

Ceramic Fiber Heaters

Heated Insulation Package

Ceramic fiber heaters offer some of the highest temperature heating element capabilities in the Watlow® family of heaters. Heating units constructed with ceramic fiber insulation isolate the heating chamber from the outside. Ceramic fiber heaters are extremely low mass, high insulation value units with self-supported heating elements. Many applications benefit from the convenience of the heating element and insulation combined into one package. Lightweight, low-density properties make Watlow's ceramic fiber heaters ideal for high-temperature applications requiring low thermal mass.

Features and Benefits

High temperature ICA resistance elements

- Bounds integrally into required position
- Allows five element configurations

Lightweight, low-density alumina-silica composition molded into shape

- Acts as an insulation to isolate the heating chamber from the outside
- Provides low shrinkage fiber and inorganic binder
- Ensures a firm, thermal shock resistant, self-supporting unit at all operating temperatures

Operating temperatures up to 2200°F (1204°C)

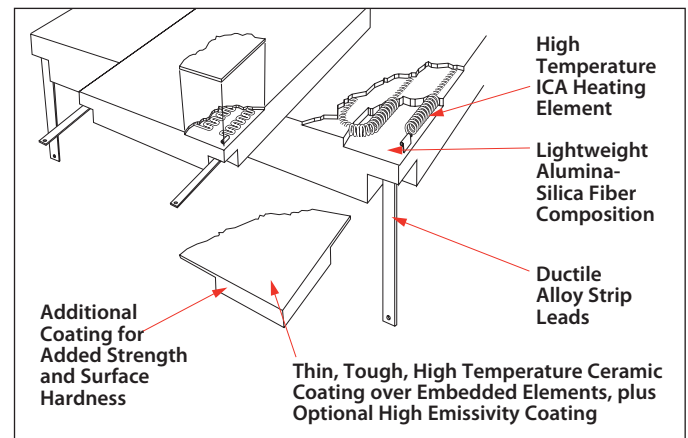
- Provides high temperature performance that cannot be achieved with many other heater types

Low mass ceramic fiber insulation of 10 to 15 lb/ft³ (160 to 240 kg/m³)

- Allows the heater to reach process temperature quickly
- Enables the energy to heat the load instead of wasting energy on itself

Works directly off common power line voltages

- Eliminates the need for expensive transformers or complex power control systems
- Enables compatibility with the full range of Watlow temperature controllers and power switching devices



Performance Capabilities

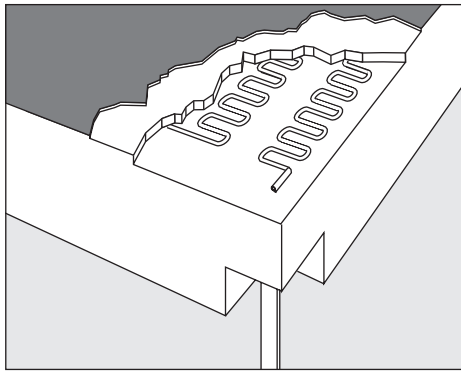
- Operates at temperatures up to 2200°F (1204°C)
- Allows watt densities from 5 to 30 W/in² (0.8 to 4.6 W/cm²)
- Uses "radiant" heat transfer exclusively

Typical Applications

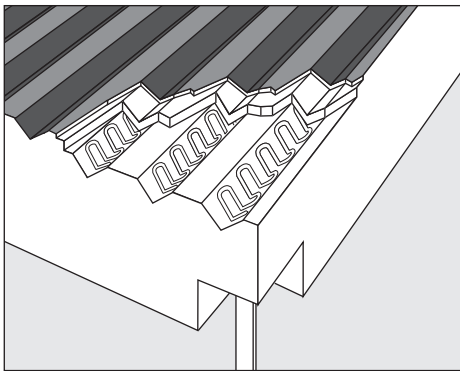
- High temperature furnaces
- Metal melting, holding and transfer
- Semiconductor processing
- Glass, ceramic and wire processing
- Analytical instrumentation

Options

Embedded Sinuated Elements



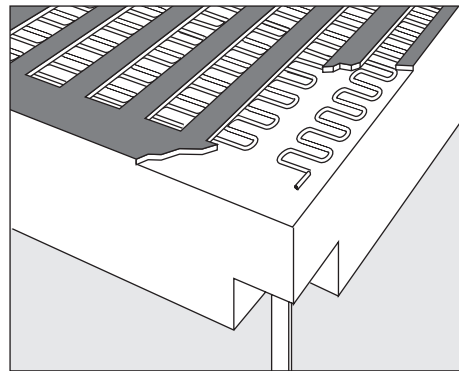
Flat Sinuated



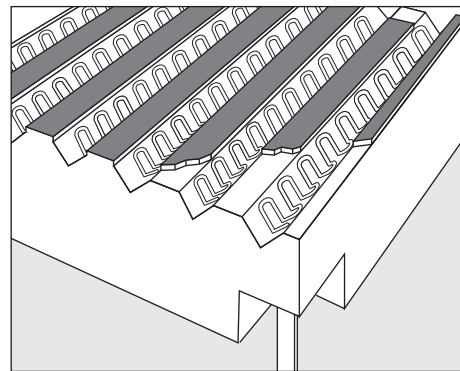
V-Sinuated

- Available in either flat or V-sinuated element configurations
- An advanced V-sinuated element configuration allows up to 27 percent additional watt density over embedded flat sinuated elements
- Performs best at medium to high temperatures at medium watt density power requirements
- Use in partially enclosed to fully enclosed applications
- Especially suited for large, flat units; semi-cylindrical units above 5 in. (125 mm) inside diameter; and full cylinders above 4 in. (100 mm) inside diameter.
- Offers greater effective insulation thickness than coiled element designs
- Enhances "heated insulation" concept of operational use
- Features high emissivity coating on new high-watt density series units.

Exposed Sinuated Elements



Flat Sinuated



V-Sinuated

- Available in either flat or V-sinuated element configurations
- Advanced V-sinuated element configuration allows up to 20 percent additional watt density over that of exposed flat sinuated elements
- Offers the lowest possible wire-to-chamber temperature difference for maximum heater life
- Provides optimum heat-up/cool-down and recovery times as well as maximum efficiency of operation
- Higher current handling capabilities possible
- Minimizes the number of circuits and connections in large furnaces
- Especially well suited for large, flat surface area units and large inside diameter curved units
- Exposed elements are available on special order as a variation of the embedded sinuated element normally provided on stock and standard units.

Termination Options

Watlow offers variations of electric leads to meet particular wiring requirements. To understand the termination options available, it is necessary to understand the different ways electrical leads can be applied.

Ceramic fiber heater electrical leads are welded to stubs – the metal parts that interface between the heating element wire and the add-on electrical leads. These stubs exit the heater at the lead pockets. Pockets are small cavities, below the cold face plane (outside surface) and generally located at or near the corners.

Watlow ceramic fiber heaters are equipped with either strip leads or double twisted wire leads. Strip leads are most commonly used, unless otherwise specified. The various lead styles refer to the lead's exit orientation relative to the pocket used on a given type of heater.

Strip Leads

Flat and semi-cylindrical ceramic fiber heaters are available with the termination options shown. When ordering termination options for catalog units, the specific strip lead **Style** must be specified. To determine the desired style, refer to the illustrations shown on this page. Otherwise, **Style A** leads will be provided and the length will be 12 in. (305 mm). Additional lengths are possible using add-on leads, which are priced per pair, per inch, for the three different widths. See the ordering charts for data on which lead width is used on a specific heater.

Strip leads are shipped with a $1\frac{3}{64}$ in. (5 mm) hole at the end of the lead. Use #10-24 screws, nuts and washers, or other wiring connections. Caution should be exercised when making connections. Leads are susceptible to loosening due to thermal expansion and contraction as the heater cycles.

Special Lead Orientation

If the various standard strip lead orientations and pocket configurations are not suitable, special designs are possible.

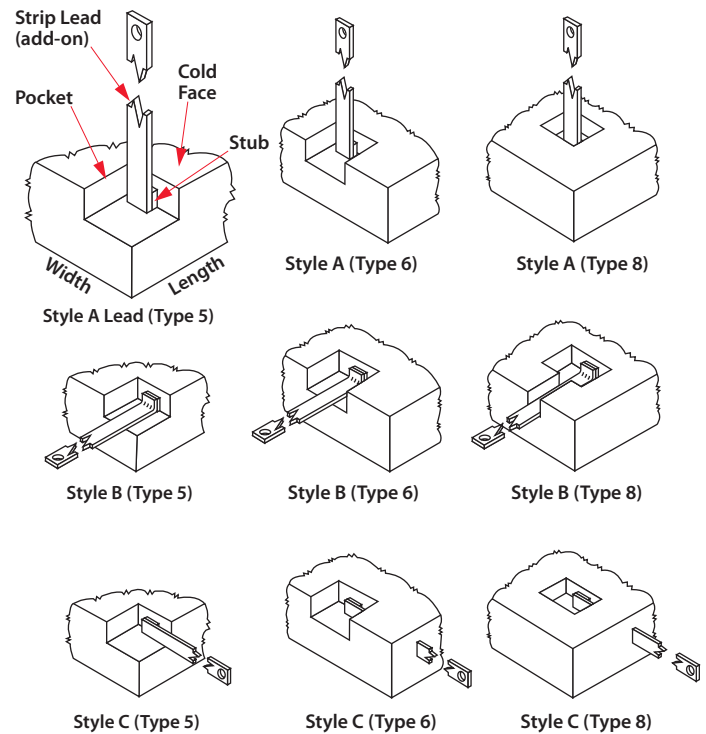
Leads Bent 90 Degrees

The double twisted leads of full cylinder heaters can be bent 90 degrees to lay into slots and exit to the sides of the unit.

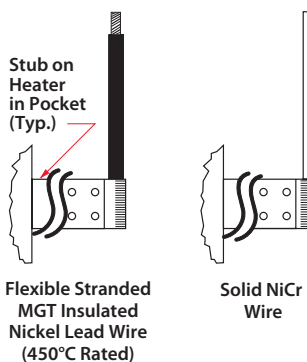
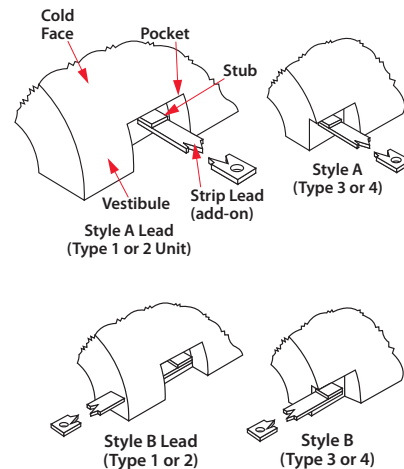
Special Add-On Lead Configurations

The two options illustrated can be welded onto the stub at the heater pocket, or for a better installation, welded on at the end of a specified length of the regular strip lead. The strip lead length can vary from zero to the value necessary to get away from the hot zone. The length of the add-on lead option eliminates the need for a custom product and satisfies a greater range of wiring requirements.

