Cartridge Heaters

Superwatt® High Watt Density

U.L. Recongnized - E56973
C.S.A. Certified - LR - 016386-0-000

Applications:

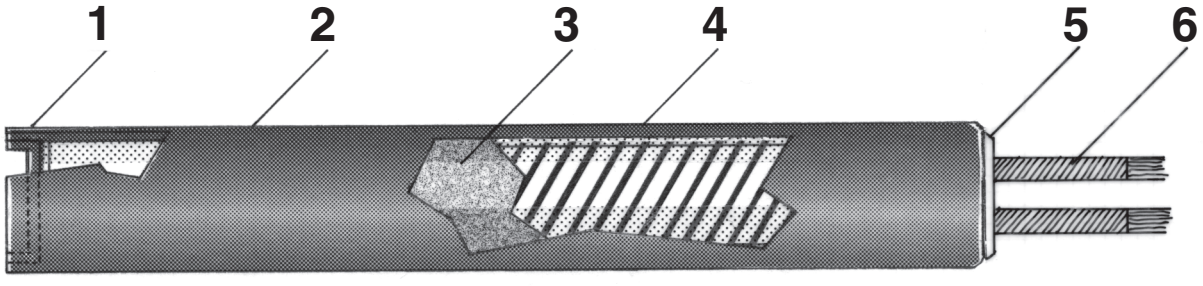
Dies, Heat Sealing, Hot Melt Adhesive, Plastic Molding, Platens, Shoe Machinery.

Features:

- **Elements are designed for maximum:** Watt density, temperature, heat transfer and heater life.
- The useful life of a Cartridge heating element is determined by how quickly the heat generated in the resistance wire can be disappated to the outside sheath. With low and moderate watt density elements, such as Hotwatt's standard line, the conventional method of inserting helical coils in formed ceramics is an entirely satisfactory method of construction because the wire temperature relative to sheath temperature, even though considerably higher, is still well within safe long-life operating temperatures.
- The Superwatt® cartridge heater accelerates the transfer of heat from the resistance wire to the sheath. This is accomplished by relocating the wire so that it is closer to the sheath; and swaging the outside diameter of the heater, thereby compressing the magnesium oxide filler so that it becomes an improved conductor of heat from the wire while maintaining its dielectric properties. (See diagram this page). By improving the heat transfer rate, it is possible to manufacture elements of higher densities because the differential between the wire temperature and the sheath temperature has been minimized.
- Long, trouble free service.
- Made in U.S.A.

Construction:

1. Heliarc welded end seal.
2. Series 300 stainless steel sheath of precision dimensions and tolerances for intimate, stable, non-oxidizing contact with cavities machined for them.
3. Pure magnesium oxide compressed to an optimum density for best heat transfer and electrical insulation at elevated temperatures.
4. Element wire situated in close proximity to outside surface for maximum heat transfer and minimum internal temperature while preserving good dielectric qualities.
5. Ceramic cap.
6. Fiberglass insulated leads.



Phone: 978-777-0070 ■ Fax: 978-774-2409

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▼ Manfactured Items ▼

Diameter: ⅛" (.124/.120)
Maximum Amperage: **3.5** Not UL/CSA

Sheath Length	Cat. No.	Min. Watts	Max. Volts
1"	HS12-1	20	120
1½"	HS12-1.5	30	120
2"	HS12-2	40	120

Sheath Length	Cat. No.	Min. Watts	Max. Volts
2½"	HS12-2.5	50	120
3"	HS12-3	60	120
3½"	HS12-3.5	70	120
4"	HS12-4	80	120

