	800	1000		
26	300	550	550	800	1000	1000	1000		
28 / 30	450	550	550	800	1000	1000	1000		
32	450	550	800	1000	1000	1000			
34	450	800	800	1000	1000				
36	450	800	800	1000					
38 / 40	550	800	800	1000					
42 / 44 / 46	550	1000	1000						
48 / 50 / 52	550	1000	1000						
54	550								
56 / 58 / 60	800								
62 / 64	300	800	1000						
66 / 68 / 70	300	800							
72 / 74	300	800							
76 / 78 / 80	300	1000							
82 / 84 / 86	300	1000							
88 / 90 / 92	450	1000							
94 / 96 / 98	450	1000							
100	450	1000							
		wattage in watt at 230 V							



# WRP / Maxi / 4.6 x 8.6

with clamping band



## Standard details for stock heaters

- Coil Heater with flat cross-section 4.6 x 8.6 mm with clamping band
- for inside diameter, length of clamping band and wattage see table
- voltage: 230 V
- for exit radial or tangential (see page 3) see table
- unheated zone (a): 45 mm
- connection option: 1000 mm teflon insulated leads, earth and glass silk protective sleeving

## Options

- with or without thermocouple (Fe-CuNi) available
- other types on request considering the technical data (see page 14ff.)

## Order details

WRP / Maxi / 4.6 x 8.6

with clamping band

- + inside-Ø: .....
- + length of clamping band: .....
- + wattage: .....
- + voltage: .....
- + exit: .....
- + connection length: .....
- + thermocouple: .....
- + number of pieces: .....



# Stock heaters (\* with thermocouple Fe-CuNi)

insid	de-Ø	le	length of clam			band l	_ in m	exit	
mm	inch	22.0	25.4	30.0	32.0	34.0	34.9	38.0	
30,0				300				400	rad. 45°
32,0				*350					tang.
38,0					*500				tang.
40,0				450					rad. 45°
42,0		350							tang.
44,4	1 3/4"						450		tang.
50,0						500			rad. 45°
50,8	2"		350						tang.
wattage in watt at 230 V									



# WRP/M

casted in brass



#### WRP/M

WRP / Mini / M

inside-Ø in mm	max. length L in mm
10 - 11	60
12 - 15	120
16 - 18	200
19 - 21	120
22 - 26	100
27 - 36	100
37 - 41	90
43	70
46	70
53	60
58	50
59	50

# $A \emptyset^{\pm 0.25} \qquad 65^{\pm 5} \qquad 25^{\pm 2} \qquad 1000^{\pm 5} \% \text{ (min. 10 mm)}$

## Standard details WRP / M

- Coil Heater casted in brass with outer sheath of stainless steel
- for inside diameter and max. length see table left
- voltage: 230 V
- unheated zone: 65+25 mm
- connection option: 1000 mm PTFE-insulated leads, earth and glass silk protective sleeving
- wall thickness 4.5 up to 5.5 mm

# Standard details WRP / Mini / M

- for corresponding nozzle diameter, length and wattage see table below
- voltage: 230 V
- unheated zones: ca. 130/180 mm (\* ca. 25/75 mm, see table)
- connection option: 1000 mm PTFE-insulated leads, earth and glass silk protective sleeving
- wall thickness: 2.5 mm

## Options

- WRP / M: with or without thermocouple (grounded or not grounded) Fe-CuNi or NiCr-Ni available; WRP / Mini / M: with separate sheath surface thermocouple available
- other unheated zones (min. 25+25 mm)
- reinforcement tube covering the unheated zone as protection against bending or breaking damages

# Order details

WRP / M

- + for nozzle-Ø: ..... resp. inside-Ø: .....
- + tolerance of inside-Ø: .....
- + length: .....
- + wattage: .....
- + voltage: .....
- + unheated zones: .....
- + number of pieces: .....

for nozzle-Ø	for nozzle-Ø			length	L in mn	า	
in mm	in inch	25.4	30.5				
19,05	3/4"	*125	125				
19,05	3/4"	250	250				
22,20	7/8"		125				
22,20	7/8"		250				
		wat	tage in	watt at 2	230 V		



# **Connection Options**



# AS-type N

- teflon insulated leads (standard)
- Ø fastening ring max. 10 mm
- glass silk insulated leads (option)

# AS-type NG

- teflon insulated leads (standard) with glass silk insulated protective sleeving
- Ø fastening ring max. 10 mm

## AS-type NM

- teflon insulated leads (standard) with flexible metal sleeving
- Ø fastening ring max. 10 mm

#### AS-type ND

- teflon insulated leads (standard) with braided metal sleeving
- Ø fastening ring max. 10 mm