Flat Units



Semi-Cylindrical Units



Accessories

Ceramic fiber heater orders can also include the following accessory items.

Rigidizer

Rigidizer is primarily used to recoat soft, cut edges of ceramic fiber heaters and ceramic fiber insulation panels. Various degrees of hardening can be achieved with additional applications.

B.T.E. Closed-End Thermocouple Tubes

Horizontal thermocouple tube between the elements. Two sizes are available: 0.140 in. (3.6 mm) and 0.265 in. (6.7 mm), both 6 in. (152 mm) long with closed end.

Black Surface Coat

Black high emissivity coating is used to raise emissivity closer to 1.0.

Ceramic Tubes

Ceramic tubes are available in four nominal sizes: $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ in. (3.2, 6, 9.5 and 13 mm) inside diameter and lengths of 0.9 in. (22 mm) and 1.9 in. (48 mm) long. Ceramic tubes have several uses, including thermocouple mounting holes, mounting pin sleeves and lead coverings.

Dry Heating Surface Mix

Dry heating surface mix is used to make the hot face of all heaters, including those with the high emissivity coating. It can also be used with rigidizer to make a very high temperature paste for touch ups of the hot face area.

Patch Kit

To easily repair small breaks or cracks, the patch kit contains one pint (0.47 L) of powered ceramic fiber, four ounces (0.118 L) of black surface coat.

Ceramic Fiber Insulation Blanket

Additional insulation value for ceramic fiber heaters is available with a ceramic fiber insulation blanket. This 6 lb/ft³ (96 kg/m³) ceramic fiber blanket contains no organic binders. It is suitable for applications up to 2300°F (1260°C) and is sold in full rolls or cut by the square foot.

Powdered Ceramic Fiber

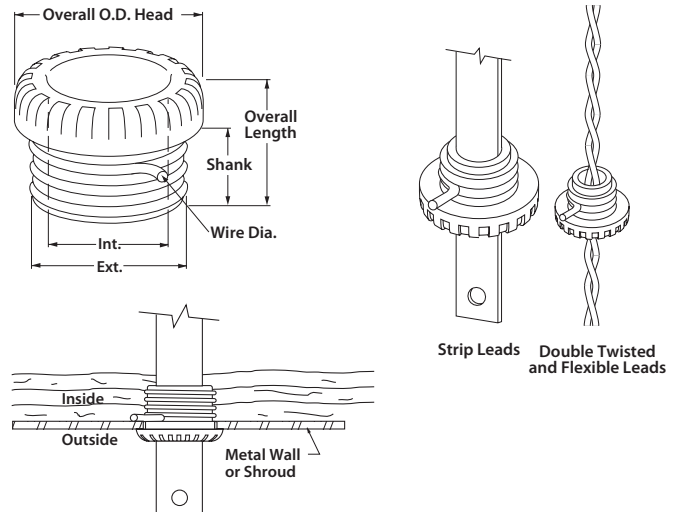
Powdered ceramic fiber is used primarily to improve surface finish in critical areas. It can also be used to repair damaged units by filling voids, cracks and broken corners. Use powdered ceramic fiber with rigidizer to make an easily applied paste.

High Temperature Coating and Electrical Potting Cement

Two different high purity, high temperature cements have multiple uses: mount thermocouple tubes, provide extra surface hardening, bond ceramic fiber gaskets and affix lightweight ceramic fiber insulation blanket to panels, as well as attach edge-spacer blocks and custom vestibules.

Strip Lead Porcelain Bushings

Strip lead porcelain bushings are primarily used to protect heater power leads when passing through the metal walls and furnace structures. Bushings are available for use with double twisted leads and the three standard strip lead widths.



Watlow® is a registered trademark of Watlow Electric Manufacturing Company.

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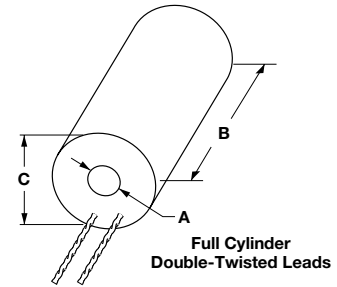
Austria	+43 6244 20129 0	India	+91 40 6661 2700
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Spain	+34 91 675 1292
Taiwan	+886 7 288 5168
UK	+44 115 964 0777

High-Temperature Heaters

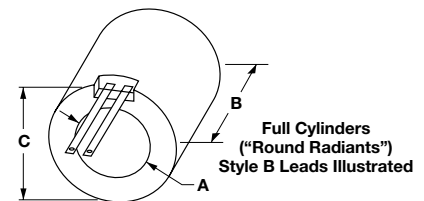
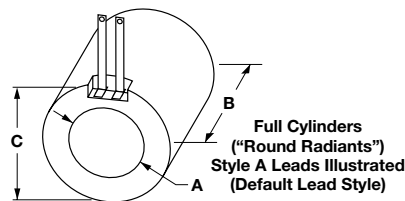


Ceramic Fiber Heaters



Full Cylinder Units

Dimensions, in. (mm)			Electrical Ratings			Lead Width	Approx. Net Wt. oz (kg)	Part Number ②
Heated Area		Overall	Volts	Power (Watts) ±5%	Surface Loading ① W/in ² (W/cm ²)			
I.D. (A) in. (mm) ± ¹ / ₁₆ (±1.6)	Length (B) in. (mm) ± ¹ / ₁₆ (±1.6)	O.D. (C) in. (mm) ± ¹ / ₈ (±3.2)						
1/2 (13)	6 (152)	2 (51)	60	175	18.6 (2.9)	Double Twisted Leads	5 (0.14)	VC400J06A
1/2 (13)	12 (305)	2 (51)	120	350	18.6 (2.9)		10 (0.28)	VC400J12A
3/4 (19)	6 (152)	3 (76)	60	200	14.2 (2.2)		8 (0.23)	VC400N06A
3/4 (19)	12 (305)	3 (76)	120	400	14.2 (2.2)		13 (0.37)	VC400N12A
1 (25)	6 (152)	3 (76)	60	220	11.7 (1.8)		9 (0.26)	VC401A06A
1 (25)	12 (305)	3 (76)	120	440	11.7 (1.8)		13 (0.37)	VC401A12A
1 1/4 (32)	6 (152)	3 1/2 (89)	60	275	11.7 (1.8)		11 (0.31)	VC401E06A
1 1/4 (32)	12 (305)	3 1/2 (89)	120	550	11.7 (1.8)		18 (0.51)	VC401E12A
1 1/2 (38)	6 (152)	3 1/2 (89)	60	300	10.6 (1.6)		12 (0.34)	VC401J06A
1 1/2 (38)	12 (305)	3 1/2 (89)	120	600	10.6 (1.6)		20 (0.57)	VC401J12A
1 3/4 (45)	6 (152)	4 (102)	120	350	10.6 (1.6)		12 (0.34)	VC401N06A
1 3/4 (45)	12 (305)	4 (102)	120	700	10.6 (1.6)		23 (0.65)	VC401N12A
2 (51)	6 (152)	4 (102)	120	425	11.3 (1.8)		13 (0.37)	VC402A06A
2 (51)	12 (305)	4 (102)	120	850	11.3 (1.8)		25 (0.71)	VC402A12A



Full Cylinder Units

Dimensions, in. (mm)			Electrical Ratings			Lead Width in. (mm)	Approx. Net Wt. lbs (kg)	Part Number ②
Heated Area		Overall	Volts	Power (Watts) ±5%	Surface Loading ① W/in ² (W/cm ²)			
I.D. (A) in. (mm) ± ¹ / ₁₆ (±1.6)	Length (B) in. (mm) ± ¹ / ₁₆ (±1.6)	O.D. (C) in. (mm) ± ¹ / ₈ (±3.2)						
3 (76)	6 (152)	7 (178)	120	650	11.5 (1.8)	3/8 (10)	2.5 (1.1)	VC403A06A
4 (102)	6 (152)	8 (203)	120	900	11.9 (1.8)	1/2 (13)	3.1 (1.4)	VC404A06A
4 (102)	6 (152)	8 (203)	120	1100	14.6 (2.3)	3/8 (10)	3.1 (1.4)	VC404A06T
5 (127)	6 (152)	9 (229)	120	1250	13.7 (2.1)	1/2 (13)	3.5 (1.6)	VC405A06A
5 (127)	6 (152)	9 (229)	120	1400	14.9 (2.3)	3/8 (10)	3.6 (1.6)	VC405A06T
6 1/2 (165)	6 (152)	10 1/2 (267)	120	1500	12.2 (1.9)	3/4 (19)	4.9 (2.2)	VC406J06A
6 1/2 (165)	6 (152)	10 1/2 (267)	120	2000	16.3 (2.5)	1/2 (13)	4.9 (2.2)	VC406J06T
8 (203)	6 (152)	12 (305)	120	1800	11.9 (1.8)	3/4 (19)	5.7 (2.6)	VC408A06A
8 (203)	6 (152)	12 (305)	120	2600	17.2 (2.7)	3/4 (19)	5.8 (2.6)	VC408A06T

① Units with part numbers ending in ...**OA**, watt densities between 10.6 to 14.2 W/in² (1.6 to 2.2 W/cm²), are coil designs suitable for use up to 2000°F (1093°C) maximum surface temperature. Units with part numbers ending in ...**T**, watt densities between 14.6 to 17.2 W/in² (2.3 to 2.7 W/cm²) are "round radiants" with sinuated element designs and high emissivity coating that are suitable for use up to 1800°F (982°C) maximum surface temperature.

② For unheated insulation tubes, substitute "**VN**" for "**VC**" in the part number of the appropriate size unit. No heats are manufacturing lead times.

