



COLD WEATHER PRODUCTS CATALOG

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HVH

Horizontal or Vertical Discharge Fan Forced Unit Heater

- 2.6 - 50 kW
- 8,900 – 170,600 Btuh
- 208, 240, 277, 480, and 600 volt
- 1 or 3 phase
- Vertical or Horizontal Airflow
- Wall or Ceiling Mounted Configurations
- CSA Certified to US and Canadian Standards
- CE Certified to European Standards

Description

The Chromalox HVH self-contained blower heater provides quiet, reliable, fan-forced heat for all types of commercial and industrial applications. The hallmark of the HVH blower heater is its versatility. It can provide vertical or horizontal airflow and can be mounted on walls or ceilings. Optional wall or ceiling swivel mounting brackets help direct airflow exactly where it is needed. Heavy-duty construction affords long, dependable service, while its two-tone gray polyester powder coat finish makes an attractive appearance.

Applications

- Shipping and Receiving Areas
- Pump Houses
- Power Generating Stations
- Aircraft Hangars
- Factories
- Warehouses
- Garages

Construction

Cabinet – Heavy 20-gauge steel, 2.6 to 15 kW models; 18-gauge steel, 25 to 50 kW models. Phosphate undercoated for corrosion resistance. Finished in a two-tone gray polyester powder coat.

Louvers – Individually adjustable. Direct airflow up or down as needed. Fintube® Heating Elements Corrosion resistant steel fins furnace-brazed to a tubular heating element, assuring long life and superior heat transfer.



Fan Motor – Totally enclosed fan motor is rated for continuous duty with built-in thermal cutout and operates on the same voltage as the heating circuit.

Dynamically Balanced Fan – Ensures smooth, quiet operation. Blade pitch is carefully selected so that the volume of air moved results in the optimum discharge air temperature. Pull-through airflow design draws air across heating elements for more even airflow distribution and cooler element operation.

Features

- **Integral 24V Control Transformer** is standard on 480V models and eliminates the need for an external control source (120V is optional).
- **Heavy Duty Magnetic Contactors** are standard on all models except 2.6 thru 5 kW single phase models, except for 480V models.
- **Linear Thermal Cutouts** open the control circuit and disconnect power to the heating elements if overheating occurs. Automatic Reset allows the control circuit to reclose and restore power when temperature returns to normal.
- **Field Convertible** — Combination 208/240V and 1 or 3 phase operation through 10 kW.

VERSATILE MOUNTING CONFIGURATIONS

Vertical Discharge

Recessed fasteners on the rear of the heater cabinet are internally threaded for suspension of unit in the vertical discharge mode with threaded rods.

Horizontal Discharge Ceiling Bracket – The ceiling bracket allows you mount the heater directly to the ceiling or over-head member, simply and easily. The swivel mounting allows you to readily adjust the direction of warm air flow for maximum comfort up to 180° rotation.

Wall Mounting Bracket – The wall mounting brackets permits the heater to be rotated to face any direction.

Factory Installed or Field Installation Kits

Summer Fan Switch Kit – Field installable for circulating warm, stratified air. Available for all models.

Thermostat Kit – Field installable on all models. Range 40° to 100°F (4° to 38°C).

Disconnect Switch Kits – Field-installable switch enables power to be disconnected while servicing heater. Mounts on the front of the heater.

Outlet Screen – Prevents objects from coming in contact with fan

Factory Installed options

- Pilot Light (recommended)
- Time Delay (heat on and off): Provides delay of fan operation until elements have warmed up. The fan stays on until cool.

Advantages

- Self Contained
- Versatile, Flexible and High Performance
- Easy Installation
- Minimum Maintenance
- Long Life
- Attractive Appearance

Because it has individually adjustable discharge louvers to direct air flow, and can be wall or ceiling (plus swivel) mounted, the HVH heater may be used in a variety of heating applications:

- Primary Heating
- Supplementary Heating
- Dual System Heating
- Spot Heating
- Entryway Air-Curtain Heating

HVH

Horizontal or Vertical Discharge Fan Forced Unit Heater *(cont'd.)*

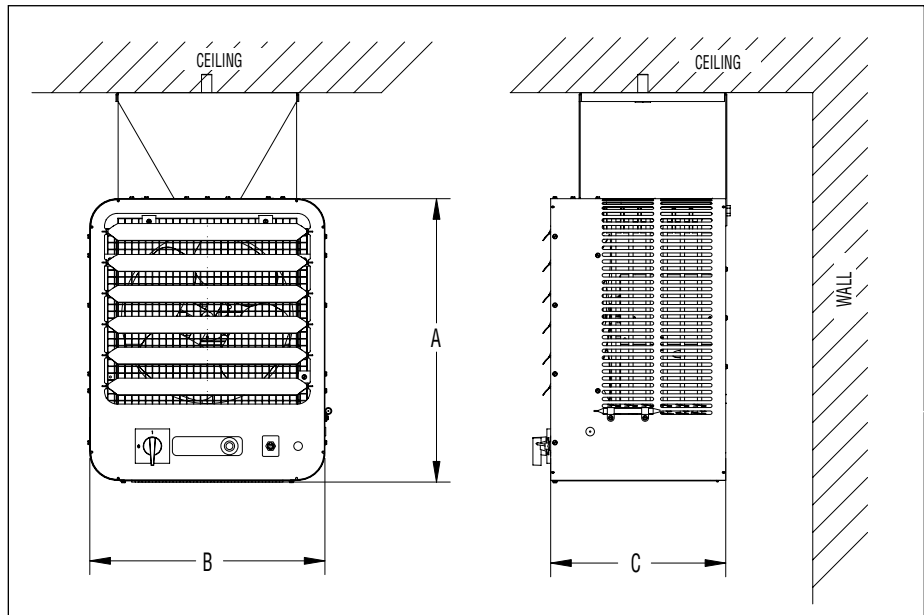
Thermostat Kits (40-90°F)

Model	Rating	PCN	Stock
TK-5	SPST	219475	S

Available Disconnect Switch Kits

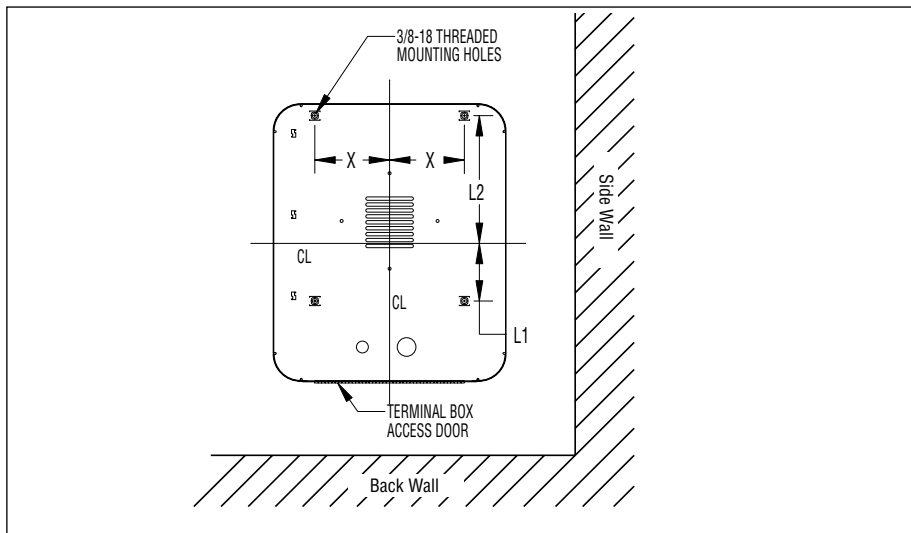
Model	Rating	PCN	Stock
HDS-1	63 Amps	219491	S
HDS-2	80 Amps	219790	NS
HDS-3	100 Amps	219803	NS

Horizontal Discharge



Heater	Dimensions In. (mm)		
	A	B	C
HVH-02 to 05 (Except 600 V)	16-1/8 (410)	13 (330)	10 (254)
HVH-07 to 15 (Except 600 V)	20-5/8 (524)	17-1/8 (435)	12-3/4 (324)
HVH-02 to 15 (600 V)	20-5/8 (524)	17-1/8 (435)	12-3/4 (324)
HVH-20 (All Voltages)	20-5/8 (524)	17-1/8 (435)	12-3/4 (324)
HVH-25 to 50 (All Voltages)	29-3/16 (741)	26-1/16 (662)	14-5/8 (371)

Rod Thread Type and Spacing Dimensions for Vertical discharge



Mounting Limitations

Hazardous Atmosphere — Unit heaters should not be used in potentially explosive atmospheres. **Corrosive Atmosphere** — The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of greenhouses, swimming pools, chemical storage bins, etc.

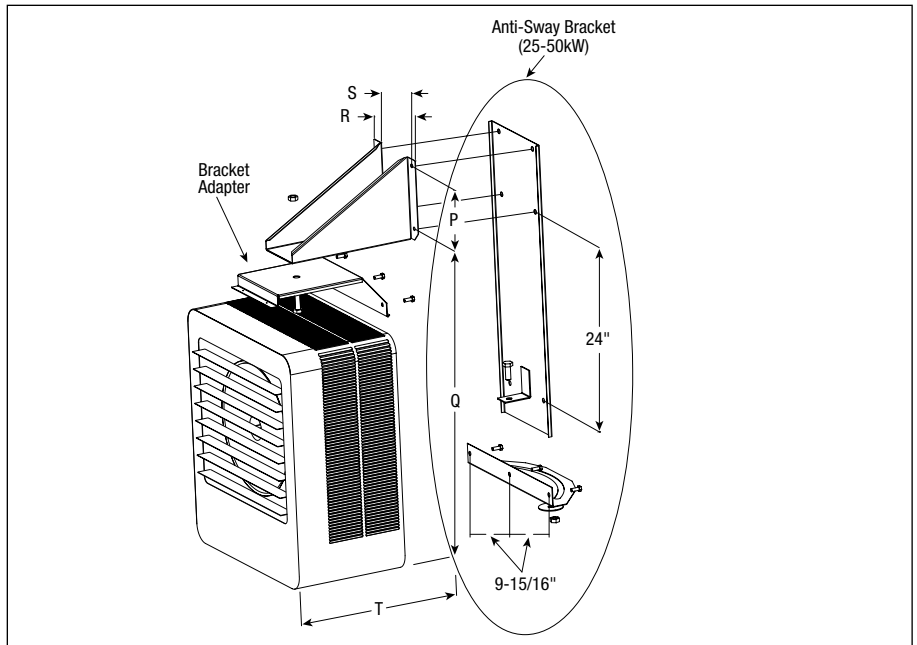
Mounting Height — Do not install unit heaters above recommended maximum mounting height. Obstructions must not block unit heater air inlet or discharge.

Unit	Rod Thread Type	Dimensions In. (mm)		
		L ₁	L ₂	X
2 to 5 kW	3/8 - 16	2-7/8 (73)	7-1/8 (181)	3-3/4 (95)
7-1/2 to 20 kW	3/8 - 16	4-5/16 (110)	9-3/8 (238)	5-1/2 (140)
25 to 50 kW	3/8 - 16	8-5/16 (211)	14 (356)	9-15/16 (252)

HVH

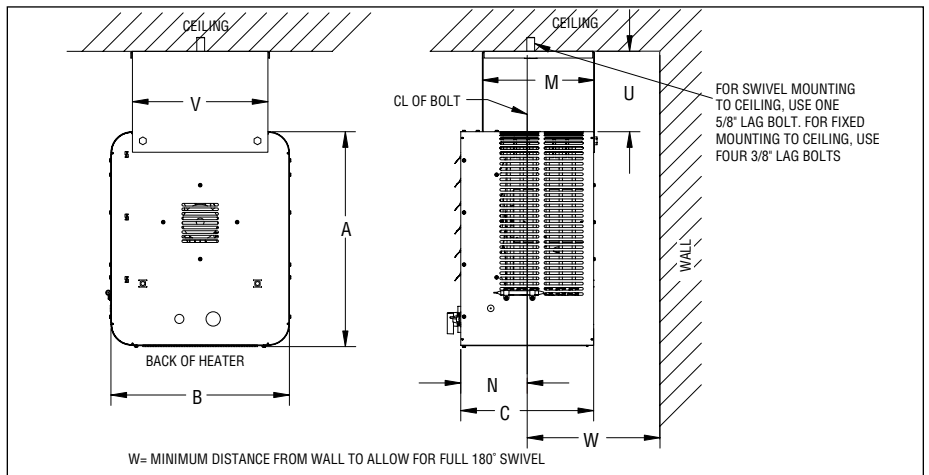
Horizontal or Vertical Discharge Fan Forced Unit Heater *(cont'd.)*

Optional Wall Swivel Mounting Bracket



Bracket Model No.	Dimensions In. (mm)					Bracket Wt. lbs. (kg.)	Use With
	P	Q	R	S	T		
HVW-1	6-1/16 (157)	18-7/8 (479)	7 (178)	5 (127)	17-5/8 (448)	4 (1.8)	HVH-02 to 05
HVW-2	6-1/16 (157)	23-1/4 (591)	7 (178)	5 (127)	18-5/8 (473)	6 (2.7)	HVH-07 to 15
HVW-3	6 (152)	23-7/16 (595)	7 (178)	5 (127)	20-1/16 (510)	6 (2.7)	HVH-02 to 15 (600 V), HVH-20 (All Voltages)
HVW-4	6 (152)	23-13/16 (605)	10-3/8 (264)	8-1/2 (216)	22-7/16 (570)	27 (12.3)	HVH-25 to 50

Optional Ceiling Swivel Mounting Bracket



Bracket Model No.	Dimensions In. (mm)								Bracket Wt. lbs. (kg.)	Use With
	A	B	C	M	N	U	V	W		
HVC-1	16-1/8 (410)	13 (330)	10 (254)	8-3/8 (213)	5-3/4 (146)	7-3/4 (197)	9-3/4 (248)	12 (305)	4 (1.8)	HVH-02, 04, 05
HVC-2	20-5/8 (524)	17-1/8 (435)	12-3/4 (324)	10-3/4 (273)	6-3/4 (171)	7-3/4 (197)	12 (305)	12 (305)	8 (3.6)	HVH-07, 10, 12, 15
HVC-3	20-5/8 (524)	17-1/8 (435)	14-1/16 (357)	12-1/16 (306)	8-1/16 (205)	7-3/4 (197)	13-5/16 (338)	8 (203)	8 (3.6)	HVH-02 to 15 (600V), HVH-20 (All Voltages)
HVC-4	29-13/16 (757)	26-1/16 (662)	14-5/8 (371)	11-3/4 (298)	8-3/16 (208)	7-3/4 (197)	22-5/16 (567)	8-7/16 (214)	17 (7.7)	HVH-25 to 50

Optional Fan Only Kits

Description	Model	PCN	Stock
Fan switch (no relay)	HVF-01	219504	S
Fan switch (24V relay)	HVF-02	219512	NS
Fan switch (120V relay)	HVF-03	219520	NS

HVH Horizontal or Vertical Discharge Fan Forced Unit Heater (cont'd.)

Electrical (60 Hz)					Motor				Air Delivery					Ordering			
kW	Volts	Ckt & Phase	Amps	Control Volts	Volts	Phase	HP	RPM	Air Flow ft ³ /min (m ³ /hr)	Air Speed ft/min (m/min)	Temp. Rise °F (°C)	Horiz. Throw ft. (m)	Mtg. ⁵ Height ft. (m)	Model	Stock	PCN	Wt. lbs. (kg)
2.6	208	1-1	13.1	N/A	208	1	1/40	1,650	410 (697)	880 (268.2)	21 (11.7)	12 (3.7)	8 (2.4)	HVH-02-81-00	S	219096	32 (14.5)
2/2.6	208/240	1-1	11.4 ²	N/A	240	1	1/40	1,650	410 (697)	880 (268.2)	21 (11.7)	12 (3.7)	8 (2.4)	HVH-02-21-00	S	219019	32 (14.5)
2.6	277	1-1	9.6	N/A	277	1	1/30	1,550	360 (612)	770 (234.7)	24 (13.3)	12 (3.7)	8 (2.4)	HVH-02-71-00	S	219117	32 (14.5)
4	208	1-1	19.8	N/A	208	1	1/40	1,650	410 (697)	880 (268.2)	31 (17.2)	12 (3.7)	8 (2.4)	HVH-04-81-00	S	219125	32 (14.5)
4	208	1-3 ³	11.7	208/240	208	1	1/40	1,650	410 (697)	880 (268.2)	31 (17.2)	12 (3.7)	8 (2.4)	HVH-04-83-34	S	219133	32 (14.5)
3/4	208/240	1-1	17.2 ²	N/A	240	1	1/40	1,650	410 (697)	880 (268.2)	31 (17.2)	12 (3.7)	8 (2.4)	HVH-04-21-00	S	219141	32 (14.5)
3/4	208/240	1-3	10.2 ²	208/240	240	1	1/40	1,650	410 (697)	880 (268.2)	31 (17.2)	12 (3.7)	8 (2.4)	HVH-04-23-34	S	219150	32 (14.5)
4	277	1-1	14.6	N/A	277	1	1/30	1,550	360 (612)	770 (234.7)	35 (19.4)	12 (3.7)	8 (2.4)	HVH-04-71-00	S	219168	32 (14.5)
4	480	1-3	5.1	24	480	1	1/35	1,550	380 (646)	815 (248.4)	33 (18.3)	12 (3.7)	8 (2.4)	HVH-04-43-30	S	219176	32 (14.5)
5	208	1-1	24.6	N/A	208	1	1/40	1,650	410 (697)	880 (268.2)	39 (21.7)	12 (3.7)	8 (2.4)	HVH-05-81-00	S	219184	32 (14.5)
5	208	1-3 ³	14.5	208/240	208	1	1/40	1,650	410 (697)	880 (268.2)	39 (21.7)	12 (3.7)	8 (2.4)	HVH-05-83-34	S	219192	32 (14.5)
3.75/5	208/240	1-1	21.4	N/A	240	1	1/40	1,650	410 (697)	880 (268.2)	39 (21.7)	12 (3.7)	8 (2.4)	HVH-05-21-00	S	219205	32 (14.5)
3.75/5	208/240	1-3 ³	12.6	208/240	240	1	1/40	1,650	410 (697)	880 (268.2)	39 (21.7)	12 (3.7)	8 (2.4)	HVH-05-23-34	S	219213	32 (14.5)
5	277	1-1	18.3	N/A	277	1	1/30	1,550	360 (612)	770 (234.7)	44 (24.4)	12 (3.7)	8 (2.4)	HVH-05-71-00	S	219221	32 (14.5)
5	480	1-3	6.3	24	480	1	1/35	1,550	380 (646)	815 (248.4)	42 (23.3)	12 (3.7)	8 (2.4)	HVH-05-43-30	S	219230	32 (14.5)
7.5	208	1-1 ³	36.5	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-81-34	S	219248	50 (22.7)
7.5	208	1-3	21.3	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-83-34	S	219256	50 (22.7)
5.6/7.5	208/240	1-1 ³	31.7 ²	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-21-34	S	219264	50 (22.7)
5.6/7.5	208/240	1	18.5 ²	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-23-34	S	219272	50 (22.7)
7.5	277	1-1	27.7	24	277	1	1/15	1,550	750 (1274)	920 (280.4)	32 (17.8)	27 (8.2)	8 (2.4)	HVH-07-71-30	S	219280	50 (22.7)
7.5	480	1-3	9.9	24	480	3	1/15	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-43-30	S	219299	50 (22.7)
7.5	600	1-3	7.6	24	575	3	1/3	1,725	850 (1444)	1040 (317.0)	28 (15.6)	27 (8.2)	8 (2.4)	HVH-07-63-30	NS	—	50 (22.7)
9.7	208	1-1 ³	47.1	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-81-34	S	219301	50 (22.7)
9.7	208	1-3	27.4	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-83-34	S	219310	50 (22.7)
7.5/10	208/240	1-1 ³	42.1 ²	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-21-34	S	219328	50 (22.7)
7.5/10	208/240	1-3	24.5 ²	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-23-34	S	219336	50 (22.7)
10	480	1-3	12.9	24	480	3	1/15	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-43-30	S	219344	50 (22.7)
10	600	1-3	10.6	24	575	3	1/3	1,725	850 (1444)	1040 (317.0)	37 (20.6)	27 (8.2)	9 (2.7)	HVH-10-63-30	NS	—	50 (22.7)
12.5	208	1-3	35.2	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	47 (26.1)	27 (8.2)	9 (2.7)	HVH-12-83-34	S	219352	50 (22.7)
9.3/12.5	208/240	1-3	30.6	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	47 (26.1)	27 (8.2)	9 (2.7)	HVH-12-23-34	S	219360	50 (22.7)
12.5	480	1-3	15.9	24	480	3	1/15	1,725	850 (1444)	1040 (317.0)	47 (26.1)	27 (8.2)	9 (2.7)	HVH-12-43-30	S	219379	50 (22.7)
12.5	600	1-3	12.6	24	575	3	1/3	1,725	850 (1444)	1040 (317.0)	47 (26.1)	27 (8.2)	9 (2.7)	HVH-12-63-30	NS	—	50 (22.7)
15	208	1-3	42.1	208/240	208	1	1/15	1,725	850 (1444)	1040 (317.0)	56 (31.1)	27 (8.2)	10 (3.0)	HVH-15-83-34	S	219387	50 (22.7)
11.25/15	208/240	1-3	36.6 ²	208/240	240	1	1/15	1,725	850 (1444)	1040 (317.0)	56 (31.1)	27 (8.2)	10 (3.0)	HVH-15-23-34	S	219395	50 (22.7)
15	480	1-3	19.0	24	480	3	1/15	1,725	850 (1444)	1040 (317.0)	56 (31.1)	27 (8.2)	10 (3.0)	HVH-15-43-30	S	219408	50 (22.7)
15	600	1-3	15.6	24	575	3	1/3	1,725	850 (1444)	1040 (317.0)	56 (31.1)	27 (8.2)	10 (3.0)	HVH-15-63-30	NS	—	50 (22.7)
14.7/19.8	208/240	1-3	47.7	24	240	3	1/3	1,725	1500 (2549)	1750 (533.4)	49 (27.2)	27 (8.2)	13 (4.0)	HVH-20-23-30	NS	219563	65 (29.5)
19.8	480	1-3	23.9	24	480	3	1/3	1,725	1500 (2549)	1750 (533.4)	49 (27.2)	27 (8.2)	13 (4.0)	HVH-20-43-30	NS	219571	65 (29.5)
19.8	600	1-3	19.4	24	575	3	1/3	1,725	1500 (2549)	1750 (533.4)	49 (27.2)	27 (8.2)	13 (4.0)	HVH-20-63-30	NS	219580	65 (29.5)
18.7/24.9	208/240	1-3	60.1	24	240	3	1/3	1,725	2500 (4248)	1650 (502.9)	27 (15.0)	36 (11.0)	13 (4.0)	HVH-25-23-30	NS	219598	90 (40.9)
25.0	480	1-3	30.2	24	480	3	1/3	1,725	2500 (4248)	1650 (502.9)	27 (15.0)	36 (11.0)	13 (4.0)	HVH-25-43-30	NS	219600	90 (40.9)
25.0	600	1-3	24.3	24	575	3	1/3	1,725	2500 (4248)	1650 (502.9)	27 (15.0)	36 (11.0)	13 (4.0)	HVH-25-63-30	NS	219619	90 (40.9)
22.4/29.9	208/240	1-3	72	24	240	3	1/3	1,725	2500 (4248)	1650 (502.9)	34 (18.9)	36 (11.0)	13 (4.0)	HVH-30-23-30	NS	219627	90 (40.9)
30.0	480	1-3	36.2	24	480	3	1/3	1,725	2500 (4248)	1650 (502.9)	34 (18.9)	36 (11.0)	13 (4.0)	HVH-30-43-30	NS	219635	90 (40.9)
30.0	600	1-3	29	24	575	3	1/3	1,725	2500 (4248)	1650 (502.9)	34 (18.9)	36 (11.0)	13 (4.0)	HVH-30-63-30	NS	219643	90 (40.9)
25.6/34.0	208/240	1-3	82.1	24	240	3	1/3	1,725	3100 (5267)	2100 (640.1)	40 (22.2)	36 (11.0)	13 (4.0)	HVH-35-23-30	NS	219651	90 (40.9)
34.0	480	1-3	41.1	24	480	3	1/3	1,725	3100 (5267)	2100 (640.1)	40 (22.2)	36 (11.0)	13 (4.0)	HVH-35-43-30	NS	219660	90 (40.9)
34.2	600	1-3	33	24	575	3	1/3	1,725	3100 (5267)	2100 (640.1)	40 (22.2)	36 (11.0)	13 (4.0)	HVH-35-63-30	NS	219678	90 (40.9)
28.1/37.4	208/240	1-3	90.1	24	240	3	1/3	1,725	3100 (5267)	2100 (640.1)	45 (25.0)	36 (11.0)	16 (4.9)	HVH-40-23-30	NS	219686	100 (45.5)
37.4	480	1-3	45.1	24	480	3	1/3	1,725	3100 (5267)	2100 (640.1)	45 (25.0)	36 (11.0)	16 (4.9)	HVH-40-43-30	NS	219694	100 (45.5)
37.5	600	1-3	36.2	24	575	3	1/3	1,725	3100 (5267)	2100 (640.1)	45 (25.0)	36 (11.0)	16 (4.9)	HVH-40-63-30	NS	219707	100 (45.5)
33.7/44.8	208/240	1-3	108	24	240	3	1/3	1,725	3100 (5267)	2100 (640.1)	51 (28.3)	36 (11.0)	16 (4.9)	HVH-45-23-30	NS	219715	100 (45.5)
44.8	480	1-3	54	24	480	3	1/3	1,725	3100 (5267)	2100 (640.1)	51 (28.3)	36 (11.0)	16 (4.9)	HVH-45-43-30	NS	219723	100 (45.5)
45.2	600	1-3	43.6	24	575	3	1/3	1,725	3100 (5267)	2100 (640.1)	51 (28.3)	36 (11.0)	16 (4.9)	HVH-45-63-30	NS	219731	100 (45.5)
38.4/51.1	208/240	1-3	123.1	24	240	3	1/3	1,725	3100 (5267)	2100 (640.1)	57 (31.7)	36 (11.0)	16 (4.9)	HVH-50-23-30	NS	219740	100 (45.5)
51.1	480	1-3	61.6	24	480	3	1/3	1,725	3100 (5267)	2100 (640.1)	57 (31.7)	36 (11.0)	16 (4.9)	HVH-50-43-30	NS	219758	100 (45.5)
51.3	600	1-3	49.5	24	575	3	1/3	1,725	3100 (5267)	2100 (640.1)	57 (31.7)	36 (11.0)	16 (4.9)	HVH-50-63-30	NS	219766	100 (45.5)

Stock Status: S = Stock NS = Non-Stock.
To order specify model, PCN, kW, volts, phase and quantity.

- For motor data, see table.
- 208V amperage is 86% of 240V value.
- Models can be field wired for 1 or 3 phase.
- Includes motor amps.
- Max. mounting height for effective heat distribution. Min. height is 7 ft.

Other Notes:

- All heaters have built-in contactors except 2.6 kW thru 5 kW single phase models, and stock 480V models have built-in control transformers and contactors with 24V holding coils. Stock 208V and 240V, 3 phase models, 4 kW through 15 kW, have 208/240V holding coils while stock 208V and 240V 3 phase models above 15 kW have 24V holding coils. All stock 277V models have 277V holding coils.
- Optional contactors holding coil voltages of 24V or 120V and control voltage transformers, are available as made-to-order models for all heater ratings.

HVH Horizontal or Vertical Discharge Fan Forced Unit Heater (*cont'd.*)

Recommended Control Options

Heater		Field Installed Options																Factory Installed Options		
		Wall Bracket Options				Ceiling Bracket Options				Outlet Screen Options			Ther-mostat Options	Disconnect Options			Fan Switch Options			
Model No.	PCN	HVVW-1 219416	HVVW-2 219424	HVVW-3 219782	HVVW-4 219820	HVC-1 219432	HVC-2 219440	HVC-3 219811	HVC-4 219838	HVS-1 219459	HVS-2 219467	HVS-3 219774	TK-5 219475	HDS-1 219491	HDS-2 219790	HDS-3 219803	HVF-01 219504	HVF-02 219512	HFD-1 ^A	PL-1 ^B
HVH-02-81-00	219096	X				X				X				X						X
HVH-02-21-00	219109	X				X				X				X						X
HVH-02-71-00	219117	X				X				X				X						
HVH-04-81-00	219125	X				X				X				X						X
HVH-04-83-34	219133	X				X				X			X	X			X		X	X
HVH-04-21-00	219141	X				X				X				X						X
HVH-04-23-34	219150	X				X				X			X	X			X		X	X
HVH-04-71-00	219168	X				X				X				X						X
HVH-04-43-30	219176	X				X				X			X	X			X		X	X
HVH-05-81-00	219184	X				X				X				X						X
HVH-05-83-34	219192	X				X				X			X	X			X			X
HVH-05-21-00	219205	X				X				X				X						X
HVH-05-23-34	219213	X				X				X			X	X			X			X
HVH-05-71-00	219221	X				X				X				X						
HVH-05-43-30	219230	X				X				X			X	X			X		X	X
HVH-07-81-34	219248		X				X				X		X	X			X			X
HVH-07-83-34	219256		X				X				X		X	X			X			X
HVH-07-21-34	219264		X				X				X		X	X			X			X
HVH-07-23-34	219272		X				X				X		X	X			X			X
HVH-07-71-30	219280		X				X				X		X	X			X			
HVH-07-43-30	219299		X				X				X		X	X			X	X	X	X
HVH-10-81-34	219301		X				X				X		X	X			X			X
HVH-10-83-34	319310		X				X				X		X	X			X			X
HVH-10-21-34	219328		X				X				X		X	X			X			X
HVH-10-23-34	219336		X				X				X		X	X			X			X
HVH-10-43-30	219344		X				X				X		X	X			X	X	X	X
HVH-12-83-34	219352		X				X				X		X	X			X			X
HVH-12-23-34	219360		X				X				X		X	X			X			X
HVH-12-43-30	219379		X				X				X		X	X			X	X	X	X
HVH-15-83-34	219387		X				X				X		X	X			X			X
HVH-15-23-34	219395		X				X				X		X	X			X			X
HVH-15-43-30	219408		X				X				X		X	X			X	X	X	X
HVH-20-23-30	219563			X				X			X		X	X			X			X
HVH-20-43-30	219571			X				X			X		X	X			X			X
HVH-20-63-30	219580			X				X			X		X	X			X			X
HVH-25-23-30	219598				X				X			X	X		X		X		X	X
HVH-25-43-30	219600				X				X			X	X	X			X		X	X
HVH-25-63-30	219619				X				X			X	X	X			X		X	X
HVH-30-23-30	219627				X				X			X	X			X	X		X	X
HVH-30-43-30	219635				X				X			X	X	X			X		X	X
HVH-30-63-30	219643				X				X			X	X	X			X		X	X
HVH-35-23-30 ^C	219651				X				X			X	X				X		X	X
HVH-35-43-30	219660				X				X			X	X	X			X		X	X
HVH-35-63-30	219678				X				X			X	X	X			X		X	X
HVH-40-23-30 ^C	219686				X				X			X	X				X		X	X
HVH-40-43-30	219694				X				X			X	X	X			X		X	X
HVH-40-63-30	219707				X				X			X	X	X			X		X	X
HVH-45-23-30 ^C	219715				X				X			X	X				X		X	X
HVH-45-43-30	219723				X				X			X	X		X		X		X	X
HVH-45-63-30	219731				X				X			X	X		X		X		X	X
HVH-50-23-30 ^C	219740				X				X			X	X				X		X	X
HVH-50-43-30	219758				X				X			X	X		X		X		X	X
HVH-50-63-30	219766				X				X			X	X		X		X		X	X

Notes:

- A. HFD-1 is a fan delay on / fan delay off. Fan delay is standard on heaters 20 kW and above
- B. PL-1 is a green pilot indicating power to heater
- C. Factory installed disconnect switch not available
- D. Field installed thermostat kits not available on models with control code 00.

HVH Horizontal or Vertical Discharge Fan Forced Unit Heater (*cont'd.*)

When ordering HVH heaters, specify the model number and corresponding PCN (Product Code Number). If controls (thermostat, fan switch, transformer, disconnect) or other options are required, designate these options in the model number when ordering, as shown below. Always specify voltage, phase and kW by listing them on the purchase order specifications.

HVH Horizontal or Vertical Discharge Blower Heater											
kW											
02	2.6 kW	20	19.8 kW								
04	4.0 k W	25	25.0 kW								
05	5.0 kW	30	30.0 kW								
07	7.5 kW	35	33.3 kW								
10	10.0 kW	40	37.5 kW								
12	12.5 kW	45	45.0 kW								
15	15.0 kW	50	50.0 kW								
Volts											
2	240V										
4	480V										
6	600V										
7	277V										
8	208V										
A	220V										
B	380V										
C	400V										
D	415V										
Phase											
1	1										
3	3										
Control											
00	No Contactor										
30	Contactor with 24V Transformer										
31	Contactor with 24V Externally Supplied										
32	Contactor with 120V Transformer										
33	Contactor with 120V Externally Supplied										
34	Contactor with 208/240V Internally Supplied										
35	Contactor with 277V Internally Supplied										
Integral Thermostat											
0	None										
TL	40-100°F Range (4° to 38°C)										
Disconnect Switch											
0	None										
D	Yes										
Fan Only Switch											
00	None										
FI	Internal (In Heater)										
FE	External (On Wall)										
Time Delay (Standard on 20kW and above)											
0	None										
R	Yes										
Pilot Light											
0	None										
P	Yes										
Outlet Screen											
0	None										
S	Yes										
HVH	05	2	1	34	TL	D	FI	-0	-0	-0	Typical Model Number

Note: 20-50 kW models available in 208/240, 480, and 600 V only.
Units with thermostats must include built-in contactor.

LUH Horizontal Blower Heater



INDUSTRIAL
UNIT HEATERS &
ACCESSORIES

- 2.6 - 45 kW
- 8,900 - 153,000 Btuh
- 208, 240, 277, 480 and 600 Volt
- 1 or 3 Phase
- Wall or Ceiling Mounted Configurations

Description

Type LUH self-contained heater provides quiet, reliable fan-forced heating in all types of commercial and industrial applications.

Applications

- Shipping and Receiving Areas
- Pump Houses
- Power Generating Stations
- Aircraft Hangers
- Factories
- Warehouses
- Garages

Construction

Die Formed Cabinet — Heavy 18 gauge steel, phosphate undercoated for corrosion resistance and finished in almond polyester powder coat.

Louvers — Individually adjustable louvers direct air flow up or down as needed.

Fintube Heating Elements have corrosion resistant steel fins that are furnace brazed to the tubular element to assure long life and superior heat transfer.



Fan Motor — Totally enclosed fan motor is rated for continuous duty with built-in thermal cutout and operates on same voltage as the heating circuit.

Dynamically Balanced Fan is attached with rubber vibration insulators for smooth, quiet operation. Blade pitch is carefully selected so that the volume of air moved results in the optimum discharge air temperature.

Features

- **Sub-divided Circuits with Individual Fuse Protection** — Standard on all heaters with a total current draw of 48 Amps or greater. The fuse compartment is conveniently located for easy access.
- **Integral 120V Control Transformer** — Standard on 480V models, eliminates the need for an external control source (24V optional).
- **Heavy Duty Magnetic Contactors** are standard on all models.
- **Thermal Cutouts** open the control circuit and disconnect power to the heating elements if overheating occurs. **Automatic Reset** allows the control circuit to reclose and restore power when temperature returns to normal.
- **Field Convertible** — Combination 208/240V and 1 or 3 phase operation through 10 kW.
- **Mounting Configurations** — Recessed welded fasteners on top of the heater cabinet are internally threaded for suspension of unit with threaded rods. Ceiling and Universal Wall Swivel brackets are optional. The ceiling bracket lets you mount heater directly to ceiling or over-head member, simply and easily. The swivel mounting allows you to readily adjust the direction of warm air flow for maximum comfort up to 180 degrees.

Optional Features (Factory Installed or Field Installation Kits)

- **Summer Fan Switch Kit** — Field installable for circulating warm stratified air. Available for all models.
- **Thermostat Kit** — Field installable on all models. Range 40°F - 100°F.
- **Power Disconnect Kit** — Field installable switch enables power to be disconnected while servicing heater. 63, 80 and 100 Amp models available. Mounts in the back of the heater.
- **Ceiling Bracket** (shown above)
- **Wall Mounting Bracket**

Advantages

- Self Contained
- Versatile, Flexible and High Performance
- Easy Installation
- Minimum Maintenance
- Long Life
- Attractive Appearance

Because it has individually adjustable discharge louvers to direct air flow, and can be wall or ceiling (plus swivel) mounted, the LUH heater may be used in a variety of heating applications:

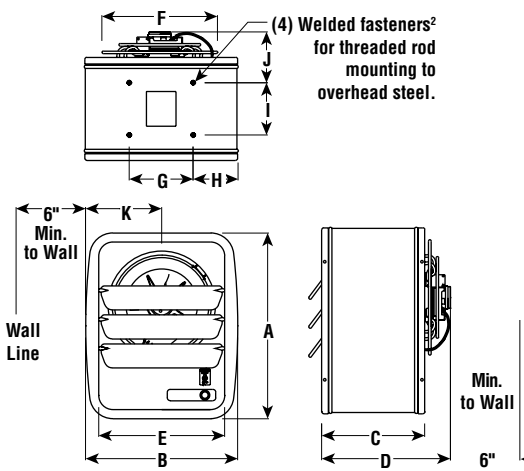
- Primary Heating
- Supplementary Heating
- Dual System Heating
- Spot Heating
- Entryway Air-Curtain Heating

Refer to
WR-80, RTC, WR-90
in the Controls section.

LUH

Horizontal Blower Heater (cont'd.)

Dimensions (Inches)

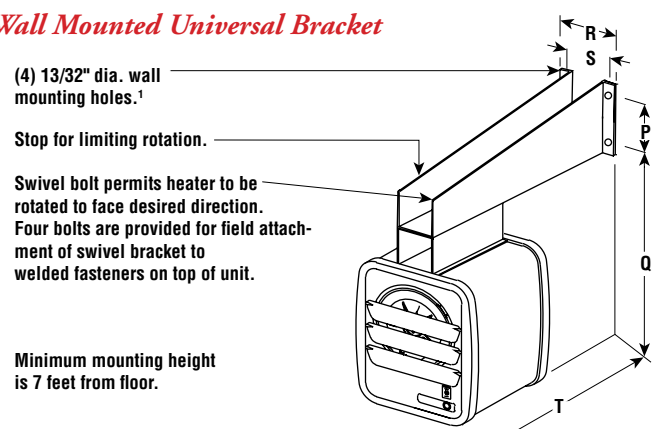


(4) Welded fasteners² for threaded rod mounting to overhead steel.

6" Min. to Wall

Min. to Wall 6"

Wall Mounted Universal Bracket



(4) 13/32" dia. wall mounting holes.¹

Stop for limiting rotation.

Swivel bolt permits heater to be rotated to face desired direction. Four bolts are provided for field attachment of swivel bracket to welded fasteners on top of unit.

Minimum mounting height is 7 feet from floor.

Wall Mounted Heaters

Heater	Dimensions (In.)					Wall Bracket	PCN	Stock	Wt. (Lbs.)
	P	Q	R	S	T				
LUH-02 to -05	1-3/4	21-1/2	6-3/4	5-1/2	14-15/16	WUH-01A	303474	S	3
LUH-07, 10, 12, 15	2	28-7/16	9-1/2	8-3/8	22-1/4	WUH-02	300484	S	5
LUH-20, 25	2	32	9-1/2	8-3/8	22-1/4	WUH-02	300484	S	7
LUH-30, 35, 40, 45	5-1/2	28-11/16	5	3-1/2	33-1/4	WUH-03	300492	S	10

Ceiling Mounted Heaters

Heater	Dimensions (In.)																Ceiling Bracket	PCN	Stock	Wt. (Lbs.)
	A	B	C	D	E	F	G	H	I	J	K	M	N	U	V	W				
LUH-02 to -05	16	13-1/8	8-7/8	11-5/8	10-3/4	9-3/4	5-1/2	3-13/16	4-1/2	4-15/16	6-5/8	6	4-7/16	4	4-1/2	10-1/2	WUH-04A	303466	NS	1
LUH-07, 10, 12, 15	20-1/2	17-1/4	11-1/2	16-3/8	14-3/8	12-3/8	8-1/4	4-1/2	6-1/4	7-7/16	8-5/8	8	6-1/4	6	7-1/4	16	WUH-05	300513	NS	2
LUH-20, 25	24	20-1/8	11-1/2	20-1/2	16-3/4	16	8-1/4	6	6-1/4	12	10-1/16	8	6-1/4	6	7-1/4	16	WUH-05	300513	NS	3
LUH-30, 35, 40, 45	24	20-1/8	17	26	16-3/4	16	8-1/4	6	11-3/4	12	10-1/16	13-3/4	9-5/16	6	7-1/4	21	WUH-06	300521	NS	3

Notes

1. Wall mounting fasteners to be supplied by customer.
2. Threaded rod to be supplied by customer.

Optional Control Accessories & Remote Thermostats Fan Only Operation Kits



Summer Fan Switch

Thermostat Kit

Note — A fan only operation (optional) is available by means of a built-in switch or by external control.

Summer Fan Switch	2 - 15 kW		20 - 45 kW		Stock	Wt. (Lbs.)
	Model	PCN	Model	PCN		
Internal 208 - 277V	ISFS-02 ²	305007	ISFS-02	305007	NS	0.25
External ¹ with Relay (24V control)	ESFS-40	305015	ESFS-40A	305058	NS	0.5
External ¹ with Relay (120V control)	ESFS-41	305023	ESFS-41A	305066	NS	0.5
External ¹ with Relay (240V control)	ESFS-42	305031	ESFS-42A	305074	NS	0.5
External ¹ with Relay (277V control)	ESFS-47	305040	—	—	NS	0.5

1. Kit includes wall plate (discard plate if switch is to be installed on heater).
2. Do not use for 480V rated heaters. 480V heaters require fan relay option with proper control voltage relay coil.

Thermostat Kits

Model	PCN	Stock	Wt. (Lbs.)
LUH-TK1 (SPST)	301129	S	0.25

Power Disconnect Kits



Model	Rating	PCN	Stock	Wt. (Lbs.)
EDS-1	63 Amp	303431	S	0.5
EDS-2	80 Amp	303440	S	0.5
EDS-3	100 Amp	303458	NS	1

3 Pole, 600V Rating

Mounting Limitations

Hazardous Atmosphere — Unit heaters should not be used in potentially explosive atmospheres. **Corrosive Atmosphere** — The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of greenhouses, swimming pools, chemical storage bins, etc. **Mounting Height** — Do not install unit heaters above recommended maximum mounting height. **Obstructions** must not block unit heater air inlet or discharge.

LUH Horizontal Blower Heater (cont'd.)

