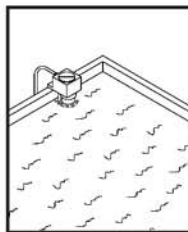


# THERMAL OVERLOAD PROTECTION

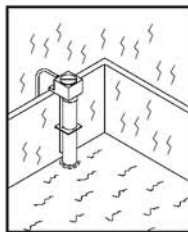
## Protector 1, 2 and 3 Series

### THE PROTECTOR 1 SERIES

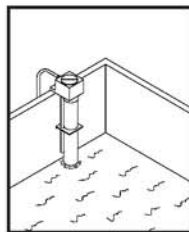
The Protector 1 overtemperature control system utilizes a heat sensitive fuse to detect overheat conditions. The fuse, placed inside a thermowell, positioned in contact with the heater sheath, will cut power to the heater in the event of low liquid level.



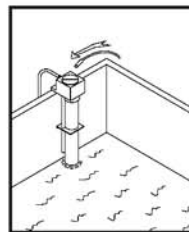
Immersion heater with PROTECTOR 1 working normally.



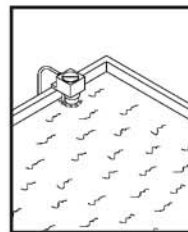
Process bath level drops due to tank leak or evaporation.



PROTECTOR 1 fuse sensor detects elevating temperature and shuts off power to heater.



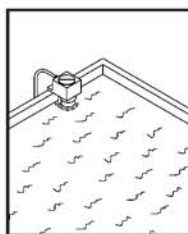
Replace fuse.



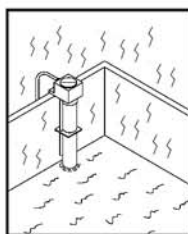
Restore the liquid level and resume operation.

### THE PROTECTOR 2 AND 3 SERIES

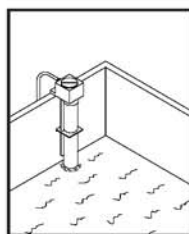
The Protector 2 and Protector 3 systems provide the same reliable overtemperature protection as the Protector 1; however, the control systems feature a heat sensing thermostat. If the liquid level drops and the heater reaches a preset overheat temperature, the thermostat cuts power to the heater and an audible alarm activates. After filling the tank, the immersion heater can quickly be made operational by pushing the reset button on the control to restore power. Protector 3 is designed for flexible lead or high temperature fluoropolymer (PTFE) heater applications only. DO NOT wire P2, P6, P7 or P8 devices directly to power or heater load, as a dangerous short circuit will result with irreparable damage to the heater. Refer to wiring diagrams for proper installation.



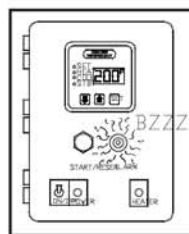
Immersion heater with PROTECTOR 2 working normally.



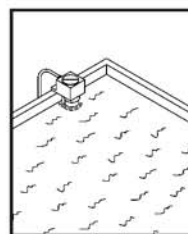
Process bath level drops due to tank leak or evaporation.



PROTECTOR 2's thermostat fuse detects elevated temperature and shuts off power to the heater.



The alarm is activated.



Restore the liquid level and push the reset button to resume operation.

### HEATER THERMAL PROTECTION CHART

| PROTECTOR TYPE | TANK TEMP. °F (°C)    | METAL | METAL FLEX RISER | QUARTZ | FLUOROPOLYMER      | FLUOROPOLYMER FLEX RISER |
|----------------|-----------------------|-------|------------------|--------|--------------------|--------------------------|
| Replaceable    | to 180°F (82°C)       | P1    | ---              | P1     | P1 to 180°F (82°C) | ---                      |
|                | 180-230°F (82-110°C)  | P4    | ---              | P4     | ---                | ---                      |
|                | 230-300°F (110-150°C) | P5    | ---              | ---    | ---                | ---                      |

### RESETTABLE PROTECTORS REQUIRE ADDITIONAL CONTROL COMPONENTS (CONSULT FACTORY)

|            |                       |    |    |     |                            |    |
|------------|-----------------------|----|----|-----|----------------------------|----|
| Resettable | to 180°F (82°C)       | P2 | P2 | P2  | P2 to 180°F (82°C)         | P3 |
|            | 180-230°F (82-110°C)  | P6 | P6 | P6  | P8<br>180-210°F (82-99°C)  | P3 |
|            | 230-300°F (110-150°C) | P7 | P7 | --- | P3<br>210-250°F (99-121°C) | P3 |

Four digit numbers indicate item number. P3 option not available on 8 and 9 kW elements. Lowest temperature replaceable style protector standard unless otherwise designated.

### VOLTAGES AVAILABLE (MOST HEATERS AND CONTROLS)

Voltages are designated in Process Technology model numbers as follows:

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| 120 volt = 1 | 208 volt = 8 | 240 volt = 2 | 400 volt = 7 | 480 volt = 4 |
| 200 volt = 0 | 220 volt = 9 | 380 volt = 3 | 415 volt = 5 | 600 volt = 6 |

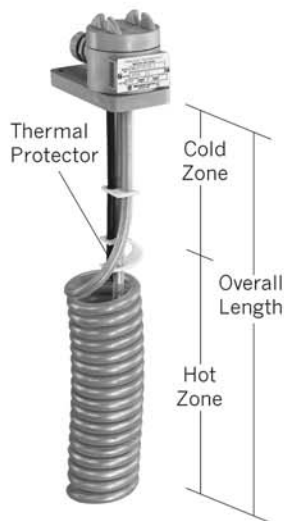
Specify single or three phase when ordering. Consult factory for other voltages.

# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)



Except 600 volts



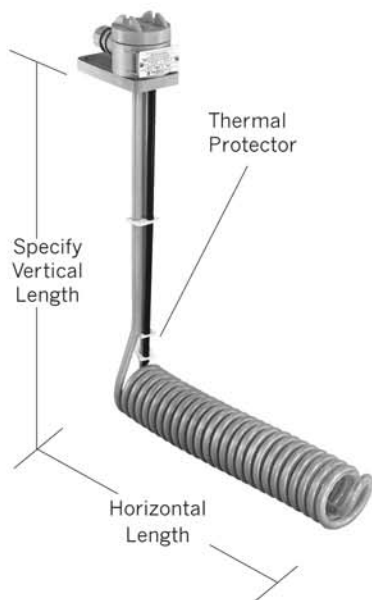
## HX SERIES, SPIRAL FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS<br>(See pg.1) | HOT<br>ZONE<br>In./(mm) | OVERALL<br>LENGTH<br>In./(mm) | STD.<br>COLD ZONE<br>In./(mm) | MAX.<br>COLD ZONE<br>In./(mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./(kg) |
|-------|---------------------|-------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------|---------------------------|
| 500   | 120                 | 5                       | 11                            | 6                             | 41                            | HX.5111-**-     | 6                         |
|       | 240                 | (125)                   | (280)                         | (155)                         | (1040)                        | HX.5211-**-     | (2.5)                     |
| 1000  | 120                 | 7                       | 11                            | 4                             | 41                            | HX1111-**-      | 7                         |
|       | 240                 | (180)                   | (280)                         | (100)                         | (1040)                        | HX1211-**-      | (3.5)                     |
| 2000  | 120                 | 12                      | 17                            | 5                             | 40                            | HX2117-**-      | 8                         |
|       | 240                 | (305)                   | (430)                         | (125)                         | (1015)                        | HX2217-**-      | (4)                       |
|       | 480                 |                         |                               |                               |                               | HX2417-**-      |                           |
| 3000  | 240                 | 16                      | 23                            | 7                             | 40                            | HX3223-**-      | 13                        |
|       | 480                 | (405)                   | (585)                         | (180)                         | (1015)                        | HX3423-**-      | (6)                       |
| 4000  | 240                 | 20                      | 29                            | 9                             | 40                            | HX4229-**-      | 15                        |
|       | 480                 | (510)                   | (735)                         | (230)                         | (1015)                        | HX4429-**-      | (7)                       |
| 5000  | 240                 | 25                      | 35                            | 10                            | 36                            | HX5235-**-      | 18                        |
|       | 480                 | (635)                   | (890)                         | (255)                         | (915)                         | HX5435-**-      | (8)                       |
| 6000  | 240                 | 29                      | 40                            | 11                            | 30                            | HX6240-**-      | 21                        |
|       | 480                 | (735)                   | (1015)                        | (280)                         | (760)                         | HX6440-**-      | (10)                      |
| 8000  | 240                 | 37                      | 47                            | 10                            | 32                            | 2HX8247-**-     | 25                        |
|       | 480                 | (940)                   | (1195)                        | (255)                         | (810)                         | 2HX8447-**-     | (12)                      |
| 9000  | 240                 | 44                      | 54                            | 10                            | 35                            | 2HX9254-**-     | 28                        |
|       | 480                 | (1120)                  | (1370)                        | (255)                         | (890)                         | 2HX9454-**-     | (13)                      |

Single phase only. Longer vertical lengths and flexible risers available, consult factory.



Except 600 volts

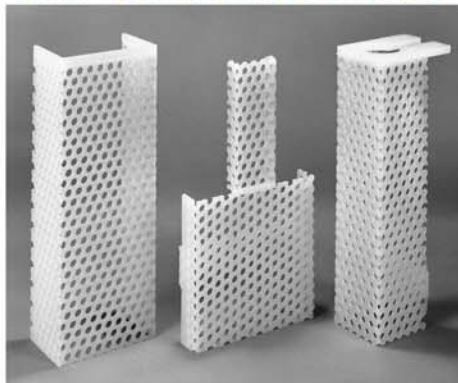


## HXL SERIES, SPIRAL L-SHAPED FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./(mm) | STD. VERT.<br>LENGTH*<br>In./(mm) | MAX.<br>COLD ZONE<br>In./(mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./(kg) |
|-------|---------------------|-------------------------|-----------------------------------|-------------------------------|-----------------|---------------------------|
| 500   | 120                 | 6                       | 12                                | 41                            | HXL.5106-R*-**- | 6                         |
|       | 240                 | (155)                   | (305)                             | (1040)                        | HXL.5206-R*-**- | (2.5)                     |
| 1000  | 120                 | 8                       | 12                                | 41                            | HXL1108-R*-**-  | 7                         |
|       | 240                 | (205)                   | (305)                             | (1040)                        | HXL1208-R*-**-  | (3.5)                     |
| 2000  | 120                 | 12                      | 18                                | 40                            | HXL2112-R*-**-  | 8                         |
|       | 240                 | (305)                   | (460)                             | (1015)                        | HXL2212-R*-**-  | (4)                       |
|       | 480                 |                         |                                   |                               | HXL2412-R*-**-  |                           |
| 3000  | 240                 | 17                      | 18                                | 40                            | HXL3217-R*-**-  | 13                        |
|       | 480                 | (430)                   | (460)                             | (1015)                        | HXL3417-R*-**-  | (6)                       |
| 4000  | 240                 | 20                      | 18                                | 40                            | HXL4220-R*-**-  | 15                        |
|       | 480                 | (510)                   | (460)                             | (1015)                        | HXL4420-R*-**-  | (7)                       |
| 5000  | 240                 | 24                      | 18                                | 36                            | HXL5224-R*-**-  | 18                        |
|       | 480                 | (610)                   | (460)                             | (915)                         | HXL5424-R*-**-  | (8)                       |
| 6000  | 240                 | 29                      | 18                                | 30                            | HXL6229-R*-**-  | 21                        |
|       | 480                 | (735)                   | (460)                             | (760)                         | HXL6429-R*-**-  | (10)                      |
| 8000  | 240                 | 37                      | 18                                | 40                            | 2HXL8237-R*-**- | 26                        |
|       | 480                 | (940)                   | (460)                             | (1015)                        | 2HXL8437-R*-**- | (12)                      |
| 9000  | 240                 | 44                      | 18                                | 35                            | 2HXL9244-R*-**- | 29                        |
|       | 480                 | (1120)                  | (460)                             | (890)                         | 2HXL9444-R*-**- | (13)                      |

\*Specify vertical length by adding height in inches after "R". Example: HXL2212-R24-P2. Single phase only. Longer vertical lengths and flexible risers available, consult factory.

## GUARDS RECOMMENDED FOR ALL FLUOROPOLYMER HEATERS



Standard guards made of polypropylene. Special fluoropolymer (PTFE) guards for chromic acid and temperatures above 180° F (82°C).

GUARDS SOLD SEPARATELY.

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)

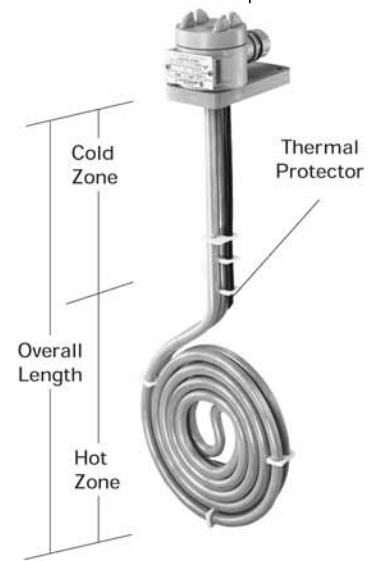
## HXF SERIES, LOW PROFILE FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS       | HOT ZONE | OVERALL LENGTH | DIA.     | STD. COLD ZONE | MAX. COLD ZONE | MODEL NUMBER   | SHIP WGT. |
|-------|-------------|----------|----------------|----------|----------------|----------------|----------------|-----------|
|       | (See Pg. 1) | In./(mm) | In./(mm)       | In./(mm) | In./(mm)       | In./(mm)       |                | Lbs./(kg) |
| 500   | 120         | 6        | 14             | 5        | 8              | 36             | HXF.5105-14-** | 6         |
|       | 240         | (155)    | (355)          | (125)    | (205)          | (915)          | HXF.5205-14-** | (2.5)     |
| 1000  | 120         | 7        | 14             | 6        | 7              | 36             | HXF1106-14-**  | 7         |
|       | 240         | (180)    | (355)          | (155)    | (180)          | (915)          | HXF1206-14-**  | (3.5)     |
| 2000  | 120         | 9        | 17             | 8        | 8              | 35             | HXF2108-17-**  | 8         |
|       | 240         | (230)    | (430)          | (205)    | (205)          | (890)          | HXF2208-17-**  | (4)       |
|       | 480         |          |                |          |                |                | HXF2408-17-**  |           |
| 3000  | 240         | 10       | 23             | 9        | 13             | 35             | HXF3209-23-**  | 13        |
|       | 480         | (255)    | (585)          | (230)    | (330)          | (890)          | HXF3409-23-**  | (6)       |
| 4000  | 240         | 12       | 29             | 11       | 17             | 35             | HXF4211-29-**  | 15        |
|       | 480         | (305)    | (735)          | (280)    | (430)          | (890)          | HXF4411-29-**  | (7)       |
| 5000  | 240         | 13       | 35             | 12       | 22             | 31             | HXF5212-35-**  | 18        |
|       | 480         | (330)    | (890)          | (305)    | (560)          | (790)          | HXF5412-35-**  | (8)       |
| 6000  | 240         | 14       | 40             | 13       | 26             | 25             | HXF6213-40-**  | 22        |
|       | 480         | (355)    | (1015)         | (330)    | (660)          | (635)          | HXF6413-40-**  | (10)      |

Single phase only. Longer vertical lengths and flexible risers available, consult factory.  
Double tier space saver 1" thick (with guard 1-1/2" thick). Not recommended for electroless chemistry.



Except 600 volts



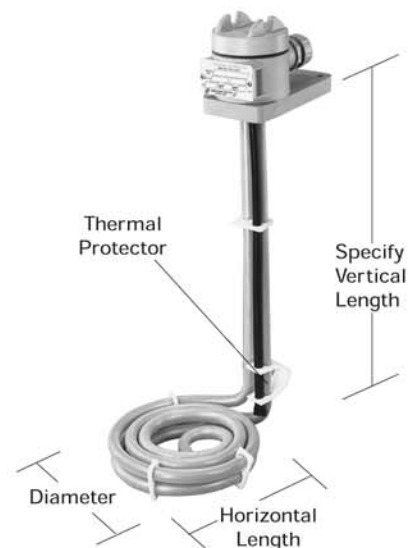
## HXFL SERIES, LOW PROFILE L-SHAPED FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS       | HORIZ. LENGTH | STD. VERT. LENGTH* | DIA.     | MAX. COLD ZONE | MODEL NUMBER    | SHIP WGT. |
|-------|-------------|---------------|--------------------|----------|----------------|-----------------|-----------|
|       | (See Pg. 1) | In./(mm)      | In./(mm)           | In./(mm) |                |                 | Lbs./(kg) |
| 500   | 120         | 5             | 12                 | 5        | 36             | HXFL.5105-R*-** | 6         |
|       | 240         | (125)         | (305)              | (125)    | (915)          | HXFL.5205-R*-** | (2.5)     |
| 1000  | 120         | 6             | 12                 | 6        | 36             | HXFL1106-R*-**  | 7         |
|       | 240         | (155)         | (305)              | (155)    | (915)          | HXFL1206-R*-**  | (3.5)     |
| 2000  | 120         | 8             | 18                 | 8        | 35             | HXFL2108-R*-**  | 8         |
|       | 240         | (205)         | (460)              | (205)    | (890)          | HXFL2208-R*-**  | (4)       |
|       | 480         |               |                    |          |                | HXFL2408-R*-**  |           |
| 3000  | 240         | 9             | 18                 | 9        | 35             | HXFL3209-R*-**  | 13        |
|       | 480         | (230)         | (460)              | (230)    | (890)          | HXFL3409-R*-**  | (6)       |
| 4000  | 240         | 11            | 18                 | 11       | 35             | HXFL4211-R*-**  | 15        |
|       | 480         | (280)         | (460)              | (280)    | (890)          | HXFL4411-R*-**  | (7)       |
| 5000  | 240         | 12            | 18                 | 12       | 31             | HXFL5212-R*-**  | 18        |
|       | 480         | (305)         | (460)              | (305)    | (790)          | HXFL5412-R*-**  | (8)       |
| 6000  | 240         | 13            | 18                 | 13       | 25             | HXFL6213-R*-**  | 22        |
|       | 480         | (330)         | (460)              | (330)    | (635)          | HXFL6413-R*-**  | (10)      |

\*Specify vertical length by adding height in inches after "R". Example: HXFL2208-R24-P1.  
Single phase only. Longer vertical lengths and flexible risers available, consult factory.  
Double tier space saver 1" thick (with guard 1-1/2" high). Guards recommended. Not recommended for electroless chemistry.

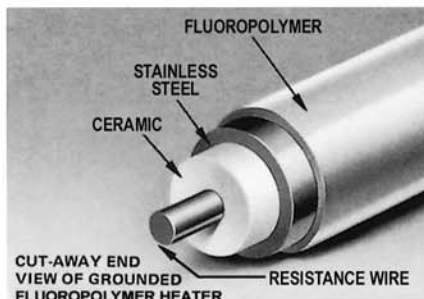


Except 600 volts



## FLUOROPOLYMER HEATER CONSTRUCTION

Ground wire is welded to stainless steel sheath.



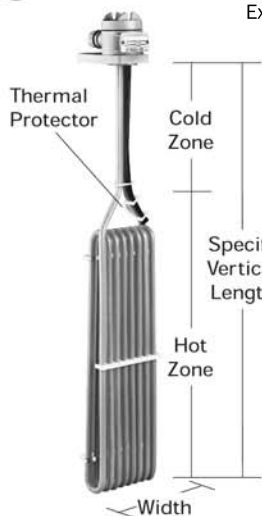
\*\*Specify thermal overload protection desired.  
See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)



Except 600 volts



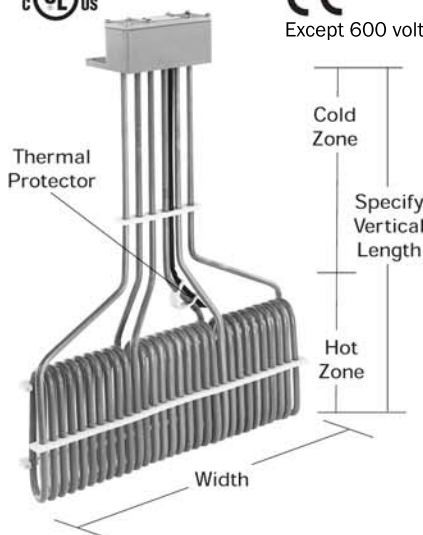
## HXO SERIES, FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS      | WIDTH    | HOT ZONE | OVERALL LENGTH | STD. COLD ZONE | MAX. COLD ZONE | MODEL NUMBER       | SHIP WGT.  |
|-------|------------|----------|----------|----------------|----------------|----------------|--------------------|------------|
|       | (See Pg.1) | In./(mm) | In./(mm) | In./(mm)       |                | In./(mm)       |                    | Lbs./ (kg) |
| 500   | 120        | 5        | 6        | 11             | 5              | 36             | HXO.5105-06-11-**- | 6          |
|       | 240        | (125)    | (155)    | (280)          | (125)          | (915)          | HXO.5205-06-11-**- | (2.5)      |
| 1000  | 120        | 6        | 7        | 11             | 5              | 36             | HXO1106-07-11-**-  | 7          |
|       | 240        | (155)    | (180)    | (280)          | (125)          | (915)          | HXO1206-07-11-**-  | (3.5)      |
| 2000  | 120        | 6        | 10       | 17             | 7              | 35             | HXO2106-10-17-**-  | 8          |
|       | 240        | (155)    | (255)    | (430)          | (180)          | (890)          | HXO2206-10-17-**-  | (4)        |
|       | 480        |          |          |                |                |                | HXO2406-10-17-**-  |            |
| 3000  | 240        | 6        | 12       | 23             | 11             | 35             | HXO3206-12-23-**-  | 13         |
|       | 480        | (155)    | (305)    | (585)          | (280)          | (890)          | HXO3406-12-23-**-  | (6)        |
| 4000  | 240        | 6        | 19       | 29             | 10             | 35             | HXO4206-19-29-**-  | 15         |
|       | 480        | (155)    | (485)    | (735)          | (255)          | (890)          | HXO4406-19-29-**-  | (7)        |
| 5000  | 240        | 6        | 20       | 35             | 15             | 31             | HXO5206-20-35-**-  | 18         |
|       | 480        | (155)    | (510)    | (890)          | (380)          | (790)          | HXO5406-20-35-**-  | (8)        |
| 6000  | 240        | 6        | 22       | 40             | 18             | 25             | HXO6206-22-40-**-  | 22         |
|       | 480        | (155)    | (560)    | (1015)         | (460)          | (635)          | HXO6406-22-40-**-  | (10)       |
| 8000  | 240        | 6        | 36       | 47             | 11             | 28             | 2HXO8206-36-47-**- | 25         |
|       | 480        | (155)    | (915)    | (1195)         | (280)          | (710)          | 2HXO8406-36-47-**- | (11.5)     |
| 9000  | 240        | 6        | 40       | 54             | 14             | 30             | 2HXO9206-40-54-**- | 28         |
|       | 480        | (155)    | (1015)   | (1370)         | (355)          | (760)          | 2HXO9406-40-54-**- | (13)       |

Single phase only. Longer lengths and flexible risers available, consult factory.



Except 600 volts



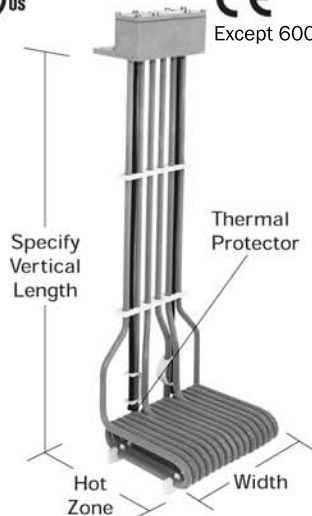
## 3HXO SERIES, MULTI ELEMENT FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS      | WIDTH    | HOT ZONE | OVERALL LENGTH | MAX. COLD ZONE | MODEL NUMBER          | SHIP WGT.  |
|-------|------------|----------|----------|----------------|----------------|-----------------------|------------|
|       | (See Pg.1) | In./(mm) | In./(mm) | In./(mm)       | In./(mm)       |                       | Lbs./ (kg) |
| 1500  | 120        | 10       | 6        | 11             | 36             | 3HXO1.5110-06-11-**-  | 15         |
|       | 240        | (255)    | (155)    | (280)          | (915)          | 3HXO1.5210-06-11-**-  | (7)        |
| 3000  | 240        | 10       | 6        | 11             | 36             | 3HXO3210-06-11-**-    | 20         |
|       | 480        | (255)    | (155)    | (280)          | (915)          | 3HXO3410-06-11-**-    | (9.5)      |
| 4500  | 240        | 10       | 9.5      | 17             | 35             | 3HXO4.5210-9.5-17-**- | 21         |
|       | 480        | (255)    | (245)    | (430)          | (890)          | 3HXO4.5410-9.5-17-**- | (9.5)      |
| 6000  | 240        | 12       | 10.5     | 17             | 35             | 3HXO6212-10.5-17-**-  | 22         |
|       | 480        | (305)    | (270)    | (430)          | (890)          | 3HXO6412-10.5-17-**-  | (10)       |
| 9000  | 240        | 12       | 16       | 23             | 35             | 3HXO9212-16-23-**-    | 36         |
|       | 480        | (305)    | (405)    | (585)          | (890)          | 3HXO9412-16-23-**-    | (16.5)     |
| 12000 | 240        | 12       | 20.5     | 29             | 35             | 3HXO12212-20.5-29-**- | 42         |
|       | 480        | (305)    | (525)    | (735)          | (890)          | 3HXO12412-20.5-29-**- | (20)       |
| 15000 | 240        | 12       | 25       | 35             | 31             | 3HXO15212-25-35-**-   | 48         |
|       | 480        | (305)    | (635)    | (890)          | (790)          | 3HXO15412-25-35-**-   | (22)       |
| 18000 | 240        | 12       | 29       | 40             | 25             | 3HXO18212-29-40-**-   | 54         |
|       | 480        | (305)    | (735)    | (1015)         | (635)          | 3HXO18412-29-40-**-   | (24.5)     |

Three phase standard. Single phase available as option. Add "-1" before thermal protector.