High-Temperature Heaters



Ceramic Fiber Heaters

Ordering Information

VC - Full Cylindrical

Part Number

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Modification Options			Lead Options	Lead Length
V	C	4	0	5	A	0	6	A		0	0		

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ Base Code Number

⑩ Modification Options

0 =	None
A =	0.140 thermocouple tube I.D. opposite leads, centered on height
B =	0.140 thermocouple tube I.D. lead side, centered on height
E =	Black surface coat
F =	Black surface coat 0.140 thermocouple tube I.D. opposite leads, centered on height
G =	Black surface coat 0.140 thermocouple tube I.D. lead side, centered on height

⑬ Lead Options

0 =	Fixed (built-in) standard double-twisted*
1 =	601 Alloy 600 strip A style
2 =	601 Alloy 600 strip B style
9 =	Flex NI, MGT A style
A =	Flex NI, MGT B style
E =	Chromel® A / NI, A style
F =	Chromel® A / NI, B style

* Double -twisted leads are only available on 1/2 thru 2 in. I.D. heaters.

⑭ Lead Length

A =	0 in.	T =	14 in.
B =	1 in.	U =	15 in.
E =	2 in.	V =	16 in.
F =	3 in.	W =	17 in.
G =	4 in.	X =	18 in.
H =	5 in.	Y =	19 in.
J =	6 in.	1 =	20 in.
K =	7 in.	2 =	21 in.
L =	8 in.	3 =	22 in.
M =	9 in.	4 =	23 in.
N =	10 in.	6 =	24 in.
P =	11 in.	7 =	30 in.
R =	12 in.	8 =	36 in.
S =	13 in.	9 =	42 in.

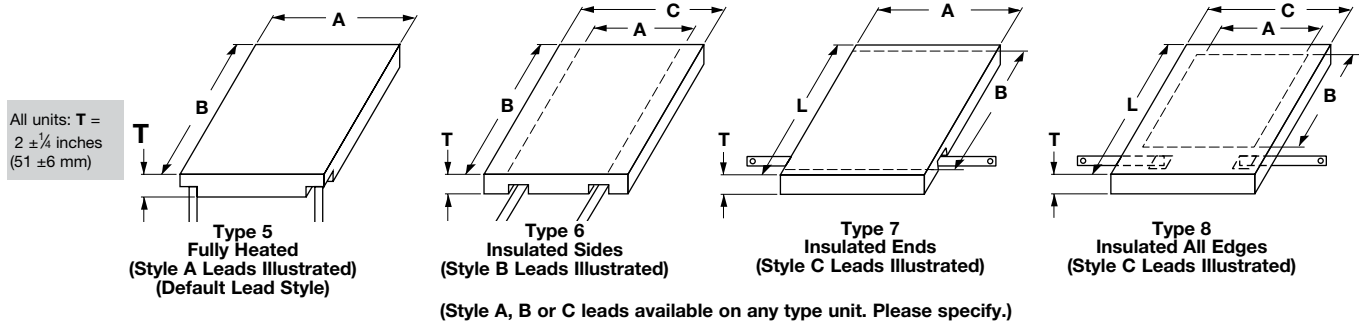
Notes:

- If the order is placed before 11:00 AM CST, heaters with standard leads (...OR) ship the same day. Heaters with non-standard leads ship the next day.
- The BTE (between-the-element) is NOT covered in this system yet. Please contact your Watlow representative for availability.

High-Temperature Heaters



Ceramic Fiber Heaters



Flat Units — Embedded Coiled Elements (see page 421)

Dimensions, in. (mm)				Electrical Rating			Strip Lead Width in. (mm)	Approximate Net Wt.			Part Number
Heated Size	Type 6 & 8	Type 7 & 8			Surface Loading	Type 5		Type 6 & 7	Type 8		
Width (A) in. (mm)	Length (B) in. (mm)	Width (C) in. (mm)	Length (L) in. (mm)	Volts	Power (Watts) ±5%	W/in ² (W/cm ²)	lbs (kg)	lbs (kg)	lbs (kg)		
4 (102)	6 (152)	8 (203)	10 (254)	60	275	11.5 (1.8)	3/8 (10)	0.6 (0.3)	1.1 (0.5)	1.7 (0.8)	VF004A06S
	12 (305)	8 (203)	16 (406)	60	550	11.5 (1.8)	1/2 (13)	1.2 (0.5)	2.2 (1.0)	2.8 (1.3)	VF004A12S
	18 (457)	8 (203)	22 (559)	120	750	10.4 (1.6)	3/8 (10)	1.9 (0.9)	3.4 (1.5)	4.5 (2.0)	VF004A18S
	24 (610)	8 (203)	28 (711)	120	1100	11.5 (1.8)	1/2 (13)	2.4 (1.1)	4.4 (2.0)	5.6 (2.5)	VF004A24S
6 (152)	6 (152)	10 (254)	10 (254)	60	375	10.4 (1.6)	3/8 (10)	0.9 (0.4)	1.5 (0.7)	2.4 (1.1)	VF006A06S
	12 (305)	10 (254)	16 (406)	120	750	10.4 (1.6)	3/8 (10)	1.8 (0.8)	2.8 (1.3)	3.7 (1.7)	VF006A12S
	18 (457)	10 (254)	22 (559)	120	1250	11.6 (1.8)	1/2 (13)	3.0 (1.4)	4.1 (1.9)	5.0 (2.3)	VF006A18S
	24 (610)	10 (254)	28 (711)	240	1500	10.4 (1.6)	3/8 (10)	3.5 (1.6)	5.3 (2.4)	6.2 (2.8)	VF006A24S
	30 (762)	10 (254)	34 (864)	240	2000	11.2 (1.7)	1/2 (13)	4.5 (2.0)	6.6 (3.0)	8.4 (3.8)	VF006A30S
	36 (914)	10 (254)	40 (1016)	240	2500	11.6 (1.8)	1/2 (13)	6.1 (2.8)	8.3 (3.8)	10.2 (4.6)	VF006A36S
8 (203)	12 (305)	12 (305)	16 (406)	120	1100	11.5 (1.8)	1/2 (13)	2.5 (1.1)	3.2 (1.5)	4.1 (1.9)	VF008A12S
	18 (457)	12 (305)	22 (559)	240	1500	10.4 (1.6)	3/8 (10)	3.6 (1.6)	4.7 (2.1)	5.6 (2.5)	VF008A18S
	24 (610)	12 (305)	28 (711)	240	2200	11.5 (1.8)	1/2 (13)	4.8 (2.2)	6.5 (2.9)	7.4 (3.4)	VF008A24S
	30 (762)	12 (305)	34 (864)	240	2500	10.4 (1.6)	1/2 (13)	6.2 (2.8)	8.0 (3.6)	9.7 (4.4)	VF008A30S
	36 (914)	12 (305)	40 (1016)	240	3000	10.4 (1.6)	3/4 (19)	7.8 (3.5)	10.0 (4.5)	11.8 (5.4)	VF008A36S
10 (254)	12 (305)	14 (356)	16 (406)	240	1250	10.4 (1.6)	3/8 (10)	2.6 (1.2)	3.9 (1.8)	5.0 (2.3)	VF010A12S
	18 (457)	14 (356)	22 (559)	240	1800	10.0 (1.6)	1/2 (13)	4.2 (1.9)	5.4 (2.4)	6.5 (2.9)	VF010A18S
	24 (610)	14 (356)	28 (711)	240	2500	10.4 (1.6)	1/2 (13)	5.2 (2.4)	7.7 (3.5)	8.8 (4.0)	VF010A24S
	30 (762)	14 (356)	34 (864)	240	3000	10.0 (1.6)	3/4 (19)	7.0 (3.2)	9.5 (4.3)	11.7 (5.3)	VF010A30S
	36 (914)	14 (356)	40 (1016)	240	3600	10.0 (1.6)	3/4 (19)	9.1 (4.1)	11.5 (5.2)	13.7 (6.2)	VF010A36S
	12 (305)	12 (305)	16 (406)	16 (406)	240	1500	10.4 (1.6)	3/8 (10)	3.2 (1.5)	4.6 (2.1)	5.8 (2.6)
18 (457)		16 (406)	22 (559)	240	2200	10.2 (1.6)	1/2 (13)	4.9 (2.2)	6.5 (2.9)	7.7 (3.5)	VF012A18S
24 (610)		16 (406)	28 (711)	240	3000	10.4 (1.6)	3/4 (19)	7.5 (3.4)	9.5 (4.3)	10.7 (4.9)	VF012A24S
30 (762)		16 (406)	34 (864)	240	3600	10.0 (1.6)	3/4 (19)	9.1 (4.1)	11.7 (5.3)	12.9 (5.9)	VF012A30S
36 (914)		16 (406)	40 (1016)	240	4400	10.2 (1.6)	3/4 (19)	12.4 (5.6)	15.5 (7.0)	16.7 (7.6)	VF012A36S
14 (356)		12 (305)	18 (457)	16 (406)	240	1750	10.4 (1.6)	1/2 (13)	4.7 (2.1)	6.1 (2.8)	7.6 (3.4)
	18 (457)	18 (457)	22 (559)	240	2550	10.6 (1.6)	1/2 (13)	6.8 (3.1)	8.5 (3.9)	10.0 (4.5)	VF014A18S
	24 (610)	18 (457)	28 (711)	240	3500	10.4 (1.6)	3/4 (19)	10.0 (4.5)	11.9 (5.4)	13.4 (6.1)	VF014A24S
	30 (762)	18 (457)	34 (864)	240	4300	10.2 (1.6)	3/4 (19)	12.5 (5.7)	15.0 (6.8)	16.5 (7.5)	VF014A30S
	36 (914)	18 (457)	40 (1016)	240/240	5200	10.3 (1.6)	1/2 (13)	14.2 (6.4)	17.2 (7.8)	18.7 (8.5)	VF014A36S ^②
	16 (406)	12 (305)	20 (508)	16 (406)	240	2100	10.9 (1.7)	1/2 (13)	5.2 (2.4)	6.7 (3.0)	8.4 (3.8)
18 (457)		20 (508)	22 (559)	240	3000	10.4 (1.6)	3/4 (19)	8.2 (3.7)	9.9 (4.5)	11.6 (5.3)	VF016A18S
24 (610)		20 (508)	28 (711)	240	4200	10.9 (1.7)	3/4 (19)	11.9 (5.4)	13.8 (6.3)	15.5 (7.0)	VF016A24S
30 (762)		20 (508)	34 (864)	240/240	5000	10.4 (1.6)	1/2 (13)	15.2 (6.9)	17.7 (8.0)	19.4 (8.8)	VF016A30S ^②
36 (914)		20 (508)	40 (1016)	240/240	6000	10.4 (1.6)	3/4 (19)	17.9 (8.1)	20.9 (9.5)	22.6 (10.3)	VF016A36S ^②

All units in this table are suitable for use up to 2000°F (1093°C) maximum surface temperature.

