Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

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Технические характеристики на картриджные нагреватели PIROWATT компании MASTERWATT

PIROWATT CARTYDRIGE HEATERS

PIROWATT cartydrige heaters

These heaters are characterised by a high specific power and a high reliability: These qualities are essential in the applications for which they have been conceived. These heaters can reach specific powers as high as 50 W/cm² and operating temperatures up to 750°C. PIROWATT cartridge heaters power supply cables are embedded into the heater head without junctions or stiff parts: this manufacturing solution has eliminated all the problems and allows to limit the non-heating (“neutral”) section to a 3 ÷ 4 mm. These heaters are used in the heating of moulds, plates, injection nozzles and hot-channel injection nozzles. They can be employed, inserted into appropriate slots, in the heating of all metallic masses.

PIROWATT
- High Power Cartridge Heaters -

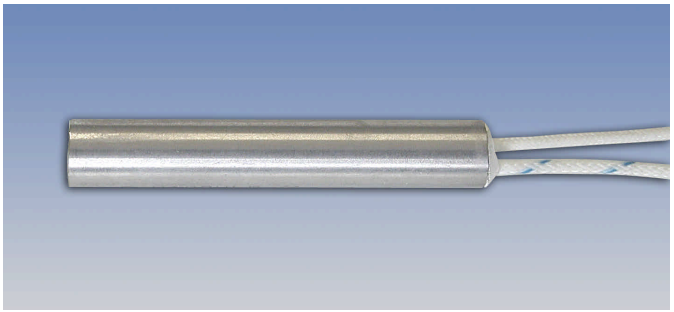
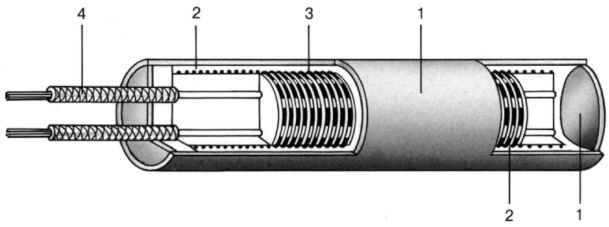


Figure 1



GENERAL CHARACTERISTICS

These heaters are characterised by a ***high specific power and a high reliability***: These qualities are essential in the applications for which they have been conceived.
These heaters can reach specific powers as high as 50 W/cm² and operating temperatures up to 750 °C.
PIROWATT cartridge heaters power supply cables are embedded into the heater head (see Figure 1) without junctions or stiff parts: this manufacturing solution has eliminated all the problems and allows to limit the non-heating ("neutral") section to a 3 ÷ 4 mm.
These heaters undergo final acceptance testing as required by EN 60335-1 specification and are manufactured to comply with VDE 0720 specifications.

APPLICATIONS

These heaters are used in the heating of moulds, plates, injection nozzles and hot-channel injection nozzles. They can be employed, inserted into appropriate slots, in the heating of all metallic masses, provided that the operating temperature does not exceed 750 °C.

TECHNICAL DATA (see Figure 1)

1. **METALLIC SHEATH** made of stainless steel suitable for high temperatures. The sheath surface is ground and the bottom is water-tight and corrosion resistant
2. **ELECTRICAL INSULATION** made of highly concentrated pure magnesium oxide
3. **RESISTIVE WINDING** made of Nickel/Chrome 80/20
4. **POWER SUPPLY** provided by a couple of pure nickel conductors, with a silicone-impregnated fibreglass insulation.

DIMENSIONS

PIROWATT cartridge heaters are available on stock in several dimensions which differ in diameter and/or length (see table below).
For all heaters the dimensional tolerances are $f_{-0.08}^{-0.02}$ for the nominal diameter and ± 1.5 % (with a maximum of 2 mm) for the length. The nominal length is the real cartridge length.

POWER

PIROWATT heaters are normally manufactured with a specific power of about 25 W/cm^2 but it is possible to manufacture them up to 50 W/cm².
PIROWATT heaters heating power is constant even if they belong to different production lots: the nominal power is guaranteed with a tolerance of ± 10 %. Thanks to this characteristic it is possible to insure an overall stability of the heating system also after the replacement of several heaters.

COUPLING SLOT

PIROWATT heaters shall be inserted into appropriate slots which have been machined inside the mass to be heated. A Slots surface finishing shall be very good for the coupling to be optimum: the presence of scores or grooves creates stagnant air pockets which, even if very small, insulate thermally the heater causing locally a strong increase of the temperature and a reduction of the heater life (see also Figure 2).