Except 600 volts



## 3HXOL SERIES, MULTI ELEMENT L-SHAPED FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS      | WIDTH    | HOT ZONE | STD. VERT. LENGTH* | MAX. COLD ZONE | MODEL NUMBER          | SHIP WGT.  |
|-------|------------|----------|----------|--------------------|----------------|-----------------------|------------|
|       | (See Pg.1) | In./(mm) | In./(mm) | In./(mm)           | In./(mm)       |                       | Lbs./ (kg) |
| 3000  | 240        | 7        | 13       | 18                 | 36             | 3HXOL3207-13-R*-**-   | 20         |
|       | 480        | (180)    | (330)    | (460)              | (915)          | 3HXOL3407-13-R*-**-   | (9.5)      |
| 4500  | 240        | 9        | 11       | 18                 | 35             | 3HXOL4.5209-11-R*-**- | 21         |
|       | 480        | (230)    | (280)    | (460)              | (890)          | 3HXOL4.5409-11-R*-**- | (9.5)      |
| 6000  | 240        | 10       | 19       | 18                 | 35             | 3HXOL6210-19-R*-**-   | 22         |
|       | 480        | (255)    | (485)    | (460)              | (890)          | 3HXOL6410-19-R*-**-   | (10)       |
| 9000  | 240        | 10       | 23       | 18                 | 35             | 3HXOL9210-23-R*-**-   | 36         |
|       | 480        | (255)    | (585)    | (460)              | (890)          | 3HXOL9410-23-R*-**-   | (16.5)     |
| 12000 | 240        | 10       | 30       | 18                 | 35             | 3HXOL12210-30-R*-**-  | 42         |
|       | 480        | (255)    | (760)    | (460)              | (890)          | 3HXOL12410-30-R*-**-  | (19.5)     |
| 15000 | 240        | 10       | 36       | 18                 | 31             | 3HXOL15210-36-R*-**-  | 48         |
|       | 480        | (255)    | (915)    | (460)              | (790)          | 3HXOL15410-36-R*-**-  | (22)       |
| 18000 | 240        | 10       | 42       | 18                 | 25             | 3HXOL18210-42-R*-**-  | 54         |
|       | 480        | (255)    | (1070)   | (460)              | (635)          | 3HXOL18410-42-R*-**-  | (24.5)     |

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

\*Specify vertical length by adding height in inches after "R". Example: 3HXOL3207-13-R24-P1. Three phase standard. Single phase available as option. Add "-1" before thermal protector.



# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)

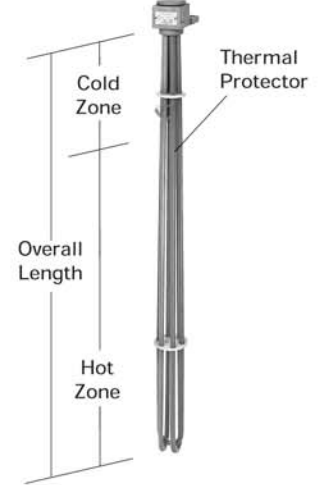
## 3HX SERIES, 3 ELEMENT FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./ (mm) | OVERALL LENGTH<br>In./ (mm) | MODEL NUMBER  | SHIP WGT.<br>Lbs./ (kg) |
|-------|---------------------|-----------------------|-----------------------------|---------------|-------------------------|
| 1000  | 120                 | 10                    | 17                          | 3HX1117-1**   | 10                      |
|       | 240                 | (255)                 | (430)                       | 3HX1217-**    | (4.5)                   |
| 1500  | 120                 | 16                    | 23                          | 3HX1.5123-1** | 11                      |
|       | 240                 | (405)                 | (585)                       | 3HX1.5223-**  | (5)                     |
| 2000  | 480                 |                       |                             | 3HX1.5423-**  |                         |
|       | 120                 | 22                    | 29                          | 3HX2129-1**   | 12                      |
| 240   |                     | (560)                 | (735)                       | 3HX2229-**    | (5.5)                   |
|       | 480                 |                       |                             | 3HX2429-**    |                         |
| 3000  | 240                 | 29                    | 35                          | 3HX3235-**    | 14                      |
|       | 480                 | (735)                 | (890)                       | 3HX3435-**    | (6.5)                   |
| 4000  | 240                 | 39                    | 47                          | 3HX4247-**    | 17                      |
|       | 480                 | (990)                 | (1195)                      | 3HX4447-**    | (8)                     |
| 5000  | 240                 | 48                    | 59                          | 3HX5259-**    | 20                      |
|       | 480                 | (1219)                | (1500)                      | 3HX5459-**    | (9)                     |
| 6000  | 240                 | 56                    | 68                          | 3HX6268-**    | 23                      |
|       | 480                 | (1422)                | (1725)                      | 3HX6468-**    | (10.5)                  |

Three phase standard. Single phase available as option. Add "-1" before thermal protector designator.



Except 600 volts



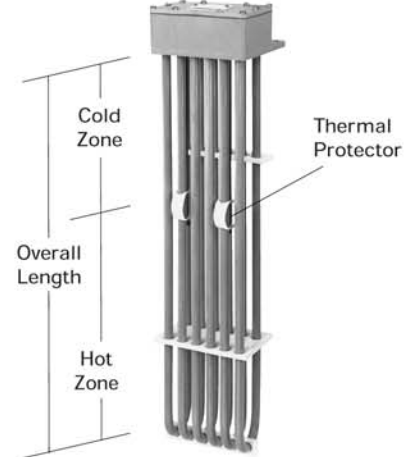
## 6HX SERIES, 6 ELEMENT FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./ (mm) | OVERALL LENGTH<br>In./ (mm) | MODEL NUMBER | SHIP WGT.<br>Lbs./ (kg) |
|-------|---------------------|-----------------------|-----------------------------|--------------|-------------------------|
| 2000  | 120                 | 9                     | 17                          | 6HX2117-1**  | 19                      |
|       | 240                 | (230)                 | (430)                       | 6HX2217-**   | (8.5)                   |
|       | 480                 |                       |                             | 6HX2417-**   |                         |
| 3000  | 240                 | 15                    | 23                          | 6HX3223-**   | 22                      |
|       | 480                 | (380)                 | (585)                       | 6HX3423-**   | (10)                    |
| 4000  | 240                 | 21                    | 29                          | 6HX4229-**   | 24                      |
|       | 480                 | (535)                 | (735)                       | 6HX4429-**   | (11)                    |
| 6000  | 240                 | 28                    | 35                          | 6HX6235-**   | 27                      |
|       | 480                 | (710)                 | (890)                       | 6HX6435-**   | (12.5)                  |
| 8000  | 240                 | 38                    | 47                          | 6HX8247-**   | 33                      |
|       | 480                 | (965)                 | (1195)                      | 6HX8447-**   | (15)                    |
| 10000 | 240                 | 47                    | 59                          | 6HX10259-**  | 40                      |
|       | 480                 | (1195)                | (1500)                      | 6HX10459-**  | (18)                    |
| 12000 | 240                 | 55                    | 68                          | 6HX12268-**  | 45                      |
|       | 480                 | (1400)                | (1725)                      | 6HX12468-**  | (20.5)                  |

Three phase standard. Single phase available as option. Add "-1" before thermal protector designator.



Except 600 volts



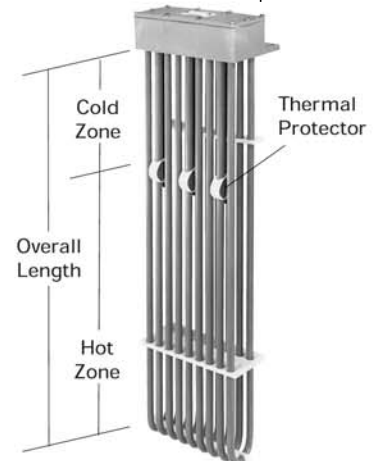
## 9HX SERIES, 9 ELEMENT FLUOROPOLYMER (PTFE) HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./ (mm) | OVERALL LENGTH<br>In./ (mm) | MODEL NUMBER | SHIP WGT.<br>Lbs./ (kg) |
|-------|---------------------|-----------------------|-----------------------------|--------------|-------------------------|
| 3000  | 240                 | 9                     | 17                          | 9HX3217-**   | 28                      |
|       | 480                 | (230)                 | (430)                       | 9HX3417-**   | (13)                    |
| 4500  | 240                 | 15                    | 23                          | 9HX4.5223-** | 33                      |
|       | 480                 | (380)                 | (585)                       | 9HX4.5423-** | (15)                    |
| 6000  | 240                 | 21                    | 29                          | 9HX6229-**   | 36                      |
|       | 480                 | (535)                 | (735)                       | 9HX6429-**   | (16.5)                  |
| 9000  | 240                 | 28                    | 35                          | 9HX9235-**   | 40                      |
|       | 480                 | (710)                 | (890)                       | 9HX9435-**   | (18)                    |
| 12000 | 240                 | 38                    | 47                          | 9HX12247-**  | 49                      |
|       | 480                 | (965)                 | (1195)                      | 9HX12447-**  | (22.5)                  |
| 15000 | 240                 | 47                    | 59                          | 9HX15259-**  | 60                      |
|       | 480                 | (1195)                | (1500)                      | 9HX15459-**  | (27.5)                  |
| 18000 | 240                 | 55                    | 68                          | 9HX18268-**  | 67                      |
|       | 480                 | (1400)                | (1725)                      | 9HX18468-**  | (30.5)                  |

Three phase standard. Single phase available as option. Add "-1" before thermal protector designator.



Except 600 volts



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)



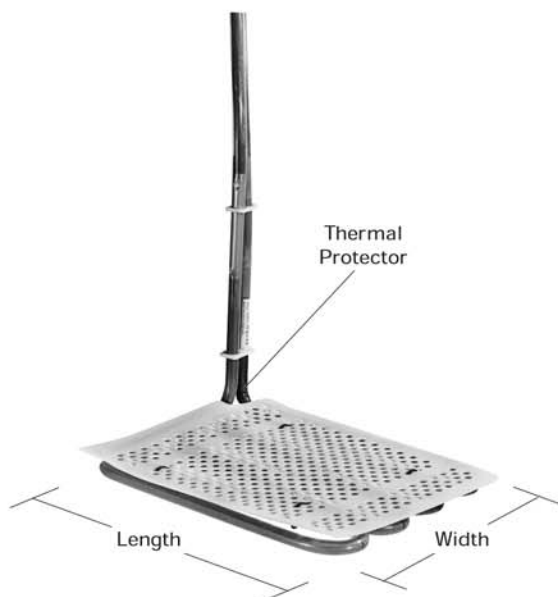
Except 600 volts

## HXRL SERIES, FLEX RISER HEATERS

| WATT | VOLTS<br>(See Pg. 1) | WIDTH<br>In./ (mm) | LENGTH<br>In. (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs. / (kg) |
|------|----------------------|--------------------|--------------------|-----------------|-----------------------------|
| 1000 | 120                  | 4                  | 19                 | HXRL1104-19L-*  | 6                           |
|      | 240                  | (100)              | (485)              | HXRL1204-19L-*  | (2.5)                       |
| 1000 | 120                  | 6                  | 13                 | HXRL1106-13L-*  | 6                           |
|      | 240                  | (155)              | (330)              | HXRL1206-13L-*  | (2.5)                       |
| 1000 | 120                  | 8                  | 10                 | HXRL1108-10L-*  | 6                           |
|      | 240                  | (205)              | (255)              | HXRL1208-10L-*  | (2.5)                       |
| 2000 | 120                  | 6                  | 25                 | HXRL2106-25L-*  | 7                           |
|      | 240                  | (155)              | (635)              | HXRL2206-25L-*  | (3.5)                       |
|      | 480                  |                    |                    | HXRL2406-25L-*  |                             |
| 2000 | 120                  | 8                  | 19                 | HXRL2108-19L-*  | 7                           |
|      | 240                  | (205)              | (485)              | HXRL2208-19L-*  | (3.5)                       |
|      | 480                  |                    |                    | HXRL2408-19L-*  |                             |
| 2000 | 120                  | 10                 | 15                 | HXRL2110-15L-*  | 7                           |
|      | 240                  | (255)              | (380)              | HXRL2210-15L-*  | (3.5)                       |
|      | 480                  |                    |                    | HXRL2410-15L-*  |                             |
| 2000 | 120                  | 12                 | 13                 | HXRL2112-13L-*  | 7                           |
|      | 240                  | (305)              | (330)              | HXRL2212-13L-*  | (3.5)                       |
|      | 480                  |                    |                    | HXRL2412-13L-*  |                             |
| 2000 | 120                  | 14                 | 11                 | HXRL2114-11L-*  | 7                           |
|      | 240                  | (355)              | (280)              | HXRL2214-11L-*  | (3.5)                       |
|      | 480                  |                    |                    | HXRL2414-11L-*  |                             |
| 3000 | 240                  | 10                 | 23                 | HXRL3210-23L-*  | 12                          |
|      | 480                  | (255)              | (585)              | HXRL3410-23L-*  | (5.5)                       |
| 3000 | 240                  | 12                 | 19                 | HXRL3212-19L-*  | 12                          |
|      | 480                  | (305)              | (485)              | HXRL3412-19L-*  | (5.5)                       |
| 3000 | 240                  | 14                 | 16                 | HXRL3214-16L-*  | 12                          |
|      | 480                  | (355)              | (405)              | HXRL3414-16L-*  | (5.5)                       |
| 3000 | 240                  | 16                 | 14                 | HXRL3216-14L-*  | 12                          |
|      | 480                  | (405)              | (355)              | HXRL3416-14L-*  | (5.5)                       |
| 3000 | 240                  | 18                 | 13                 | HXRL3218-13L-*  | 12                          |
|      | 480                  | (460)              | (330)              | HXRL3418-13L-*  | (5.5)                       |
| 4000 | 240                  | 12                 | 25                 | HXRL4212-25L-*  | 14                          |
|      | 480                  | (305)              | (635)              | HXRL4412-25L-*  | (6.5)                       |
| 4000 | 240                  | 14                 | 22                 | HXRL4214-22L-*  | 14                          |
|      | 480                  | (355)              | (560)              | HXRL4414-22L-*  | (6.5)                       |
| 4000 | 240                  | 18                 | 17                 | HXRL4218-17L-*  | 14                          |
|      | 480                  | (460)              | (430)              | HXRL4418-17L-*  | (6.5)                       |
| 4000 | 240                  | 20                 | 15                 | HXRL4220-15L-*  | 14                          |
|      | 480                  | (510)              | (380)              | HXRL4420-15L-*  | (6.5)                       |
| 5000 | 240                  | 12                 | 31                 | HXRL5212-31L-*  | 17                          |
|      | 480                  | (305)              | (790)              | HXRL5412-31L-*  | (8)                         |
| 5000 | 240                  | 14                 | 27                 | HXRL5214-27L-*  | 17                          |
|      | 480                  | (355)              | (685)              | HXRL5414-27L-*  | (8)                         |
| 5000 | 240                  | 16                 | 23                 | HXRL5216-23L-*  | 17                          |
|      | 480                  | (405)              | (585)              | HXRL5416-23L-*  | (8)                         |
| 5000 | 240                  | 18                 | 21                 | HXRL5218-21L-*  | 17                          |
|      | 480                  | (460)              | (535)              | HXRL5418-21L-*  | (8)                         |
| 6000 | 240                  | 12                 | 36                 | HXRL6212-36L-*  | 20                          |
|      | 480                  | (305)              | (915)              | HXRL6412-36L-*  | (9)                         |
| 6000 | 240                  | 14                 | 30                 | HXRL6214-30L-*  | 20                          |
|      | 480                  | (355)              | (765)              | HXRL6414-30L-*  | (9)                         |
| 6000 | 240                  | 16                 | 26                 | HXRL6216-26L-*  | 20                          |
|      | 480                  | (405)              | (660)              | HXRL6416-26L-*  | (9)                         |
| 6000 | 240                  | 20                 | 21                 | HXRL6220-21L-*  | 20                          |
|      | 480                  | (510)              | (535)              | HXRL6420-21L-*  | (9)                         |

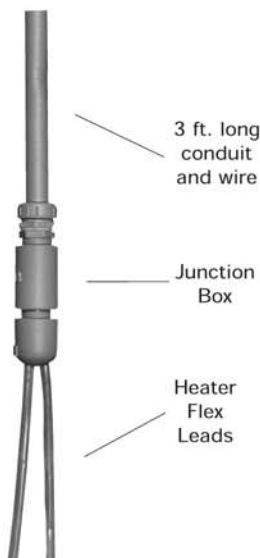
4' continuous fluoropolymer (PTFE) leads standard. Longer lengths available as option. Single phase only. Rigid risers available. Other dimensional configurations available, consult factory. P3 protector standard. Fluoropolymer guards sold separately. Risers pictured in left position, right position available.

HXRL, HXOL and HXSL series available with purged element design for permeating chemical applications, consult factory.



## JUNCTION BOX

Provided on all heaters with flexible leads.



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# FLUOROPOLYMER (PTFE) HEATERS

10 Watts Per Square Inch (1.5 w/cm<sup>2</sup>)

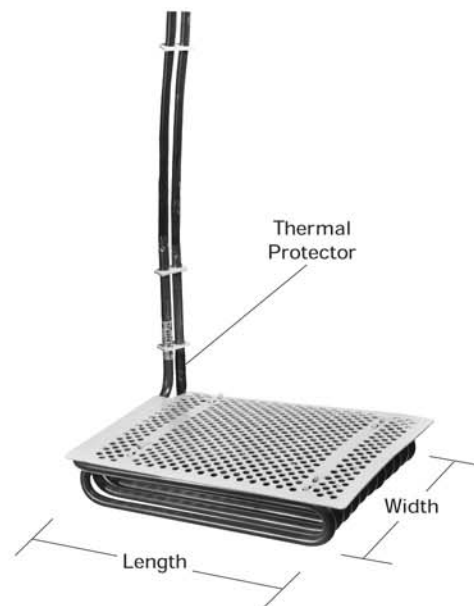
## HXOL SERIES, FLEX RISER HEATERS

| WATTS | VOLTS<br>(See Pg. 1) | WIDTH<br>In./ (mm) | LENGTH<br>In./ (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|----------------------|--------------------|---------------------|-----------------|----------------------------|
| 1000  | 120                  | 2                  | 11                  | HXOL1102-11L-** | 6                          |
|       | 240                  | (50)               | (280)               | HXOL1202-11L-** | (2.5)                      |
| 1000  | 120                  | 4                  | 8                   | HXOL1104-08L-** | 6                          |
|       | 240                  | (100)              | (205)               | HXOL1204-08L-** | (2.5)                      |
| 2000  | 120                  | 4                  | 13                  | HXOL2104-13L-** | 7                          |
|       | 240                  | (100)              | (330)               | HXOL2204-13L-** | (3.5)                      |
|       | 480                  |                    |                     | HXOL2404-13L-** |                            |
| 2000  | 120                  | 5                  | 10                  | HXOL2105-10L-** | 7                          |
|       | 240                  | (125)              | (255)               | HXOL2205-10L-** | (3.5)                      |
|       | 480                  |                    |                     | HXOL2405-10L-** |                            |
| 2000  | 120                  | 6                  | 8                   | HXOL2106-08L-** | 7                          |
|       | 240                  | (155)              | (205)               | HXOL2206-08L-** | (3.5)                      |
|       | 480                  |                    |                     | HXOL2406-08L-** |                            |
| 3000  | 240                  | 4                  | 18                  | HXOL3204-18L-** | 12                         |
|       | 480                  | (100)              | (460)               | HXOL3404-18L-** | (5.5)                      |
| 3000  | 240                  | 5                  | 12                  | HXOL3205-12L-** | 12                         |
|       | 480                  | (125)              | (305)               | HXOL3405-12L-** | (5.5)                      |
| 3000  | 240                  | 6                  | 11                  | HXOL3206-11L-** | 12                         |
|       | 480                  | (155)              | (280)               | HXOL3406-11L-** | (5.5)                      |
| 3000  | 240                  | 8                  | 8                   | HXOL3208-08L-** | 12                         |
|       | 480                  | (205)              | (205)               | HXOL3408-08L-** | (5.5)                      |
| 4000  | 240                  | 5                  | 18                  | HXOL4205-18L-** | 14                         |
|       | 480                  | (125)              | (460)               | HXOL4405-18L-** | (6.5)                      |
| 4000  | 240                  | 6                  | 14                  | HXOL4206-14L-** | 14                         |
|       | 480                  | (155)              | (355)               | HXOL4406-14L-** | (6.5)                      |
| 4000  | 240                  | 8                  | 11                  | HXOL4208-11L-** | 14                         |
|       | 480                  | (205)              | (280)               | HXOL4408-11L-** | (6.5)                      |
| 5000  | 240                  | 6                  | 18                  | HXOL5206-18L-** | 17                         |
|       | 480                  | (155)              | (460)               | HXOL5406-18L-** | (8)                        |
| 5000  | 240                  | 8                  | 13                  | HXOL5208-13L-** | 17                         |
|       | 480                  | (205)              | (330)               | HXOL5408-13L-** | (8)                        |
| 5000  | 240                  | 9                  | 11                  | HXOL5209-11L-** | 17                         |
|       | 480                  | (230)              | (280)               | HXOL5409-11L-** | (8)                        |
| 5000  | 240                  | 10                 | 10                  | HXOL5210-10L-** | 17                         |
|       | 480                  | (255)              | (255)               | HXOL5410-10L-** | (8)                        |
| 6000  | 240                  | 7                  | 18                  | HXOL6207-18L-** | 20                         |
|       | 480                  | (180)              | (460)               | HXOL6407-18L-** | (9)                        |
| 6000  | 240                  | 8                  | 15                  | HXOL6208-15L-** | 20                         |
|       | 480                  | (205)              | (380)               | HXOL6408-15L-** | (9)                        |
| 6000  | 240                  | 9                  | 13                  | HXOL6209-13L-** | 20                         |
|       | 480                  | (230)              | (330)               | HXOL6409-13L-** | (9)                        |
| 6000  | 240                  | 10                 | 12                  | HXOL6210-12L-** | 20                         |
|       | 480                  | (255)              | (305)               | HXOL6410-12L-** | (9)                        |
| 6000  | 240                  | 11                 | 11                  | HXOL6211-11L-** | 20                         |
|       | 480                  | (280)              | (280)               | HXOL6411-11L-** | (9)                        |

4' continuous fluoropolymer (PTFE) leads standard. Longer lengths available as option. Single phase only. Rigid risers available. Other dimensional configurations available, consult factory. P3 protector standard. Fluoropolymer guards sold separately. Risers pictured in left position, right position available.



CE  
Except 600 volts



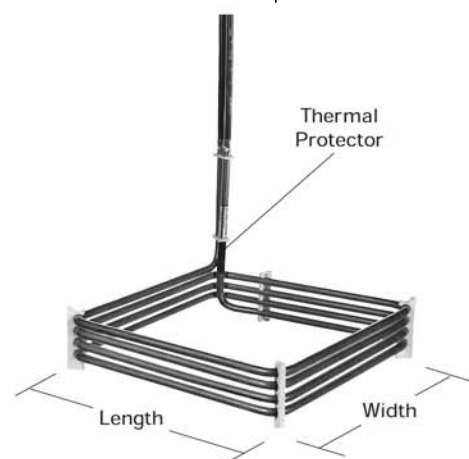
## HXSL SERIES, FLEX RISER HEATERS

| WATTS | VOLTS<br>(See Pg.1) | WIDTH* | LENGTH* | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------|---------|-----------------|----------------------------|
| 1000  | 120                 | *      | *       | HXSL1**         | 6                          |
|       | 240                 | *      | *       |                 | (2.5)                      |
| 2000  | 120                 | *      | *       | HXSL2**         | 7                          |
|       | 240                 | *      | *       |                 | (3.5)                      |
|       | 480                 | *      | *       |                 |                            |
| 3000  | 240                 | *      | *       | HXSL3**         | 12                         |
|       | 480                 | *      | *       |                 | (5.5)                      |
| 4000  | 240                 | *      | *       | HXSL4**         | 14                         |
|       | 480                 | *      | *       |                 | (6.5)                      |
| 5000  | 240                 | *      | *       | HXSL5**         | 17                         |
|       | 480                 | *      | *       |                 | (8)                        |
| 6000  | 240                 | *      | *       | HXSL6**         | 20                         |
|       | 480                 | *      | *       |                 | (9)                        |

\*Please consult factory for model numbers of specific heaters. Single phase only. Heaters built to conform to tank dimensions. 4' continuous fluoropolymer (PTFE) leads standard, longer lengths available as option. P3 protector standard. Rigid risers available. Guards available as option, consult factory. Risers pictured in left position, right position available.



CE  
Except 600 volts



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# QUARTZ HEATERS

## 25 Watts Per Square Inch (4 w/cm<sup>2</sup>)

### QM SERIES, QUARTZ HEATERS WITH METAL ELEMENTS

| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./ (mm) | OVERALL LENGTH<br>In./ (mm) | MODEL NUMBER   | SHIP WGT.<br>Lbs./ (kg) |
|-------|---------------------|-----------------------|-----------------------------|----------------|-------------------------|
| 500   | 120                 | 7                     | 10                          | QM.5110-*. **  | 9                       |
|       | 240                 | (180)                 | (255)                       | QM.5210-*. **  | (4)                     |
| 1000  | 120                 | 7                     | 11                          | QM1111-*. **   | 10                      |
|       | 240                 | (180)                 | (280)                       | QM1211-*. **   | (4.5)                   |
| 1000  | 120                 | 7                     | 17                          | QM1117-*. **   | 11                      |
|       | 240                 | (180)                 | (430)                       | QM1217-*. **   | (5)                     |
| 2000  | 240                 | 12                    | 17                          | QM2217-*. **   | 11                      |
|       | 480                 | (305)                 | (430)                       | QM2417-*. **   | (5)                     |
| 2000  | 240                 | 12                    | 23                          | QM2223-*. **   | 14                      |
|       | 480                 | (305)                 | (585)                       | QM2423-*. **   | (6.5)                   |
| 3000  | 240                 | 18                    | 23                          | QM3223-*. **   | 14                      |
|       | 480                 | (460)                 | (585)                       | QM3423-*. **   | (6.5)                   |
| 3000  | 240                 | 18                    | 29                          | QM3229-*. **   | 17                      |
|       | 480                 | (460)                 | (735)                       | QM3429-*. **   | (8)                     |
| 3500  | 240                 | 21                    | 29                          | QM3.5229-*. ** | 17                      |
|       | 480                 | (535)                 | (735)                       | QM3.5429-*. ** | (8)                     |
| 4000  | 240                 | 28                    | 35                          | QM4235-*. **   | 20                      |
|       | 480                 | (710)                 | (890)                       | QM4435-*. **   | (9)                     |
| 4000  | 240                 | 28                    | 41                          | QM4241-*. **   | 23                      |
|       | 480                 | (710)                 | (1040)                      | QM4441-*. **   | (10.5)                  |
| 5000  | 240                 | 33                    | 41                          | QM5241-*. **   | 23                      |
|       | 480                 | (840)                 | (1040)                      | QM5441-*. **   | (10.5)                  |
| 5000  | 240                 | 33                    | 47                          | QM5247-*. **   | 26                      |
|       | 480                 | (840)                 | (1195)                      | QM5447-*. **   | (12)                    |
| 6000  | 240                 | 39                    | 47                          | QM6247-*. **   | 26                      |
|       | 480                 | (990)                 | (1195)                      | QM6447-*. **   | (12)                    |
| 6000  | 240                 | 39                    | 52                          | QM6252-*. **   | 29                      |
|       | 480                 | (990)                 | (1320)                      | QM6452-*. **   | (13)                    |
| 8000  | 240                 | 49                    | 59                          | QM8259-*. **   | 31                      |
|       | 480                 | (1245)                | (1500)                      | QM8459-*. **   | (14)                    |
| 10000 | 240                 | 62                    | 71                          | QM10271-*. **  | 34                      |
|       | 480                 | (1575)                | (1900)                      | QM10471-*. **  | (15.5)                  |

Single phase standard. Three phase available as option, add "-3" before thermal protector designator. Standard guard is polypropylene. Fluoropolymer (PTFE) guards available for chromic acid and high temperature applications (180° F and higher).