① Add Type number (Type 5 - 8) in the blank position in the part number. Example: **VS704A06S**.

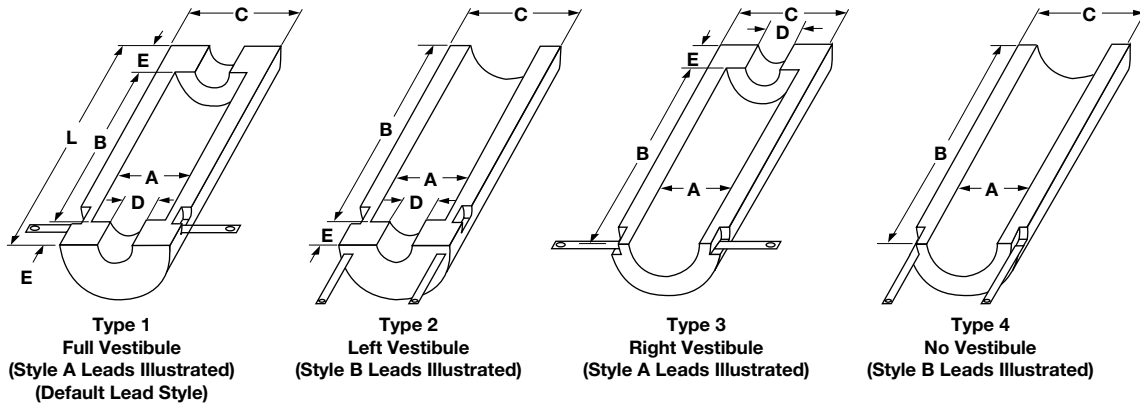
For unheated units, see catalog page 430.

② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters



Ceramic Fiber Heaters



(Style A or B leads available on any type unit. Please specify.)

Semi-Cylindrical Units — Embedded Coiled Elements (see page 421)

Dimensions, in. (mm)						Electrical Ratings			Approx. Net Wt.		Part Number	
Heated Size			Type 1, 2, & 3 Sizes			Power (Watts) ±5%	Surface Loading W/in ² (W/cm ²)	Strip Lead Width in. (mm)	Type 1 Full Vest. lbs (kg)	Type 4 No Vest. lbs (kg)		
I.D. (A) in. (mm) ±1/8 (±3.2)	Length (B) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	O.D. (C) in. (mm) (Ref)	Vestibule Sizes									
			Length (L) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	Dia. (D) in. (mm) ±1/8 (±3.2)	Length (E) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	Volts						
2 (51)	6 (152)	6 (152)	8 (203)	1 (25)	1 (25)	60	275	14.6 (2.3)	3/8 (10)	1.1 (0.5)	1.1 (0.5)	VS[®]02A06S
	12 (305)	6 (152)	14 (356)	1 (25)	1 (25)	120	550	14.6 (2.3)	3/8 (10)	1.8 (0.8)	1.8 (0.8)	VS[®]02A12S
	18 (457)	6 (152)	20 (508)	1 (25)	1 (25)	120	750	13.3 (2.1)	3/8 (10)	2.3 (1.0)	2.3 (1.0)	VS[®]02A18S
	24 (610)	6 (152)	26 (660)	1 (25)	1 (25)	240	1100	14.6 (2.3)	3/8 (10)	3.5 (1.6)	3.5 (1.6)	VS[®]02A24S
3 1/2 (89)	6 (152)	7 1/2 (191)	9 1/2 (241)	2 (51)	1 3/4 (45)	60	450	13.6 (2.1)	1/2 (13)	2.0 (0.9)	1.5 (0.7)	VS[®]03J06S
	12 (305)	7 1/2 (191)	15 1/2 (394)	2 (51)	1 3/4 (45)	120	900	13.6 (2.1)	1/2 (13)	3.1 (1.4)	2.6 (1.2)	VS[®]03J12S
	18 (457)	7 1/2 (191)	21 1/2 (546)	2 (51)	1 3/4 (45)	120	1250	12.6 (2.0)	1/2 (13)	4.5 (2.0)	4.0 (1.8)	VS[®]03J18S
	24 (610)	7 1/2 (191)	27 1/2 (699)	2 (51)	1 3/4 (45)	240	1800	13.6 (2.1)	1/2 (13)	5.4 (2.4)	4.9 (2.2)	VS[®]03J24S
5 (127)	6 (152)	9 (229)	11 (279)	3 1/2 (89)	2 1/2 (64)	60	625	13.3 (2.1)	1/2 (13)	3.4 (1.5)	2.5 (1.1)	VS[®]05A06S
	12 (305)	9 (229)	17 (432)	3 1/2 (89)	2 1/2 (64)	120	1250	13.3 (2.1)	1/2 (13)	4.9 (2.2)	4.0 (1.8)	VS[®]05A12S
	18 (457)	9 (229)	23 (584)	3 1/2 (89)	2 1/2 (64)	240	1775	12.6 (2.0)	1/2 (13)	5.7 (2.6)	4.8 (2.2)	VS[®]05A18S
	24 (610)	9 (229)	29 (737)	3 1/2 (89)	2 1/2 (64)	240	2500	13.3 (2.1)	1/2 (13)	7.9 (3.6)	6.9 (3.1)	VS[®]05A24S
	30 (762)	9 (229)	35 (889)	3 1/2 (89)	2 1/2 (64)	240	3100	13.2 (2.0)	3/4 (19)	10.9 (4.9)	9.2 (4.2)	VS[®]05A30S
	36 (914)	9 (229)	41 (1041)	3 1/2 (89)	2 1/2 (64)	240	3550	12.6 (2.0)	3/4 (19)	13.2 (6.0)	11.5 (5.2)	VS[®]05A36S
6 1/2 (165)	6 (152)	10 1/2 (267)	12 (305)	5 (127)	3 (76)	120	750	12.2 (1.9)	3/8 (10)	3.8 (1.7)	2.6 (1.2)	VS[®]06J06S
	12 (305)	10 1/2 (267)	18 (457)	5 (127)	3 (76)	240	1500	12.2 (1.9)	3/8 (10)	5.4 (2.4)	4.2 (1.9)	VS[®]06J12S
	18 (457)	10 1/2 (267)	24 (610)	5 (127)	3 (76)	240	2100	11.4 (1.8)	1/2 (13)	7.5 (3.4)	6.2 (2.8)	VS[®]06J18S
	24 (610)	10 1/2 (267)	30 (762)	5 (127)	3 (76)	240	3000	12.2 (1.9)	3/4 (19)	10.9 (4.9)	8.9 (4.0)	VS[®]06J24S
	30 (762)	10 1/2 (267)	36 (914)	5 (127)	3 (76)	240	3750	12.2 (1.9)	3/4 (19)	13.5 (6.1)	11.4 (5.2)	VS[®]06J30S
	36 (914)	10 1/2 (267)	42 (1067)	5 (127)	3 (76)	240	4200	11.4 (1.8)	3/4 (19)	16.4 (7.4)	14.3 (6.5)	VS[®]06J36S
8 (203)	6 (152)	12 (305)	12 (305)	6 1/2 (165)	3 (76)	120	900	11.6 (1.8)	1/2 (13)	5.0 (2.3)	2.8 (1.3)	VS[®]08A06S
	12 (305)	12 (305)	18 (457)	6 1/2 (165)	3 (76)	240	1800	11.6 (1.8)	1/2 (13)	7.6 (3.4)	5.0 (2.3)	VS[®]08A12S
	18 (457)	12 (305)	24 (610)	6 1/2 (165)	3 (76)	240	2500	11.1 (1.7)	1/2 (13)	10.5 (4.8)	8.1 (3.7)	VS[®]08A18S
	24 (610)	12 (305)	30 (762)	6 1/2 (165)	3 (76)	240	3500	11.6 (1.8)	3/4 (19)	13.9 (6.3)	12.4 (5.6)	VS[®]08A24S
	30 (762)	12 (305)	36 (914)	6 1/2 (165)	3 (76)	240	4200	11.1 (1.7)	3/4 (19)	16.6 (7.5)	14.1 (6.4)	VS[®]08A30S
	36 (914)	12 (305)	42 (1067)	6 1/2 (165)	3 (76)	240/240	5000	11.1 (1.7)	1/2 (13)	18.0 (8.2)	15.6 (7.1)	VS[®]08A36S[®]

CONTINUED

All units have 2 ±1/4 inch thick walls.

All units in this table are suitable for use up to 2000°F (1093°C) maximum surface temperature.

① Add Type number (Type 1 - 4) in the blank position in the part number. Example: **VS[®]102A06S**.
For unheated units, see catalog page 430.

Overall length applies only to the full vestibule (Type 1) units. Types 2 and 3 are shorter by one vestibule length. Type 4 length equals (B).

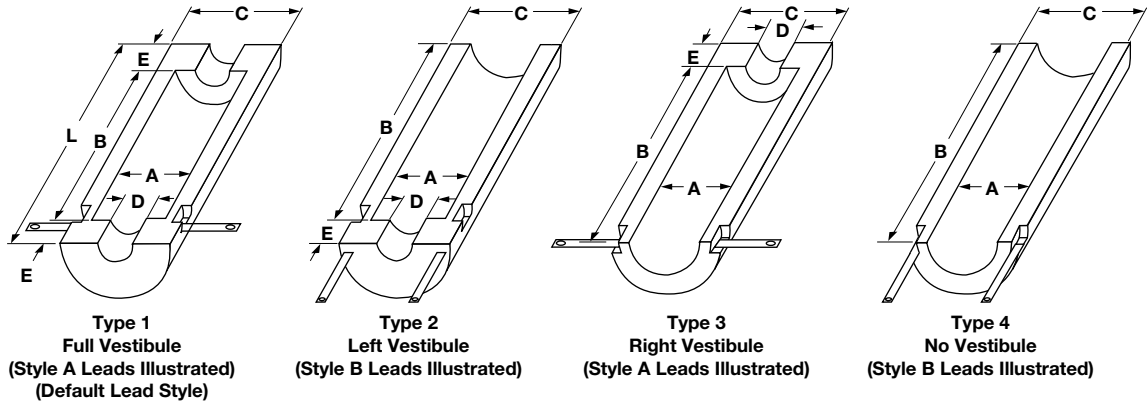
Type 2 (left vestibule) and Type 3 (right vestibule) style units are not stocked. They are, however, still standard units and designs are kept on file.

② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters



Ceramic Fiber Heaters



(Style A or B leads available on any type unit. Please specify.)

Semi-Cylindrical Units — Embedded Coiled Elements (Con't.) (see page 421)

Dimensions, in. (mm)						Electrical Ratings				Approx. Net Wt.		Part Number
Heated Size			Type 1, 2, & 3 Sizes			Volts	Power (Watts) ±5%	Surface Loading W/in ² (W/cm ²)	Strip Lead Width in. (mm)	Approx. Net Wt.		
I.D. (A) in. (mm) ±1/8 (±3.2)	Length (B) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	O.D. (C) in. (mm) (Ref)	Vestibule Sizes							Type 1 Full Vest. lbs (kg)	Type 4 No Vest. lbs (kg)	
			Length (L) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	Dia. (D) in. (mm) ±1/8 (±3.2)	Length (E) in. (mm) +1/16 -1/8 (+1.6 - 3.2)							
10 (254)	12 (305)	14 (356)	18 (457)	8 (203)	3 (76)	240	2100	11.1 (1.7)	1/2 (13)	9.2 (4.2)	6.5 (2.9)	VS₁₀A12S
	18 (457)	14 (356)	24 (610)	8 (203)	3 (76)	240	3000	10.6 (1.6)	3/4 (19)	13.3 (6.0)	10.6 (4.8)	VS₁₀A18S
	24 (610)	14 (356)	30 (762)	8 (203)	3 (76)	240	4200	11.1 (1.7)	3/4 (19)	15.5 (7.0)	12.8 (5.8)	VS₁₀A24S
	30 (762)	14 (356)	36 (914)	8 (203)	3 (76)	240/240	5000	10.6 (1.6)	1/2 (13)	18.7 (8.5)	15.4 (7.0)	VS₁₀A30S²
	36 (914)	14 (356)	42 (1067)	8 (203)	3 (76)	240/240	6000	10.6 (1.6)	3/4 (19)	22.6(10.3)	19.3 (8.8)	VS₁₀A36S²
12 (305)	12 (305)	16 (406)	18 (457)	10 (254)	3 (76)	240	2500	11.1 (1.7)	1/2 (13)	9.9 (4.5)	6.8 (3.1)	VS₁₂A12S
	18 (457)	16 (406)	24 (610)	10 (254)	3 (76)	240	3500	10.3 (1.6)	3/4 (19)	13.0 (5.9)	9.9 (4.5)	VS₁₂A18S
	24 (610)	16 (406)	30 (762)	10 (254)	3 (76)	240	4200	9.3 (1.4)	3/4 (19)	18.5 (8.4)	15.4 (7.0)	VS₁₂A24S
	30 (762)	16 (406)	36 (914)	10 (254)	3 (76)	240/240	6000	10.6 (1.6)	3/4 (19)	22.5(10.2)	18.6 (8.4)	VS₁₂A30S²
	36 (914)	16 (406)	42 (1067)	10 (254)	3 (76)	240/240	7000	10.3 (1.6)	3/4 (19)	26.9(12.2)	23.1(10.5)	VS₁₂A36S²
14 (356)	12 (305)	18 (457)	18 (457)	12 (305)	3 (76)	240	3000	11.4 (1.8)	3/4 (19)	12.6 (5.7)	9.0 (4.1)	VS₁₄A12S
	18 (457)	18 (457)	24 (610)	12 (305)	3 (76)	240	4200	10.6 (1.6)	3/4 (19)	15.3 (6.9)	11.7 (5.3)	VS₁₄A18S
	24 (610)	18 (457)	30 (762)	12 (305)	3 (76)	240/240	6000	11.4 (1.8)	3/4 (19)	18.8 (8.5)	15.2 (6.9)	VS₁₄A24S
	30 (762)	18 (457)	36 (914)	12 (305)	3 (76)	240/240	7000	10.6 (1.6)	3/4 (19)	26.7(12.1)	22.2(10.1)	VS₁₄A30S²
	36 (914)	18 (457)	42 (1067)	12 (305)	3 (76)	240/240	8400	10.6 (1.6)	3/4 (19)	31.8(14.4)	27.3(12.4)	VS₁₄A36S²
16 (406)	12 (305)	20 (508)	18 (457)	14 (356)	3 (76)	240	3500	11.6 (1.8)	3/4 (19)	14.0 (6.4)	10.2 (4.6)	VS₁₆A12S
	18 (457)	20 (508)	24 (610)	14 (356)	3 (76)	240	4200	9.3 (1.4)	3/4 (19)	16.9 (7.7)	13.1 (5.9)	VS₁₆A18S
	24 (610)	20 (508)	30 (762)	14 (356)	3 (76)	240/240	7000	11.6 (1.8)	3/4 (19)	20.8 (9.4)	17.0 (7.7)	VS₁₆A24S
	30 (762)	20 (508)	36 (914)	14 (356)	3 (76)	240/240	7600	10.1 (1.6)	3/4 (19)	30.1(13.7)	24.2(11.0)	VS₁₆A30S²
	36 (914)	20 (508)	42 (1067)	14 (356)	3 (76)	240/240	9000	9.9 (1.5)	3/4 (19)	34.4(15.6)	28.5(12.9)	VS₁₆A36S²

All units in this table have 2 ±1/4 inch thick walls.

All units in this table are suitable for use up to 2000°F (1093°C) maximum surface temperature.

① Add Type number (Type 1 - 4) in the blank position in the part number. Example: **VS₁₀A06S**.

For unheated units, see catalog page 430.

Overall length applies only to the full vestibule (Type 1) Units. Types 2 and 3 are shorter by one vestibule length. Type 4 length equals (B).

Type 2 (left vestibule) and Type 3 (right vestibule) style units are not stocked. They are, however, still standard units and designs are kept on file.

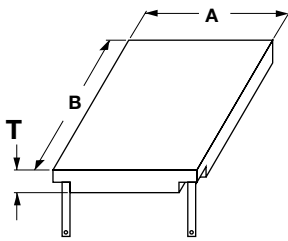
② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters

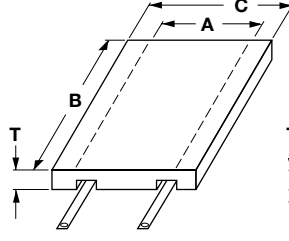


Ceramic Fiber Heaters

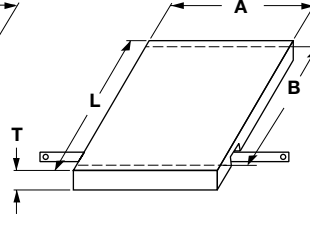
All units: T =
2 ± 1/4 inches
(51 ± 6 mm)



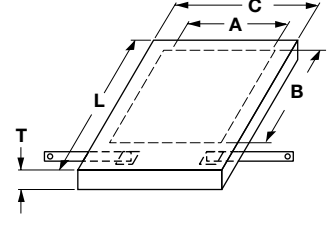
Type 5
Fully Heated
(Style A Leads Illustrated)
(Default Lead Style)



Type 6
Insulated Sides
(Style B Leads Illustrated)



Type 7
Insulated Ends
(Style C Leads Illustrated)



Type 8
Insulated All Edges
(Style C Leads Illustrated)

(Style A, B or C leads available on any type unit. Please specify.)

Flat Units—High Watt Density Sinuated Elements (see page 420)