Specifications and Ordering Information

Electrical (60 Hz)				Motor				CFM	Air Delivery				Mtg. ⁵ Height (Ft.)	Ordering			
kW	Volts	Ckt & Phase	Amps ⁴	Volts	Phase	HP	RPM		FPM	Temp. Rise (°F)	Horiz. Throw (Ft.)	Model		Stock	PCN	Wt. (Lbs.)	
2.6	208	1 - 1	13.1	208	1	1/40	1,650	410	880	21	12	8	LUH-02-81-34	S	303001	32	
2.0/2.6	208/240	1 - 1	11.4 ²	240	1	1/40	1,650	410	880	21	12	8	LUH-02-21-34	S	303010	32	
2.6	277	1 - 1	9.6	277	1	1/30	1,550	360	770	24	12	8	LUH-02-71-35	S	303028	32	
4	208	1 - 1	19.8	208	1	1/40	1,650	410	880	31	12	8	LUH-04-81-34	S	303036	32	
4	208	1 - 3 ³	11.7	208	1	1/40	1,650	410	880	31	12	8	LUH-04-83-34	S	303044	32	
3/4	208/240	1 - 1	17.2 ²	240	1	1/40	1,650	410	880	31	12	8	LUH-04-21-34	S	303052	32	
3/4	208/240	1 - 3 ³	10.2 ²	240	1	1/40	1,650	410	880	31	12	8	LUH-04-23-34	S	303060	32	
4	277	1 - 1	14.6	277	1	1/30	1,550	360	770	35	12	8	LUH-04-71-35	S	303079	32	
4	480	1 - 3	5.1	480	1	1/35	1,550	380	815	33	12	8	LUH-04-43-32	S	303087	32	
5	208	1 - 1	24.6	208	1	1/40	1,650	410	880	39	12	8	LUH-05-81-34	S	303095	32	
5	208	1 - 3 ³	14.5	208	1	1/40	1,650	410	880	39	12	8	LUH-05-83-34	S	303108	32	
3.75/5	208/240	1 - 1	21.4	240	1	1/40	1,650	410	880	39	12	8	LUH-05-21-34	S	303116	32	
3.75/5	208/240	1 - 3 ³	12.6	240	1	1/40	1,650	410	880	39	12	8	LUH-05-23-34	NS	303124	32	
5	277	1 - 1	18.3	277	1	1/30	1,550	360	770	44	12	8	LUH-05-71-35	NS	303132	32	
5	480	1 - 3	6.3	480	1	1/35	1,550	380	815	42	12	8	LUH-05-43-32	S	303140	32	
7.5	208	1 - 1 ³	36.5	208	1	1/15	1,725	850	1,040	28	27	8	LUH-07-81-34	NS	303159	50	
7.5	208	1 - 3	21.3	208	1	1/15	1,275	850	1,040	28	27	8	LUH-07-83-34	S	303167	50	
5.6/7.5	208/240	1 - 1 ³	31.7 ²	240	1	1/15	1,725	850	1,040	28	27	8	LUH-07-21-34	S	303175	50	
5.6/7.5	208/240	1 - 3	18.5 ²	240	1	1/15	1,725	850	1,040	28	27	8	LUH-07-23-34	NS	303183	50	
7.5	277	1 - 1	27.7	277	1	1/15	1,550	750	920	32	27	8	LUH-07-71-35	NS	303191	50	
7.5	480	1 - 3	9.9	480	3	1/15	1,725	850	1,040	28	27	8	LUH-07-43-32	S	303204	50	
7.5	600	1 - 3	7.6	575	3	1/3	1,725	850	1,040	28	27	8	LUH-07-63-32	NS	—	50	
9.7	208	1 - 1 ³	47.1	208	1	1/15	1,725	850	1,040	37	27	9	LUH-10-81-34	NS	303212	50	
9.7	208	1 - 3	27.4	208	1	1/15	1,725	850	1,040	37	27	9	LUH-10-83-34	S	303220	50	
7.5/10	208/240	1 - 1 ³	42.1 ²	240	1	1/15	1,725	850	1,040	37	27	9	LUH-10-21-34	S	303239	50	
7.5/10	208/240	1 - 3	24.5 ²	240	1	1/15	1,725	850	1,040	37	27	9	LUH-10-23-34	NS	303247	50	
10	480	1 - 3	12.9	480	3	1/15	1,725	850	1,040	37	27	9	LUH-10-43-32	S	303255	50	
10	600	1 - 3	10.6	575	3	1/3	1,725	850	1,040	37	27	9	LUH-10-63-32	NS	—	50	
12.5	208	1 - 3	35.2	208	1	1/15	1,725	850	1,040	47	27	9	LUH-12-83-34	S	303263	50	
9.3/12.5	208/240	1 - 3	30.6	240	1	1/15	1,725	850	1,040	47	27	9	LUH-12-23-34	NS	303271	50	
12.5	480	1 - 3	15.9	480	3	1/15	1,725	850	1,040	47	27	9	LUH-12-43-32	S	303280	50	
12.5	600	1 - 3	12.6	575	3	1/3	1,725	850	1,040	47	27	9	LUH-12-63-32	NS	—	50	
15	208	1 - 3	42.1	208	1	1/15	1,725	850	1,040	56	27	10	LUH-15-83-34	NS	303298	50	
11.25/15	208/240	1 - 3	36.6 ²	240	1	1/15	1,725	850	1,040	56	27	10	LUH-15-23-34	NS	303300	50	
15	480	1 - 3	19.0	480	3	1/15	1,725	850	1,040	56	27	10	LUH-15-43-32	S	303319	50	
15	600	1 - 3	15.6	575	3	1/3	1,725	850	1,040	56	27	10	LUH-15-63-32	NS	—	50	
14.5/19.4	208/240	1 - 3	48.0 ²	240	3	1/3	1,725	1,240	1,160	53	31	11	LUH-20-23-34	NS	303327	73	
20	480	1 - 3	25.0	480	3	1/3	1,725	1,240	1,160	53	31	11	LUH-20-43-32	S	303335	73	
20	600	1 - 3	19.6	575	3	1/3	1,725	1,240	1,160	53	31	11	LUH-20-63-32	NS	—	73	
25	480	1 - 3	31.0	480	3	1/3	1,725	1,350	1,260	60	31	12	LUH-25-43-32	S	303343	73	
25	600	1 - 3	24.6	575	3	1/3	1,725	1,350	1,260	60	31	12	LUH-25-63-32	NS	—	73	
30	208	2 - 3	85.2	240	3	1/3	1,725	1,555	1,450	64	46	13	LUH-30-83-34	NS	303351	106	
22.5/30	208/240	2 - 3	74.0 ²	240	3	1/3	1,725	1,555	1,450	64	46	13	LUH-30-23-34	NS	303360	106	
30	480	2 - 3	37.1	480	3	1/3	1,725	1,555	1,450	64	46	13	LUH-30-43-32	S	303378	106	
30	600	2 - 3	29.6	575	3	1/3	1,725	1,555	1,450	64	46	13	LUH-30-63-32	NS	—	106	
26.25/35	208/240	2 - 3	86.0 ²	240	3	1/3	1,725	1,555	1,450	71	45	14	LUH-35-23-34	NS	303386	106	
35	480	2 - 3	43.1	480	3	1/3	1,725	1,555	1,450	71	45	14	LUH-35-43-32	S	303394	106	
35	600	2 - 3	34.7	575	3	1/3	1,725	1,555	1,450	71	45	14	LUH-35-63-32	NS	—	106	
28.5/38	208/240	2 - 3	93.3	240	3	1/3	1,725	1,555	1,450	84	44	15	LUH-40-23-34	NS	303407	106	
39	480	2 - 3	47.9	480	3	1/3	1,725	1,555	1,450	84	44	15	LUH-40-43-32	S	303415	106	
40	600	2 - 3	39.7	575	3	1/3	1,725	1,555	1,450	84	44	15	LUH-40-63-32	NS	—	106	
45	480	2 - 3	55.1	480	3	1/3	1,725	1,555	1,450	94	42	17	LUH-45-43-32	S	303423	106	
45	600	2 - 3	43.7	575	3	1/3	1,725	1,555	1,450	94	42	17	LUH-45-63-32	NS	—	106	

Stock Status: S = stock NS = non-stock

To Order—Specify model, PCN, kW, volts, phase and quantity.

- For motor data, see table.
- 208V amperage is 86% of 240V value.
- Models can be field wired for 1 or 3 phase.
- Includes motor Amps.
- Maximum mounting height for effective heat distribution. Minimum height is 7 feet.

Other Notes —

- All heaters have built-in contactors and stock 480V models have built-in control transformers and contactor with 120V holding coils. All stock 208 and 240V models have 208/240V holding coils. All stock 277V models have 277V holding coils.
- Optional contactors available with 120 or 24V holding coils on made-to-order models, contact your Local Chromalox Sales office.
- When total heater capacity exceeds 48 Amps, built-in fusing is provided behind a hinged and latched door in the side which allows easy access.

LUH Horizontal Blower Heater (cont'd.)

Recommended Control Options

PCN	Description	Kits				PCN	Description	Kits			
		Thermostat	Fan Only	Remote Fan	Dis-connect			Thermostat	Fan Only	Remote Fan	Dis-connect
303001	LUH-02-81-34-00 208V 1P 2.6kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303220	LUH-10-83-34-00 208V 3P 10kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303010	LUH-02-21-34-00 240V 1P 2.6kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303239	LUH-10-21-34-00 240V 1P 10kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303028	LUH-02-71-35-00 277V 1P 2.6kW	LUH-TK1	ISFS-02	ESFS-47	EDS-1	303247	LUH-10-23-34-00 240V 3P 10kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303036	LUH-04-81-34-00 208V 1P 4kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303255	LUH-10-43-32-00 480V 3P 10kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1
303044	LUH-04-83-34-00 208V 3P 4kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303263	LUH-12-83-34-00 208V 3P 12.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303052	LUH-04-21-34-00 240V 1P 4kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303271	LUH-12-23-34-00 240V 3P 12.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303060	LUH-04-23-34-00 240V 3P 4kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303280	LUH-12-43-32-00 480V 3P 12.5kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1
303079	LUH-04-71-35-00 277V 1P 4kW	LUH-TK1	ISFS-02	ESFS-47	EDS-1	303298	LUH-15-83-34-00 208V 3P 15kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303087	LUH-04-43-32-00 480V 3P 4kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1	303300	LUH-15-23-34-00 240V 3P 15kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1
303095	LUH-05-81-34-00 208V 1P 5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303319	LUH-15-43-32-00 480V 3P 15kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1
303108	LUH-05-83-34-00 208V 3P 5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303327	LUH-20-23-34-00 240V 3P 20kW	LUH-TK1	ISFS-02	ESFS-42A	EDS-1
303116	LUH-05-21-34-00 240V 1P 5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303335	LUH-20-43-32-00 480V 3P 20kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-1
303124	LUH-05-23-34-00 240V 3P 5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303343	LUH-25-43-32-00 480V 3P 25kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-1
303132	LUH-05-71-35-00 277V 1P 5kW	LUH-TK1	ISFS-02	ESFS-47	EDS-1	303351	LUH-30-83-34-00 208V 3P 30kW	LUH-TK1	ISFS-02	ESFS-42A	N/A
303140	LUH-05-43-32-00 480V 3P 5kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1	303360	LUH-30-23-34-00 240V 3P 30kW	LUH-TK1	ISFS-02	ESFS-42A	EDS-3
303159	LUH-07-81-34-00 208V 1P 7.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303378	LUH-30-43-32-00 480V 3P 30kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-1
303167	LUH-07-83-34-00 208V 3P 7.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303386	LUH-35-23-34-00 240V 3P 35kW	LUH-TK1	ISFS-02	ESFS-42A	N/A
303175	LUH-07-21-34-00 240V 1P 7.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303394	LUH-35-43-32-00 480V 3P 35kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-1
303183	LUH-07-23-34-00 240V 3P 7.5kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1	303407	LUH-40-23-34-00 240V 3P 40kW	LUH-TK1	ISFS-02	ESFS-42A	N/A
303191	LUH-07-71-35-00 277V 1P 7.5kW	LUH-TK1	ISFS-02	ESFS-47	EDS-1	303415	LUH-40-43-32-00 480V 3P 40kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-2
303204	LUH-07-43-32-00 480V 3P 7.5kW	LUH-TK1	ESFS-41	ESFS-41	EDS-1	303423	LUH-45-43-32-00 480V 3P 45kW	LUH-TK1	ESFS-41A	ESFS-41A	EDS-2
303212	LUH-10-81-34-00 208V 1P 10kW	LUH-TK1	ISFS-02	ESFS-42	EDS-1						

When ordering LUH heaters, specify the model number and corresponding PCN (Product Code Number). If controls or thermostat/fan options are required, designate these options in the model number when ordering, as shown below. Always specify voltage, phase and kW by listing them on the purchase order product specifications.

Model Numbers

Chromalox Horizontal Unit Heater

Heating Elements

02 = 2.6 kW	10 = 10.0 kW	25 = 25.0 kW	45 = 45.0 kW
04 = 4.0 kW	12 = 12.5 kW	30 = 30.0 kW	
05 = 5.0 kW	15 = 15.0 kW	35 = 35.0 kW	
07 = 7.5 kW	20 = 20.0 kW	40 = 40.0 kW	

Heater Voltage and Phase

81 = 208V, 1 Phase	71 = 277V, 1 Phase
83 = 208V, 3 Phase	43 = 480V, 3 Phase
21 = 240V, 1 Phase	63 = 600V, 3 Phase
23 = 240V, 3 Phase	

Control

0 0	No Contactor(s)
3 0	24V Control Internal Transformer
3 1	24V Control Externally Supplied
3 2	120V Control Internal Transformer
3 3	120V Control Externally Supplied
3 4	208/240V Control Internally Supplied, No Transformer
3 5	277V Control Internally Supplied

Control

0 0	No Thermostat, No Summer Fan Switch
4 0	Internal Thermostat Only
4 1	Internal Therm. and Internal Sum. Fan Sw.
4 2	External Sum. Fan Sw. Only (Not 480V)
4 3	External Sum. Fan Sw. and Fan Relay (All Volts)
4 4	Rem. Fan Sw. and Internal Therm. (Not 480V)
4 5	Rem. Fan Sw., Fan Relay and Int. Therm. (All Volts)D, E, F, G
4 6	Internal Sum. Fan Sw. (Not 480 V)
4 7	Internal Sum. Fan Sw., Fan Relay (All Volts)

Disconnect Switch

1	63 Amp
2	80 Amp
3	100 Amp

LUH 05 21 34 41 1 Typical Model Number



UB High Capacity Horizontal Blower Heater

- 2 - 50 kW
- 6,820 - 170,600 Btuh
- 120, 208, 240, 277, 480 and 550 Volt
- 1 or 3 Phase
- Wall or Ceiling Mounted Configurations

Description

Rugged, industrial UB heaters are ideal for factories, warehouses, garages or any other area that requires a high volume of forced-air heat.

Applications

- Entryway Air-Curtain Heating
- Power Generating Stations
- Factories
- Freeze Protection of Machinery

Construction (2 - 50 kW models)

Painted Finish — For attractive appearance and corrosion resistance.

Cabinet — 16 gauge steel cabinet construction supported with an 18 gauge base assembly and finished in almond powder.

Louvers — Adjustable discharge grille to direct the air flow up or down.

Heavy Gauge Rear Wire Grille protects against accidental contact with rapidly rotating fan blade.



Metal Sheath Fintube® Heating Elements —

The electric heat bank - Chromalox patented metal sheath Fintube® heating elements. Heat radiation fins are corrosion-resistant copper-clad steel, furnace brazed to the tubular heating elements to assure superior heat transfer. Wide spacing prevents clogging. Air is evenly drawn across the circumferential elements preventing hot spots and prolonging element life.

Rugged Motor and Dynamically Balanced Fan provides a high volume of hot air.

Integral Automatic Reset Thermal Cutout for fast heat response and overheat protection.

Features (2 - 20 kW models)

Fan Only Operation — UB-23 and UB-32, (excluding the 120V UB-32), have a separate fan control switch for circulating air during summer months.

Totally Enclosed Fan Motor — Continuous duty with built-in automatic reset thermal overload protection operates on same voltage as supplied to the heater, except on 480 and 550 volt where motor is either 115 or 230 volts. All motors are single phase with sleeve bearings.

Heaters with model numbers having a suffix "T" include a transformer to stepdown the voltage for operating the fan motor.

External contactor is not necessary with heaters having a model number suffix "R".

Wall or Ceiling Mounting Brackets are available separately for field installation depending on mounting arrangement desired.

Features (25 - 50 kW models)

Universal Wall & Ceiling Mounting Bracket is included to provide flexibility in the mounting arrangement.

Fan Interlock — Fan motor contactor includes a set of auxiliary contacts to prevent heating elements from being energized unless contacts of fan motor contactor are closed.

Thermal Fan Delay allows fan motor to continue to operate after heating thermostat has been satisfied to maximize transfer of generated heat to space being heated and extend operating life of heating elements.

Built-in Controlling Contactors and Line Fusing — All heaters drawing 48 Amps or greater are sub-divided into two (2) circuits with built-in line fuses and controlling contactors. Units drawing less than 48 Amps have built-in contactors only, line fusing must be provided externally. All units regardless of amperage rating have built-in fuse protection for the motor and transformer.

Integral 120V Control Circuit — 120 volt power for the control circuit is provided from the unit mounted transformer to eliminate the need to run separate power to the unit for control.

Heavy Duty 1/3 HP Motor operates at 1,550 RPM on line voltage. Motor has built-in thermal overload protection, permanently lubricated ball bearings and factory installed line fuses for maximum trouble-free service life.

Advantages

- Low Maintenance
- High Capacity
- Primary Heating
- Supplementary Heating
- Dual System Heating
- Long Horizontal Air Throw
- Long Life

Refer to
WR-80, WR-90
in the Controls section.

UB

High Capacity Horizontal Blower Heater *(cont'd.)*

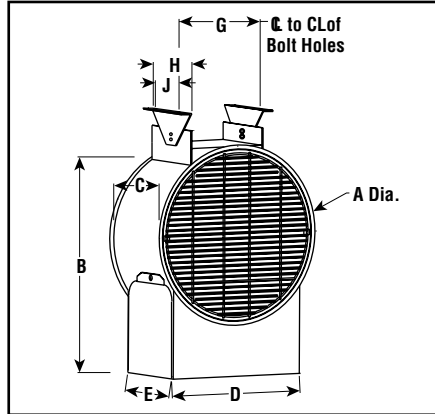
Mounting Kits

For 2 -20 kW Heaters - Order Separately

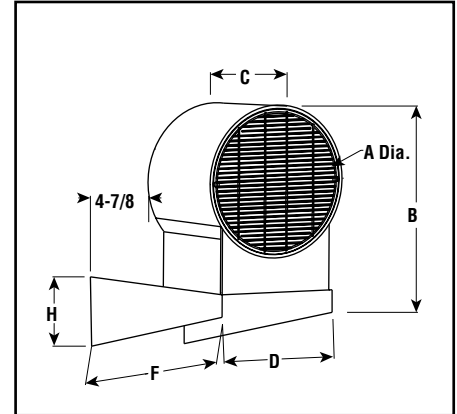
Heater	Model	PCN
Ceiling Mounting Brackets		
UB-23 and 32	1-44419	264330
UB-502 and 752	2-44419	264348
UB-1002, 1252, 1502 and 2002	3-44419	264356
Wall Mounting Brackets		
UB-23 and 32	WUB-1	264305
UB-502 and 752	WUB-3	264313
UB-1002, 1252, 1502 and 2002	WUB-4	264321

For 25 - 50 kW Heaters - a Universal Wall & Ceiling Mounting Bracket is included.

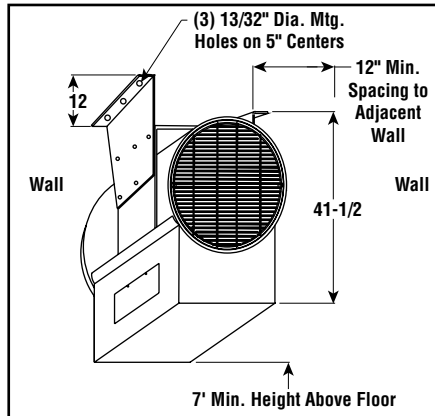
Ceiling Mounting Kit (2-20 kW) — Dimensions (Inches)



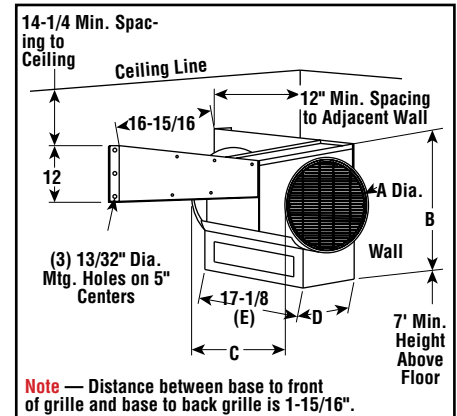
Wall Mounting Kit (2-20 kW) — Dimensions (Inches)



Ceiling Mounting Kit (25-50 kW) — Dimensions (Inches)



Wall Mounting Kit (25-50 kW) — Dimensions (Inches)



Dimensions (Inches)

Model	Dimensions (In.)								
	A	B	C	D	E	F	G	H	J
UB-23	10-3/8	13-1/2	8	6-7/16	3	11-3/8	9-7/16	6	4
UB-32	10-3/8	13-1/2	8	6-7/16	3	11-3/8	9-7/16	6	4
UB-502	13-5/8	17-3/16	13	8-7/16	7-9/16	15-9/16	11-7/8	8	6
UB-752	13-5/8	17-3/16	13	8-7/16	7-9/16	15-9/16	11-7/8	8	6
UB-1002	17-1/8	20-3/4	15-3/16	11-3/4	9-5/16	17-5/32	12-1/4	10	8
UB-1252	17-1/8	20-3/4	15-3/16	11-3/4	9-5/16	17-5/32	12-1/4	10	8
UB-1502	17-1/8	20-3/4	15-3/16	11-3/4	9-5/16	17-5/32	12-1/4	10	8
UB-2002	17-1/8	20-3/4	15-3/16	11-3/4	9-5/16	17-5/32	12-1/4	10	8
UB-2502	17-1/8	23-5/16	21	14	17-1/8	17-5/32	18-15/16	10	8
UB-3002	17-1/8	23-5/16	21	14	17-1/8	17-5/32	18-15/16	10	8
UB-3502	21-1/8	27-5/16	21	17-7/16	17-1/8	17-5/32	22-15/16	10	8
UB-4002	21-1/8	27-5/16	21	17-7/16	17-1/8	17-5/32	22-15/16	10	8
UB-4502	21-1/8	27-5/16	21	17-7/16	17-1/8	17-5/32	22-15/16	10	8
UB-5002	21-1/8	27-5/16	21	17-7/16	17-1/8	17-5/32	22-15/16	10	8

Industrial Air & Radiant Heaters

UB High Capacity Horizontal Blower Heater *(cont'd.)*

INDUSTRIAL
UNIT HEATERS &
ACCESSORIES

Electrical (60 Hz)				Motor				CFM	Air Delivery			Mtg. Height (Ft.)	Ordering			
kW	Volts	Phase	Amps	Volts	Phase	HP	RPM		FPM	Temp. Rise (°F)	Horiz. Throw (Ft.)		Model	Stock	PCN	Wt. (Lbs.)
2	120	1	16.7	115	1	1/15	1,550	316	657	21	10	8	UB-23	S	261403	13.5
2	208	1	9.6	208	1	1/15	1,550	316	657	21	10	8	UB-23	NS	261411	13.5
2	240	1	8.3	230	1	1/15	1,550	316	657	21	10	8	UB-23	NS	261420	13.5
3	120	1	25	115	1	1/15	1,550	316	657	31	10	8	UB-32	S	261438	13.5
3	208	1	14.4	208	1	1/15	1,550	316	657	31	10	8	UB-32	S	261446	13.5
3	240	1	12.5	230	1	1/15	1,550	316	657	31	10	8	UB-32	S	261454	13.5
5	120	1	41.7	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	261462	43
5	208	1	24	208	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	261489	43
5	240	1	20.8	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	261500	43
5	550 ¹	3	5.3	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	285368	43
5	240	1	20.8	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502R	NS	264250	43
5	550 ¹	3	5.3	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502	NS	266685	43
5	208	3	13.9	208	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	261497	43
5	240	3	12	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502D	NS	261518	43
5	240	3	12	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502R	NS	269755	43
5	480	1	10.4	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502	NS	261526	43
5	480	1	10.4	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502	NS	269114	43
5	480	3	6	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502	NS	261534	43
5	480	3	6	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502T	S	269704	51
5	480	3	6	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502	NS	265199	43
5	480	3	6	115	1	1/15	1,050	405	430	40	12-1/2	8	UB-502R	NS	264268	43
5	480	3	6	230	1	1/15	1,050	405	430	40	12-1/2	8	UB-502T	NS	264233	51
7.5	208	1	36.1	208	1	1/15	1,050	590	640	37	13	8	UB-752	NS	261569	43
7.5	208	3	20.8	208	1	1/15	1,050	590	640	37	13	8	UB-752D	NS	261577	43
7.5	240	1	31.3	230	1	1/15	1,050	590	640	37	13	8	UB-752D	NS	261585	43
7.5	240	3	18.1	230	1	1/15	1,050	590	640	37	13	8	UB-752D	NS	261593	43
7.5	240	3	18.1	230	1	1/15	1,050	590	640	37	13	8	UB-752R	NS	264276	43
7.5	480	1	15.6	115	1	1/15	1,050	590	640	37	13	8	UB-752	NS	261606	43
7.5	480	1	15.6	230	1	1/15	1,050	590	640	37	13	8	UB-752	NS	269122	43
7.5	480	3	9	115	1	1/15	1,050	590	640	37	13	8	UB-752	S	261614	43
7.5	480	3	9	230	1	1/15	1,050	590	640	37	13	8	UB-752	NS	265228	43
7.5	480	3	9	230	1	1/15	1,050	590	640	37	13	8	UB-752R	NS	264292	43
7.5	480	3	9	115	1	1/15	1,050	590	640	37	13	8	UB-752T	NS	265324	51
7.5	480	3	9	115	1	1/15	1,050	590	640	37	13	8	UB-752R	NS	264284	43
7.5	480	3	9	230	1	1/15	1,050	590	640	37	13	8	UB-752T	NS	264241	51
7.5	550 ¹	3	7.9	115	1	1/15	1,050	590	640	37	13	8	UB-752	NS	266693	43
7.5	550	3	7.9	230	1	1/15	1,050	590	640	37	13	8	UB-752	NS	285376	43
10	208 ¹	1	48.1	208	1	1/15	1,050	1,180	800	28	40	9	UB-1002E	NS	261622	48
10	208	3	27.8	208	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	261630	48
10	240	1	41.7	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	261649	48
10	240	3	24.1	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002E	NS	261657	48
10	480	1	20.1	115	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	261665	48
10	480	3	12	115	1	1/15	1,050	1,180	800	28	40	9	UB-1002E	NS	261673	48
10	480	1	20.8	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	265244	48
10	550 ¹	3	10.5	115	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	266706	48
10	480	3	12	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	265236	48
10	550 ¹	3	10.5	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002	NS	285350	48
10	480	3	12	115	1	1/15	1,050	1,180	800	28	40	9	UB-1002T	NS	277843	56
10	480	3	12	230	1	1/15	1,050	1,180	800	28	40	9	UB-1002T	NS	277851	56
12.5	208	3	34.7	208	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	261681	48
12.5	240 ¹	1	52.1	230	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	261690	48
12.5	240	3	30.1	230	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	261702	48
12.5	480	1	26	115	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	261710	48
12.5	480	1	26	230	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	265260	48
12.5	480	3	15.1	115	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	261729	48
12.5	480	3	15.1	230	1	1/15	1,050	1,180	800	36	40	9	UB-1252	NS	265252	48
15	208	3	41.7	208	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	261737	52
15	240 ¹	1	62.5	230	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	261745	52
15	240	3	36.1	230	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	261753	52
15	480	1	31.3	115	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	261761	52
15	480	1	31.3	230	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	265279	52
15	480	3	18.1	115	1	1/15	1,050	1,330	900	32	45	10	UB-1502	S	261770	52
15	480	3	18.1	230	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	265295	52
15	480	3	18.1	115	1	1/15	1,050	1,330	900	32	45	10	UB-1502E-T	S	266677	60
15	550 ¹	3	15.8	115	1	1/15	1,050	1,330	900	32	45	10	UB-1502	NS	264364	52
19.9	240	3	47.9	230	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	261809	52
20	480	1	41.7	115	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	261817	52
20	480	1	41.7	230	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	265287	52
20	480	3	24.1	115	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	261825	52
20	480	3	24.1	230	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	265308	52
20	480	3	24.1	115	1	1/15	1,050	1,330	900	42	45	11	UB-2002E-T	S	285384	60
20	550 ¹	3	21	115	1	1/15	1,050	1,330	900	42	45	11	UB-2002	NS	264372	52

UB High Capacity Horizontal Blower Heater *(cont'd.)*

Electrical (60 Hz)				Motor				CFM	Air Delivery			Mtg. Height (Ft.)	Ordering			
kW	Volts	Phase	Amps	Volts	Phase	HP	RPM		FPM	Temp. Rise (°F)	Horiz. Throw (Ft.)		Model	Stock	PCN	Wt. (Lbs.)
25	240	3	60.2	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332558	185
25	240	3	60.2	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332566	185
25	240	3	60.2	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332574	185
25	240	3	60.2	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332582	185
25	480	3	30.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332590	185
25	480	1	52.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332603	185
25	480	1	52.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332611	185
25	480	1	52.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332620	185
25	480	1	52.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332638	185
25	480	3	30.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332646	185
25	480	3	30.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332654	185
25	480	3	30.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332662	185
25	480	3	30.1	460	3	1/3	1,725	1,450	920	57	48	12	UB-2502	NS	332670	185
25	480	3	30.1	460	3	1/3	1,725	1,450	920	57	48	12	UB-2502	NS	332689	185
25	480	3	30.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332697	185
25	550	3	26.3	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332700	185
25	550	3	26.3	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332718	185
25	550	3	26.3	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332726	185
25	575	3	26.3	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332734	185
25	575	3	26.3	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332742	185
25	575	3	26.3	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332750	185
25	575	3	26.3	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332769	185
25	600	3	24.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332777	185
25	600	3	24.1	115	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332785	185
25	600	3	24.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332793	185
25	600	3	24.1	230	1	1/3	1,550	1,300	825	64	48	12	UB-2502	NS	332806	185
30	240	3	72.3	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332814	185
30	240	3	72.3	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332822	185
30	240	3	72.3	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332830	185
30	240	3	72.3	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332849	185
30	480	1	62.5	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332857	185
30	480	1	62.5	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332865	185
30	480	1	62.5	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332873	185
30	480	1	62.5	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332881	185
30	480	3	36.1	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332890	185
30	480	3	36.1	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332902	185
30	480	3	36.1	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332910	185
30	480	3	36.1	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332929	185
30	480	3	36.1	460	3	1/3	1,725	1,450	920	69	48	13	UB-3002	NS	332937	185
30	480	3	36.1	460	3	1/3	1,725	1,450	920	69	48	13	UB-3002	NS	332945	185
30	550	3	31.5	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332953	185
30	550	3	31.5	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332961	185
30	550	3	31.5	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332970	185
30	550	3	31.5	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332988	185
30	575	3	30.2	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	332996	185
30	575	3	30.2	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333008	185
30	575	3	30.2	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333016	185
30	575	3	30.2	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333024	185
30	600	3	28.9	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333032	185
30	600	3	28.9	115	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333040	185
30	600	3	28.9	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333059	185
30	600	3	28.9	230	1	1/3	1,550	1,300	825	77	48	13	UB-3002	NS	333067	185
35	240	3	84.3	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333075	210
35	240	3	84.3	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333083	210
35	480	1	72.9	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333091	210
35	480	1	72.9	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333104	210
35	480	1	72.9	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333112	210
35	480	1	72.9	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333120	210
35	480	3	42.2	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333139	210
35	480	3	42.2	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333147	210
35	480	3	42.2	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333155	210
35	480	3	42.2	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333163	210
35	480	3	42.2	460	3	1/3	1,725	2,800	1,165	42	54	14	UB-3502	NS	333171	210
35	480	3	42.2	460	3	1/3	1,725	2,800	1,165	42	54	14	UB-3502	NS	333180	210
35	550	3	36.8	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333198	210
35	550	3	36.8	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333200	210
35	550	3	36.8	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333219	210
35	550	3	36.8	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333227	210
35	575	3	35.2	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333235	210
35	575	3	35.2	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333243	210
35	575	3	35.2	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333251	210
35	575	3	35.2	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333260	210
35	600	3	33.7	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333278	210

UB High Capacity Horizontal Blower Heater

Electrical (60 Hz)				Motor				CFM	Air Delivery			Mtg. Height (Ft.)	Ordering			
kW	Volts	Phase	Amps	Volts	Phase	HP	RPM		FPM	Temp. Rise (°F)	Horiz. Throw (Ft.)		Model	Stock	PCN	Wt. (Lbs.)
35	600	3	33.7	115	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333286	210
35	600	3	33.7	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333294	210
35	600	3	33.7	230	1	1/3	1,550	2,500	1,040	47	54	14	UB-3502	NS	333307	210
40	480	1	83.3	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333315	210
40	480	1	83.3	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333323	210
40	480	1	83.3	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333331	210
40	480	1	83.3	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333340	210
40	480	3	48.2	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333358	210
40	480	3	48.2	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333366	210
40	480	3	48.2	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333374	210
40	480	3	48.2	230	1	1/3	1,500	2,500	1,040	53	54	15	UB-4002	NS	333382	210
40	480	3	48.2	460	3	1/3	1,725	2,800	1,165	48	54	15	UB-4002	NS	333390	210
40	480	3	48.2	460	3	1/3	1,725	2,800	1,165	48	54	15	UB-4002	NS	333403	210
40	550	3	42	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333411	210
40	550	3	42	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333420	210
40	550	3	42	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333438	210
40	550	3	42	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333446	210
40	575	3	40.2	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333454	210
40	575	3	40.2	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333462	210
40	575	3	40.2	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333470	210
40	575	3	40.2	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333489	210
40	600	3	38.5	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333497	210
40	600	3	38.5	115	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333500	210
40	600	3	38.5	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333518	210
40	600	3	38.5	230	1	1/3	1,550	2,500	1,040	53	54	15	UB-4002	NS	333526	210
45	480	1	93.8	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333534	210
45	480	1	93.8	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333542	210
45	480	3	54.2	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333550	210
45	480	3	54.2	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333569	210
45	480	3	54.2	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333577	210
45	480	3	54.2	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333585	210
45	480	3	54.2	460	3	1/3	1,725	2,800	1,165	54	54	17	UB-4502	NS	333593	210
45	480	3	54.2	460	3	1/3	1,725	2,800	1,165	54	54	17	UB-4502	NS	333606	210
45	550	3	47.3	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333614	210
45	550	3	47.3	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333622	210
45	550	3	47.3	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333630	210
45	550	3	47.3	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333649	210
45	575	3	45.2	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333657	210
45	575	3	45.2	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333665	210
45	575	3	45.2	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333673	210
45	575	3	45.2	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333681	210
45	600	3	43.4	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333690	210
45	600	3	43.4	115	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333702	210
45	600	3	43.4	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333710	210
45	600	3	43.4	230	1	1/3	1,550	2,500	1,040	60	54	17	UB-4502	NS	333729	210
50	480	3	60.2	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333737	210
50	480	3	60.2	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333745	210
50	480	3	60.2	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333753	210
50	480	3	60.2	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333761	210
50	480	3	60.2	460	3	1/3	1,725	2,800	1,165	60	54	17	UB-5002	NS	333770	210
50	480	3	60.2	460	3	1/3	1,725	2,800	1,165	60	54	17	UB-5002	NS	333788	210
50	550	3	52.5	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333796	210
50	550	3	52.5	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333809	210
50	550	3	52.5	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333817	210
50	550	3	52.5	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333825	210
50	575	3	50.3	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333833	210
50	575	3	50.3	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333841	210
50	575	3	50.3	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333850	210
50	575	3	50.3	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333868	210
50	600	3	48.2	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333876	210
50	600	3	48.2	115	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333884	210
50	600	3	48.2	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333892	210
50	600	3	48.2	230	1	1/3	1,550	2,500	1,040	67	54	17	UB-5002	NS	333905	210

Stock Status: S = stock NS = non-stock

To Order—Specify model, PCN, kW, volts, phase and quantity.

1. Not UL Listed.

Other Note — Up to 600V available, contact your Local Chromalox Sales office.

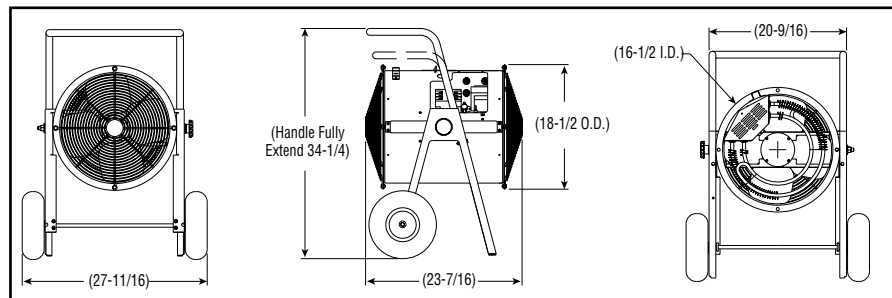
DRA

Portable Spot Industrial Salamander Blower Heater

- 7.5 to 30 kW
- 25,590 to 102,360 BTUH
- 208, 240, 480 and 600 Volts
- No Assembly Required
- Built-in Controls



Dimensions (Inches)



Description

The Chromalox DRA Dragon is a rugged industrial grade, self contained, highly mobile, electric blower heater. The DRA can be left unattended without the threat of poisoning from combustion by-products associated with fuel fired heaters. The built in safety features include an adjustable thermostat to control the outlet air temperature, auto-reset cutouts for the fan motor and heating elements. The thermostat provides settings for full off, fan only and temperature control in the heating setting. Dragon heaters feature a large, easily accessible control and wiring compartment containing a magnetic contactor; additional safety is provided by a 120 volt control voltage transformer and motor starter on 480 and 600 volt units. The bright red polyester powder coated heating cylinder is highly visible and can be rotated to direct heat or fan driven air movement where it is needed. For assured safety, all standard units meet the requirements of UL (File No. E7061) and CSA (File No. LR40859).

Construction

Heating Cylinder

A structural frame consisting of 2 spun steel rings and 2 formed steel channels support a 20 gauge steel cylinder phosphate coated for corrosion resistance, and finished in red polyester powder coat paint. The heating cylinder pivots vertically to direct air flow.

Leg Assembly

Each side consists of a one piece, 12 gauge, formed steel member, which accepts a steel tubular handle, held in place with a 1-1/2" long x 1/4" bolt on each side. The handle can be raised from the shipping position if desired. The rubber, pneumatic wheels are 10" diameter and 3 1/2" wide to provide ease of transporting the heater on irregular and gravel surfaces. The large wheels make it easy to roll up stairways without damage to decorative step surfaces.

Fan Assembly

The self-centering fan assembly consists of a totally enclosed, permanently lubricated motor and a dynamically balanced aluminum fan blade for smooth, quiet operation.

Controls

A thermostat, with a temperature range of 40°F to 100°F is included, with a full off position, a fan only position and an adjustable range of temperature settings in the heating mode position. Each unit includes a 3 pole magnetic contactor and auto-reset thermal cutout. 480 volt and 600 volt units also include a motor relay and 120 volt control voltage transformer for personnel safety.

Safety Guards

Front and rear grills are 10 gauge, finished in black polyester powder coat and are designed to meet OSHA safety requirements.

Heating Assembly

The patented metal sheath Fintube® heating elements consist of steel fins furnace brazed on industrial grade .475 diameter steel sheath tubular heaters for maximum heat transfer. The elements are held in place with steel bulkhead fittings for durability. The elements feature a high temperature finish for corrosive protection.

Applications

- For Best Results Use in Enclosed Area with Ceiling Heights Below 15'
- Warming Workers
- Thawing Frozen Pipes
- Thawing Railroad Cars
- Heating Large Tents
- Non-Hazardous Areas

DRA

Portable Spot Industrial Salamander Blower Heater (*cont'd.*)

Specifications and Ordering Information

kW	Volts	Phase	Amps ¹	BTU/H	HP	CFM	Temp. Rise °F ²	Model	Stock	PCN	Wt. (Lbs.)
7.5	208	1 and 3	36.3/21.0	25,590	0.06	1070	23	DRA-07-83	NS	295523	65
7.5/5.6	240/208	1 and 3	31.5/18.3 ³	25,590	0.06	1070	23	DRA-07-23	S	295531	65
9.75	208	1 and 3	47.1/27.3	33,267	0.06	1070	31	DRA-10-83	S	295540	65
10/7.5	240/208	1 and 3	40.8/23.7 ³	33,267	0.06	1070	31	DRA-10-23	S	295558	65
15	208	3	41.8	51,180	0.06	1070	46	DRA-15-83	NS	295566	65
15/11.2	240/208	3	36.3 ³	51,180	0.06	1070	46	DRA-15-23	S	295574	65
15	480	1 and 3	31.4	51,180	0.06	1070	46	DRA-15-43	S	295582	65
15	600	1 and 3	25.2	51,180	0.06	1070	46	DRA-15-93	NS	295596	65
19.5/15	240/208	3	47.1 ³	66,534	0.06	1070	61	DRA-20-23	NS	295603	75
20	480	1 and 3	42.0	68,240	0.06	1070	62	DRA-20-43	S	295611	75
20	600	1 and 3	33.5	68,240	0.06	1070	62	DRA-20-93	NS	295620	75
30	480	3	36.3	102,360	0.06	1070	92	DRA-30-43	S	295638	75
30	600	3	29.1	102,360	0.06	1070	92	DRA-30-93	NS	295646	75

Stock Status: S = stock NS = non-stock
To Order—Specify model, PCN, kW, volts, phase and quantity.

1. Includes motor amps
2. Temperature rise at 240V operation
3. 208V amperage is 86% of 240V value

Models designated 1 and 3 can be field converted from three phase to single phase. Consult product installation, operation, and maintenance manual for details.

All models factory pre-wired with an 8 foot cord and plug for use in 3 phase operation (See table 1 factory installed plug and cord information)

Factory Installed Plug and Cord Data

Model	Plug Type	Cable Type	Model	Plug Type	Cable Type
DRA-07-83	NEMA 18-30P, Straight Blade	10 AWG, 4 Wire	DRA-15-93	NEMA 17-30P, Twist-Lock	12 AWG, 4 Wire
DRA-07-23	NEMA 18-30P, Straight Blade	10 AWG, 4 Wire	DRA-20-23	NEMA 15-50P, Straight Blade	4 AWG, 4 Wire
DRA-10-83	NEMA 18-30P, Straight Blade	8 AWG, 4 Wire	DRA-20-43	NEMA 16-30P, Twist-Lock	8 AWG, 4 Wire
DRA-10-23	NEMA 18-30P, Straight Blade	8 AWG, 4 Wire	DRA-20-93	NEMA 17-30P, Twist-Lock	10 AWG, 4 Wire
DRA-15-83	NEMA 18-50P, Straight Blade	6 AWG, 4 Wire	DRA-30-43	Non-NEMA 50A, Twist-Lock	6 AWG, 4 Wire
DRA-15-23	NEMA 15-50P, Straight Blade	6 AWG, 4 Wire	DRA-30-93	Non-NEMA 50A, Twist-Lock	8 AWG, 4 Wire
DRA-15-43	NEMA 16-30P, Twist-Lock	10 AWG, 4 Wire			

Standard Locking Plugs

Plug Type	Catalog Number	Description	Volts	Amps	NEMA#	Fits Cable Dia. (In.)	Stock	PCN	Wt. (Lbs.)
LOCKING	PGL-15-20	3 Pole, 4 Wire	250	20	L15-20	.385 to .780	NS	338845 / 511556014	0.5
LOCKING	PGL-16-30	3 Pole, 4 Wire	480	30	L16-30	.595 to 1.150	NS	338861 / 511556023	0.5
LOCKING	PGL-17-30	3 Pole, 4 Wire	600	30	L17-30	.595 to 1.150	S	338870 / 511556032	0.5
LOCKING	PGL-3763C	2 Pole, 3 Wire	600	50	N/A	.750 to 1.125	NS	338917 / 511556033	0.5
LOCKING	PGL-3765C	3 Pole, 4 Wire	600	50	N/A	.750 to 1.125	NS	338925 / 511556034	0.5
NON LOCKING	PGN-6-50	2 Pole, 3 Wire	250	50	6-50	.625 to 1.187	S	338888 / 511506014	0.5
NON LOCKING	PGN-15-20	3 Pole, 4 Wire	250	20	15-20	.390 to .775	S	338896 / 511506006	0.5
NON LOCKING	PGN-18-30	4 Pole, 4 Wire	208	30	18-30	.625 to 1.310	NS	511506026	0.5
NON LOCKING	PGN-18-50	4 Pole, 4 Wire	208	30	18-50	.625 to 1.310	NS	511506024	0.5
LOCKING	PGL-8165C	3 Pole, 4 Wire	480	50	N/A	.92 to 1.2	NS	511556031	0.5
NON LOCKING	PGN-8461C	3 Pole, 4 Wire	250	60	N/A	.625 to 1.310	NS	511506028	0.5

Stock Status: S = stock NS = non-stock
To Order—Specify model, PCN, kW, volts, phase and quantity.