\* Insert "E" for element or "J" for tube. Guard model number below.

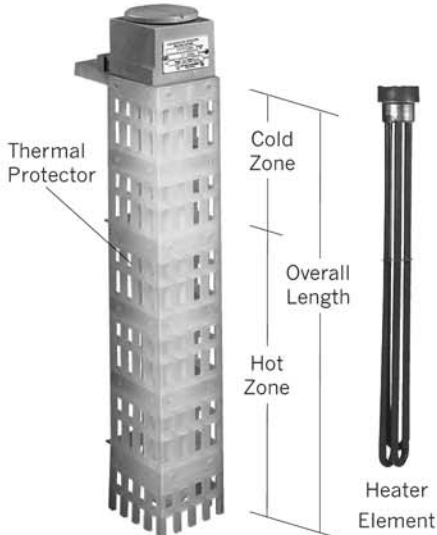
### QUARTZ HEATER GUARDS

| SINGLE TUBE |              | SINGLE GUARD |  | TRIPLE TUBE |              | TRIPLE GUARD |  | TRIPLE ASSEMBLY |
|-------------|--------------|--------------|--|-------------|--------------|--------------|--|-----------------|
| WATTS       | LENGTH       | MODEL NUMBER |  | WATTS       | LENGTH       | MODEL NUMBER |  | SHIP WT.        |
|             | In./ (mm)    |              |  |             | In./ (mm)    |              |  | Lbs./ (kg)      |
| 500         | 10<br>(255)  | QM10G        |  | 1500        | 10<br>(255)  | 3QM10G       |  | 21<br>(10)      |
| 1000        | 11<br>(280)  | QM11G        |  | 3000        | 11<br>(280)  | 3QM11G       |  | 22<br>(10)      |
| 1000        | 17<br>(430)  | QM17G        |  | 3000        | 17<br>(430)  | 3QM17G       |  | 26<br>(12)      |
| 2000        | 17<br>(430)  | QM17G        |  | 6000        | 17<br>(430)  | 3QM17G       |  | 26<br>(12)      |
| 2000        | 23<br>(585)  | QM23G        |  | 6000        | 23<br>(585)  | 3QM23G       |  | 30<br>(14)      |
| 3000        | 23<br>(585)  | QM23G        |  | 9000        | 23<br>(585)  | 3QM23G       |  | 30<br>(14)      |
| 3000        | 29<br>(735)  | QM29G        |  | 9000        | 29<br>(735)  | 3QM29G       |  | 34<br>(15.5)    |
| 3500        | 29<br>(735)  | QM29G        |  | 10500       | 29<br>(735)  | 3QM29G       |  | 34<br>(15.5)    |
| 4000        | 35<br>(890)  | QM35G        |  | 12000       | 35<br>(890)  | 3QM35G       |  | 38<br>(17)      |
| 4000        | 41<br>(1040) | QM41G        |  | 12000       | 41<br>(1040) | 3QM41G       |  | 44<br>(20)      |
| 5000        | 41<br>(1040) | QM41G        |  | 15000       | 41<br>(1040) | 3QM41G       |  | 44<br>(20)      |
| 5000        | 47<br>(1195) | QM47G        |  | 15000       | 47<br>(1195) | 3QM47G       |  | 48<br>(22)      |
| 6000        | 47<br>(1195) | QM47G        |  | 18000       | 47<br>(1195) | 3QM47G       |  | 48<br>(22)      |
| 6000        | 52<br>(1320) | QM52G        |  | 18000       | 52<br>(1320) | 3QM52G       |  | 52<br>(24)      |
| 8000        | 59<br>(1500) | QM59G        |  | 24000       | 59<br>(1500) | 3QM59G       |  | 55<br>(25)      |
| 10000       | 71<br>(1805) | QM71G        |  | 30000       | 71<br>(1805) | 3QM71G       |  | 65<br>(30)      |

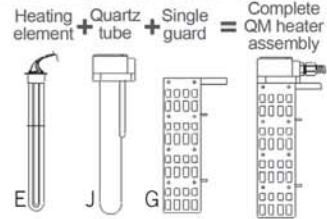
Standard guard is polypropylene. Fluoropolymer (PTFE) guards available for chromic acid and high temperature applications (180° F and higher).

UL US  
Less than 4000 watts

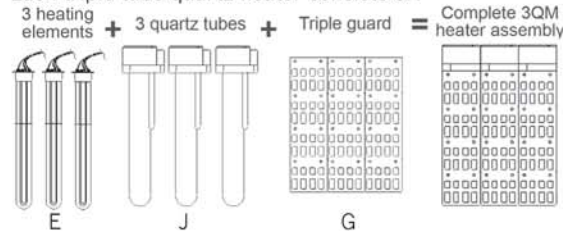
CE  
Except 600 watts



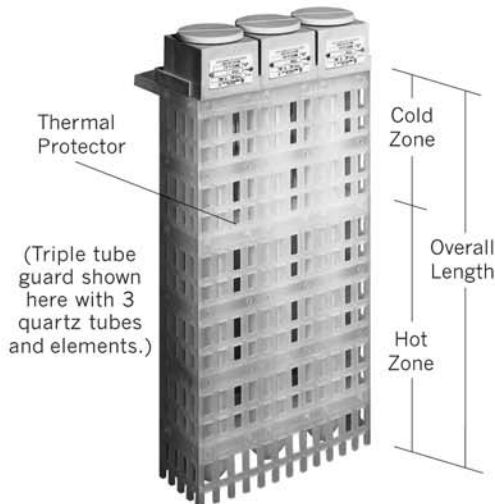
Each single tube quartz heater consists of:



Each triple tube quartz heater consists of:



UL US  
Except 600 watts



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# TUBULAR HEATERS

## 40 Watts Per Square Inch (6.2 w/cm<sup>2</sup>)

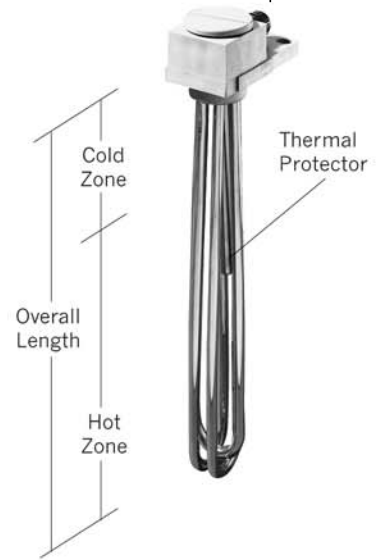
### 3HS SERIES, 3 ELEMENT STAINLESS STEEL HEATERS

| WATTS | VOLTS<br>(See Pg. 1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|----------------------|--------------------------|--------------------------------|-----------------|----------------------------|
| 3000  | 240                  | 11                       | 17                             | 3HS3217-*       | 9                          |
|       | 480                  | (280)                    | (430)                          | 3HS3417-*       | (4)                        |
| 4500  | 240                  | 16                       | 23                             | 3HS4.5223-*     | 10                         |
|       | 480                  | (405)                    | (585)                          | 3HS4.5423-*     | (4.5)                      |
| 7500  | 240                  | 21                       | 29                             | 3HS7.5229-*     | 12                         |
|       | 480                  | (535)                    | (735)                          | 3HS7.5429-*     | (5.5)                      |
| 10500 | 240                  | 26                       | 34                             | 3HS10.5234-*    | 14                         |
|       | 480                  | (660)                    | (865)                          | 3HS10.5434-*    | (6.5)                      |

Three phase standard, single phase available as option. Add "-1" before thermal protector designator.



Except 600 volts



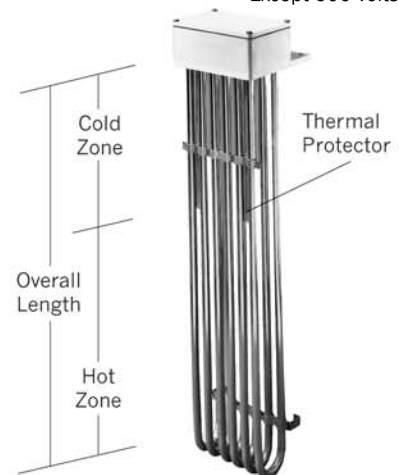
### 6HS SERIES, 6 ELEMENT STAINLESS STEEL HEATERS

| WATTS | VOLTS<br>(See Pg. 1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|----------------------|--------------------------|--------------------------------|-----------------|----------------------------|
| 6000  | 240                  | 10                       | 17                             | 6HS6217-*       | 12                         |
|       | 480                  | (255)                    | (430)                          | 6HS6417-*       | (5.5)                      |
| 9000  | 240                  | 16                       | 23                             | 6HS9223-*       | 13                         |
|       | 480                  | (405)                    | (585)                          | 6HS9423-*       | (6)                        |
| 15000 | 240                  | 20                       | 29                             | 6HS15229-*      | 16                         |
|       | 480                  | (510)                    | (735)                          | 6HS15429-*      | (7.5)                      |
| 21000 | 240                  | 25                       | 34                             | 6HS21234-*      | 18                         |
|       | 480                  | (635)                    | (865)                          | 6HS21434-*      | (8.5)                      |

Three phase standard, single phase available as option. Add "-1" before thermal protector designator.



Except 600 volts



### 9HS SERIES, 9 ELEMENT STAINLESS STEEL HEATERS

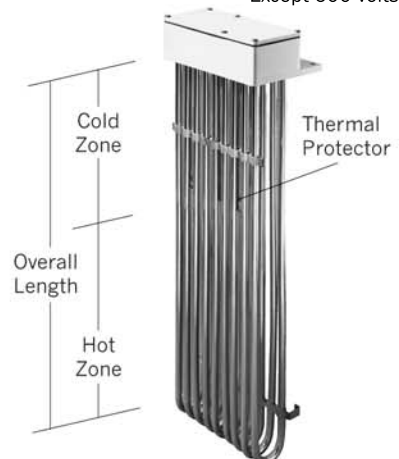
| WATTS | VOLTS<br>(See Pg. 1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|----------------------|--------------------------|--------------------------------|-----------------|----------------------------|
| 9000  | 240                  | 10                       | 17                             | 9HS9217-*       | 16                         |
|       | 480                  | (255)                    | (430)                          | 9HS9417-*       | (7.5)                      |
| 13500 | 240                  | 16                       | 23                             | 9HS13.5223-*    | 19                         |
|       | 480                  | (405)                    | (585)                          | 9HS13.5423-*    | (9)                        |
| 22500 | 240                  | 20                       | 29                             | 9HS22.5229-*    | 23                         |
|       | 480                  | (510)                    | (735)                          | 9HS22.5429-*    | (10.5)                     |
| 31500 | 240                  | 25                       | 34                             | 9HS31.5234-*    | 25                         |
|       | 480                  | (635)                    | (835)                          | 9HS31.5434-*    | (11.5)                     |

Three phase standard, single phase available as option. Add "-1" before thermal protector designator.

\*31500 watt, 240 volt heater requires welded metal junction box and permanent P2 thermal overload protection.



Except 600 volts



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# METAL OVER THE SIDE HEATERS

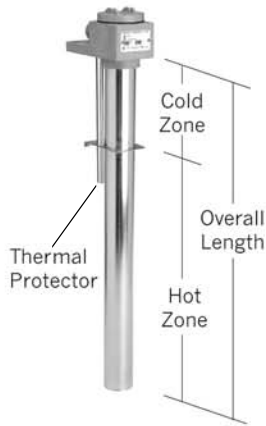
35 Watts Per Square Inch (5.4 w/cm<sup>2</sup>) • Derated 18 w/in<sup>2</sup> (2.8 w/cm<sup>2</sup>)



Except Steel



Except 600 volts



## P, F, S & T SERIES, METAL OVER THE SIDE HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | STEEL     | 304<br>SS | 316<br>SS | TITANIUM  | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------|--------------------------------|-----------|-----------|-----------|-----------|----------------------------|
| 1000  | 120                 | 6                        | 11                             | P1111-**  | F1111-**  | S1111-**  | T1111-**  | 7                          |
|       | 240                 | (155)                    | (280)                          | P1211-**  | F1211-**  | S1211-**  | T1211-**  | (3.5)                      |
| 2000  | 120                 | 10                       | 17                             | P2117-**  | F2117-**  | S2117-**  | T2117-**  | 10                         |
|       | 240                 | (255)                    | (430)                          | P2217-**  | F2217-**  | S2217-**  | T2217-**  | (4.5)                      |
| 3000  | 480                 |                          |                                | P2417-**  | F2417-**  | S2417-**  | T2417-**  |                            |
|       | 240                 | 16                       | 23                             | P3223-**  | F3223-**  | S3223-**  | T3223-**  | 11                         |
| 4000  | 480                 | (405)                    | (585)                          | P3423-**  | F3423-**  | S3423-**  | T3423-**  | (5)                        |
|       | 240                 | 20                       | 29                             | P4229-**  | F4229-**  | S4229-**  | T4229-**  | 13                         |
| 5000  | 480                 | (510)                    | (735)                          | P4429-**  | F4429-**  | S4429-**  | T4429-**  | (6)                        |
|       | 240                 | 25                       | 35                             | P5235-**  | F5235-**  | S5235-**  | T5235-**  | 15                         |
| 6000  | 480                 | (635)                    | (890)                          | P5435-**  | F5435-**  | S5435-**  | T5435-**  | (7)                        |
|       | 240                 | 30                       | 40                             | P6240-**  | F6240-**  | S6240-**  | T6240-**  | 17                         |
| 8000  | 480                 | (760)                    | (1015)                         | P6440-**  | F6440-**  | S6440-**  | T6440-**  | (8)                        |
|       | 240                 | 37                       | 47                             | P8247-**  | F8247-**  | S8247-**  | T8247-**  | 23                         |
| 9000  | 480                 | (940)                    | (1195)                         | P8447-**  | F8447-**  | S8447-**  | T8447-**  | (10.5)                     |
|       | 240                 | 44                       | 54                             | P9254-**  | F9254-**  | S9254-**  | T9254-**  | 24                         |
| 10000 | 480                 | (1120)                   | (1370)                         | P9454-**  | F9454-**  | S9454-**  | T9454-**  | (11)                       |
|       | 240                 | 49                       | 59                             | P10259-** | F10259-** | S10259-** | T10259-** | 25                         |
| 12000 | 480                 | (1245)                   | (1500)                         | P10459-** | F10459-** | S10459-** | T10459-** | (11.5)                     |
|       | 480                 | 58                       | 68                             | P12468-** | F12468-** | S12468-** | T12468-** | 28                         |
|       |                     | (1475)                   | (1730)                         |           |           |           |           | (13)                       |

Three phase available as option. Add "-3" before thermal protector designator.



Except Steel



Except 600 volts

## 3P, 3F, 3S, & 3T SERIES, TRIPLE METAL OVER THE SIDE HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | STEEL       | 304<br>SS   | 316<br>SS   | TITANIUM    | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------|--------------------------------|-------------|-------------|-------------|-------------|----------------------------|
| 3000  | 240                 | 6                        | 11                             | 3P3211-***  | 3F3211-***  | 3S3211-***  | 3T3211-***  | 21                         |
|       | 480                 | (155)                    | (280)                          | 3P3411-***  | 3F3411-***  | 3S3411-***  | 3T3411-***  | (9.5)                      |
| 6000  | 240                 | 10                       | 17                             | 3P6217-***  | 3F6217-***  | 3S6217-***  | 3T6217-***  | 30                         |
|       | 480                 | (255)                    | (430)                          | 3P6417-***  | 3F6417-***  | 3S6417-***  | 3T6417-***  | (14)                       |
| 9000  | 240                 | 16                       | 23                             | 3P9223-***  | 3F9223-***  | 3S9223-***  | 3T9223-***  | 33                         |
|       | 480                 | (405)                    | (585)                          | 3P9423-***  | 3F9423-***  | 3S9423-***  | 3T9423-***  | (15)                       |
| 12000 | 240                 | 20                       | 29                             | 3P12229-*** | 3F12229-*** | 3S12229-*** | 3T12229-*** | 39                         |
|       | 480                 | (510)                    | (735)                          | 3P12429-*** | 3F12429-*** | 3S12429-*** | 3T12429-*** | (18)                       |
| 15000 | 240                 | 25                       | 35                             | 3P15235-*** | 3F15235-*** | 3S15235-*** | 3T15235-*** | 45                         |
|       | 480                 | (635)                    | (890)                          | 3P15435-*** | 3F15435-*** | 3S15435-*** | 3T15435-*** | (20.5)                     |
| 18000 | 240                 | 30                       | 40                             | 3P18240-*** | 3F18240-*** | 3S18240-*** | 3T18240-*** | 51                         |
|       | 480                 | (760)                    | (1015)                         | 3P18440-*** | 3F18440-*** | 3S18440-*** | 3T18440-*** | (23)                       |
| 24000 | 240                 | 37                       | 47                             | 3P24247-*** | 3F24247-*** | 3S24247-*** | 3T24247-*** | 63                         |
|       | 480                 | (940)                    | (1195)                         | 3P24447-*** | 3F24447-*** | 3S24447-*** | 3T24447-*** | (28.5)                     |
| 27000 | 480                 | 44                       | 54                             | 3P27454-*** | 3F27454-*** | 3S27454-*** | 3T27454-*** | 69                         |
|       |                     | (1120)                   | (1370)                         |             |             |             |             | (31)                       |
| 30000 | 480                 | 49                       | 59                             | 3P30459-*** | 3F30459-*** | 3S30459-*** | 3T30459-*** | 75                         |
|       |                     | (1245)                   | (1500)                         |             |             |             |             | (34)                       |
| 36000 | 480                 | 58                       | 68                             | 3P36468-*** | 3F36468-*** | 3S36468-*** | 3T36468-*** | 84                         |
|       |                     | (1475)                   | (1730)                         |             |             |             |             | (38)                       |

Standard units consist of single head with single conduit. Add "-1" for single phase or "-3" for three phase. For individual heads, order 3 single tube heaters.



Except Steel



Except 600 volts

## D SERIES, DERATED METAL OVER THE SIDE HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./ (mm) | OVERALL<br>LENGTH<br>In./ (mm) | STEEL       | 304<br>SS   | 316<br>SS   | TITANIUM    | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------|--------------------------------|-------------|-------------|-------------|-------------|----------------------------|
| 500   | 120                 | 6                        | 11                             | DP.5111-**  | DF.5111-**  | DS.5111-**  | DT.5111-**  | 7                          |
|       | 240                 | (155)                    | (280)                          | DP.5211-**  | DF.5211-**  | DS.5211-**  | DT.5211-**  | (3.5)                      |
| 1000  | 240                 | 10                       | 17                             | DP1217-**   | DF1217-**   | DS1217-**   | DT1217-**   | 10                         |
|       | 480                 | (255)                    | (430)                          | DP1417-**   | DF1417-**   | DS1417-**   | DT1417-**   | (4.5)                      |
| 1500  | 240                 | 16                       | 23                             | DP1.5223-** | DF1.5223-** | DS1.5223-** | DT1.5223-** | 11                         |
|       | 480                 | (405)                    | (585)                          | DP1.5423-** | DF1.5423-** | DS1.5423-** | DT1.5423-** | (5)                        |
| 2000  | 240                 | 20                       | 29                             | DP2229-**   | DF2229-**   | DS2229-**   | DT2229-**   | 13                         |
|       | 480                 | (510)                    | (735)                          | DP2429-**   | DF2429-**   | DS2429-**   | DT2429-**   | (6)                        |
| 2500  | 240                 | 25                       | 35                             | DP2.5235-** | DF2.5235-** | DS2.5235-** | DT2.5235-** | 15                         |
|       | 480                 | (635)                    | (890)                          | DP2.5435-** | DF2.5435-** | DS2.5435-** | DT2.5435-** | (7)                        |
| 3000  | 240                 | 30                       | 40                             | DP3240-**   | DF3240-**   | DS3240-**   | DT3240-**   | 17                         |
|       | 480                 | (760)                    | (1015)                         | DP3440-**   | DF3440-**   | DS3440-**   | DT3440-**   | (8)                        |
| 4000  | 240                 | 37                       | 47                             | DP4247-**   | DF4247-**   | DS4247-**   | DT4247-**   | 23                         |
|       | 480                 | (940)                    | (1195)                         | DP4447-**   | DF4447-**   | DS4447-**   | DT4447-**   | (10.5)                     |
| 4500  | 240                 | 44                       | 54                             | DP4.5254-** | DF4.5254-** | DS4.5254-** | DT4.5254-** | 24                         |
|       | 480                 | (1120)                   | (1370)                         | DP4.5454-** | DF4.5454-** | DS4.5454-** | DT4.5454-** | (11)                       |
| 5000  | 240                 | 49                       | 59                             | DP5259-**   | DF5259-**   | DS5259-**   | DT5259-**   | 25                         |
|       | 480                 | (1245)                   | (1500)                         | DP5459-**   | DF5459-**   | DS5459-**   | DT5459-**   | (11.5)                     |
| 6000  | 240                 | 58                       | 68                             | DP6268-**   | DF6268-**   | DS6268-**   | DT6268-**   | 28                         |
|       | 480                 | (1475)                   | (1730)                         | DP6468-**   | DF6468-**   | DS6468-**   | DT6468-**   | (13)                       |

Three phase available as option. Add "-3" before thermal protector designator.

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# METAL OVER THE SIDE & L-SHAPED HEATERS

Derated 18 w/in<sup>2</sup> (2.8 w/cm<sup>2</sup>) • 35 Watts Per Square Inch (5.4 w/cm<sup>2</sup>)

## D3 SERIES, DERATED TRIPLE METAL OVER THE SIDE HEATERS

| WATTS | VOLTS       | HOT ZONE | OVERALL LENGTH | STEEL          | 304 SS         | 316 SS         | TITANIUM       | SHIP WGT. |
|-------|-------------|----------|----------------|----------------|----------------|----------------|----------------|-----------|
|       | (See Pg. 1) | In./(mm) | In./(mm)       |                |                |                |                | Lbs./(kg) |
| 1500  | 120         | 6        | 11             | D3P1.5111-**-  | D3F1.5111-**-  | D3S1.5111-**-  | D3T1.5111-**-  | 21        |
|       | 240         | (155)    | (280)          | D3P1.5211-**-  | D3F1.5211-**-  | D3S1.5211-**-  | D3T1.5211-**-  | (9.5)     |
| 3000  | 240         | 10       | 17             | D3P3217-**-    | D3F3217-**-    | D3S3217-**-    | D3T3217-**-    | 30        |
|       | 480         | (255)    | (430)          | D3P3417-**-    | D3F3417-**-    | D3S3417-**-    | D3T3417-**-    | (14)      |
| 4500  | 240         | 16       | 23             | D3P4.5223-**-  | D3F4.5223-**-  | D3S4.5223-**-  | D3T4.5223-**-  | 33        |
|       | 480         | (405)    | (585)          | D3P4.5423-**-  | D3F4.5423-**-  | D3S4.5423-**-  | D3T4.5423-**-  | (15)      |
| 6000  | 240         | 20       | 29             | D3P6229-**-    | D3F6229-**-    | D3S6229-**-    | D3T6229-**-    | 39        |
|       | 480         | (510)    | (735)          | D3P6429-**-    | D3F6429-**-    | D3S6429-**-    | D3T6429-**-    | (18)      |
| 7500  | 240         | 25       | 35             | D3P7.5235-**-  | D3F7.5235-**-  | D3S7.5235-**-  | D3T7.5235-**-  | 45        |
|       | 480         | (635)    | (890)          | D3P7.5435-**-  | D3F7.5435-**-  | D3S7.5435-**-  | D3T7.5435-**-  | (20.5)    |
| 9000  | 240         | 30       | 40             | D3P9240-**-    | D3F9240-**-    | D3S9240-**-    | D3T9240-**-    | 51        |
|       | 480         | (760)    | (1015)         | D3P9440-**-    | D3F9440-**-    | D3S9440-**-    | D3T9440-**-    | (23)      |
| 12000 | 240         | 37       | 47             | D3P12247-**-   | D3F12247-**-   | D3S12247-**-   | D3T12247-**-   | 63        |
|       | 480         | (940)    | (1195)         | D3P12447-**-   | D3F12447-**-   | D3S12447-**-   | D3T12447-**-   | (28.5)    |
| 13500 | 240         | 44       | 54             | D3P13.5254-**- | D3F13.5254-**- | D3S13.5254-**- | D3T13.5254-**- | 69        |
|       | 480         | (1120)   | (1370)         | D3P13.5454-**- | D3F13.5454-**- | D3S13.5454-**- | D3T13.5454-**- | (31)      |
| 15000 | 240         | 49       | 59             | D3P15259-**-   | D3F15259-**-   | D3S15259-**-   | D3T15259-**-   | 75        |
|       | 480         | (1245)   | (1500)         | D3P15459-**-   | D3F15459-**-   | D3S15459-**-   | D3T15459-**-   | (34)      |
| 18000 | 240         | 58       | 68             | D3P18268-**-   | D3F18268-**-   | D3S18268-**-   | D3T18268-**-   | 84        |
|       | 480         | (1475)   | (1730)         | D3P18468-**-   | D3F18468-**-   | D3S18468-**-   | D3T18468-**-   | (38)      |

Standard units consist of single head with single conduit. Add ".1" for single phase or ".3" for three phase. For individual heads, order 3 single tube heaters.