Dimensions, in. (mm)				Electrical Rating			Strip Lead Width in. (mm)	Approximate Net Wt.			Part Number
Heated Size		Type 6 & 8	Type 7 & 8	Volts	Power (Watts) ±5%	Surface Loading W/in ² (W/cm ²)		Type 5	Type 6 & 7	Type 8	
Width (A) in. (mm)	Length (B) in. (mm)	Width (C) in. (mm)	Length (L) in. (mm)				lbs (kg)	lbs (kg)	lbs (kg)		
6 (152)	12 (305)	10 (254)	16 (406)	60	1250	17.4 (2.7)	1/2 (13)	1.7 (0.8)	2.7 (1.6)	3.6 (1.2)	VF006A12T
	18 (457)	10 (254)	22 (559)	120	2000	18.5 (2.9)	1/2 (13)	2.6 (1.2)	3.7 (2.1)	4.6 (1.7)	VF006A18T
	24 (610)	10 (254)	28 (711)	120	2500	17.4 (2.7)	1/2 (13)	3.2 (1.5)	5.0 (2.7)	5.9 (2.3)	VF006A24T
	24 (610)	10 (254)	28 (711)	240	2500	17.4 (2.7)	1/2 (13)	3.2 (1.5)	5.0 (2.7)	5.9 (2.3)	VF006A24U
	30 (762)	10 (254)	34 (864)	240	3400	18.9 (2.9)	1/2 (13)	4.5 (2.0)	7.1 (3.6)	7.9 (3.2)	VF006A30T
	36 (914)	10 (254)	40 (1016)	240	4000	18.5 (2.9)	1/2 (13)	5.5 (2.5)	8.5 (4.2)	9.3 (3.9)	VF006A36T
8 (203)	12 (305)	12 (305)	16 (406)	60	1800	18.7 (2.9)	3/4 (19)	2.3 (1.0)	3.0 (1.8)	3.9 (1.4)	VF008A12T
	18 (457)	12 (305)	22 (559)	120	3000	20.8 (3.2)	3/4 (19)	3.5 (1.6)	4.6 (2.5)	5.5 (2.1)	VF008A18T
	24 (610)	12 (305)	28 (711)	120	3600	18.7 (2.9)	3/4 (19)	4.4 (2.0)	6.1 (3.2)	7.0 (2.8)	VF008A24T
	30 (762)	12 (305)	34 (864)	240	5000	20.8 (3.2)	1/2 (13)	6.1 (2.8)	8.7 (4.4)	9.7 (4.0)	VF008A30T
	36 (914)	12 (305)	40 (1016)	240	6000	20.8 (3.2)	3/4 (19)	7.0 (3.2)	10.0 (5.0)	11.0 (4.5)	VF008A36T
	10 (254)	12 (305)	14 (356)	16 (406)	120	2000	16.7 (2.6)	1/2 (13)	2.4 (1.1)	3.7 (2.2)	4.8 (1.7)
18 (457)		14 (356)	22 (559)	120	3600	20.0 (3.1)	3/4 (19)	4.0 (1.8)	5.2 (2.9)	6.3 (2.4)	VF010A18T
24 (610)		14 (356)	28 (711)	240	4500	17.9 (2.8)	1/2 (13)	4.7 (2.1)	7.2 (3.8)	8.3 (3.3)	VF010A24T
30 (762)		14 (356)	34 (864)	240	6000	20.0 (3.1)	3/4 (19)	6.7 (3.0)	9.3 (4.8)	10.5 (4.2)	VF010A30T
36 (914)		14 (356)	40 (1016)	240	7200	20.0 (3.1)	3/4 (19)	8.5 (3.9)	11.5 (5.8)	12.7 (5.2)	VF010A36T
12 (305)		12 (305)	16 (406)	16 (406)	120	2500	17.4 (2.7)	1/2 (13)	2.9 (1.3)	4.3 (2.5)	5.5 (2.0)
	12 (305)	16 (406)	16 (406)	240	2500	17.4 (2.7)	3/8 (10)	2.9 (1.3)	4.3 (2.5)	5.5 (2.0)	VF012A12U
	18 (457)	16 (406)	22 (559)	240	4000	18.5 (2.9)	1/2 (13)	4.5 (2.0)	6.1 (3.3)	7.3 (2.8)	VF012A18T
	24 (610)	16 (406)	28 (711)	240	6000	20.8 (3.2)	3/4 (19)	6.6 (3.0)	8.6 (4.4)	9.8 (3.9)	VF012A24T
	30 (762)	16 (406)	34 (864)	240	7200	20.0 (3.1)	3/4 (19)	8.6 (3.9)	11.2 (5.7)	12.6 (5.1)	VF012A30T
	36 (914)	16 (406)	40 (1016)	240/240	8400	19.4 (3.0)	1/2 (13)	10.2 (4.6)	13.2 (6.6)	14.6 (6.0)	VF012A36T ²
14 (356)	12 (305)	18 (457)	16 (406)	120	3500	20.8 (3.2)	3/4 (19)	4.2 (1.9)	5.3 (3.0)	6.7 (2.4)	VF014A12T
	18 (457)	18 (457)	22 (559)	240	4900	19.4 (3.0)	1/2 (13)	6.1 (2.8)	7.6 (4.1)	9.1 (3.4)	VF014A18T
	24 (610)	18 (457)	28 (711)	240	7000	20.8 (3.2)	3/4 (19)	8.5 (3.9)	10.5 (5.4)	11.9 (4.8)	VF014A24T
	30 (762)	18 (457)	34 (864)	240/240	8400	20.0 (3.1)	1/2 (13)	10.7 (4.9)	13.2 (6.6)	14.6 (6.0)	VF014A30T ²
	36 (914)	18 (457)	40 (1016)	240/240	9800	19.4 (3.0)	1/2 (13)	12.2 (5.5)	15.2 (7.5)	16.6 (6.9)	VF014A36T ²
	16 (406)	12 (305)	20 (508)	16 (406)	120	3550	18.5 (2.9)	3/4 (19)	4.7 (2.1)	5.7 (3.4)	7.4 (2.6)
18 (457)		20 (508)	22 (559)	240	5750	20.0 (3.1)	3/4 (19)	7.1 (3.2)	8.6 (4.7)	10.3 (3.9)	VF016A18T
24 (610)		20 (508)	28 (711)	240	7100	18.5 (2.9)	3/4 (19)	9.5 (4.3)	11.5 (6.0)	13.2 (5.2)	VF016A24T
30 (762)		20 (508)	34 (864)	240/240	9600	20.0 (3.1)	1/2 (13)	11.7 (5.3)	14.2 (7.2)	15.9 (6.4)	VF016A30T ²
36 (914)		20 (508)	40 (1016)	240/240	11,500	20.0 (3.1)	3/4 (19)	14.2 (6.4)	17.2 (8.6)	18.9 (7.8)	VF016A36T ²

All units in this table are suitable for use up to 1800°F (982°C) maximum surface temperature.

① Add Type number (Type 5 - 8) in the blank position in the part number. Example: **VF806A12T**. For unheated units, see catalog page 430.

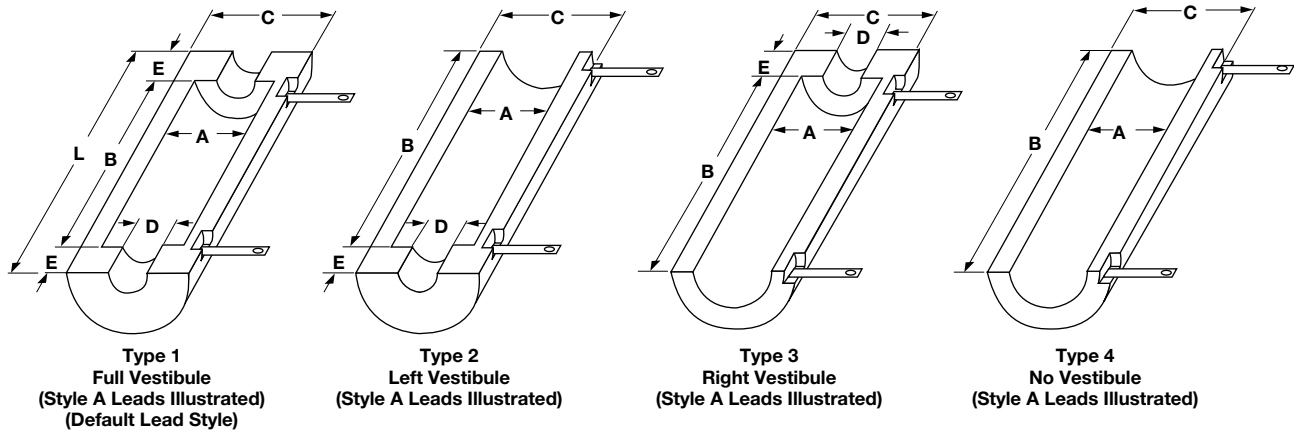
Sinuated wire, high watt density units are provided with embedded sinuated elements and high emissivity coating unless exposed sinuated is specified when manufactured. (These are not stocked.) Contact your Watlow representative.

② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters



Ceramic Fiber Heaters



Semi-Cylindrical Units—High Watt Density Sinuated Elements (see page 420)

Dimensions, in. (mm)						Electrical Ratings			Strip Lead Width in. (mm)	Approx. Net Wt.		Part Number
Heated Size			Type 1, 2, & 3 Sizes			Volts	Power (Watts) ±5%	Surface Loading W/in ² (W/cm ²)		Type 1 Full Vest.	Type 4 No Vest.	
I.D. (A) in. (mm) ± ¹ / ₈ (±3.2)	Length (B) in. (mm) + ¹ / ₁₆ - ¹ / ₈ (+1.6 - 3.2)	O.D. (C) in. (mm) (Ref)	Vestibule Sizes							lbs (kg)	lbs (kg)	
			Length (L) in. (mm) + ¹ / ₁₆ - ¹ / ₈ (+1.6 - 3.2)	Dia. (D) in. (mm) ± ¹ / ₈ (±3.2)	Length (E) in. (mm) + ¹ / ₁₆ - ¹ / ₈ (+1.6 - 3.2)							
5 (127)	6 (152)	9 (229)	11 (279)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	60	750	15.9 (2.5)	3/8 (10)	3.1 (1.4)	2.3 (1.0)	VS [®] 05A06T
	12 (305)	9 (229)	17 (432)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	60	1400	14.9 (2.3)	3/4 (19)	4.5 (2.0)	3.6 (1.6)	VS [®] 05A12T
	18 (457)	9 (229)	23 (584)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	120	2100	14.9 (2.3)	1/2 (13)	5.2 (2.4)	4.3 (2.0)	VS [®] 05A18T
	24 (610)	9 (229)	29 (737)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	120	2800	14.9 (2.3)	3/4 (19)	6.9 (3.1)	6.0 (2.7)	VS [®] 05A24T
	30 (762)	9 (229)	35 (889)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	240	3500	14.9 (2.3)	1/2 (13)	8.3 (3.8)	7.4 (3.4)	VS [®] 05A30T
	36 (914)	9 (229)	41 (102)	3 ¹ / ₂ (89)	2 ¹ / ₂ (64)	240	4200	14.9 (2.3)	1/2 (13)	9.6 (4.4)	8.7 (3.9)	VS [®] 05A36T
6 ¹ / ₂ (165)	6 (152)	10 ¹ / ₂ (267)	12 (305)	5 (127)	3 (76)	60	1000	16.3 (2.5)	1/2 (13)	3.6 (1.6)	2.4 (1.1)	VS [®] 06J06T
	12 (305)	10 ¹ / ₂ (267)	18 (457)	5 (127)	3 (76)	120	2000	16.3 (2.5)	1/2 (13)	5.1 (2.3)	3.9 (1.8)	VS [®] 06J12T
	18 (457)	10 ¹ / ₂ (267)	24 (610)	5 (127)	3 (76)	120	3000	16.3 (2.5)	3/4 (19)	6.8 (3.1)	5.6 (2.5)	VS [®] 06J18T
	24 (610)	10 ¹ / ₂ (267)	30 (762)	5 (127)	3 (76)	240	4000	16.3 (2.5)	1/2 (13)	9.5 (4.3)	7.4 (3.4)	VS [®] 06J24T
	30 (762)	10 ¹ / ₂ (267)	36 (914)	5 (127)	3 (76)	240	5000	16.3 (2.5)	3/4 (19)	11.0 (5.0)	9.3 (4.2)	VS [®] 06J30T
	36 (914)	10 ¹ / ₂ (267)	42 (1067)	5 (127)	3 (76)	240	6000	16.3 (2.5)	3/4 (19)	12.4 (5.6)	11.2 (5.1)	VS [®] 06J36T
8 (203)	6 (152)	12 (305)	12 (305)	6 ¹ / ₂ (165)	3 (76)	60	1300	17.2 (2.7)	1/2 (13)	4.1 (1.9)	2.6 (1.2)	VS [®] 08A06T
	12 (305)	12 (305)	18 (457)	6 ¹ / ₂ (165)	3 (76)	120	2600	17.2 (2.7)	3/4 (19)	6.9 (3.1)	5.4 (2.4)	VS [®] 08A12T
	18 (457)	12 (305)	24 (610)	6 ¹ / ₂ (165)	3 (76)	240	3900	17.2 (2.7)	1/2 (13)	8.5 (3.9)	7.0 (3.2)	VS [®] 08A18T
	24 (610)	12 (305)	30 (762)	6 ¹ / ₂ (165)	3 (76)	240	5200	17.2 (2.7)	1/2 (13)	12.0 (5.4)	10.5 (4.8)	VS [®] 08A24T
	30 (762)	12 (305)	36 (914)	6 ¹ / ₂ (165)	3 (76)	240	6250	16.7 (2.6)	3/4 (19)	13.8 (6.3)	12.3 (5.6)	VS [®] 08A30T
	36 (914)	12 (305)	42 (1067)	6 ¹ / ₂ (165)	3 (76)	240/240	7800	17.2 (2.7)	1/2 (13)	15.6 (7.1)	14.1 (6.4)	VS [®] 08A36T [®]

CONTINUED

All units in this table have 2 ±¹/₄ inch thick walls.