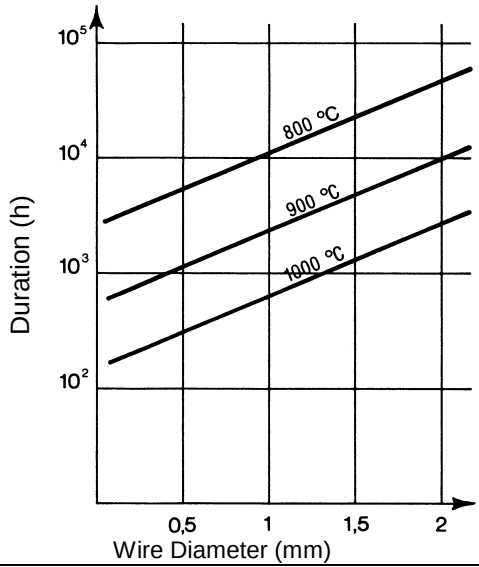


Figure 2: Nickel/Chrome 80/20 winding lifetime (in hours) as a function of the operating temperature and of the wire diameter

The cartridge heater, when hot, expands by few cents of a mm. Hence the tolerances on the slot dimensions is less important than the surface finishing quality. The best result is obtained with an H7 reamer.

ELECTRICAL CONNECTION

The connection to the power supply (monophase) is normally via a couple of nickel cables. Upon request, special cable terminals (see section "Special Constructions") can be provided.

HEATERS WITH EMBEDDED THERMOCOUPLE

When there is not enough room for the separate installation of a thermocouple, heaters with embedded thermocouple can be used.
Standard heaters, available on stock, contain a J-type thermocouple with an Iron/Constantan junction. The thermocouple is located close to the bottom of the heater and is isolated from the metallic sheath.
Other constructions are possible too. Please consult section "Special Constructions"

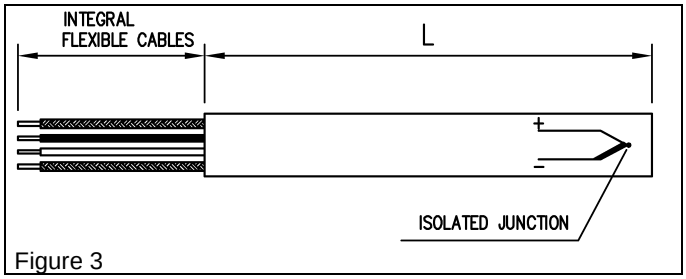


Figure 3

INSTALLATION INSTRUCTIONS

Each heater shall be inserted into its appropriate slot. Please make sure that the surface finishing of the slot is very good (see section "Coupling Slot"). To prevent a blockage of the heater within the slot after a long period of operation, NEVER-SEEZ lubricant (see data sheet in Figure 4) can be used. This product, however, shall not be used to compensate poor finishing conditions of the slots: i.e. it is not possible to use this lubricant to fill scores, grooved, excessive clearance.
Heaters cables shall be installed such that rubbing and pressure points are avoided: this, in fact, is necessary to avoid an early damage of the insulation. Under this respect, it shall be verified that the movements of the heated masses do not damage the electrical connection areas.
Silicone-rubber insulated cables should be used in place of fibreglass-silicone ones (see section "Special Constructions") whenever the environmental temperature allows to do so. These cables, in fact, can provide the best flexibility, especially if they are spiral-winded

Figure 4:**NEVER-SEEZ Lubricant**

Very effective against corrosion, makes the heater extraction easier after a long operational period.
Operating Temperature: -180 °C / + 1200 °C

SUGGESTIONS FOR THERMAL CONTROL

The adoption of a proper thermal control system is a key parameter if an efficient heating of the mass to be heated is desired. In addition, such systems allow to insure the longest lifetime to the heaters.
First of all, it is recommended to locate the temperature sensors, as much as possible, at equal distance from the surrounding heaters: this will avoid (see also Figure 5) excessive heating (high thermal inertia due to an excessive distance between sensor and heater - ①) or high-frequency heating cycles (too rapid response caused by a too short distance between sensor and heater -②).

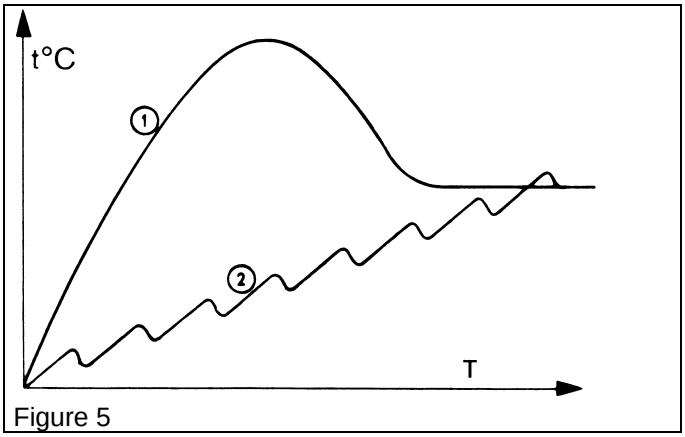


Figure 5

The use of thermo-regulators using SCR components is recommended. These systems, in fact, turn the heaters ON only when the sinusoidal curve crosses the zero ("Zero crossing" activation) thus reducing considerable the thermal shocks on the heater resistive winding (See Figure 6 – point①)