# AS-type NT

- teflon insulated leads (standard) with PTFE-sleeving
- Ø fastening ring max. 10 mm

#### AS-type NSM

- teflon insulated leads (standard) with flexible metal sleeving
- Ø fastening ring max. 8 mm

#### AS-type SGI\*

- teflon insulated leads (standard) with glass silk insulated protective sleeving from inside
- A Ø ~ 5.5 mm

## AS-type SMI\*

- teflon insulated leads (standard) with flexible metal sleeving from inside
- 🕨 A Ø ~ 7 mm

## AS-type SDI\*

- teflon insulated leads (standard) with braided metal sleeving from inside
- 🕨 A Ø ~ 6 mm

# AS-type STI\*

- teflon insulated leads (standard) with PTFE-sleeving from inside
- A Ø ~ 5.5 mm

SDI\*

STI\*



# **Technical Data**

WRP / Mini / f / 1.3 x 2.3       beater sheath       CrNI-isteel or nickel         WRP / Mini / f / 1.3 x 2.3       insulation material       highly compressed MgO         isolation material       highly compressed MgO       beater sheath         isolation material       highly compressed MgO         isolation resistance       60.01 / 4.02         isolation material       solot compression         isolation resistance       cold)         isolation resistance       resistance         isolation resistance       resisone							
WRP / Mini / F / 1.3 x 2.3       insulation material       highly compressed MgO         Mex / Mini / B / 1.3       heat conductor material       NiCr 8020         iso 24 V)       max. 750 °C       max. 750 °C         iso only valid for options with voltage stability (cold)       900 V-AC       insulation material       NiCr 8020         i* only valid for options with voltage stability (cold)       25 M/Om at 500 V-DC °       insulation material       900 V-AC         i* unit voltage > 24 V       insulation material       1000 V-AC       insulation material       900 V-AC °         i* unit voltage > 24 V       insulation material       25 M/Om at 500 V-DC °       insulation material       900 V-AC °         i* unit voltage > 24 V       imax. total length straight       3000 mm       900 V-AC °       insulation material       900 V-AC °         i* unit voltage > 24 V       imaked at total insight straight       3000 mm       100 V-DC °       insulation material       900 V-AC °         i* unit voltage > 24 V       imaked at total insight straight       3000 mm       100 V-AC °       insulation material       900 V-AC °         i* unit voltage > 24 V       imaked at total insight straight       3000 mm       imake straight inside diameter tolerance       25 mm       inside diameter tolerance       3 mm         i* unit voltage straight strai	WRP / Mini:	heater sheath	CrNi-steel or nickel				
WRP / Min / J       heat conductor material       NiCr 8020         sheath for low safety voltages up       high voltage stability (cold)       ≥ 5 MOhm at 500 V-DC 1         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC 1       insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC 1         insulation resistance (cold)       ≥ 0.5 mA at 253 V-AC 2       max. total length straight       3000 mm         min. length of the unheated zone       25 mm (shorter on request)       inside diameter tolerances       without reflection tobe: up to 16 3 0 mm -0.06/-0.20         up to 16 3 0 mm -0.06/-0.20       up to 16 3 0 mm -0.06/-0.20       up to 16 3 0 mm -0.06/-0.20       up to 16 3 0 mm -0.06/-0.20         wattage tolerance (cold)       ± 10% (± 2% on request)       connection voltage       max. 250 V         wattage tolerance (cold)       ± 10% (± 2% on request)       connection voltage       max. 250 V         wattage tolerance (cold)       ± 10% (± 2% on request)       connections (standard)       see WRP (except AS-Types S.*)         WRP / Mini / M       wattage tolerance       to clamp to stated nozzle diameter       sheath surface load       max. 150 WCP         asame as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C       wattage tolerance (cold)       ± 10% (± 5% on request)         wattage tolerance (cold)       ± 10% (± 5% on request)       wattage	WRP / Mini / F / 1.3 x 2.3	insulation material	highly compressed MgO				
also bossible with cutrent return variance       sheath is temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC °         leakage current (cold)       ≤ 0.5 mA at 253 V-AC °         max. total length straight       ± 5%         inside diameter tolerances       without reflection tube:         up to 18 20 W-DC °       leakage current (cold)         wattage tolerance straight       ± 5%         inside diameter tolerances       without reflection tube:         up to 18 20 mm -0.10/-0.30       with current (cold)         connection voltage       max. 250 V         sheath surface load       max. 250 V         wattage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 250 V         sheath surface load       max. 15 W(cm²         depending on operation temperature       at the heated heater sheath         and heat decrease       inside diameter tolerance       to clamp to stated nozzie diameter         with clamping band       same as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C         watage tolerance (cold)       ± 10% (± 5% on request)       watage       max. 15 W(cm² on the surface         of the inner WRP / Mini, but		heat conductor material	NiCr 8020				