FASTShip

Same-day shipping on stock item
orders received before 4 pm CST.
3-day shipping on assembly-stock items.

HF

Portable Blower Heater



- 1.9 - 4 kW
- 6,483 - 13,648 Btuh
- 120 and 240 Volt
- Single Phase
- AC and DC Rated Models

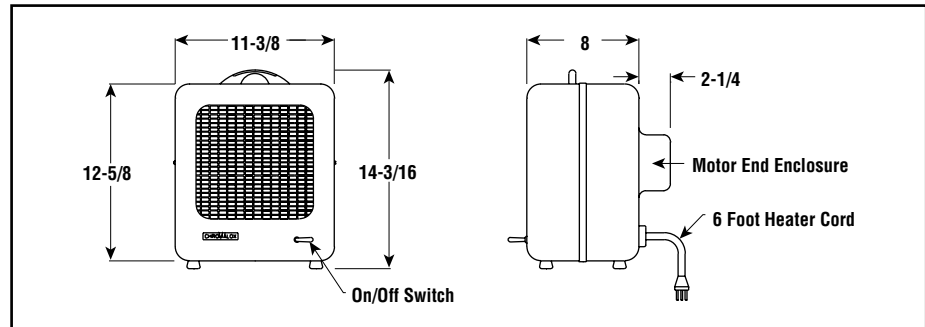
Description

Heavy duty HF portable blower heaters are ideal for heating small areas in industrial environments and are available in DC ratings for use in crane cabs.

Applications

- Construction Sites
- Garages
- Work Stations
- Warehouses
- Crane Cabs
- Storage Buildings

Dimensions (Inches)



Construction

Cabinet — Heavy 20 gauge steel, phosphate undercoated for corrosion resistance and finished in almond powder coat providing a good, clean appearance. Includes carrying handle.

Heating Elements — Shock-resistant metal sheath heating elements, designed for long life.

AC Rated Models include a quiet, completely enclosed, vibration-free AC motor, overheat cutout, on/off toggle switch and 6 ft. cord and ground plug (except HF-303AC, which does not include a plug).

DC Rated Models equipped with DC motors and DC rated magnetic contactors wired in series with the overheat cutout. Like the AC models, DC rated units also include on/off toggle switch, 6 ft. cord and plugs except on HF-303H and HF-303E which includes the cord only and HF-403E which includes neither the cord nor the plug.

Advantages

- Clean and Reliable
- Easy to Move
- Built-in Thermal Cutout
- DC Ratings

Specifications and Ordering Information

Electrical (60 Hz)				Motor				CFM	Air Delivery ¹			Mtg. Height (Ft.)	Ordering			
kW	Volts	Phase	Amps	Volts	Phase	HP	RPM		FPM ¹	Temp. Rise (°F) ¹	Horiz. Throw (Ft.)		Model ¹	Stock	PCN	Wt. (Lbs.)
1.9	120	1	15.8	115	1	1/30	1,550	170	410	35	6	13-3/16	HF-203G AC	S	261307	16.5
1.9	120	1	15.8	125	1	1/60	1,725	200	480	30	6	13-3/16	HF-203EG DC	S	261323	16.5
2	240	1	8.3	240	1	1/30	1,550	170	410	37	6	13-3/16	HF-203G AC	NS	261315	16.5
2	240	1	8.3	125	1	1/60	1,725	200	480	32	6	13-3/16	HF-203DG DC	S	261331	16.5
3	120	1	25	115	1	1/30	1,550	170	410	56	6	13-3/16	HF-303H AC ³	S	261340	19
3	240	1	12.5	240	1	1/30	1,550	170	410	56	6	13-3/16	HF-303G AC	NS	261358	19
3	120	1	25	125	1	1/60	1,725	200	480	48	6	13-3/16	HF-303E DC ³	NS	261366	19
3	240	1	12.5	125	1	1/60	1,725	200	480	48	6	13-3/16	HF-303DG DC	S	261374	19
4	240	1	16.7	240	1	1/30	1,550	170	410	75	6	13-3/16	HF-403G AC	S	261382	19
4	240	1	16.7	125	1	1/60	1,725	200	480	63	6	13-3/16	HF-403E DC ²	S	261390	19

Stock Status: NS = non-stock
To Order—Specify model, PCN, kW, volts, phase and quantity.

1. Approximate value.
2. Without cord and plug.
3. Cord only, no plug.

Other Notes —

- A. Alternating current (AC) 60 Hz (supplied with on/off switch).
- B. Direct current (DC).

HCH

Wall Mounted Convection Heater

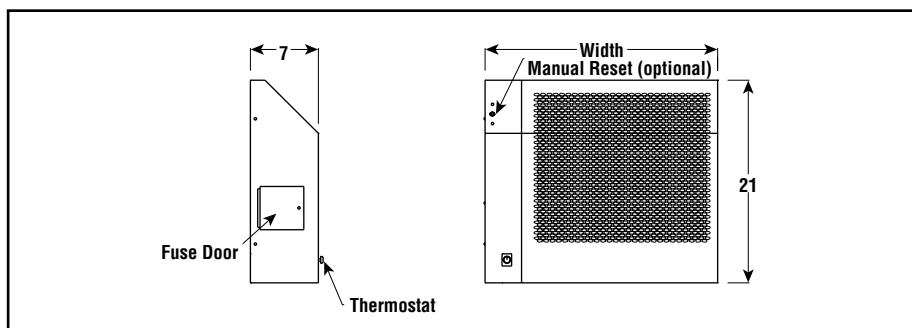


INDUSTRIAL
UNIT HEATERS &
ACCESSORIES

- 500 - 5,000 Watts
- 1,706 - 17,060 Btuh
- 120, 208, 240, 277, 480, 575 and 600 Volt
- 1 & 3 Phase
- Built-in Controls
- 24, 36 or 48" Widths



Dimensions (Inches)



Description

Type HCH convection heaters are designed for easy installation in hard-use areas. The patented metal sheath Fintube® radiating heating elements with furnace brazed steel fins assures long life and superior heat transfer. Each unit is self-contained, complete with thermostat, automatic reset (standard) and manual reset (optional) cutout.

Applications

- Entryways
- Stairwells
- Guard Shacks
- Isolated Buildings
- Cold Spots in Offices or Plants

Construction

Cabinet — Heavy 18 gauge steel, zinc chromate primer and almond polyester powder coat finish.

Heating Elements — Rugged, shock-proof 0.475" diameter steel with furnace brazed steel fins.

Features

Power Terminal Block — Provided to facilitate field installation.

Built-in Contactors and Fused Control Voltage Transformers — Typical on all models rated over 277V and all three-phase heaters.

Thermostat and Overtemperature Cutout — All models include a thermostat (55 - 105°F) and automatic reset overtemperature cutout. Models with suffix M in the model number include an additional manual reset cutout.

Advantages

- Minimum Maintenance
- Attractive Design
- Self Contained
- Safer to Operate in Unattended Areas

CAUTION — Not intended for use where flammable vapors, gases, liquids or other combustible atmospheres are present.

HCH

Wall Mounted

Convection Heater *(cont'd.)*

Specifications and Ordering Information

Electrical					Dimensions (In.)			w/o Manual Reset			w/ Manual Reset			Wt. (Lbs.)
kW	Volts	Phase	Amps	Btuh	Height	Width	Depth	Model	Stock	PCN	Model	Stock	PCN	
0.5	120	1	4.2	1,706	21	24	7	HCH-051	NS	330376	HCH-051M	NS	331459	41
0.5	208	1	2.4	1,706	21	24	7	HCH-051	NS	330384	HCH-051M	NS	331467	41
0.5	240	1	2.1	1,706	21	24	7	HCH-051	NS	330392	HCH-051M	NS	331475	41
0.5	277	1	1.8	1,706	21	24	7	HCH-051	NS	330405	HCH-051M	NS	331483	41
0.75	120	1	6.25	2,559	21	24	7	HCH-071	NS	330413	HCH-071M	NS	331491	41
0.75	208	1	3.6	2,559	21	24	7	HCH-071	NS	330421	HCH-071M	NS	331504	41
0.75	240	1	3.1	2,559	21	24	7	HCH-071	NS	330430	HCH-071M	NS	331512	41
0.75	277	1	2.7	2,559	21	24	7	HCH-071	NS	330448	HCH-071M	NS	331520	41
1	120	1	8.3	3,412	21	24	7	HCH-101	NS	330456	HCH-101M	NS	331539	41
1	208	1	4.8	3,412	21	24	7	HCH-101	NS	330464	HCH-101M	NS	331547	41
1	208	3	2.8	3,412	21	24	7	HCH-101	NS	330501	HCH-101M	NS	331580	41
1	240	1	4.2	3,412	21	24	7	HCH-101	NS	330472	HCH-101M	NS	331555	41
1	240	3	2.4	3,412	21	24	7	HCH-101	NS	330510	HCH-101M	NS	331598	41
1	277	1	3.6	3,412	21	24	7	HCH-101	NS	330480	HCH-101M	NS	331563	41
1	480	1	2.1	3,412	21	24	7	HCH-101	NS	330499	HCH-101M	NS	331571	41
1	480	3	1.2	3,412	21	24	7	HCH-101	NS	330528	HCH-101M	NS	331600	41
1	480	3	1.2	3,412	21	24	7	HCH-101 (4W)	NS	330536	HCH-101M (4W)	NS	331619	41
1.5	120	1	12.5	5,118	21	24	7	HCH-151	NS	330544	HCH-151M	NS	331627	41
1.5	208	1	7.2	5,118	21	24	7	HCH-151	NS	330552	HCH-151M	NS	331635	41
1.5	208	3	4.2	5,118	21	24	7	HCH-151	NS	330595	HCH-151M	NS	331678	41
1.5	240	1	6.3	5,118	21	24	7	HCH-151	NS	330560	HCH-151M	NS	331643	41
1.5	240	3	3.6	5,118	21	24	7	HCH-151	NS	330608	HCH-151M	NS	331686	41
1.5	277	1	3.1	5,118	21	24	7	HCH-151	NS	330579	HCH-151M	NS	331651	41
1.5	480	1	3.1	5,118	21	24	7	HCH-151	NS	330587	HCH-151M	NS	331661	41
1.5	480	3	1.8	5,118	21	24	7	HCH-151	NS	330616	HCH-151M	NS	331694	41
1.5	480	3	1.8	5,118	21	24	7	HCH-151 (4W)	NS	330659	HCH-151M (4W)	NS	331731	41
1.5	550	3	1.6	5,118	21	24	7	HCH-151	NS	330624	HCH-151M	NS	331707	41
1.5	575	3	1.5	5,118	21	24	7	HCH-151	NS	330632	HCH-151M	NS	331715	41
1.5	600	3	1.4	5,118	21	24	7	HCH-151	NS	330640	HCH-151M	NS	331723	41
2	120	1	16.7	6,824	21	24	7	HCH-201	NS	330667	HCH-201M	NS	331740	41
2	208	1	9.6	6,824	21	24	7	HCH-201	NS	330675	HCH-201M	NS	331758	41
2	208	3	5.6	6,824	21	24	7	HCH-201	NS	330712	HCH-201M	NS	331790	41
2	240	1	8.3	6,824	21	24	7	HCH-201	NS	330683	HCH-201M	NS	331766	41
2	240	3	4.8	6,824	21	24	7	HCH-201	NS	330720	HCH-201M	NS	331803	41
2	277	1	7.2	6,824	21	24	7	HCH-201	NS	330691	HCH-201M	NS	331774	41
2	480	1	4.2	6,824	21	24	7	HCH-201	NS	330704	HCH-201M	NS	331782	41
2	480	3	2.4	6,824	21	24	7	HCH-201	NS	330739	HCH-201M	NS	331811	41
2	480	3	2.4	6,824	21	24	7	HCH-201 (4W)	NS	330771	HCH-201M (4W)	NS	331854	41
2	550	3	2.1	6,824	21	24	7	HCH-201	NS	330747	HCH-201M	NS	331820	41
2	575	3	2	6,824	21	24	7	HCH-201	NS	330755	HCH-201M	NS	331838	41
2	600	3	1.9	6,824	21	24	7	HCH-201	NS	330763	HCH-201M	NS	331846	41
2.5	120	1	20.8	8,530	21	36	7	HCH-251	NS	330780	HCH-251M	NS	331862	57
2.5	208	1	12	8,530	21	36	7	HCH-251	NS	330798	HCH-251M	NS	331870	57
2.5	240	1	10.4	8,530	21	36	7	HCH-251	NS	330800	HCH-251M	NS	331889	57
2.5	277	1	9	8,530	21	36	7	HCH-251	NS	330819	HCH-251M	NS	331897	57
2.5	480	1	5.2	8,530	21	36	7	HCH-251	NS	330827	HCH-251M	NS	331900	57
2.5	208	3	6.9	8,530	21	36	7	HCH-251	NS	330835	HCH-251M	NS	331918	57
2.5	240	3	6	8,530	21	36	7	HCH-251	NS	330843	HCH-251M	NS	331926	57
2.5	480	3	3	8,530	21	36	7	HCH-251	NS	330851	HCH-251M	NS	331934	57
2.5	480	3	3	8,530	21	36	7	HCH-251 (4W)	NS	330894	HCH-251M (4W)	NS	331977	57
2.5	550	3	2.6	8,530	21	36	7	HCH-251	NS	330860	HCH-251M	NS	331942	57
2.5	575	3	2.5	8,530	21	36	7	HCH-251	NS	330878	HCH-251M	NS	331950	57
2.5	600	3	2.4	8,530	21	36	7	HCH-251	NS	330886	HCH-251M	NS	331969	57
3	208	1	14.4	10,236	21	36	7	HCH-301	NS	330907	HCH-301M	NS	331985	57
3	208	3	8.3	10,236	21	36	7	HCH-301	NS	330940	HCH-301M	NS	332021	57
3	240	1	12.5	10,236	21	36	7	HCH-301	NS	330915	HCH-301M	NS	331993	57
3	240	3	7.2	10,236	21	36	7	HCH-301	NS	330958	HCH-301M	NS	332030	57
3	277	1	10.8	10,236	21	36	7	HCH-301	NS	330923	HCH-301M	NS	332005	57
3	480	1	6.3	10,236	21	36	7	HCH-301	NS	330931	HCH-301M	NS	332013	57
3	480	3	3.6	10,236	21	36	7	HCH-301	NS	330966	HCH-301M	NS	332048	57
3	550	3	3.2	10,236	21	36	7	HCH-301	NS	330974	HCH-301M	NS	332056	57
3	575	3	3	10,236	21	36	7	HCH-301	NS	330982	HCH-301M	NS	332064	57
3	600	3	2.9	10,236	21	36	7	HCH-301	NS	330990	HCH-301M	NS	332072	57
3	480	3	3.6	10,236	21	36	7	HCH-301 (4W)	NS	331002	HCH-301M (4W)	NS	332080	57

HCH

Wall Mounted

Convection Heater (cont'd.)

Specifications and Ordering Information

Electrical					Dimensions (In.)			w/o Manual Reset			w/ Manual Reset			Wt. (Lbs.)
kW	Volts	Phase	Amps	Btuh	Height	Width	Depth	Model	Stock	PCN	Model	Stock	PCN	
3.5	208	1	16.8	11,942	21	36	7	HCH-351	NS	331010	HCH-351M	NS	332099	57
3.5	240	1	14.6	11,942	21	36	7	HCH-351	NS	331029	HCH-351M	NS	332101	57
3.5	277	1	12.6	11,942	21	36	7	HCH-351	NS	331037	HCH-351M	NS	332110	57
3.5	480	1	7.3	11,942	21	36	7	HCH-351	NS	331045	HCH-351M	NS	332128	57
3.5	208	3	9.7	11,942	21	36	7	HCH-351	NS	331053	HCH-351M	NS	332136	57
3.5	240	3	8.4	11,942	21	36	7	HCH-351	NS	331061	HCH-351M	NS	332144	57
3.5	480	3	4.2	11,942	21	36	7	HCH-351	NS	331070	HCH-351M	NS	332152	57
3.5	550	3	3.7	11,942	21	36	7	HCH-351	NS	331088	HCH-351M	NS	332160	57
3.5	575	3	3.5	11,942	21	36	7	HCH-351	NS	331096	HCH-351M	NS	332179	57
3.5	600	3	3.4	11,942	21	36	7	HCH-351	NS	331109	HCH-351M	NS	332187	57
3.5	480	3	4.2	11,942	21	36	7	HCH-351 (4W)	NS	331117	HCH-351M (4W)	NS	332195	57
4	208	1	19.2	13,648	21	48	7	HCH-401	NS	331125	HCH-401M	NS	332208	70
4	208	3	11.1	13,648	21	48	7	HCH-401	NS	331168	HCH-401M	NS	332240	70
4	240	1	16.7	13,648	21	48	7	HCH-401	S	331133	HCH-401M	NS	332216	70
4	240	3	9.6	13,648	21	48	7	HCH-401	NS	331176	HCH-401M	NS	332259	70
4	277	1	14.4	13,648	21	48	7	HCH-401	NS	331141	HCH-401M	NS	332224	70
4	480	1	8.3	13,648	21	48	7	HCH-401	NS	331150	HCH-401M	NS	332232	70
4	480	3	4.8	13,648	21	48	7	HCH-401	NS	331184	HCH-401M	NS	332267	70
4	550	3	4.2	13,648	21	48	7	HCH-401	NS	331192	HCH-401M	NS	332275	70
4	575	3	4.0	13,648	21	48	7	HCH-401	NS	331205	HCH-401M	NS	332283	70
4	600	3	3.9	13,648	21	48	7	HCH-401	NS	331213	HCH-401M	NS	332291	70
4	480	3	4.8	13,648	21	48	7	HCH-401 (4W)	NS	331221	HCH-401M (4W)	NS	332304	70
4.5	208	1	21.6	15,354	21	48	7	HCH-451	NS	331230	HCH-451M	NS	332355	70
4.5	240	1	18.8	15,354	21	48	7	HCH-451	NS	331248	HCH-451M	NS	332320	70
4.5	277	1	16.2	15,354	21	48	7	HCH-451	NS	331256	HCH-451M	NS	332339	70
4.5	480	1	9.4	15,354	21	48	7	HCH-451	NS	331264	HCH-451M	NS	332347	70
4.5	208	3	12.5	15,354	21	48	7	HCH-451	NS	331272	HCH-451M	NS	332355	70
4.5	240	3	10.8	15,354	21	48	7	HCH-451	NS	331280	HCH-451M	NS	332363	70
4.5	480	3	5.4	15,354	21	48	7	HCH-451	NS	331299	HCH-451M	NS	332371	70
4.5	480	3	5.4	15,354	21	48	7	HCH-451 (4W)	NS	331336	HCH-451M (4W)	NS	332419	70
4.5	550	3	4.7	15,354	21	48	7	HCH-451	NS	331301	HCH-451M	NS	332380	70
4.5	575	3	4.5	15,354	21	48	7	HCH-451	NS	331310	HCH-451M	NS	332398	70
4.5	600	3	4.3	15,354	21	48	7	HCH-451	NS	331328	HCH-451M	NS	332400	70
5	208	1	24	17,060	21	48	7	HCH-501	NS	331344	HCH-501M	NS	332427	70
5	208	3	13.9	17,060	21	48	7	HCH-501	NS	331387	HCH-501M	NS	332460	70
5	240	1	20.1	17,060	21	48	7	HCH-501	NS	331352	HCH-501M	NS	332435	70
5	240	3	12	17,060	21	48	7	HCH-501	NS	331395	HCH-501M	NS	332478	70
5	277	1	18.1	17,060	21	48	7	HCH-501	NS	331360	HCH-501M	NS	332443	70
5	480	1	10.4	17,060	21	48	7	HCH-501	S	331379	HCH-501M	NS	332451	70
5	480	3	6	17,060	21	48	7	HCH-501	NS	331408	HCH-501M	NS	332486	70
5	480	3	6	17,060	21	48	7	HCH-501 (4W)	NS	331440	HCH-501M (4W)	NS	332523	70
5	550	3	5.3	17,060	21	48	7	HCH-501	NS	331416	HCH-501M	NS	332494	70
5	575	3	5	17,060	21	48	7	HCH-501	NS	331424	HCH-501M	NS	332507	70
5	600	3	4.8	17,060	21	48	7	HCH-501	NS	331432	HCH-501M	NS	332515	70

Stock Status: S = stock NS = non-stock

To Order—Specify model, PCN, kW, volts, phase and quantity.

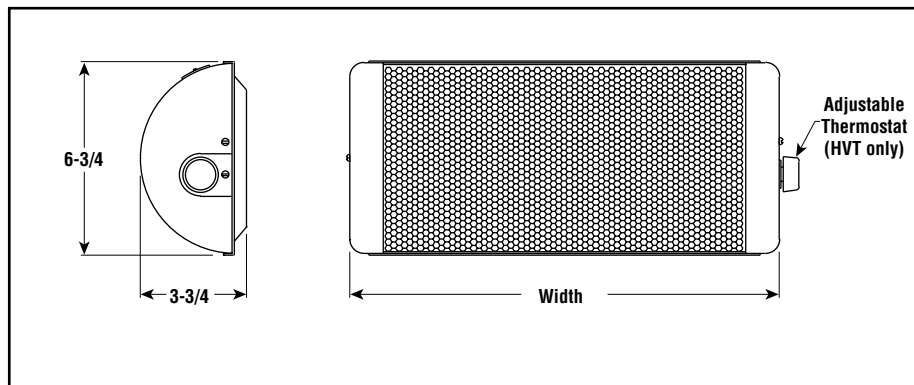
Note — (4W) represents 4 wire.

EH & HVT Industrial Convection Heaters



- Without Thermostat (type EH)
- With Thermostat (type HVT)
- 250 - 1,000 Watts
- 853 - 3,412 Btuh
- 120 and 240 Volt
- Single Phase

Dimensions (Inches)



Description

EH and HVT industrial convection heaters are designed for the highest dependability for rough plant areas and small manned or unattended areas.

Applications

- Crane Cabs
- Shop Offices
- Small Plant Areas
- Non-Hazardous Pump Sheds

Construction

Cabinet — Heavy gauge perforated steel case finished in corrosion resistant almond polyester powder coat paint.

Heating Elements are strip type construction and are the most rugged, durable, long-lasting elements available to industry.

Built-in Thermostat — (HVT only). Furnished standard to provide temperatures from 50°F - 110°F.

Advantages

- Long Life
- Rugged for High Traffic Areas
- Easy Installation
- Corrosion Resistant

CAUTION — Not intended for use where flammable vapors, gases, liquids or other combustible atmospheres are present.

Specifications and Ordering Information

kW	Volts	Phase	Amps	Btuh	Dimensions (In.)			Model	Stock	PCN	Wt. (Lbs.)
					Height	Width	Depth				
EH — Without Thermostat											
0.25	120	1	2.1	853	6-3/4	14-5/8	3-3/4	EH-1221	S	261833	7
0.25	240	1	1	853	6-3/4	14-5/8	3-3/4	EH-1221	NS	261841	7
0.5	120	1	4.2	1,706	6-3/4	14-5/8	3-3/4	EH-1251	S	261850	7
0.5	240	1	2.1	1,706	6-3/4	14-5/8	3-3/4	EH-1251	NS	261868	7
HVT — With Thermostat											
0.5	120	1	4.2	1,706	6-3/4	28-5/8	3-3/4	HVT-1251	S	240055	13
1	120	1	8.3	3,412	6-3/4	28-5/8	3-3/4	HVT-2411	S	240071	15
Stock Status: S = stock NS = non-stock To Order—Specify model, PCN, kW, volts, phase and quantity.											

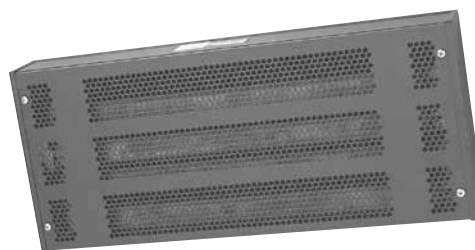
Stock Status: S = stock NS = non-stock

To Order—Specify model, PCN, kW, volts, phase and quantity.

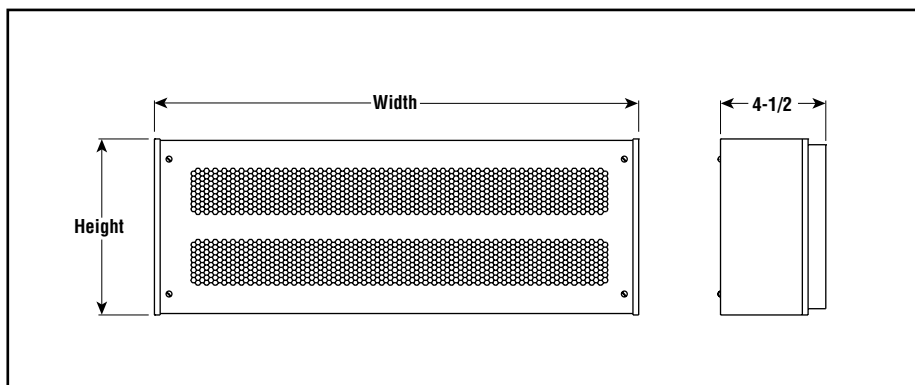
Refer to
WR-80, WR-90
in the Controls section.

H Horizontal Convection Heater

- 1 - 3 kW
- 3,412 - 10,236 Btuh
- 120, 240 and 480 Volt
- Single Phase



Dimensions (Inches)



Description

Type H horizontal convection heaters are designed for the highest dependability for rugged plant areas and small manned or unattended areas.

Applications

- Crane Cabs
- Shop Offices
- Small Plant Areas
- Non-Hazardous Pump Sheds

Construction

Cabinet — Heavy gauge perforated steel case finished in corrosion resistant black polyester powder coat paint.

Heating Elements are strip type construction and are the most rugged, durable, long-lasting elements available to industry.

CAUTION — Not intended for use where flammable vapors, gases, liquids or other combustible atmospheres are present.

Advantages

- Long Life
- Durable for High Traffic Areas
- Easy Installation
- Corrosion Resistant

Specifications and Ordering Information

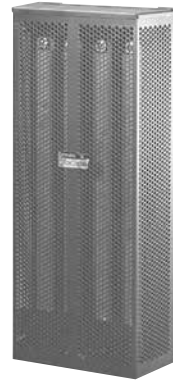
kW	Volts	No. Elem.	Amps	Btuh	Dimensions (In.)			Model	Stock	PCN	Wt. (Lbs.)
					Height	Width	Depth				
1	120	2	8.3	3,412	7-1/2	20-3/4	4-1/2	H-1801	S	261948	28
1	240	2	4.2	3,412	7-1/2	20-3/4	4-1/2	H-1801	NS	261956	28
1.5	120	2	12.5	5,118	7-1/2	26-1/2	4-1/2	H-2405	NS	262000	30
1.5	240	2	6.3	5,118	7-1/2	26-1/2	4-1/2	H-2405	S	262019	30
1.5	480	2	3.1	5,118	7-1/2	26-1/2	4-1/2	H-2405	NS	262027	30
2	120	4	16.7	6,824	11-1/4	26-1/2	4-1/2	H-2406	S	262060	32
2	240	4	8.3	6,824	11-1/4	26-1/2	4-1/2	H-2406	S	262078	32
2	480	4	4.2	6,824	11-1/4	26-1/2	4-1/2	H-2406	S	262086	32
3	240	4	12.5	10,236	11-1/4	26-1/2	4-1/2	H-2407	S	262131	32
3	480	4	6.3	10,236	11-1/4	26-1/2	4-1/2	H-2407	S	262140	32

Stock Status: S = stock AS = assembly stock NS = non-stock
To Order — Specify model, PCN, kW, volts, phase and quantity.

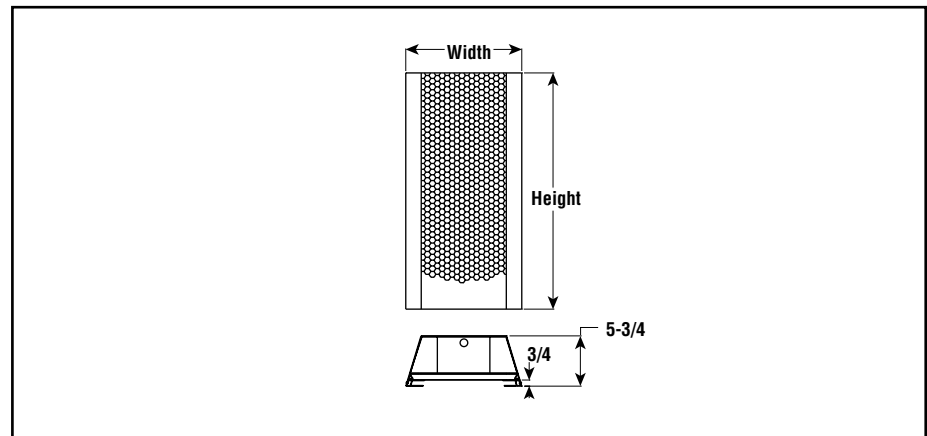
Refer to
WR-80, WR-90
in the Controls section.

V Vertical Convection Heater

- 2 - 4.5 kW
- 6,824 - 15,354 Btuh
- 120, 240 and 480 Volt
- Single Phase



Dimensions (Inches)



Description

Type V vertical convection heaters are designed for the highest dependability for rugged plant areas and small manned or unattended areas.

Applications

- Crane Cabs
- Shop Offices
- Small Plant Areas
- Non-Hazardous Pump Sheds

Construction

Cabinet — Heavy gauge perforated steel case finished in corrosion resistant black polyester powder coat paint.

Heating Elements are strip type construction and are the most rugged, durable, long-lasting elements available to industry.

CAUTION — Not intended for use where flammable vapors, gases, liquids or other combustible atmospheres are present.

Advantages

- Long Life
- Durable for High Traffic Areas
- Easy Installation
- Corrosion Resistant
- Low Maintenance

Specifications and Ordering Information

kW	Volts	No. Elem.	Amps	Btuh	Dimensions (In.)			Model	Stock	PCN	Wt. (Lbs.)
					Height	Width	Depth				
2	240	4	8.3	6,824	27	12-3/4	5-3/4	V-2020	NS	262254	34
3	240	4	12.5	10,236	27	12-3/4	5-3/4	V-2030	S	262318	34
3	480	4	6.3	10,236	27	12-3/4	5-3/4	V-2030	NS	262326	34
4.5	120	6	25	10,236	27	17-3/4	5-3/4	V-2040	NS	262369	44
4.5	240	6	18.8	15,354	27	17-3/4	5-3/4	V-2040	NS	262377	44
4.5	480	6	9.4	15,354	27	17-3/4	5-3/4	V-2040	S	262385	44

Stock Status: S = stock AS = assembly stock NS = non-stock
To Order—Specify model, PCN, kW, volts, phase and quantity.

Refer to
WR-80, WR-90
in the Controls section.

CXH-A Explosion Proof Blower Heater for Hazardous Locations

- 3 - 35 kW
- 10,200 - 119,420 Btuh
- 208 to 600 Volts
- 1 or 3 Phase
- Meets UL, CSA, NEC and OSHA Requirements
- ATEX and EAC Models Available



HAZARDOUS LOCATION &
CORROSIVE ENVIRONMENT
HEATERS & ACCESSORIES

Description

Type CXH-A is designed to heat areas classified as hazardous locations to provide primary or supplementary heating for comfort or freeze protection.

Applications

- Sewage Treatment Plants
- Petrochemical Facilities, Oil Rigs
- Unattended Pumping Stations
- Chemical Storage and Handling Facilities
- Paint Storage Areas
- Grain Elevators
- Coal Preparation Plants
- Aircraft Servicing Areas
- Oil Refineries
- Areas Containing Metal Dusts

Construction

Cabinet — 14 gauge steel construction with polyester powder coat paint finish.

Adjustable Louvers — Control the direction of airflow as needed.

Rugged, Seamless, Copper Heating Elements — are immersed in the sealed liquid-to-air heat exchanger.

Factory Sealed Heat Exchanger — Features steel tubes with integral aluminum fins and filled with glycol-water heat transfer fluid.

Safety Pressure Relief Device on the heat exchanger is factory helium leak tested to assure a leak-proof design.

Explosion Proof Ball Bearing Motor — Permanently lubricated and equipped with built-in thermal overload protection.

Epoxy Coated Aluminum Fan — Prevents sparking.

Features

Pre-Wired Explosion Proof Control Center

with magnetic contactor and control circuit transformer.

Quick-Acting Auto Reset Cutout

Pole, Wall and Ceiling Mounting Kits — Optional. Recessed threaded fasteners on top of heater for mounting with threaded rods.

Warranty — Limited Three Year (Consult Terms of Sale or Owner's Manual for more information.)

Optional Features

- Built-in Thermostat 50°F to 90°F (10°C to 32°C)
- Built-in Manual Disconnect Switch
- Pilot Light
- Fan Selector Switch

Designed for Areas Classified

Low operating temperature for atmospheres having an ignition temperature higher than 165°C (329°F) code T3B.

- Class I, Group C, D - Divisions 1 & 2
- Class II, Groups E, F, G - Divisions 1 & 2

Optional Classifications

- Temperature Code T3C 160°C (320°F)
Class I, Groups C, D - Divisions 1 & 2
Class II, Groups F, G - Divisions 1 & 2



II2G Ex d IIB T3

- Arctic Duty Construction

Advantages

- Easy Installation
- Safe, Propylene Glycol Heat Transfer Fluid
- Low Surface Temperature
- Wall, Pole or Ceiling Mounting
- Built-in Controls
- Virtually Maintenance Free
- Corrosion Resistant
- 120V Control (24V optional)
- Rugged and Versatile

Refer to
WR-80EP
in the Controls section.

CXH-A

Explosion Proof Blower Heater for Hazardous Locations (cont'd.)

Heater Rating and Operating Data

(3 to 35 kW)	Hazardous Location Classifications	3 to 35 kW Models - Class I, Group C & D; Class II, Groups E, F & G, Divisions 1 & 2
	Temperature Codes	This temperature shall not exceed the ignition temperature of the gas or vapor to be encountered. All standard models 165°C (329°F) T3B
INSTALLATION	Maximum Mounting Height From Floor to Bottom of Heater	8' to 10' (2.4 to 3 meters) normal, when heat is required at floor level.
	Ambient Temperature	-40°F/-40°C (Min.) 104°F/40°C (Max.)
	Operating Limits Maximum Operational Altitude Above Sea level	7500' (2286 meters). Check with local Chromalox sales office for recommendations for higher elevations.
PROTECTION	High-Limit	Auto reset quick acting linear type thermal cutout.
	Pressure Relief	Pressure relief device.
HEAT EXCHANGER	General Description	Steel tubes, with integral rolled-aluminum fins
	Core Material	Steel.
	Heat Transfer Fluid	Propylene Glycol (Ethylene Glycol available for arctic duty - check with local Chromalox sales office.)
	Heating Element Assembly	Immersion heater assembly with seamless copper sheathed heating elements.
CABINET	Cabinet	14 gauge steel, polyester powder-coated. Individually adjustable louvers with minimum position stops.
	Fan Guard	Heavy duty polyester powder-coated steel.
	Fasteners	Nickel plated steel for corrosion resistance.
	Conduit Material	Plated steel for corrosion resistance.
	Control Enclosure	Cast aluminum (non-copper Alloy) NEMA 7 and 9 enclosure.
	Hanger Connections	2 (two) 5/8" UNC tapped holes.
CONTROLS	Control Circuit	Built in 120V control. Optional 24V control available.
	Power Contactor	50 Amp/600V.
	Transformer	Primary voltage same as heater voltage - secondary voltage, 24V or 120V.

CXH-A

Explosion Proof Blower Heater for Hazardous Locations (cont'd.)

Ordering Information

To Order — Complete the Model Number using the Matrix Provided.

Model Numbers

When ordering CXH-A heaters, specify the model number and corresponding PCN (Product Code Number, found in the Ordering Information Table). If thermostat, or disconnect switch options are required, designate these options in addition to the model number when ordering. Use PCN Numbers only on standard models. On made to order CXH heaters, complete catalog number from matrix provided. Always specify voltage, phase and kW by listing them on the purchase order product specifications.

Model Explosion Proof Blower Heater									
CXH-A									
Code	Heating Element Rating (kW)								
03	3								
05	5								
07	7.5								
10	10								
15	15								
18	18								
20	20								
25	25								
30	30								
35	35								
Code	Heater Volts								
2	240								
3	380 (3 phase only)								
4	480 (3 phase only)								
5	415 (3 phase only)								
6	575 (3 phase only)								
8	208								
9	600 (3 phase only)								
Code	Phase								
1	1								
3	3								
Code	Control Volts								
30	24								
32	120 (Std.)								
Code	Thermostat Option								
00	Without Thermostat								
40	Thermostat								
Code	Heat Exchanger								
1	Ethylene Groups C, D, E, F, G								T3B
2	Propylene Groups C, D, E, F, G (Std.)								T3B
3	Ethylene Groups C, D, F, G								T3C
4	Propylene Groups C, D, F, G								T3C
Code	Options								
0	Without Disconnect								
1	Disconnect: 15 Amp 3-phase, 30 Amp 1-phase or 3-phase, specify as required								
2	60 Amp Disconnect								
3	Pilot Light No Disconnect								
4	Pilot Light and 30 Amp Disconnect								
5	Pilot Light and 60 Amp Disconnect								
6	Summer Fan Switch								
7	Summer with Pilot Light								
8	Disconnect with Fan Switch								
9	Disconnect Pilot Light and Fan Switch								
Code									
EP	Explosion Proof								
CXH-A	10	4	3	30	40	1	1	EP	Typical Model Number

CXH-A

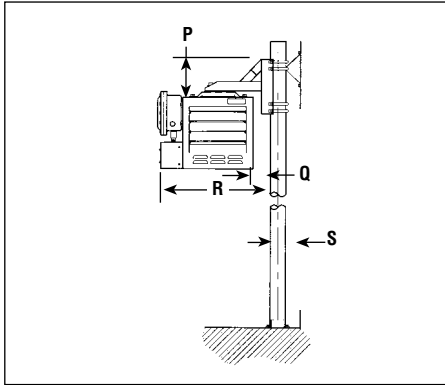
Explosion Proof Blower Heater for Hazardous Locations (*cont'd.*)

Mounting Kits

Pole (PMB)¹

Particularly useful in buildings with insufficient strength to use other types of mounts. Requires 3-1/2" schedule 40 pipe (4" O.D.) - not supplied.

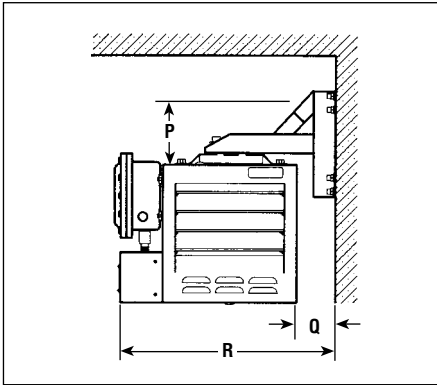
Pole Mounting Bracket



Wall (WMB)¹

Ideal for use in buildings that have substantial walls. Arm only can also be bolted directly to structural steel.

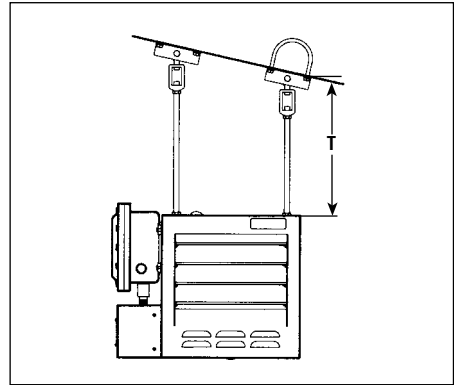
Wall Mounting Bracket



Ceiling (HMK)

Simple and economical if adequate overhead structure exists. Requires 5/8" rod, cut and threaded (not supplied).

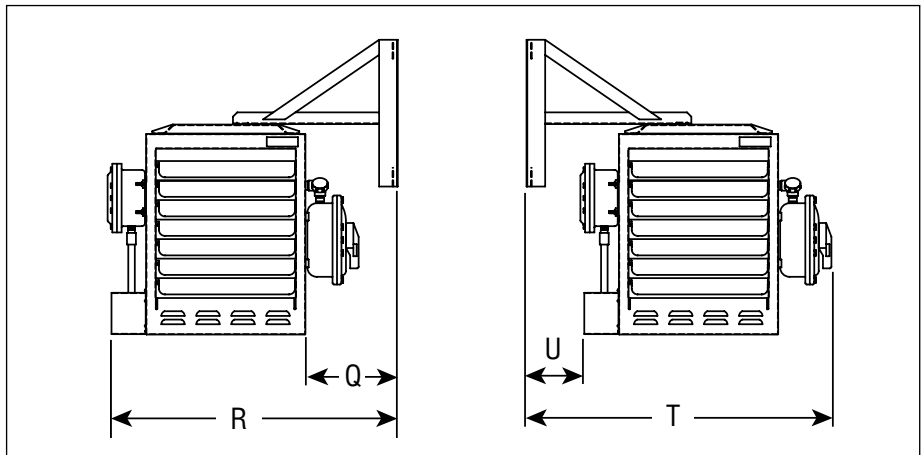
Ceiling Mounting Bracket



Mounting Kits

Heater	Pole		Wall		Ceiling		Dimensions In. (mm.)				
	Model	PCN	Model	PCN	Model	PCN	P	Q	R	S	T (Min.)
CXH-A-03 to -10	PMB-12	025179	WMB-12	025152	HMK-00	025195	10 (254.0)	5-1/2 (139.7)	29-1/2 (749.3)	6 (152.4)	7 (177.8)
CXH-A-15 to -20	PMB-16	025187	WMB-16	025160	HMK-00	025195	11-1/2 (292.1)	5-1/8 (130.2)	33 (838.2)	6 (152.4)	7 (177.8)
CXH-A-25 to -35	PMB-20	029073	WMB-20	029065	HMK-00	025195	14-1/2 (368.3)	5-3/8 (136.5)	38-1/4 (971.6)	6 (152.4)	7 (177.8)

Wall Mounting Kits (for models supplied with disconnect switch)



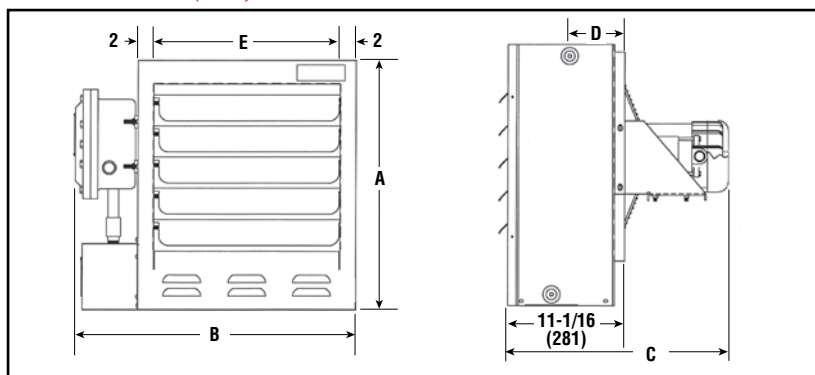
Wall Mounting Kits (for models supplied with disconnect switch)

Heater	Model	PCN	Dimensions In. (mm)				Wt. Lbs. (kg)
			Q	R	T	U	
CXH-A-03 to -10	WMBD-12	028880	7-7/8 (200.0)	31-1/16 (789.0)	30-1/8 (765.2)	6-15/16 (176.2)	26 (11.8)
CHX-A-15 to -20	WMBD-16	028898	13-3/4 (349.3)	40-15/16 (1039.8)	35-3/8 (898.5)	8-3/16 (208.0)	28 (12.7)
CHX-A-25 to -35	WMBD-20	028900	14-7/8 (377.8)	16-1/16 (408.0)	40-1/2 (1028.7)	9-5/16 (236.5)	30 (13.6)

CXH-A

Explosion Proof Blower Heater for Hazardous Locations (cont'd.)