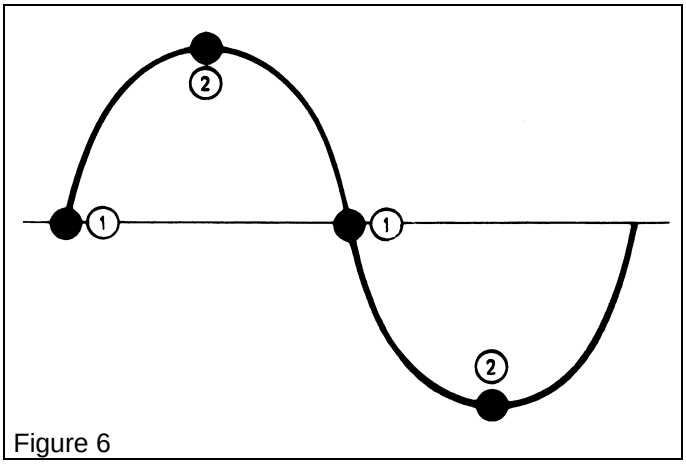
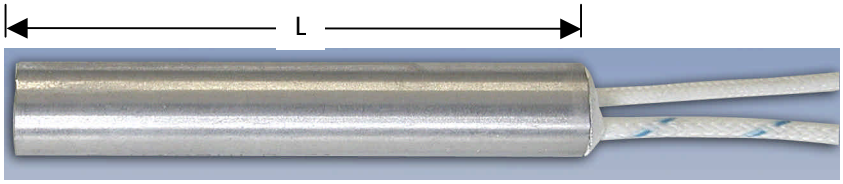


Figure 6

ON/OFF regulators can turn the heaters ON in any point of the sinusoidal curve (see Figure 6 – point②) causing very high thermal shocks on the heater winding and a consequent reduction of the heater lifetime.

PIROWATT-HLP HEATERS

- Inclusive of flexible cables – Metric sizes -



inclusive of flexible cables L = 500 mm

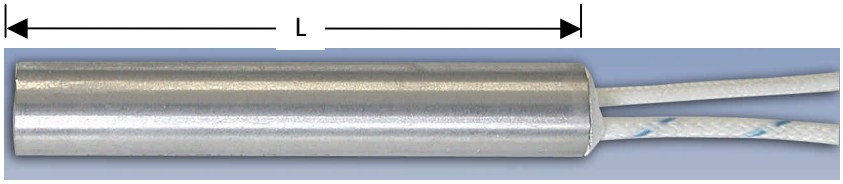
ØD mm	L mm	Power (Watt at 230V)	Code
6.5 -0,02 -0.08	40	100	100650400100
		125	100650400125
		160	100650400160
		175	100650400175
		200	100650400200
	50	100	100650500100
		160	100650500160
		200	100650500200
		250	100650500250
	60	125	100650600125
		200	100650600200
		250	100650600250
		315	100650600315
	80	125	100650800125
		180	100650800180
		280	100650800280
		350	100650800350
	100	160	100651000160
		220	100651000220
		350	100651000350
8 -0,02 -0.08	40	100	100800400100
		160	100800400160
		200	100800400200
		250	100800400250
	50	125	100800500125
		200	100800500200
		250	100800500250
		315	100800500315
	60	100	100800600100
		140	100800600140
		220	100800600220
		280	100800600280
		350	100800600350
	80	160	100800800160
		200	100800800200
		315	100800800315
		400	100800800400
	100	180	100801000180
		280	100801000280
		400	100801000400
	130	250	100801300250
		400	100801300400
10 -0,02 -0.08	40	100	101000400100
		125	101000400125
		200	101000400200
		250	101000400250
		315	101000400315
	50	100	101000500100
		160	101000500160
		250	101000500250
		315	101000500315
	60	400	101000500400
		125	101000600125
		180	101000600180
		315	101000600315
		400	101000600400
		500	101000600500
	80	160	101000800160
		250	101000800250
		400	101000800400
		500	101000800500
		630	101000800630