big voltage stability (cold)       800 V-AC         big voltage stability (cold)       ≥ 5 MOhm at 500 V-DC <sup>1</sup> big voltage > 24 V       insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC <sup>1</sup> big voltage > 24 V       insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC <sup>1</sup> big voltage > 24 V       insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC <sup>1</sup> insulation resistance (cold)       ≤ 0.5 mA at 253 V-AC <sup>1</sup> max. total length straight       3000 mm         insulation resistance       25 mm (shorter on request)       iength tolerance straight       ± 5%         inside diameter tolerances       without reflection tube: u0.0540.015       wattage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 260 V       max. 260 V       max. 10 WorA <sup>2</sup> at the heated heater sheath         wattage tolerance (cold)       ± 10% (± 2% on request)       connection voltage       max. 260 V         with clamping band       sheath surface load       max. 10 WorA <sup>2</sup> at the heated heater sheath         same as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C       wattage lolerance (cold)       max. 10 Wicm <sup>2</sup> wattage tolerance (cold)       ± 10% (± 5% on request)       wattage lolerance (cold)       max. 10 Wicm <sup>2</sup> wattage tolerance (co	heater sheath for low safety voltages up	sheath temperature	max. 750 °C				
* only valid for options with voltage > 24 V       insulation resistance (cold)       ≥ 5 MD/m at 500 V-DC ?         * eakage current (cold)       ≤ 0.5 mA at 253 V-AC ??         * max. total length straight       3000 mm         * min. length of the unheated zone       25 mm (shorter on request)         length tolerance straight       ± 5%         with out reflection tube:       up to 18 2 mm -0.10/-0.30         with tolerance straight       ± 5%         wattage tolerance (cold)       ± 10% (e 2% on request)         connection voltage       max. 250 V         wattage tolerance (cold)       ± 10% (e 2% on request)         connection voltage       max. 15 W(cm²         at the heated heater sheath       at the heated heater sheath         and heat decrease       minimum bending radius       3 mm         connections (standard)       see WRP (except AS-Types S.*)         WRP / Mini, but       temperature at inner brass sheath       max. 650 °C         wattage tolerance (cold)       ± 10% (± 5% on request)       wattage         wattage       max. 10 W(cm²       at the heated heater sheath         same as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C         wattage       max. 10 W(cm²       at the heated heater sheath         inside diameter t	to 24 V)	high voltage stability (cold)	800 V-AC				
• only valid for options with voltage > 24 V       I eakage current (cold)       ± 0.5 mA at 253 V-AC ''         max. total length straight       3000 mm       3000 mm         min.length of the unheated zone       25 mm (shorter on request)         length tolerance straight       ± 5%         inside diameter tolerances       without reflection tube: up to 18 12 mm - 0.05/-0.20 up to 18 12 mm - 0.05/-0.20 up to 18 12 mm - 0.05/-0.20 up to 18 20 mm - 0.010/-0.30 with reflection tube: + 0.05/+0.15         wattage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 15 W/cm² at the heated heater sheath and heat decrease         minimum bending radius       3 mm         connections (standard)       see WRP (except AS-Types S.*)         WRP / Mini / F / 1.3 x 2.3 with clamping band same as WRP / Mini, but       inside diameter tolerance sheath surface load max. 10 W/cm² at the heated heater sheath and heat decrease         WRP / Mini / M WRP / M       temperature at inner brass sheath wattage tolerance (cold)       ± 10% (± 5% on request)         wattage tolerance (cold)       ± 10% (± 5% on request)       wattage max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       ± 0.25 mm       coaxiality from inside-0 to outside-0         wRP / Mini, but       temperature at inner brass sheath wattage tolerance (cold)       ± 10% (± 5% on request)         wattage tolerance (cold)       ± 10%		insulation resistance (cold)	$\geq$ 5 MOhm at 500 V-DC <sup>1)</sup>				
voltage > 24 V       max. total length straight       3000 mm         min. length of the unheated zone       25 mm (shorter on request)         length lobrance straight       ± 5%         inside diameter tolerances       without reflection tube: up to 16/3 0 mm -0.10/-0.30 with reflection tube: +0.05/-0.20 up to 16/3 0 mm -0.10/-0.30 with reflection tube: +0.05/-0.20 up to 16/3 0 mm -0.10/-0.30 with reflection tube: +0.05/-0.15         vattage tolerance (cold)       ± 10% (s 2% on request)         connection voltage       max. 250 V         sheath surface load       at the heater sheath         and heat decrease       at the heater sheath         minimum bending radius       3 mm         connections (standard)       see WRP (except AS-Types S.*)         with clamping band       sheath surface load         same as WRP / Mini, but       temperature at inner brass sheath       max. 10 W/cm²         same as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C         wattage       max. 15 W/cm² on the surface       of the inner WRP         inside diameter tolerance       of the inner WRP       inside diameter tolerance       of 25 mm         coaxiality from inside-Ø to outside-Ø       Isi/00.55         wattage       outside diameter tolerance       a 0.25 mm         outside diameter tolerance       of 26/00.55	<sup>1)</sup> only valid for options with	leakage current (cold)	$\leq$ 0.5 mA at 253 V-AC <sup>1)</sup>				