All units in this table are suitable for use up to 1800°F (982°C) maximum surface temperature.

① Add Type number (Type 1 - 4) in the blank position in the part number. Example: **VS106J06T**. For unheated units, see catalog page 430.

Sinuated wire, high watt density units are provided with embedded sinuated elements and high emissivity coating unless exposed sinuated is specified when manufactured. (These are not stocked.) Contact your Watlow representative.

Overall length applies only to the full vestibule (Type 1) units. Types 2 and 3 are shorter by one vestibule length. Type 4 length equals (B).

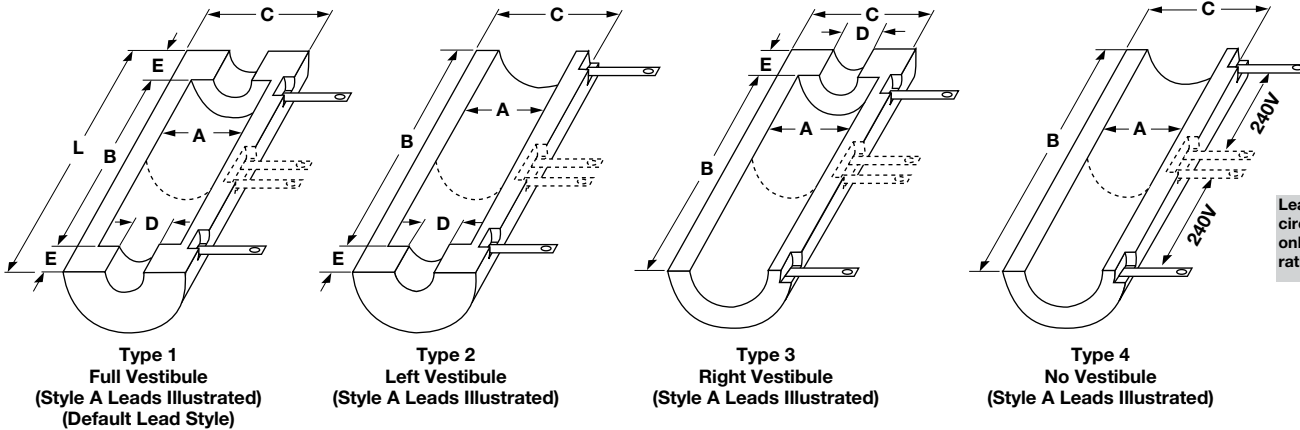
Type 2 (left vestibule) and Type 3 (right vestibule) style units are not stocked. They are, however, still standard units and designs are kept on file.

② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters



Ceramic Fiber Heaters



Semi-Cylindrical Units—High Watt Density Sinuated Elements (Con't.) (see page 420)

Dimensions, in. (mm)						Electrical Ratings			Strip Lead Width in. (mm)	Approx. Net Wt.		Part Number
Heated Size			Type 1, 2, & 3 Sizes			Power (Watts) ±5%	Surface Loading W/in ² (W/cm ²)	Type 1 Full Vest. lbs (kg)		Type 4 No Vest. lbs (kg)		
I.D. (A) in. (mm) ±1/8 (±3.2)	Length (B) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	O.D. (C) in. (mm) (Ref)	Vestibule Sizes						Volts			
			Length (L) in. (mm) +1/16 -1/8 (+1.6 - 3.2)	Dia. (D) in. (mm) ±1/8 (±3.2)	Length (E) in. (mm) +1/16 -1/8 (+1.6 - 3.2)							
10 (254)	12 (305)	14 (356)	18 (457)	8 (203)	3 (76)	240	3200	17.0 (2.6)	1/2 (13)	8.5 (3.9)	5.8 (2.6)	VS ^① 10A12T
	18 (457)	14 (356)	24 (610)	8 (203)	3 (76)	240	4800	17.0 (2.6)	1/2 (13)	12.0 (5.4)	9.3 (4.2)	VS ^① 10A18T
	24 (610)	14 (356)	30 (762)	8 (203)	3 (76)	240	6400	17.0 (2.6)	3/4 (19)	13.8 (6.3)	11.1 (5.0)	VS ^① 10A24T
	30 (762)	14 (356)	36 (914)	8 (203)	3 (76)	240/240	8000	17.0 (2.6)	1/2 (13)	17.6 (8.0)	14.9 (6.8)	VS ^① 10A30T ^②
	36 (914)	14 (356)	42 (1067)	8 (203)	3 (76)	240/240	9600	17.0 (2.6)	1/2 (13)	21.3 (9.7)	18.6 (8.4)	VS ^① 10A36T ^②
12 (305)	12 (305)	16 (406)	18 (457)	10 (254)	3 (76)	240	3800	16.8 (2.6)	1/2 (13)	8.9 (4.0)	5.9 (2.7)	VS ^① 12A12T
	18 (457)	16 (406)	24 (610)	10 (254)	3 (76)	240	5700	16.8 (2.6)	3/4 (19)	11.2 (5.1)	8.1 (3.7)	VS ^① 12A18T
	24 (610)	16 (406)	30 (762)	10 (254)	3 (76)	240	7600	16.8 (2.6)	3/4 (19)	16.7 (7.6)	13.6 (6.2)	VS ^① 12A24T
	30 (762)	16 (406)	36 (914)	10 (254)	3 (76)	240/240	9600	17.0 (2.6)	1/2 (13)	18.0 (8.2)	14.9 (6.8)	VS ^① 12A30T ^②
	36 (914)	16 (406)	42 (1067)	10 (254)	3 (76)	240/240	11400	16.8 (2.6)	3/4 (19)	19.2 (8.7)	16.1 (7.3)	VS ^① 12A36T ^②
14 (356)	12 (305)	18 (457)	18 (457)	12 (305)	3 (76)	240	4400	16.7 (2.6)	1/2 (13)	11.4 (5.2)	7.7 (3.5)	VS ^① 14A12T
	18 (457)	18 (457)	24 (610)	12 (305)	3 (76)	240	6600	16.7 (2.6)	3/4 (19)	12.9 (5.9)	9.4 (4.3)	VS ^① 14A18T
	24 (610)	18 (457)	30 (762)	12 (305)	3 (76)	240/240	8800	16.7 (2.6)	1/2 (13)	16.3 (7.4)	12.7 (5.8)	VS ^① 14A24T ^②
	30 (762)	18 (457)	36 (914)	12 (305)	3 (76)	240/240	11400	17.3 (2.7)	3/4 (19)	19.4 (8.8)	15.8 (7.2)	VS ^① 14A30T ^②
	36 (914)	18 (457)	42 (1067)	12 (305)	3 (76)	240/240	13200	16.7 (2.6)	3/4 (19)	22.4 (10.2)	18.8 (8.5)	VS ^① 14A36T ^②
16 (406)	12 (305)	20 (508)	18 (457)	14 (356)	3 (76)	240	5000	16.6 (2.6)	3/4 (19)	11.8 (5.4)	8.0 (3.6)	VS ^① 16A12T
	18 (457)	20 (508)	24 (610)	14 (356)	3 (76)	240/240	7500	16.6 (2.6)	1/2 (13)	15.1 (6.8)	11.3 (5.1)	VS ^① 16A18T
	24 (610)	20 (508)	30 (762)	14 (356)	3 (76)	240/240	10,000	16.6 (2.6)	1/2 (13)	18.1 (8.2)	14.3 (6.5)	VS ^① 16A24T ^②
	30 (762)	20 (508)	36 (914)	14 (356)	3 (76)	240/240	12,800	16.8 (2.6)	3/4 (19)	22.3 (10.1)	18.5 (8.4)	VS ^① 16A30T ^②
	36 (914)	20 (508)	42 (1067)	14 (356)	3 (76)	240/240	15,000	16.6 (2.6)	3/4 (19)	26.4 (12.0)	22.6 (10.3)	VS ^① 16A36T ^②

All units in this table have 2 ±1/4 inch thick walls.

All units in this table are suitable for use up to 1800°F (982°C) maximum surface temperature.

① Add Type number (Type 1 through 4) in the blank position in the part number. Example **VS106J06T**.

For unheated units, see catalog page 430.

Sinuated wire, high watt density units are provided with embedded sinuated elements and high emissivity coating unless exposed sinuated is specified when manufactured. (These are not stocked.) Contact your Watlow representative.

Overall length applies only to the full vestibule (Type 1) units. Types 2 and 3 are shorter by one Vestibule length. Type 4 length equals (B).

Type 2 (left vestibule) and Type 3 (right vestibule) style units are not stocked. They are, however, still standard units and designs are kept on file.

② These units have dual elements to use in "parallel" for 240V usage. Alternate designs are available for 480V, 277V and three-phase (internally wired). Contact your Watlow representative.

High-Temperature Heaters



Ceramic Fiber Heaters

Ordering Information

VF - Flat

VS - Semi-Cylindrical

Part Number

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Base Code Nbr.	Modification Options			Lead Options	Lead Length
V	F	5	1	2	A	1	2	S		0	0		

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ Base Code Number

⑩ Modification Options	
0 =	None
A =	0.140 thermocouple tube I.D. center of heated length of unit
B =	0.265 thermocouple tube I.D. center of heated length of unit
E =	Black surface coat
F =	Black surface coat 0.140 thermocouple tube I.D. center of heated length of unit
G =	Black surface coat 0.265 thermocouple tube I.D. center of heated length of unit

⑬ Lead Options	
0 =	None
1 =	601 Alloy 600 strip A style
2 =	601 Alloy 600 strip B style
3 =	601 Alloy 600 strip C style
9 =	Flex NI, MGT A style
A =	Flex NI, MGT B style
B =	Flex NI, MGT C style
E =	Chromel® -A / NI, A style
F =	Chromel® -A / NI, B style
G =	Chromel® -A / NI, C style

⑭ Lead Length			
A =	0 in.	T =	14 in.
B =	1 in.	U =	15 in.
E =	2 in.	V =	16 in.
F =	3 in.	W =	17 in.
G =	4 in.	X =	18 in.
H =	5 in.	Y =	19 in.
J =	6 in.	1 =	20 in.
K =	7 in.	2 =	21 in.
L =	8 in.	3 =	22 in.
M =	9 in.	4 =	23 in.
N =	10 in.	6 =	24 in.
P =	11 in.	7 =	30 in.
R =	12 in.	8 =	36 in.
S =	13 in.	9 =	42 in.