ØD mm	L mm	Power (Watt at 230V)	Code
10 -0,02 -0.08	100	220	101001000220
		350	101001000350
		560	101001000560
		700	101001000700
		850	101001000850
	130	315	101001300315
		500	101001300500
		800	101001300800
	160	400	101001600400
		630	101001600630
		800	101001600800
	200	1000	101002001000
12.5 -0,02 -0.08	40	100	101250400100
		160	101250400160
		250	101250400250
		315	101250400315
		400	101250400400
	50	100	101250500100
		200	101250500200
		315	101250500315
		400	101250500400
		500	101250500500
	60	125	101250600125
		200	101250600200
		315	101250600315
		400	101250600400
		500	101250600500
	80	200	101250800200
		315	101250800315
		500	101250800500
		630	101250800630
		800	101250800800
	100	250	101251000250
		400	101251000400
		630	101251000630
		800	101251000800
		1000	101251001000
	130	400	101251300400
		630	101251300630
		1000	101251301000
		1250	101251301250
	160	500	101251600500
		800	101251600800
		1250	101251601250
	200	630	101252000630
		900	101252000900
		1500	101252001500
	250	1250	101252501250
	300	1000	101253001000
		1500	101253001500
		2000	101253002000
16 -0,02 -0.08	40	100	101600400100
		250	101600400250
		315	101600400315
		400	101600400400
	50	160	101600500160
		250	101600500250
		400	101600500400
		500	101600500500
		630	101600500630

ØD mm	L mm	Power (Watt at 230V)	Code
16 -0,02 -0.08	60	160	101600600160
		250	101600600250
		400	101600600400
		500	101600600500
		630	101600600630
	80	280	101600800280
		400	101600800400
		630	101600800630
		800	101600800800
		1000	101600801000
	100	350	101601000350
		500	101601000500
		800	101601000800
		1000	101601001000
		1250	101601001250
	130	500	101601300500
		700	101601300700
		1100	101601301100
		1400	101601301400
		1800	101601301800
	160	630	101601600630
		900	101601600900
		1600	101601601600
		1800	101601601800
	200	800	101602000800
		1250	101602001250
		2000	101602002000
	250	1000	101602501000
		1600	101602501600
	300	1250	101603001250
		1800	101603001800
20 -0,02 -0.08	60	200	102000600200
		315	102000600315
		500	102000600500
		630	102000600630
		800	102000600800
	80	350	102000800350
		500	102000800500
		800	102000800800
		1000	102000801000
		1250	102000801250
	100	450	102001000450
		630	102001000630
		1000	102001001000
		1400	102001001400
		1600	102001001600
	130	630	102001300630
		900	102001300900
		1400	102001301400
		1800	102001301800
		2200	102001302200
	160	800	102001600800
		1100	102001601100
		1800	102001601800
		2200	102001602200
	200	1000	102002001000
		1600	102002001600
		2500	102002002500
	250	1250	102002501250
		2000	102002502000
	300	1600	102003001600
		2200	102003002200

PIROWATT-HLP HEATERS

- Inclusive of flexible cables – Imperial sizes -



inclusive of flexible cables L = 500 mm

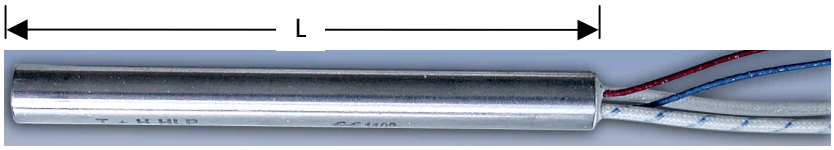
ØD	L	Power (Watt at 230V)	Code
1/4" 6.22 mm +0.05	1" 1/2 38.1 mm	100	100630380100
		125	100630380125
		160	100630380160
		175	100630380175
		200	100630380200
	2" 50.8 mm	100	100630500100
		160	100630500160
		200	100630500200
		250	100630500250
	2" 1/2 63.5 mm	125	100630630125
		200	100630630200
		250	100630630250
		315	100630630315
	3" 76.2 mm	300	100630760300
	3" 1/4 82.5 mm	125	100630820125
		180	100630820180
		280	100630820280
		350	100630820350
	4" 101.6 mm	160	100631010160
		220	100631010220
		350	100631010350
3/8" 9.4 mm +0.05	1" 1/2 38.1 mm	100	100950380100
		125	100950380125
		200	100950380200
		250	100950380250
		315	100950380315
	2" 50.8 mm	100	100950500100
		160	100950500160
		250	100950500250
		315	100950500315
		400	100950500400
	2" 1/2 63.5 mm	125	100950630125
		180	100950630180
		315	100950630315
		400	100950630400
		500	100950630500
	3" 76.2 mm	250	100950760250
		400	100950760400