WRP / Mini / M     inside diameter tolerance     25 mm (shorter on request)	voltage > 24 V	max. total length straight	3000 mm				
Iength tolerance straight       ± 5%         inside diameter tolerances       without reflection tube:       up to 18 12 nm -0.05/-0.20         up to 18 12 nm -0.05/-0.15       watage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 15 WCm²         at the heater sheath       at the heater sheath         at the heater sheath       at the heater sheath         minimum bending radius       3 mm         connection (standard)       see WRP (except AS-Types S*)         WRP / Mini, but       inside diameter tolerance       to clamp to stated nozzle diameter         watage tolerance (cold)       ± 10% (± 5% on request)       max. 15 WCm²         watage tolerance (cold)       sheath surface load       max. 15 WCm²         depending on operation temperature       at the heated nozzle diameter         watage tolerance (cold)       ± 10% (± 5% on request)         watage       max. 15 WCm² on the surface         of the inner WRP       max. 15 WCm² on the surface         watage tolerance (cold)       ± 10% (± 5% on request)         watage       max. 15 WCm² on the surface         of the inner WRP       max. 15 WCm² on the surface         outside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm		min. length of the unheated zone	25 mm (shorter on request)				
without reflection tube:       up to 10 12 mm -0.05/-0.20         up to 10 12 mm -0.05/-0.20       up to 10 30 mm -0.10/-0.30         wattage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 250 V         sheath surface load       max. 15 W(cm²         and heat decrease       minimum bending radius       3 mm         connections (standard)       see WRP (except AS-Types S*)         WRP / Mini / F / 1.3 x 2.3       inside diameter tolerance       to clamp to stated nozzle diameter         with clamping band       same as WRP / Mini, but       temperature and heat decrease       max. 10 W(cm²         with ge tolerance (cold)       ± 10% (± 5% on request)       max. 10 W(cm²         at the heated heater sheath       and heat decrease       at the heated heater sheath         with clamping band       temperature at inner brass sheath       max. 650 °C         wRP / Mini / M       temperature diameter tolerance       on application conditions         wattage tolerance (cold)       ± 10% (± 5% on request)       max. 15 W(cm² at the heated heater sheath         inside diameter tolerance       on application conditions       outside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm       coaxiality from inside-Ø to outside-Ø       @© 0 0 0.5      <		length tolerance straight	± 5%				
watage tolerance (cold)       ± 10% (± 2% on request)         connection voltage       max. 35 W/cm³         sheath surface load       max. 15 W/cm³         ad pending on operation temperature       at the heated heater sheath         minimum Dending radius       3 mm         connections (standard)       see WRP (except AS-Types S.*)         WRP / Mini / F / 1.3 x 2.3       inside diameter tolerance       to clamp to stated nozzle diameter         with clamping band       sheath surface load       max. 10 W/cm²         same as WRP / Mini, but       temperature at inner brass sheath       max. 650 °C         WRP / M       temperature at inner brass sheath       max. 650 °C         wattage       max. 15 W/cm² on the surface         of the inner WRP       inside diameter tolerance       ± 0.25 rm         coaxiality from inside-Ø to outside-Ø       (©[0.0.5]         WRP / 0.3.3       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO         WRP / Ø.3.3       heater sheath       G0.0.5         WRP / Ø.3.3       heater sheath       G0.0.5         wattage       max. 75 °C       heater sheath         insulation material       highly compressed MgO         insulation material       highly compressed MgO		inside diameter tolerances	without reflection tube: up to IØ 12 mm -0.05/-0.20 up to IØ 30 mm -0.10/-0.30 with reflection tube: +0.05/+0.15				