Dimensions In. (mm)



Heater Dimensions In. (mm)

Heater	Dimensions (In.)				
	A	B	C	D	E (Mtg. Holes)
CXH-A-03 to -10	19-1/8 (485.8)	23-7/8 (606.4)	21 (533.4)	3-1/2 (88.9)	13-5/8 (346.1)
CXH-A-15 to -20	25 (635.0)	27-7/8 (708.0)	21 (533.4)	4-13/32 (111.9)	17-5/8 (447.7)
CXH-A-25 to -35	32-5/39 (816.1)	31-7/8 (809.6)	21-3/4 (552.5)	5-1/2 (139.7)	21-5/8 (549.3)

Notes —
A. E dimension mounting hole center to center.
B. Disconnect switch option increases B dimension by 7 inches (177.8 mm).

CXH-A

Explosion Proof Blower Heater for Hazardous Locations (cont'd.)

Optional Controls & Disconnects

Built-in Adjustable Thermostat

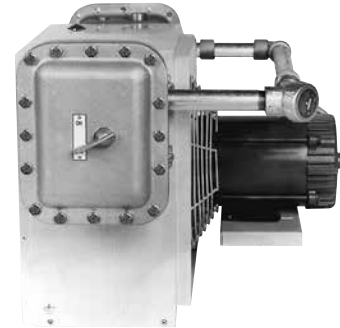
- Temperature range 50°F to 90°F (10°C to 32°C)
- Adjustable control knob on exterior of explosion-proof enclosure
- Mounted and wired to heater control center
- Eliminates installation of wall thermostats and associated explosion-proof conduit.
- Factory Installed

Built-in Disconnect Switch

- 15, 30 or 60 Amp as required by application
- Factory installed, eliminating field labor
- Meets National Electric Code (NEC)

Built-in Fan Switch

- Allows fan only operation for cooling



Specifications and Ordering Information

Electrical (60 Hz)				Control Volts	Motor			Air Delivery				Mtg. Height Ft. (mm.)	Ordering			
kW	Volts	Phase	Full Load Amps		Phase	HP	RPM	Air Flow F³/min (m³/hr)	Air Speed ft/min (m/min)	Temp. Rise ° F (°C)	Horiz. Throw Ft. (mm)		Model	Stock	PCN	Wt. (Lbs.)
Standard Models																
3	208	1	16.7	120	1	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-81-32-00-20EP	NS	026008	135 (61.4)
3	208	3	9.7	120	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-83-32-00-20EP	NS	026016	135 (61.4)
3	240	1	14.8	120	1	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-21-32-00-20EP	NS	026024	135 (61.4)
3	240	3	8.6	120	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-23-32-00-20EP	NS	026032	135 (61.4)
3	480	3	4.3	120	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-43-32-00-20EP	NS	026040	135 (61.4)
3	575	3	3.6	120	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-63-32-00-20EP	NS	026059	135 (61.4)
3	208	1	16.7	24	1	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-81-30-00-20EP	NS	026067	135 (61.4)
3	208	3	9.7	24	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-83-30-00-20EP	NS	026075	135 (61.4)
3	240	1	14.8	24	1	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-21-30-00-20EP	NS	026083	135 (61.4)
3	240	3	8.6	24	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-23-30-00-20EP	NS	026091	135 (61.4)
3	480	3	4.3	24	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-43-30-00-20EP	NS	026104	135 (61.4)
3	575	3	3.6	24	3	1/4	1,725	700 (1189)	900 (274.3)	13 (7.2)	28 (8.5)	8 (2.4)	CXH-A-03-63-30-00-20EP	NS	026112	135 (61.4)
5	208	1	26.3	120	1	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-81-32-00-20EP	NS	026120	135 (61.4)
5	208	3	15.3	120	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-83-32-00-20EP	NS	026139	135 (61.4)
5	240	1	23.1	120	1	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-21-32-00-20EP	NS	026147	135 (61.4)
5	240	3	13.4	120	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-23-32-00-20EP	NS	026155	135 (61.4)
5	480	3	6.7	120	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-43-32-00-20EP	S	026163	135 (61.4)
5	575	3	5.6	120	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-63-32-00-20EP	NS	026171	135 (61.4)
5	208	1	26.3	24	1	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-81-30-00-20EP	NS	026180	135 (61.4)
5	208	3	15.3	24	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-83-30-00-20EP	NS	026198	135 (61.4)
5	240	1	23.1	24	1	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-21-30-00-20EP	NS	026200	135 (61.4)
5	240	3	13.4	24	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-23-30-00-20EP	NS	026219	135 (61.4)
5	480	3	6.7	24	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-43-30-00-20EP	NS	026227	135 (61.4)
5	575	3	5.6	24	3	1/4	1,725	700 (1189)	900 (274.3)	22 (12.2)	28 (8.5)	8 (2.4)	CXH-A-05-63-30-00-20EP	NS	026235	135 (61.4)
7.5	208	1	38.4	120	1	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-81-32-00-20EP	NS	026243	135 (61.4)
7.5	208	3	22.2	120	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-83-32-00-20EP	NS	026251	135 (61.4)
7.5	240	1	33.6	120	1	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-21-32-00-20EP	NS	026260	135 (61.4)
7.5	240	3	19.4	120	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-23-32-00-20EP	NS	026278	135 (61.4)
7.5	480	3	9.7	120	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-43-32-00-20EP	NS	026286	135 (61.4)
7.5	575	3	8.1	120	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-63-32-00-20EP	NS	026294	135 (61.4)
7.5	208	1	38.4	24	1	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-81-30-00-20EP	NS	026307	135 (61.4)
7.5	208	3	22.2	24	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-83-30-00-20EP	NS	026315	135 (61.4)
7.5	240	1	33.6	24	1	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-21-30-00-20EP	NS	026323	135 (61.4)
7.5	240	3	19.4	24	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-23-30-00-20EP	NS	026331	135 (61.4)
7.5	480	3	9.7	24	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-43-30-00-20EP	NS	026340	135 (61.4)
7.5	575	3	8.1	24	3	1/4	1,725	840 (1427)	1070 (326.1)	27 (15.0)	32 (9.8)	10 (3.0)	CXH-A-07-63-30-00-20EP	NS	026358	135 (61.4)

CXH-A

Explosion Proof Blower Heater for Hazardous Locations (cont'd.)

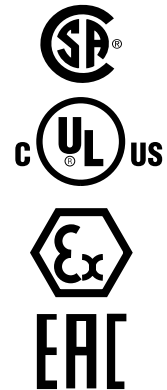
HAZARDOUS LOCATION &
CORROSIVE ENVIRONMENT
HEATERS & ACCESSORIES

Electrical (60 Hz)				Motor				Air Delivery				Mtg. Height Ft. (mm.)	Ordering			
kW	Volts	Phase	Full Load Amps	Control Volts	Phase	HP	RPM	Air Flow ft ³ /min (m ³ /hr)	Air Speed ft/min (m/min)	Temp. Rise °F (°C)	Horiz. Throw Ft. (mm.)		Model	Stock	PCN	Wt. (Lbs.)
10	240	1	44	120	1	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-21-32-00-20EP	NS	026374	140 (63.6)
10	240	3	25.5	120	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-23-32-00-20EP	NS	026382	140 (63.6)
10	480	3	12.7	120	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-43-32-00-20EP	S	025101	140 (63.6)
10	575	3	10.6	120	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-63-32-00-20EP	NS	026390	140 (63.6)
10	208	3	29.2	24	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-83-30-00-20EP	NS	026403	140 (63.6)
10	240	1	44	24	1	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-21-30-00-20EP	NS	026411	140 (63.6)
10	240	3	25.5	24	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-23-30-00-20EP	NS	026420	140 (63.6)
10	480	3	12.7	24	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-43-30-00-20EP	NS	026438	140 (63.6)
10	575	3	10.6	24	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-63-30-00-20EP	NS	026446	140 (63.6)
15	208	3	43	120	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-83-32-00-20EP	NS	026454	160 (72.7)
15	240	3	37.5	120	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-23-32-00-20EP	NS	026462	160 (72.7)
15	480	3	18.7	120	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-43-32-00-20EP	S	026470	160 (72.7)
15	575	3	15.7	120	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-63-32-00-20EP	NS	026489	160 (72.7)
15	208	3	43	24	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-83-30-00-20EP	NS	026497	160 (72.7)
15	240	3	37.5	24	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-23-30-00-20EP	NS	026500	160 (72.7)
15	480	3	18.7	24	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-43-30-00-20EP	NS	026518	160 (72.7)
15	575	3	15.7	24	3	1/4	1,725	1450 (2464)	1040 (317.0)	31 (17.2)	47 (14.3)	10 (3.0)	CXH-A-15-63-30-00-20EP	NS	026526	160 (72.7)
18	240	3	44.7	120	3	1/4	1,725	1400 (2379)	1000 (304.8)	39 (21.7)	43 (13.1)	10 (3.0)	CXH-A-18-23-32-00-20EP	NS	026534	171 (77.7)
18	240	3	44.7	24	3	1/4	1,725	1400 (2379)	1000 (304.8)	39 (21.7)	43 (13.1)	10 (3.0)	CXH-A-18-23-30-00-20EP	NS	026542	171 (77.7)
20	480	3	24.8	120	3	1/4	1,725	1400 (2379)	1000 (304.8)	43 (23.9)	43 (13.1)	10 (3.0)	CXH-A-20-43-32-00-20EP	S	025110	171 (77.7)
20	575	3	20.7	120	3	1/4	1,725	1400 (2379)	1000 (304.8)	43 (23.9)	43 (13.1)	10 (3.0)	CXH-A-20-63-32-00-20EP	NS	026550	171 (77.7)
20	480	3	24.8	24	3	1/4	1,725	1400 (2379)	1000 (304.8)	43 (23.9)	43 (13.1)	10 (3.0)	CXH-A-20-43-30-00-20EP	NS	026569	171 (77.7)
20	575	3	20.7	24	3	1/4	1,725	1400 (2379)	1000 (304.8)	43 (23.9)	43 (13.1)	10 (3.0)	CXH-A-20-63-30-00-20EP	NS	026577	171 (77.7)
25	480	3	31.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	32 (17.8)	54 (16.5)	10 (3.0)	CXH-A-25-43-32-00-20EP	NS	028556	216 (98.2)
25	575	3	25.8	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	32 (17.8)	54 (16.5)	10 (3.0)	CXH-A-25-63-32-00-20EP	NS	028589	216 (98.2)
25	480	3	31.1	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	32 (17.8)	54 (16.5)	10 (3.0)	CXH-A-25-43-30-00-20EP	NS	028602	216 (98.2)
25	575	3	25.8	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	32 (17.8)	54 (16.5)	10 (3.0)	CXH-A-25-63-30-00-20EP	NS	028609	216 (98.2)
30	480	3	37.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	39 (21.7)	54 (16.5)	10 (3.0)	CXH-A-30-43-32-00-20EP	S	028564	216 (98.2)
30	575	3	30.2	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	39 (21.7)	54 (16.5)	10 (3.0)	CXH-A-30-63-32-00-20EP	NS	028615	216 (98.2)
30	480	3	37.1	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	39 (21.7)	54 (16.5)	10 (3.0)	CXH-A-30-43-30-00-20EP	NS	028620	216 (98.2)
30	575	3	30.2	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	39 (21.7)	54 (16.5)	10 (3.0)	CXH-A-30-63-30-00-20EP	NS	028625	216 (98.2)
35	480	3	43.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	45 (25.0)	54 (16.5)	10 (3.0)	CXH-A-35-43-32-00-20EP	NS	028572	216 (98.2)
35	575	3	36	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	45 (25.0)	54 (16.5)	10 (3.0)	CXH-A-35-63-32-00-20EP	NS	028605	216 (98.2)
35	480	3	43.1	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	45 (25.0)	54 (16.5)	10 (3.0)	CXH-A-35-43-30-00-20EP	NS	028612	216 (98.2)
35	575	3	36	24	3	1/2	1,725	2330 (3959)	1070 (326.1)	45 (25.0)	54 (16.5)	10 (3.0)	CXH-A-35-63-30-00-20EP	NS	028617	216 (98.2)
Models with Built-In Thermostats																
10	480	3	12.7	120	3	1/4	1,725	840 (1427)	1070 (326.1)	36 (20.0)	32 (9.8)	10 (3.0)	CXH-A-10-43-32-40-20EP	S	028580	150 (68.2)
20	480	3	24.8	120	3	1/4	1,725	1400 (2379)	1070 (326.1)	43 (23.9)	43 (13.1)	10 (3.0)	CXH-A-20-43-32-40-20EP	S	028599	161 (73.2)
25	480	3	31.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	32 (17.8)	54 (16.5)	10 (3.0)	CXH-A-25-43-32-40-20EP	NS	028601	216 (98.2)
30	480	3	37.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	39 (21.7)	54 (16.5)	10 (3.0)	CXH-A-30-43-32-40-20EP	S	028610	216 (98.2)
35	480	3	43.1	120	3	1/2	1,725	2330 (3959)	1070 (326.1)	45 (25.0)	54 (16.5)	10 (3.0)	CXH-A-35-43-32-40-20EP	S	-	216 (98.2)
Stock Status: S = stock NS = non-stock																
To Order—Specify model, PCN, kW, volts, phase and quantity.																

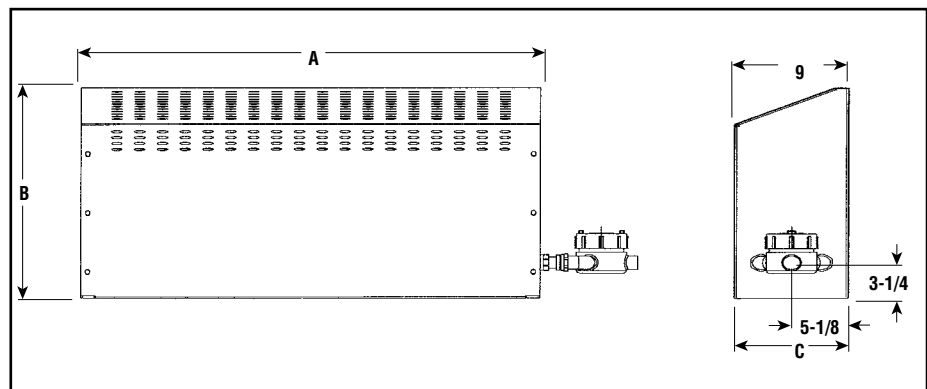
CVEP

Explosion Proof Convection Heater

- 1.6 - 9 kW
- 5,459 - 30,708 Btuh
- 120, 208, 240, 277, 480 and 575 Volt
- 1 & 3 Phase
- Built-in & Prewired Control Options
- UL Listed and CSA Certified for Class 1, Division 1 or 2, Group B, C & D Environments
- ATEX and EAC Models Available



Dimensions (Inches)



Description

Type CVEP explosion proof convection heater is designed to provide a rugged, corrosion-resistant heat source for areas where volatile flammable liquids, gases or vapors are present. All basic models without controls are UL listed and CSA certified for use in areas designated as Class 1, Division 1 or 2 Group B, C or D locations.

Applications

- Petroleum Refineries, Gasoline Storage and Dispensing Areas
- Industrial Areas Using Flammable Liquids in Dip Tanks
- Petroleum Refineries
- Dry Cleaning Plants
- Utility and Natural Gas Plants
- Aircraft Hangers/Fueling Areas
- Solvent Extraction Plants
- Storage Areas for Flammable Products or Batteries
- Sewage Treatment Plants
- Hydrogen Atmospheres

Dimensions (Inches)

kW	A	B	C
1.6, 1.8 and 3.6	34	20	9
3.2 and 7.6	58	20	9
4.0, 4.5 and 9.0	70	20	9

Construction

Cabinet — Sloped top, constructed of heavy 16 gauge steel, polyester powder coated for maximum corrosion resistance.

Explosion Proof Junction Box — For conduit entry and ease of power wiring.

Heating Elements — Sealed, metal sheath, heavy-duty, low watt density, enclosed high grade resistance wire embedded in MgO refractory core. Elements are inserted in a copper tube with aluminum fins.

Features

Integral Mounting Brackets allow for easy wall installation.

Sloped Top Cabinet ensures maximum ventilation by preventing objects from being placed on the top which would restrict air flow.

Designed for Areas Classified

- Class I, Division 1 or 2, Groups B, C, D
- Temperature Code T3A 180°C (356°F) or T2A 280°C (536°F)
- II2G Ex d IIB T2-T3

Optional Features (Factory Installed)

- Thermostat
- Magnetic Contactor
- Control Voltage Transformer

Advantages

- Easy Installation
- Clean, Safer Heat Source
- Pre-Wired Control Options
- Long Life

Refer to WR-80EP
in the Controls section.

CVEP

Explosion Proof Convection Heater (cont'd.)

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Power & Temp. Control Options

Power Control Combination	Thermostat Option	Figure Number
00	00	1
00	40 ¹	5
00	42 ²	2
30 - 35	00	4
30 - 35	40	5
30 - 35	42	3

¹ Thermostat option: 40
Temperature range: 40° - 90°F
Electrical Rating: 25 Amp 24V, 120V, 240V
AC 22 Amp 277 VAC
Higher Voltage or 3
phase requires magnetic
contactor option and
transformer

² Thermostat option: 42
Temperature range: 50° - 90°F
Electrical Rating: 22 Amps 125/277 VAC
Higher Voltage or 3
phase requires magnetic
contactor option and
transformer

Model Explosion Proof Convection Heater

CVEP

Code Watts

16	1600	40	4000
18	1800	45	4500
32	3200	76	7600
36	3600	90	9000

Code Voltage

1	120	6	575
2	240	7	277
3	380	8	208
4	480	9	600
5	415		

Code Phase

1	Single
3	Three

Code Power Control Options (See Options Table)

00	no transformer no contactor
30	(24V) transformer and contactor
31	no transformer with contactor(24V)
32	(120V) transformer and contactor
33	no transformer with contactor(120V)
34	no transformer with contactor(208/240V)
35	no transformer with contactor(277V)

Code Thermo/Class Options (See Options Table)

00	no thermo B, C & D
40	thermo in box B, C & D
42	thermo C & D

CVEP 16 1 1 30 42 Typical Model Number

CE approved models available. Contact your Chromalox representative.

Dimensions (Inches)

Figure 1

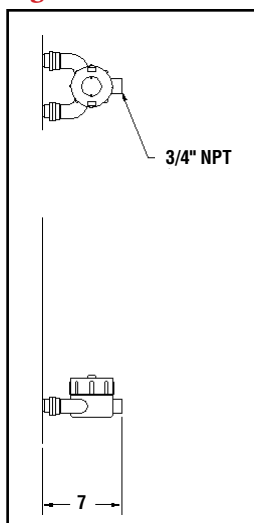


Figure 2

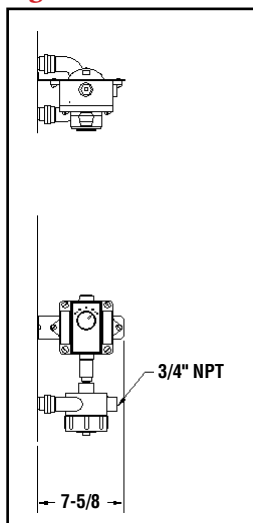


Figure 3

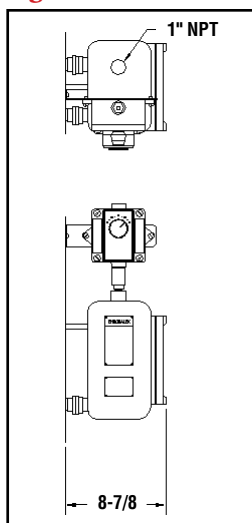


Figure 4

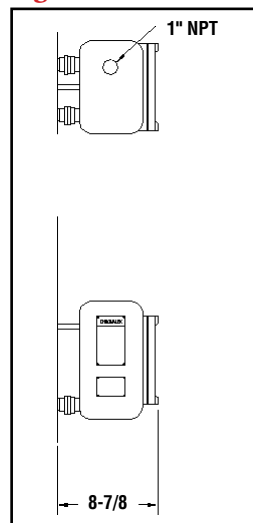
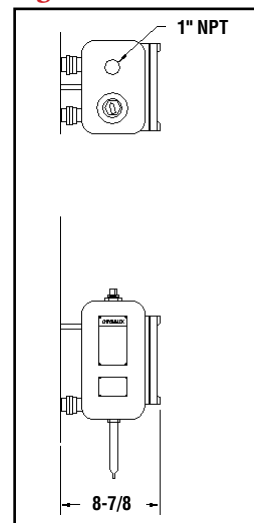


Figure 5



CVEP

Convection Heater For Hazardous Locations

Specifications and Ordering Information

Electrical					Model	Stock	PCN	Wt. (Lbs.)
kW	Volts	Phase	Amps	Btuh				
Temperature Code T3A (356°F, 180°C) Group B, C, and D								
1.6	208	1	7.7	5,500	CVEP-16-81-00-00	NS	088336	58
1.6	208	3	4.5	5,500	CVEP-16-83-00-00	NS	086844	58
1.6	240	1	6.7	5,500	CVEP-16-21-00-00	NS	086852	58
1.6	240	3	3.8	5,500	CVEP-16-23-00-00	NS	086860	58
1.6	277	1	5.8	5,500	CVEP-16-71-00-00	NS	086879	58
1.6	480	1	3.3	5,500	CVEP-16-41-00-00	NS	086887	58
1.6	480	3	1.9	5,500	CVEP-16-43-00-00	NS	086895	58
1.6	575	1	2.8	5,500	CVEP-16-61-00-00	NS	086908	58
3.2	208	1	15.4	11,000	CVEP-32-81-00-00	NS	086916	94
3.2	208	3	9.0	11,000	CVEP-32-83-00-00	NS	086924	94
3.2	240	1	13.3	11,000	CVEP-32-21-00-00	NS	086932	94
3.2	240	3	7.7	11,000	CVEP-32-23-00-00	NS	086940	94
3.2	277	1	11.6	11,000	CVEP-32-71-00-00	NS	086959	94
3.2	480	1	6.7	11,000	CVEP-32-41-00-00	NS	086967	94
3.2	480	3	3.8	11,000	CVEP-32-43-00-00	NS	086975	94
3.2	575	1	5.6	11,000	CVEP-32-61-00-00	NS	086983	94
4	208	1	19.2	13,600	CVEP-40-81-00-00	NS	086991	112
4	208	3	11.1	13,600	CVEP-40-83-00-00	NS	087003	112
4	240	1	16.7	13,600	CVEP-40-21-00-00	NS	087011	112
4	240	3	9.6	13,600	CVEP-40-23-00-00	NS	087020	112
4	277	1	14.4	13,600	CVEP-40-71-00-00	NS	087038	112
4	480	1	8.3	13,600	CVEP-40-41-00-00	NS	087046	112
4	480	3	4.8	13,600	CVEP-40-43-00-00	NS	087054	112
4	575	1	7	13,600	CVEP-40-61-00-00	NS	087062	112
Temperature Code T2A (536°F, 280°C) Group B, C, and D								
1.8	120	1	15	6,140	CVEP-18-11-00-00	NS	028759	46
1.8	208	1	8.7	6,140	CVEP-18-81-00-00	NS	028767	46
1.8	208	3	5	6,140	CVEP-18-83-00-00	NS	028775	46
1.8	240	1	7.5	6,140	CVEP-18-21-00-00	S	028783	46
1.8	240	3	4.4	6,140	CVEP-18-23-00-00	NS	028791	46
1.8	277	1	6.5	6,140	CVEP-18-71-00-00	NS	028804	46
1.8	480	1	3.7	6,140	CVEP-18-41-00-00	NS	028812	46
1.8	480	3	2.2	6,140	CVEP-18-43-00-00	NS	028820	46
3.6	208	1	17.3	12,300	CVEP-36-81-00-00	S	087070	58
3.6	208	3	10	12,300	CVEP-36-83-00-00	NS	087089	58
3.6	240	1	15	12,300	CVEP-36-21-00-00	S	087097	58
3.6	240	3	8.7	12,300	CVEP-36-23-00-00	NS	087100	58
3.6	277	1	13	12,300	CVEP-36-71-00-00	NS	087118	58
3.6	480	1	7.5	12,300	CVEP-36-41-00-00	S	087126	58
3.6	480	3	4.3	12,300	CVEP-36-43-00-00	NS	087134	58
3.6	575	1	6.3	12,300	CVEP-36-61-00-00	NS	087142	58
7.6	208	1	36.5	24,000	CVEP-76-81-00-00	NS	085913	94
7.6	208	3	21.1	24,000	CVEP-76-83-00-00	NS	085921	94
7.6	240	1	31.7	24,000	CVEP-76-21-00-00	S	085930	94
7.6	240	3	18.3	24,000	CVEP-76-23-00-00	NS	085948	94
7.6	277	1	27.4	24,000	CVEP-76-71-00-00	NS	085956	94
7.6	480	1	15.8	24,000	CVEP-76-41-00-00	NS	085964	94
7.6	480	3	9.2	24,000	CVEP-76-43-00-00	NS	085972	94
7.6	575	1	13.2	24,000	CVEP-76-61-00-00	NS	085980	94
9	208	1	43.3	30,700	CVEP-90-81-00-00	NS	087230	112
9	208	3	25	30,700	CVEP-90-83-00-00	NS	087249	112
9	240	1	37.5	30,700	CVEP-90-21-00-00	NS	087257	112
9	240	3	21.7	30,700	CVEP-90-23-00-00	NS	087265	112
9	277	1	32.5	30,700	CVEP-90-71-00-00	NS	087273	112
9	480	1	18.8	30,700	CVEP-90-41-00-00	NS	087281	112
9	480	3	10.8	30,700	CVEP-90-43-00-00	NS	087290	112
9	575	1	15.7	30,700	CVEP-90-61-00-00	NS	087302	112
Stock CVEP with Built-in Thermostat								
1.8	120	1	15	6,140	CVEP-18-11-00-42	S	028839	59
1.8	208	1	8.7	6,140	CVEP-18-81-00-42	S	028847	59
1.8	240	1	7.5	6,140	CVEP-18-21-00-42	NS	028855	59
1.8	277	1	6.5	6,140	CVEP-18-71-00-42	NS	028863	59
1.8	480	1	3.7	6,140	CVEP-18-41-32-42 ¹	NS	028871	69
3.6	208	1	17.3	12,300	CVEP-36-81-00-42	S	028644	60
3.6	240	1	15	12,300	CVEP-36-21-00-42	S	028660	60
3.6	480	1	7.5	12,300	CVEP-36-41-32-42 ¹	NS	028652	70

Stock Status: S = stock AS = assembly stock NS = non-stock
To Order—Specify model, PCN, kW, volts, phase and quantity.
 CE approved models available. Contact your Chromalox representative.

Note —

1. Includes control transformer and contactor
2. Other sizes and configurations available, contact your Local Chromalox Sales office.

HD3D

Hose Down Corrosion Resistant Blower Heater

- 2 - 39 kW
- 6,800 - 133,110 Btuh
- 120, 208, 240, 277, 480 and 575 Volt (up to 690V available without 3rd party)
- 1 & 3 Phase
- Built-in Controls
- Vertical or Horizontal Airflow
- Wall or Ceiling Mounted Configurations

Advantages

Because it has an adjustable discharge grille to direct air flow, and can be wall or ceiling (plus swivel) mounted, the HD3D heater may be used in a variety of heating applications:

- Primary Heating
- Supplementary Heating
- Dual System Heating
- Spot Heating
- Entryway Air-Curtain Heating
- Freeze Protection

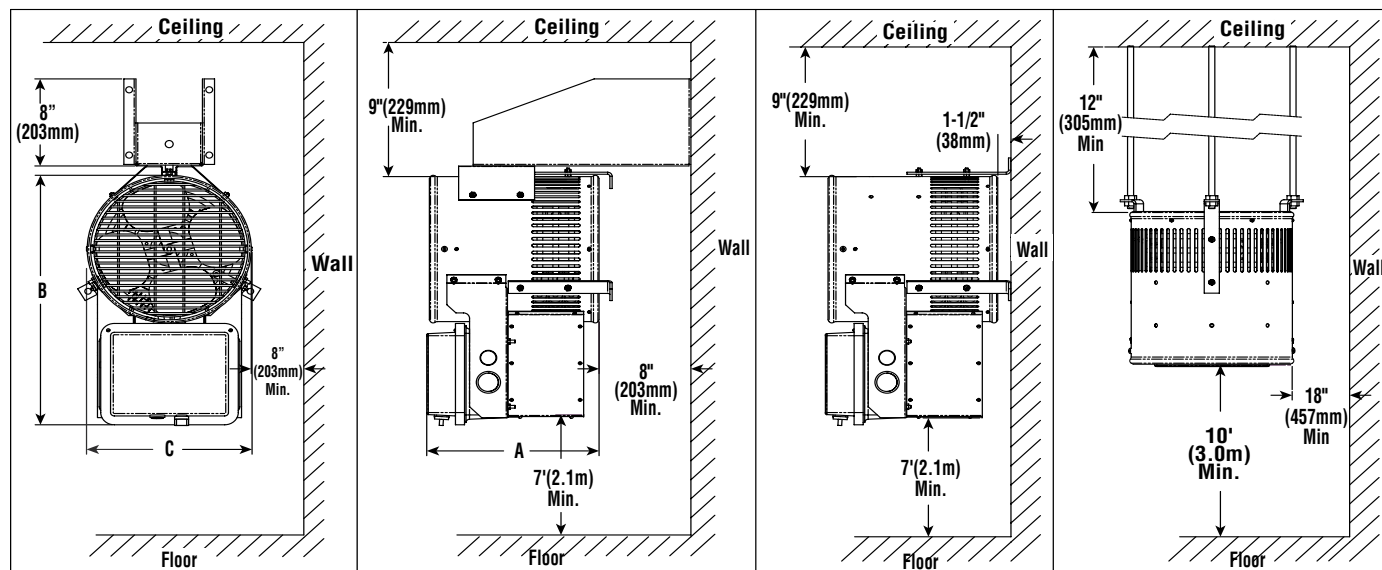
Description

This reliable, rugged, self-contained HD3D heater is an ideal heat source for freeze protection or comfort heat in dusty/dirty/corrosive non-hazardous environments. Standard HD3D heaters include low profile stainless steel wall/ceiling mounting brackets that can be used to mount directly to a wall for horizontal airflow perpendicular to the wall. These brackets can also be used to mount the heater directly to the ceiling for vertical airflow.

Dimensions In. (mm)

kW	Volts	Phase	A	B	C
2.0 - 7.5	All	1, 3	13-1/2 (342.9)	24-1/2 (622.3)	15 (381.0)
10.0 - 20.0	All	1, 3	17-1/4 (438.2)	28 (711.2)	15-1/8 (384.2)
25.0 - 39.0	480, 575	3	21-1/4 (539.8)	32-1/4 (819.2)	19-1/2 (495.3)

Dimensions In. (mm)



HAZARDOUS LOCATION & CORROSIVE ENVIRONMENT HEATERS & ACCESSORIES

Selector Switch and Pilot Light

HD3D

Hose Down Corrosion Resistant Blower Heater

(cont'd.)

Construction

Roll Formed Case is constructed of 20 gauge corrosion resistant type 304 stainless steel.

Adjustable Discharge Grille directs air flow up or down as needed.

NEMA 4X Control Enclosure houses the heater controls, contactors and control voltage transformer, easily accessible from front of heater.

Heating Elements — High quality, long-life, Stainless Steel Fintube® (type 316) offers maximum resistance to corrosion.

Totally Enclosed Motor — The motor is permanently lubricated, ball bearing type and is epoxy painted for moisture and corrosion resistance.

Dynamically Balanced Fan — Aluminum fan is epoxy coated and provides optimum air flow across the heating elements.

Features

Transformer provides a 120V control circuit (24V optional). Standard on all units except 2 kW and 3 kW, 120V.

Heavy Duty Contactors for heating circuit and motor are included. (Not furnished on 120V, 2 and 3 kW units)

Automatic Reset Thermal Cutout is provided for fast heat response and overheat protection.

Fan Time Delay Relay dissipates residual heat build-up after shutdown.

Low Profile Fixed Wall & Ceiling Mounting Bracket (Non Swiveling)

Optional Features

- Integral Thermostat*
 - 40°F to 100°F (4.4°C to 37.8°C)
- Pilot Light*
 - Green Indicates Power On
- Selector Switch (3 position) — Heater On,* Off or Fan Only Operation for Heater
- Manual Reset Cutout
- Epoxy Painted Stainless Steel Case
- 24V Control Circuit

Accessories

Universal Swivel Wall & Ceiling Brackets Ordering Information

Model	PCN	Used With	Stock Status
USB-1	520604	HD3D 200 to 750	S
USB-2	520612	HD3D 1000 to 2000	S
USB-3	520620	HD3D 2500 to 4000	S

External Drip Shields Ordering Information

Model	PCN	Used With	Stock Status
HD3DS-1	520639	HD3D 200 to 750	S
HD3DS-2	520647	HD3D 1000 to 2000	S
HD3DS-3	520655	HD3D 2500 to 4000	S

Field Installable Disconnect Kit

The disconnect kit consists of a complete liquid tight assembly, including a 3-pole 48 Amp Switch, power terminal block and all the hardware to mount to the main heater enclosure. Positive action to remove all power from enclosure.

Ordering Information

Model	PCN	Used With	Stock Status
DS-50HD	520663	All	S

HD3D Hose Down Corrosion Resistant Blower Heater (cont'd.)

Specifications and Ordering Information

Electrical (60 Hz)				Motor				CFM	Air Delivery				Mtg. Ht. **	Ordering			
kW	Volts	Phase	Full Load Amps	Control Volts	Phase	HP	RPM		Air Flow ft ³ /min (m ³ /hr)	Air Speed ft/min (m/min)	Temp. Rise °F (°C)	Horiz. Throw ft. (m)		Model	Stock	PCN	Wt. Lbs. (kg)
2	120	1	17.5	115	1	1/15	1,050	405	405 (688)	430 (131.1)	21 (11.7)	12 (3.7)	7 (2.1)	HD3D-200	NS	520014	45 (20.5)
2	208	1	10	208	1	1/15	1,050	405	405 (688)	430 (131.1)	21 (11.7)	12 (3.7)	7 (2.1)	HD3D-200	NS	520022	45 (20.5)
2	240	1	9	240	1	1/15	1,050	405	405 (688)	430 (131.1)	21 (11.7)	12 (3.7)	7 (2.1)	HD3D-200	NS	520030	45 (20.5)
2	277	1	7.5	277	1	1/15	1,050	405	405 (688)	430 (131.1)	21 (11.7)	12 (3.7)	7 (2.1)	HD3D-200	NS	520049	45 (20.5)
3	120	1	25.5	115	1	1/15	1,050	405	405 (688)	430 (131.1)	31 (17.2)	12 (3.7)	7 (2.1)	HD3D-300	NS	520057	45 (20.5)
3	208	1	15	208	1	1/15	1,050	405	405 (688)	430 (131.1)	31 (17.2)	12 (3.7)	7 (2.1)	HD3D-300	NS	520065	45 (20.5)
3	240	1	13	240	1	1/15	1,050	405	405 (688)	430 (131.1)	31 (17.2)	12 (3.7)	7 (2.1)	HD3D-300	NS	520073	45 (20.5)
3	277	1	11.5	277	1	1/15	1,050	405	405 (688)	430 (131.1)	31 (17.2)	12 (3.7)	7 (2.1)	HD3D-300	NS	520081	45 (20.5)
5	208	1	24.5	208	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520090	50 (22.7)
5	240	1	21.5	240	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520102	50 (22.7)
5	277	1	18.5	277	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520110	50 (22.7)
5	480	1	11	480	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520129	50 (22.7)
5	208	3	14.5	208	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520137	50 (22.7)
5	240	3	12.5	240	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520145	50 (22.7)
5	480	3	6.5	480	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500 [†]	S	520153	50 (22.7)
5	480	3	6.5	480	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500 TSP ^{††}	S	520161	51 (23.2)
5	575	3	5.5	575	1	1/15	1,050	405	405 (688)	430 (131.1)	40 (22.2)	12 (3.7)	7 (2.1)	HD3D-500	NS	520170	50 (22.7)
7.5	208	1	36.5	208	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520188	50 (22.7)
7.5	240	1	31.5	240	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520196	50 (22.7)
7.5	277	1	27.5	277	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520209	50 (22.7)
7.5	480	1	16	480	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520217	50 (22.7)
7.5	208	3	21	208	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520225	50 (22.7)
7.5	240	3	18.5	240	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520233	50 (22.7)
7.5	480	3	9.5	480	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750 [†]	S	520241	50 (22.7)
7.5	480	3	9.5	480	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750 TSP ^{††}	S	520250	51 (23.2)
7.5	575	3	8	575	1	1/15	1,050	590	590 (1002)	640 (195.1)	37 (20.6)	13 (4.0)	7 (2.1)	HD3D-750	NS	520268	50 (22.7)
10	240	1	42	240	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520276	60 (27.3)
10	277	1	36.5	277	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520284	60 (27.3)
10	480	1	21	480	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520292	60 (27.3)
10	208	3	28	208	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520305	60 (27.3)
10	240	3	24.5	240	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520313	60 (27.3)
10	480	3	12.5	480	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000 [†]	S	520321	60 (27.3)
10	480	3	12.5	480	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000 TSP ^{††}	S	520330	61 (27.7)
10	575	3	10.5	575	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	40 (12.2)	7 (2.1)	HD3D-1000	NS	520348	60 (27.3)
12.5	277	1	45.5	277	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520356	60 (27.3)
12.5	480	1	26.5	480	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520364	60 (27.3)
12.5	208	3	35	208	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520372	60 (27.3)
12.5	240	3	30.5	240	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520380	60 (27.3)
12.5	480	3	15.5	480	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520399	60 (27.3)
12.5	575	3	13	575	1	1/15	1,050	1,180	1180 (2005)	800 (243.8)	28 (15.6)	36 (11.0)	7 (2.1)	HD3D-1250	NS	520401	60 (27.3)
15	480	1	31.5	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500	NS	520410	60 (27.3)
15	208	3	42	208	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500	NS	520428	60 (27.3)
15	240	3	36.5	240	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500	NS	520436	60 (27.3)
15	480	3	18.5	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500 [†]	S	520444	60 (27.3)
15	480	3	18.5	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500 TSP ^{††}	S	520452	61 (27.7)
15	575	3	15.5	575	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	32 (17.8)	45 (13.7)	7 (2.1)	HD3D-1500	NS	520460	60 (27.3)
19.5	240	3	47.5	240	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	42 (23.3)	45 (13.7)	7 (2.1)	HD3D-2000	NS	520479	60 (27.3)
20	480	1	42	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	42 (23.3)	45 (13.7)	7 (2.1)	HD3D-2000	NS	520487	60 (27.3)
20	480	3	24.5	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	42 (23.3)	45 (13.7)	7 (2.1)	HD3D-2000 [†]	S	520495	60 (27.3)
20	480	3	24.5	480	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	42 (23.3)	45 (13.7)	7 (2.1)	HD3D-2000 TSP ^{††}	S	520508	61 (27.7)
20	575	3	20.5	575	1	1/15	1,050	1,330	1330 (2260)	900 (274.3)	42 (23.3)	45 (13.7)	7 (2.1)	HD3D-2000	NS	520516	60 (27.3)
25	480	3	30.5	480	3	1/3	1,725	2,700	2700 (4587)	1110 (338.3)	31 (17.2)	48 (14.6)	7 (2.1)	HD3D-2500	S	520524	80 (36.4)
25	575	3	25.5	575	3	1/3	1,550	1,800	1800 (3058)	740 (225.6)	42 (23.3)	48 (14.6)	7 (2.1)	HD3D-2500	NS	520532	80 (36.4)
30	480	3	36.5	480	3	1/3	1,725	2,700	2700 (4587)	1110 (338.3)	37 (20.6)	48 (14.6)	7 (2.1)	HD3D-3000	S	520540	80 (36.4)
30	575	3	30.5	575	3	1/3	1,550	1,800	1800 (3058)	740 (225.6)	50 (27.8)	48 (14.6)	7 (2.1)	HD3D-3000	NS	520559	80 (36.4)
35	480	3	42.5	480	3	1/3	1,725	2,700	2700 (4587)	1110 (338.3)	47 (23.9)	48 (14.6)	7 (2.1)	HD3D-3500	NS	520567	80 (36.4)
35	575	3	35.5	575	3	1/3	1,550	1,800	1800 (3058)	740 (225.6)	57 (31.7)	48 (14.6)	7 (2.1)	HD3D-3500	NS	520575	80 (36.4)
39	480	3	47.5	480	3	1/3	1,725	2,700	2700 (4587)	1110 (338.3)	50 (27.8)	48 (14.6)	7 (2.1)	HD3D-4000	S	520583	80 (36.4)
39	575	3	39.5	575	3	1/3	1,550	1,800	1800 (3058)	740 (225.6)	65 (36.1)	48 (14.6)	7 (2.1)	HD3D-4000	NS	520591	80 (36.4)

Stock Status: S = stock NS = non-stock

To Order—Specify model, PCN, kW, volts, phase and quantity.

*HD3D Series heaters with TSP suffix includes thermostat, selector switch and pilot light.

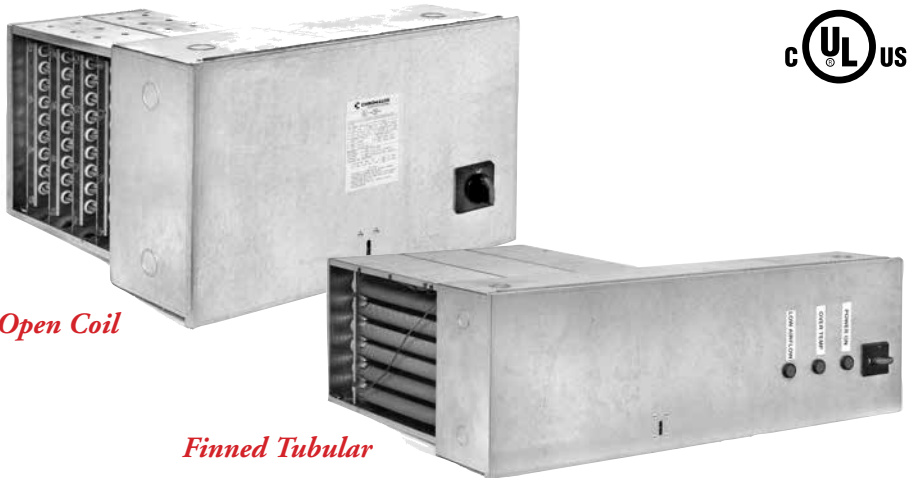
†Models can be field re-wired for use on single phase

**Mounting height if mounted for horizontal airflow. For vertical mounting, minimum height is 10'.

DH

UL Listed Open Coil & Fintubular Air Duct Heaters

- Up to 458 kW
- Up to 35 kW/Ft² Power Densities
- Up to 600 Volt
- 6 x 8" to 40 x 72" Duct Sizes
- Slip-In and Flanged Mounting
- Heavy Gauge Galvanized Frame
- NEMA1 Control Panel
- Meets NEC Requirements
- Configured to Order
- cULus Listed
- Available with CE mark for Europe



Open Coil

Finned Tubular

Description

Type DH duct heaters are pre-engineered, factory assembled units consisting of a standard frame section, heating elements and a prewired control panel. They are available in a wide range of standard frame sizes, with various heating capacities and heating stages operating on AC voltage ratings of 120 to 600V.

The standard duct heater is designed to be inserted in a rectangular opening cut in the side of a horizontal or vertical duct. For larger ducts or where it may be more desirable to attach the duct directly to the heater, a frame may be added to the heater.