ØD	L	Power (Watt at 230V)	Code
3/8" 9.4 mm +0.05	4" 101.6 mm	220	100951010220
		350	100951010350
		560	100951010560
		700	100951010700
		850	100951010850
	5" 127 mm	500	100951270500
	6" 152.4 mm	750	100951520750
1/2" 12.57 mm +0.05	1" 1/2 38.1 mm	100	101270380100
		160	101270380160
		250	101270380250
		315	101270380315
		400	101270380400
	2" 50.8 mm	100	101270500100
		200	101270500200
		315	101270500315
		400	101270500400
		500	101270500500
	2" 1/2 63.5 mm	125	101270630125
		200	101270630200
		315	101270630315
		400	101270630400
		500	101270630500
	3" 76.2 mm	300	101270760300
		500	101270760500
		750	101270760750
	4" 101.6 mm	250	101271010250
		400	101271010400
		630	101271010630
		800	101271010800
		1000	101271011000
	5" 1/4 133.3 mm	630	101271330630
	6" 1/2 165.1 mm	500	101271650500
		800	101271650800
		1250	101271651250
	8" 203.2 mm	630	101272030630
		900	101272030900
		1500	101272031500
	9" 228.6 mm	1500	101272281500
	10" 254 mm	1500	101272541500

ØD	L	Power (Watt at 230V)	Code
5/8" 15.75 mm +0.05	2" 50.8 mm	160	101580500160
		250	101580500250
		400	101580500400
		500	101580500500
		630	101580500630
	2" 1/2 63.5 mm	160	101580630160
		250	101580630250
		400	101580630400
		500	101580630500
		630	101580630630
	3" 1/4 82.5 mm	280	101580820280
		400	101580820400
		630	101580820630
		800	101580820800
		1000	101580821000
	4" 101.6 mm	350	101581010350
		500	101581010500
		800	101581010800
		1000	101581011000
		1250	101581011250
	5" 1/4 133.3 mm	500	101581330500
		700	101581330700
		1100	101581331100
		1400	101581331400
		1800	101581331800
	6" 1/2 165.1 mm	630	101581650630
		900	101581650900
		1600	101581651600
		1800	101581651800
	8" 203.2 mm	800	101582030800
		1250	101582031250
		2000	101582032000
	10" 254 mm	1000	101582541000
		1600	101582541600
	12" 307.8 mm	1250	101583071250
		1800	101583071800

PIROWATT-HLPT HEATERS WITH EMBEDDED THERMOCOUPLE

- Inclusive of flexible cables -



inclusive of flexible cables L = 500 mm

METRIC SIZES

ΦD (mm)	L (mm)	Power (Watt at 230V)	Code
6.5 -0,02 -0.08	40	100	110650400100
		175	110650400175
	50	200	110650500200
	60	250	110650600250
	100	350	110651000350
8 -0,02 -0.08	40	200	110800400200
	60	200	110800600200
	80	400	110800800400
10 -0,02 -0.08	40	200	111000400200
	50	250	111000500250
	60	400	111000600400
	80	250	111000800250
	160	400	111001600400

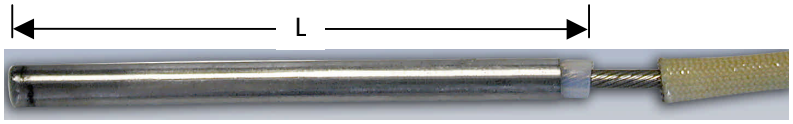
IMPERIAL SIZES

ΦD	L	Power (Watt at 230V)	Code
1/4" 6.22 mm +0.05	1" 1/2 38.1 mm	100	110630380100
		175	110630380175
	2" 50.8 mm	200	110630500200
	2" 1/2 63.5 mm	250	110630630250
	3" 76.2 mm	300	110630760300
	4" 101.6 mm	350	110631010350
3/8" 9.4 mm +0.05	1" 1/2 38.1 mm	200	110950380200
	2" 50.8 mm	250	110950500250
	2" 1/2 63.5 mm	315	110950630315
	3" 1/4 82.5 mm	400	110950820400
	4" 101.6 mm	350	110951010350

SINGLE-POLE PIROWATT-HLP MICRO-HEATERS

- Inclusive of flexible terminal cable -

Current return on external sheath – suitable for operation voltage up to 24 V



inclusive of flexible cables L = 500 mm

ΦD (mm)	L (mm)	Power (Watt at 24V)	Code
4.5 -0,02 - 0.04	40	60	10045040060
		100	10045040100
	50	60	10045050060
		100	10045050100
	60	80	10045060080
		125	10045060125
	80	100	10045080100
		160	10045080160
	100	100	10045100100
		160	10045100160

SPECIAL CONSTRUCTIONS

Special cartridge heaters, additional to those available on stock, can be manufactured following dedicated customer requirements. In these cases, the feasibility shall be assessed case by case by our technical department.
The parameter which can be changed, with respect to the standard heaters, are the following:

DIMENSIONS

PIROWATT heaters can be manufactured in all diameters in the range 4.5 ÷ 25 mm and with lengths ranging from 40 mm to 1000 mm.

SUPPLY VOLTAGE

Supply voltage can vary between 6 and 500 Volt. Depending on the heater diameter, however, some limitations exist for the maximum current and the maximum length that can be manufactured. They are summarised in Table 1.