wRP / Mini / F / 1.3 x 2.3     inside diameter tolerance     max. 250 V       wWRP / Mini / F / 1.3 x 2.3     inside diameter tolerance     3 mm       with clamping band     inside diameter tolerance     to clamp to stated nozzle diameter       ad heat decrease     max. 10 W/cm²       wwrp / Mini / M     temperature and heat decrease       wwrp / Mini, but     inside diameter tolerance     to clamp to stated nozzle diameter       wattage tolerance (cold)     ± 10% (± 5% on request)       wattage     max. 15 W/cm²       wattage     max. 10 W/cm²       at the heated heater sheath     max. 650 °C       wattage tolerance (cold)     ± 10% (± 5% on request)       wattage     max. 15 W/cm² on the surface of the inner WRP       inside diameter tolerance     on application conditions       outside diameter tolerance     on application conditions       outside diameter tolerance     ± 0.25 mm       coaxiality from inside-Ø to outside-Ø     @ 0 0.5       WRP / F / 2.2 x 4.2     heater sheath     CrNi-steel or nickel       insulation material     highly compressed MgO       MRP / G 3.3     heater sheath     S00 °C       inglication condition     insulation resistance (cold)     ≥ 5 Mohm at 500 V-DC       iseast temperature     max. 750 °C     heat conductor material       high voltage stability (c		wattage tolerance (cold)	± 10% (± 2% on request)				
sheath surface load and heat decrease       max. 15 W/cm² at the heated heater sheath and heat decrease         minimum bending radius connections (standard)       3 mm see WRP (except AS-Types S.*)         WRP / Mini / F / 1.3 x 2.3 with clamping band same as WRP / Mini, but       inside diameter tolerance sheath surface load depending on operation temperature and heat decrease       to clamp to stated nozzle diameter max. 10 W/cm² at the heated heater sheath         WRP / Mini / M WRP / M WRP / M same as WRP / Mini, but       temperature at inner brass sheath watage tolerance (cold)       max. 650 °C watage         WRP / Mini, but       temperature at inner brass sheath watage       max. 15 W/cm² on request)         watage       max. 15 W/cm² at the heated heater sheath         wRP / Mini, but       temperature at inner brass sheath watage       max. 15 W/cm² on request)         watage       max. 15 W/cm² at the heated heater sheath       max. 650 °C max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions outside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm coaxiality from inside-Ø to outside-Ø       isi@ Ø.0.5         WRP / Ø 3.3       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO       heat conductor material         heat onductor material       NiCr 8020       sheath temperature       max. 750 °C		connection voltage	max. 250 V				
minimum bending radius       3 mm         connections (standard)       see WRP (except AS-Types S.*)         WRP / Mini / F / 1.3 x 2.3       inside diameter tolerance       to clamp to stated nozzle diameter         with clamping band       sheath surface load       max. 10 W/cm²         asame as WRP / Mini , but       temperature at inner brass sheath       max. 650 °C         WRP / Mini , M       temperature at inner brass sheath       max. 650 °C         wattage tolerance (cold)       ± 10% (± 5% on request)         wattage       max. 15 W/cm² on the surface of the inner VRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       © 0.5         WRP / Q / 3.0 x 3.0       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO         heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         highly voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≤ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         min. length of the unheated zone       2.2 x 4.2: 25 mm <t< td=""><td></td><td>sheath surface load depending on operation temperature and heat decrease</td><td>max. 15 W/cm<sup>2</sup> at the heated heater sheath</td></t<>		sheath surface load depending on operation temperature and heat decrease	max. 15 W/cm <sup>2</sup> at the heated heater sheath				
wmm       connections (standard)       see WRP (except AS-Types S.*)         wmm       inside diameter tolerance       to clamp to stated nozzle diameter         with clamping band       sheath surface load       max. 10 W/cm²         depending on operation temperature       at the heater sheath       max. 650 °C         wmm       wattage tolerance (cold)       ± 10% (± 5% on request)         wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       ©[Ø]0,5         wRP:       heater sheath       CrNi-steel or nickel         wRP / Ø 3.3       heater sheath       CrNi-steel or nickel         wRP / Ø 3.3       sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC       insulation material         high voltage stability (cold)       800 V-AC       insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC       max. total length straight       3000 mm         min. length of the unheated zone       (with head length 25 mm)       3.0 x 3.0: 25 mm         0.0 x 3.0: 26 mm       0.0 x 3.0: 26 mm       0.0 x 3.0: 26 mm <td></td> <td>minimum bending radius</td> <td colspan="4">3 mm</td>		minimum bending radius	3 mm				