▼ Manfactured Items ▼

Diameter: ¼" (.249/.245)
Maximum Amperage: **4**

Sheath Length	Cat. No.	Min. Watts	Max. Volts
1"	HS25-1	70	120
1½"	HS25-1.5	70	120
2"	HS25-2	100	120
2½"	HS25-2.5	130	120
3"	HS25-3	150	240
3½"	HS25-3.5	180	240
4"	HS25-4	210	240
4½"	HS25-4.5	240	240
5"	HS25-5	260	240
5½"	HS25-5.5	290	240
6"	HS25-6	320	240
6½"	HS25-6.5	350	240
7"	HS25-7	380	240
7½"	HS25-7.5	410	240
8"	HS25-8	440	240
8½"	HS25-8.5	470	240
9"	HS25-9	500	240
9½"	HS25-9.5	530	240
10"	HS25-10	560	240
10½"	HS25-10.5	590	240
11"	HS25-11	620	240
11½"	HS25-11.5	650	240
12"	HS25-12	680	240

Diameter: ⅜" (.374/.370)
Maximum Amperage: **6**

Cat. No.	Min. Watts	Max. Volts
HS37-1	70	120
HS37-1.5	80	120
HS37-2	120	240
HS37-2.5	160	240
HS37-3	200	240
HS37-3.5	240	240
HS37-4	280	240
HS37-4.5	320	240
HS37-5	360	240
HS37-5.5	400	240
HS37-6	440	240
HS37-6.5	480	240
HS37-7	520	240
HS37-7.5	560	240
HS37-8	600	240
HS37-8.5	640	240
HS37-9	680	240
HS37-9.5	720	240
HS37-10	760	240
HS37-10.5	800	240
HS37-11	840	240
HS37-11.5	880	240
HS37-12	920	240

Diameter: ½" (.499/.495)
Maximum Amperage: **10**

Cat. No.	Min. Watts	Max. Volts
HS50-1.5	110	240
HS50-2	160	240
HS50-2.5	210	240
HS50-3	270	240
HS50-3.5	330	240
HS50-4	380	240
HS50-4.5	430	240
HS50-5	490	240
HS50-5.5	550	240
HS50-6	600	240
HS50-6.5	650	240
HS50-7	700	240
HS50-7.5	750	240
HS50-8	800	240
HS50-8.5	850	240
HS50-9	900	240
HS50-9.5	950	240
HS50-10	1000	240
HS50-10.5	1050	240
HS50-11	1100	240
HS50-11.5	1150	240
HS50-12	1200	240

▼ IN STOCK ITEMS ▼

Diameter: ¼"

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
1"	HS25-1	100	120	250	.02
1¼"	HS25-1.25	100	120	165	.02
1½"	HS25-1.5	70	120	85	.02
1½"	HS25-1.5	100	120	125	.02
1½"	HS25-1.5	120	120	150	.02
2"	HS25-2	100	120	85	.03
2"	HS25-2	150	120	125	.03
2"	HS25-2	200	240	173	.03
2½"	HS25-2.5	135	120	85	.03
2½"	HS25-2.5	185	120	115	.03

Diameter: ¼" (continued)

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
2½"	HS25-2.5	250	120	159	.03
2½"	HS25-2.5	250	240	159	.03
3"	HS25-3	75	120	38	.04
3"	HS25-3	170	120	90	.04
3"	HS25-3	220	120	115	.04
3"	HS25-3	300	120	156	.04
3"	HS25-3	300	240	156	.04
3½"	HS25-3.5	50	120	21	.04
3½"	HS25-3.5	65	120	27	.04
3½"	HS25-3.5	200	120	85	.04

Cartridge Heaters

Superwatt® High Watt Density

▼ IN STOCK ITEMS (Continued) ▼

Diameter: ¼" (continued)