Table 1: limitations in the choice of PIROWATT heaters as a function of the operational current

Cartridge Diameter	6.5	8	10	12.5	16	20	1/4"	3/8"	1/2"	5/8"
Maximum current (A)	4	5	7	14	18	22	4	7	14	18
Cartridge Maximum Length	100	130	260	300	300	300	100	160	260	310
Wires sect. (mm²)	0.5	0.75	0.75	1	1.5	2.5	0.5	0.75	1	1.5

These limitations are less stringent if the power supply voltage is low (up to 42V) or if special power supply cables are employed, especially if coupled to a bilateral power supply (see examples ③, ④ and ⑤ in Figure 8).

HEATING POWER DISTRIBUTION

Some applications (e.g. packaging machines) require a non uniform distribution of the heating power. In these cases, constructions with the heating power concentrated at the terminal ends (see Figure 7 – sketch ①) can be made.
Constructions with alternating hot and cold zones (see sketch ②) are possible too.
Finally, constructions with separate power stages (see examples ③ and ④) are also possible if Φ 12.5 mm heaters are used.

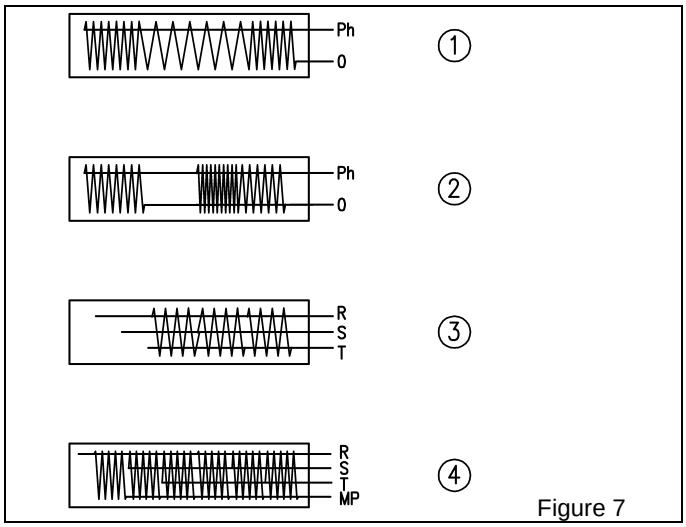


Figure 7

POWER SUPPLY TERMINALS

Upon request, the following power supply terminals can be implemented (see Figure 8):

① naked nickel wire type BL or rigid nickel wires type NA
② specially insulated cables (this solution is possible if it is requested to increase the length of the neutral section in the terminal area)
③④⑤ terminals at both sides (bilateral power supply)
⑥⑦⑧ single-pole terminals for low voltage heaters with current return on the external sheath

In all the above cases, supply cables or terminals with lengths different from the standard can be requested.

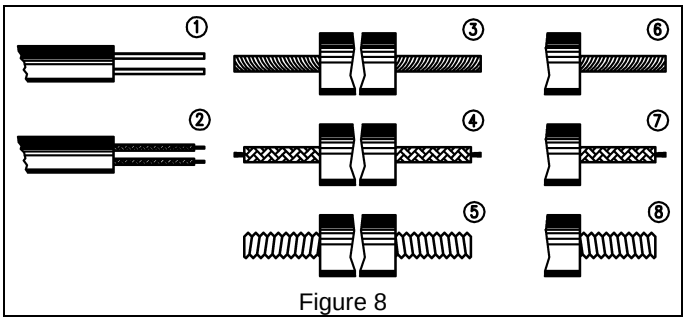


Figure 8

Terminals finishing can also be requested to be different from the standard. The available options are shown in Figure 9.

LOW SPECIFIC POWER HEATERS

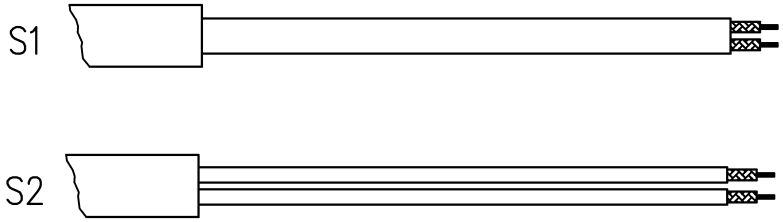
Several applications require the heating power to be low (see, e.g., the cases of liquids and gases heating).
For these applications, low specific power PIROTERM heaters can be used. These heaters are designed to tailor the customer's requirements and, consequently, are not available on stock.
This specific product line is presented in the last page of this catalogue.

Figure 9: optional solutions for the finishing of the terminals

PROTECTION BY FIBREGLASS SHEATH

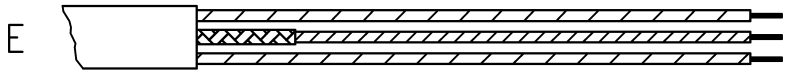
TYPE S1 – one single sheath incorporated both power supply cables.