WRP / Mini / F / 1.3 x 2.3       inside diameter tolerance       to clamp to stated nozzle diameter         with clamping band       sheath surface load       max. 10 W/cm²         at the heated heater sheath       at the heated heater sheath         and heat decrease       at the heated heater sheath         wRP / Mini, but       temperature at inner brass sheath       max. 650 °C         wattage       max. 15 W/cm² on request)         wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       © 0.5         WRP / J / 2.2 x 4.2       heater sheath       coaxiality from inside-Ø to outside-Ø         WRP / Ø 3.3       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO         heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         min. length of the unheated zone       (with head length 25 mm)		connections (standard)	see WRP (except AS-Types S*)				
WRP / Mini / F / 1.3 x 2.3       inside diameter tolerance       to clamp to stated nozzle diameter         same as WRP / Mini, but       sheath surface load       max. 10 W/cm²         wth clamping band       at the heated heater sheath         wRP / Mini / M       temperature at inner brass sheath       max. 650 °C         wattage tolerance (cold)       ± 10% (± 5% on request)         wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       ± 0.25 mm         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       © 0.5         WRP / K / 2,3.0 x 3.0       heater sheath         wRP / Ø 3.3       heater sheath         coaxiality from inside-Ø to outside-Ø       © 0.5         wRP / Ø 3.3       heater sheath         insulation material       highly compressed MgO         heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         with head length 25 mm)       (with head length 25 mm)         0.3 x 3.0;							
with clamping band same as WRP / Mini, but       sheath surface load depending on operation temperature and heat decrease       max. 10 W/cm² at the heated heater sheath         wRP / Mini, but       temperature at inner brass sheath watage tolerance (cold) ± 10% (± 5% on request) watage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance outside diameter tolerance       on application conditions outside diameter tolerance       on application conditions         wRP / Mini, but       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO         heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         highly voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≤ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         with head length 25 mm) (with head length 25 mm) (with head length 25 mm) (with head length 25 mm)	WRP / Mini / F / 1.3 x 2.3	inside diameter tolerance	to clamp to stated nozzle diameter				
WRP / Mini / M       temperature at inner brass sheath       max. 650 °C         wattage tolerance (cold)       ± 10% (± 5% on request)         wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       ● Ø 0.5         WRP / F / 2.2 x 4.2       heater sheath       CrNi-steel or nickel         insulation material       highly compressed MgO         heat conductor material       NiCr 8020         wRP Ø 3.3       sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC       insulation resistance (cold)         insulation resistance (cold)       ≤ 5 MOhm at 500 V-DC       leakage current (cold)         insulation resistance (cold)       ≤ 0.5 mA at 253 V-AC       max. total length straight         min. length of the unheated zone       2.2 x 4.2: 25 mm (with head length 25 mm)       3.0 x 3.0: 25 mm         WR bead length 25 mm)       3.0 x 3.0: 25 mm       with head length 25 mm)	same as WRP / Mini, but	sheath surface load depending on operation temperature and heat decrease	at the heated heater sheath				
WRP / Mini / M       temperature at inner brass sheath       max. 650 °C         wattage tolerance (cold)       ± 10% (± 5% on request)         same as WRP / Mini, but       wattage         max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       @ Ø Ø 0.5         WRP:       heater sheath       CrNi-steel or nickel         msulation material       highly compressed MgO         heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         min. length of the unheated zone       2.2 x 4.2: 25 mm (with head length 25 mm) 3.0 x 3.0: 25 mm         Ø 3.3:       10 mm							
wattage tolerance (cold)       ± 10% (± 5% on request)         same as WRP / Mini, but       wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       Imax. 75 mm         WRP:       heater sheath       CrNi-steel or nickel         wRP / Q / 3.0 x 3.0       insulation material       highly compressed MgO         wRP Ø 3.3       heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≤ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         min. length of the unheated zone       2.2 x 4.2: 25 mm         (with head length 25 mm)       3.0 x 3.0: 25 mm	WRP / Mini / M	temperature at inner brass sheath	max. 650 °C				
wattage       max. 15 W/cm² on the surface of the inner WRP         inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø	WRP/M same as WRP/Mini_but	wattage tolerance (cold)	± 10% (± 5% on request)				
inside diameter tolerance       on application conditions         outside diameter tolerance       ± 0.25 mm         coaxiality from inside-Ø to outside-Ø       Image: CrNi-steel or nickel         WRP:       heater sheath       CrNi-steel or nickel         wRP / C / 3.0 x 3.0       insulation material       highly compressed MgO         wRP Ø 3.3       heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         win. length of the unheated zone       2.2 x 4.2: 25 mm (with head length 25 mm)         0.0 x 3.0: 25 mm       With head length 25 mm)         0.0 x 3.0: 25 mm       With head length 25 mm)		wattage	max. 15 W/cm <sup>2</sup> on the surface of the inner WRP				