Applications

- Primary Room Heating (Central or Zone)
- Supplemental Room Heating (Heat Pumps)
- Air Tempering (Outside Air)
- Preheating (Make-Up Air)
- Reheating (Overcooling applications)
- Industrial and Commercial Buildings

Standard Features

Heater Frame — Galvanized for corrosion protection.

Heating Elements — 80/20 Nickel/Chromium open coil or painted steel finned.

Mounting — Insert or flanged designs configured for horizontal airflow.

Control Panel — Integral control panel pre-wired for easy wiring and installation.

Listed for zero clearance to combustible materials.

Overtemperature Protection — provided with both manual and automatic resets.

Factory Prewired — 48 Amp maximum circuits to meet NEC requirements.

Controls — 24V transformer, magnetic contactors, airflow switch, disconnect switch and overtemperature cutouts allow for thermostat control.

Fusing — Power fusing on heaters above 48 amps.

Easy Wiring access through opening in terminal box.

Optional Features

Heater Frame — Outdoor Use (per UL1996) galvanized frame, stainless steel (NEMA 1 or Outdoor Use) frame.

Heating Elements — Stainless steel finned tubular or Monel® finned tubular for added corrosion resistance.

Mounting — Insert or flanged designs for vertical or bottom mounting.

Control Panel — Remote control panel allows for additional space around heater.

Pilot Lights — "Heat-on", fault, low airflow, "Stage On".

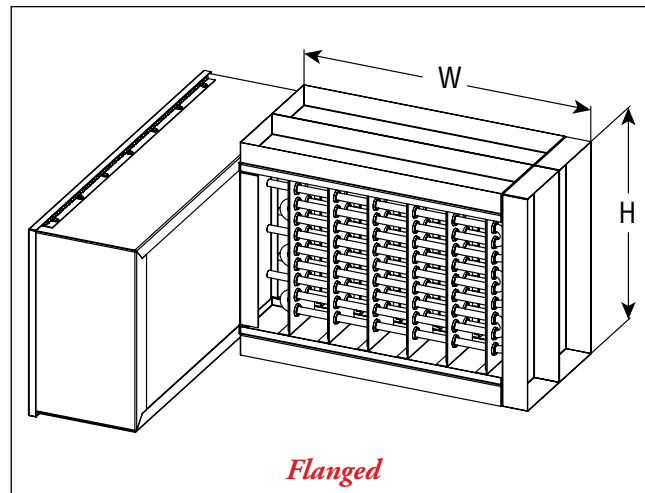
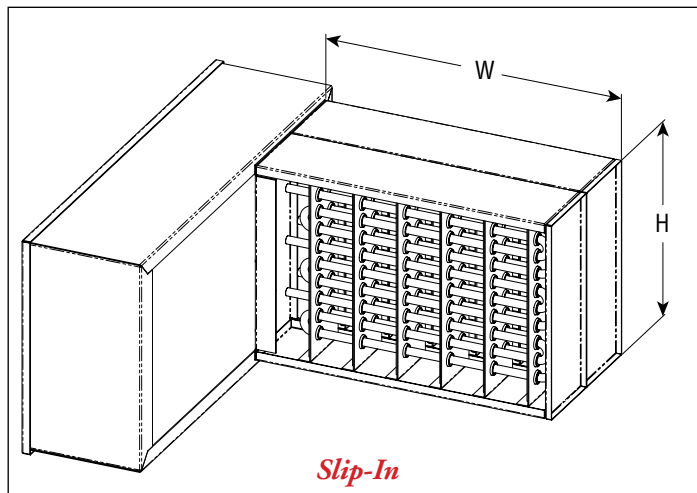
SCR Power Control — SCR with proportional control, or vernier control for more precise temperatures.

Staging Control — Prewired for remote thermostat staging or built in staging control with 4-20 mA, 0-10.

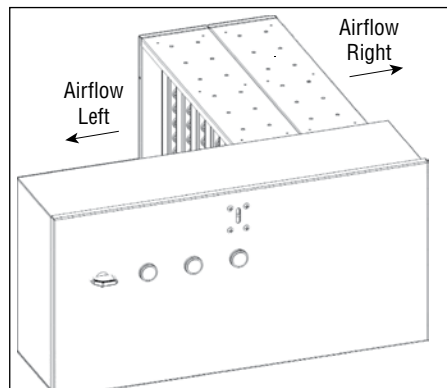
DH

UL Listed Open Coil & Fintubular Air Duct Heaters (*cont'd.*)

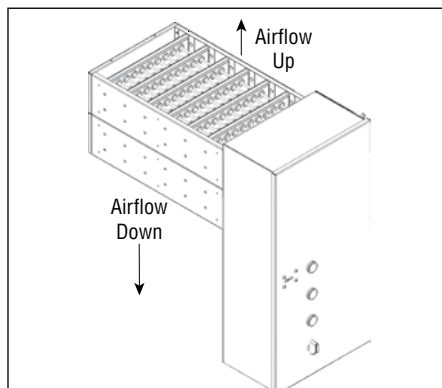
Heater Dimensions



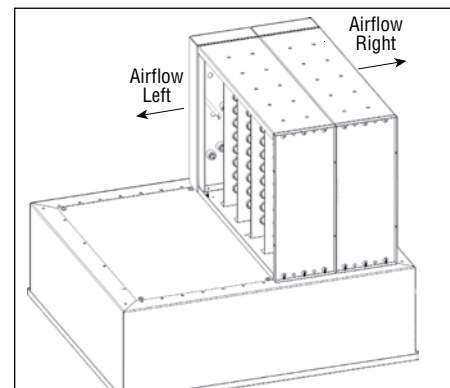
Airflow Orientation



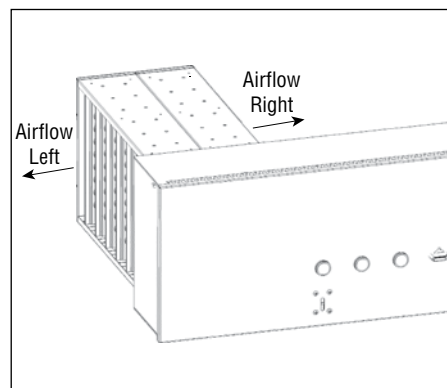
Horizontal duct with panel extended in LEFT direction



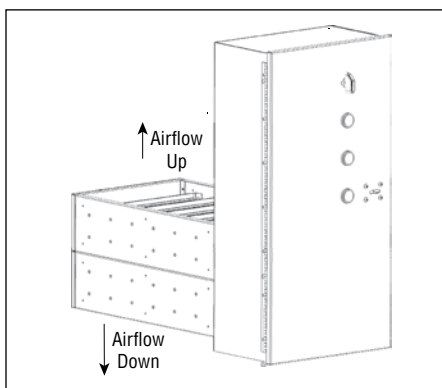
Vertical duct with panel extended in DOWNWARD direction



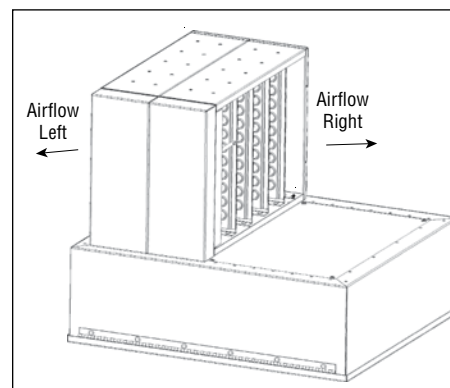
Bottom mount in horizontal duct with panel extended in LEFT direction



Horizontal duct with panel extended in RIGHT direction



Vertical duct with panel extended in UPWARD direction



Bottom mount in horizontal duct with panel extended in RIGHT direction

DH UL Listed Open Coil & Fintubular Air Duct Heaters (*cont'd.*)

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

DH Open Coil & Tubular Duct Heater												
Code		Element Type										
OC	PS	Open Coil Elements										
		Painted Steel Finned Tubular Elements										
		SS		304 Stainless Steel Finned Tubular Element								
		MO		MONEL® Elements								
Code		Panel and Heater Mounting										
IS		Integral Control Panel, Slip-In Frame										
		IF	Integral Control Panel, Flanged Frame									
Code			Terminal Box and Frame Construction									
		GPG Galvanized Terminal Box and Frame (NEMA 1)										
		DPG Outdoor Use Galvanized Terminal Box and Frame										
		GPS Stainless Steel Terminal Box and Frame (NEMA 1)										
		DPS Outdoor Use Stainless Steel Terminal Box and Frame										
Code		Height of Duct in Inches										
		XXX										
Code		Width of Duct in Inches										
		XXX										
Code		Line Voltage										
12		120V		27		277V		44		440V		
28		208V		38		380V		46		460V		
24		240V		40		400V		48		480V		
22		220V		41		415V		60		600V		
								69		690V		
Code		Phase										
1		Single Phase										
3		Three Phase										
Code		Kilowatts										
		XXX										
Code		Airflow Direction										
F1		Horizontal Left					F4		Vertical Down			
F2		Horizontal Right					F5		Bottom Mount			
F3		Vertical Up										
Code		Panel Orientation (Integral Panel Only)										
P1		Extend Left Direction (Horiz. & Bottom Mount Configs Only)										
P2		Extend Right Direction (Horiz. & Bottom Mount Config. Only)										
P3		Extend Upward (Vertical Airflow Only)										
P4		Extend Downward (Vertical Airflow Only)										
DH-		OC-	II-	GPG-	O10-	O12-	48-	1-	O15-	F1-	P1	Typical Model Number

Notes

1. Unless otherwise specified, heaters are wired for single stage operation and provided with on/off contactor control and a 24V control circuit
2. Heaters above 277V line voltage or three phase include a 24V control circuit transformer
3. To comply with UL requirements all heaters are design not to exceed 48 amps per circuit and are provided with both automatic and manual reset cutouts
4. Although Chromalox can provide heaters with line voltage terminal blocks in place of a disconnect, per NEC requirements a disconnect must be supplied within line of sight of the heater.
5. Finned tubular heaters are provided with back-up contactors
6. Maximum number of heater stages is 12 on all heaters. Minimum of 4 stages on pneumatic control.

Optional Features

Code	Description	Code	Description
D1	Remove Disconnect (Replaced with Terminal Block)	T1	120V Control Circuit Transformer
D2	Add Disconnect Fusing	T2-XXX	Remove Transformer (External control, XXX specifies contactor voltage)
S1	Remove Airflow Switch (Must add Fan Interlock Relay)	T3	Remove Transformer and Contactor (Line voltage thermostat control)
S2-XXX	Add Fan Interlock Relay (XXX Specifies Coil Voltage, e.g. S1-120 for 120V)	C1	SCR (Full SCR control On/Off, 24V to 265V input)
F1	Add Power Fusing (Models below 48 amps)	C2-X	SCR Controller (X specifies control signal - see table)
L1	Heater On Pilot Light	C3-XX	Staging (XX specifies number of stages)
L2	Stage On Pilot Light	C4-X	Electronic Staging Controller (Full contactor control, X specifies control signal - see table)
L3	Low Airflow Alarm Light	C5	Pneumatic-Electronic Proportional Controller (Specify pressure range on schedule)
L4	Automatic Reset Overtemperature Cutout Alarm Light	C6-X	Vernier Control (Uses contactors and SCR, X specifies control signal)

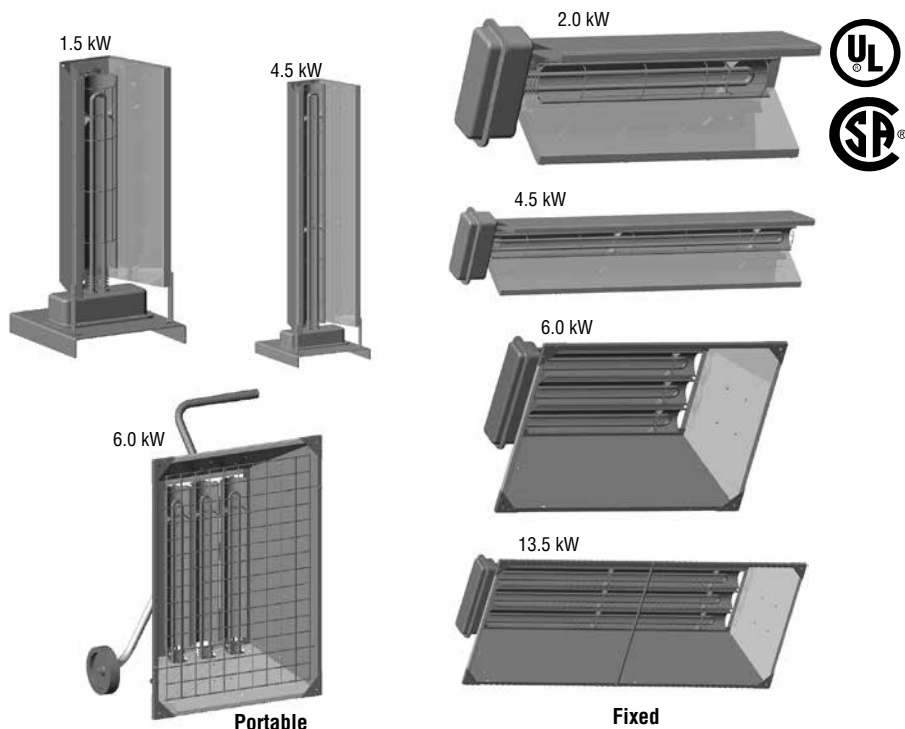
Control Signal Codes			
Code	Description	Code	Description
1	0 to 5 vdc (available on SCR control only)	3	4 to 20 mA
2	0 to 10 Vdc (2 to 10 Vdc control range)	4	0 to 135 Ω (available on Vernier and electronic staging control)

ChromaStar™ Infra-Red Radiant Heaters

- 1.5 to 13.5 kW
- 5,118 to 46,062 BTU/Hr
- 120, 208, 240, 277, 480, and 600 Volts
- Single or 3 Phase - Most Models Field Convertible
- Fixed Overhead - Convertible to Portable
- Portable/Factory Assembled
- Optional Accessories
 - Ground Fault
 - Disconnect
 - Tip Over Shut Down
- UL Listed, CSA (Fixed Overhead Models Only)
- INCOLOY Sheath

Applications

- Localized heating in large plants
- Loading Docks
- Narrow warehouse aisle heating
- Garages
- Dry paint
- Prevent freezing of pipes, valves
- Heat hoppers



Description

The Chromalox ChromaStar™ infra-red comfort heaters are designed to provide a rugged source of heat for use in areas where dependence on air movement is impractical. The heaters are versatile, designed to provide warmth directly where it is needed for primary or spot heating applications. Each unit is constructed for long life and requires minimal maintenance. There are no moving parts or motors to wear out, no air filters or lubrication required.

All Chromalox ChromaStar™ radiant heaters feature the exclusive “Arctic End” Patent Pending heating element terminal construction. This feature lowers the terminal box temperatures resulting in extended element and wiring life.

Extruded aluminum housings are rigid to provide added protection to the heating elements located at the focal point of a built-in mirrored aluminum reflector(s).

The heater(s) consist of hairpin bent .430” diameter alloy sheath tubular element(s) constructed of high quality resistance wire embedded in carefully selected MgO refractory insulation. The element feature “Arctic end” terminal construction for longer life and cooler terminal enclosure temperatures. The element(s) also feature terminal construction using a wedged-in silicone bushings that produce unequalled resistance to moisture absorption. The heating element(s) connect to a gasketed, moisture resistance terminal enclosure with liquid-tight bulkhead threaded fittings. An extension reflector constructed of

0.050” mirrored aluminum extends over the assembly to provide a more uniform heating pattern.

Portable

All portable heaters are supplied fully assembled to a rugged, chrome-nickel plated tubular steel cart and handle (1.5 and 2.0 kW heater has a fixed pedestal). The cart features large wheels for easy portability. All portable heaters include safety grills to protect personnel from contacting hot elements.

Field wiring is accomplished through a 3/4” conduit opening in terminal enclosure. The 1.5 kW unit comes complete with a factory installed 6 foot cord and 2 prong grounding type plug. Other models can be field wired using accessory cable and plug kits shown.

Fixed Overhead

The Chromalox ChromaStar™ radiant heater is shipped fully assembled and can be hung from the ceiling with 2 chains or rigid angle brackets attached to the heater brackets located on the back of the heater.

Field wiring is accomplished through the liquid tight terminal enclosure. No secondary splice box required.

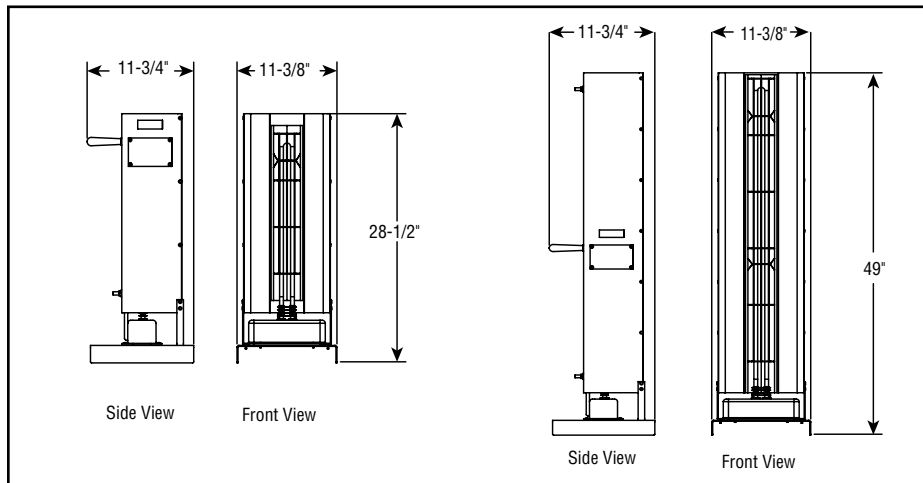
Protective screens, disconnect switches and portable carts are available for these heaters as shown.

ChromaStar™

Infra-Red Radiant Heaters

(cont'd.)

Portable Radiant Heaters 1.5 to 4.5 kW Dimensions



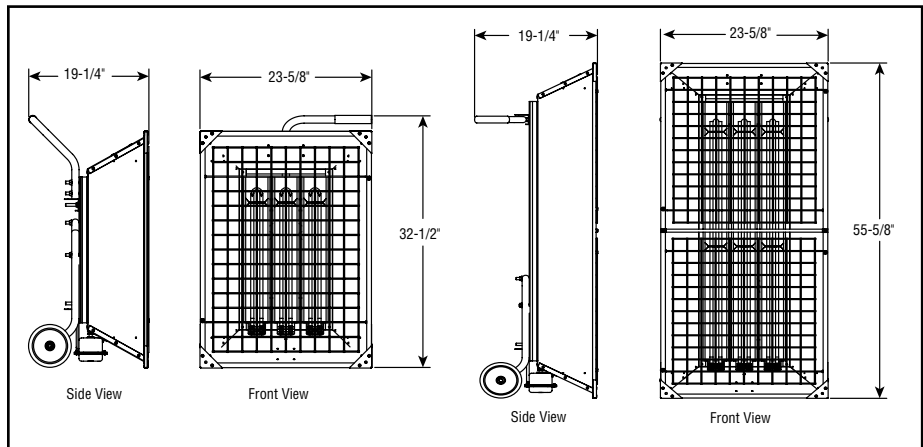
Specifications and Ordering Information

Electrical						Dimensions (in.)			Ordering			
kW	Volts	Phase	No. Elem.	Amps	Btuh	Height	Base Width	Base Depth	Model	Stock	PCN	Wt. (Lbs.)
1.5	120	1	1	12.5	5,118	28-1/2	11-3/8	11-3/4	STAR-02A-11-PC*	S	340486	15
2	208	1	1	9.6	6,824	28-1/2	11-3/8	11-3/4	STAR-02A-81-P	NS	340494	15
2	240	1	1	8.3	6,824	28-1/2	11-3/8	11-3/4	STAR-02A-21-P	NS	340507	15
2	277	1	1	7.2	6,824	28-1/2	11-3/8	11-3/4	STAR-02A-71-P	NS	340515	15
2	480	1	1	4.2	6,824	28-1/2	11-3/8	11-3/4	STAR-02A-41-P	NS	340523	15
2	600	1	1	3.2	6,824	28-1/2	11-3/8	11-3/4	STAR-02A-61-P	NS	340531	15
4.5	208	1	1	21.6	15,354	49	11-3/8	11-3/4	STAR-05A-81-P	NS	340380	25
4.5	240	1	1	18.8	15,354	49	11-3/8	11-3/4	STAR-05A-21-P	NS	340398	25
4.5	277	1	1	16.2	15,354	49	11-3/8	11-3/4	STAR-05A-71-P	NS	340400	25
4.5	480	1	1	9.4	15,354	49	11-3/8	11-3/4	STAR-05A-41-P	NS	340419	25
4.5	600	1	1	7.5	15,354	49	11-3/8	11-3/4	STAR-05A-61-P	NS	340427	25

Stock Status: S = stock NS = non-stock *Incl 6 foot cord and 2-prong grounding type plug.

To Order — Specify model, PCN, kW, volts, phase and quantity.

Portable Radiant Heaters 6 to 13.5 kW Dimensions



Specifications and Ordering Information

Electrical					Dimensions (in.)			Ordering			
kW	Volts	Phase	Amps	Btuh	Height	Base Width	Base Depth	Model	Stock	PCN	Wt. (Lbs.)
6	208	3	16.7	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-83-P	NS	341163	26
6	240	3	14.4	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-23-P	S	341171	26
6	277	1	21.7	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-71-P	NS	341180	26
6	480	3	7.2	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-43-P	S	341198	26
6	600	3	5.8	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-63-P	NS	341200	26
13.5	208	3	37.5	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-83-P	S	341219	44
13.5	240	3	32.5	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-23-P	NS	341227	44
13.2	277	1	47.7	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-71-P	NS	341235	44
13.5	480	3	16.3	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-43-P	S	341243	44
13.5	600	3	3	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-63-P	NS	341251	44

Stock Status: S = stock NS = non-stock *Includes 6 foot cord and 2-prong grounding type plug.

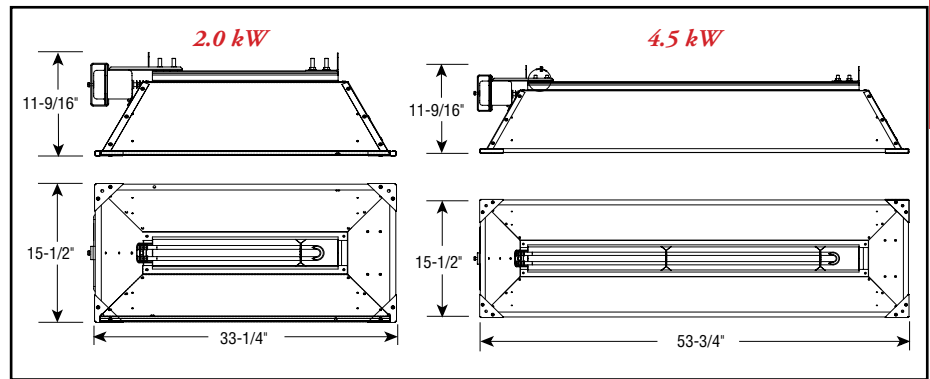
To Order — Specify model, PCN, kW, volts, phase and quantity. Assembly Stock shipped in one week.

For Stock shipment, order fixed overhead heaters on following page and appropriate cart kit.

ChromaStar™

Infra-Red Radiant Heaters (cont'd.)

Fixed Overhead Radiant Heaters 2.0 to 4.5 kW Dimensions U.L Listed & CSA Certified for Fixed Installations



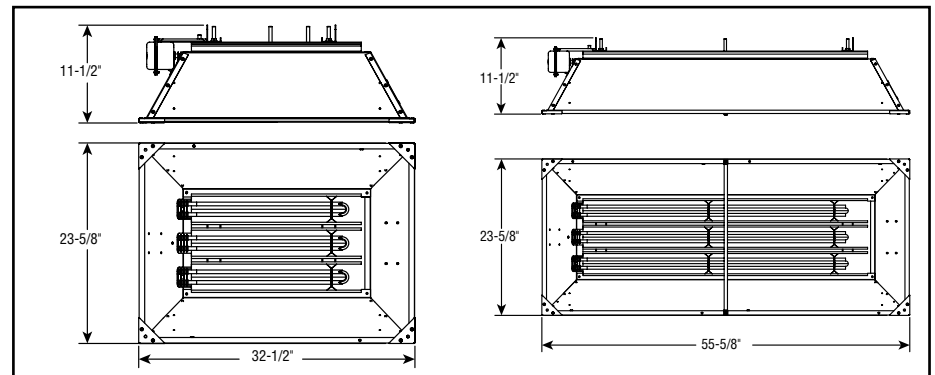
INFRARED RADIANT
HEATERS

Specifications and Ordering Information

Electrical					Dimensions (in.)			Ordering			
kW	Volts	Phase	Amps	Btuh	Height	Base Width	Base Depth	Model	Stock	PCN	Wt. (Lbs.)
2	208	1	9.6	6,824	27-11/16	9-7/8	6-13/16	STAR-02A-81-F	S	340558	14
2	240	1	8.3	6,824	27-11/16	9-7/8	6-13/16	STAR-02A-21-F	S	340566	14
2	277	1	7.2	6,824	27-11/16	9-7/8	6-13/16	STAR-02A-71-F	NS	340574	14
2	480	1	4.2	6,824	27-11/16	9-7/8	6-13/16	STAR-02A-41-F	S	340582	14
2	600	1	3.3	6,824	27-11/16	9-7/8	6-13/16	STAR-02A-61-F	NS	340590	14
4.5	208	1	21.6	15,354	48-3/16	9-7/8	6-13/16	STAR-05A-81-F	NS	340435	23
4.5	240	1	18.8	15,354	48-3/16	9-7/8	6-13/16	STAR-05A-21-F	NS	340443	23
4.5	277	1	16.2	15,354	48-3/16	9-7/8	6-13/16	STAR-05A-71-F	NS	340451	23
4.5	480	1	9.4	15,354	48-3/16	9-7/8	6-13/16	STAR-05A-41-F	S	340460	23
4.5	600	1	7.5	15,354	48-3/16	9-7/8	6-13/16	STAR-05A-61-F	NS	340478	23

Stock Status: S = stock NS = non-stock
To Order — Specify model, PCN, kW, volts, phase and quantity.

Fixed Overhead Radiant Heaters 6.0 to 13.5 kW Dimensions



Specifications and Ordering Information

Electrical					Dimensions (in.)			Ordering			
kW	Volts	Phase	Amps	Btuh	Height	Base Width	Base Depth	Model	Stock	PCN	Wt. (Lbs.)
6	208	3	16.7	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-83-F	NS	340339	26
6	240	3	14.4	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-23-F	S	340347	26
6	277	1	21.7	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-71-F	NS	340355	26
6	480	3	7.2	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-43-F	S	340363	26
6	600	3	5.8	20,472	32-1/2	23-5/8	11-1/2	STAR-06A-63-F	NS	340371	26
13.5	208	3	37.5	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-83-F	NS	340232	44
13.5	240	3	32.5	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-23-F	S	340240	44
13.5	277	1	48.7	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-71-F	NS	340259	44
13.5	480	3	16.3	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-43-F	S	340267	44
13.5	600	3	13	46,062	55-5/8	23-5/8	11-1/2	STAR-14A-63-F	NS	340275	44

Stock Status: S = stock NS = non-stock
To Order — Specify model, PCN, kW, volts, phase and quantity.

ChromaStar™ Infra-Red Radiant Heaters (cont'd.)

Accessories

For use with both Fixed Overhead and Portable Heaters

Disconnect Kits

The disconnect kit consists of a complete liquid tight assembly including a 3 pole 48 Amp switch, power terminal block and all hardware to mount either the fixed overhead or portable radiant heater. Disconnects are used for shutting off power to unit. Kits can be used on all STAR heaters.



Specifications and Ordering Information

Model No.	kW	Status	PCN	Wt. (Lbs.)
DS-50600	All	AS	340662	3

Tip-Over Switch and Ground Fault Detector Kits

(for Portable STAR-06 and STAR-14 Heaters)

The Chromalox STAR-TG series kits include the components and features of the STARTIP tip-over kits with the additional protection provides by a ground fault detector. The ground fault detector will monitor for any gradual changes in the insulation level due to humidity or mechanical damage as they develop and will de-energize the contactor to prevent arcing type faults, preventing premature element failure and potential fire damage.

Specifications and Ordering Information

Model No.	Volts	Status	PCN	Wt. (Lbs.)
STAR-TG-8	208	NS	340726	16
STAR-TG-2	240	NS	340734	16
STAR-TG-7	277	NS	340742	16
STAR-TG-4	480	NS	340750	16
STAR-TG-6	600	NS	340769	16

ChromaStar™

Accessories

(cont'd.)

Plug Kits for Portable Heaters

Plug Type	Model Number	Description	Volts	Amps	Config.	NEMA#	ANSI#	Fits Cable Dia.	Stock	PCN	Wt. (Lbs.)
Locking	PGL-15-20	3 Pole 4 Wire	250	20		L15-20	C73.85	.385"-.780	NS	338845	0.5
Locking	PGL-15-30	3 Pole 4 Wire	250	30		L15-30	C73.86	.385"-.780	NS	338853	0.5
Locking	PGL-16-30	3 Pole 4 Wire	480	30		L16-30	C73.88	.595"-1.150	NS	338861	0.5
Locking	PGL-17-30	3 Pole 4 Wire	600	30		L17-30	C73.89	.595"-1.150	NS	338870	0.5
Locking	PGL-3763C	2 Pole 3 Wire	600	50		-	-	.750"-1.125	NS	338917	0.5
Locking	PGL-3765C	3 Pole 4 Wire	600	50		-	-	.750"-1.125	NS	338925	0.5
Non Locking	PGN-6-50	2 Pole 3 Wire	250	50		6-50	C73.53	.625"-1.187	NS	338888	0.5
Non Locking	PGN-15-20	3 Pole 4 Wire	250	20		15-20	C73.59	.390"-.775	NS	338896	0.5
Non Locking	PGN-15-50	3 Pole 4 Wire	250	50		15-50	C73.61	.750"-1.250	NS	338909	0.5

INFRARED RADIANT HEATERS

Cable Kits for ChromaStar™ Series Portable Radiant Heaters

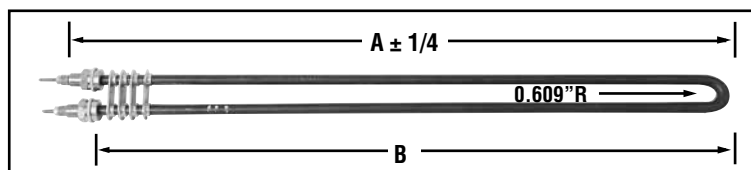
Cable packages include 25 feet Type SO cable, with either 3-conductors or 4-conductors, depending on the heater requirements. Each cable assembly includes the proper cord (connector). Plugs are not included. All models are factory wired for 3-phase, but can be field wired for single phase, select plug and cord accordingly.

Model No.	Cable Specifications			Cord Connector	Stock	PCN	Wt. (Lbs.)
	Size/Type	Max. Amp	Temperature Ratings	NPT			
PLC-2514-4	14/4SO	15	90 Deg. C	3/4"	NS	295427	7
PLC-2514-3	14/3SO	18	90 Deg. C	3/4"	NS	295670	23
PLC-2512-4	12/4SO	20	90 Deg. C	1"	NS	295435	9
PLC-2512-3	12/3SO	25	90 Deg. C	3/4"	NS	295662	6
PLC-2510-3	10/3SO	30	90 Deg. C	1"	NS	295443	9
PLC-2508-3	8/4SO	35	90 Deg. C	1"	NS	295460	15
PLC-2506-4	6/4SO	45	90 Deg. C	1"	NS	295494	17
PLC-2506-3	6/3SO	55	90 Deg. C	1"	NS	295486	16

SO = hard Service Cord, 600V Length = 25 Feet

Replacement Elements

Model No.	kW	Volts	Win2	Dimensions - inches		Status	PCN	Wt. Lbs.
				A	B			
UTU-STAR 21	1.5	120	32	21-1/2	20-1/2	NS	106059	2
UTU-STAR 28	2	208	42	21-1/2	20-1/2	NS	106067	3
UTU-STAR 22	2	240	42	21-1/2	20-1/2	NS	106075	3
UTU-STAR 27	2	277	42	21-1/2	20-1/2	NS	106083	3
UTU-STAR 24	2	480	42	21-1/2	20-1/2	NS	106091	3
UTU-STAR 26	2	600	42	21-1/2	20-1/2	NS	106104	3
UTU-STAR 48	4.5	208	42	43-3/8	42-3/8	NS	106403	4
UTU-STAR 42	4.5	240	42	43-3/8	42-3/8	NS	106411	4
UTU-STAR 47	4.5	277	42	43-3/8	42-3/8	NS	106796	4
UTU-STAR 44	4.5	480	42	43-3/8	42-3/8	NS	106964	4
UTU-STAR 46	4.5	600	42	43-3/8	42-3/8	NS	106972	4



UTU-STAR

ChromaStar™ Accessories (cont'd.)

Accessories for Fixed Overhead Heaters

Hanger Kit

Hanger kits include 24 feet of chain, 4 “S” hooks to mount units in a fixed overhead position using the universal mounting brackets included on the back of fixed overhead radiant models. The chain is long enough to allow all heaters to be mounted up to 6 feet from the ceiling.

Specifications and Ordering Information

Model No.	kW	Status	PCN	Wt. (Lbs.)
STAR-HK	All	S	340654	2

Portable Cart Kits

Chromalox series ChromaStar™ fixed overhead radiant heaters can be field converted to portable spot heaters with the use of the cart kits. Each kit includes wheels, legs, handle, grill(s), baffle (if required) and all of the necessary hardware to complete the modification. These kits are easy to install with standard tools.

Specifications and Ordering Information

Model No.	kW	Status	PCN	Wt. (Lbs.)
STAR-06A CART	6	NS	340830	8
STAR-14A CART	13.5	S	340849	8

Floor Protection Baffle Kit

The Chromalox safety baffle kit includes a reflector baffle which can be field installed on the lower reflective panel on portable STAR radiant heaters. The baffle will protect temperature sensitive flooring materials such as vinyl tile from being damaged due to radiant heat.

Specifications and Ordering Information

Model No.	kW	Status	PCN	Wt. (Lbs.)
FP-614	6 or 13.5	NS	340865	2

Safety Grill Kits

The safety grill kits contain one (2kW, 4.5kW and 6kW) or two grills (13.5kW) to protect personnel from coming in contact with hot heating elements. The grills are constructed of heavy gauge plated steel and are simple to install.

Specifications and Ordering Information

Model No.	kW	Status	PCN	Wt. (Lbs.)
GR-2	2	S	111878	5
GR-4	4.5	S	111894	5
GR-6KW	6	NS	340638	6
GR-14AKW	13.5	NS	340857	12

Ground Fault Detection

The Chromalox STAR-GF series wall mounted ground fault detectors are designed to monitor for any gradual changes in the insulation level due to humidity or mechanical damage as they develop and will de-energize the load to prevent arcing type faults, preventing premature element failure and potential fire damage. The detector consists of a ground fault sensor, control circuit transformer, magnetic contactor and an on off toggle switch with rubber boot, completely pre-wired in a NEMA 4 enclosure.

Specifications and Ordering Information

Model No.	Heater Volts	Status	PCN	Wt. Lbs.
STAR-GF-8	208	NS	340777	16
STAR-GF-2	240	NS	340785	16
STAR-GF-7	277	NS	340793	16
STAR-GF-4	480	NS	340806	16
STAR-GF-6	600	NS	340814	16



PHD & PHDT Heavy Duty Fiberglas® Woven Drum Heaters

- 5, 15, 30 and 55 Gallon Metal Drums
- 4" Width
- Operating Temperatures up to 450°F
- Adjustable Thermostat, 50 - 425°F Optional
- 120 or 240 Volt, Single Phase
- 300 - 1,200 Watts
- Moisture Resistant
- Grounded heating element for Safe Operation

Description

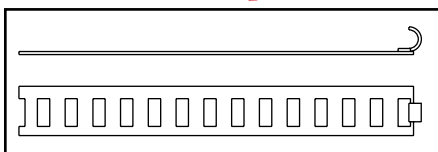
Type PHD Heavy-Duty Fiberglas® Woven Drum Heaters are constructed of Fiberglas® insulated resistance wire woven into a mesh blanket and then encased in layers of silicone rubber. Because of their construction, the Woven Drum Heaters are much stronger and more durable than the standard silicone.

Rubber Drum Heaters are recommended for harsh working environments. All versions use a spring clasp to provide a snug fit around the drums.

Features

- Low watt density electrical resistance heat.
- All 120V units come with a 6 foot power cord and three prong plug. (No plug is included with 240V heaters.)
- An optional built-in adjustable thermostat, 50 - 425°F, is available as a stock option.
- All models come with springs for attachment to your drum.
- Complete, ready to install and use as received.
- All models feature a grounded heating element for electrical protection.
- Girth extension straps are available from stock to use the heaters on non-standard size drums. They can be used to adapt stock heaters to larger drums or other cylindrical containers similar in size. They will permit extending the length of the heater to fit sizes 1/2 - 10" larger in circumference. One step is required per woven drum heater.

Girth Extension Straps



Applications

- Freeze Protection
- Melting of Low Melting Point Solids such as Paraffin, Resins and Chocolate
- Viscosity Control of Fluids such as Paint, Syrups and Honey
- Maintenance of Materials for Roofing, Chimney and Vent Pipe Work

Installation

The Woven Drum Heaters raise/maintain the temperature of the contents of the drum by convection. Heating will occur from the point where the heater is installed to the top of the drum. If the entire drum is to be heated, the drum heater should be installed as near to the bottom of the drum as possible. If only part of the material is to be heated, the drum heater should be installed around the center or top section of the drum. This will provide a faster heat-up and save energy. However, care must be given to ensure that the material level in the drum never falls below the location of the heater.

Specifications and Ordering Information

Drum		Volts	Watts	PHD			PHDT (50 - 425°F Adjustable Thermostat)		
Size	Type			Model	PCN	Stock	Model	PCN	Stock
55 gallon	Metal	120	1200	PHD-55-1-12	123027	S	PHDT-55-1-12	123107	S
55 gallon	Metal	240	1200	PHD-55-2-12	123035	S	PHDT-55-2-12	123115	S
30 gallon	Metal	120	1000	PHD-30-1-10	122980	S	PHDT-30-1-10	123060	S
30 gallon	Metal	240	1000	PHD-30-2-10	122999	S	PHDT-30-2-10	123078	S
15 gallon	Metal	120	700	PHD-15-1-7	122964	S	PHDT-15-1-7	123043	S
15 gallon	Metal	240	700	PHD-15-2-7	122972	S	PHDT-15-2-7	123051	S
5 gallon	Metal	120	550	PHD-5-1-5	123000	S	PHDT-5-1-5	123086	S
5 gallon	Metal	240	550	PHD-5-2-5	123019	S	PHDT-5-2-5	123094	S
—	—	—	—	PDES-10 Girth Extension Strap	290132	S	PDES-10 Girth Extension Strap	290132	S

To Order — Specify model, PCN and quantity.

IBG

Flexible Thermal Drum Insulation Blanket

- **Flexible and Easy to Mount**
- **Chemical and Moisture Resistant**
- **Operating Temperatures up to 450°F**
- **Designed for Integrated Use with Flexible Drum Heaters**

Description

Insulating blankets are energy saving blankets that increase heating efficiency and reduce operating costs. Bulk Fiberglas® insulation is covered with silicone glass cloth. Easy installation is provided with Velcro® fastening device. All blankets are moisture resistant, but not waterproof.

Type IBG are stock insulation blankets designed to use in conjunction with Chromalox stock drum heaters. They are designed to only cover the drum heater; providing thermal protection from the back, heated-surface of the drum heater. Full coverage thermal insulation blankets are available as made-to-order items per customer specifications. All stock products are shipped within 24 hours.

Applications

- Thermal Protection from Heated Surfaces
- Thermal Insulation to Minimize Heat Loss
- Maximize Effectiveness of Heater

Ordering Information

Please refer to the matrix provided on the Flexible Heater Ordering Guidelines page which follows.

Specifications and Ordering Information

Model	Stock	PCN	Wt. (Lbs.)	Stock
IBG-5	S	298070	2	NS
IBG-16	S	299225	2	NS
IBG-30	S	299233	3	S
IBG-55	S	298089	3	S

Stock Status: S = stock NS = non-stock
To Order— Specify model, PCN and quantity.

SL

Silicone Rubber Insulated Flexible Heater



SILICONE
LAMINATED
HEATERS



- SL-N General Purpose Heaters
- SL-B Enclosure Heaters
- Flexible in Design and Application
- UL and CSA Recognized Components
- Square, Rectangular, Round and Custom Shapes
 - Max. size of a single piece: 36" Wide x 120" Long
 - Can join sections into longer length
- Up to 600 Volt
- Silicone Rubber Material Temp. Range -80°F to 390°F
- Myriad of Mounting Methods
- Standard Thickness Ranges from 0.030" to 0.060" Except at Lead Pad Which is 0.15" Thick Depending on Design.
- Standard Resistance Tolerance is -10% +5%.

Description

Chromalox SL Silicone Rubber Insulated Heaters provide the greatest flexibility in meeting your application requirements. Ruggedness, dimensional stability, flexibility, and superior weather survivability are all characteristics of reinforced silicone rubber heaters. The thin profile and direct contact of the heaters provide fast, efficient heat transfer to your part and require less power than traditional heating methods.

Features

- Standard Heaters are available or made to order to exact electrical and contour specifications.
- Silicone Rubber can operate from -80°F to 392°F
- Silicone Rubber Material is UL Recognized for watt densities of:
 - 5 W/In² in open air
 - 10 W/In² attached with factory supplied PSA
 - 15 W/In² vulcanized to metal part.
- Up to 40 W/In² possible with proper temperature control.
- Fast heat-up and cool down.
- Wide choice of electrical termination: Solderless connectors and terminals, stranded lead wires, cords and plugs.
- Distributed wattage requirements can be met by design.

Note — With flexible heaters, less wattage is generally needed due to the direct contact of the elements to the part. In most cases of high watt density, you are adding power but

increasing the number of cycles the heater is going to experience. The same heat-up requirements can be met by decreasing wattage and increasing actual operation time. In addition, by decreasing on-off cycles, you will be lengthening the life of your element.

Ordering Information

Please refer to the matrix provided on the Flexible Heater Ordering Guidelines page which follows.

Options

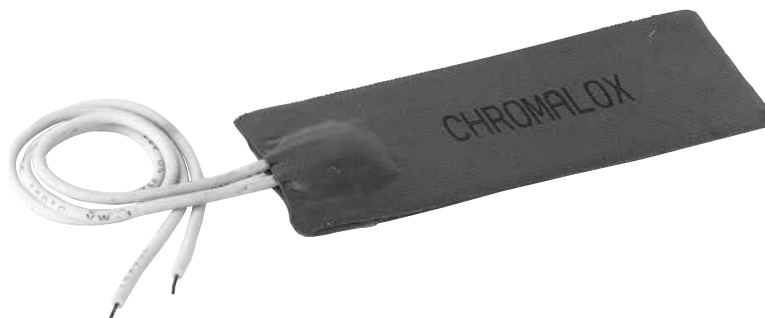
- For Mounting Methods, Temperature Control and Termination Options. Consult the Flexible Heaters section.
- Grounding of the heating element can be easily achieved internally to the element or externally to your equipment. A wire-mesh screen can be vulcanized into the heater to provide a ground plane. Mounting plates, foil backing or flying ground wires are several options available for external grounding.
- Three methods of integral insulation can be provided. The most durable and one of greatest thermal insulation is to vulcanize a layer of silicone foam to the back of the heater. Silicone foam is available in thicknesses of 1/8, 1/4 or 1/2". Finally, Fiberglas[®] insulation can be encased in silicone rubber and serve as the outer two layers of the heating element. This method is not recommended for outdoor use since construction methods allow for moisture to permeate the insulation.