## L SERIES, METAL L-SHAPED HEATERS

| WATTS | VOLTS       | HORIZ.   | STD. VERT.* | STEEL         | 304 SS        | 316 SS        | TITANIUM      | SHIP WGT. |
|-------|-------------|----------|-------------|---------------|---------------|---------------|---------------|-----------|
|       | (See Pg. 1) | In./(mm) | In./(mm)    |               |               |               |               | Lbs./(kg) |
| 1000  | 120         | 13       | 15          | LP1113-R-**-  | LF1113-R-**-  | LS1113-R-**-  | LT1113-R-**-  | 10        |
|       | 240         | (330)    | (380)       | LP1213-R-**-  | LF1213-R-**-  | LS1213-R-**-  | LT1213-R-**-  | (4.5)     |
| 2000  | 120         | 17       | 19          | LP2117-R-**-  | LF2117-R-**-  | LS2117-R-**-  | LT2117-R-**-  | 11        |
|       | 240         | (430)    | (485)       | LP2217-R-**-  | LF2217-R-**-  | LS2217-R-**-  | LT2217-R-**-  | (5)       |
|       | 480         |          |             | LP2417-R-**-  | LF2417-R-**-  | LS2417-R-**-  | LT2417-R-**-  |           |
| 3000  | 240         | 22       | 25          | LP3222-R-**-  | LF3222-R-**-  | LS3222-R-**-  | LT3222-R-**-  | 12        |
|       | 480         | (560)    | (635)       | LP3422-R-**-  | LF3422-R-**-  | LS3422-R-**-  | LT3422-R-**-  | (5.5)     |
| 4000  | 240         | 26       | 25          | LP4226-R-**-  | LF4226-R-**-  | LS4226-R-**-  | LT4226-R-**-  | 13        |
|       | 480         | (660)    | (635)       | LP4426-R-**-  | LF4426-R-**-  | LS4426-R-**-  | LT4426-R-**-  | (6)       |
| 5000  | 240         | 31       | 37          | LP5231-R-**-  | LF5231-R-**-  | LS5231-R-**-  | LT5231-R-**-  | 14        |
|       | 480         | (790)    | (940)       | LP5431-R-**-  | LF5431-R-**-  | LS5431-R-**-  | LT5431-R-**-  | (6.5)     |
| 6000  | 240         | 36       | 50          | LP6236-R-**-  | LF6236-R-**-  | LS6236-R-**-  | LT6236-R-**-  | 15        |
|       | 480         | (915)    | (1270)      | LP6436-R-**-  | LF6436-R-**-  | LS6436-R-**-  | LT6436-R-**-  | (7)       |
| 8000  | 240         | 44       | 50          | LP8244-R-**-  | LF8244-R-**-  | LS8244-R-**-  | LT8244-R-**-  | 18        |
|       | 480         | (1120)   | (1270)      | LP8444-R-**-  | LF8444-R-**-  | LS8444-R-**-  | LT8444-R-**-  | (8)       |
| 9000  | 240         | 50       | 50          | LP9250-R-**-  | LF9250-R-**-  | LS9250-R-**-  | LT9250-R-**-  | 20        |
|       | 480         | (1270)   | (1270)      | LP9450-R-**-  | LF9450-R-**-  | LS9450-R-**-  | LT9450-R-**-  | (9)       |
| 10000 | 240         | 55       | 50          | LP10255-R-**- | LF10255-R-**- | LS10255-R-**- | LT10255-R-**- | 22        |
|       | 480         | (1400)   | (1270)      | LP10455-R-**- | LF10455-R-**- | LS10455-R-**- | LT10455-R-**- | (10)      |
| 12000 | 240         | 64       | 50          | LP12264-R-**- | LF12264-R-**- | LS12264-R-**- | LT12264-R-**- | 25        |
|       | 480         | (1625)   | (1270)      | LP12464-R-**- | LF12464-R-**- | LS12464-R-**- | LT12464-R-**- | (11.5)    |

\*Specify vertical length by adding height in inches after "-R". Example: LS2217-R24-P1. Single phase standard. Three phase available as option.

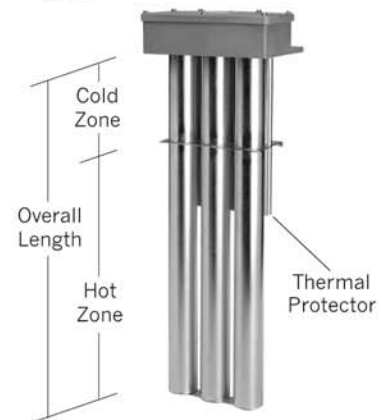
## 3L SERIES, TRIPLE METAL L-SHAPED HEATERS

| WATTS | VOLTS       | HORIZ.   | STD. VERT.* | STEEL          | 304 SS         | 316 SS         | TITANIUM       | SHIP WGT. |
|-------|-------------|----------|-------------|----------------|----------------|----------------|----------------|-----------|
|       | (See Pg. 1) | In./(mm) | In./(mm)    |                |                |                |                | Lbs./(kg) |
| 3000  | 240         | 13       | 15          | 3LP3213-R-**-  | 3LF3213-R-**-  | 3LS3213-R-**-  | 3LT3213-R-**-  | 30        |
|       | 480         | (330)    | (380)       | 3LP3413-R-**-  | 3LF3413-R-**-  | 3LS3413-R-**-  | 3LT3413-R-**-  | (14)      |
| 6000  | 240         | 17       | 37          | 3LP6217-R-**-  | 3LF6217-R-**-  | 3LS6217-R-**-  | 3LT6217-R-**-  | 33        |
|       | 480         | (430)    | (940)       | 3LP6417-R-**-  | 3LF6417-R-**-  | 3LS6417-R-**-  | 3LT6417-R-**-  | (15)      |
| 9000  | 240         | 22       | 37          | 3LP9222-R-**-  | 3LF9222-R-**-  | 3LS9222-R-**-  | 3LT9222-R-**-  | 36        |
|       | 480         | (560)    | (940)       | 3LP9422-R-**-  | 3LF9422-R-**-  | 3LS9422-R-**-  | 3LT9422-R-**-  | (16.5)    |
| 12000 | 240         | 26       | 37          | 3LP12226-R-**- | 3LF12226-R-**- | 3LS12226-R-**- | 3LT12226-R-**- | 39        |
|       | 480         | (660)    | (940)       | 3LP12426-R-**- | 3LF12426-R-**- | 3LS12426-R-**- | 3LT12426-R-**- | (18)      |
| 15000 | 240         | 31       | 37          | 3LP15231-R-**- | 3LF15231-R-**- | 3LS15231-R-**- | 3LT15231-R-**- | 42        |
|       | 480         | (790)    | (940)       | 3LP15431-R-**- | 3LF15431-R-**- | 3LS15431-R-**- | 3LT15431-R-**- | (19)      |
| 18000 | 240         | 36       | 50          | 3LP18236-R-**- | 3LF18236-R-**- | 3LS18236-R-**- | 3LT18236-R-**- | 45        |
|       | 480         | (915)    | (1270)      | 3LP18436-R-**- | 3LF18436-R-**- | 3LS18436-R-**- | 3LT18436-R-**- | (20.5)    |
| 24000 | 240         | 44       | 50          | 3LP24244-R-**- | 3LF24244-R-**- | 3LS24244-R-**- | 3LT24244-R-**- | 54        |
|       | 480         | (1120)   | (1270)      | 3LP24444-R-**- | 3LF24444-R-**- | 3LS24444-R-**- | 3LT24444-R-**- | (24.5)    |
| 27000 | 480         | 50       | 50          | 3LP27450-R-**- | 3LF27450-R-**- | 3LS27450-R-**- | 3LT27450-R-**- | 60        |
|       |             | (1270)   | (1270)      |                |                |                |                | (27.5)    |
| 30000 | 480         | 55       | 50          | 3LP30455-R-**- | 3LF30455-R-**- | 3LS30455-R-**- | 3LT30455-R-**- | 66        |
|       |             | (1400)   | (1270)      |                |                |                |                | (30)      |
| 36000 | 480         | 64       | 50          | 3LP36464-R-**- | 3LF36464-R-**- | 3LS36464-R-**- | 3LT36464-R-**- | 75        |
|       |             | (1625)   | (1270)      |                |                |                |                | (34)      |

\*Specify vertical length by adding height in inches after "-R". Example: 3LS6217-R39-P1. Three phase standard. Single phase available as option. Specify vertical length (riser height) greater than or equal to tank depth.

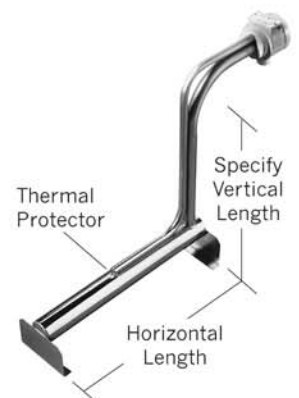
UL US Except Steel

CE Except 600 volts



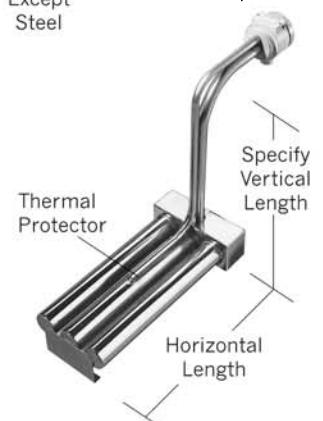
UL US Except Steel

CE Except 600 volts



UL US Except Steel

CE Except 600 volts



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# METAL VERTICAL & DERATED L-SHAPED HEATERS

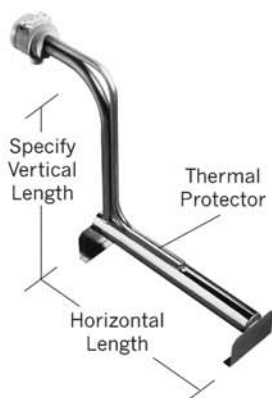
35 Watts Per Square Inch (5.4 w/cm<sup>2</sup>) • Derated 18 w/in<sup>2</sup> (2.8 w/cm<sup>2</sup>)



Except Steel



Except 600 volts



## DL SERIES, DERATED METAL L-SHAPED HEATERS

| WATTS       | VOLTS | HORIZ. STD. IN./ (mm) | VERT.* IN./ (mm) | STEEL         | 304 SS        | 316 SS        | TITANIUM      | SHIP WGT. Lbs./ (kg) |
|-------------|-------|-----------------------|------------------|---------------|---------------|---------------|---------------|----------------------|
| (See Pg. 1) |       |                       |                  |               |               |               |               |                      |
| 500         | 120   | 13                    | 15               | DLP.5113-R**  | DLF.5113-R**  | DLS.5113-R**  | DLT.5113-R**  | 10                   |
|             | 240   | (330)                 | (380)            | DLP.5213-R**  | DLF.5213-R**  | DLS.5213-R**  | DLT.5213-R**  | (4.5)                |
| 1000        | 120   | 17                    | 19               | DLP1117-R**   | DLF1117-R**   | DLS1117-R**   | DLT1117-R**   | 11                   |
|             | 240   | (430)                 | (485)            | DLP1217-R**   | DLF1217-R**   | DLS1217-R**   | DLT1217-R**   | (5)                  |
| 1500        | 120   | 22                    | 25               | DLP1.5122-R** | DLF1.5122-R** | DLS1.5122-R** | DLT1.5122-R** | 12                   |
|             | 240   | (560)                 | (635)            | DLP1.5222-R** | DLF1.5222-R** | DLS1.5222-R** | DLT1.5222-R** | (5.5)                |
| 2000        | 480   |                       |                  | DLP1.5422-R** | DLF1.5422-R** | DLS1.5422-R** | DLT1.5422-R** |                      |
|             | 240   | 26                    | 25               | DLP2226-R**   | DLF2226-R**   | DLS2226-R**   | DLT2226-R**   | 13                   |
| 2500        | 480   | (660)                 | (635)            | DLP2426-R**   | DLF2426-R**   | DLS2426-R**   | DLT2426-R**   | (6)                  |
|             | 240   | 31                    | 37               | DLP2.5231-R** | DLF2.5231-R** | DLS2.5231-R** | DLT2.5231-R** | 14                   |
| 3000        | 480   | (790)                 | (940)            | DLP2.5431-R** | DLF2.5431-R** | DLS2.5431-R** | DLT2.5431-R** | (6.5)                |
|             | 240   | 36                    | 50               | DLP3236-R**   | DLF3236-R**   | DLS3236-R**   | DLT3236-R**   | 15                   |
| 4000        | 480   | (915)                 | (1270)           | DLP3436-R**   | DLF3436-R**   | DLS3436-R**   | DLT3436-R**   | (7)                  |
|             | 240   | 44                    | 50               | DLP4244-R**   | DLF4244-R**   | DLS4244-R**   | DLT4244-R**   | 18                   |
| 4500        | 480   | (1120)                | (1270)           | DLP4444-R**   | DLF4444-R**   | DLS4444-R**   | DLT4444-R**   | (8)                  |
|             | 240   | 50                    | 50               | DLP4.5250-R** | DLF4.5250-R** | DLS4.5250-R** | DLT4.5250-R** | 20                   |
| 5000        | 480   | (1270)                | (1270)           | DLP4.5450-R** | DLF4.5450-R** | DLS4.5450-R** | DLT4.5450-R** | (9)                  |
|             | 240   | 55                    | 50               | DLP5255-R**   | DLF5255-R**   | DLS5255-R**   | DLT5255-R**   | 22                   |
| 6000        | 480   | (1400)                | (1270)           | DLP5455-R**   | DLF5455-R**   | DLS5455-R**   | DLT5455-R**   | (10)                 |
|             | 240   | 64                    | 50               | DLP6264-R**   | DLF6264-R**   | DLS6264-R**   | DLT6264-R**   | 25                   |
|             | 480   | (1625)                | (1270)           | DLP6464-R**   | DLF6464-R**   | DLS6464-R**   | DLT6464-R**   | (11.5)               |

\*Specify vertical length by adding height in inches after "R". Example: DLS1117-R24-P1.

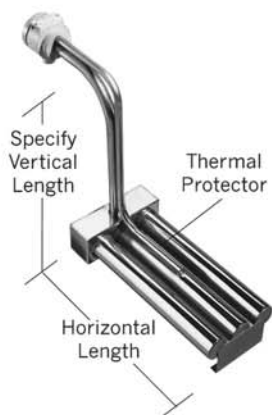
## D3L SERIES, DERATED TRIPLE TUBE METAL L-SHAPED HEATERS



Except Steel



Except 600 volts



| WATTS       | VOLTS | HORIZ. STD. IN./ (mm) | VERT.* IN./ (mm) | STEEL           | 304 SS          | 316 SS          | TITANIUM        | SHIP WGT. Lbs./ (kg) |
|-------------|-------|-----------------------|------------------|-----------------|-----------------|-----------------|-----------------|----------------------|
| (See Pg. 1) |       |                       |                  |                 |                 |                 |                 |                      |
| 1500        | 120   | 13                    | 15               | D3LP1.5113-R**  | D3LF1.5113-R**  | D3LS1.5113-R**  | D3LT1.5113-R**  | 30                   |
|             | 240   | (330)                 | (380)            | D3LP1.5213-R**  | D3LF1.5213-R**  | D3LS1.5213-R**  | D3LT1.5213-R**  | (14)                 |
| 3000        | 120   | 17                    | 37               | D3LP3217-R**    | D3LF3217-R**    | D3LS3217-R**    | D3LT3217-R**    | 33                   |
|             | 480   | (430)                 | (940)            | D3LP3417-R**    | D3LF3417-R**    | D3LS3417-R**    | D3LT3417-R**    | (15)                 |
| 4500        | 240   | 22                    | 37               | D3LP4.5222-R**  | D3LF4.5222-R**  | D3LS4.5222-R**  | D3LT4.5222-R**  | 36                   |
|             | 480   | (560)                 | (940)            | D3LP4.5422-R**  | D3LF4.5422-R**  | D3LS4.5422-R**  | D3LT4.5422-R**  | (16.5)               |
| 6000        | 240   | 26                    | 37               | D3LP6226-R**    | D3LF6226-R**    | D3LS6226-R**    | D3LT6226-R**    | 39                   |
|             | 480   | (660)                 | (940)            | D3LP6426-R**    | D3LF6426-R**    | D3LS6426-R**    | D3LT6426-R**    | (18)                 |
| 7500        | 240   | 31                    | 37               | D3LP7.5231-R**  | D3LF7.5231-R**  | D3LS7.5231-R**  | D3LT7.5231-R**  | 42                   |
|             | 480   | (790)                 | (940)            | D3LP7.5431-R**  | D3LF7.5431-R**  | D3LS7.5431-R**  | D3LT7.5431-R**  | (19)                 |
| 9000        | 240   | 36                    | 50               | D3LP9236-R**    | D3LF9236-R**    | D3LS9236-R**    | D3LT9236-R**    | 45                   |
|             | 480   | (915)                 | (1270)           | D3LP9436-R**    | D3LF9436-R**    | D3LS9436-R**    | D3LT9436-R**    | (20.5)               |
| 12000       | 240   | 44                    | 50               | D3LP12244-R**   | D3LF12244-R**   | D3LS12244-R**   | D3LT12244-R**   | 54                   |
|             | 480   | (1120)                | (1270)           | D3LP12444-R**   | D3LF12444-R**   | D3LS12444-R**   | D3LT12444-R**   | (24.5)               |
| 13500       | 240   | 50                    | 50               | D3LP13.5250-R** | D3LF13.5250-R** | D3LS13.5250-R** | D3LT13.5250-R** | 60                   |
|             | 480   | (1270)                | (1270)           | D3LP13.5450-R** | D3LF13.5450-R** | D3LS13.5450-R** | D3LT13.5450-R** | (27.5)               |
| 15000       | 240   | 55                    | 50               | D3LP15255-R**   | D3LF15255-R**   | D3LS15255-R**   | D3LT15255-R**   | 66                   |
|             | 480   | (1400)                | (1270)           | D3LP15455-R**   | D3LF15455-R**   | D3LS15455-R**   | D3LT15455-R**   | (30)                 |
| 18000       | 240   | 64                    | 50               | D3LP18264-R**   | D3LF18264-R**   | D3LS18264-R**   | D3LT18264-R**   | 75                   |
|             | 480   | (1625)                | (1270)           | D3LP18464-R**   | D3LF18464-R**   | D3LS18464-R**   | D3LT18464-R**   | (34)                 |

\*Specify vertical length by adding height in inches after "R". Example: D3LS3217-R36-P1.

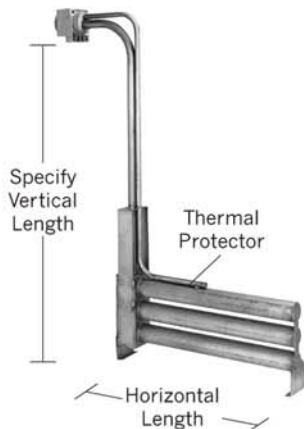
## 3LV SERIES, TRIPLE VERTICAL STACK METAL L-SHAPED HEATERS



Except Steel



Except 600 volts



| WATTS       | VOLTS | HORIZ. STD. LGTH. IN./ (mm) | VERT.* IN./ (mm) | STEEL         | 304 SS        | 316 SS        | TITANIUM      | SHIP WGT. Lbs./ (kg) |
|-------------|-------|-----------------------------|------------------|---------------|---------------|---------------|---------------|----------------------|
| (See Pg. 1) |       |                             |                  |               |               |               |               |                      |
| 3000        | 240   | 13                          | 19               | 3LVP3213-R**  | 3LVF3213-R**  | 3LVS3213-R**  | 3LVT3213-R**  | 30                   |
|             | 480   | (330)                       | (485)            | 3LVP3413-R**  | 3LVF3413-R**  | 3LVS3413-R**  | 3LVT3413-R**  | (14)                 |
| 6000        | 240   | 17                          | 37               | 3LVP6217-R**  | 3LVF6217-R**  | 3LVS6217-R**  | 3LVT6217-R**  | 33                   |
|             | 480   | (430)                       | (940)            | 3LVP6417-R**  | 3LVF6417-R**  | 3LVS6417-R**  | 3LVT6417-R**  | (15)                 |
| 9000        | 240   | 22                          | 37               | 3LVP9222-R**  | 3LVF9222-R**  | 3LVS9222-R**  | 3LVT9222-R**  | 36                   |
|             | 480   | (560)                       | (940)            | 3LVP9422-R**  | 3LVF9422-R**  | 3LVS9422-R**  | 3LVT9422-R**  | (16.5)               |
| 12000       | 240   | 26                          | 37               | 3LVP12226-R** | 3LVF12226-R** | 3LVS12226-R** | 3LVT12226-R** | 39                   |
|             | 480   | (660)                       | (940)            | 3LVP12426-R** | 3LVF12426-R** | 3LVS12426-R** | 3LVT12426-R** | (18)                 |
| 15000       | 240   | 31                          | 37               | 3LVP15231-R** | 3LVF15231-R** | 3LVS15231-R** | 3LVT15231-R** | 42                   |
|             | 480   | (790)                       | (635)            | 3LVP15431-R** | 3LVF15431-R** | 3LVS15431-R** | 3LVT15431-R** | (19)                 |
| 18000       | 240   | 36                          | 50               | 3LVP18236-R** | 3LVF18236-R** | 3LVS18236-R** | 3LVT18236-R** | 45                   |
|             | 480   | (915)                       | (1270)           | 3LVP18436-R** | 3LVF18436-R** | 3LVS18436-R** | 3LVT18436-R** | (20.5)               |
| 24000       | 240   | 44                          | 50               | 3LVP24244-R** | 3LVF24244-R** | 3LVS24244-R** | 3LVT24244-R** | 54                   |
|             | 480   | (1120)                      | (1270)           | 3LVP24444-R** | 3LVF24444-R** | 3LVS24444-R** | 3LVT24444-R** | (24.5)               |
| 27000       | 480   | 50                          | 50               | 3LVP27450-R** | 3LVF27450-R** | 3LVS27450-R** | 3LVT27450-R** | 60                   |
|             |       | (1270)                      | (1270)           |               |               |               |               | (27.5)               |
| 30000       | 480   | 55                          | 50               | 3LVP30455-R** | 3LVF30455-R** | 3LVS30455-R** | 3LVT30455-R** | 66                   |
|             |       | (1400)                      | (1270)           |               |               |               |               | (30)                 |
| 36000       | 480   | 64                          | 50               | 3LVP36464-R** | 3LVF36464-R** | 3LVS36464-R** | 3LVT36464-R** | 75                   |
|             |       | (1625)                      | (1270)           |               |               |               |               | (34)                 |

\*Specify vertical length by adding height in inches after "R". Example: 3LVF3213-R39-P1.

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



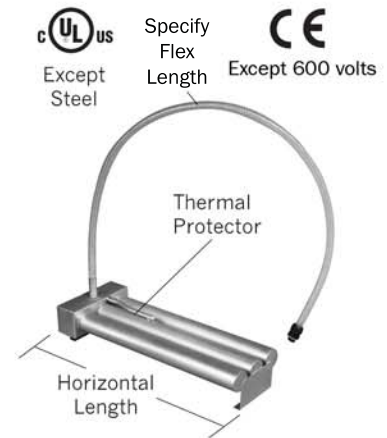
# SPECIAL APPLICATION HEATERS

## FLEX RISER HEATER OPTION FOR METAL L-SHAPED HEATERS

Non-conductive fluoropolymer (PTFE) riser with stainless steel reinforced construction affords versatile installation in various tank depths and enhances delivery time as well. With less bulk and less weight, most heaters can be shipped by a parcel carrier thereby reducing shipping costs.

### Specifications

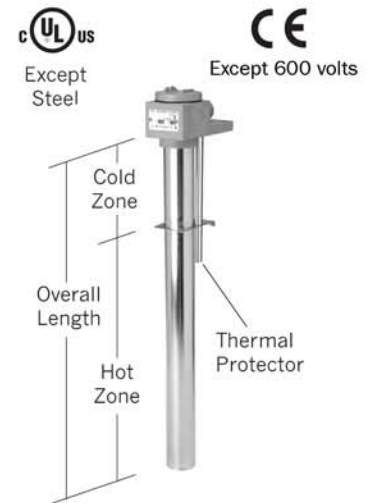
- Patented design.
- Bend radius 7.75" (200 mm) minimum.
- 48" (1220 mm) length standard. Longer lengths available. Consult factory.
- Suitable for process temperatures up to 300°F only. Available with P2 overtemperature protection only. P2 safety components necessary for thermal overtemperature monitoring. (Consult factory)
- To order, specify part number "FR" before riser length. Example: LT3222-FR-25-P2. FR=Flex Riser.



## DEEP TANK HEATERS

| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./(mm) | OVERALL LENGTH<br>In./(mm) | STEEL      | 304 SS     | 316 SS     | TITANIUM   | SHIP WGT.<br>Lbs./(kg) |
|-------|---------------------|----------------------|----------------------------|------------|------------|------------|------------|------------------------|
| 12000 | 240                 | 58                   | 96                         | P12296-**  | F12296-**  | S12296-**  | T12296-**  | 37                     |
|       | 480                 | (1475)               | (2440)                     | P12496-**  | F12496-**  | S12496-**  | T12496-**  | (17)                   |
| 12000 | 240                 | 58                   | 120                        | P122120-** | F122120-** | S122120-** | T122120-** | 45                     |
|       | 480                 | (1475)               | (3050)                     | P124120-** | F124120-** | S124120-** | T124120-** | (20)                   |
| 12000 | 240                 | 58                   | 144                        | P122144-** | F122144-** | S122144-** | T122144-** | 53                     |
|       | 480                 | (1475)               | (3655)                     | P124144-** | F124144-** | S124144-** | T124144-** | (24)                   |
| 15000 | 240                 | 76                   | 96                         | P15296-**  | F15296-**  | S15296-**  | T15296-**  | 37                     |
|       | 480                 | (1930)               | (2440)                     | P15496-**  | F15496-**  | S15496-**  | T15496-**  | (17)                   |
| 15000 | 240                 | 76                   | 120                        | P152120-** | F152120-** | S152120-** | T152120-** | 45                     |
|       | 480                 | (1930)               | (3050)                     | P154120-** | F154120-** | S154120-** | T154120-** | (20)                   |
| 15000 | 240                 | 76                   | 144                        | P152144-** | F152144-** | S152144-** | T152144-** | 53                     |
|       | 480                 | (1930)               | (3655)                     | P154144-** | F154144-** | S154144-** | T154144-** | (24)                   |
| 18000 | 480                 | 82                   | 96                         | P18496-**  | F18496-**  | S18496-**  | T18496-**  | 37                     |
|       |                     | (2080)               | (2440)                     |            |            |            |            | (17)                   |
| 18000 | 480                 | 82                   | 120                        | P184120-** | F184120-** | S184120-** | T184120-** | 45                     |
|       |                     | (2080)               | (3050)                     |            |            |            |            | (20)                   |
| 18000 | 480                 | 82                   | 144                        | P184144-** | F184144-** | S184144-** | T184144-** | 53                     |
|       |                     | (2080)               | (3655)                     |            |            |            |            | (24)                   |

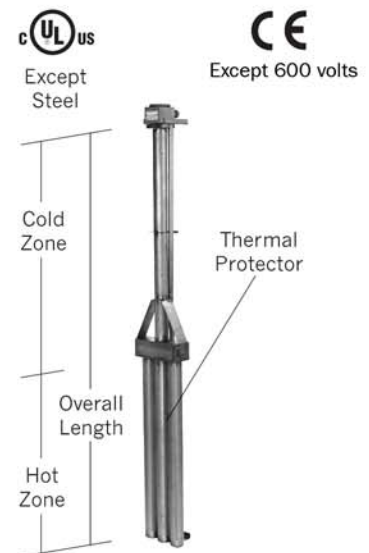
Three phase available as option. Add "-3" before thermal protector designator.