outside diameter tolerance $\pm 0.25 \text{ mm}$ coaxiality from inside-Ø to outside-Ø $\bigcirc 0 0.5$ WRP: WRP / G / 3.0 x 3.0 WRP Ø 3.3heater sheathCrNi-steel or nickel highly compressed MgO heat conductor materialheat conductor materialNiCr 8020 sheath temperaturemax. 750 °C high voltage stability (cold)high voltage stability (cold)800 V-AC insulation resistance (cold) $\geq 5 \text{ MOhm at 500 V-DC}$ leakage current (cold)leakage current (cold) $\leq 0.5 \text{ mA at 253 V-AC}$ max. total length straight3000 mm (with head length 25 mm) 3.0 x 3.0: 25 mm (with head length 25 mm) Ø 3.3: 10 mm		inside diameter tolerance	on application conditions				
coaxiality from inside-Ø to outside-ØImage: Order of the constraint of the conductor materialCrNi-steel or nickelWRP / G / 3.0 x 3.0heater sheathCrNi-steel or nickelWRP Ø 3.3insulation materialhighly compressed MgOWRP Ø 3.3heat conductor materialNiCr 8020sheath temperaturemax. 750 °Chigh voltage stability (cold)800 V-ACinsulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 \times 4.2$ : 25 mm (with head length 25 mm) $3.0 \times 3.0$ : 25 mm (with head length 25 mm)Ø 3.3:10 mm		outside diameter tolerance	± 0.25 mm				
WRP:heater sheathCrNi-steel or nickelWRP / Q / 3.0 x 3.0insulation materialhighly compressed MgOWRP Ø 3.3heat conductor materialNiCr 8020sheath temperaturemax. 750 °Chigh voltage stability (cold)800 V-ACinsulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 \times 4.2: 25 \text{ mm}$ (with head length 25 mm) $3.0 \times 3.0: 25 \text{ mm}$ (with head length 25 mm) $3.0 \times 3.0: 25 \text{ mm}$		coaxiality from inside-Ø to outside-Ø	ØØ 0,5				
WRP:       heater sheath       CrNi-steel or nickel         WRP / Q / 3.0 x 3.0       insulation material       highly compressed MgO         WRP Ø 3.3       heat conductor material       NiCr 8020         sheath temperature       max. 750 °C         high voltage stability (cold)       800 V-AC         insulation resistance (cold)       ≥ 5 MOhm at 500 V-DC         leakage current (cold)       ≤ 0.5 mA at 253 V-AC         max. total length straight       3000 mm         min. length of the unheated zone       2.2 x 4.2: 25 mm (with head length 25 mm)         3.0 x 3.0: 25 mm       3.0 x 3.0: 25 mm         Ø 3.3: 10 mm       10 mm							
WRP / F / 2.2 x 4.2 WRP / Q / 3.0 x 3.0 WRP Ø 3.3insulation material heat conductor materialhighly compressed MgO NiCr 8020heat conductor materialNiCr 8020sheath temperaturemax. 750 °Chigh voltage stability (cold)800 V-ACinsulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 x 4.2$ : 25 mm (with head length 25 mm) $3.0 x 3.0$ : 25 mm (with head length 25 mm)Ø 3.3:10 mm	WRP:	heater sheath	CrNi-steel or nickel				
WRP Ø 3.3heat conductor materialNiCr 8020heat conductor materialmax. 750 °Chigh voltage stability (cold)800 V-ACinsulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 \times 4.2$ : 25 mm (with head length 25 mm) $3.0 \times 3.0$ : 25 mm (with head length 25 mm) $0$ 3.3:10 mm	WRP / F / 2.2 x 4.2	insulation material	highly compressed MgO				
sheath temperaturemax. 750 °Chigh voltage stability (cold) $800 \text{ V-AC}$ insulation resistance (cold) $\geq 5 \text{ MOhm at 500 V-DC}$ leakage current (cold) $\leq 0.5 \text{ mA at 253 V-AC}$ max. total length straight $3000 \text{ mm}$ min. length of the unheated zone $2.2 \times 4.2: 25 \text{ mm}$ (with head length 25 mm) $3.0 \times 3.0: 25 \text{ mm}$ (with head length 25 mm) $0 \times 3.3: 10 \text{ mm}$	WRP Ø 3.3	heat conductor material	NiCr 8020				
high voltage stability (cold)800 V-ACinsulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 \times 4.2$ : 25 mm (with head length 25 mm) $3.0 \times 3.0$ : 25 mm (with head length 25 mm) $0.5 \times 3.2$ :10 mm		sheath temperature	max. 750 °C				
insulation resistance (cold) $\geq$ 5 MOhm at 500 V-DCleakage current (cold) $\leq$ 0.5 mA at 253 V-ACmax. total length straight3000 mmmin. length of the unheated zone $2.2 \times 4.2$ : 25 mm (with head length 25 mm) $3.0 \times 3.0$ : 25 mm (with head length 25 mm) $0$ 3.3:10 mm		high voltage stability (cold)	800 V-AC				
$\begin{array}{llllllllllllllllllllllllllllllllllll$		insulation resistance (cold)	$\geq$ 5 MOhm at 500 V-DC				
max. total length straight3000 mmmin. length of the unheated zone2.2 x 4.2:25 mm (with head length 25 mm)3.0 x 3.0:25 mm (with head length 25 mm)Ø 3.3:10 mm		leakage current (cold)	≤ 0.5 mA at 253 V-AC				
min. length of the unheated zone 2.2 x 4.2: 25 mm (with head length 25 mm) 3.0 x 3.0: 25 mm (with head length 25 mm) Ø 3.3: 10 mm		max. total length straight	3000 mm				
(with head length 25 mm) 3.0 x 3.0: 25 mm (with head length 25 mm) Ø 3.3: 10 mm		min. length of the unheated zone	2.2 x 4.2: 25 mm (with head length 25 mm)				
Ø 3.3: 10 mm			3.0 x 3.0: 25 mm (with head length 25 mm)				
			Ø 3.3: 10 mm				