Ceramic Fiber Heaters

How to Order

Made-to-Order

Ordering Information

Quantity: When ordering, specify quantity of units desired. Semi-cylindrical units are sold as “each half.” Two halves to make a pair are usually required. Please include the number of desired spares or extras in the total quantity.

Part number: Use the part number if an exact re-order of a previously designed made-to-order unit is needed. Please reconfirm volts and watts, lead orientation and length. Most heaters allow selection of several stock modifications (see page 432) and termination options (see pages 426 and 427).

Dimensions for made-to-order units: Include a drawing if possible. Specify the heated area, width and length, overall width/length, thickness, electrical ratings, etc.

Wattage: 6.5 to 25 W/in² (1.0 - 3.9 W/cm²) on the heating surface is the recommended watt density range for operation in the 1500 to 2200°F (815 - 1204°C) range. (Note: At the higher temperatures, lower watt densities must be employed.) Please provide operating temperatures and conditions. Contact your Watlow representative for higher watt densities at other temperatures. Generally, for higher operating temperature limits, lower watt densities must be used.

Voltage: 60, 120 and 240VAC are offered on units. However, up to 600 volts is possible with extended capabilities. Internally connected three-lead, three-phase units are also available on made-to-order units (these are normally internally wye-connected). Contact your Watlow representative on special voltage requirements.

Leads: Lead length and orientation (i.e. **Style A, B or C**). Lead **Style A**, 12 in. (305 mm) long.

Shipping weight: The product listing tables show net weights per unit. To estimate gross shipping weight, add 30 percent to the total. Additional shipping/packaging charges may be incurred for certain large orders. Due to the light weight but large size of these heaters, dimensional box weighting may occur on expedited air shipments.

Ordering Hints

Ordering ceramic fiber heaters is easy. However, it is very important to pay attention to part numbers and special modifications details.

- Always fill in the “..._...” (blank) code position with the correct Type number (see illustrations above the charts).
- Always provide the correct Lead Style letter. (See suggested illustrations above the charts, but Style A-12 will be the default lead if not otherwise specified.)
- Supply a drawing or sketch whenever possible to eliminate confusion.
- When ordering Type 6, 7, 8 units, be certain of the heated area and no-heat area orientations desired.
- When planning to order Type 2 and/or Type 3 units (left or right vestibule), there are three options to consider—two of which could be used on the Type 1 items:
 1. Order the appropriate full vestibule unit. The customer can carefully remove the unneeded vestibule.
 2. Order the full vestibule unit. Prior to shipping Watlow will remove the unneeded vestibule as a stock modification. There is a small additional charge for this.
 3. Special order the desired Type 2 or 3 unit. This requires extended manufacturing of the heater and increases delivery time, but will minimize costs.

WATLOW CERAMIC FIBER HEATERS

Watlow Electric, Columbia, Mo 65202

CAUTION!

Read All Instructions
Before Installing!

NOTE :

Seriously Shortened Heater Life
May Result if Improperly Adjusted
Control Systems are Used!
See Instruction #6 (over)

NOTE :

Serious Damage May
Occur If Leads Are
Bent Incorrectly!
See Instruction #2 (over)

The enclosed Watlow Ceramic Fiber Heating Units, Model
Number _____, are rated at _____ volts
for _____ watts. These heaters may be operated, with
suitable controls, up to _____ deg. F/ _____ deg. C
heater surface temperature in a clean, dry AIR atmosphere
(unless another atmosphere is specified below).

Note: Special atmosphere. Operating Temperature above
reflects the de-rating for use in a _____ atmosphere.

IF "TEMPERATURE RATING" ABOVE IS MARKED "**"

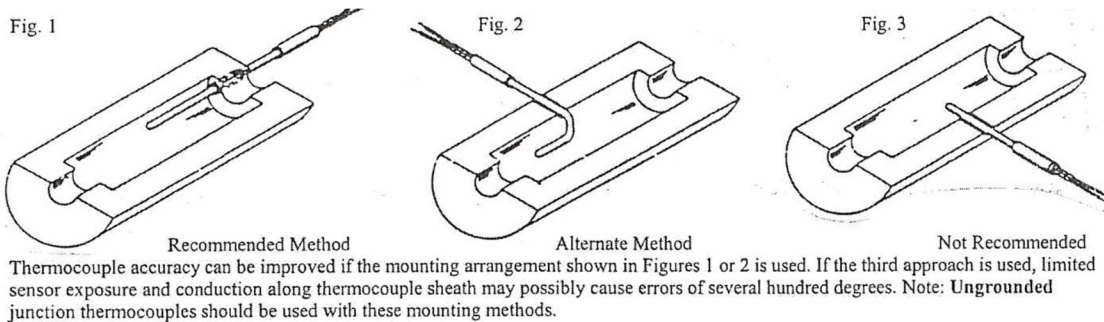
This heating unit has not been given a "Recommended Maximum" operating temperature rating because the rated power exceeds our limits for the size, configuration, ect. However, its construction uses the same high temperature materials as used in other heaters of this type. We recommend that these "**" rated heaters be operated continuously ONLY at reduced power levels which have been determined by the user to provide satisfactory operation and life in the application.

Special Notice Regarding Heaters Shipped Using the "Instapak" Material; For disposal of this material, there are four (4) options to consider:

1. RECLAIM AT MUNICIPAL "WASTE-TO-ENERGY" FACILITIES.
2. DISPOSE OF THE MATERIAL IN LAND FILL.
3. CALL 1-800-982-6197 FOR THE NEAREST "INSTAPAK" RETURN LOCATIONS IN THE U.S AND CANADA
4. RETURN THE MATERIAL DIRECTLY TO:
SEALED AIR CORPORATION
7110 SANTA FE DRIVE
HODGKINS, IL 60525
(708) 352-8700

INSTALLATION AND OPERATING INSTRUCTIONS WATLOW CERAMIC FIBER HEATING UNITS

1. Watlow ceramic fiber heaters are not to be used as CONTACT heaters, and should not be operated in contact with conductive surfaces. Operation in this manner will void warranties. A minimum of 1/2 inch air gap is advised, with wider spacings used at higher temperatures and /or higher voltages. **Check to verify that the surrounding support structures, thermocouples, and control instruments are properly grounded to insure operator and personal safety.** If application questions arise, consult Watlow.
2. **SERIOUS DAMAGE MAY OCCUR IF LEADS ARE BENT IMPROPERLY!**
 - A. **Strip leads:** The flat strip leads will only bend in one direction. Grasp the strip leads with pliers or vise-grips between the heater and the bend to prevent forces from being applied directly to the lead pocket. Maintain a 1/16 inch minimum bend radius. Avoid folding, then mashing, the strip flat against itself as this may cause cracking or fracture of the lead material.
 - B. **Double Twisted wire leads:** Grasp the lead firmly with pliers or vise-grips between heater and bend. Cushion the leads on both sides with strips of wood to prevent crushing or nicking the wire. Form the lead around a one inch (minimum) diameter arbor, taking extreme care to prevent forces from being applied to the heater through the leads. If a bend radius of 1/2 inch or smaller is required, it will be necessary to heat the point to be bent with a torch to soften the wire slightly before bending.
3. To ensure good electrical contact to leads, use a compression type connector. Space the connector as far away from the heated area as possible to minimize thermal expansion and contraction, Oxidation, and subsequent self-loosening of the connector. Insure that the fasteners / connectors are tightly secured. If possible, these connections should be checked for tightness periodically.
4. Do not cut, notch, or drill the heater before insuring that the heating element will not be touched. For a nominal charge, a template showing location of heating elements can be provided upon request. Consult your Watlow sales representative, or the factory for other techniques. **Any modifications to the unit (including cutting ,drilling, or sanding) within the "heated area" (with or without use of coil templates) will be performed at the customer's risk and will void all warranties.**
5. Always mount high limit thermocouples so that the tip (junction) is located within 1/8" of the heated surface and directly above an element to monitor and control the element temperature (See Fig. 1,2 & 3 below.) Operation without such high limit control is not recommended. Consult your Watlow sales representative for assistance and suitable equipment.



6. Operating heaters at above their rated voltages will reduce heater life. Further, operating with power switching devices set to long cycle times will reduce heater life as significantly as operations beyond temperature limits. Operating at reduced voltages may limit thermal performance. (Cycle times of under 5 seconds is recommended, or better, **the use of SSR'S AND SCR'S IS PREFERRED.**)
7. Never connect different model number heating units in a series. Also, due to resistance change of the element with life, never connect new and aged heaters (even if the same model number) in series. Series connected heated heaters must be replaced in sets. Example: 4x6 flat unit rated 310 watts at 60 volts can be connected in series to operate from a 120 volt power supply. However, one 4x6 flat unit rated 310 watts at 60 volts and one at 6x6 flat unit rated 450 wats at 60 volts cannot be connected in series to operate from a 120 volt power supply. If two units rated for 240 volt operation are to be connected in series for 480 volt operation, see instruction 7. NOTE: Terminals or leads marked "common" or "com" must be connected together at the same voltage potential.
8. Only binder-free insulation should be used as back-up insulation ceramic fiber heaters. Many insulations currently available contain organic binders. When heated they give off fumes which attack the heating elements causing premature failure. A suggested back-up insulation for operations up to 2200°F is 6 pound density ceramic fiber blanket insulation.
- 9 During normal use, these heating units typically develop one or more cracks in the hot face surface. The size of these cracks will vary depending on the following: the size of the unit, the maximum soak temperature, and the number of firings to temperature from ambient. The cracks will normally not Impair the usefulness or functional capabilities of the heating unit as it was designed. Repairs of cracks is generally not necessary in typical furnace applications.
10. Please consult your sales representative or the factory if you have any further questions concerning your heating application.