## 3V SERIES, TRIPLE DEEP TANK HEATERS

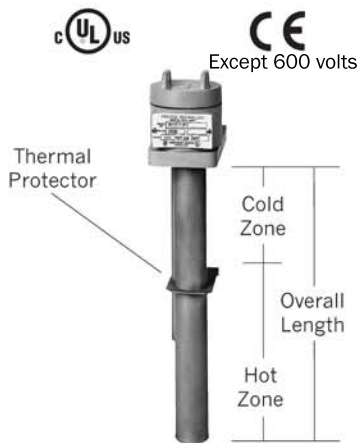
| WATTS | VOLTS<br>(See Pg.1) | HOT ZONE<br>In./(mm) | STEEL          | 304 SS         | 316 SS         | TITANIUM       | EST. SHIP WGT.<br>Lbs./(kg) |
|-------|---------------------|----------------------|----------------|----------------|----------------|----------------|-----------------------------|
| 18000 | 240                 | 36                   | 3VP18236-R*-** | 3VF18236-R*-** | 3VS18236-R*-** | 3VT18236-R*-** | 70                          |
|       | 480                 | (915)                | 3VP18436-R*-** | 3VF18436-R*-** | 3VS18436-R*-** | 3VT18436-R*-** | (32)                        |
| 24000 | 240                 | 37                   | 3VP24237-R*-** | 3VF24237-R*-** | 3VS24237-R*-** | 3VT24237-R*-** | 75                          |
|       | 480                 | (940)                | 3VP24437-R*-** | 3VF24437-R*-** | 3VS24437-R*-** | 3VT24437-R*-** | (34)                        |
| 27000 | 480                 | 44                   | 3VP27444-R*-** | 3VF27444-R*-** | 3VS27444-R*-** | 3VT27444-R*-** | 80                          |
|       |                     | (1120)               |                |                |                |                | (36)                        |
| 30000 | 480                 | 49                   | 3VP30449-R*-** | 3VF30449-R*-** | 3VS30449-R*-** | 3VT30449-R*-** | 87                          |
|       |                     | (1245)               |                |                |                |                | (40)                        |
| 36000 | 480                 | 58                   | 3VP36458-R*-** | 3VF36458-R*-** | 3VS36458-R*-** | 3VT36458-R*-** | 100                         |
|       |                     | (1475)               |                |                |                |                | (46)                        |
| 45000 | 480                 | 66                   | 3VP45466-R*-** | 3VF45466-R*-** | 3VS45466-R*-** | 3VT45466-R*-** | 120                         |
|       |                     | (1675)               |                |                |                |                | (55)                        |
| 48000 | 480                 | 70                   | 3VP48470-R*-** | 3VF48470-R*-** | 3VS48470-R*-** | 3VT48470-R*-** | 125                         |
|       |                     | (1780)               |                |                |                |                | (57)                        |
| 54000 | 480                 | 78                   | 3VP54478-R*-** | 3VF54478-R*-** | 3VS54478-R*-** | 3VT54478-R*-** | 40                          |
|       |                     | (1980)               |                |                |                |                | (64)                        |

\*P2 thermal protection standard. Specify cold zone required. Example: 3VP18236-R59-P2.



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# SMALL TANK HEATERS



## B SERIES, SMALL TANK METAL HEATERS (1 1/4" Dia.)

| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./(mm) | LENGTH<br>In./(mm) | 304<br>SS    | 316<br>SS    | TITANIUM     | SHIP<br>WGT.<br>Lbs./(kg) |
|-------|---------------------|-------------------------|--------------------|--------------|--------------|--------------|---------------------------|
| 500   | 120                 | 5                       | 10                 | FB.5110-**-  | SB.5110-**-  | TB.5110-**-  | 5                         |
|       | 240                 | (130)                   | (255)              | FB.5210-**-  | SB.5210-**-  | TB.5210-**-  | (2)                       |
| 1000  | 120                 | 8                       | 14                 | FB1114-**-   | SB1114-**-   | TB1114-**-   | 6                         |
|       | 240                 | (205)                   | (355)              | FB1214-**-   | SB1214-**-   | TB1214-**-   | (3)                       |
| 1500  | 120                 | 11                      | 17                 | FB1.5117-**- | SB1.5117-**- | TB1.5117-**- | 8                         |
|       | 240                 | (280)                   | (430)              | FB1.5217-**- | SB1.5217-**- | TB1.5217-**- | (3.5)                     |
| 2000  | 120                 | 14                      | 23                 | FB2123-**-   | SB2123-**-   | TB2123-**-   | 9                         |
|       | 240                 | (355)                   | (585)              | FB2223-**-   | SB2223-**-   | TB2223-**-   | (4)                       |

## V SERIES, VARIPOWER HEATERS (1/2" Dia.)



| WATTS | VOLTS<br>(See Pg.1) | HOT<br>ZONE<br>In./(mm) | LENGTH<br>In./(mm) | 304<br>SS    | 316<br>SS    | TITANIUM     | SHIP<br>WGT.<br>Lbs./(kg) |
|-------|---------------------|-------------------------|--------------------|--------------|--------------|--------------|---------------------------|
| 500   | 120                 | 5                       | 10                 | FB.5110-**-  | SB.5110-**-  | TB.5110-**-  | 5                         |
|       | 240                 | (130)                   | (255)              | FB.5210-**-  | SB.5210-**-  | TB.5210-**-  | (2)                       |
| 1000  | 120                 | 8                       | 14                 | FB1114-**-   | SB1114-**-   | TB1114-**-   | 6                         |
|       | 240                 | (205)                   | (355)              | FB1214-**-   | SB1214-**-   | TB1214-**-   | (3)                       |
| 1500  | 120                 | 11                      | 17                 | FB1.5117-**- | SB1.5117-**- | TB1.5117-**- | 8                         |
|       | 240                 | (280)                   | (430)              | FB1.5217-**- | SB1.5217-**- | TB1.5217-**- | (3.5)                     |
| 2000  | 120                 | 14                      | 23                 | FB2123-**-   | SB2123-**-   | TB2123-**-   | 9                         |
|       | 240                 | (355)                   | (585)              | FB2223-**-   | SB2223-**-   | TB2223-**-   | (4)                       |

Vapor tight polypropylene terminal enclosure with 4' cord and plug (100 watt model) and 4' flexible PVC liquid tight conduit (on 300 through 1000 watt models). Designed for vertical installation. **DO NOT** immerse terminal enclosure. Optional 1/2" PVDF screw plug adapter available for side wall mounting (100 watt) (see page 18). Patented self-regulating design protects against overheating and fires. Plug included with 120VAC models only (see page 18).



## PLUG-IN OPTION

Plug-in heater/control option available on 120 VAC quartz, fluoropolymer (PTFE) and metal heaters up to 1500 watts in combination with the NR25 thermostat with 6' (1.8 m) cord and plug.



\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

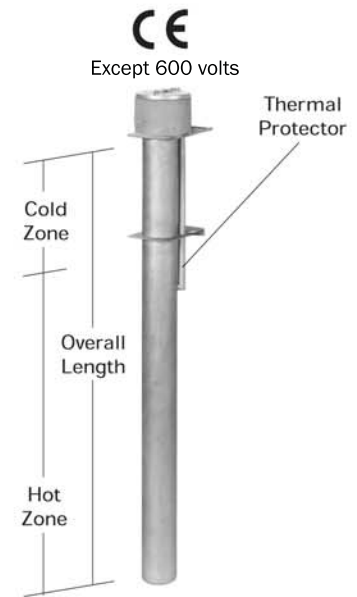


# PHOSPHATE HEATERS/INLINE WATER HEATERS

## DAS SERIES, PHOSPHATE HEATERS

| WATTS | VOLTS | HOT ZONE<br>In./(mm.) | OVERALL LENGTH<br>In./(mm.) | MODEL NUMBER | SHIP WGT.<br>Lbs./(kg.) |
|-------|-------|-----------------------|-----------------------------|--------------|-------------------------|
| 1000  | 120   | 7                     | 11                          | DAS1111-P4   | 17                      |
|       | 240   | (180)                 | (280)                       | DAS1211-P4   | (8)                     |
| 2000  | 240   | 12                    | 17                          | DAS2217-P4   | 20                      |
|       | 480   | (305)                 | (430)                       | DAS2417-P4   | (9)                     |
| 3000  | 240   | 18                    | 23                          | DAS3223-P4   | 24                      |
|       | 480   | (460)                 | (585)                       | DAS3423-P4   | (11)                    |
| 3500  | 240   | 21                    | 29                          | DAS3.5229-P4 | 30                      |
|       | 480   | (535)                 | (735)                       | DAS3.5429-P4 | (14)                    |
| 4000  | 240   | 28                    | 35                          | DAS4235-P4   | 36                      |
|       | 480   | (710)                 | (890)                       | DAS4435-P4   | (16)                    |
| 5000  | 240   | 33                    | 41                          | DAS5241-P4   | 42                      |
|       | 480   | (840)                 | (1040)                      | DAS5441-P4   | (19)                    |
| 6000  | 240   | 39                    | 47                          | DAS6247-P4   | 48                      |
|       | 480   | (990)                 | (1320)                      | DAS6447-P4   | (22)                    |
| 8000  | 240   | 49                    | 59                          | DAS8259-P4   | 58                      |
|       | 480   | (1245)                | (1500)                      | DAS8459-P4   | (27)                    |
| 10000 | 240   | 62                    | 71                          | DAS10271-P4  | 64                      |
|       | 480   | (1575)                | (1900)                      | DAS10471-P4  | (30)                    |

\* Thermal protection designator. Single phase standard. Three phase available as option. Add "-3" before thermal protection designator.



## TYTAN™ ELECTRIC INLINE WATER HEATERS

| WATTS  | VOLTS | TITANIUM<br>MODEL NUMBER | STAINLESS<br>MODEL NUMBER | SHIP<br>WGT.<br>Lbs./(kg.) |
|--------|-------|--------------------------|---------------------------|----------------------------|
| 12000  | 240   | TY-012-240-3             | TY-012-240-3-S            | 300                        |
|        | 480   | TY-012-480-3             | TY-012-480-3-S            | (136)                      |
| 18000  | 240   | TY-018-240-3             | TY-018-240-3-S            | 300                        |
|        | 480   | TY-018-480-3             | TY-018-480-3-S            | (136)                      |
| 24000  | 240   | TY-024-240-3             | TY-024-240-3-S            | 300                        |
|        | 480   | TY-024-480-3             | TY-024-480-3-S            | (136)                      |
| 36000  | 240   | TY-036-240-3             | TY-036-240-3-S            | 338                        |
|        | 480   | TY-036-480-3             | TY-036-480-3-S            | (153)                      |
| 48000  | 240   | TY-048-240-3             | TY-048-240-3-S            | 338                        |
|        | 480   | TY-048-480-3             | TY-048-480-3-S            | (153)                      |
| 72000  | 240   | TY-072-240-3             | TY-072-240-3-S            | 350                        |
|        | 480   | TY-072-480-3             | TY-072-480-3-S            | (159)                      |
| 96000  | 480   | TY-096-480-3             | TY-096-480-3-S            | 570                        |
|        |       |                          |                           | (259)                      |
| 120000 | 480   | TY-120-480-3             | TY-120-480-3-S            | 580                        |
|        |       |                          |                           | (263)                      |
| 144000 | 480   | TY-144-480-3             | TY-144-480-3-S            | 590                        |
|        |       |                          |                           | (268)                      |



Wall mounted unit pictured.

Consult factory for sizing assistance. Wall mounted up to 72 kW, floor mounted 96 kW and higher.

## STANDARD FEATURES

- Rapid installation
- No ionic contamination
- Voltages for 208-600 volt
- State of the art controllers
- Redundant safety supervisory circuits

## OPTIONAL FEATURES

- Semi S2/S3 compliance
- CE compliance
- Disconnect and circuit breaker
- Remote interface
- Remote communications
- PLC control
- PLC memory backup
- Casters (floor mount units only)

# SCREW PLUG HEATERS



Except 600 volts



Overall Length

## 2T SERIES, 2" STAINLESS STEEL SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL LENGTH<br>In./.(mm) | PIPE<br>THREAD | NO. OF<br>ELEMENTS | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./.(kg) |
|-------|---------------------|-----------------------------|----------------|--------------------|-----------------|----------------------------|
| 2000  | 240                 | 8                           | 2              | 2                  | 2T2208          | 5                          |
|       | 480                 | (205)                       |                |                    | 2T2408          | (2.5)                      |
| 3000  | 240                 | 12                          | 2              | 2                  | 2T3212          | 6                          |
|       | 480                 | (305)                       |                |                    | 2T3412          | (3)                        |
| 4000  | 240                 | 18                          | 2              | 2                  | 2T4218          | 7                          |
|       | 480                 | (460)                       |                |                    | 2T4418          | (3.5)                      |
| 6000  | 240                 | 25                          | 2              | 2                  | 2T6225          | 8                          |
|       | 480                 | (635)                       |                |                    | 2T6425          | (4)                        |
| 8000  | 240                 | 32                          | 2              | 2                  | 2T8232          | 10                         |
|       | 480                 | (815)                       |                |                    | 2T8432          | (4.5)                      |
| 10000 | 240                 | 40                          | 2              | 2                  | 2T10240         | 10                         |
|       | 480                 | (1015)                      |                |                    | 2T10440         | (4.5)                      |
| 12000 | 240                 | 48                          | 2              | 2                  | 2T12248         | 12                         |
|       | 480                 | (1220)                      |                |                    | 2T12448         | (5.5)                      |
| 15000 | 240                 | 54                          | 2              | 2                  | 2T15254         | 15                         |
|       | 480                 | (1375)                      |                |                    | 2T15454         | (7)                        |

Single phase. Other sizes available, consult factory.



Except 600 volts



Overall Length

## T2T SERIES, 2" TITANIUM SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL LENGTH<br>In./.(mm) | PIPE<br>THREAD | NO. OF<br>ELEMENTS | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./.(kg) |
|-------|---------------------|-----------------------------|----------------|--------------------|-----------------|----------------------------|
| 2000  | 240                 | 8                           | 2              | 2                  | T2T2208         | 4                          |
|       | 480                 | (205)                       |                |                    | T2T2408         | (2)                        |
| 4000  | 240                 | 18                          | 2              | 2                  | T2T4218         | 6                          |
|       | 480                 | (460)                       |                |                    | T2T4418         | (3)                        |
| 6000  | 240                 | 25                          | 2              | 2                  | T2T6225         | 7                          |
|       | 480                 | (635)                       |                |                    | T2T6425         | (3.5)                      |
| 8000  | 240                 | 32                          | 2              | 2                  | T2T8232         | 8                          |
|       | 480                 | (815)                       |                |                    | T2T8432         | (4)                        |
| 12000 | 480                 | 48                          | 2              | 2                  | T2T12448        | 10                         |
|       |                     | (1220)                      |                |                    |                 | (4.5)                      |

Single phase. Other sizes available, consult factory.



Except 600 volts



Overall Length

## T SERIES, 2" TUBULAR SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL LENGTH<br>In./.(mm) | PIPE<br>THREAD | 304<br>SS | 316<br>SS | TITANIUM | SHIP<br>WGT.<br>Lbs./.(kg) |
|-------|---------------------|-----------------------------|----------------|-----------|-----------|----------|----------------------------|
| 1000  | 120                 | 10                          | 2              | FT1110    | ST1110    | TT1110   | 11                         |
|       | 240                 | (255)                       |                | FT1210    | ST1210    | TT1210   | (5)                        |
| 2000  | 120                 | 14                          | 2              | FT2114    | ST2114    | TT2114   | 14                         |
|       | 240                 | (355)                       |                | FT2214    | ST2214    | TT2214   | (6.5)                      |
|       | 480                 |                             | 2              | FT2414    | ST2414    | TT2414   |                            |
|       |                     |                             |                |           |           |          |                            |
| 3000  | 240                 | 19                          | 2              | FT3219    | ST3219    | TT3219   | 16                         |
|       | 480                 | (485)                       |                | FT3419    | ST3419    | TT3419   | (7.5)                      |
| 4000  | 240                 | 23                          | 2              | FT4223    | ST4223    | TT4223   | 20                         |
|       | 480                 | (585)                       |                | FT4423    | ST4423    | TT4423   | (9)                        |
| 6000  | 240                 | 33                          | 2              | FT6233    | ST6233    | TT6233   | 26                         |
|       | 480                 | (840)                       |                | FT6433    | ST6433    | TT6433   | (12)                       |
| 8000  | 240                 | 40                          | 2              | FT8240    | ST8240    | TT8240   | 29                         |
|       | 480                 | (1020)                      |                | FT8440    | ST8440    | TT8440   | (13.5)                     |
| 9000  | 240                 | 47                          | 2              | FT9247    | ST9247    | TT9247   | 32                         |
|       | 480                 | (1195)                      |                | FT9447    | ST9447    | TT9447   | (14.5)                     |
| 12000 | 480                 | 61                          | 2              | FT12461   | ST12461   | TT12461  | 37                         |
|       |                     | (1550)                      |                |           |           |          | (17)                       |

Single phase standard, three phase available as option. Add "-3" to end of model number. Other sizes available, consult factory.

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# SCREW PLUG HEATERS

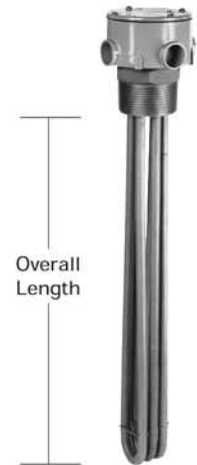
## 5T SERIES, 2 1/2" STAINLESS STEEL SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL<br>LENGTH<br>In./ (mm) | PIPE<br>THREAD | NO. OF<br>ELEMENTS | MODEL<br>NUMBER      | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------------|----------------|--------------------|----------------------|----------------------------|
| 4500  | 240<br>480          | 12<br>(305)                    | 2-1/2          | 3                  | 5T4.5212<br>5T4.5412 | 7<br>(3.5)                 |
| 6000  | 240<br>480          | 18<br>(460)                    | 2-1/2          | 3                  | 5T6218<br>5T6418     | 8<br>(4)                   |
| 9000  | 240<br>480          | 25<br>(635)                    | 2-1/2          | 3                  | 5T9225<br>5T9425     | 9<br>(4.5)                 |
| 12000 | 240<br>480          | 32<br>(815)                    | 2-1/2          | 3                  | 5T12232<br>5T12432   | 10<br>(4.5)                |
| 15000 | 240<br>480          | 40<br>(1015)                   | 2-1/2          | 3                  | 5T15240<br>5T15440   | 12<br>(5.5)                |
| 18000 | 240<br>480          | 48<br>(1220)                   | 2-1/2          | 3                  | 5T18248<br>5T18448   | 15<br>(7)                  |

Three phase standard, single phase available as option. Add "-1" to end of model number. Other sizes available, consult factory.



Except 600 volts



Overall  
Length

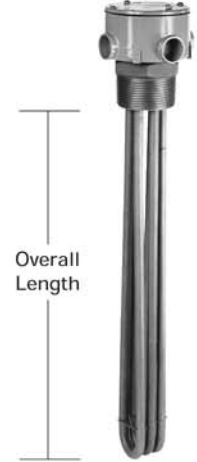
## T5T SERIES, 2 1/2" TITANIUM SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL<br>LENGTH<br>In./ (mm) | PIPE<br>THREAD | NO. OF<br>ELEMENTS | MODEL<br>NUMBER      | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------------|----------------|--------------------|----------------------|----------------------------|
| 3000  | 240<br>480          | 8<br>(205)                     | 2-1/2          | 3                  | T5T3208<br>T5T3408   | 5<br>(2.5)                 |
| 6000  | 240<br>480          | 18<br>(460)                    | 2-1/2          | 3                  | T5T6218<br>T5T6418   | 6<br>(3)                   |
| 9000  | 240<br>480          | 25<br>(635)                    | 2-1/2          | 3                  | T5T9225<br>T5T9425   | 7<br>(3.5)                 |
| 12000 | 240<br>480          | 32<br>(815)                    | 2-1/2          | 3                  | T5T12232<br>T5T12432 | 8<br>(4)                   |
| 18000 | 240<br>480          | 48<br>(1220)                   | 2-1/2          | 3                  | T5T18248<br>T5T18448 | 13<br>(6)                  |

Three phase standard, single phase available as option. Add -1 to end of model number. Other sizes available, consult factory.



Except 600 volts



Overall  
Length

## HXT SERIES, FLUOROPOLYMER (PTFE) SCREW PLUG HEATERS

| WATTS | VOLTS<br>(See Pg.1) | OVERALL<br>LENGTH<br>In./ (mm) | PIPE<br>THREAD | MODEL<br>NUMBER               | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------|---------------------|--------------------------------|----------------|-------------------------------|----------------------------|
| 1000  | 120<br>240          | 9<br>(230)                     | 2-1/2          | HXT1109<br>HXT1209            | 9<br>(4)                   |
| 2000  | 120<br>240<br>480   | 14<br>(360)                    | 2-1/2          | HXT2114<br>HXT2214<br>HXT2414 | 12<br>(5.5)                |
| 3000  | 240<br>480          | 19<br>(485)                    | 2-1/2          | HXT3219<br>HXT3419            | 15<br>(7)                  |
| 4000  | 240<br>480          | 26<br>(660)                    | 2-1/2          | HXT4226<br>HXT4426            | 17<br>(8)                  |
| 5000  | 240<br>480          | 30<br>(765)                    | 2-1/2          | HXT5230<br>HXT5430            | 20<br>(9)                  |
| 6000  | 240<br>480          | 34<br>(865)                    | 2-1/2          | HXT6234<br>HXT6434            | 23<br>(10.5)               |

Single phase only.

### STANDARD FEATURES:

UL Type 4 IP62 style plastic heads standard for all metal heaters.

### Optional Features:

- Explosion resistant heads
- Integral thermostats
- Thermowells
- Metric sizes
- Custom sizes



Except 600 volts



Overall  
Length

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# SCREW PLUG AND FLUOROPOLYMER (PTFE) FLANGED HEATERS



## V\*T SERIES, 1/2" VARIPOWER SCREW PLUG HEATERS

| WATTS | VOLTS       | LGTH.    | NPT  | 316 SS   | TITANIUM | FLUORO-POLYMER | SHIP WGT. |
|-------|-------------|----------|------|----------|----------|----------------|-----------|
|       | (See Pg. 1) | In./(mm) |      |          |          |                | Lbs./(kg) |
| 100   | 120         | 7        | 1/2" | VST.1107 | VTT.1107 | VXT.1107       | 1         |
|       | 240         | (180)    |      | VST.1207 | VTT.1207 | VXT.1207       | (.5)      |
| 200   | 120         | 10       | 1/2" | VST.2110 | VTT.2110 | VXT.2110       | 1         |
|       | 240         | (255)    |      | VST.2210 | VTT.2210 | VXT.2210       | (.5)      |

1/2" PVDF screw plug adapter included. Patented self-regulating design protects against overheating and fires. Plug included with 120V models only. Single phase only.



Except 600 volts



## TB SERIES, 1 1/4" SMALL TANK SCREW PLUG HEATERS

| WATTS | VOLTS      | LGTH.    | NPT    | 304 SS    | 316 SS    | TITANIUM  | SHIP WGT. |
|-------|------------|----------|--------|-----------|-----------|-----------|-----------|
|       | (See Pg.1) | In./(mm) |        |           |           |           | Lbs./(kg) |
| 500   | 120        | 8        | 1-1/4" | FTB.5108  | STB.5108  | TTB.5108  | 8         |
|       | 240        | (205)    |        | FTB.5208  | STB.5208  | TTB.5208  | (4)       |
| 1000  | 120        | 10       | 1-1/4" | FTB1110   | STB1110   | TTB1110   | 10        |
|       | 240        | (255)    |        | FTB1210   | STB1210   | TTB1210   | (4.5)     |
| 1500  | 120        | 14       | 1-1/4" | FTB1.5114 | STB1.5114 | TTB1.5114 | 14        |
|       | 240        | (355)    |        | FTB1.5214 | STB1.5214 | TTB1.5214 | (6.5)     |
| 2000  | 120        | 17       | 1-1/4" | FTB2117   | STB2117   | TTB2117   | 17        |
|       | 240        | (430)    |        | FTB2217   | STB2217   | TTB2217   | (8)       |

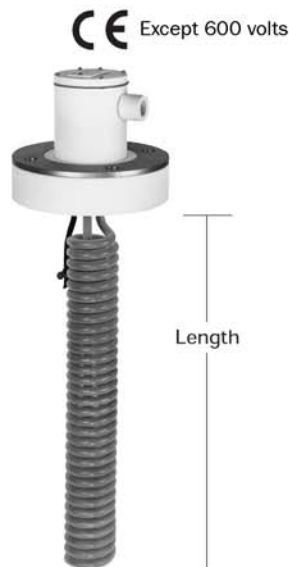
Single phase only.

## 3FLX SERIES, 3" 150 LB.\* FLUOROPOLYMER (PTFE) FLANGED HEATERS

| WATTS | VOLTS      | NO. OF ELEMENTS | LENGTH      | MODEL NUMBER | SHIP WGT.    |
|-------|------------|-----------------|-------------|--------------|--------------|
|       | (See Pg.1) |                 | In./(mm)    |              | Lbs./(kg)    |
| 1000  | 240        | 1               | 11<br>(280) | 3FLX1211-*   | 20<br>(9)    |
| 2000  | 240        | 1               | 16<br>(405) | 3FLX2216-*   | 23<br>(11)   |
| 3000  | 240        | 1               | 21<br>(535) | 3FLX3221-*   | 26<br>(12)   |
| 4000  | 240        | 1               | 28<br>(710) | 3FLX4228-*   | 29<br>(13.5) |
| 5000  | 240        | 1               | 32<br>(815) | 3FLX5232-*   | 32<br>(15)   |
| 6000  | 240        | 1               | 35<br>(890) | 3FLX6235-*   | 35<br>(16)   |
|       | 480        |                 |             | 3FLX6435-*   |              |

## 6FLX SERIES, 6" 150 LB.\* FLUOROPOLYMER (PTFE) FLANGED HEATERS

| WATTS | VOLTS      | NO. OF ELEMENTS | LENGTH      | MODEL NUMBER | SHIP WGT.  |
|-------|------------|-----------------|-------------|--------------|------------|
|       | (See Pg.1) |                 | In./(mm)    |              | Lbs./(kg)  |
| 3000  | 240        | 3               | 11<br>(280) | 6FLX3211-*   | 42<br>(19) |
| 6000  | 240        | 3               | 16<br>(405) | 6FLX6216-*   | 51<br>(23) |
| 9000  | 240        | 3               | 21<br>(535) | 6FLX9221-*   | 60<br>(27) |
| 12000 | 240        | 3               | 28<br>(710) | 6FLX12228-*  | 66<br>(30) |
| 15000 | 240        | 3               | 32<br>(815) | 6FLX15232-*  | 75<br>(34) |
| 18000 | 240        | 3               | 35<br>(890) | 6FLX18235-*  | 84<br>(38) |
|       | 480        |                 |             | 6FLX18435-*  |            |



3FLX pictured

\* Note: Heater rated up to 50 PSI working pressure. Single phase only.