continuation next page >>



# **Technical Data**

<< continuation of previous page	length tolerance straight	2.2 x 4.2: heated zone ± 1%				
WRP		unheated zone ± 2.5%				
WRP/F/22x42		3.0 x 3.0: heated zone ± 1%				
WRP $/ \Omega / 30 \times 30$		unheated zone ± 2.5%				
WRP Ø 3 3		Ø 3.3: heated zone $\pm 2.5\%$				
		unheated zone ± 2.5%				
	inside diameter tolerances	without reflection tube:				
		up to IØ 12 mm -0.05/-0.20				
		up to IØ 30 mm -0.10/-0.30				
		up to IØ 50 mm -0.20/-0.40				
		> IØ 50 mm on request				
		with reflection tube: +0.05/+0.15				
	wattage tolerance (cold)	± 10% (± 5% on request)				
	connection voltage	max. 250 V				
	sheath surface load	max. 15 W/cm <sup>2</sup>				
	depending on operation temperature					
	and heat decrease					
	minimum bending radius	2.2 x 4.2: heated zone 4 mm				
	Ũ	unheated zone 3 mm				
		3.0 x 3.0: heated zone 3 mm				
		unheated zone 3 mm				
		Ø 3.3: heated zone 3 mm				
		unheated zone 3 mm				
	connections (standard)	PTFE-insulated flexible leads.				
		continuous heat resistant up to 260 °C				
		max. current				
		at 20 °C = 27.9 A; at 250 °C = 5.6 A				
	thermocouple	Fe-CuNi or NiCr-Ni				
	alemeedque	(arounded or not arounded)				
		(9.00.1202 0. 101 9.00.1202)				
WRP / Maxi / 4.6 x 8.6	heater sheath	CrNi-steel				
	in a substitute sector table	highly as a second Mag				

heater sheath	CrNi-steel (standard 1.4541, on request 1.4876)
insulation material	highly compressed MgO
heat conductor material	NiCr 8020
sheath temperature	max. 750 °C
high voltage stability (cold)	1250 V-AC
insulation resistance (cold)	≥ 5 MOhm at 500 V-DC
leakage current (cold)	≤ 0.5 mA at 253 V-AC
max. total length straight	3000 mm
min. length of the unheated zone	45 mm
length tolerance straight	flat part ± 1% round part ± 5%
inside diameter tolerances	without reflection tube: up to IØ 30 mm -0.10/-0.30 up to IØ 50 mm -0.20/-0.40 > IØ 50 mm on request with reflection tube: +0.05/+0.15
wattage tolerance (cold)	± 10% (± 5% on request)
connection voltage	max. 440 V
sheath surface load depending on operation temperature and heat decrease	max. 10 W/cm <sup>2</sup>
minimum bending radius	10 mm (15 mm when bending on end)
connections (standard)	see WRP
thermocouple	Fe-CuNi or NiCr-Ni



hotset — in Germany and 30 other countries all over the world:



WRPgb. 2/1.000/10/99 S — We reserve the right to change about technical details