TYPE S2 – each power supply cable is protected by a dedicated fibreglass sheath.



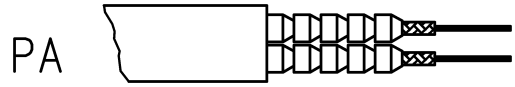
WITH GROUNDING CABLE

The grounding cable is connected to the heater metallic sheath and is marked to make its identification easier.



PROTECTION BY CERAMIC BUSHES

For diameters up to Φ 8 mm and operating temperatures above 280 °C.

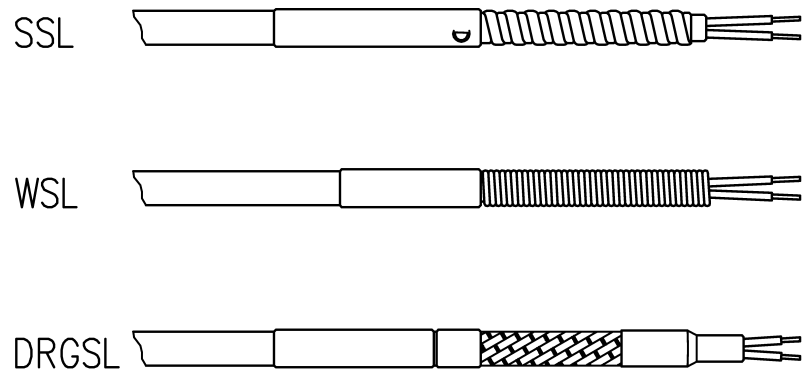


PROTECTION BY FLEXIBLE METALLIC SHEATH

TYPE SSL - protection by a flexible metallic tube made of stainless or zinc plated steel

TYPE WSL - protection by a flexible, corrugated, water-tight tube

TYPE DRGSL - protection by a zinc plated steel metallic braid

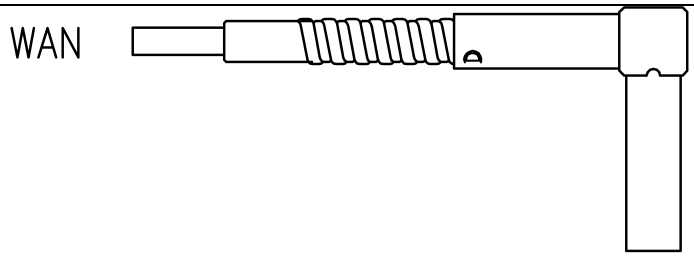


TYPE WAN – SQUARE METALLIC TERMINAL FOR 90° EXIT

WAN SSL - with flexible metallic tube

WAN WSL -with corrugated, flexible tube

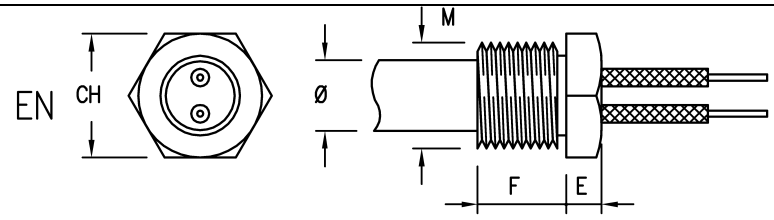
WAN DRGSL - with metallic braid



TYPE EN - THREADED BUSHING WITH HEXAGONAL LEDGE, WATER-TIGHT WELDED

EN MS - with brass bushing

EN VA - with stainless steel bushing



Φ	6.5	8	10	12.5	16	20
M	10 x 1	12 x 1.5	14 x 1.5	16 x 1.5	20 x 1.5	27 x 1.5
F	7	9	9	10.5	13	13.5
E	3.5	4	4	4.5	5	6.5
CH	12	14	17	19	24	30

PIROTERM
- Low Specific Power Cartridge Heaters -

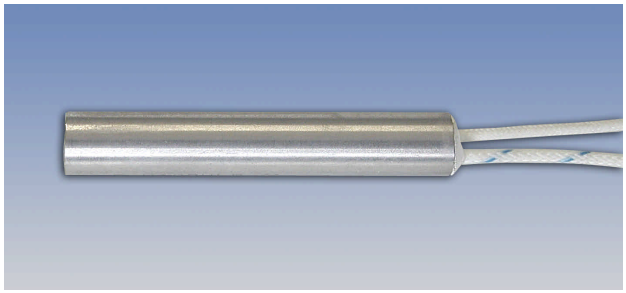
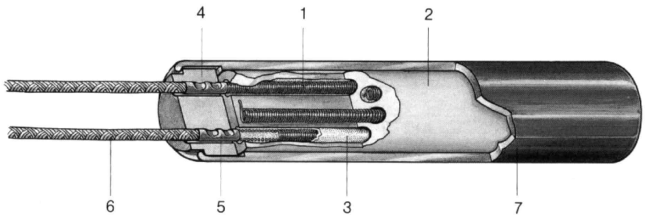