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.



# FL SERIES, FLANGED HEATERS

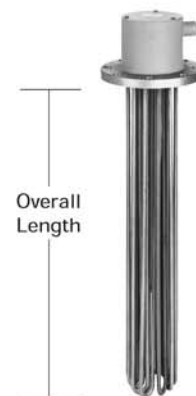
**CE** Except 600 volts

## 3" 150 LBS. SS FLANGED 3 SS ELEMENTS

| WATTS | VOLTS      | OVERALL LGTH. | MODEL NUMBER   | SHIP WGT.  |
|-------|------------|---------------|----------------|------------|
|       | (See Pg.1) | In./ (mm)     |                | Lbs./ (kg) |
| 3000  | 240        | 9             | 3FLS3209-**-   | 14         |
|       | 480        | (230)         | 3FLS3409-**-   | (6.5)      |
| 4500  | 240        | 13            | 3FLS4.5213-**- | 15         |
|       | 480        | (330)         | 3FLS4.5413-**- | (7)        |
| 6000  | 240        | 19            | 3FLS6219-**-   | 16         |
|       | 480        | (485)         | 3FLS6419-**-   | (7.5)      |
| 9000  | 240        | 26            | 3FLS9226-**-   | 17         |
|       | 480        | (660)         | 3FLS9426-**-   | (8)        |
| 12000 | 240        | 33            | 3FLS12233-**-  | 18         |
|       | 480        | (840)         | 3FLS12433-**-  | (8.5)      |
| 15000 | 240        | 41            | 3FLS15241-**-  | 20         |
|       | 480        | (1040)        | 3FLS15441-**-  | (9)        |
| 18000 | 240        | 49            | 3FLS18249-**-  | 21         |
|       | 480        | (1245)        | 3FLS18449-**-  | (10)       |

## 5" 150 LBS. SS FLANGED 6 SS ELEMENTS

| WATTS | VOLTS      | OVERALL LGTH. | MODEL NUMBER  | SHIP WGT.  |
|-------|------------|---------------|---------------|------------|
|       | (See Pg.1) | In./ (mm)     |               | Lbs./ (kg) |
| 6000  | 240        | 9             | 5FLS6209-**-  | 25         |
|       | 480        | (230)         | 5FLS6409-**-  | (11.5)     |
| 9000  | 240        | 13            | 5FLS9213-**-  | 28         |
|       | 480        | (330)         | 5FLS9413-**-  | (13)       |
| 12000 | 240        | 19            | 5FLS12219-**- | 30         |
|       | 480        | (485)         | 5FLS12419-**- | (14)       |
| 18000 | 240        | 26            | 5FLS18226-**- | 33         |
|       | 480        | (660)         | 5FLS18426-**- | (15)       |
| 24000 | 240        | 33            | 5FLS24233-**- | 37         |
|       | 480        | (840)         | 5FLS24433-**- | (17)       |
| 30000 | 240        | 41            | 5FLS30241-**- | 40         |
|       | 480        | (1040)        | 5FLS30441-**- | (18)       |
| 36000 | 240        | 49            | 5FLS36249-**- | 43         |
|       | 480        | (1245)        | 5FLS36449-**- | (19.5)     |



## 6" 150 LBS SS FLANGED 12 SS ELEMENTS

| WATTS | VOLTS      | OVERALL LGTH. | MODEL NUMBER  | SHIP WGT.  |
|-------|------------|---------------|---------------|------------|
|       | (See Pg.1) | In./ (mm)     |               | Lbs./ (kg) |
| 12000 | 240        | 9             | 6FLS12209-**- | 48         |
|       | 480        | (230)         | 6FLS12409-**- | (22)       |
| 18000 | 240        | 13            | 6FLS18213-**- | 54         |
|       | 480        | (330)         | 6FLS18413-**- | (24.5)     |
| 24000 | 240        | 19            | 6FLS24219-**- | 60         |
|       | 480        | (485)         | 6FLS24419-**- | (27)       |
| 36000 | 240        | 26            | 6FLS36226-**- | 67         |
|       | 480        | (660)         | 6FLS36426-**- | (30.5)     |
| 48000 | 240        | 33            | 6FLS48233-**- | 76         |
|       | 480        | (840)         | 6FLS48433-**- | (34.5)     |
| 60000 | 240        | 41            | 6FLS60241-**- | 84         |
|       | 480        | (1040)        | 6FLS60441-**- | (38)       |
| 72000 | 240        | 49            | 6FLS72249-**- | 111        |
|       | 480        | (1245)        | 6FLS72449-**- | (50.5)     |

## STANDARD FEATURES:

- 316 Stainless Steel Construction
- PI Thermal Overload Protection

## Optional features:

- Materials of construction:
  - Titanium = FLT
  - Incoloy = FLI
  - Steel = FLP
- Resettable thermal protection. (See pg.1)
- Explosion resistant enclosures
- Integral thermostats
- Thermowells
- Custom sizes
- Metric sizes

\*\*Specify thermal overload protection desired. See page 1. All heaters must be operated in conjunction with appropriate temperature and level controls.

# THERMAL PROTECTION ACCESSORIES

## REPLACEABLE THERMAL PROTECTORS

| HEATER MODEL DESIGNATOR | ITEM NUMBER | HEATER MATERIAL | HEATER STYLE  | TEMPERATURE RANGE     |
|-------------------------|-------------|-----------------|---------------|-----------------------|
| P1                      | 6021-18-R   | Metal           | Over-the-side | up to 180°F (82°C)    |
| P4                      | 6022-18-R   | Metal           | Over-the-side | 180-230°F (82-110°C)  |
| P5                      | 6023-18-R   | Metal           | Over-the-side | 230-300°F (110-150°C) |
| P1                      | 6021-85-R   | Metal           | L-shaped      | up to 180°F (82°C)    |
| P4                      | 6022-85-R   | Metal           | L-shaped      | 180-230°F (82-110°C)  |
| P5                      | 6023-85-R   | Metal           | L-shaped      | 230-300°F (110-150°C) |
| P1                      | 6032-26-R   | Fluoropolymer   | Over-the-side | up to 180°F (82°C)    |
| P1                      | 6032-48-R   | Fluoropolymer   | L-shaped      | up to 180°F (82°C)    |
| P1                      | 6032-26-R   | Quartz          | Over-the-side | up to 180°F (82°C)    |
| P4                      | 6033-26-R   | Quartz          | Over-the-side | 180-230°F (82-110°C)  |

\* Order replacement protectors by item number.

## RESETTABLE THERMAL PROTECTORS

| HEATER MODEL DESIGNATOR | ITEM NUMBER | HEATER MATERIAL | HEATER STYLE  | TEMPERATURE RANGE     |
|-------------------------|-------------|-----------------|---------------|-----------------------|
| P2                      | 2804-18-R   | Metal           | Over-the-side | up to 180°F (82°C)    |
| P6                      | 4047-18-R   | Metal           | Over-the-side | 180-230°F (82-110°C)  |
| P7                      | 2805-18-R   | Metal           | Over-the-side | 230-300°F (110-150°C) |
| P2                      | 2804-85-R   | Metal           | L-shaped      | up to 180°F (82°C)    |
| P6                      | 4047-85-R   | Metal           | L-shaped      | 180-230°F (82-110°C)  |
| P7                      | 2805-85-R   | Metal           | L-shaped      | 230-300°F (110-150°C) |
| P2                      | 4575-26-R   | Fluoropolymer   | Over-the-side | up to 180°F (82°C)    |
| P8                      | 5580-48-R   | Fluoropolymer   | Over-the-side | 180-230°F (82-110°C)  |
| P2                      | 4575-48-R   | Fluoropolymer   | L-shaped      | up to 180°F (82°C)    |
| P8                      | 5580-48-R   | Fluoropolymer   | L-shaped      | 180-230°F (82-110°C)  |
| P2                      | 4575-26-R   | Quartz          | Over-the-side | up to 180°F (82°C)    |
| P6                      | 5580-48-R   | Quartz          | Over-the-side | 180-230°F (82-110°C)  |

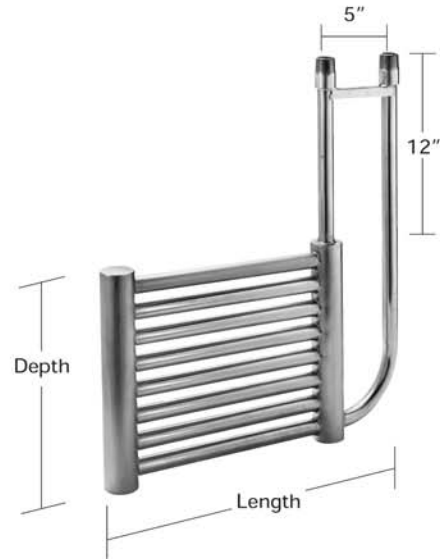
\* Order replacement protectors by item number.



# METAL HEAT EXCHANGERS

## G SERIES, GRID COILS

| EXCH. NO. OF<br>AREA TUBES<br>(Sq. Ft.) | DEPTH<br>In./ (mm) | LENGTH<br>In./ (mm) | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./ (kg) |
|-----------------------------------------|--------------------|---------------------|-----------------|----------------------------|
| 4.6                                     | 8                  | 12 (305)            | *8G-24          | 13 (6)                     |
| 5.6                                     | 8                  | 12 "                | *8G-30          | 14 (6.5)                   |
| 6.7                                     | 8                  | 12 "                | *8G-36          | 15 (7)                     |
| 8.8                                     | 8                  | 12 "                | *8G-48          | 18 (8)                     |
| 10.9                                    | 8                  | 12 "                | *8G-60          | 20 (9)                     |
| 13.7                                    | 8                  | 12 "                | *8G-72          | 25 (11.5)                  |
| 15.1                                    | 8                  | 12 "                | *8G-84          | 30 (13.5)                  |
| 17.2                                    | 8                  | 12 "                | *8G-96          | 35 (16)                    |
| 19.2                                    | 8                  | 12 "                | *8G-108         | 38 (17)                    |
| 21.3                                    | 8                  | 12 "                | *8G-120         | 42 (19)                    |
| 23.4                                    | 8                  | 12 "                | *8G-132         | 45 (20.5)                  |
| 25.5                                    | 8                  | 12 "                | *8G-144         | 50 (22.5)                  |
|                                         |                    |                     |                 |                            |
| 6.8                                     | 12                 | 18 (460)            | *12G-24         | 15 (7)                     |
| 8.4                                     | 12                 | 18 "                | *12G-30         | 18 (8)                     |
| 10.0                                    | 12                 | 18 "                | *12G-36         | 22 (10)                    |
| 13.2                                    | 12                 | 18 "                | *12G-48         | 28 (13)                    |
| 16.3                                    | 12                 | 18 "                | *12G-60         | 35 (16)                    |
| 19.5                                    | 12                 | 18 "                | *12G-72         | 45 (20.5)                  |
| 22.6                                    | 12                 | 18 "                | *12G-84         | 50 (22.5)                  |
| 25.7                                    | 12                 | 18 "                | *12G-96         | 56 (25.5)                  |
| 28.9                                    | 12                 | 18 "                | *12G-108        | 62 (28)                    |
| 32.0                                    | 12                 | 18 "                | *12G-120        | 68 (31)                    |
| 35.2                                    | 12                 | 18 "                | *12G-132        | 75 (34)                    |
| 38.3                                    | 12                 | 18 "                | *12G-144        | 90 (41)                    |
|                                         |                    |                     |                 |                            |
| 9.4                                     | 16                 | 24 (610)            | *16G-24         | 20 (9)                     |
| 11.5                                    | 16                 | 24 "                | *16G-30         | 25 (11.5)                  |
| 13.6                                    | 16                 | 24 "                | *16G-36         | 29 (13)                    |
| 17.8                                    | 16                 | 24 "                | *16G-48         | 35 (15.5)                  |
| 22.0                                    | 16                 | 24 "                | *16G-60         | 43 (19.5)                  |
| 26.1                                    | 16                 | 24 "                | *16G-72         | 50 (22.5)                  |
| 30.3                                    | 16                 | 24 "                | *16G-84         | 62 (28)                    |
| 34.5                                    | 16                 | 24 "                | *16G-96         | 70 (32)                    |
| 38.7                                    | 16                 | 24 "                | *16G-108        | 80 (36)                    |
| 42.9                                    | 16                 | 24 "                | *16G-120        | 88 (40)                    |
| 47.1                                    | 16                 | 24 "                | *16G-132        | 97 (44)                    |
| 51.3                                    | 16                 | 24 "                | *16G-144        | 105 (47.5)                 |
|                                         |                    |                     |                 |                            |
| 11.5                                    | 20                 | 30 (762)            | *20G-24         | 23 (10.5)                  |
| 14.2                                    | 20                 | 30 "                | *20G-30         | 28 (13)                    |
| 16.8                                    | 20                 | 30 "                | *20G-36         | 34 (15.5)                  |
| 22.0                                    | 20                 | 30 "                | *20G-48         | 40 (18)                    |
| 27.2                                    | 20                 | 30 "                | *20G-60         | 48 (22)                    |
| 32.5                                    | 20                 | 30 "                | *20G-72         | 55 (25)                    |
| 37.7                                    | 20                 | 30 "                | *20G-84         | 68 (31)                    |
| 42.9                                    | 20                 | 30 "                | *20G-96         | 75 (34)                    |
| 48.2                                    | 20                 | 30 "                | *20G-108        | 87 (39.5)                  |
| 53.4                                    | 20                 | 30 "                | *20G-120        | 100 (45.5)                 |
| 58.5                                    | 20                 | 30 "                | *20G-132        | 115 (52)                   |
| 63.9                                    | 20                 | 30 "                | *20G-144        | 125 (57)                   |
|                                         |                    |                     |                 |                            |
| 13.7                                    | 24                 | 36 (915)            | *24G-24         | 38 (17)                    |
| 16.8                                    | 24                 | 36 "                | *24G-30         | 42 (19)                    |
| 20.0                                    | 24                 | 36 "                | *24G-36         | 45 (20.5)                  |
| 26.3                                    | 24                 | 36 "                | *24G-48         | 50 (22.5)                  |
| 32.5                                    | 24                 | 36 "                | *24G-60         | 57 (26)                    |
| 38.8                                    | 24                 | 36 "                | *24G-72         | 65 (29.5)                  |
| 45.1                                    | 24                 | 36 "                | *24G-84         | 75 (34)                    |
| 51.4                                    | 24                 | 36 "                | *24G-96         | 85 (38.5)                  |
| 57.7                                    | 24                 | 36 "                | *24G-108        | 100 (45.5)                 |
| 64.0                                    | 24                 | 36 "                | *24G-120        | 115 (52)                   |
| 70.3                                    | 24                 | 36 "                | *24G-132        | 130 (59)                   |
| 76.6                                    | 24                 | 36 "                | *24G-144        | 150 (68)                   |
|                                         |                    |                     |                 |                            |
| 15.8                                    | 28                 | 42 (1070)           | *28G-24         | 40 (18)                    |
| 19.5                                    | 28                 | 42 "                | *28G-30         | 45 (20.5)                  |
| 23.2                                    | 28                 | 42 "                | *28G-36         | 50 (22.5)                  |
| 30.6                                    | 28                 | 42 "                | *28G-48         | 58 (26.5)                  |
| 38.0                                    | 28                 | 42 "                | *28G-60         | 65 (29.5)                  |
| 45.4                                    | 28                 | 42 "                | *28G-72         | 75 (34)                    |
| 52.8                                    | 28                 | 42 "                | *28G-84         | 85 (38.5)                  |
| 60.2                                    | 28                 | 42 "                | *28G-96         | 100 (45.5)                 |
| 67.6                                    | 28                 | 42 "                | *28G-108        | 115 (52)                   |
| 75.0                                    | 28                 | 42 "                | *28G-120        | 130 (59)                   |
| 82.4                                    | 28                 | 42 "                | *28G-132        | 150 (68)                   |
| 89.8                                    | 28                 | 42 "                | *28G-144        | 175 (79.5)                 |



## ORDERING EXAMPLE:

Add (H) to end of model number for horizontal style. For vertical style, add (V) to end of model number and reverse dimensions (ie: width becomes coil length and length becomes coil width). Add (S) to end of model number for steam usage. Add (W) to end of model number for water usage.

**Example:** T 8 G - 24 H S  
 \*Coil Material: T = Titanium, S = Stainless, H = Hasteloy C®, Z = Zirconium  
 No. of Tubes: 8, Grid Style: G, Coil Length (Inches): 24, H = Horizontal, V = Vertical, S = Steam, W = Water

Consult factory for inlet/outlet sizing assistance.



## THERMAX² SERIES, HEAT EXCHANGERS

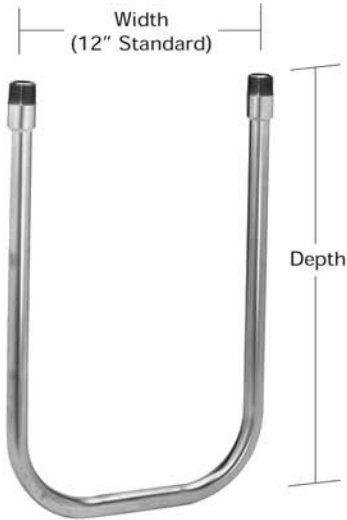
| EXCH. AREA<br>(Sq. Ft.) | OVERALL LENGTH<br>In./ (mm) | DIM. DIA.<br>In./ (mm) | MODEL NUMBER<br>(316 L Stainless) | SHIP WGT.<br>Lbs./ (kg) |
|-------------------------|-----------------------------|------------------------|-----------------------------------|-------------------------|
| 1.1                     | 6.25<br>(159)               | 2.75<br>(70)           | IS1.1-2.75-6.25                   | 5<br>(2.5)              |
| 2.5                     | 10.25<br>(261)              | 2.75<br>(70)           | IS2.5-2.75-10.25                  | 7<br>(3)                |
| 3.8                     | 14.25<br>(362)              | 2.75<br>(70)           | IS3.8-2.75-14.25                  | 10<br>(4.5)             |
| 3.8                     | 10.75<br>(273)              | 3.75<br>(96)           | IS3.8-3.75-10.75                  | 15<br>(7)               |
| 5.8                     | 15.50<br>(394)              | 3.75<br>(96)           | IS5.8-3.75-15.5                   | 20<br>(9)               |
| 7.8                     | 20.25<br>(515)              | 3.75<br>(96)           | IS7.8-3.75-20.25                  | 24<br>(11)              |
| 15.0                    | 20.25<br>(515)              | 4.75<br>(121)          | IS15.0-4.75-20.25                 | 30<br>(13.5)            |

316L stainless steel standard, titanium available.

Hasteloy C® is a registered trademark of Carpenter Technology.

# METAL HEAT EXCHANGERS

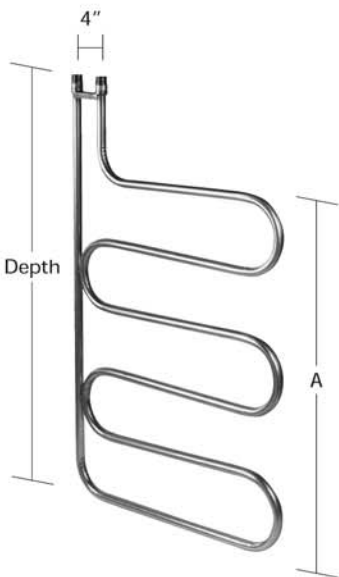
## UC SERIES, U COILS



| EXCHANGE AREA<br>(Sq. Ft.) | DEPTH<br>In./.(mm) | WIDTH<br>In./.(mm) | STEEL | 316 SS | TITANIUM | SHIP WGT.<br>Lbs./.(kg) |
|----------------------------|--------------------|--------------------|-------|--------|----------|-------------------------|
| .75                        | 18<br>(460)        | 12<br>(305)        | UC18P | UC18S  | UC18T    | 3<br>(1.5)              |
| 1.00                       | 24<br>(610)        | 12<br>(305)        | UC24P | UC24S  | UC24T    | 4<br>(2)                |
| 1.25                       | 30<br>(765)        | 12<br>(305)        | UC30P | UC30S  | UC30T    | 5<br>(2.5)              |
| 1.50                       | 36<br>(915)        | 12<br>(305)        | UC36P | UC36S  | UC36T    | 6<br>(3)                |
| 1.75                       | 42<br>(1070)       | 12<br>(305)        | UC42P | UC42S  | UC42T    | 7<br>(3)                |
| 2.00                       | 48<br>(1220)       | 12<br>(305)        | UC48P | UC48S  | UC48T    | 8<br>(3.5)              |
| 2.25                       | 54<br>(1375)       | 12<br>(305)        | UC54P | UC54S  | UC54T    | 9<br>(4)                |
| 2.50                       | 60<br>(1525)       | 12<br>(305)        | UC60P | UC60S  | UC60T    | 10<br>(4.5)             |

1" dia. tubing with 1" MNPT fittings standard. Bottom coils available. Hastelloy C® and Zirconium coils available, consult factory. 1/2", 5/8", 3/4" and 1 1/4" tubing available. PTFE sleeve for solution interface available.

| No. of Passes | "A" Standard | "A" Low Profile |
|---------------|--------------|-----------------|
| 2             | 8 1/2        | 8 1/2           |
| 4             | 23           | 17              |
| 6             | 37           | 26              |
| 8             | 52           | 34              |
| 10            | 60 1/2       | 43              |



## SP SERIES, SERPENTINE COILS

| EXCHANGE AREA<br>(Sq. Ft.) | LENGTH<br>In./.(mm) | DEPTH<br>In./.(mm) | NO. OF PASSES | STEEL   | 316 SS  | TITANIUM | SHIP WGT.<br>Lbs./.(kg) |
|----------------------------|---------------------|--------------------|---------------|---------|---------|----------|-------------------------|
| 2.75                       | 24<br>(610)         | 36<br>(915)        | 4             | SP4-24P | SP4-24S | SP4-24T  | 10<br>(4.5)             |
| 3.75                       | 36<br>(915)         | 36<br>(915)        | 4             | SP4-36P | SP4-36S | SP4-36T  | 12<br>(5.5)             |
| 4.75                       | 48<br>(1220)        | 36<br>(915)        | 4             | SP4-48P | SP4-48S | SP4-48T  | 14<br>(6.5)             |
| 5.75                       | 60<br>(1525)        | 36<br>(915)        | 4             | SP4-60P | SP4-60S | SP4-60T  | 16<br>(7.5)             |
| 7.25                       | 78<br>(1985)        | 36<br>(915)        | 4             | SP4-78P | SP4-78S | SP4-78T  | 20<br>(9)               |
| 8.75                       | 96<br>(2440)        | 36<br>(915)        | 4             | SP4-96P | SP4-96S | SP4-96T  | 24<br>(11)              |
| 3.75                       | 20<br>(510)         | 48<br>(1220)       | 6             | SP6-20P | SP6-20S | SP6-20T  | 12<br>(5.5)             |
| 5.00                       | 30<br>(765)         | 48<br>(1220)       | 6             | SP6-30P | SP6-30S | SP6-30T  | 14<br>(6.5)             |
| 6.25                       | 40<br>(1020)        | 48<br>(1220)       | 6             | SP6-40P | SP6-40S | SP6-40T  | 17<br>(8)               |
| 7.50                       | 50<br>(1270)        | 48<br>(1220)       | 6             | SP6-50P | SP6-50S | SP6-50T  | 20<br>(9)               |
| 8.75                       | 60<br>(1525)        | 48<br>(1220)       | 6             | SP6-60P | SP6-60S | SP6-60T  | 24<br>(11)              |
| 10.00                      | 70<br>(1780)        | 48<br>(1220)       | 6             | SP6-70P | SP6-70S | SP6-70T  | 27<br>(12.5)            |

Serpentine coil heaters offer lower cost per heating surface area. The design allows them to be installed in tanks with limited space. Bottom coils available. Hastelloy C and Zirconium coils available, consult factory. 1" diameter tubing with 1" MNPT fittings standard. 1/2", 5/8", 3/4" and 1 1/4" tubing available. PTFE sleeve for solution interface available.

## METAL HELICAL COILS



- Custom designed to your specifications
- 3/8" diameter through 1 1/4" diameter tubing (.035 - .065 wall)
- Coil ODs as small as 3 1/4" and as large as 10' diameter (dependent upon tube diameter and wall thickness)
- Materials: Steel, 304 and 316 stainless steel and titanium. Other grades and materials available upon request.
- Single and multiple layer coils.

Hastelloy C is a registered trademark of Carpenter Technology.