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
3½"	HS25-3.5	200	240	85	.04
3½"	HS25-3.5	260	120	110	.04
3½"	HS25-3.5	260	240	110	.04
4"	HS25-4	65	120	21	.04
4"	HS25-4	75	120	27	.04
4"	HS25-4	100	120	27	.04
4"	HS25-4	235	120	85	.04
4"	HS25-4	235	240	85	.04
4"	HS25-4	300	120	110	.04
4"	HS25-4	300	240	110	.04
4"	HS25-4	400	120	150	.04
4"	HS25-4	400	240	150	.04
4½"	HS25-4.5	70	120	21	.05
4½"	HS25-4.5	90	120	27	.05
4½"	HS25-4.5	270	120	85	.05
4½"	HS25-4.5	270	240	85	.05
4½"	HS25-4.5	350	120	110	.05
4½"	HS25-4.5	350	240	110	.05
5"	HS25-5	75	120	21	.06
5"	HS25-5	100	120	28	.06
5"	HS25-5	305	120	85	.06
5"	HS25-5	305	240	85	.06
5"	HS25-5	400	120	115	.06
5"	HS25-5	400	240	115	.06
6"	HS25-6	100	120	23	.06
6"	HS25-6	400	120	94	.06
6"	HS25-6	400	240	94	.06
7"	HS25-7	90	120	18	.12
7"	HS25-7	300	120	69	.12
7"	HS25-7	300	240	69	.12

Diameter: ⅜"

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
1"	HS37-1	100	120	165	.04
1¼"	HS37-1.25	100	120	110	.04
1¼"	HS37-1.25	150	120	165	.04
1½"	HS37-1.5	25	120	22	.05
1½"	HS37-1.5	50	120	26	.05
1½"	HS37-1.5	100	120	90	.05
1½"	HS37-1.5	100	240	90	.05
1½"	HS37-1.5	150	120	125	.05
1½"	HS37-1.5	200	120	105	.05
1½"	HS37-1.5	200	240	105	.05

Diameter: ⅜" (continued)

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
2"	HS37-2	40	120	21	.06
2"	HS37-2	50	120	27	.06
2"	HS37-2	60	120	34	.06
2"	HS37-2	150	120	85	.06
2"	HS37-2	150	240	85	.06
2"	HS37-2	200	120	110	.06
2"	HS37-2	200	240	110	.06
2"	HS37-2	250	120	135	.06
2"	HS37-2	250	240	135	.06
2½"	HS37-2.5	50	120	21	.07
2½"	HS37-2.5	75	120	31	.07
2½"	HS37-2.5	200	120	85	.07
2½"	HS37-2.5	200	240	85	.07
2½"	HS37-2.5	300	120	125	.07
2½"	HS37-2.5	300	240	125	.07
3"	HS37-3	60	120	21	.08
3"	HS37-3	100	120	25	.08
3"	HS37-3	250	120	85	.08
3"	HS37-3	250	240	85	.08
3"	HS37-3	400	120	135	.08
3"	HS37-3	400	240	135	.08
3½"	HS37-3.5	75	120	21	.09
3½"	HS37-3.5	300	120	85	.09
3½"	HS37-3.5	450	120	130	.18
3½"	HS37-3.5	300	240	85	.09
4"	HS37-4	90	120	21	.10
4"	HS37-4	125	120	30	.10
4"	HS37-4	350	120	85	.10
4"	HS37-4	350	240	85	.10
4"	HS37-4	500	120	120	.10
4"	HS37-4	500	240	120	.10
5"	HS37-5	125	120	23	.11
5"	HS37-5	500	240	95	.11
6"	HS37-6	150	120	22	.13
6"	HS37-6	600	120	90	.13
6"	HS37-6	600	240	90	.13
9½"	HS37-9.5	250	120	24	.19
9½"	HS37-9.5	1000	240	96	.19
10"	HS37-10	250	120	22	.20
10"	HS37-10	1000	240	90	.20
12"	HS37-12	250	120	19	.22
12"	HS37-12	1000	240	79	.22

• Lengths longer than those listed may be ordered.