SL-N

Silicone Rubber Insulated General Purpose Heater



- Standard Pre-Designed Sizes and Ratings
- Most Models Stocked
- Square, Rectangular and Round Shapes
- Chemical and Moisture Resistant
- 10" Leads
- Flexible
- Standard 1" Square to 12" W x 48" L in 120 Volts
- Custom Designed Models Available



Description

Standard Chromalox Silicone Rubber heaters are pre-designed and available in a wide array of sizes and ratings to meet customer needs. Some models are stocked and can be shipped within 24 hours from receipt of your order. All standard models incorporate 10" silicone insulated stranded lead wire. Stocked items can be modified to include pressure sensitive adhesive but, will require additional lead time.

- Standard Thickness Ranges from 0.030" to 0.060" except at Lead Pad which is 0.15" Thick Depending on Design.
- Standard Resistance Tolerance is +10%, -5%.
- Silicon Rubber Material Temperature Range -80°F to +390°F

Specifications and Ordering Information

Watts	Volts	DIM (In.)		Model	Stock	PCN
		Width	Length			
25	120	1	5	SL-N-1-5-O-10-120V-25W	S	121515
50	120	1	10	SL-N-1-10-O-10-120V-50W	S	121523
100	120	1	20	SL-N-1-20-O-10-120V-100W	S	121540
150	120	1	30	SL-N-1-30-O-10-120V-150W	S	121566
200	120	1	40	SL-N-1-40-O-10-120V-200W	S	121582
400	120	1	80	SL-N-1-80-O-10-120V-400W	S	121590
20	120	2	2	SL-N-2-2-O-10-120V-20W	S	121611
50	120	2	5	SL-N-2-5-O-10-120V-50W	S	121620
100	120	2	10	SL-N-2-10-O-10-120V-100W	S	121638
150	120	2	15	SL-N-2-15-O-10-120V-150W	S	121646
200	120	2	20	SL-N-2-20-O-10-120V-200W	S	121654
200	240	2	20	SL-N-2-20-O-10-240V-200W	S	121662
75	120	3	5	SL-N-3-5-O-10-120V-75W	S	121726
150	120	3	10	SL-N-3-10-O-10-120V-150W	S	121734
225	120	3	15	SL-N-3-15-O-10-120V-225W	S	121742
300	120	3	20	SL-N-3-20-O-10-120V-300W	S	121769
300	240	3	20	SL-N-3-20-O-10-240V-300W	S	121777
375	120	3	25	SL-N-3-25-O-10-120V-375W	S	121785
600	120	3	40	SL-N-3-40-O-10-120V-600W	S	121814
200	120	4	10	SL-N-4-10-O-10-120V-200W	S	121822
250	120	5	10	SL-N-5-10-O-10-120V-250W	S	121849
375	120	5	15	SL-N-5-15-O-10-120V-375W	S	121857
500	120	5	20	SL-N-5-20-O-10-120V-500W	S	121865
450	120	6	15	SL-N-6-15-O-10-120V-450W	S	121873
600	120	6	20	SL-N-6-20-O-10-120V-600W	S	121881

Stock Status: S = stock NS = non-stock
To Order—Specify model, PCN and quantity.

Note — All supplied with standard 10" leads.

SL-B

Silicone Rubber Insulated Enclosure & Air Heater

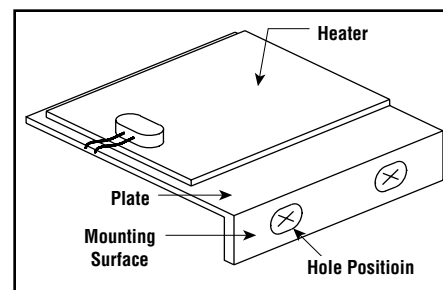


SILICONE
LAMINATED
HEATERS

- All Models Stocked
- 25, 50, 100 and 200 Watts
- 120 Volts
- Vulcanized to Mounting Plate for Easy Installation
- Custom Design and Thermostats Available
- Air Temperature Sensing Thermostats (40°F close, 55°F open) available

Features

- 10" Lead Length is standard
- 25, 50, 100 and 200 watt heaters available with or without integral air temperature sensing thermostat.
- All stock heaters operate on 120V. Heaters requiring other voltages up to 600V are available as non-stock items however special thermostats will be required.
- Easy installation. Consult Chromalox with Bracket and Mounting Slots
- Integral or remote air temperature sensing thermostats ensure heater operation in condensation forming and other air heating application conditions.



Installation

The SL-B enclosure heaters are factory vulcanized to an aluminum mounting plate that allows for easy installation. The mounting surface is perpendicular to the heater and has two tapped mounting Holes. If using the heater with the integral thermostat, vertical mounting with the sensor towards the base of the enclosure is recommended.

Description

Type SL-B Silicone Rubber Insulated Enclosure Heaters and General Purpose Air Heaters are used for freeze protection and condensate protection in electrical enclosures. They are also installed in equipment to keep mechanical components functioning in applications such as ATM machines and automatic doors. Shipment can be made within 24 hours from receipt of order.

Applications

Freeze or condensation protection in enclosures containing electronic equipment, such as: Temperature Control Panels, Control Valve Housings, ATMs, Traffic Signal Boxes. Also, General Purpose Air Heating applications.

Specifications

Watts	Dimensions (In.)		
	Heated Surface	Plate Size	Mounting Surface
25	2 x 5	2.5 x 5	0.5 x 5
50	2 x 5	2.5 x 5	0.5 x 5
100	2 x 10	2.5 x 10	0.5 x 10
200	4 x 10	4.5 x 10	0.5 x 10

Model	Volts	Watts	PCN
Enclosure w/In-line Thermostat, (40°F)			
SL-B-2-5-55P	120	25	122622
SL-B-2-5-55P	120	50	122606
SL-B-2-10-55P	120	100	122585
SL-B-4-10-55P	120	200	123297
Enclosure without Thermostat			
SL-B-2-5-O	120	25	122614
SL-B-2-5-O	120	50	122593
SL-B-2-10-O	120	100	122577
SL-B-4-10-O	120	200	123300
Field Installable Thermostat Kit, (40°F)			
T-N-55P-Kit	—	—	122657

Determining Minimum Recommended Wattage

°F Above Ambient	Total Surface Area (Ft²)													
	2	3	4	5	6	7.5	9	10	15	20	25	30	40	50
Uninsulated Enclosures														
20	30	40	55	70	80	100	120	135	205	270	335	405	540	670
40	55	80	110	135	160	200	245	270	405	540	670	805	1,075	1,340
60	90	120	160	205	245	300	365	405	605	805	1,005	1,210	1,610	2,010
80	110	160	215	270	325	400	485	540	805	1,075	1,340	1,610	2,145	2,680
100	135	200	270	335	405	500	605	670	1,005	1,340	1,675	2,010	2,680	3,350
120	165	240	320	405	485	600	725	805	1,210	1,610	2,010	2,415	3,220	4,020
140	190	280	375	470	565	700	845	940	1,410	1,880	2,345	2,815	3,775	4,690
Insulated Enclosures														
20	10	10	15	20	20	25	30	35	50	65	80	100	130	160
40	15	20	30	35	40	50	60	65	100	130	160	195	260	320
60	20	30	55	50	60	75	90	100	145	195	240	290	385	480
80	30	40	55	65	80	100	115	130	195	260	320	320	515	640
100	35	50	65	80	100	125	145	160	240	320	400	400	640	800
120	40	60	80	100	115	150	175	195	290	385	480	480	770	960
140	45	70	90	115	135	175	205	225	340	450	560	560	900	1,120

Notes –

- 1) Unit conversions: A. °F = (°C x 1.8) + 32 B. Ft² = 0.092 x m²
- 2) Contact Chromalox for enclosures with surface areas larger than 50ft².
- 3) In most cases multiple heaters should be used in applications requiring wattages greater than 500 watts. This is especially true for heaters with in-line thermostats as they can be affected by thermal gradient. Contact Chromalox for more information.

SLDH

Silicone Rubber Insulated Drum Heater



- Stock Products
- For 5, 15, 30 and 55 Gallon Metal and Non-Metal Drums
- Adjustable Thermostats
- Chemical and Moisture Resistant
- Rugged and Flexible
- Easy to Store
- Internally Grounded Standard



Description

Silicone Rubber Insulated Drum Heaters are constructed of silicone rubber reinforced Fiberglas® cloth laminated around resistance wire to provide flexible, moisture and chemical resistant heat. Drum heaters can withstand flexing without fear of premature failure. Stock drum heaters are shipped within 24 hours of receipt of your order.

Features

- Low watt density electrical resistance heat.
- All stock 120V products come with a 6 foot power cord and three-prong plug. 240V heaters do not include a plug.
- Optional built-in adjustable thermostat, 70 - 425°F for steel drums or 70 - 140°F for plastic drums.
- All models come with a heavy-duty spring assembly for attachment to your drum.
- Complete, ready to install and use as received.
- All grounded models feature a wire-mesh screen for ground-fault protection. Should the heater surface be punctured or damaged in any way, the grounding grid will provide electrical protection.
- Girth extension straps are available from stock so you can use Chromalox heavy duty SLDH on non-standard size drums. They can also be used to adapt stock heaters to larger drums or other cylindrical containers similar in size. They will permit extending the length of the heater to fit sizes 1/2 - 10" larger in circumference. One strap is required per heater.

Note:

Not for heating flammable materials or for use in hazardous areas.

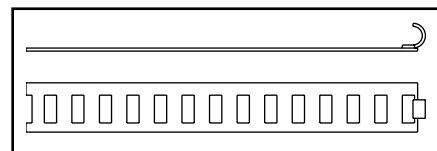
Applications

- Freeze Protection
- Melting of Low Melting Point Solids such as Paraffin, Resins and Chocolate
- Viscosity Control of Fluids such as Paint, Syrups and Honey
- Maintenance of Materials for Roofing, Chimney and Vent Pipe Work

Installation

The SLDH heats the contents of the drum by convection. Heating will occur from the point where the heater is installed to the top of the drum. If the entire drum is to be heated, the SLDH should be installed as near to the bottom of the drum as possible. If only part of the material is to be heated, the drum heater should be installed around the center or top section of the drum. This will provide a faster heat-up and save energy. However, care must be given to ensure that the material level in the drum never falls below the location of the heater.

Girth Extension Straps



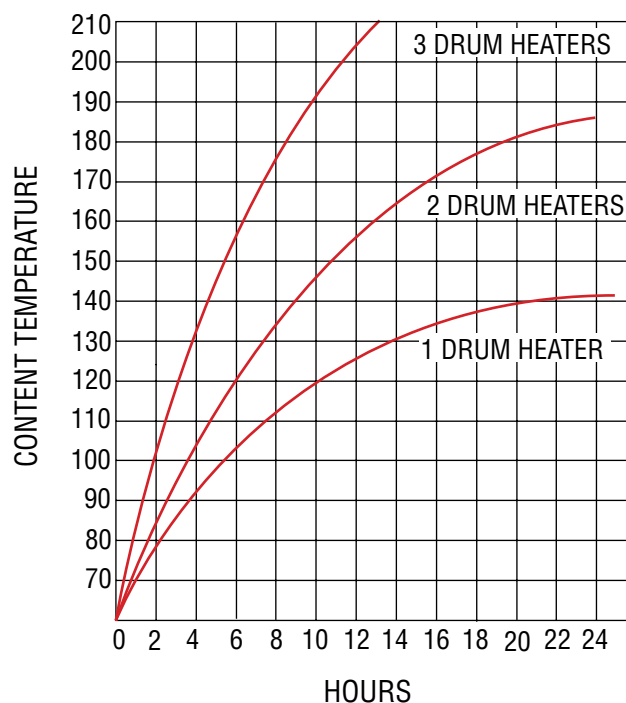
SLDH

Silicone Rubber

Insulated Drum Heater

(cont'd.)

*1000 watt, 55 Gallon Drum Heater Performance
(Covered Drum Filled with Water at 70°F ambient)*



Drum Capacity Cross Reference

Drum Size	Diameter (Inches)	Diameter (Millimeters)	Drum Capacity
55 gal.	22-1/2 (nom.)	570	210 litres
30 gal.	18-1/2 (nom.)	470	115 litres
15 gal.	13-1/2 (nom.)	343	57 litres
5 gal.	11-1/2 (nom.)	290	20 litres

When a single heater is used, place the heater at the bottom of the drum to minimize stratification.

Specifications and Ordering Information

Drum Size	Drum Type	Adjustable Thermostat	Watts	Model Number 120 Volts	PCN	Model Number 240 Volts	PCN	Heater Width (In.)	Stock Status	Weight (Lbs.)
5 Gallon	Metal	70 to 425°F	550	SLDH-05-A-6CPGM-1-55	123123	-	-	4	S	1.4
15 Gallon	Metal	70 to 425°F	500	SLDH-15-A-6CPGM-1-50	123131	SLDH-15-A-6CGM-2-50	123211	3	S	1.412
15 Gallon	Metal	70 to 425°F	700	SLDH-15-A-6CPGM-1-70	123140	-	-	4	S	1.6
30 Gallon	Metal	70 to 425°F	750	SLDH-30-A-6CPGM-1-75	123158	SLDH-30-A-6CGM-2-75	123220	3	S	1.7
30 Gallon	Metal	70 to 425°F	1000	SLDH-30-A-6CPGM-1-100	123166	-	-	4	S	2
55 Gallon	Metal	70 to 425°F	1000	SLDH-55-A-6CPGM-1-100	123174	SLDH-55-A-6CGM-2-100	123238	3	S	1.9
55 Gallon	Metal	70 to 425°F	1200	SLDH-55-A-6CPGM-1-120	123182	SLDH-55-A-6CGM-2-120	123246	4	S	2.3
5 Gallon	Plastic	70 to 140°F	300	SLDHP-05-A-6CPGM-1-30	123190	-	-	9.5	S	3.4
55 Gallon	Plastic	70 to 140°F	750	SLDHP-55-A-6CPGM-1-75	123203	-	-	9.5	S	5.1

Stock Status: S = stock NS = non-stock
To Order— Specify model, PCN and quantity.

WR

Wall Mounted Room Thermostats

- Heavy Duty
25 Amps, 120 Vac
22 Amps, 240 Vac
18 Amps, 277 Vac
- Positive Snap-Action Switch
- 3 Degree Control Differential
- UL Listed, CSA Certified



WR-80



WR-90



Description

WR-80

Range 40-80°F Internal Sensing Element
Indicating Thermometer

WR-90

External Sensing Bulb Range 20-90°F

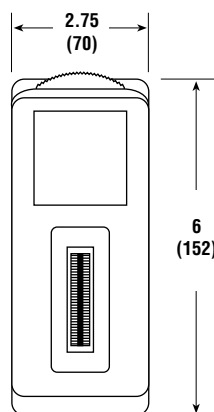
The WR Series Room Thermostats are designed to directly control individual heaters or, by using an external contactor, can control several heaters. The WR-90 is particularly useful for maintaining lower temperatures (in

garages, warehouses, etc.) and avoiding unnecessary heating costs.

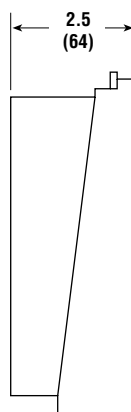
Each design has accuracy and provides long reliable service with a 3 degree control differential. Both units are heavy duty, single stage, with a SPST line voltage snap-action switch and are finished with tough, metallic gray enamel housings.

WARNING: Hazard of Fire. The WR thermostats are designed for temperature control service only. Because they do not fail-safe, they should not be used for temperature limiting duty.

Dimensions

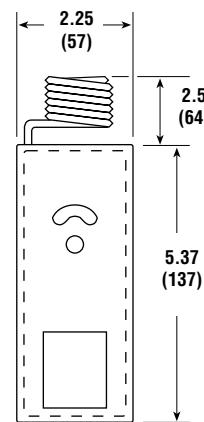


Front View

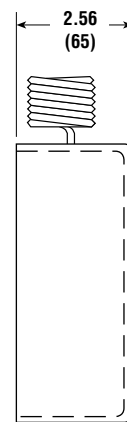


Side View

WR-80



Front View



Side View

WR-90

All Dimensions in Inches (mm)

Specifications and Ordering Information

Model	Temp. Range (°F)	Voltage/Current			Stock	PCN	Wt. (Lbs.)
		120V	240V	277V			
WR-80	40 - 80	25A	22A	18A	S	263177	1
WR-90	20 - 90	25A	22A	18A	S	263185	1

Stock Status: S = stock NS = non-stock
Note — 1. Pilot Duty rating, 125 VA for 120 - 277 Vac.

EPETD-8D

Explosion Proof Room Thermostat



THERMOSTATS
& CONTROLS

- Heavy Duty
- 22 Amps @ 120 - 277 Vac
- Full Load Motor Rating:
3/4 HP @ 125Vac, 1-1/2 HP @ 250Vac
- Double Pole, Double Throw (DPDT) Snap Action Switch Operation
- Heat, Cool or Heat/Cool compatible
- Temperature Range 50-90°F (10-32°C)
- Temperature Adjustment Knob with Dual Temperature Scale
- Bi-Metal Temperature Sensor
- Case accepts 2 x 3/4" NPT conduit (on top and bottom)
- 3/4 NPT Plug & 1/2 X 3/4 NPT Adapter included
- 1/2" thick cast Aluminum housing
- UL/cUL Class I, Groups C&D, Class II, Groups E, F & G
- NEMA Class 7, Div 1 Approved
- Tolerance: Heat 2°F/Cool 4°F
- Dimensions: 5.625" x 6.375" (143mm x 162mm)



Description

The EPETD-8D Thermostat is designed to control heating, cooling, heating and cooling or ventilation systems in commercial or industrial applications that are located in hazardous areas.

Applicable industries include oil & gas, petrochemical, power generation, food & beverage, waste water, mining, agriculture, general industrial and the life sciences including lab/analytical and medical.

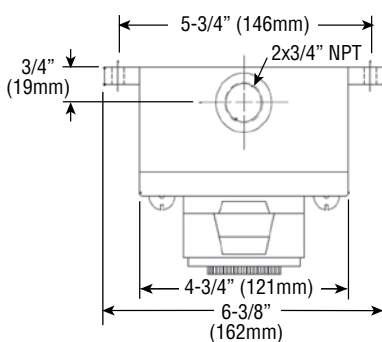
The EPETD-8D is suitable for challenging environments found in grain elevators, munition plants, hospital operating rooms, fueling depots as well as any hazardous area with comfort-air needs.

This thermostat has a snap action, double pole-double throw switch operated by a bimetal actuator and is offered with an adjustable, dual temperature scale knob with positive off.

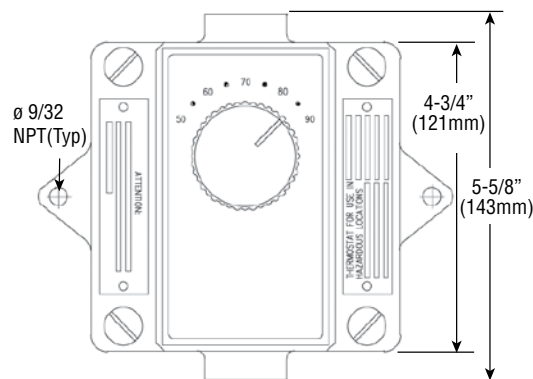
No leveling is required during installation. The case is conveniently equipped with top and bottom 3/4" NPT taps, a 1/2" x 3/4" adapter and a 3/4" NPT plug.

The EPETD-8D is UL/cUL Listed for Class I, Groups C & D, Class II, Groups E, F & G and carries a NEMA7/Div 1 enclosure rating.

Dimensions In. (mm)



Top View



Front View

Specifications and Ordering Information

Model	Temperature Range	Current	Voltage	Weight	Approvals	PCN
EPETD-8D	50-90°F 10-32°C	22 Amps	120-277 Vac	5 lbs. 2.3 kg	UL/cUL Class I, Groups C & D Class II, Groups E, F & G NEMA 7, Div I	266204

WCRT

Corrosion Resistant Wall Mounted Industrial Room Thermostat



- 25-Amps, 120 - 240 Vac
22 - Amps, 277 Vac
- Positive Snap-Action Switch
- Heating or Cooling Control,
SPDT Contacts
- NEMA 4X Weatherproof
Enclosure
- 40 - 100°F Temperature Range
- 2.5°F Differential

Description

The WCRT Room Thermostat is designed to directly control an individual heater. Using an external contactor, it can control several heaters. The WCRT provides high level accuracy and sensitivity with 2.5°F differential. The control has a SPDT output and can be used for heating or cooling.

WARNING: Hazard of Fire. The WCRT thermostat is designed for temperature control service only. Because it is not fail-safe, it should not be used for temperature limiting duty.

Applications

- Can be used to control room temperature in harsh environments regardless of whether heating or cooling is required.
- Tolerates continuous spraying with water, high humidity, airborne contamination and moderately corrosive conditions.

Ratings for Other Electrical Applications

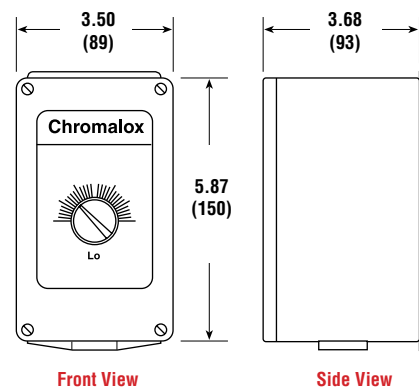
Type of Service	Maximum Rating (Amps AC)		
	120V	240V	277V
Locked Rotor	80	60	50
Inductive	16	12	10
Pilot Duty	125VA	125VA	125VA

Suitable for 24 Vac Operation @ 100mA Minimum

Features

- Shielded sensing bulb is nickel-plated and attached directly to bottom of enclosure where it is shielded from damage and accumulation of insulating particles.
- Sealed Noryl case with neoprene gasket to seal out dust and moisture. Knob opening is closed with lubricated "O" ring.
- Adjustable Knob setting is accurate to $\pm 2.5^\circ\text{F}$ with large easily-read numerical dial.
- Positive OFF for heating is provided by setting unit to LO position. (At LO Position, heat circuit is open and cool circuit is closed at any temperature.)

Dimensions



All Dimensions in Inches (mm)

Specifications and Ordering Information

Model	Type	Temp. Range (°F)	Voltage/Current, Resistive			Voltage/Current, Inductive			Stock	PCN	Wt. (Lbs.)
			120V	240V	277V	120V	240V	277V			
WCRT-100	SPDT	40-100	22A	22A	18A	16A	12A	10A	S	223589	1

Stock Status: S = stock NS = non-stock

WT

Wall Mounted Residential & Commercial Room Thermostat

- 22 Amps, 120 Vac - 240 Vac
18 Amps, 277 Vac
- 45 - 75°F Temperature Range
- Ivory Color
- Mounts in Standard
Electrical Box



THERMOSTATS
& CONTROLS

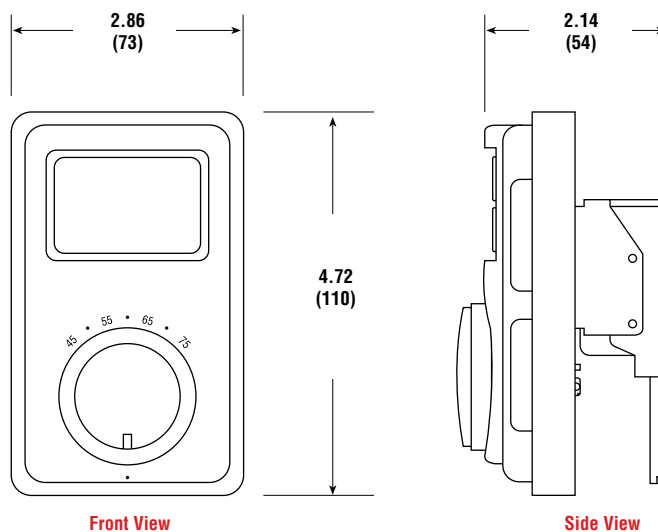
Description

The WT-121 and WT-122 Room Thermostats are designed to control individual heaters or may be used with an external contactor. The WT-121 provides heat control with a SPST snap action switch (open on rise) for breaking one line of the power source. The WT-122 also is a heat control but uses a DPST snap action switch and will break both lines of the power source.

Both models include heat anticipators—assuring closer and more even temperature regulation.

WARNING: Hazard of Fire. The WT thermostats are designed for temperature control service only. Because they are not fail-safe, they should not be used for temperature limiting duty.

Dimensions



All Dimensions in Inches (mm)

Specifications and Ordering Information

Model	Type	Temp. Range (°F)	Voltage/Current				Stock	PCN	Wt. (Lbs.)
			120V	208V	240V	277V			
WT-121	SPST	45-75	22A	22A	22A	18A	S	309999	1
WT-122	DPST	45-75	22A	22A	22A	18A	S	310009	1

Stock Status: S = stock NS = non-stock

Heat Tracing Products Applications

Electric Heat Tracing Products

Chromalox heating cable line includes cables suitable for most process maintenance, pipe and vessel freeze protection and roof and gutter de-icing applications.

Industrial Heating Cables are ideal for process maintenance applications. Maintenance temperatures up to 1100°F can be achieved in a variety of hazardous and corrosive environments. Industrial Cables include:

SRL — Self-Regulating, Low Temperature

SRP — Self-Regulating Process Maintenance

SRM/E — Self-Regulating, Medium Temperature Enhanced

SLL — Constant Wattage, Medium Temperature

CWM — Constant Wattage, Medium Temperature

MI — Mineral Insulation, High Temperature

Tube Bundles — Pre-Installed/Traced Tube Bundles

Commercial Application Cables are designed to meet specific needs of winterizing applications such as water line freeze protection and preventing ice damage to building structures. Commercial Cables include:

SRF — Self-Regulating Freeze Protection

SRF-RG — Self-Regulating Roof and Gutter Freeze Protection

HWM — Hot Water Maintenance Applications

Industrial Process Maintenance Applications

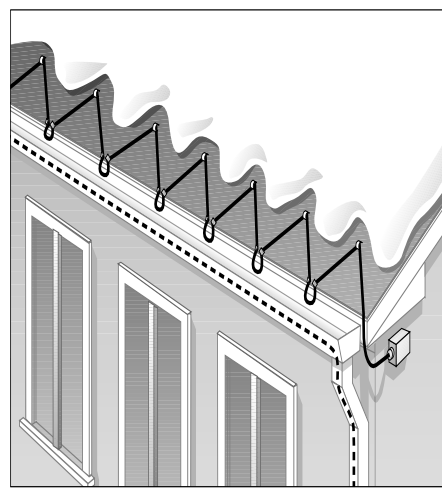
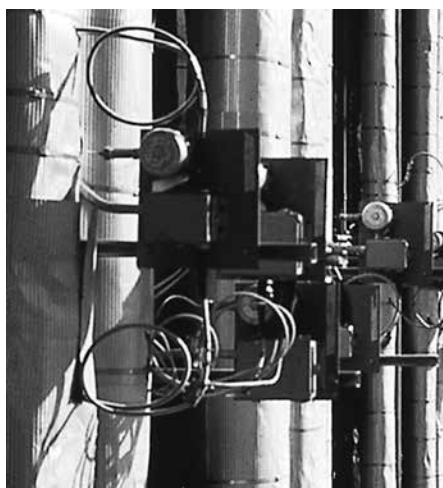
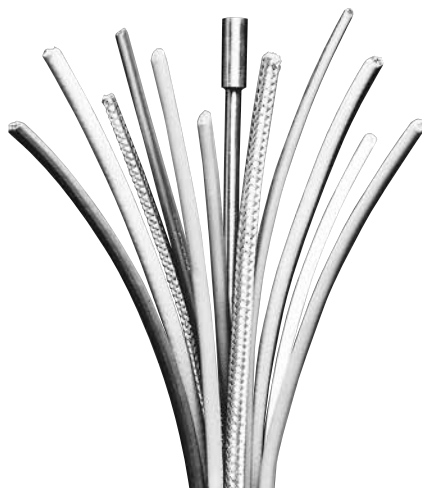
When industrial process piping and vessels must be maintained above the ambient air temperature, Chromalox has the heating cable to fit the application. Cables range in the maximum maintenance temperature from 150°F for SRL to 1100°F for MI cables.

- Petroleum Refineries — Maintain petroleum and by-products at process temperature
- Waste Water Treatment Facilities — Prevent the precipitation of NaOH from solutions
- Food Processing Plants — Maintain viscosity of products in processes such as chocolate, oils and tallow
- Instrument Lines
- Storage Tanks
- Div. 1 and Div. 2 Hazardous Location Applications (Contact your Local Chromalox Sales office for Div. 1 applications)
- Freeze Protection of Steam Cleaned Lines
- Power Generating Plants — Trace steam condensate lines and other chemical additive lines
- Asphalt Lines

Commercial Applications

In a large number of regions in the world, buildings are susceptible to damage caused by water freezing. Primarily, this damage involves either the bursting of pipes or structural damage due to the weight of ice and snow building up on the roof. Chromalox Commercial Application Cables are intended to prevent this damage.

- Cooling Tower Pipes
- Parking Garage Drain Lines
- Chiller Water Lines
- Exposed Pipe Traps
- Exposed Storm Water Pipes
- Sump Discharge Pipes and Equipment
- Wet Sprinkler Fire Systems, where approved by Local Codes
- Outdoor Sports Facilities and Stadiums
- Roof and Gutter De-icing
- Hot Water Maintenance



Heat Tracing Products

Industrial & Commercial Grade Cables & Control Systems

Heat Tracing Products — Section Outline

Industrial Cable Applications

Self-Regulating

Chromalox SRL, SRP and SRM/E Self Regulating Heating Cables provide the most versatility in heat trace designs and applications. Constructed of a semiconductive heater matrix extruded between parallel buss wires, a self-regulating cable adjusts its output to independently respond to temperatures all along its length. As temperatures increase, the heater's resistance increases which lowers the output wattage. Conversely, as the temperature decreases, the resistance decreases and the cable produces more heat. The result — an energy efficient heating cable.

Self-regulating cables are flexible, can be cut-to-length in the field and can be overlapped without fear of burnout in areas where complex piping and equipment require additional heat trace cable.

Chromalox manufactures low (SRL) Process (SRP) and medium (SRM/E) temperature self-regulating heating cable for use on 120 and 208 to 277V. Equipped with a ground braid and optional TPR or FEP jacket, Chromalox self-regulating cables are third party tested and approved for use in harsh corrosive and hazardous applications.

Constant Wattage

Chromalox CWM Constant Wattage Heating Cables are ideally suited for applications where a particular watt density is required at all times. The heater element consists of a nichrome wire wrapped around parallel, insulated buss wires. At specific intervals, a short section of insulation is removed from alternating buss wires to create connection nodes for the nichrome wire. The result is a network of parallel resistors along the entire length of constant wattage cable.

Constant wattage cables are flexible, can be cut-to-length in the field, and are manufactured for use on voltages from 120 to 480V. Although not suited for overlapping, its constant output makes it an ideal choice for higher temperature applications where higher watt densities are required. Equipped with a ground braid and optional FEP jacket, Chromalox constant wattage cables are third party tested and approved for use in harsh, corrosive and hazardous areas. Contact your local Chromalox Sales office for hazardous area designs.

SLL Series Long Line Cables

Chromalox SLL Series Long Line cable provides safe, reliable heat tracing for process temperature maintenance and freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16, 14, 12 or 10 AWG buss wire with metal braid and fluropolymer overjacketing, SLL ensures operating integrity in most hostile industrial environments. The 450°F (232°C) maximum exposure temperature rating allows steam cleaning of process equipment with up to 300 psig steam.

Mineral Insulated

Chromalox MI Mineral Insulated Heating Cables are the most rugged heating cable in Chromalox's product line. Constructed of a solid series resistor element embedded in highly compacted mineral insulation, MI cables are built to handle high temperature, high wattage applications. The series resistor and mineral insulation are encased in a metallic jacket of Alloy 825 for high temperature or corrosive applications.

Mineral insulated cables are factory assembled and tested, ensuring the highest quality product. Since the units consist of a series resistor, virtually any wattage/voltage/length cable configuration can be produced within the cable's physical operating limits. Chromalox mineral insulated cables are available for use up to 600V and are tested and approved for use in corrosive and hazardous areas. Optional accessories include pulling eyes and reverse glands. Other special features are also available.

Commercial Cable Applications

Self-Regulating Freeze Protection

Chromalox SRF Self Regulating Freeze Protection Heating Cable is a self-regulating cable designed for the freeze protection of water lines. The self-regulating matrix allows for overlapping and easy field installation. SRF also lowers its output and energy consumption as the temperature increases thus lowering energy costs. The 16 AWG buss wires provide for long circuits which reduce the number of accessories required.

A braided and braided with overjacket construction is available. Braided cable should be used on dry pipes and dry locations. The overjacket construction is suitable for wet locations where occasional exposure to moisture is expected.

SRF heating cable is not for use in hazardous locations. Consult the Industrial Cable Products in this section for cables suitable for hazardous locations.

Self-Regulating Hot Water Maintenance

HWM Cable is specifically designed for hot water temperature maintenance applications. HWM features a self regulating matrix that varies its output to accommodate changes in ambient or pipe temperature. This cable is designed to make up heat losses through the piping insulation and maintain consistent pipe temperatures for sink, shower, dishwashing, laundry, and kitchen service applications. HWM will maintain temperatures between 90°F and 140°F for these applications with service voltages between 120 and 277 volts. Circuit lengths up to 500 feet are available. HWM cable and accessories provide a low cost alternative to expensive recirculation systems for domestic hot water temperature maintenance applications.

Self-Regulating Roof & Gutter De-Icing

SRF-RG Heating Cable is specifically designed for roof and gutter de-icing applications. SRF-RG features a self-regulating matrix that reduces output as snow melt requirements decrease or when warm weather is present.

The braided and overjacketed construction provides reliable moisture protection. The 16 AWG buss wires allow ample circuit lengths and rugged design. Accessories are available for mounting to roofs and gutters.

Heat Tracing Products

Application & Selection Guidelines

General Product Summary

This section is designed to assist you in determining the appropriate cable for use in your application.

Step 1 — Collect Required Application Data and Determine Heat Loss

Step 2 — Choose the cable that best meets your specific application parameters based on the summary. Consideration of application temperature, exposure temperature, application requirements and environmental ratings should be made.

Step 3 — Select Heating Cable Wattage Rating

Step 4 — Determine Total Cable Required

Step 5 — Determine Circuits and Circuit Protection

Step 6 — Select Appropriate Accessories

Step 1 — Collect Required Application Data & Determine Heat Loss

Application data required can be split into two categories. The first is the heat loss data. This includes:

- Maintenance Temperature
- Minimum Ambient Temperature
- Pipe Size
- Insulation Type (or K factor)
- Insulation Thickness
- Indoor/Outdoor Installation
- Maximum Expected Wind Speed
- Required Safety Factor.

Refer to the Technical section of this catalog, “Determining Heat Energy Requirements — Pipe & Tank Tracing” for details on

performing heat loss calculations. For Commercial Freeze Protection, please see Cable Selection Tables in this section.

The second category of data required is the application and environmental conditions. This includes:

- Maximum Exposure Temperature (Power Off Condition)
- Circuit Length Considerations
- Available Voltage
- Hazardous Area Requirements
- Type of Pipe (Plastic or Metal)
- Chemical Exposure
- Fire Resistance.

Step 2 — Select the Cable

Choose the cable that best fits your specific application parameters and wattage requirements.

Heat Tracing Product Features

Features	Industrial						Commercial		
	SRL	SRP	SRM/E	CWM	SLL	Alloy 825 MI	SRF	SRF-RG	HWM
Max. Maintenance Temp. (°F)	150	225	302	320	302	900	100	50	225
Max. Exposure Temp. (°F) Power Off	185	275	420	400	450	1,100	185	185	275
Max. W/Ft.	10	15	20	12	12	50	8	12	15
Max. Circuit Length (Ft.)	95-660	55-750	150-750	225-900	7,500	330-1,000	180-660	135-540	500-800
Buss Wire Size	16	16	16	12	16,14,12,10	N/A	16	16	16
Voltages	120, 208-277	120, 208-270	120, 208-277	120, 208-277, 480	120-600	Up to 600	120, 208-277	120, 208-277	120, 208-270
Hazardous Ratings	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Usable on Plastic Pipe	Yes	No	No	No	No	No	Yes	Yes	Yes
Cut-to-Length in Field	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Field Splicable	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Can be Overlapped	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Output Varies with Temp.	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Varies Output Along Length	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Design of System	Simple	Simple	Simple	Simple	Involved	Involved	Simple	Simple	Simple
Installation of System	Easiest	Easiest	Easiest	Simple	Simple	Involved	Easiest	Easiest	Easiest
Fire Resistance	Fair	Fair	Fair	Fair	Fair	Excellent	Fair	Fair	Fair
Chemical Resistance	See Corrosion Guide, next page								
Size (Max. In.)	.435x.185	.435x.185	.435x.185	.435x.235	.435x.185	0.4	.435x.185	.435x.185	.435x.185
Accessories	DL/EL/U	D/UL	DL/U	DL/EL/U	U		DL/EL/U	RG Access.	DL/U
Monitor Wire Available	Yes	Yes	Contact Factory	Contact Factory	No	No	No	No	Yes
Applications	FL,PL	FL,FH, PL,PH	FL,FH, PL,PH	FL,FH, PL,PH	FL,FH, PL,PH	FL,FH, PL,PH	FL	RG	HWM
	FL = Freeze Protection FH = Freeze Protection, High Exposure Temp. PL = Process Maintenance, Low Temperature				PH = Process Maintenance, High Temperature RG = Roof and Gutter De-icing HWM = Hot Water Maintenance				

Heat Tracing Products

Application & Selection Guidelines *(cont'd.)*

Agency Approvals

Area	SRL-C	SRL-CR	SRL-CT	HSRL	SRM/E-C	SRM/E-CT	SRP	HSRM	CWM-C	CWM-CT	MI	SRF-C	SRF-CR	SRF-RG	HWM
Ordinary Area															
UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Factory Mutual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ATEX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Class 1 Div 2, Groups B,C,D															
UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Factory Mutual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
CSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ATEX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Class II Div 2, Groups F,G															
UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Factory Mutual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
CSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ATEX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Class III Div 2															
UL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Factory Mutual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
CSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ATEX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Class 1 Div 1, Groups B,C,D*															
UL			✓	✓	✓			✓							
Factory Mutual			✓	✓	✓			✓							
CSA			✓	✓	✓			✓							
ATEX			✓	✓	✓			✓							
Class II Div 1, Groups F,G															
UL			✓	✓	✓			✓							
Factory Mutual			✓	✓	✓			✓							
CSA			✓	✓	✓			✓							
ATEX			✓	✓	✓			✓							
Class III Div 1															
UL				✓				✓							
Factory Mutual				✓				✓							
CSA				✓				✓							
ATEX				✓				✓							
Zone 2 and Zone 22															
Factory Mutual			✓				✓				✓				
CSA			✓				✓				✓				
ATEX			✓				✓				✓				
Zone 1 and Zone 21															
Factory Mutual											✓				
CSA											✓				
ATEX											✓				

*Class I, Division I, Groups B,C & D - UL, CSA, FM - Contact your Local Chromalox Sales office for design assistance.

Corrosion Guide to Select Proper Cable Construction

Exposure To	Industrial									Commercial		
	SRL	SRM/E	SRP	HSRL	HSRM	CWM	SLL	Alloy 825 MI		SRF	SRF-RG	HWM
Moisture	C, CR, CT	C, CT	C, CT	CT	CT	C, CT	CT	Yes		C, CR	Yes	C, CT
Aqueous Solutions of Inorganic Compounds	CR, CT	CT	CT	CT	CT	CT	CT	No		No	No	CT
Liquids Organic Chemicals	CT	CT	CT	CT	CT	CT	CT	Yes		No	No	CT
Acids or Bases	CT	CT	CT	CT	CT	CT	CT	No		No	No	CT
Note — This is a recommendation guide. Chromalox cannot warrant any Electric Heat Trace against failure by sheath degradation if such failure is the result of operating conditions beyond the control of the heater manufacturer. It is the responsibility of the purchaser to make the ultimate choice of sheath material based on knowledge of the chemical composition of the corrosive solution, character of materials entering the solution, and controls which maintains the process.												

Heat Tracing Products

Application & Selection Guidelines (cont'd.)

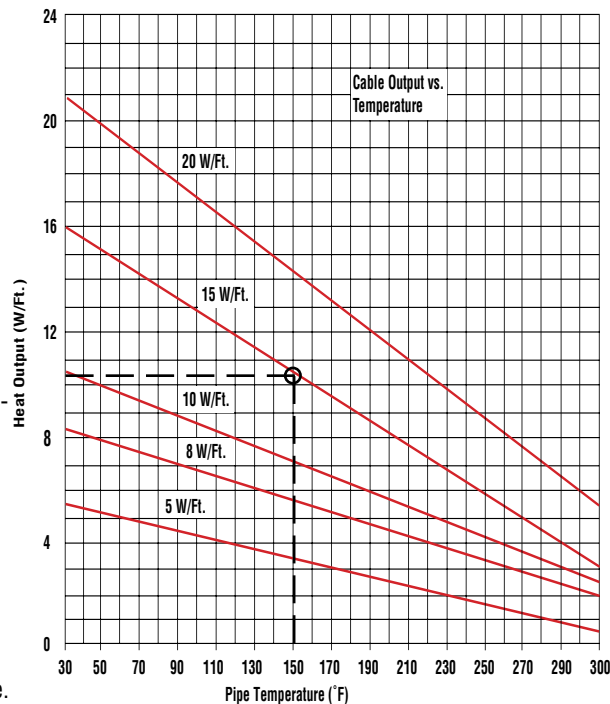
Required Jacket Material

Select the appropriate jacket configuration for the desired level of mechanical and corrosive chemical protection. The CR over-jacket option can be used when additional mechanical protection is desired. The CR over-jacket option is required when the cable can be exposed to aqueous inorganic chemicals. The CT over-jacket option is required when the cable can be exposed to organic chemicals or strong corrosives. Use Corrosion Guide above to determine the correct jacket material option for the cable type selected.

Step 3 — Select Heating Cable Wattage Rating

After calculating the heat loss in the pipe and adjusting for any application deviations, you may determine which cable rating to use. If you have selected a self-regulating cable you must adjust the output based on maintenance temperatures, using the Thermal Output Rating Graphs shown on the individual product pages, select the lowest cable rating that will provide the pipe maintenance temperature. **For Example:** A 15 W/Ft. SRM/E cable @ 150°F will output approximately 10 W/Ft. Multiple passes or runs of cable may be required to provide sufficient output per foot calculated in Step 1. This is accomplished with parallel runs of cable or spiraling. Contact your Local Chromalox Sales office.

Cable Output vs. Temperature



Step 4 — Determine Total Length of Cable Required

The total amount of heating cable is determined by adding the total footage of pipe to be traced and adding for allowances for the components such as flanges, valves, pipe supports; then, multiply by the total number of runs or Wrap Factor determined in Step 3.