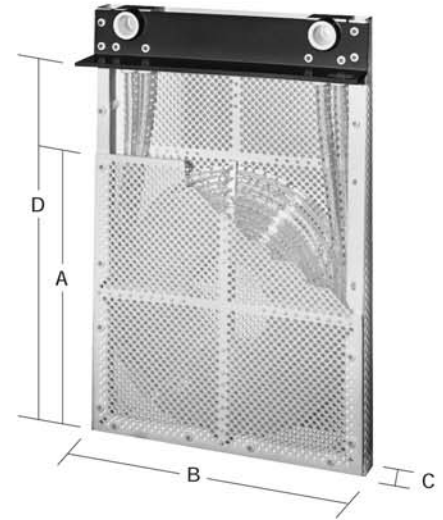
# FLUOROPOLYMER HEAT EXCHANGERS

## X SERIES, FLUOROPOLYMER HEATING/COOLING COILS

| EXCHANGE AREA | A               | B               | C               | D               | MODEL NUMBER     | SHIP WGT.    |
|---------------|-----------------|-----------------|-----------------|-----------------|------------------|--------------|
| (Sq. Ft.)     | In./ (mm)       | In./ (mm)       | In./ (mm)       | In./ (mm)       |                  | Lbs./kg      |
| 2.25*         | 11-1/2<br>(293) | 11-1/2<br>(293) | 1-1/2<br>(38)   | 17-1/2<br>(445) | X1-12-12-18-F    | 10<br>(4.5)  |
| 4.50*         | 11-1/2<br>(293) | 11-1/2<br>(293) | 2<br>(51)       | 17-1/2<br>(445) | X2-12-12-18-F    | 12<br>(5.5)  |
| 4.50*         | 15-1/2<br>(394) | 15-1/2<br>(394) | 1-1/2<br>(38)   | 21-1/2<br>(550) | X2-16-16-22-F    | 15<br>(7)    |
| 9.25*         | 15-1/2<br>(394) | 15-1/2<br>(394) | 2<br>(51)       | 21-1/2<br>(550) | X4-16-16-22-F    | 18<br>(8)    |
| 6.00          | 17-1/2<br>(445) | 17-1/2<br>(445) | 2<br>(51)       | 23-1/2<br>(597) | X2-18-18-24-F-LP | 22<br>(10)   |
| 12.00         | 17-1/2<br>(445) | 17-1/2<br>(445) | 3-1/4<br>(82.5) | 23-1/2<br>(597) | X4-18-18-24-F-LP | 30<br>(13.5) |
| 18.00         | 17-1/2<br>(445) | 17-1/2<br>(445) | 4-1/2<br>(114)  | 23-1/2<br>(597) | X6-18-18-24-F-LP | 38<br>(17.5) |
| 24.00         | 17-1/2<br>(445) | 17-1/2<br>(445) | 5-3/4<br>(146)  | 23-1/2<br>(597) | X8-18-18-24-F-LP | 42<br>(19)   |
| 11.50         | 23-1/2<br>(597) | 23-1/2<br>(597) | 2<br>(51)       | 29-1/2<br>(750) | X2-24-24-30-F-LP | 32<br>(14.5) |
| 23.00         | 23-1/2<br>(597) | 23-1/2<br>(597) | 3-1/4<br>(82.5) | 29-1/2<br>(750) | X4-24-24-30-F-LP | 37<br>(17)   |
| 34.50         | 23-1/2<br>(597) | 23-1/2<br>(597) | 4-1/2<br>(114)  | 29-1/2<br>(750) | X6-24-24-30-F-LP | 41<br>(18.5) |
| 46.50         | 23-1/2<br>(597) | 23-1/2<br>(597) | 5-3/4<br>(146)  | 29-1/2<br>(750) | X8-24-24-30-F-LP | 60<br>(27)   |

\* = 1/4" diameter tubing. All other coils have 1/2" diameter tubing.

10 psi minimum steam pressure. Vacuum breakers strongly recommended for all fluoropolymer coils used with steam service. (See page 24).



## STANDARD FEATURES:

- All fluoropolymer construction of wetted parts.
- Non-conductive. Eliminates stray currents in tank.
- Integral inlet and outlet manifolds for single point connections.
- For heating and cooling most acid and alkaline aqueous solutions.
- FEP (Fluorinated Ethylene Propylene) fluoropolymer standard, maximum pressure (steam) 30 psi.
- PTFE (Polytetrafluoroethylene) fluoropolymer guard construction.

## Optional Features:

- PFA (Perfluoroalkoxy) fluoropolymer available, maximum pressure (steam) 60 psi.
- L-shaped configurations available for bottom exchange applications.
- Heating/cooling combination package available. Consult factory.
- Anti-floatation brackets available.

# ACCESSORIES



## IX SERIES, INSULATORS/ISOLATORS

| SIZE (NPT) | LENGTH<br>In./mm | MODEL NUMBER | SHIP WGT.<br>Lbs./kg |
|------------|------------------|--------------|----------------------|
| 1/2"       | 2" (51)          | IX-5 *       | 1 (.5)               |
| 3/4"       | 2" (51)          | IX-3 *       | 1 (.5)               |
| 1"         | 2-1/2" (63.5)    | IX-1 *       | 1 (.5)               |
| 1 1/4"     | 2-1/2" (63.5)    | IX-1-1/4 *   | 1 (.5)               |
| 1 1/2"     | 2-1/2" (63.5)    | IX-1-1/2 *   | 1 (.5)               |
| 2"         | 2-1/2" (63.5)    | IX-2 *       | 1 (.5)               |

Used to isolate the heat exchanger from stray current. Metric sizes available, consult factory.

\* Specify: S for stainless steel, T for titanium.



## VB SERIES, VACUUM BREAKERS

| SIZE (NPT) | MODEL NUMBER | SHIP WGT.<br>Lbs./kg |
|------------|--------------|----------------------|
| 1/2"       | VB-5         | 1 (.5)               |

Recommended for all fluoropolymer heat exchangers used with steam service.

## S SERIES, SOLENOID VALVES



### BRASS (Water Service)

| SIZE (NPT) | CV FACTOR | MIN. (PSI) OPER. PRES | MAX (PSI) | MAX. FLUID TEMP. | MODEL NUMBER | SHIP WGT.<br>Lbs./kg |
|------------|-----------|-----------------------|-----------|------------------|--------------|----------------------|
| 1/2"       | 4         | 5                     | 125       | 180°F (82°C)     | S-5-W        | 3 (1.5)              |
| 3/4"       | 5         | 5                     | 125       | 180°F (82°C)     | S-3-W        | 4 (2)                |
| 1"         | 13.5      | 5                     | 125       | 180°F (82°C)     | S-1-W        | 6 (3)                |
| 1 1/4"     | 15        | 5                     | 125       | 180°F (82°C)     | S-1-1/4-W    | 11 (5)               |
| 1 1/2"     | 22.5      | 5                     | 125       | 180°F (82°C)     | S-1-1/2-W    | 12 (5.5)             |
| 2"         | 43        | 5                     | 125       | 180°F (82°C)     | S-2-W        | 13 (6)               |

### BRASS (Steam Service)

| SIZE (NPT) | CV FACTOR | MIN. (PSI) OPER. PRES | MAX (PSI) | MAX. FLUID TEMP. | MODEL NUMBER | SHIP WGT.<br>Lbs./kg |
|------------|-----------|-----------------------|-----------|------------------|--------------|----------------------|
| 1/2"       | 4         | 5                     | 50        | 300°F (149°C)    | S-5-S        | 3 (1.5)              |
| 3/4"       | 5         | 5                     | 50        | 300°F (149°C)    | S-3-S        | 4 (2)                |
| 1"         | 13.5      | 5                     | 50        | 300°F (149°C)    | S-1-S        | 6 (3)                |
| 1 1/4"     | 15        | 5                     | 50        | 300°F (149°C)    | S-1-1/4-S    | 11 (5)               |
| 1 1/2"     | 22.5      | 5                     | 50        | 300°F (149°C)    | S-1-1/2-S    | 12 (5.5)             |
| 2"         | 43        | 5                     | 50        | 300°F (149°C)    | S-2-S        | 13 (6)               |

Normally closed standard. Normally open optional. Stainless steel and zero minimum pressure valves available, consult factory.



## ST SERIES, STRAINERS

| SIZE (NPT) | MODEL NUMBER | SHIP WGT.<br>Lbs./kg |
|------------|--------------|----------------------|
| 1/2"       | ST5          | 3 (1.5)              |
| 3/4"       | ST3          | 3 (1.5)              |
| 1"         | ST1          | 4 (2)                |
| 1 1/4"     | ST1-1/4      | 5 (2.5)              |
| 1 1/2"     | ST1-1/2      | 6 (3)                |
| 2"         | ST2          | 10 (4.5)             |

20 mesh stainless screen. 125 PSI maximum at 400°F (205°C).

UL TYPE 1, IP60



## AHM SERIES, AMP HOUR METERS

| VOLTS  | MAX. RECTIFIER<br>AMP. RATING | SHUNT<br>SIZES    | MODEL<br>NUMBER | SHIP<br>WGT.<br>Lbs./kg |
|--------|-------------------------------|-------------------|-----------------|-------------------------|
| 80-240 | 10 through 30,000             | 50 through 150 mV | AHM             | 3 (1.5)                 |

Resettable counters and amp minute meters available as option, consult factory.



# LEVEL CONTROLS

## LC SERIES, CONDUCTIVITY TYPE LEVEL CONTROLS

| PROBE ASSEMBLY | PROBE LENGTH<br>IN. / (mm) | NO. OF PROBES | CIRCUITRY | REPLACEMENT BOARD ONLY | PROBE SHIP WT.<br>LBS. / (kg) | SHIP WEIGHT<br>LBS. / (kg) |
|----------------|----------------------------|---------------|-----------|------------------------|-------------------------------|----------------------------|
| 2(*) 6         | 6<br>(155)                 | 2             | LCB       | LC                     | 3<br>(1.5)                    | 5<br>(2)                   |
| 2(*) 12        | 12<br>(305)                | 2             | LCB       | LC                     | 3<br>(1.5)                    | 5<br>(2)                   |
| 2(*) 18        | 18<br>(460)                | 2             | LCB       | LC                     | 4<br>(2)                      | 6<br>(2.5)                 |
| 2(*) 24        | 24<br>(610)                | 2             | LCB       | LC                     | 6<br>(2.5)                    | 7<br>(3)                   |
| 2(*) 30        | 30<br>(762)                | 2             | LCB       | LC                     | 7<br>(3)                      | 8<br>(3.5)                 |
| 2(*) 36        | 36<br>(915)                | 2             | LCB       | LC                     | 8<br>(3.5)                    | 9<br>(4)                   |
| 2(*) 48        | 48<br>(1220)               | 2             | LCB       | LC                     | 9<br>(4)                      | 11<br>(5)                  |
| 3(*) 6         | 6<br>(155)                 | 3             | LCB       | LC                     | 3<br>(1.5)                    | 5<br>(2)                   |
| 3(*) 12        | 12<br>(305)                | 3             | LCB       | LC                     | 3<br>(1.5)                    | 5<br>(2)                   |
| 3(*) 18        | 18<br>(460)                | 3             | LCB       | LC                     | 4<br>(2)                      | 6<br>(2.5)                 |
| 3(*) 24        | 24<br>(610)                | 3             | LCB       | LC                     | 6<br>(2.5)                    | 7<br>(3)                   |
| 3(*) 30        | 30<br>(762)                | 3             | LCB       | LC                     | 7<br>(3)                      | 8<br>(3.5)                 |
| 3(*) 36        | 36<br>(915)                | 3             | LCB       | LC                     | 8<br>(3.5)                    | 9<br>(4)                   |
| 3(*) 48        | 48<br>(1220)               | 3             | LCB       | LC                     | 9<br>(4)                      | 11<br>(5)                  |

(LC2) two probe units for single level control. (LC3) three probe units for two point control and refill/pump down capabilities. Four and five probe units are available for multiple level requirements, consult factory. Can be ordered as part of a combination temperature control assembly.

### \*STANDARD PROBE MATERIALS:

S = STAINLESS STEEL

H = HASTELLOY C®

T = TITANIUM

G = GRAPHITE

FLUOROPOLYMER (PTFE) COVERED STANDARD

## ESP SERIES, CAPACITIVE TYPE LEVEL CONTROLS

| MODEL NUMBER | VOLTS                        | CONTACTS                       | MIN. LOAD | MAX. LOAD | MAX AMB. TEMP   | SENSING RANGE           | SHIP WGT.<br>Lbs./ (kg) |
|--------------|------------------------------|--------------------------------|-----------|-----------|-----------------|-------------------------|-------------------------|
| ESP          | 120/265<br>VAC<br>(50-60 Hz) | Field<br>selectable<br>N/O-N/C | 10 mA     | 500 mA    | 176°F<br>(80°C) | .12 to .98"<br>(3-25mm) | 1<br>(.5)               |

Monitors liquid level from outside of plastic or non-metallic tanks. Polyethylene, CPVC, and fluoropolymer mounting wells available for vertical mounting, consult factory.



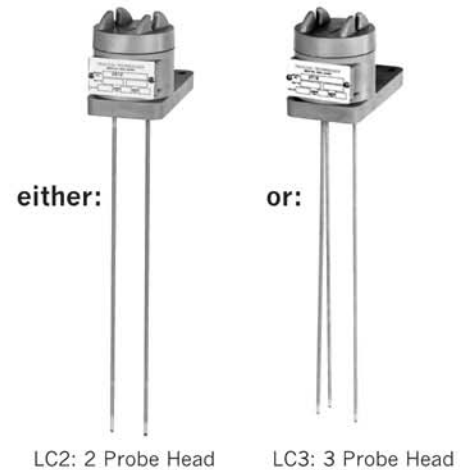
UL TYPE 4/4X, IP62  
(indoor)

Complete level consists of one of these:



LCB: LC Circuitry in Enclosure

**PLUS**



LC2: 2 Probe Head

LC3: 3 Probe Head



# NON-INDICATING AND INDICATING CONTROLS



## NR SERIES, NON-INDICATING THERMOSTATS SINGLE PHASE WITH 5 FT. AND 12 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS   | MAX. AMPS | TEMP. RANGE | SENSOR LENGTH<br>Ft. (m) | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./ (kg) |
|--------------|---------|-----------|-------------|--------------------------|------------------|-------------------------|
| NR25         | 120/240 | 25*       | 30-220°F    | 5' (1.5)                 | NR25-5L          | 3 (1.5)                 |
| NR25-12      | 120/240 | 25*       | 30-220°F    | 12' (3.7)                | NR25-12L         | 3 (1.5)                 |
| N25H         | 120/240 | 25*       | 200-550°F   | 5' (1.5)                 | N25H-5L          | 3 (1.5)                 |

\*For heating only - 15 amp maximum when used in conjunction with protector fuses.

## NR SERIES, NON-INDICATING COMBINATION CONTROLS ONE OR THREE PHASE WITH 5 FT. FEP SLEEVED SENSOR



UL TYPE 1, IP60



| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | REPL. RELAY P/N | REPL. RELAY P/N<br>LESS TRANS. | REPL. TRANS. | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./ (kg) |
|--------------|----------------------|-----------|-----------------|--------------------------------|--------------|------------------|-------------------------|
| NR302        | 240                  | 30        | AH30-1          | AH30-2                         | HD50 2/1     | NR25-5L          | 15                      |
| NR304        | 480                  | 30        | AH30-1          | ---                            | HD50 4/1     | NR25-5L          | (7)                     |
| NR502        | 240                  | 50        | AH50-1          | AH50-2                         | HD50 2/1     | NR25-5L          | 16                      |
| NR504        | 480                  | 50        | AH50-1          | ---                            | HD50 4/1     | NR25-5L          | (7.5)                   |
| NR752        | 240                  | 75        | AH75-1          | AH75-2                         | HD100 2/1    | NR25-5L          | 22                      |
| NR754        | 480                  | 75        | AH75-1          | ---                            | HD100 4/1    | NR25-5L          | (10)                    |
| NR902        | 240                  | 90        | AH90-1          | AH90-2                         | HD100 2/1    | NR25-5L          | 24                      |
| NR904        | 480                  | 90        | AH90-1          | ---                            | HD100 4/1    | NR25-5L          | (11)                    |
| NR1202       | 240                  | 120       | AH120-1         | AH120-2                        | HD150 2/1    | NR25-5L          | 26                      |
| NR1204       | 480                  | 120       | AH120-1         | ---                            | HD150 4/1    | NR25-5L          | (12)                    |
| NR1502       | 240                  | 150       | AH150-1         | AH150-2                        | HD150 2/1    | NR25-5L          | 32                      |
| NR1504       | 480                  | 150       | AH150-1         | ---                            | HD150 4/1    | NR25-5L          | (14.5)                  |

Combination control consists of gasketed plastic enclosure, thermostat, contactor and optional control transformer. Transformer must be used on 480 volts and is recommended for 240 volts. To omit stepdown transformer, add "LT" to end of model number. See NR25 chart above for thermostat options. Additional control options available, consult factory.



## DLC SERIES, DIGITAL THERMOSTATS SINGLE PHASE WITH 10 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | TEMP. RANGE              | SENSOR LENGTH | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./ (kg) |
|--------------|----------------------|-----------|--------------------------|---------------|------------------|-------------------------|
| DLC16-1      | 120                  | 16        | -58-302°F<br>(-50-150°C) | 10'<br>(3m)   | DLC-10L          | 2<br>(1)                |
| DLC16-2      | 240                  | 16        | -58-302°F<br>(-50-150°C) | 10'<br>(3m)   | DLC-10L          | 2<br>(1)                |

Direct acting output for cooling applications available. Celsius readout (must specify).

## DLC SERIES, DIGITAL COMBINATION CONTROLS ONE OR THREE PHASE WITH 10 FT. FEP SLEEVED SENSOR



UL TYPE 1, IP60



| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | REPL. RELAY P/N | REPL. RELAY P/N<br>LESS TRANS. | REPL. TRANS. | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./ (kg) |
|--------------|----------------------|-----------|-----------------|--------------------------------|--------------|------------------|-------------------------|
| DLC302       | 240                  | 30        | AH30-1          | AH30-2                         | HD50 2/1     | DLC-10L          | 16                      |
| DLC304       | 480                  | 30        | AH30-1          | ---                            | HD50 4/1     | DLC-10L          | (7.5)                   |
| DLC502       | 240                  | 50        | AH50-1          | AH50-2                         | HD50 2/1     | DLC-10L          | 17                      |
| DLC504       | 480                  | 50        | AH50-1          | ---                            | HD50 4/1     | DLC-10L          | (8)                     |
| DLC752       | 240                  | 75        | AH75-1          | AH75-2                         | HD100 2/1    | DLC-10L          | 23                      |
| DLC754       | 480                  | 75        | AH75-1          | ---                            | HD100 4/1    | DLC-10L          | (10.5)                  |
| DLC902       | 240                  | 90        | AH90-1          | AH90-2                         | HD100 2/1    | DLC-10L          | 25                      |
| DLC904       | 480                  | 90        | AH90-1          | ---                            | HD100 4/1    | DLC-10L          | (11.5)                  |
| DLC1202      | 240                  | 120       | AH120-1         | AH120-2                        | HD150 2/1    | DLC-10L          | 27                      |
| DLC1204      | 480                  | 120       | AH120-1         | ---                            | HD150 4/1    | DLC-10L          | (12.5)                  |
| DLC1502      | 240                  | 150       | AH150-1         | AH150-2                        | HD150 2/1    | DLC-10L          | 33                      |
| DLC1504      | 480                  | 150       | AH150-1         | ---                            | HD150 4/1    | DLC-10L          | (15)                    |

Combination control consists of gasketed plastic enclosure, thermostat, contactor and optional control transformer. Transformer must be used on 480 volts and is recommended for 240 volts. To omit stepdown transformer, add "LT" to end of model number. See DLC chart above for thermostat options. Additional control options available, consult factory.

FEP is a fluorinated ethylene propylene fluoropolymer.



# DIGITAL AND NON-INDICATING CONTROLS

## DSL SERIES, 1/16 DIN DIGITAL THERMOSTATS DUAL SETPOINT WITH 10 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS  | MAX. AMPS | TEMP. RANGE               | SENSOR LENGTH<br>Ft./m | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|--------|-----------|---------------------------|------------------------|------------------|----------------------|
| DSL          | 85-265 | 3         | -100-500°F<br>(-73-260°C) | 10' (3)                | RTD1000          | 2 (1)                |

Longer sensor lengths and higher temperature ranges available. Many features included as standard. 0-10V, 4-20MA and RS485 outputs optional, consult factory.



## DSL SERIES, DIGITAL COMBINATION CONTROLS ONE OR THREE PHASE WITH 10 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | REPL. RELAY P/N | REPL. RELAY P/N<br>LESS TRANS. | REPL. TRANS. | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|----------------------|-----------|-----------------|--------------------------------|--------------|------------------|----------------------|
| DSL302       | 240                  | 30        | AH30-1          | AH30-2                         | HD50 2/1     | RTD1000          | 16                   |
| DSL304       | 480                  | 30        | AH30-1          | ---                            | HD50 4/1     | RTD1000          | (7.5)                |
| DSL502       | 240                  | 50        | AH50-1          | AH50-2                         | HD50 2/1     | RTD1000          | 17                   |
| DSL504       | 480                  | 50        | AH50-1          | ---                            | HD50 4/1     | RTD1000          | (8)                  |
| DSL752       | 240                  | 75        | AH75-1          | AH75-2                         | HD100 2/1    | RTD1000          | 23                   |
| DSL754       | 480                  | 75        | AH75-1          | ---                            | HD100 4/1    | RTD1000          | (10.5)               |
| DSL902       | 240                  | 90        | AH90-1          | AH90-2                         | HD100 2/1    | RTD1000          | 25                   |
| DSL904       | 480                  | 90        | AH90-1          | ---                            | HD100 4/1    | RTD1000          | (11.5)               |
| DSL1202      | 240                  | 120       | AH120-1         | AH120-2                        | HD100 2/1    | RTD1000          | 27                   |
| DSL1204      | 480                  | 120       | AH120-1         | ---                            | HD100 4/1    | RTD1000          | (12.5)               |
| DSL1502      | 240                  | 150       | AH150-1         | AH150-2                        | HD150 2/1    | RTD1000          | 33                   |
| DSL1504      | 480                  | 150       | AH150-1         | ---                            | HD150 4/1    | RTD1000          | (15)                 |

Combination control consists of gasketed plastic enclosure, thermostat, contactor and optional control transformer. Transformer must be used on 480 volts and is recommended for 240 volts. To omit step-down transformer, add "LT" to end of model number. See DSL chart for thermostat options. Longer sensor lengths and additional control options available, consult factory.



FEP is a fluorinated ethylene propylene fluoropolymer.

# DIGITAL CONTROLS

UL TYPE 12, IP61  
(enclosed) CE



## DE SERIES, 1/8 DIN DIGITAL THERMOSTATS SINGLE SETPOINT WITH 10 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS  | MAX. AMPS | TEMP. RANGE          | SENSOR LENGTH<br>Ft./m | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|--------|-----------|----------------------|------------------------|------------------|----------------------|
| DE20         | 90-260 | 20        | 0-500°F<br>(0-260°C) | 10'<br>(3)             | RTD1000          | 3<br>(1.5)           |

Longer sensor lengths, thermocouples, 100 ohm RTDs, voltage, current and frequency inputs available as options, consult factory.

## DE SERIES, DIGITAL COMBINATION CONTROLS ONE OR THREE PHASE WITH 10 FT. FEP SLEEVED SENSOR

UL TYPE 1, IP60



| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | REPL. RELAY P/N | REPL. RELAY P/N<br>LESS TRANS. | REPL. TRANS. | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|----------------------|-----------|-----------------|--------------------------------|--------------|------------------|----------------------|
| DE302        | 240                  | 30        | AH30-1          | AH30-2                         | HD50 2/1     | RTD1000          | 16                   |
| DE304        | 480                  | 30        | AH30-1          | ---                            | HD50 4/1     | RTD1000          | (7.5)                |
| DE502        | 240                  | 50        | AH50-1          | AH50-2                         | HD50 2/1     | RTD1000          | 17                   |
| DE504        | 480                  | 50        | AH50-1          | ---                            | HD50 4/1     | RTD1000          | (8)                  |
| DE752        | 240                  | 75        | AH75-1          | AH75-2                         | HD100 2/1    | RTD1000          | 23                   |
| DE754        | 480                  | 75        | AH75-1          | ---                            | HD100 4/1    | RTD1000          | (10.5)               |
| DE902        | 240                  | 90        | AH90-1          | AH90-2                         | HD100 2/1    | RTD1000          | 25                   |
| DE904        | 480                  | 90        | AH90-1          | ---                            | HD100 4/1    | RTD1000          | (11.5)               |
| DE1202       | 240                  | 120       | AH120-1         | AH120-2                        | HD150 2/1    | RTD1000          | 27                   |
| DE1204       | 480                  | 120       | AH120-1         | ---                            | HD150 4/1    | RTD1000          | (12.5)               |
| DE1502       | 240                  | 150       | AH150-1         | AH150-2                        | HD150 2/1    | RTD1000          | 33                   |
| DE1504       | 480                  | 150       | AH150-1         | ---                            | HD150 4/1    | RTD1000          | (15)                 |

Combination control consists of gasketed plastic enclosure, thermostat, contactor and optional control transformer. Transformer must be used on 480 volts and is recommended for 240 volts. To omit step-down transformer, add "LT" to end of model number. See DE chart for thermostat options. Longer sensor lengths and additional control options available, consult factory.

UL TYPE 12, IP61  
(enclosed) CE



## DQ SERIES, 1/4 DIN DIGITAL THERMOSTATS DUAL SETPOINT WITH 10 FT. FEP SLEEVED SENSOR

| MODEL NUMBER | VOLTS  | MAX. AMPS | TEMP. RANGE          | SENSOR LENGTH<br>Ft./m | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|--------|-----------|----------------------|------------------------|------------------|----------------------|
| DQ15         | 85-240 | 20        | 0-500°F<br>(0-260°C) | 10'<br>(3)             | RTD1000          | 3 (1.5)              |

Longer sensor lengths, thermocouples, 100 ohm RTDs, voltage, current and frequency inputs as well as 4-20 mA outputs available as options, consult factory.

## DQ SERIES, DIGITAL COMBINATION CONTROLS ONE OR THREE PHASE WITH 10 FT. FEP SLEEVED SENSOR

UL TYPE 1, IP60



| MODEL NUMBER | VOLTS<br>(See Pg. 1) | MAX. AMPS | REPL. RELAY P/N | REPL. RELAY P/N<br>LESS TRANS. | REPL. TRANS. | REPL. SENSOR P/N | SHIP WGT.<br>Lbs./kg |
|--------------|----------------------|-----------|-----------------|--------------------------------|--------------|------------------|----------------------|
| DQ302        | 240                  | 30        | AH30-1          | AH30-2                         | HD50 2/1     | RTD1000          | 16                   |
| DQ304        | 480                  | 30        | AH30-1          | ---                            | HD50 4/1     | RTD1000          | (7.5)                |
| DQ502        | 240                  | 50        | AH50-1          | AH50-2                         | HD50 2/1     | RTD1000          | 17                   |
| DQ504        | 480                  | 50        | AH50-1          | ---                            | HD50 4/1     | RTD1000          | (8)                  |
| DQ752        | 240                  | 75        | AH75-1          | AH75-2                         | HD100 2/1    | RTD1000          | 23                   |
| DQ754        | 480                  | 75        | AH75-1          | ---                            | HD100 4/1    | RTD1000          | (10.5)               |
| DQ902        | 240                  | 90        | AH90-1          | AH90-2                         | HD100 2/1    | RTD1000          | 25                   |
| DQ904        | 480                  | 90        | AH90-1          | ---                            | HD100 4/1    | RTD1000          | (11.5)               |
| DQ1202       | 240                  | 120       | AH120-1         | AH120-2                        | HD150 2/1    | RTD1000          | 27                   |
| DQ1204       | 480                  | 120       | AH120-1         | ---                            | HD150 4/1    | RTD1000          | (12.5)               |
| DQ1502       | 240                  | 150       | AH150-1         | AH150-2                        | HD150 2/1    | RTD1000          | 33                   |
| DQ1504       | 480                  | 150       | AH150-1         | ---                            | HD150 4/1    | RTD1000          | (15)                 |

Combination control consists of gasketed plastic enclosure, thermostat, contactor and optional control transformer. Transformer must be used on 480 volts and is recommended for 240 volts. To omit step-down transformer, add "LT" to end of model number. See DQ chart for thermostat options. Longer sensor lengths and additional control options available, consult factory.