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Cartridge Heaters

Superwatt® High Watt Density

▼ IN STOCK ITEMS (Continued) ▼

Diameter: ½"

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
1½"	HS50-1.5	35	120	21	.07
1½"	HS50-1.5	135	120	85	.07
1½"	HS50-1.5	135	240	85	.07
1½"	HS50-1.5	335	120	210	.07
2"	HS50-2	50	120	21	.08
2"	HS50-2	200	120	85	.08
2"	HS50-2	200	240	85	.08
2"	HS50-2	400	120	165	.08
2½"	HS50-2.5	70	120	21	.09
2½"	HS50-2.5	120	120	37	.09
2½"	HS50-2.5	270	120	85	.09
2½"	HS50-2.5	270	240	85	.09
2½"	HS50-2.5	470	120	150	.09
2½"	HS50-2.5	470	240	150	.09
3"	HS50-3	85	120	21	.10
3"	HS50-3	135	120	34	.10
3"	HS50-3	335	120	85	.10
3"	HS50-3	335	240	85	.10
3"	HS50-3	535	120	135	.10

Diameter: ½" (continued)

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
3"	HS50-3	535	240	135	.10
4"	HS50-4	120	120	21	.11
4"	HS50-4	470	120	85	.11
4"	HS50-4	470	240	85	.11
5"	HS50-5	125	120	17	.13
5"	HS50-5	500	120	70	.13
5"	HS50-5	500	240	70	.13
6"	HS50-6	185	120	21	.15
6"	HS50-6	735	120	85	.15
6"	HS50-6	735	240	85	.15
8"	HS50-8	250	120	21	.17
8"	HS50-8	1000	120	85	.17
8"	HS50-8	1000	240	85	.17
10"	HS50-10	300	120	20	.22
10"	HS50-10	1200	240	80	.22
12"	HS50-12	500	120	28	.40
12"	HS50-12	2000	240	112	.40
14"	HS50-14	575	120	27	.48
14"	HS50-14	2300	240	110	.48

▼ Manfactured Items ▼

Diameter:	⅝" (.624/.620)			¾" (.749/.745)			1" (.999/.993)		
Maximum Amperage:	**20**			**28**			**30**		
Sheath Length	Cat. No.	Min. Watts	Max. Volts	Cat. No.	Min. Watts	Max. Volts	Cat. No.	Min. Watts	Max. Volts
1½"	HS62-1.5	130	240						
2″	HS62-2	200	240						
2½"	HS62-2.5	270	240	HS75-2.5	330	240			
3"	HS62-3	340	240	HS75-3	410	240	HS1.0-3	475	240
3½"	HS62-3.5	410	240	HS75-3.5	495	240	HS1.0-3.5	570	240
4"	HS62-4	480	240	HS75-4	575	240	HS1.0-4	665	240
4½"	HS62-4.5	550	240	HS75-4.5	660	240	HS1.0-4.5	760	240
5″	HS62-5	620	240	HS75-5	740	240	HS1.0-5	855	240
5½"	HS62-5.5	690	240	HS75-5.5	825	240	HS1.0-5.5	950	240
6″	HS62-6	760	240	HS75-6	910	240	HS1.0-6	1045	240
6½"	HS62-6.5	830	240	HS75-6.5	980	240	HS1.0-6.5	1140	240
7″	HS62-7	900	240	HS75-7	1075	240	HS1.0-7	1235	240
7½"	HS62-7.5	970	240	HS75-7.5	1150	240	HS1.0-7.5	1330	240
8″	HS62-8	1040	240	HS75-8	1240	240	HS1.0-8	1425	240
8½"	HS62-8.5	1110	240	HS75-8.5	1325	240	HS1.0-8.5	1520	240
9"	HS62-9	1180	240	HS75-9	1400	240	HS1.0-9	1615	240
9½"	HS62-9.5	1250	240	HS75-9.5	1475	240	HS1.0-9.5	1710	240
10″	HS62-10	1320	240	HS75-10	1560	240	HS1.0-10	1805	240
10½"	HS62-10.5	1390	240	HS75-10.5	1645	240	HS1.0-10.5	1900	240
11″	HS62-11	1460	240	HS75-11	1730	240	HS1.0-11	1995	240
11½"	HS62-11.5	1530	240	HS75-11.5	1820	240	HS1.0-11.5	2090	240
12″	HS62-12	1600	240	HS75-12	1890	240	HS1.0-12	2185	240
14"	HS62-14	1740	240	HS75-14	2050	240	HS1.0-14	2545	240
16″	HS62-16	1880	240	HS75-16	2210	240	HS1.0-16	2920	240
18″	HS62-18	2020	240	HS75-18	2370	240	HS1.0-18	3300	240
20″	HS62-20	2090	240	HS75-20	2450	240	HS1.0-20	3675	240