Figure 10



GENERAL CHARACTERISTICS

These heaters are characterised by a ***low specific power and a high reliability***: These qualities make them suitable for the most different applications.
They consist of a carefully machined stainless steel tube hosting, in intimate contact, a ceramic insulator that is resistant to wide thermal excursions and that provides a good thermal conductivity.
This insulator is drilled to allow the insertion of a nickel/ chrome 80/20 spiral whose wire section is defined case by case such that optimum operating conditions can be insured. Magnesium oxide powder surrounds the spiral. The distribution of the powder grain sizes is optimised to fill up any internal volume and guarantee a perfect heat exchange between the spiral and the ceramic insulator.
Power supply is granted by a couple of pure nickel plaits provided with an insulation that is suitable for high temperatures.

APPLICATIONS

These heaters are employed in several applications: in the heating of liquids, gases or metals, in rubber presses, in chills and die-casting moulds, in thermal-welding machines, in footwear moulds, in scientific apparatuses, in freezer or conditioning assemblies, in food processing machines and in packaging plants. More in general these heaters are the best solution whenever a compact, easily adaptable, easily replaceable, extremely safe and long lasting heat source is required.

TECHNICAL DATA (see Figure 10)

1. **RESISTIVE WINDING** made of Nickel/Chrome 80/20
2. **MULTI-HOLE TUBE** made of high density steatite characterised by a very high electrical insulation and a very good thermal conductivity
3. **MAGNESIUM OXIDE** whose granular composition allows high density of the compacted powder, high electrical insulation and optimum heat conduction
4. **TERMINAL HEAD** made of ceramic material, resistant to thermal shocks, abrasions and vibrations
5. **CONDUCTOR JUNCTION** made of nickel, joined to the nickel/chrome resistive winding by means of controlled-atmosphere welding
6. **POWER SUPPLY CABLES** in pure nickel, with silicone-fibreglass insulation.
7. **METALLIC SHEATH** in stainless steel AISI 304 (or other stainless steel, if required)

DIMENSIONS

PIROTERM cartridge heaters can be manufactured in diameters ranging from Φ 8 to Φ 32 mm e with lengths L up to 2500 mm. The tolerance on the diameter size is a ± 0.08 mm while for the length it is ± 1.5 %.

POWER

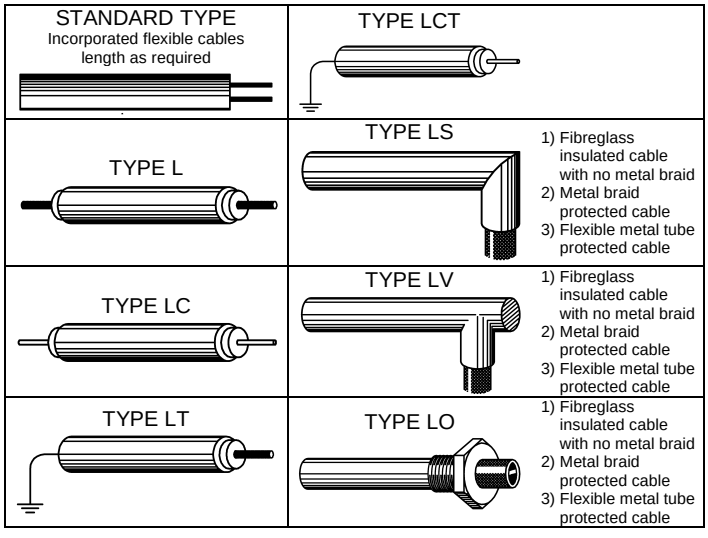
PIROTERM heaters are manufactured with specific power up to 5 W/cm^2. The nominal power is granted with a tolerance of ± 10 %.
Constructions with non uniform power distribution and/or with more heating circuits (see “Heating Power Distribution” section in page 6) are possible as required.

COUPLING SLOT

PIROWATT heaters shall be inserted into appropriate slots which have been machined inside the mass to be heated. A Slots surface finishing shall be very good for the coupling to be optimum: the presence of scores or grooves creates stagnant air pockets which, even if very small, insulate thermally the heater causing locally a strong increase of the temperature and a reduction of the heater life (see also Figure 2).
Under this respect, the considerations made for PIROWATT heaters apply also to PIROTERM.

ELECTRICAL CONNECTION

For the electrical connection (monophase power supply) two nickel cables are normally employed. If requested, the special terminals showed in Figure 11 can be provided.



To order a PIROTERM heater please specify:

- The diameter D
- The length L
- The power W
- The power supply voltage V
- The length of the power supply cables
- The type of construction

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