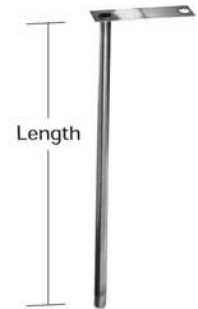
FEP is a fluorinated ethylene propylene fluoropolymer.



# ACCESSORIES

## W SERIES, THERMOWELLS

| THERMOWELL<br>MATERIAL  | DIA. | OVER THE SIDE WELLS                |                                    |                                    | SHIP<br>WGT.<br>Lbs./ (kg) |
|-------------------------|------|------------------------------------|------------------------------------|------------------------------------|----------------------------|
|                         |      | MODEL NO.<br>12" LENGTH<br>(305mm) | MODEL NO.<br>24" LENGTH<br>(610mm) | MODEL NO.<br>36" LENGTH<br>(915mm) |                            |
| Quartz                  | 1/2" | WQ12                               | WQ24                               | WQ36                               | 2 (1)                      |
| 304 SS                  | 1/2" | WF12                               | WF24                               | WF36                               | 2 (1)                      |
| 316 SS                  | 1/2" | WS12                               | WS24                               | WS36                               | 2 (1)                      |
| Titanium                | 1/2" | WT12                               | WT24                               | WT36                               | 2 (1)                      |
| Fluoropolymer (FEP)     | 1/2" | WX12                               | WX24                               | WX36                               | 2 (1)                      |
| 1/2" NPT THREADED WELLS |      |                                    |                                    |                                    |                            |
| 304 SS                  | 1/2" | WFT12                              | WFT24                              | WFT36                              | 2 (1)                      |
| 316 SS                  | 1/2" | WST12                              | WST24                              | WST36                              | 2 (1)                      |
| Titanium                | 1/2" | WTT12                              | WTT24                              | WTT36                              | 2 (1)                      |
| Fluoropolymer (FEP)     | 1/2" | WXT12                              | WXT24                              | WXT36                              | 2 (1)                      |



## DTS SERIES, DIGITAL TIME SWITCH

| MODEL NUMBER | VOLTAGE | SWITCHING CAPACITY | SHIP WGT.<br>Lbs./ (kg) |
|--------------|---------|--------------------|-------------------------|
| DTS-1        | 120     | 20A                | 1 (.5)                  |

Can be ordered as part of a combination temperature control assembly.



# ELECTRIC HEATER SIZING INFORMATION

|         |      | TEMPERATURE ° F |     |     |     |     |     |     |     |     |     |     |     |
|---------|------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| GALLONS |      | 100             | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 |
|         | 50   | 1               | 1   | 1   | 2   | 2   | 2   | 2   | 3   | 3   | 4   | 4   | 5   |
|         | 100  | 2               | 2   | 3   | 3   | 3   | 4   | 4   | 5   | 6   | 6   | 8   | 8   |
|         | 200  | 4               | 4   | 5   | 6   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 14  |
|         | 300  | 6               | 6   | 7   | 8   | 9   | 10  | 12  | 14  | 15  | 16  | 18  | 20  |
|         | 400  | 8               | 8   | 9   | 10  | 12  | 14  | 16  | 19  | 20  | 21  | 24  | 26  |
|         | 500  | 9               | 10  | 12  | 13  | 15  | 18  | 20  | 24  | 24  | 27  | 30  | 32  |
|         | 600  | 11              | 12  | 15  | 16  | 18  | 21  | 24  | 28  | 30  | 32  | 36  | 38  |
|         | 700  | 13              | 14  | 17  | 18  | 21  | 24  | 28  | 32  | 36  | 38  | 42  | 44  |
|         | 800  | 15              | 16  | 19  | 21  | 24  | 28  | 32  | 36  | 40  | 44  | 48  | 52  |
|         | 900  | 17              | 18  | 21  | 24  | 27  | 32  | 36  | 40  | 44  | 48  | 54  | 58  |
|         | 1000 | 18              | 21  | 24  | 27  | 30  | 36  | 40  | 44  | 48  | 54  | 58  | 64  |

This chart provides an easy reference to estimate the kW required to heat a tank. Heat loss from the surface of the solution and from the sides of the tank have been taken into account. Find the gallons at the left, move to the right to the column with the temperature at which you will be heating the solution. The number indicated here is the kW required to do the heating job. This kW figure assumes a heat-up period of six hours; for a twelve hour heat-up time, simply divide the kW figure in half.

**CAUTION:** This chart is for quick *estimates* only. Use formula below for determining actual heat requirement.

## DETERMINING SPECIFIC HEATING REQUIREMENTS FOR ELECTRIC HEATERS

To determine the heating requirement of a tank, first obtain the following information:

- 1) Total cubic feet of tank. (Multiply the inside dimensions of the tank in feet - length x width x depth.)  
One m<sup>3</sup> = 35.3 ft<sup>3</sup>
- 2) Total gallons of solution. Multiply by 7.48 the cubic feet of the tank occupied by solution. (If the solution is normally 6" below the top of the tank, allow for this when figuring.)
- 3) Average ambient (room) temperature at which tank will be used.
- 4) Temperature level at which solution is to be held.
- 5) Heat up time desired.

Losses due to agitation, ventilation and work loads should be considered in calculating total kW requirements. After this information is known, the following calculations can be made:

$$\frac{A \times 1.0^* \times 8.35^{**} \times B}{3412 \times C} = \underline{\hspace{2cm}}$$

$$D \times E = \underline{\hspace{2cm}}$$

Add the results of both calculations. The total is the Kilowatt requirement of the tank.

A = Total gallons of solution. One liter = .264 gallons.

B = Difference from ambient temperature and desired solution temperature in degrees F.

C = Desired heat up time (hours).

D = Heat loss of tank. Refer to charts below

E = Square feet of top of tank. Multiply length x width.

\* = Specific heat of water. Insert specific heat of your solution here.

\*\* = Weight of water in pounds. Insert specific weight of your solution here. One kilogram = 2.2 pounds.

Losses due to agitation, ventilation, and work loads should be considered in calculating total kW requirements.

### SURFACE LOSSES IN KILOWATTS FROM OPEN HOT WATER TANK (°F)

|      |     |      |     |      |      |
|------|-----|------|-----|------|------|
| 75°  | .01 | 125° | .14 | 175° | .45  |
| 80°  | .01 | 130° | .16 | 180° | .50  |
| 85°  | .01 | 135° | .18 | 185° | .55  |
| 90°  | .02 | 140° | .21 | 190° | .60  |
| 95°  | .04 | 145° | .24 | 195° | .66  |
| 100° | .05 | 150° | .27 | 200° | .72  |
| 105° | .07 | 155° | .30 | 205° | .80  |
| 110° | .09 | 160° | .34 | 210° | .87  |
| 115° | .10 | 165° | .37 | 215° | .95  |
| 120° | .12 | 170° | .41 | 220° | 1.04 |

### SURFACE LOSSES IN KILOWATTS FROM OPEN HOT WATER TANK WITH MILD AIR AGITATION/VENTILATION (120 FPM, °F)

|      |     |      |     |      |      |
|------|-----|------|-----|------|------|
| 80°  | .03 | 130° | .30 | 180° | 1.10 |
| 85°  | .05 | 135° | .35 | 185° | 1.30 |
| 90°  | .07 | 140° | .41 | 190° | 1.60 |
| 95°  | .09 | 145° | .45 | 195° | 1.95 |
| 100° | .11 | 150° | .51 | 200° | 2.35 |
| 105° | .13 | 155° | .58 | 205° | 2.80 |
| 110° | .15 | 160° | .65 | 210° | 3.25 |
| 115° | .18 | 165° | .73 | -    | -    |
| 120° | .21 | 170° | .83 | -    | -    |
| 125° | .25 | 175° | .95 | -    | -    |

## AMP CALCULATION FOR CONTROL SELECTION

### AMPS FOR HEATING LOAD

| Heater Watts | Single Phase |       |       |       |      |      | Three Phase (Balanced) |      |      |      |      |  |
|--------------|--------------|-------|-------|-------|------|------|------------------------|------|------|------|------|--|
|              | 120V         | 208V  | 230V  | 240V  | 460V | 480V | 208V                   | 230V | 240V | 460V | 480V |  |
| 1,000        | 8.4          | 4.8   | 4.4   | 4.2   | 2.2  | 2.1  | 2.8                    | 2.6  | 2.5  | 1.3  | 1.2  |  |
| 2,000        | 16.7         | 9.7   | 8.7   | 8.4   | 4.4  | 4.2  | 5.6                    | 5.1  | 4.9  | 2.6  | 2.5  |  |
| 3,000        | 25.0         | 14.5  | 13.1  | 12.5  | 6.6  | 6.3  | 8.4                    | 7.6  | 7.3  | 3.8  | 3.7  |  |
| 4,000        | 33.4         | 19.3  | 17.4  | 16.7  | 8.7  | 8.4  | 11.2                   | 10.1 | 9.7  | 5.9  | 4.9  |  |
| 6,000        | 50.0         | 28.9  | 26.1  | 25.0  | 13.1 | 12.5 | 16.7                   | 15.1 | 14.5 | 7.6  | 7.3  |  |
| 8,000        | 66.7         | 38.5  | 34.8  | 33.4  | 17.4 | 16.7 | 22.3                   | 20.2 | 19.3 | 10.1 | 9.7  |  |
| 9,000        | 75.0         | 43.3  | 39.2  | 37.5  | 19.6 | 18.8 | 25.1                   | 22.7 | 21.7 | 11.4 | 10.9 |  |
| 12,000       | 100.0        | 57.7  | 52.2  | 50.0  | 26.1 | 25.0 | 33.4                   | 30.2 | 29.0 | 15.1 | 14.5 |  |
| 18,000       | 150.0        | 86.6  | 78.3  | 75.0  | 39.2 | 37.5 | 50.1                   | 45.3 | 43.4 | 22.7 | 21.7 |  |
| 27,000       | 225.0        | 129.9 | 117.4 | 112.5 | 58.7 | 56.3 | 75.1                   | 67.9 | 65.1 | 34.0 | 32.6 |  |
| 36,000       | 300.0        | 173.1 | 156.6 | 150.0 | 78.3 | 75.0 | 100.1                  | 90.5 | 86.8 | 45.3 | 43.4 |  |

For single phase or two wire power supplies to heaters.

$$\text{AMP RATING PER POLE}^* = \frac{\text{Total capacity (watts)}}{\text{line voltage}}$$

$$\text{Example: } \frac{4000 \text{ watts}}{240 \text{ volts}} = 16.67 \text{ Amps}$$

For three phase balanced power supplies (Delta or Wye connections) to heaters using a three-pole contactor.

$$\text{AMP RATING PER POLE}^* = \frac{\text{Total capacity (watts)}}{\text{line voltage} \times 1.73}$$

$$\text{Example: } \frac{4000}{240 \times 1.73} = 9.63 \text{ Amps}$$

Contactor sizing:

\*Amp rating per pole X 1.25= contactor rating



# COIL SIZING INFORMATION

## FORMULA FOR STEAM HEATING MEDIA

$$\frac{\text{Gallons to be Heated} \times \text{Temperature Rise Required} \times \text{Steam Pressure Factor (See Chart A)}}{1000} = \text{Square feet of area required for one hour heat-up}$$

$$\frac{A \times B \times C}{1000} = \text{Square feet of area required for one hour heat-up}$$

### Calculation process:

- 1) Determine gallons in tank. Enter this amount at (A).
- 2) Subtract the temperature of the solution to be heated from the temperature to which it must be heated. Enter this amount in (B).
- 3) Locate your useable steam pressure in the Steam Pressure Factor (see chart A) and find the factor number. Enter this at (C).
- 4) Multiply (A) times (B) times (C) and divide by 1000. This is the square foot area you require for a one hour heat-up. If more time is available, coil surface area may be reduced by dividing the square foot area by the heat-up time available, up to 4 hours, maximum.

NOTE: For operating temperatures over 170°F, consult factory.

CHART A

| Steam Pressure Available (PSI)        | 5#  | 10# | 15# | 20# | 25# | 30# | Above 30#       |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----------------|
| Steam Pressure Factor (Fluoropolymer) | 2.2 | 2   | 1.7 | 1.5 | 1.3 | 1.1 | Consult Factory |
| Steam Pressure Factor (Metal)         | .55 | .50 | .42 | .37 | .30 | .27 | Consult Factory |

## FORMULA FOR HOT WATER HEATING MEDIA

$$\frac{\text{Gallons in tank} \times \text{Temperature Rise Required} \times 8.33}{U \times (\text{Hot Water Temperature} - \text{Required Tank Temperature})} = \text{Square feet of area required for one hour heat-up}$$

$$\frac{A \times B \times 8.33}{U \times D} = \frac{C}{E} = \text{Square feet of area required for one hour heat-up}$$

- 1) Determine gallons in tank. Enter at (A).
- 2) Subtract temperature of solution to be heated from the temperature to which it is to be heated. Enter at (B).
- 3) Multiply (A) times (B) times 8.33. Enter answer at (C).
- 4) Subtract the required tank temperature from the temperature of your hot water supply. Enter this figure at (D).
- 5) Multiply (D) by (U) and enter answer at (E).
- 6) Divide line (C) by line E to determine square feet of area required. If more time is available, coil surface area may be reduced by dividing the square foot area by the heat-up time, up to 4 hours, maximum.

NOTE: For operating temperatures over 170°F, consult factory.

U Factor for Metal Coils = 100  
U Factor for FEP Coils = 30

## FORMULA FOR COOLING WITH ANY MEDIUM

$$\frac{U \times \text{Volts} \times \text{Amps} \times 3.412}{(\text{Required Tank Temperature} - \text{Cooling Liquid Temperature})} = \text{Square feet of surface area required}$$

$$\frac{A}{U \times B} = \frac{A}{C} = \text{Square feet of surface area required}$$

U Factor for Metal Coils = 100  
U Factor for FEP Coils = 30

This formula assumes that all electrical energy is dissipated in the tank as heat. In more efficient electrochemical conversions, the energy dissipated as heat may be less.

- 1) Determine watts by multiplying voltage times amperage delivered by the tank rectifier. Multiply this product times 3.412 to determine BTUs. Enter answer at (A).
- 2) Subtract cooling liquid temperature from required tank temperature. Enter at (B). Caution: If this number is less than 15, consult factory for assistance in determining proper coil size.
- 3) Multiply (B) times (U) and enter answer at (C).
- 4) Divide line (A) by line (C) to determine square feet of surface area required.

Check solution guide for proper sheath material selection.



# IMMERSION HEATER SOLUTION GUIDE

| SOLUTION                                                 | TYPE OF HEATER            | SOLUTION                                    | TYPE OF HEATER            | SOLUTION                                 | TYPE OF HEATER           |
|----------------------------------------------------------|---------------------------|---------------------------------------------|---------------------------|------------------------------------------|--------------------------|
| Acetic .....                                             | PTFE* or Quartz           | Copper Bright Acid .....                    | PTFE* or Quartz           | Nitric Acid .....                        | PTFE* or Quartz          |
| Actane 70, 80 .....                                      | PTFE*                     | Copper Cyanide .....                        | 304 St. Steel             | Nitric Hydrochloric Acids ...            | PTFE* or Quartz          |
| Actane Salt .....                                        | PTFE*                     | Copper Fluoborate .....                     | PTFE*                     | <b>Nitric Phosphoric</b> .....           | <b>Quartz</b>            |
| Acid Sulfate .....                                       | PTFE* or Quartz           | Copper Pyrophosphate .....                  | 304 St. Steel             | <b>Oil</b> .....                         | <b>Steel</b>             |
| Alcorite .....                                           | PTFE* or Quartz           | Copper Strike .....                         | 304 St. Steel             | Oleic Acid .....                         | PTFE* or Quartz          |
| Alkaline Cleaners (Electrified)....                      | 304 St. Steel             | Copper Sulfate .....                        | PTFE* or Quartz           | <b>Paint Stripper (Alkaline)</b> .....   | <b>304 St. Steel</b>     |
| Alkaline Soaking Cleaners .....                          | 304 St. Steel             | Cyanide .....                               | 304 St. Steel             | <b>Perchloroethylene</b> .....           | <b>316 St. Steel</b>     |
| Alodine (most formulas) .....                            | 316 St. Steel             | Deionized Water ....                        | 316 St. Steel or Titanium | <b>Phosphoric Acid (No Fluoride) ...</b> | <b>PTFE* or Quartz</b>   |
| Alstan .....                                             | 304 St. Steel             | Deoxidizer (Etching) .....                  | Quartz                    | <b>Phosphate Cleaner</b> .....           | <b>304 St. Steel</b>     |
| Aluminum Bright Dip .....                                | PTFE* or Quartz           | Deoxidizer Non-Chromated .....              | 316 St. Steel             | <b>Phosphate</b> .....                   | <b>316 St. Steel</b>     |
| <b>Aluminum Cleaners</b> .....                           | <b>304 St. Steel</b>      | Dichromic Seal .....                        | 316 St. Steel             | Potassium Acid Sulfate .....             | PTFE* or Quartz          |
| Aluminum Chloride .....                                  | PTFE* or Quartz           | Diethylene Glycol .....                     | 304 St. Steel             | Potassium Cyanide .....                  | 304 St. Steel            |
| Aluminum Sulfate .....                                   | 304 St. Steel             | Diversey, 511, 514 .....                    | PTFE*                     | Potassium Hydroxide .....                | 304 St. Steel            |
| Ammonia .....                                            | 304 St. Steel             | <b>Down Therm</b> .....                     | <b>316 St. Steel</b>      | Potassium Hydrochloric .....             | PTFE* or Quartz          |
| Ammonia Persulfate .....                                 | PTFE* or Quartz           | Dye Solutions .....                         | 304 St. Steel             | <b>Potassium Permanganate</b> ....       | <b>PTFE* or Titanium</b> |
| Ammonium Bi Fluoride.....                                | PTFE*                     | Ebonal C .....                              | Titanium                  | Rhodium .....                            | PTFE* or Quartz          |
| Ammonium Chloride .....                                  | Titanium                  | Electroless Copper .....                    | PTFE*                     | Rochelle Salt Cyanide .....              | 304 St. Steel            |
| Ammonium Nitrate .....                                   | 316 St. Steel             | <b>Electroless Nickel</b> .....             | <b>PTFE* or Titanium</b>  | Ruthenium .....                          | PTFE* or Quartz          |
| Anodizing (Aluminum) .....                               | PTFE* or Quartz           | Electroless Tin (Acid) .....                | PTFE* or Quartz           | Salt (Actine) .....                      | PTFE*                    |
| ARP 28, 80 Blackening Salts..                            | PTFE* or Quartz           | Electroless Tin (Alkaline) .....            | 316 St. Steel             | Sea Water .....                          | Titanium                 |
| Arsenic .....                                            | 304 St. Steel             | Electro Cleaner .....                       | 304 St. Steel             | Silver Bromide .....                     | 316 St. Steel            |
| Barium Chloride .....                                    | Quartz or Titanium        | Electro Polishing .....                     | PTFE* or Quartz           | Silver Cyanide .....                     | 304 St. Steel            |
| Benzoic Acid .....                                       | Titanium                  | Enthone 80 Acid .....                       | PTFE*                     | Silver Lume .....                        | 304 St. Steel            |
| Black Nickel .....                                       | PTFE* or Quartz           | <b>Ethylene Glycol</b> .....                | <b>Steel</b>              | Silver Nitrate .....                     | 316 St. Steel            |
| <b>Black Oxide (Hi-Temp)</b> .....                       | <b>304 St. Steel</b>      | Ferric Nitrate .....                        | 304 St. Steel             | Sodium Bisulfate .....                   | PTFE* or Quartz          |
| Black Oxide (Low-Temp) .....                             | Titanium                  | Ferric Sulfate .....                        | 304 St. Steel             | Sodium Carbonate .....                   | Titanium                 |
| <b>Bonderizing</b> .....                                 | <b>316 St. Steel</b>      | Ferric Ammonium Oxide .....                 | 316 St. Steel             | Sodium Chlorate .....                    | Titanium                 |
| Boric Acid .....                                         | Titanium                  | Ferric Chloride .....                       | PTFE*, Quartz, Titanium   | Sodium Chloride .....                    | Titanium                 |
| Brass Cyanide .....                                      | 304 St. Steel             | Fluborate .....                             | PTFE*                     | Sodium Cyanide .....                     | 304 St. Steel            |
| Bright Nickel .....                                      | PTFE*, Quartz, Titanium   | Formic Acid .....                           | 316 St. Steel             | Sodium Dichromate (Hot Seal) ...         | 316 St. Steel            |
| Bright Copper Cyanide .....                              | 304 St. Steel             | <b>Glycerol</b> .....                       | <b>304 St. Steel</b>      | Sodium Hydroxide .....                   | Steel                    |
| Bronze .....                                             | 304 St. Steel             | Immersion Gold .....                        | 304 St. Steel             | Sodium Hypochlorite .....                | PTFE*                    |
| Brown Oxide .....                                        | Titanium                  | Gold-Acid .....                             | PTFE*, Quartz, Titanium   | Sodium Persulfate .....                  | PTFE* or Quartz          |
| Burnite .....                                            | PTFE* or Quartz           | Gold Cyanide .....                          | 304 St. Steel             | Stannate .....                           | Steel                    |
| Butyric Acid .....                                       | Titanium                  | Grey Nickel .....                           | PTFE*, Quartz, Titanium   | Stanostar .....                          | PTFE* or Quartz          |
| Cadmium Black .....                                      | PTFE* or Quartz           | Hot Seal Dichromate .....                   | 316 St. Steel             | Stearic Acid .....                       | Quartz                   |
| Cadmium (Alkaline) .....                                 | 304 St. Steel             | <b>Hydrogen Peroxide</b> .....              | <b>PTFE* or Quartz</b>    | Sulfamate Nickel ....                    | PTFE*, Quartz, Titanium  |
| Cadmium Fluoborate .....                                 | PTFE*                     | Hydrochloric Acid .....                     | PTFE* or Quartz           | Sulfur .....                             | PTFE* or Quartz          |
| Calcium Chloride .....                                   | Titanium                  | Hydrofluoric Acid .....                     | PTFE*                     | Sulfuric Acid .....                      | PTFE* or Quartz          |
| Calcium Hypochlorite .....                               | Titanium                  | Indium .....                                | PTFE* or Quartz           | Sulfur Peroxide .....                    | PTFE* or Quartz          |
| Carbonic Acid .....                                      | Titanium                  | Iridite (4-75,4-73,14,14-2,14-9).           | 316 St. Steel             | Sulphamic Acid .....                     | PTFE* or Quartz          |
| <b>Caustic Etch</b> .....                                | <b>Steel</b>              | Iridite (1,2,3,4-C,7,8,15) .....            | PTFE* or Quartz           | Tannic Acid .....                        | Titanium                 |
| Caustics .....                                           | Steel                     | Iron Fluoborate .....                       | PTFE*                     | Tin Nickel .....                         | PTFE*                    |
| <b>Caustics (highly concentrated 20% and over)</b> ..... | <b>Steel</b>              | <b>Iron Phosphate</b> .....                 | <b>316 St. Steel</b>      | Tin Plating (Acid) .....                 | PTFE* or Quartz          |
| Chlorine/Wet .....                                       | PTFE* or Quartz           | Isoprep (186,187,188) .....                 | 316 St. Steel             | (Stanus/Sulphate) .....                  | PTFE* or Quartz          |
| Chloride .....                                           | PTFE*, Quartz or Titanium | Isoprep Acid Salts .....                    | PTFE*                     | Tin Plating Acid (Fluborate) .....       | PTFE*                    |
| Chlorosulfuric Acid .....                                | Titanium                  | Jetal .....                                 | 304 St. Steel             | Tin Plating (Alkaline) .....             | 304 St. Steel            |
| Chromic Anodizing .....                                  | PTFE* or Quartz           | Lead Acetate .....                          | 304 St. Steel             | <b>Trichlorethylene</b> .....            | <b>316 St. Steel</b>     |
| Chromic Acetate .....                                    | PTFE* or Quartz           | <b>Lime Saturated Water (Alkaline)</b> .... | <b>316 St. Steel</b>      | Trioxide (Pickle) .....                  | PTFE* or Quartz          |
| Chromic Nickel .....                                     | PTFE* or Quartz           | Linseed Oil .....                           | 304 St. Steel             | <b>Turco (4181, 4338)</b> .....          | <b>316 St. Steel</b>     |
| Chromium (No Fluorides) PTFE*,Quartz,Titanium            |                           | <b>Magnesium Hydroxide</b> .....            | <b>304 St. Steel</b>      | Unichrome .....                          | PTFE* or Quartz          |
| Chromium (Fluoride) .....                                | PTFE*                     | Magnesium Nitrate .....                     | PTFE* or Quartz           | Water .....                              | 316 St. Steel or Quartz  |
| Citric Acid .....                                        | Titanium                  | <b>Manganese Phosphate</b> .....            | <b>316 St. Steel</b>      | Wood's Nickel Strike ..                  | Titanium, PTFE*, Quartz  |
| Clear Chromate .....                                     | PTFE* or Quartz           | McDermid 629 .....                          | PTFE*                     | Yellow Dichromate .....                  | PTFE* or Quartz          |
| Cobalt Nickel .....                                      | PTFE*, Quartz, Titanium   | Mercuric Chloride .....                     | Titanium                  | Zinc Acid .....                          | PTFE* or Titanium        |
| Cobalt Plating .....                                     | 304 St. Steel             | Muriatic Acid .....                         | PTFE* or Quartz           | Zinc Ammonium Chloride.                  | Quartz or Titanium       |
| Cobra Etch .....                                         | PTFE*                     | Nickel (Plating Solution)                   |                           | Zinc Cyanide .....                       | 304 St. Steel            |
| Copper Acid .....                                        | PTFE* or Quartz           | (Watts) .....                               | PTFE*, Quartz, Titanium   | <b>Zinc Phosphate</b> .....              | <b>316 St. Steel</b>     |
|                                                          |                           | Nickel Acetate Seal .....                   | 316 St. Steel             | Zinc Phosphate (Fluoride) .....          | PTFE                     |
|                                                          |                           | Nickel Chloride .....                       | Titanium                  | Zincate .....                            | 304 St. Steel            |

Solutions requiring derated heaters are indicated by **bold, italicized** type.

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**DO NOT USE ELECTRIC IMMERSION HEATERS TO HEAT FLAMMABLE SOLUTIONS!**

\*PTFE is a polytetrafluoroethylene fluoropolymer.