Cartridge Heaters

Superwatt® High Watt Density

CARTRIDGE

▼ IN STOCK ITEMS ▼

Diameter: ⅝"

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
2"	HS62-2	65	120	21	.13
2"	HS62-2	250	120	85	.13
2"	HS62-2	250	240	85	.13
2½"	HS62-2.5	85	120	21	.15
2½"	HS62-2.5	335	120	85	.15
2½"	HS62-2.5	335	240	85	.15
3"	HS62-3	105	120	21	.17
3"	HS62-3	415	120	85	.17
3"	HS62-3	415	240	85	.17
4"	HS62-4	145	120	21	.20
4"	HS62-4	585	120	85	.20
4"	HS62-4	585	240	85	.20
6"	HS62-6	230	120	21	.30
6"	HS62-6	920	120	85	.30
6"	HS62-6	920	240	85	.30
8"	HS62-8	250	120	17	.40
8"	HS62-8	375	120	25	.40
8"	HS62-8	1000	240	70	.40
8"	HS62-8	1500	240	100	.40
10"	HS62-10	400	120	21	.70
10"	HS62-10	1600	240	85	.70
12"	HS62-12	435	120	20	.80
12"	HS62-12	1750	240	80	.80
14"	HS62-14	925	120	35	.79
14"	HS62-14	3700	240	140	.79
16"	HS62-16	625	120	21	.91
16"	HS62-16	1125	120	37	.91
16"	HS62-16	2500	240	82	.91
16"	HS62-16	4500	240	148	.91
18"	HS62-18	750	120	22	1.03
18"	HS62-18	3000	240	87	1.03
20"	HS62-20	875	120	23	1.25
20"	HS62-20	3500	240	92	1.25

Diameter: ¾"

Length	Cat.No.	Watts	Volts	Watt Density w/in.²	Approx. Wght. (lbs.)
6"	HS75-6	250	120	20	.44
6"	HS75-6	1000	240	80	.44
6"	HS75-6	1500	240	115	.44
8"	HS75-8	375	120	21	.58
8"	HS75-8	500	120	27	.58
8"	HS75-8	1500	240	85	.58
8"	HS75-8	2000	240	110	.58
10"	HS75-10	500	120	22	.85
10"	HS75-10	2000	240	90	.85
12"	HS75-12	550	120	20	1.00
12"	HS75-12	2200	240	80	1.00
14"	HS75-14	1125	120	35	1.03
14"	HS75-14	2500	240	79	1.03
14"	HS75-14	4500	240	142	1.03
16"	HS75-16	1125	120	32	1.14
16"	HS75-16	4700	240	129	1.14
18"	HS75-18	1250	120	30	1.25
18"	HS75-18	5000	240	122	1.25

Cartridge Heaters

Superwatt® High Watt Density

Obtaining maximum heat transfer and long life.

Fit

High watt density heaters require careful fit to insure optimum performance and long life. Hotwatt recommends that installation holes not be drilled and reamed over .002" or larger than the nominal hole size required. The heaters are sized so that they never exceed .005" less than the nominal diameter and always at least .001" under the nominal diameter for a slide fit. These close fits insure rapid heat transfer from the heater and also help keep the unit as cool as possible, which contributes to long life. See chart A for allowable watt densities at different fit tolerances and operating temperatures.