(Total Feet of Traced Pipe + Cable Allowance for Components) x # of Runs = Total Cable Length

Step 5 — Determine Circuits & Circuit Protection

Circuit protection depends on the breaker size being used and the start-up temperature. The National Electric Code (NEC 1996) requires the use of ground fault protection breakers for heating cable. Refer to the specific data of the individual heat trace cable to determine maximum circuit lengths. To determine the number of circuits required for each pipe, divide the total cable length found in Step 4 by the maximum circuit length found in the individual cable data charts. Round up to the next higher number.

$$\text{Number of Circuits} = \frac{\text{Cable Length}}{\text{Maximum Circuit Length}}$$

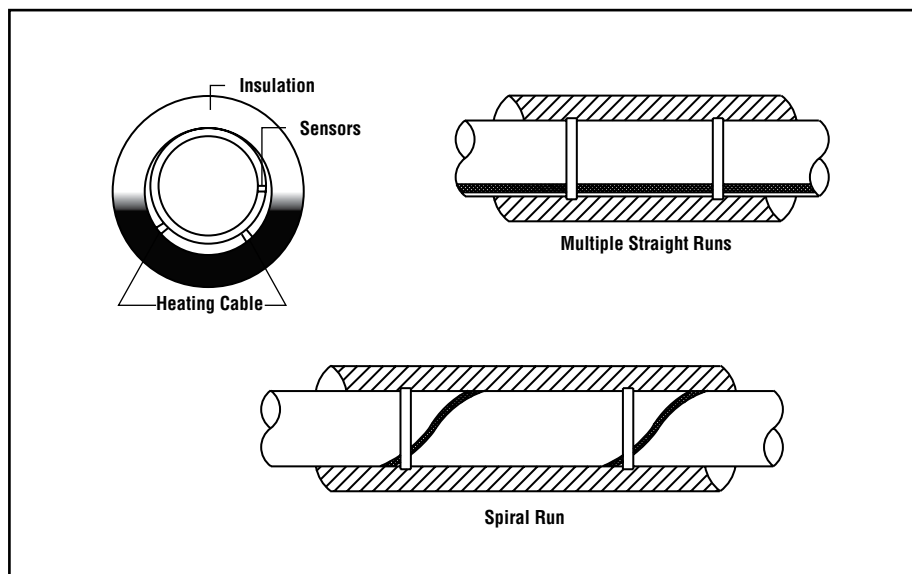
Pipe Component Cable Allowance Estimation

Component	Cable Allowance Factor (Ft.)	x	# Components	Total Additional Cable
Flange Pair	1.5	x		
Pipe Support	2.0	x		
Butterfly Valve	2.5	x		
Ball Valve	2.7	x		
Globe Valve	4.0	x		
Gate Valve	5.0	x		
Example: Pipe: 150 feet Valves: 1 globe valve Pipe Supports: 2 Flanges: 2 Total Cable Length = $[150 + (1 \times 4) + (2 \times 2) + (2 \times 1.5)] \times 2 \text{ runs}$ = 161 feet x 2 runs = 322 feet				

Heat Tracing Products

Application & Selection Guidelines (*cont'd.*)

Design of Multiple Runs when Heat Requirements Exceed Cable Output Ratings



Step 6 — Select Controls & General Application Accessories

Chromalox provides a wide range of termination accessory and control options for your heat tracing systems needs.

Accessory options range from ordinary area under the insulation kits in our EL series all the way through connections and terminations for Division 1 hazardous areas in our HL series. The accessories carry a full complement of third party approvals from UL, Factory Mutual, Canadian Standards, ATEX and IECEx.

Controls range from Thermostats for both ambient air and pipe/tank sensing applications to WeatherTrace power distribution and controls panels through our IntelliTrace line of distribution, monitoring and control panels. Whether your project is a few lines of freeze protection or a few hundred lines of process piping we have the right control option for your needs.



*More Information
is Available Online
on Heat Trace.*

Bookmark Your Browser to
www.chromalox.com
and Select **Manuals**.



Accessory Descriptions

U Series

- Designed for Ordinary and Hazardous Area use in Industrial applications
- Integrated design allows for quick cable termination
- Line carries worldwide approvals including ATEX and IECEx
- Reduced parts count results in fast installation times
- Line includes:
 - Power Connection
 - Multi Entry Connection (for splice, tee or multiple power to 3 cables)
 - Above Insulation End Seal
 - Below Insulation End Seal
 - Lighted End Seal
 - Ambient Thermostat
 - Line Sensing Thermostat
 - Lighted End Seal
- Thermostats also serve as power connection for cable - eliminating need for extra power connection box.

DL Series

- Designed for Ordinary and Hazardous Area use in Industrial Applications
- Integrated design allows for fast installation
- Box design allows easy access for field wiring, maintenance and trouble shooting
- CSA, Factory Mutual and UL approved for ordinary and Hazardous area use (Div. 2)
- Line Includes
 - Power Connection
 - Splice and Tee (connect up to 3 cables)
 - Below Insulation End Seal
 - Lighted End Seal (ordinary area use only)
 - Ambient Thermostat
 - Line Sensing Thermostat
- Thermostats also serve as power connection for cable - eliminating need for extra power connection box.

Heat Tracing Products

Application & Selection Guidelines (*cont'd.*)

EL Series

- Designed for use in ordinary areas for both commercial and industrial applications
- Low profile designs allow for ease of insulation around connections
- Kits include standard electrical terminations and heat shrink products familiar to most installers
- Low parts count allows fast termination of cables
- Third Party Approvals through UL, Factory Mutual and CSA.
- Line Includes
 - Junction Box
 - Pipe Stand off with sealing grommets and cable boots
 - Heat shrink splice and tee kits
 - Heat Shrink end caps

HL Series

- Specifically designed for use in Division 1 hazardous areas
- Corrosion Resistant housing made of high strength cast aluminum
- Reduced parts count for fast installation
- Small profiles for ease of insulation
- Line Includes
 - Power Connection
 - Splice Kit
 - Tee Kit
 - End Seal Kit
 - Add on Signal lights for End Seal and Power Connection

Controls Descriptions

DL Controls

The DL Series temperature controls are available in four models to handle a broad range of applications. Models include two ambient sensing and two line sensing thermostats. These high quality models combine On/Off temperature control and cable power connection in one affordable, convenient easy to install package. The line includes two 22 amp capable models for Ordinary Area installations and two 11 amp capable hermetically sealed models for Division 2 hazardous area applications. Products carry UL, Factory Mutual and CSA approvals.

EL Controls

The EL controls line contains ambient and line sensing controllers for use in Division 1 and Division 2 areas. All products switch 22 amps and come in NEMA 4x and NEMA 7 rated enclosures. Two models are available in dual output form. All capillaries are nontoxic oil filled available in 8 and 10 foot lengths. Products carry UL, Factory Mutual and CSA approvals.

WeatherTrace Control and Distribution Panels

The Chromalox FPAS, FPASM, FPLS, and FPLSM series panels offer power distribution, ground fault protection, individual circuit alarming, with options for both line sensing and ambient sensing control. Line sensing is accomplished in conjunction with U SERIES, DL SERIES or EL SERIES thermostats. Ambient sensing can be accomplished with thermostats or optional Chromalox solid state 1604 series temperature controllers. The panels are housed in NEMA 4 enclosures for indoor/outdoor applications. NEMA 4X 304 stainless steel enclosures may be selected as an option for more harsh environments. The standard models are available in 12,18,20,30 and 42 position panel boards with 100 and 225 amp bus ratings in single and three phase configurations. Branch circuit breakers are available in 20, 25, 30 and 40 amp single pole and two pole configurations with 30mA ground-fault equipment protection. Options for Z-purge systems for hazardous area installation are available. Sentinel monitoring system is available for alarm indication when a circuit loses power. Common alarm available for interface to building management systems. Panels are built in a UL 508 certified manufacturing plant and carry UL and cUL approvals.

DTS Digital Thermostat

The DTS-HAZ is a single circuit controller which switches 30 Amps at 100-277 Vac in Class I, Division 2 areas. It employs SSR on/off control, soft start feature, programmable parameter values, AC or DC alarm and large LED display. It comes complete with a standard pipe stand or optional wall mount as well as an RTD sensor. All of this is housed in a 6" x 6" enclosure, which facilitates all wiring needs.

IntelliTRACE® ITC Series

The ITC is a 1 or 2 circuit microprocessor-based temperature controller, switching 40 Amps per circuit at 100-277 Vac, and may be used in either freeze protection or process temperature control applications. The ITC's compact 10" x 8" x 6" NEMA 4X enclosure facilitates all of the electrical connections and it features a high resolution TFT display, PID or On/Off SSR control, selectable soft start program, dual RTD sensor input per circuit, current load and GFEP monitoring. All process variables may be monitored both locally and remotely. The ITC is designed for line or ambient sensing heat trace applications in hazardous (Class I, Division 2) or non-hazardous areas.

Should the ITC unit realize a failed sensor, the controller automatically switches into a user adjustable manual output duty cycle. This controller provides LED indication of load, power and alarm status for each circuit, has front panel capacitive touch user interface buttons and comes complete with heavy gage stainless steel mounting brackets.

IntelliTRACE Control, Monitoring and Distribution Panels

The IntelliTRACE ITAS and ITLS Series is a micro-processor based Control/Monitoring and Power Management and Distribution system for Heat Trace Applications. The ITAS and ITLS Series has models suitable for ordinary as well as Class I, Division 2 areas and will manage 6-72 circuits

The ITAS and ITLS Control Panel Series provides alarms for high / low temperatures, high/low current, ground fault leakage and sensor faults.

The 40 Amps per circuit capacity, the Integral Circuit Panel and the Soft Start feature save significant time, installation and maintenance costs.

The customizable I/O (Sensor) Mapping, the remote monitoring capability and the wireless communication option provide desirable process management flexibility options.

SRL

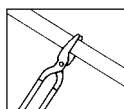
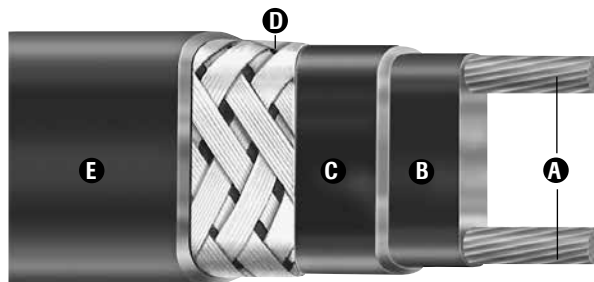
Self-Regulating Low Temperature

- Self-Regulating, Energy Efficient
- 16 AWG Buss Wire
- Circuit Lengths to 660 Feet
- Process Temperature Maintenance to 150°F (65°C)
- Maximum Continuous Exposure Temperature, Power Off, 185°F (85°C)
- Industrial Freeze Protection Applications
- Freeze Protection of Fire Protection System Piping
- Field Splicing Without Disrupting Heat Output
- 3, 5, 8 and 10 W/Ft.
- 120 and 208 - 277 Volt From Stock
- Approximate Size 3/8"W x 1/8"H
- Min. Bend Radius 1-1/8"
- For Use on Metal and Plastic Pipes

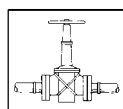
Description

Chromalox SRL self-regulating heating cable provides safe, reliable heat tracing for freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16 AWG buss wire with a tinned copper braid and optional overjacketing, SRL ensures operating integrity in Div. 2 hazardous environments as well as certain corrosive industrial environments. SRL heating cable has a maximum maintenance temperature rating of 150°F (65°C).

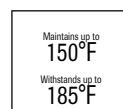
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



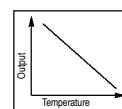
Cut to Length
in Field



Can be Single
Overlapped



Low Tempera-
ture



Self Regulating
Output



HEAT TRACE AND
ACCESSORIES

Features

- Energy efficient, self-regulating SRL uses less energy when less heat is required.
- Easy to install, SRL can be cut to any length (up to max. circuit length) in the field.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- SRL features lower installed cost than steam tracing, less maintenance expense and less downtime.
- SRL can be single overlapped without burn-out, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Because SRL is self-regulating, over-temperature conditions are minimized.
- Chromalox termination, splice, tee and end seal kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires** — Provide reliable electrical current capability.
- B Semiconductive Polymer Core Matrix** — "Self-Regulating" component of the cable, its electrical resistance varies with temperature. As process temperature drops, the core's heat output increases; as process temperature rises, the heat output decreases.
- C Polyolefin Jacket** — Flame retardant, electrically insulates the matrix and buss wires and provides resistance to water and some inorganic chemical solutions.
- D Tinned Copper Braid** — Provides additional mechanical protection in any environment and a positive ground path.

- E High Temperature Fluoropolymer or TPR Overjacket (optional)** — Corrosion resistant, flame retardant overjacket is highly effective in many environments. TPR coatings protect against certain inorganic chemical solutions. Fluoropolymer coatings are used for exposure to organic or corrosive solutions. These coatings also protect against abrasion and impact damage.

Approvals

Factory Mutual (FM) Approved, UL Listed, and CSA certified for ordinary areas. UL Listed for freeze protection of fire protection system piping. ATEX, IECEx, FM, and CSA Approved for hazardous (classified) areas when used with U Series, HL, DL, and EL accessories.

CSA and FM Approved:

- Class I, Div. 1* & 2 Groups A*, B, C, D (gases, vapors)
- Class II, Div. 1* & 2 Groups E*, F, G (combustible dust)
- Class III, Div. 2 (easily ignitable fibers and fillings)
- 3 Watt Rated T6 Temperature Class
- 5 and 8 Watt Rated T5 Temperature Class
- 10 Watt Rated T4A Temperature Class
- *CSA Only
- *-CT overjacket only

ATEX Approved:

- II 2 G Ex e II T5 Gb Ta -60°C to 95°C

IECEx Approved:

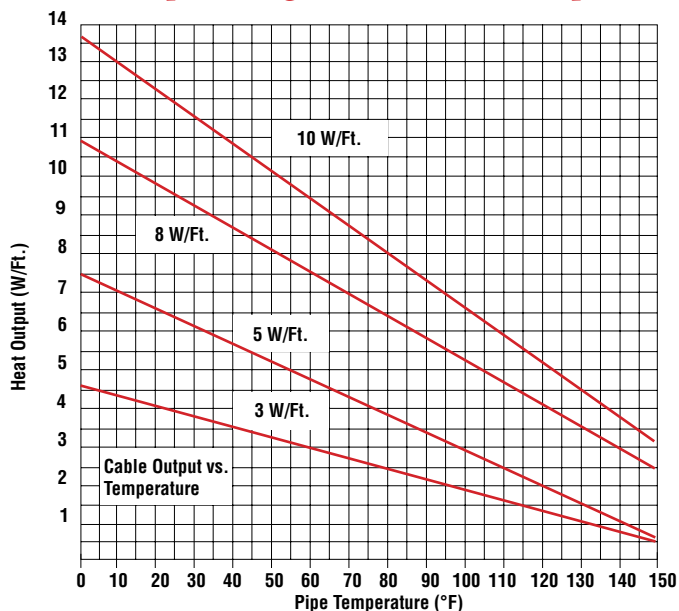
- ITS 07.0018X Ex e II T5 Gb Ta -60C to 95C

SRL

Self-Regulating Low Temperature *(cont'd.)*

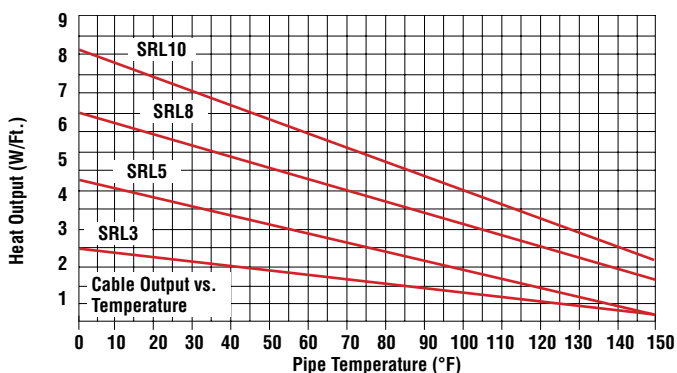


Thermal Output Ratings on Insulated Metal Pipe¹



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation, and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Thermal Output Ratings on Plastic Pipe with Aluminum Tape



Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
SRL 3	2.4	-20	2.6	-13	3.4	+15
SRL 5	4.1	-18	4.5	-10	5.6	+13
SRL 8	6.88	-14	7.28	-9	8.96	+12
SRL 10	8.7	-13	9.2	-8	11.1	+10

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	50°F Start-Up (Ft.)						0°F Start-Up (Ft.)						-20°F Start-Up (Ft.)					
	10A	15A	20A	25A	30A	40A	10A	15A	20A	25A	30A	40A	10A	15A	20A	25A	30A	40A
SRL3-1C	205	305	360	NR	NR	NR	135	200	270	330	360	NR	120	185	245	300	360	NR
SRL3-2C	400	600	660	NR	NR	NR	275	415	555	660	NR	NR	245	370	495	600	660	NR
SRL5-1C	125	185	250	270	NR	NR	90	135	180	225	270	NR	80	120	160	205	245	270
SRL5-2C	250	375	505	540	NR	NR	180	270	360	450	540	NR	160	245	325	405	490	540
SRL8-1C	100	150	200	215	NR	NR	70	110	145	180	215	NR	65	100	130	165	200	210
SRL8-2C	185	285	375	420	NR	NR	135	200	265	335	395	420	120	175	235	300	350	420
SRL10-1C	60	95	130	160	180	NR	50	80	105	130	155	180	45	70	95	120	140	180
SRL10-2C	100	160	210	260	315	360	80	125	170	210	255	340	75	120	160	195	240	320

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

Note — Thermal magnetic circuit breakers are recommended since magnetic circuit breakers could "nuisance trip" at low temperature.

SRL

Self-Regulating Low Temperature *(cont'd.)*

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
3 @ 50°F	120	SRL 3-1C	S	382678	53
		SRL 3-1CT	S	383400	66
		SRL 3-1CR	S	382731	64
	208 - 277	SRL 3-2C	S	382686	53
		SRL 3-2CT	S	383419	66
		SRL 3-2CR	S	382740	64
5 @ 50°F	120	SRL 5-1C	S	382694	53
		SRL 5-1CT	S	383443	66
		SRL 5-1CR	S	382758	64
	208 - 277	SRL 5-2C	S	382707	53
		SRL 5-2CT	S	383451	66
		SRL 5-2CR	S	382766	64
8 @ 50°F	120	SRL 8-1C	S	382555	53
		SRL 8-1CT	S	383460	66
		SRL 8-1CR	S	382598	64
	208 - 277	SRL 8-2C	S	382563	53
		SRL 8-2CT	S	383478	66
		SRL 8-2CR	S	382600	64
10 @ 50°F	120	SRL 10-1C	S	382820	53
		SRL 10-1CT	S	383486	66
		SRL 10-1CR	S	382846	64
	208 - 277	SRL 10-2C	S	382838	53
		SRL 10-2CT	S	383494	66
		SRL 10-2CR	S	382854	64
To Order — Specify length, model, PCN and installation accessories.					

HEAT TRACE AND ACCESSORIES

Accessories

Accessories		U Series	DL	EL
Power Connection	Heat trace to electrical service connection	UPC	RTPC	SSK
Splice & Tee		UMC	RTST	RT-RST
End Seal	For terminating cable	UES	RTES	RT-RES
Lighted End Seal		UESL	RTST-SL	N/A
Thermostat	Ambient air sensing thermostat	UAS	RTAS	THL/TXL
	Line sensing mechanical thermostat	UBC	RTBC	THR/TXR
To Order — General Application & Installation Accessories such as tape, pipe straps, warning labels, etc., refer to the U Series, DL & EL General Application Accessories page at the end of this section.				

Ordering Information

To Order —
Complete the Model Number using the Matrix provided.

Contact your Local Chromalox Sales office for monitor wire option.

Model Self-Regulating Low Temperature

SRL Self-Regulating, Low Temperature Heating Cable

Code Output (W/Ft.)

3 Three
5 Five
8 Eight
10 Ten

Code Voltage

1 120
2 208 - 277

Code Braid and Overcoat Options

C Tin-Plated copper metallic braid for additional protection and ground path
CT Fluoropolymer corrosion resistant overjacket over braid for hostile/corrosive environments
CR TPR overjacket over braid for protection against certain inorganic chemical solutions

SRL 5 1 C Typical Model Number



More Information
is Available Online
on Heat Trace.

Bookmark Your Browser to
www.chromalox.com
and Select **Manuals**.

SRP

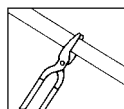
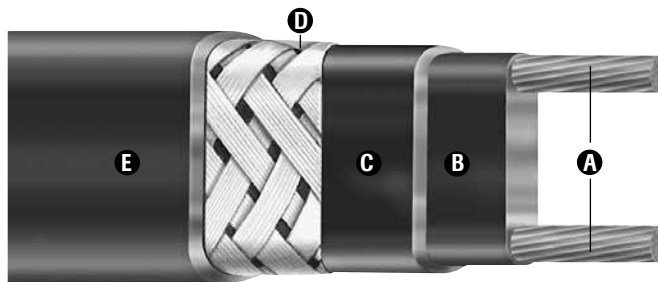
Self-Regulating Process Temperatures

- Self-Regulating, Energy Efficient
- 16 AWG Buss Wire
- Circuit Lengths to 750 ft.
- Process Temperature Maintenance to 230°F (110°C)
- Maximum Continuous Exposure Temperature, Power Off, 275°F (135°C)
- Available in 5, 10, and 15 Watts per Foot
- 120 and 208-277 Volts Available from Stock
- Industrial Process Maintenance Applications
- Approximate Size 3/8"W x 1/8"H
- Min. Bend Radius 1-1/8"
- For use on Metallic Pipes
- Consult Factory for use on Plastic Piping

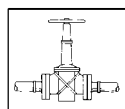
Description

Chromalox SRP self-regulating heating cable provides safe, reliable heat tracing for process maintenance applications to 230°F (110°C) or freeze protection of pipes / tank with high heat losses. Constructed of industrial grade 16 AWG buss wire with a tinned copper braid and optional overjacketing, SRP ensures operating integrity most hostile industrial environments.

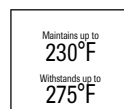
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



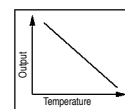
Cut to Length
in Field



Can be Single
Overlapped



Low Tempera-
ture



Self Regulating
Output

Features

- Energy efficient, self-regulating SRP uses less energy when less heat is required.
- Easy to install, SRP can be cut to any length (up to max circuit length) in the field.
- SRP features lower installed cost than steam tracing, less maintenance expense and less down time.
- SRP can be single overlapped without burn-out, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Because SRP is self-regulating, overtemperature conditions are minimized.
- Chromalox U-Series Connection Kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires** – Provide reliable electric current capability.
- B Semiconductive Polymer Core Matrix** “Self-Regulating” component of the cable its electrical resistance varies with temperature. As process temperature drops, the core’s heat output increases; as process temperature rises, the heat output decreases.
- C Fluoropolymer Jacket** – Flame retardant, electrically insulates the matrix and buss wires and provides corrosion resistance.

- D Tinned Copper Braid** – Provides additional mechanical protection in any environment and a positive ground path.
- E High Temperature Fluoropolymer Overjacket** – Corrosion resistant, flame retardant overjacket is highly effective in many environments. Protects against exposure to organic or corrosive solutions. The overjacket also protects against abrasion and impact damage.

Approvals

Factory Mutual (FM) approved for ordinary areas. FM approved for hazardous (classified) areas when used with U Series and DL accessories

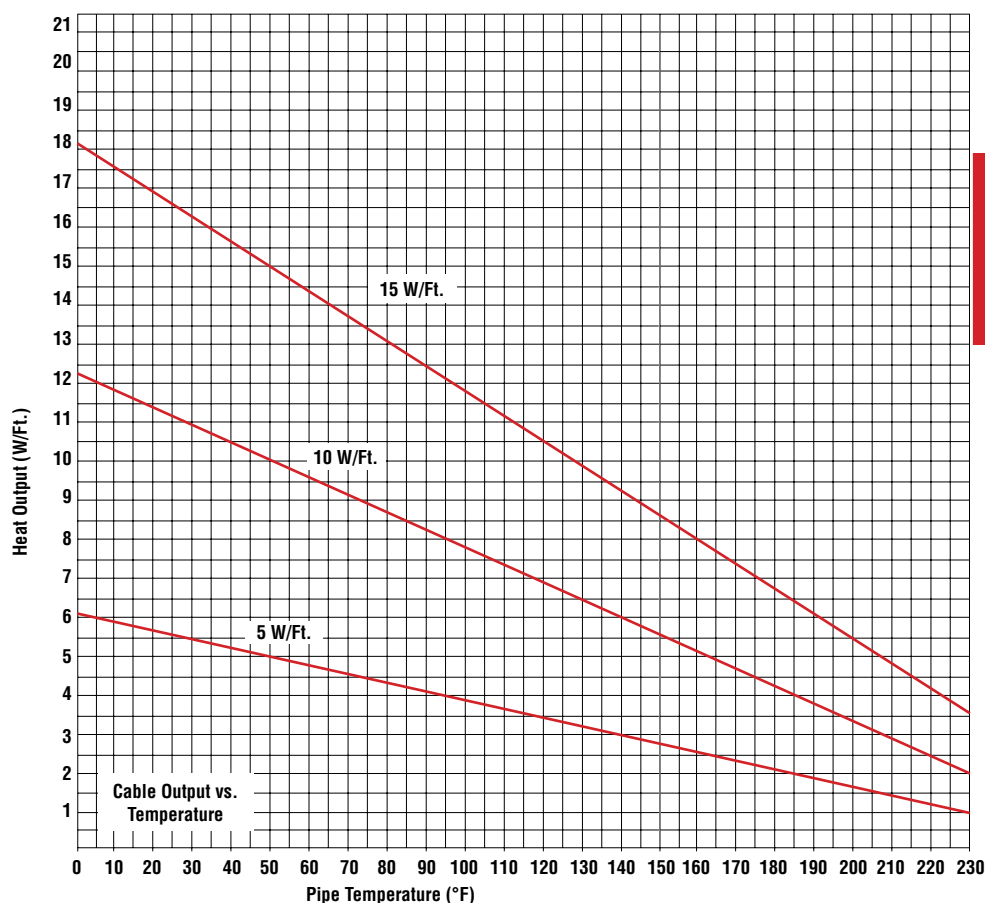
FM Approved:

- Class I, Division 2, Groups B, C, D (Gases, vapors)
- Class II, Divisions 1* & 2, Groups F, G (Combustible dust)
- Class III, Division 2 (Easily ignitable fibers and fillings)
- Class I, Zone 1, AEx e II
- 3, 5, 8 and 10 Watt Rated T4 Temperature Class

SRP

Self-Regulating Process Temperatures (cont'd.)

Thermal Output Ratings on Insulated Metal Pipes



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
SRP 5	3.85	-20	4.25	-13	6.45	+15
SRP 10	8.3	-18	8.80	-10	12.50	+13
SRP 15	12.75	-14	13.50	-9	18.45	+12

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	50°F Start-Up (Ft.)					0°F Start-Up (Ft.)					-20°F Start-Up (Ft.)				
	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
SRP5-1CT	145	195	295	390	490	110	145	215	295	360	70	90	135	180	225
SRP5-2CT	295	385	580	750	750	220	290	430	580	720	135	180	270	360	450
SRP10-1CT	100	135	200	270	330	70	95	145	190	240	65	85	130	175	215
SRP10-2CT	200	270	400	530	665	145	190	290	380	480	130	175	260	350	440
SRP15-1CT	75	100	150	200	250	60	80	120	160	200	55	70	110	145	180
SRP15-2CT	150	195	295	390	500	120	160	235	320	400	110	145	220	290	360

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

SRP

Self-Regulating Process Temperatures (cont'd.)

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
Output at Rated Voltage					
5 @ 50°F	120	SRP 5-1C	S	387161	68
		SRP 5-1CT	S	387188	80
	208 - 277	SRP 5-2 C	S	387217	68
		SRP 5-2CT	S	387225	80
10 @ 50°F	120	SRP 10-1C	S	387102	68
		SRP 10-1CT	S	387129	80
	208 - 277	SRP 10-2C	S	387170	68
		SRP 10-2CT	S	387196	80
15 @ 50°F	120	SRP 15-1C	S	387065	68
		SRP 15-1CT	S	387073	80
	208 - 277	SRP 15-2C	S	387110	68
		SRP 15-2CT	S	387137	80
To Order – Specify length, model, PCN and installation accessories.					

Accessories

Accessories		DL Series	U Series
Power Connection	Heat trace to electrical service connection	RTPC	UPC
T- Splice	Electrical connection for 3 segments	RTST	UMC
In-Line Splice	Electrical connection for 2 segments	RTST	UMC
End Seal	For terminating cable	RTES	UES
Lighted End Seal	For terminating cable	RTST-SL	UESL
Thermostat	Ambient air sensing thermostat	RTAS	UAS
	Line sensing mechanical thermostat	RTBC	UBC
To Order – For general application & installation accessories such as tape, pipe straps, warning labels, etc. refer the to the DL & EL General Application Accessories page at the end of this section.			

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	Hazardous Location Self-Regulating Process Temperature			
SRP	Code		Output (W/Ft.)	
	5		Five	
	10		Ten	
	15		Fifteen	
	Code		Voltage	
	1		120	
	2		240	
	Code		Construction	
	C		Braid Only	
	CT		Standard braid and overjacket	
SRP	5	1	CT	Typical Model Number

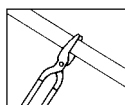
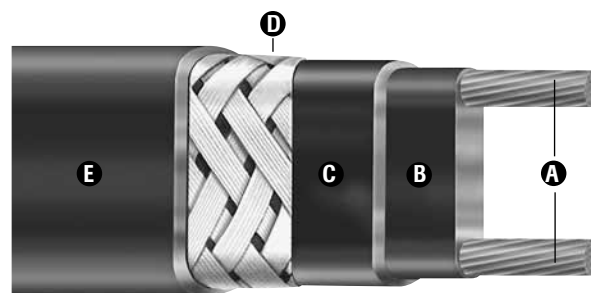
SRM/E Self-Regulating Medium Temperature

- Self-Regulating, Energy Efficient
- 16 AWG Buss Wire
- Circuit Lengths to 750 Feet
- Process Temperature Maintenance to 302°F (150°C)
- Maximum Continuous Exposure Temperature, Power Off, 420°F (215°C)
- Industrial Process Maintenance Applications
- Industrial Freeze Protection Applications
- Freeze Protection of Fire Protection System Piping
- Steam Cleanable on Process Equipment Up to 300 PSIG
- 5, 8, 10, 15 and 20 W/Ft.
- 120 and 208 - 277 Volt From Stock
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"
- For Use on Metallic Pipes Only

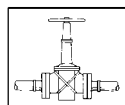
Description

Chromalox SRM/E self-regulating heating cable provides safe, reliable heat tracing for process temperature maintenance and freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16 AWG buss wire with metal braid and optional overjacketing, SRM/E ensures operating integrity in most hostile industrial environments. The 420°F (215°C) maximum exposure temperature rating allows steam cleaning of process equipment with up to 300 psig steam.

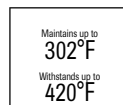
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



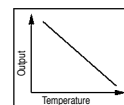
Cut to Length
in Field



Can be
Overlapped



Medium Tem-
perature



Self Regulating
Output

Features

- Energy efficient, self-regulating SRM/E uses less energy when less heat is required.
- Easy to install, SRM/E can be cut to any length (up to max. circuit length) in the field.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- With lower installed cost than steam tracing, SRM/E features less maintenance expense and downtime.
- SRM/E can be overlapped without burnout, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Because SRM/E is self-regulating, overtemperature conditions are minimized.
- Chromalox termination, splice, tee and end seal kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires** — Provide reliable electrical current capability.
- B Semiconductive Polymer Core Matrix** — “Self-Regulating” component of the cable, its electrical resistance varies with temperature. As process temperature drops, the core’s heat output increases; as process temperature rises, the heat output decreases.
- C High Temperature Fluoropolymer Jacket** — Flame retardant, electrically insulates the matrix and provides corrosion resistance.
- D Metallic Braid** — Provides additional mechanical protection in any environment and a positive ground path.

- E High Temperature Fluoropolymer Overjacket (optional)** — Corrosion resistant, flame retardant overjacket is highly effective in hostile, aqueous and chemically active environments. It also protects against abrasion and impact damage.

Approvals

Factory Mutual (FM) Approved, UL Listed, and CSA certified for ordinary areas. UL Listed for freeze protection of fire protection system piping. ATEX, IECEx, FM, and CSA Approved for hazardous (classified) areas when used with U Series, HL, DL, and EL accessories.

CSA and FM Approved:

- Class I, Div. 1* & 2 Groups A*, B, C, D (gases, vapors)
- Class II, Div. 1* & 2 Groups E*, F, G (combustible dust)
- Class III, Div. 2 (easily ignitable fibers and fillings)
- 5 and 8 Watt Rated T3 Temperature Class
- 10, 15, and 20 Watt Rated T2D Temperature Class

*CSA Only

*-CT overjacket only

ATEX Approved:

- II 2 G Ex e II T3 Gb Ta -60°C to 195°C

IECEx Approved:

- ITS 07.0018X Ex e II T3 Gb Ta -60°C to 195°C

Note 1 Exception — Cable Surface Temperature shall not exceed 190°C in Class II, Div. 2, Group F; 165°C in Class II, Div. 2 Group G.



HEAT TRACE AND
ACCESSORIES

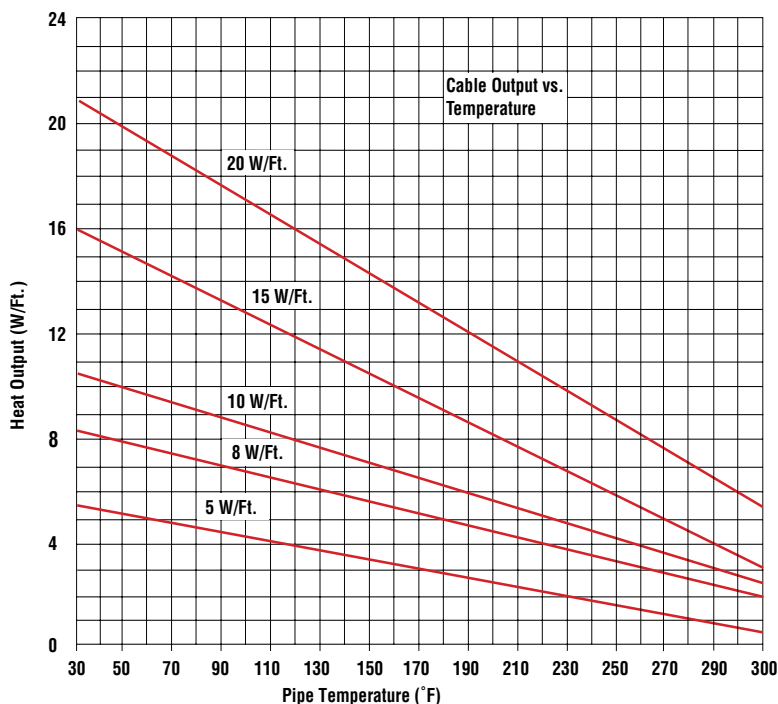
SRM/E

Self-Regulating Medium Temperature

(cont'd.)



Thermal Output Ratings on Insulated Metal Pipe¹



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation, and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
SRM/E 5	3.85	-23	4.25	-15	6.45	+23
SRM/E 8	6.4	-20	6.88	-14	10.24	+22
SRM/E 10	8.3	-17	8.80	-12	12.50	+20
SRM/E 15	12.75	-15	13.50	-10	18.45	+19
SRM/E 20	17.6	-12	18.40	-8	24.40	+19

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	50°F Start-Up (Ft.)					0°F Start-Up (Ft.)					-20°F Start-Up (Ft.)				
	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
SRM/E 5-1	180	240	360	375	NR	165	220	330	375	NR	155	210	310	375	NR
SRM/E 5-2	360	480	720	750	NR	325	430	645	750	NR	310	415	620	750	NR
SRM/E 8-1	145	190	285	325	NR	135	175	265	325	NR	130	165	250	325	NR
SRM/E 8-2	285	380	575	650	NR	255	345	520	650	NR	245	335	490	650	NR
SRM/E 10-1	95	125	190	250	NR	90	110	175	250	NR	85	100	170	245	250
SRM/E 10-2	190	255	385	490	NR	165	225	345	490	NR	155	215	330	470	490
SRM/E 15-1	70	95	145	190	210	65	85	125	165	210	60	80	120	150	210
SRM/E 15-2	145	190	290	385	420	120	175	270	360	420	115	165	260	340	420
SRM/E 20-1	60	75	115	155	160	50	65	105	140	160	45	65	100	135	160
SRM/E 20-2	115	155	230	305	350	100	135	200	270	350	90	130	195	255	335

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

Note — Thermal magnetic circuit breakers are recommended since magnetic circuit breakers could "nuisance trip" at low temperature.

SRM/E

Self-Regulating Medium Temperature

(cont'd.)

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
5 @ 50°F	120	SRM/E 5-1C SRM/E 5-1CT	S S	388084 388092	80 100
	208 - 277	SRM/E 5-2C SRM/E 5-2CT	S S	388113 388121	80 100
8 @ 50°F	120	SRM/E 8-1C SRM/E 8-1CT	S S	388148 388156	80 100
	208 - 277	SRM/E 8-2C SRM/E 8-2CT	S S	388172 388180	80 100
10 @ 50°F	120	SRM/E 10-1C SRM/E 10-1CT	S S	388201 388210	80 100
	208 - 277	SRM/E 10-2C SRM/E 10-2CT	S S	388236 388244	80 100
15 @ 50°F	120	SRM/E 15-1C SRM/E 15-1CT	S S	388260 388279	80 100
	208 - 277	SRM/E 15-2C SRM/E 15-2CT	S S	388308 388316	80 100
20 @ 50°F	120	SRM/E 20-1C SRM/E 20-1CT	S S	388332 388340	80 100
	208 - 277	SRM/E 20-2C SRM/E 20-2CT	S S	388367 388375	80 100
To Order — Specify length, model, PCN and installation accessories.					

HEAT TRACE AND
ACCESSORIES

Accessories

Accessories		U Series	DL	EL
Power Connection	Heat trace to electrical service connection	UPC	RTPC	SSK
Splice & Tee		UMC	RTST	RT-TST
End Seal	For terminating cable	UES	RTES	N/A
Lighted End Seal		UESL	RTST-SL	N/A
Thermostat	Ambient air sensing thermostat	UAS	RTAS	THL/TXL
	Line sensing mechanical thermostat	UBC	RTBC	THR/TXR
To Order —	General Application & Installation Accessories such as tape, pipe straps, warning labels, etc., refer to the U Series, DL & EL General Application Accessories page at the end of this section.			

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	Self-Regulating Medium Temperature			
SRM/E	Self-Regulating, Medium Temperature Enhanced Heating Cable			
	Code	Output (W/Ft.)		
	5	Five		
	8	Eight		
	10	Ten		
	15	Fifteen		
	20	Twenty		
		Code	Voltage	
		1	120	
		2	208 - 277	
		Code	Braid and Overcoat Options	
		C	Tin-Plated copper metallic braid for additional protection and ground path	
		CT	Fluoropolymer corrosion resistant overjacket over braid for hostile/corrosive environments	
SRM/E	8	1	CT	Typical Model Number



More Information
is Available Online
on Heat Trace.

Bookmark Your Browser to
www.chromalox.com
and Select **Manuals**.

HSRL Self-Regulating Low Temperature

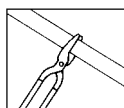
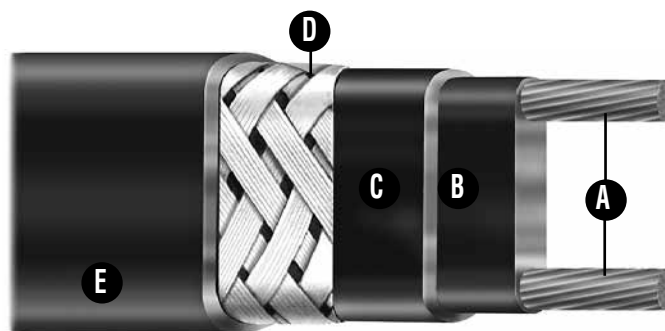
- Self-Regulating, Energy Efficient
- 16 AWG Buss Wire
- Circuit Lengths to 660 Feet
- Process Temperature Maintenance to 150°F (65°C)
- Maximum Continuous Exposure Temperature, Power Off, 185°F (85°C)
- Freeze Protection of Fire Protection System Piping
- Available in 3, 5, 8, and 10 Watts per Foot
- 120 and 208-277 Volts Available
- Division 1 Hazardous Locations
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"
- For Use on Metal & Plastic Pipes

Description

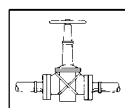
Chromalox HSRL self-regulating heating cable provides safe, reliable heat tracing for freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16 AWG buss wire with a tinned copper braid and fluoropolymer overjacket, HSRL ensures operating integrity in Div. 1 hazardous environments. HSRL heating cable has a maximum maintenance temperature rating of 150°F (65°C) and a maximum exposure temperature of 185°F (85°C)

Note: Due to the nature of Division 1 hazardous location applications consultation with a factory representative is required.

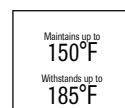
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30 mA is recommended to minimize nuisance tripping.



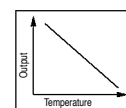
Cut to Length
in Field



Can be Single
Overlapped



Maintains up to
150°F
Withstands up to
185°F
Low Tempera-
ture



Self Regulating
Output

Features

- Energy efficient, self-regulating HSRL uses less energy when less heat is required.
- Easy to install, HSRL can be cut to any length (up to max circuit length) in the field.
- HSRL features lower installed cost than steam tracing, less maintenance expense and less down time.
- HSRL can be overlapped without burnout, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Chromalox HL Connection Kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires—** Provide reliable electric current capability.
- B Semiconductive Polymer Core Matrix—** "Self-Regulating" component of the cable its electrical resistance varies with temperature. As process temperature drops, the core's heat output increases; as process temperature rises, the heat output decreases.
- C Polyolefin Jacket—** Flame retardant, electrically insulates the matrix and buss wires and provides resistance to water and some inorganic chemical solutions.

- D Tinned Copper Braid—** Provides additional mechanical protection in any environment and a positive ground path.
- E High Temperature Fluoropolymer Overjacket—** Corrosion resistant, flame retardant overjacket is highly effective in many environments. Protects against exposure to organic or corrosive solutions. The overjacket also protects against abrasion and impact damage.

Approvals

FM Approved

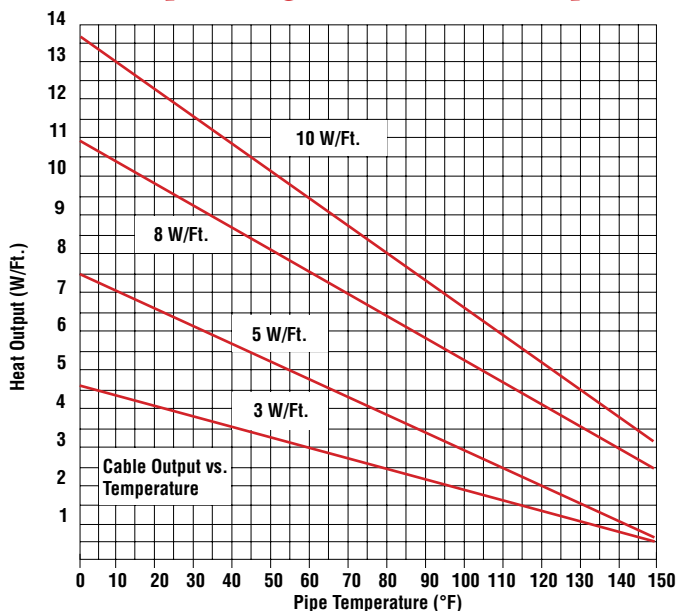
- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1
- 3 Watt rated T6 temperature class
- 5 and 8 Watt rated T5 temperature class
- 10 Watt rated T4A temperature class

CSA Approved

- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- 3 Watt rated T6 temperature class
- 5 and 8 Watt rated T5 temperature class
- 10 Watt rated T4A temperature class

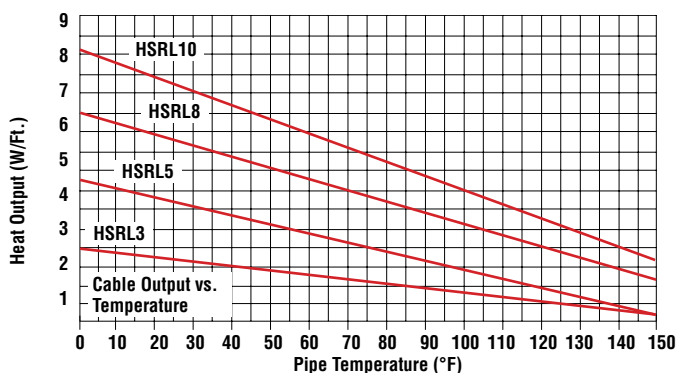
HSRL Self-Regulating Low Temperature (cont'd.)