Cycling

Rapid cycling of heaters from very low to very high temperatures shortens their life considerably. It is recommended therefore, that care be taken to compute the correct wattage for any given installation. Optimum wattage should result in a 50/50 off/on cycle. For very high temperature operation (over 750°F), off/on control might well be replaced by input voltage regulation through variable transformers or silicon rectifiers so that great temperature fluctuations in the heater wire are minimized.

Location of temperature control point

When thermostats are used, the sensing element ought not to be placed further than ½" away from the heater wherever possible. Location further away could conceivably cause the unit to run too hot and thereby shorten life.

Wattage

Minimum wattage is based on 60 watts per square inch. Units with lower watt densities may be manufactured for special conditions such as high temperature or vibration. Minimum wattage available can be determined using the following formula and the values in Table 1:

$$\text{Minimum Watts} = \frac{\text{Voltage Squared}}{\text{Ohms/inch x Heated Length}}$$

Table 1: Maximum allowable Ohms per inch by diameter.

Superwatt Diameter	Maximum Ohms per Inch of Heated Length
⅛"	800
¼"	600
⅜"	800
½"	600
⅝"	500
¾"	600
1"	700

Voltage

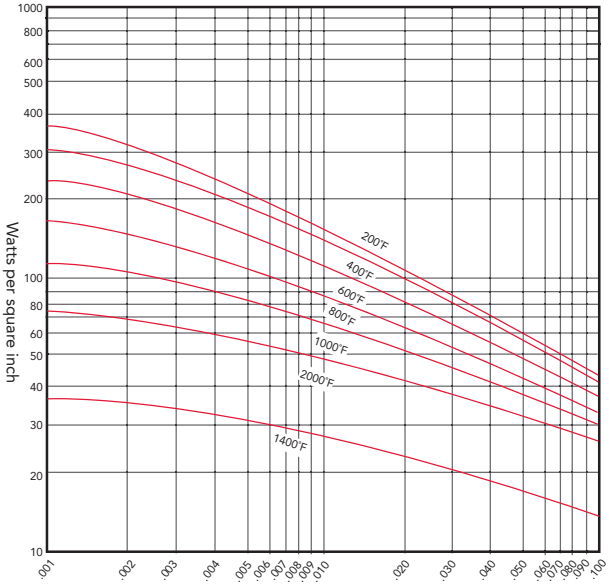
Standard Voltage is either 120V or 240V. Other voltages are available.

Termination

All units up to 1" diameter, within published amperage limits, are manufactured with 6" (type SF1) leads. 1" diameter units are manufactured with 6" (type SF2). Longer length leads are available.

Stock units supplied with 12" leads.

Graph A: Maximum watts/sq. in. with various increasing temperatures and hole tolerances.



Hole size over nominal fractional size

The watt densities are based on a unit installed in mild steel. Different materials affect the above values i.e. the lower the thermal conductivity of the material, the lower the maximum allowable watts per square inch.

Formula for determination of allowable element wattage:

Element Wattage: 3.142 x Diameter x Heated Length x Maximum watts/square inch from Graph A.

Formula for determination of watts/sq.in:

$$\textbf{Watts/sq. in.} = \frac{\text{Unit Wattage}}{\text{3.142 x Diameter x Heated Length}}$$

Heated Length is ½" less than sheath length

Tolerances

Wattage tolerances is +5% -10% at rated voltage. Length tolerances are ±2% with a ±1/16" minimum. Length tolerances apply to element sheath length.

Camber tolerances for units up to 12" long is .005" per six inch length. For units over 12" long, tolerance is .020" per foot of length. This value varies as the square of the length in feet. (i.e.—a 36" unit has a camber tolerance of .020" x $(3)^2$ = .180"). Normally camber does not present a problem since the unit will flex enough to fit a straight, close fit hole.

How To Order

After determining the wattage required and the line voltage available: determine the physical space available for heaters and the number of heaters required.
Review Stock List for In-Stock Items.

Specify: catalog number, wattage, voltage, lead type, and special features if required.

Example: HS37-4.25/375W120V/SF1-18/SF26