Thermal Output Ratings on Insulated Metal Pipe¹



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation, and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Thermal Output Ratings on Plastic Pipe with Aluminum Tape



Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
HSRL 3	2.4	-20	2.6	-13	3.4	+15
HSRL 5	4.1	-18	4.5	-10	5.6	+13
HSRL 8	6.88	-14	7.28	-9	8.96	+12
HSRL 10	8.7	-13	9.2	-8	11.1	+10

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	50°F Start-Up (Ft.)						0°F Start-Up (Ft.)						-20°F Start-Up (Ft.)					
	10A	15A	20A	25A	30A	40A	10A	15A	20A	25A	30A	40A	10A	15A	20A	25A	30A	40A
HSRL3-1CT	205	305	360	NR	NR	NR	135	200	270	330	360	NR	120	185	245	300	360	NR
HSRL3-2CT	400	600	660	NR	NR	NR	275	415	555	660	NR	NR	245	370	495	600	660	NR
HSRL5-1CT	125	185	250	270	NR	NR	90	135	180	225	270	NR	80	120	160	205	245	270
HSRL5-2CT	250	375	505	540	NR	NR	180	270	360	450	540	NR	160	245	325	405	490	540
HSRL8-1CT	100	150	200	215	NR	NR	70	110	145	180	215	NR	65	100	130	165	200	210
HSRL8-2CT	185	285	375	420	NR	NR	135	200	265	335	395	420	120	175	235	300	350	420
HSRL10-1CT	60	95	130	160	180	NR	50	80	105	130	155	180	45	70	95	120	140	180
HSRL10-2CT	100	160	210	260	315	360	80	125	170	210	255	340	75	120	160	195	240	320

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

Heating Cable

HSRL Self-Regulating Low Temperature (cont'd.)

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
3 @ 50°F	120	HSRL 3-1CT	S	382070	66
	208 - 277	HSRL 3-2CT	S	382061	66
5 @ 50°F	120	HSRL 5-1CT	S	382053	66
	208 - 277	HSRL 5-2CT	S	382045	66
8 @ 50°F	120	HSRL 8-1CT	S	382037	66
	208 - 277	HSRL 8-2CT	S	382029	66
10 @ 50°F	120	HSRL 10-1CT	S	382010	66
	208 - 277	HSRL 10-2CT	S	382022	66
To Order — Specify length, model, PCN and installation accessories.					

Accessories

Description		Model
Power Connection	Heat trace to electrical service connection	HL-PC
T- Splice	Electrical connection for 3 cables	HL-T
In-Line Splice	Electrical connection for 2 cables	HL-S
End Seal	For terminating cable	HL-ES
Thermostat	Ambient air sensing thermostat	TXL
	Line sensing mechanical thermostat	TXR
		E-122
— Please refer to HL Connection Accessories page		

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Model	Hazardous Location Self-Regulating Low Temperature			
HSRL	Self-Regulating, Low Temperature Heating Cable			
	Code	Output (W/Ft.)		
	3	Three		
	5	Five		
	8	Eight		
	10	Ten		
		Code	Voltage	
		1	120	
		2	240	
		Code	Standard Braid & Overjacket	
		CT	Tinned copper metallic braid for ground path fluoropolymer corrosion resistant overjacket. Specifically tested for Division I environments.	
HSRL	3	1	CT	Typical Model Number

Note 1 — Note: Due to the nature of Division 1 hazardous location applications consultation with a factory representative is required.

HSRM Self-Regulating Medium Temperature

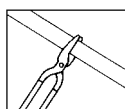
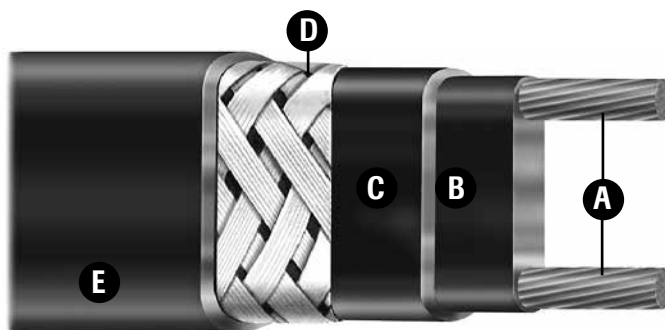
- Self-Regulating, Energy Efficient
- 16 AWG Buss Wire
- Circuit Lengths to 750 Feet
- Process Temperature Maintenance to 302°F (150°C)
- Maximum Continuous Exposure Temperature, Power Off, 420°F (215°C)
- Freeze Protection of Fire Protection System Piping
- Available in 5, 8, 10, 15 and 20 Watts per Foot
- 120 and 208-277 Volts Available
- Division 1 Hazardous Locations
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"
- For Use on Metallic Pipes Only

Description

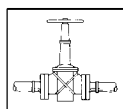
Chromalox HSRM self-regulating heating cable provides safe, reliable heat tracing for freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16 AWG buss wire with a tinned copper braid and fluoropolymer overjacket, HSRM ensures operating integrity in Div. 1 hazardous environments. HSRM heating cable has a maximum maintenance temperature rating of 302°F (150°C) and a maximum exposure temperature of 420°F (215°C).

Note: Due to the nature of Division 1 hazardous location applications consultation with a factory representative is required.

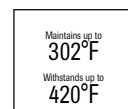
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



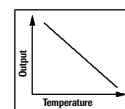
Cut to Length
in Field



Can be
Overlapped



Medium Tem-
perature



Self Regulating
Output

Features

- Energy efficient, self-regulating HSRM uses less energy when less heat is required.
- Easy to install, HSRM can be cut to any length (up to max circuit length) in the field.
- HSRM features lower installed cost than steam tracing, less maintenance expense and less down time.
- HSRM can be overlapped without burnout, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Chromalox HL Connection Kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires—** Provide reliable electric current capability.
- B Semiconductive Polymer Core Matrix—** “Self-Regulating” component of the cable its electrical resistance varies with temperature. As process temperature drops, the core’s heat output increases; as process temperature rises, the heat output decreases.
- C Fluoropolymer Jacket—** Flame retardant electrically insulates the matrix and provides corrosion resistance.

D Tinned Copper Braid— Provides additional mechanical protection in any environment and a positive ground path.

E High Temperature Fluoropolymer Overjacket— Corrosion resistant, flame retardant overjacket is highly effective in many environments. Protects against exposure to organic or corrosive solutions. The overjacket also protects against abrasion and impact damage.

Approvals

FM Approved

- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1
- 5 and 8 Watt rated T3C Temperature Class
- 10 Watt rated T3A Temperature Class
- 15 and 20 Watt rated T2C Temperature Class

CSA Approved

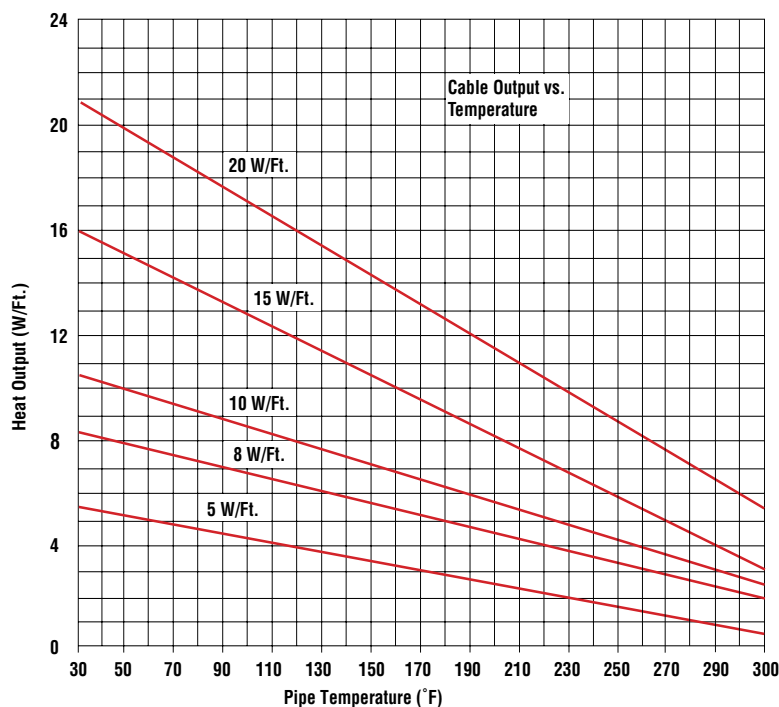
- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- 5 and 8 Watt rated T3C Temperature Class
- 10 Watt rated T3A Temperature Class
- 15 and 20 Watt rated T2C Temperature Class

HSRM

Self-Regulating Medium Temperature

(cont'd.)

Thermal Output Ratings on Insulated Metal Pipe¹



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation, and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
HSRM 5	3.85	-23	4.25	-15	6.45	+23
HSRM 8	6.4	-20	6.88	-14	10.24	+22
HSRM 10	8.3	-17	8.80	-12	12.50	+20
HSRM 15	12.75	-15	13.50	-10	18.45	+19
HSRM 20	17.6	-12	18.40	-8	24.40	+19

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	50°F Start-Up (Ft.)					0°F Start-Up (Ft.)					-20°F Start-Up (Ft.)				
	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
HSRM 5-1	180	240	360	375	NA	165	220	330	375	NA	155	210	310	375	NA
HSRM 5-2	360	480	720	750	NA	325	430	645	750	NA	310	415	620	750	NA
HSRM 8-1	145	190	285	325	NA	135	175	265	325	NA	130	165	250	325	NA
HSRM 8-2	285	380	575	650	NA	255	345	520	650	NA	245	335	490	650	NA
HSRM 10-1	95	125	190	250	NA	90	110	175	250	NA	85	100	170	245	250
HSRM 10-2	190	255	385	490	NA	165	225	345	490	NA	155	215	330	470	490
HSRM 15-1	70	95	145	190	210	65	85	125	165	210	60	80	120	150	210
HSRM 15-2	145	190	290	385	420	120	175	270	360	420	115	165	260	340	420
HSRM 20-1	60	75	115	155	160	50	65	105	140	160	45	65	100	135	160
HSRM 20-2	115	155	230	305	350	100	135	200	270	350	90	130	195	255	335

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

HSRM Self-Regulating Medium Temperature (cont'd.)

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
5 @ 50°F	120	HSRM5-1CT	S	382176	80
	208 - 277	HSRM5-2CT	S	382168	80
8 @ 50°F	120	HSRM8-1CT	S	382150	80
	208 - 277	HSRM8-2CT	S	382141	80
10 @ 50°F	120	HSRM10-1CT	S	382133	80
	208 - 277	HSRM10-2CT	S	382125	80
15 @ 50°F	120	HSRM15-1CT	S	382117	80
	208 - 277	HSRM15-2CT	S	382109	80
20 @ 50°F	120	HSRM20-1CT	S	382096	80
	208 - 277	HSRM20-2CT	S	382088	80
To Order — Specify length, model, PCN and installation accessories.					

HEAT TRACE AND
ACCESSORIES

Accessories

Description	Model
Power Connection	Heat trace to electrical service connection HL-PC
T- Splice	Electrical connection for 3 circuits HL-T
In-Line Splice	Electrical connection for 2 circuits HL-S
End Seal	For terminating cable HL-ES
Thermostat	Ambient air sensing thermostat TXL
	Line sensing mechanical thermostat TXR E-122
To Order — Please refer to HL Connection Accessories page.	

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Note — Due to the
nature of Division 1
hazardous location
applications
consultation with a
factory representative
is required.

Model	Hazardous Location Self-Regulating Medium Temperature				
HSRM	Self-Regulating, Medium Temperature Heating Cable				
	Code	Output (W/Ft.)			
	5	Five			
	8	Eight			
	10	Ten			
	15	Fifteen			
	20	Twenty			
	Code	Voltage			
	1	120			
	2	240			
	Code	Standard Braid & Overcoat Options			
	CT	Tinned copper braid for ground path fluoropolymer overjacket specifically tested for Division I environments			
HSRM	8	—	1	CT	Typical Model Number

SLL

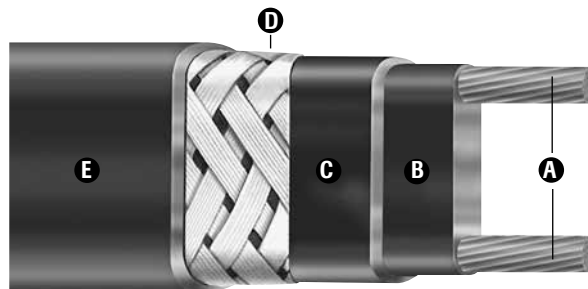
Series Long Line Cable

- 16, 14, 12, 10 AWG Buss Wire
- Circuit Lengths up to 7,500 Feet (2,286m)
- Minimum Install Temperature -40°F (-40°C)
- Maximum Continuous Exposure Temperature, Power Off, 450°F (232°C)
- Industrial Process Maintenance Applications
- Industrial Freeze Protection Applications
- Steam Cleanable on Process Equipment Up to 300 PSIG
- Outputs up to 12 W/Ft.
- 120 - 600 Volt From Stock
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"
- For Use on Metallic Pipes Only

Description

Chromalox SLL Series Long Line cable provides safe, reliable heat tracing for process temperature maintenance and freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16, 14, 12 or 10 AWG buss wire with metal braid and fluoropolymer overjacketing, SLL ensures operating integrity in most hostile industrial environments. The 450°F (232°C) maximum exposure temperature rating allows steam cleaning of process equipment with up to 300 psig steam.

WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



Features

- Exceeds limitations of parallel resistance cables.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- With lower installed cost than steam tracing, SLL features less maintenance expense and downtime.
- Chromalox termination, splice and end seal kits reduce installation time.

Construction

- A** Twin 16, 14, 12, 10 AWG Copper Buss Wires — Provide reliable electrical current capability.
- B** High Temperature Fluoropolymer Core Matrix — Flame retardant, electrically insulates the matrix and provides corrosion resistance.

- C** High Temperature Fluoropolymer Jacket — Flame retardant, electrically insulates the matrix and provides corrosion resistance.
- D** Metallic Braid — Provides additional mechanical protection in any environment and a positive ground path.
- E** High Temperature Fluoropolymer Overjacket — Corrosion resistant, flame retardant overjacket is highly effective in hostile, aqueous and chemically active environments. It also protects against abrasion and impact damage.

Approvals

*Approvals Pending.

SLL

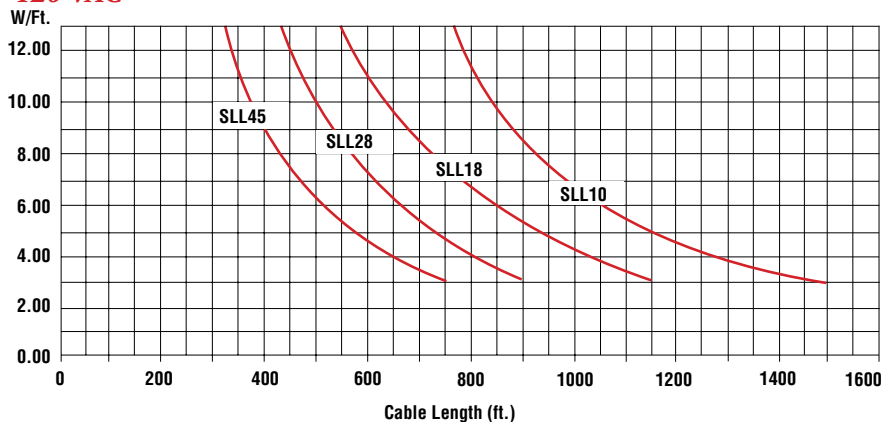
Series Long Line Cable (cont'd.)

Note 1: These graphs are general guides to selection. Actual designs require consideration of other important variables and must be approved by Chromalox.

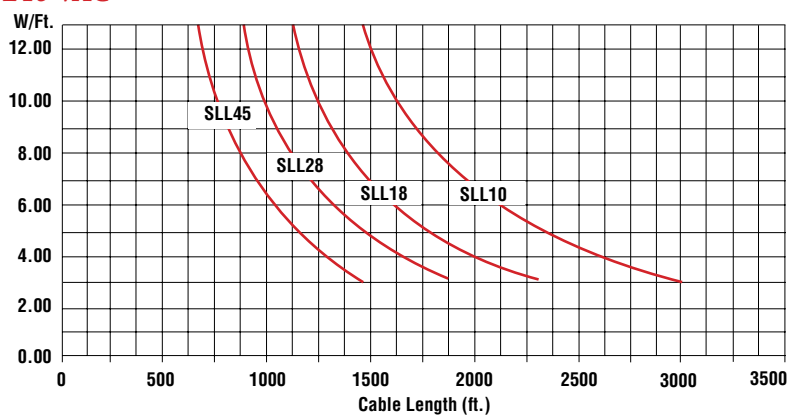
Nominal Output Ratings on Metal Pipe*

*All power outputs below at 68°F (20°C)

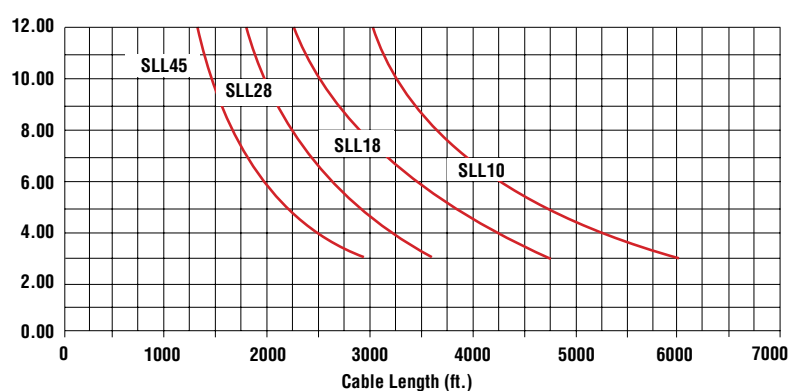
120 VAC



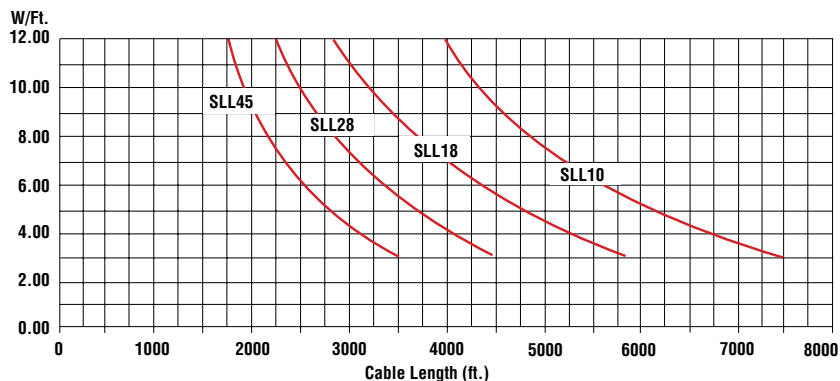
240 VAC



480 VAC



600 VAC



Heating Cable

SLL

Series Long Line Cable *(cont'd.)*

Specifications

Model No.	PCN	Stock	Conductor Size	Ω/ft @ 68°F (20°C)	Ω/m @ 68°F (20°C)	Max. Circuit Breaker Size	Wt./1000' (lbs.)
SLL10-CT	384972	S	10	0.00240	0.007872	50	100
SLL18-CT	384964	S	12	0.003680	0.01207	50	100
SLL28-CT	384956	S	14	0.00580	0.00190	40	100
SLL45-CT	384948	S	16	0.00948	0.0310	30	100
To Order — Specify length, model, PCN and installation accessories. All resistances above are nominal resistance values.							

Accessories

Accessories		U Series
Power Connection	Heat trace to electrical service connection	UPC-LL
Splice	For splicing 2 SLL cables together	UMC-LL
End Seal	For terminating cable	UES-LL
To Order — General Application & Installation Accessories such as tape, pipe straps, warning labels, etc., refer to the U Series Long Line Kits Accessories page at the end of this section.		

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Model	Series Long Line Cable			
SLL	Series Long Line Cable			
	Code	Wire		
	10	10 Awg		
	18	12 Awg		
	28	14 Awg		
	45	16 Awg		
	Code	Braid and Overcoat Options		
	CT	Fluoropolymer corrosion resistant overjacket over braid for hostile/ corrosive environments		
SLL	10	-	CT	Typical Model Number



More Information
is Available Online
on Heat Trace.

Bookmark Your Browser to
www.chromalox.com
and Select **Manuals**.

CWM

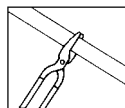
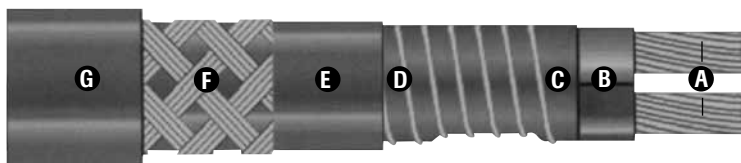
Constant Wattage Medium Temperature

- **Uniform Thermal Output, Low Energy Cost**
- **No Inrush at Any Ambient**
- **Industrial/Process and Commercial/Construction Applications**
- **Maximum Exposure Temperature, Power Off, 392°F (200°C)**
- **Steam Cleanable on Process Equipment Up to 190 PSIG (Power Off)**
- **4, 8 and 12 W/Ft.**
- **120, 208 - 277 and 480 Volt From Stock**
- **Approximate Size 1/4"W x 1/8"H**
- **Minimum Bend Radius 1-1/4"**
- **For Use on Metallic Pipes**
- **Consult Factory for Use on Plastic Pipes**

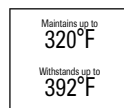
Description

Chromalox CWM constant wattage heating cable is a proven, reliable solution for industrial process temperature maintenance and freeze protection. CWM features a parallel heating core that produces uniform thermal output over its entire length. Using a single power point, you can easily configure and install a heat tracing system as short as several feet or as long as 780 feet right in the field. With 392°F (200°C) fluoropolymer electrical insulation over-jacketing, CWM has outstanding electrical and thermal properties, and is well suited for most chemically hostile environments.

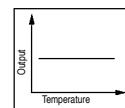
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



Cut to Length
in Field



Medium Tem-
perature



Constant Watt-
age Output

Note — Consult maximum maintenance temperature chart on page G-23 for allowable watt densities.

Features

- Durable, non-aging fluoropolymer jacket ensures long service life and can be used in some hostile environments.
- Flexible, easy to install on most equipment and delivers long-term reliable performance.
- Eliminates the need for oversized wiring or switchgear.
- Accurate temperature, reliable electric heat that can be consistently controlled and easily monitored.
- Safe and rugged.
- Parallel circuitry allows cut-to-length.
- High performance, rated to withstand up to 392°F saturated steam (190 psig) temperature (power off).
- Low profile, uses standard size thermal insulation on piping and process equipment.

- D Nickel Chromium Wire** — Heating component of the cable.
- E FEP Insulation** — Rugged outer sheath protects heating cable, assures longer service life, and provides protection against environmental application hazards.
- F Tinned Copper Braid** — Plated copper braid increases robust construction, provides ground path and provides additional protection in any location. Suffix "C" in model number.
- G FEP Overjacket (optional)** — Fluoropolymer overjacket, over the braid, provides protection from most aqueous and chemically corrosive solutions. Suffix "T" in model number.

Approvals¹

UL Listed for ordinary areas.

CSA Certified for ordinary and:

- Class I, Div. 2, Groups A, B, C, D
- Class II, Div. 2, Groups F, G. Rated T3 Temperature Class².

Notes

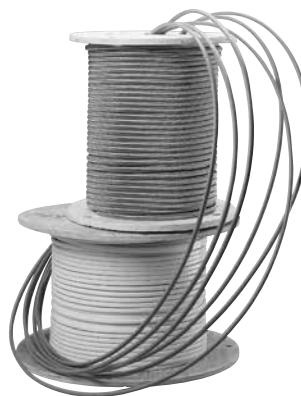
1. Depends on specific model.
2. Exception: Cable surface temperature shall not exceed 190°C in Class II, Div. 2, Group F; 165°C in Class II, Div. 2, Group G.

Construction

- A Twin 12 AWG Copper Buss Wires** — Provide reliable, consistent electrical current.
- B FEP Insulation Jacket** — Electrically insulates buss wires.
- C Pairing Jacket** — Secures two buss wires together and provides wrapping surface for Nichrome wire.

CWM

Constant Wattage Medium
Temperature (*cont'd.*)



Specifications

Model	Output (W/Ft.)	Nominal Voltage (Vac)	Circuit Load (Amps/Ft.)	Max. Circuit Length (Ft.)
CWM 4-1CT	4	120	0.033	350
CWM 8-1CT	8	120	0.067	240
CWM 12-1CT	12	120	0.100	200
CWM 4-2CT	4	240	0.017	700
CWM 8-2CT	8	240	0.033	480
CWM 12-2CT	12	240	0.050	400
CWM 12-4CT	12	480	0.025	780

Output Wattage at Various Operating Voltages (Ft.)

Model	120V	208V	220V	240V	277V	480V
CWM 12-1	12	—	—	—	—	—
CWM 8-1	8	—	—	—	—	—
CWM 4-1	4	—	—	—	—	—
CWM 12-2	3	9	10.1	12	—	—
CWM 8-2	2	6	6.7	8	—	—
CWM 4-2	—	3	3.4	4	—	—
CWM 12-4	—	2.3	2.5	3	4	12

Maximum Allowable Pipe Maintenance Temperature with Power On

Output (W/Ft.)	Temperatures (°F)								
	3	4	6	6.7	8	9	10.1	10.6	12
w/o AT-1 Tape	340	325	293	282	262	246	229	222	200
w/ AT-1 Tape	350	344	332	328	320	314	307	304	296

CWM

Constant Wattage Medium Temperature *(cont'd.)*

Ordering Information

Output (W/Ft.)	Nominal Voltage (Vac)	Model	Stock	PCN	Wt./1000' (Lbs.)
4	120	CWM 4-1C	S	392040	96
		CWM 4-1CT	S	392075	110
	240	CWM 4-2C	S	392059	96
		CWM 4-2CT	S	392083	110
8	120	CWM 8-1C	S	392139	96
		CWM 8-1CT	S	392163	110
	240	CWM 8-2C	S	392147	96
		CWM 8-2CT	S	392171	110
12	120	CWM 12-1C	S	392227	96
		CWM 12-1CT	S	392251	110
	240	CWM 12-2C	S	392235	96
		CWM 12-2CT	S	392260	110
	480	CWM 12-4C	S	392243	96
		CWM 12-4CT	S	392278	110

HEAT TRACE AND ACCESSORIES

Accessories

Accessories		U Series	DL	EL
Power Connection	Heat trace to electrical service connection	UPC	RTPC	SSK
Splice & Tee		UMC	RTST	RT-TST
End Seal	For terminating cable	UES	RTES	N/A
Lighted End Seal		UESL	RTST-SL	N/A
Thermostat	Ambient air sensing thermostat	UAS	RTAS	THL/TXL
	Line sensing mechanical thermostat	UBC	RTBC	THR/TXR
To Order — General Application & Installation Accessories such as tape, pipe straps, warning labels, etc., refer to the U Series, DL & EL General Application Accessories page at the end of this section.				

Ordering Information

To Order —
Complete the Model Number using the Matrix provided.

Model	Constant Wattage Medium Temperature			
CWM	Constant Wattage, Medium Temperature Heating Cable			
	Code	Output (W/Ft.)		
	4	Four		
	8	Eight		
	12	Twelve		
		Code	Nominal Voltage (Vac)	
		1	120	
		2	240	
		4	480	
		Code	Braid and Overcoat Options	
		C	Standard tinned-copper metallic braid for additional protection and ground path	
		CT	Fluoropolymer corrosion resistant overjacket over braid for hostile/corrosive environments	
CWM	4	1	C	Typical Model Number



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MI

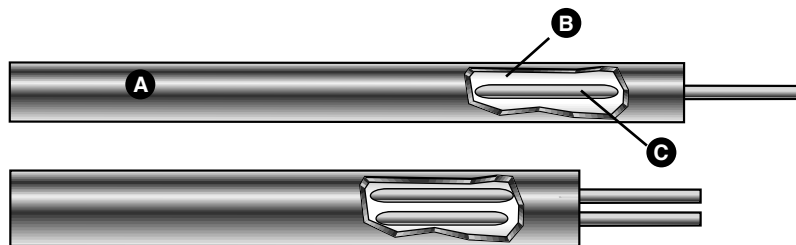
Mineral Insulated High Temperature

- **Constant Wattage Series Resistance Heating Cable Sets**
- **Process Temperature Maintenance to 1100°F (593°C)**
- **Maximum Exposure Temperature 1200°F (648°C) (Power Off)**
- **Corrosion Resistant Alloy 825 or Stainless Steel Sheath**
- **Factory Assembled Cable Sets—Ready for Installation**
- **Fully Annealed Sheath allows Field Bending**
- **Min. Bend Radius 6 x Diameter of Cable**
- **For Use on Metallic Pipes Only**

Description

Chromalox MI mineral insulated heating cables provide rugged and reliable heat tracing for a variety of demanding applications. The high nickel alloy sheath, magnesium oxide dielectric insulation and resistance wire construction allow the tracing of equipment up to 1100°F maintenance temperatures and excellent resistance to many corrosive environments. At lower temperatures, watt densities of up to 50 W/Ft can be designed. Please contact factory for cable maintenance temperature above 400°F.

WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30 mA is recommended to minimize nuisance tripping.



Construction

- A** Metal Sheath: High nickel content Alloy 825 is recognized for its use in high temperature applications, and use in many corrosive environments. This alloy has excellent resistance to pitting, chloride-stress, acid and alkali corrosion. Stainless steel is also available.
- B** MgO: Highly compacted Magnesium Oxide provides insulation of the resistance wire for voltages up to 600V. Completely sealed sheath protects the MgO from moisture & contamination.
- C** Resistance Wire: A large number of available resistances enables the design of a large range of lengths and wattages. Double and single conductor available
- D** Cold-Lead (Shown Below): Non-heating MI cable extends the leads away from the high temperature equipment. 4 ft. long is standard.

- E** Gland Fitting (Shown Below): Every set includes one or two 1/2" NPT fittings for connection to a junction box. The number of fittings depends on the configuration of the cable set. (Optional 3/4" NPT)

Approvals

Factory Mutual (FM) Approved and CSA certified for ordinary areas. FM and CSA Approved for hazardous (classified) areas.

CSA and FM Approved:

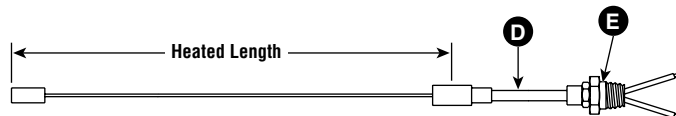
- Class I, Div. 1* & 2 Groups A*, B, C, D (gases, vapors)
- Class II, Div. 1* & 2 Groups E*, F, G (combustible dust)
- Class III, Div. 2 (easily ignitable fibers and fillings)
- Consult Chromalox for T ratings

*CSA Only

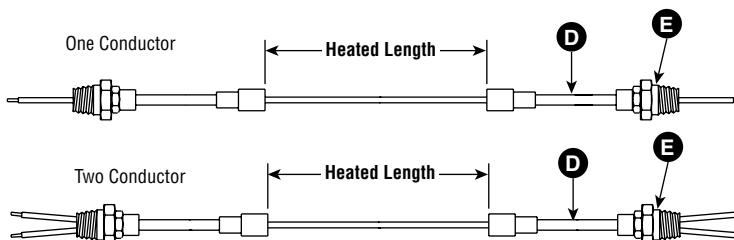
* Stainless steel not 3rd party approved.

Available Designs

Form "A" (one cold section w/12 AWG - 12 in. pigtails and termination w/ end cap, 0.50" brass pressure fittings)
Available in two conductor only



Form "E" (two cold sections w/12 AWG - 12 in. pigtails, 0.50" brass pressure fittings)
Available in one conductor or two conductor



MI

Mineral Insulated High Temperature (cont'd.)

Heating Cable System Design

1. Heater Design

Determine heater design to use.

2. Calculate Heat Loss

Using the Technical Section of this catalog (Determining Heat Energy Requirements), calculate the heat energy requirements of the pipe or tank to be heated. In addition, Chromalox® offers ChromaTrace, a heat trace design program to facilitate heat tracing system design.

3. Determine Total Cable Length

In addition to the system piping, in-line equipment such as valves, flanges and pipe supports require additional heat tracing to maintain the system operating temperature. Refer to Technical Section of this catalog (Pipe Component Allowance Table) to determine the proper component cable allowances for your system. Add the heated pipe length and the component cable allowance lengths to calculate the total cable length.

Guidelines for tracing tanks and vessels are also given in the Technical Section of this catalog

4. Determine Available Voltage (V)

Determine what Voltage is available. At a given voltage, not every cable length and power output is available. For example, shorter lengths may require 120V supply. Trying several voltages may result in a more efficient design.

5. Calculate Resistance per Foot (R/ft) using the desired Watts per Foot (W/ft) and cable length (L)

$$R/ft_{\text{desired}} = V^2 / (W/ft_{\text{desired}} \times L^2)$$

6. Select the Proper Resistance per Foot (R/ft) Rating

Choose a cable having equal or the next lower resistance per foot value from the Ordering Information Table

7. Calculate Actual W/Ft. and Total Wattage (W_{TOTAL})

$$W/ft_{\text{actual}} = V^2 / (R/ft_{\text{actual}} \times L^2)$$

$$W_{\text{TOTAL}} = W/ft_{\text{actual}} \times L$$

8. Determine Current Draw (I)

$$I = V / (R/ft_{\text{actual}} \times L)$$

9. Select Heater Single or Double Conductor Length

The cold lead is determined by the customer or by using a standard 4 ft. Standard cold lead pigtails are #12 awg.

10. Convert Design to a Model Number.

Use order table and optional construction adders below to convert design to a complete model number.

Note:

Some cable resistances must be modified according to the resistance curves in the Order Information Table. Modify your resistance according to the following procedure:

- Based on desired pipe temperature to be maintained, use graph 1 & 2 to determine the resistance multiplier. Multiply the resistance multiplier by the nominal cable resistance to determine the actual resistance at power on/off operating conditions. Recalculate the watt/ft. output of the cable using the new resistance per foot value.
- Determine the electrical and thermal conditions. Once the cable resistance has been selected, verify the performance of the cable you have selected from Graph-3 and 4.

Optional Construction Adders

Prefix	Suffix	Description
P		Pulling Eye for "A" form only
	UG	UL listing tag**
	UH	UL hazardous area listing tag**
	F12	1/2" NPT Brass Cold Lead Fitting
	F34	3/4" NPT Brass Cold Lead Fitting
	FS12	1/2" NPT SS Cold Lead Fitting
	FS34	3/4" NPT SS Cold Lead Fitting

**Required volts, amps and watts with each cable order

MI Mineral Insulated High Temperature (cont'd.)

Available Resistances

Two conductor, Alloy 825, 300 Volts, 0.20 lbs/ft

Cable Model	Nominal Resistance Ω/ft	Nominal Resistance Ω/m	Approx. Cable Diameter (In.)	Approx. Cable Diameter (mm.)	Maximum Exposure Temp. Rating °F (°C)	Multiplier Curve
556K	0.0457	0.1500	0.169	4.3	600 (315)	1
658K	0.0582	0.1910	0.169	4.3		1
674K	0.0735	0.2410	0.169	4.3		3
693K	0.0926	0.3038	0.188	4.8		3
712K	0.1170	0.3839	0.188	4.8		3
715K	0.1500	0.4920	0.161	4.1		5
721K	0.1990	0.6560	0.146	3.7		N/A
732K	0.3190	1.0466	0.188	4.8		N/A
742K	0.4160	1.3649	0.188	4.8	1200 (648)	N/A
752K	0.4998	1.6400	0.161	4.1		N/A
766K	0.6600	2.1655	0.188	4.8		N/A
774K	0.7742	2.5400	0.161	4.1		N/A
783K	0.8300	2.7232	0.188	4.8		N/A
810K	0.9990	3.2800	0.169	4.3		N/A
813K	1.3000	4.2653	0.188	4.8		N/A
818K	1.8000	5.9058	0.188	4.8		N/A
824K	2.3400	7.6775	0.188	4.8		N/A
830K	2.7492	9.0200	0.146	3.7		N/A
838K	3.7000	12.1397	0.188	4.8		N/A
846K	4.7200	15.4863	0.188	4.8		N/A
860K	5.6000	18.3736	0.188	4.8		N/A
866K	6.6000	21.6546	0.188	4.8		N/A
894K	8.9900	29.5000	0.138	3.5		N/A
919K	18.0000	59.0580	0.188	4.8		N/A

Two conductor, Alloy 825, 600 Volts, 0.27 lbs/ft

Cable Model	Nominal Resistance Ω/ft	Nominal Resistance Ω/m	Approx. Cable Diameter (In.)	Approx. Cable Diameter (mm.)	Maximum Exposure Temp. Rating °F (°C)	Multiplier Curve
588B	0.0082	0.0269	0.3110	7.9	600 (315)	2
614B	0.0130	0.0427	0.3031	7.7		2
627B	0.0281	0.0922	0.2756	7.0		4
640B	0.0402	0.1319	0.2598	6.6		6
670B	0.0650	0.2133	0.3125	7.9	1200 (648)	N/A
710B	0.1000	0.3280	0.2637	6.7		N/A
715B	0.1620	0.5315	0.3125	7.9		N/A
720B	0.1999	0.6560	0.2441	6.2		N/A
732B	0.3250	1.0663	0.3125	7.9		N/A
750B	0.5059	1.6599	0.2047	5.2		N/A
774B	0.7350	2.4115	0.3125	7.9		N/A
810B	1.6200	5.3152	0.3125	7.9		N/A
819B	1.8700	6.1355	0.3125	7.9		N/A
830B	2.9700	9.7446	0.3125	7.9		N/A
840B	4.4590	14.6300	0.2126	5.4		N/A
859B	6.0043	19.7001	0.2165	5.5		N/A

MI

Mineral Insulated High Temperature *(cont'd.)*

One conductor, Alloy 825, 600 Volts, 0.18 lbs/ft

Cable Model	Nominal Resistance Ω/ft	Nominal Resistance Ω/m	Approx. Cable Diameter (In.)	Approx. Cable Diameter (mm.)	Maximum Exposure Temp Rating °F (°C)	Multiplier Curve
140SC	0.00064	0.0021	0.3189	8.1	600 (315)	1
145SC	0.00104	0.0034	0.2874	7.3		1
170SC	0.00162	0.0053	0.2717	6.9		1
189SC	0.00259	0.0085	0.2165	5.5		1
216SC	0.00396	0.0130	0.1929	4.9		1
226SC	0.00640	0.0210	0.1850	4.7		1
239SC	0.01128	0.0370	0.1850	4.7		1
250SC	0.01463	0.0480	0.1850	4.7		3
262SC	0.01829	0.0600	0.1850	4.7		3
279SC	0.02316	0.0760	0.1850	4.7		4
310SC	0.02895	0.0950	0.1850	4.7		4
313SC	0.03657	0.1200	0.1850	4.7		5
316SC	0.04663	0.1530	0.1811	4.6		5
321SC	0.05821	0.1910	0.1850	4.7		5
326SC	0.07315	0.2400	0.1850	4.7		5
333SC	0.11521	0.3780	0.1811	4.6		5
346SC	0.14995	0.4920	0.1811	4.6	1200 (648)	N/A
372SC	0.19994	0.6560	0.1811	4.6		N/A
412SC	0.27979	0.9180	0.1811	4.6		N/A
415SC	0.49985	1.6400	0.1811	4.6		N/A
423SC	0.69979	2.2960	0.1614	4.1		N/A
430SC	0.84974	2.7880	0.1693	4.3		N/A
439SC	0.99970	3.2800	0.1614	4.1		N/A
447SC	1.29838	4.2600	0.1614	4.1		N/A
459SC	1.59951	5.2480	0.1614	4.1		N/A
499SC	1.99939	6.5600	0.1457	3.7		N/A

HEAT TRACE AND
ACCESSORIES

Two Conductor, Stainless Steel, 300 Volts

Cable Number	Ohms/ft	Maximum Exposure Temperature Rating °F (°C)	Resistance Curve
110S	11.0000	1100 (593)	N/A
900S	9.0000		
750S	7.5000		
600S	6.0000		
400S	4.0000		
275S	2.7500		
200S	2.0000		
170S	1.7000		
114S	1.1400		
700S	0.7000		
472S	0.4720		
374S	0.3740		
293S	0.2930		
201S	0.2000		
150S	0.1500		
100S	0.1000		
734S	0.0734		
583S	0.0583		
458S	0.0458		
324S	0.0324		

MI

Mineral Insulated High Temperature (*cont'd.*)

Two Conductor, Stainless Steel, 600 Volts

Cable Number	Ohms/ft	Maximum Exposure Temperature Rating °F (°C)	Resistance Curve
6110S	11.00000	1100 (593)	N/A
6900S	9.00000		
6600S	6.00000		
6414S	4.14000		
6200S	2.00000		
6115S	1.15000		
6700S	0.70000		
6505S	0.50500		
6286S	0.28600		
6201S	0.20000		
6150S	0.15000		
6100S	0.10000		
6775S	0.07750		
6561S	0.05610		
6402S	0.04020		
6281S	0.02810		
6202S	0.02000		
6130S	0.01300		
6818S	0.00818		
6516S	0.00516		
6324S	0.00324		
6204S	0.00204		
6128S	0.00128		

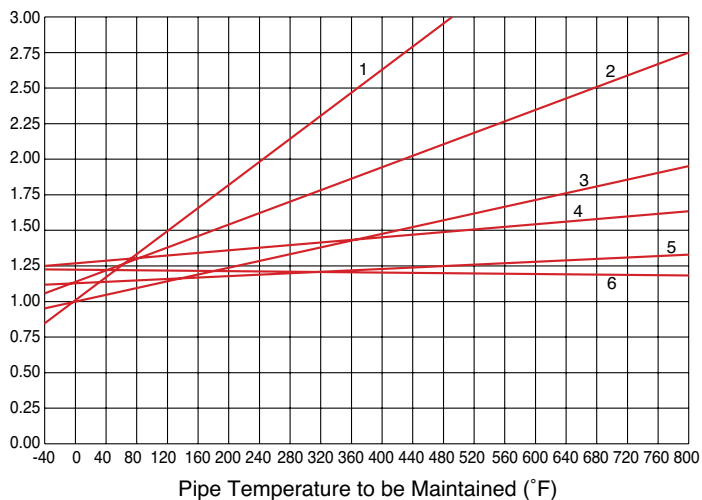
MI

Mineral Insulated High Temperature (cont'd.)

Specification / Application Information

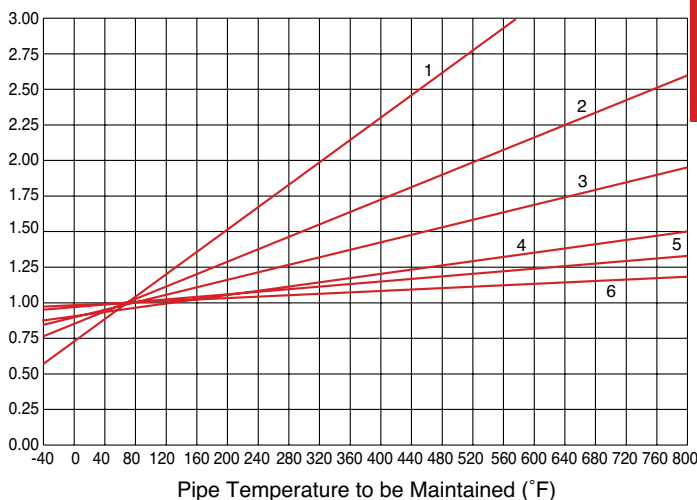
Graph-1

Resistance Correction Factor (Power On)



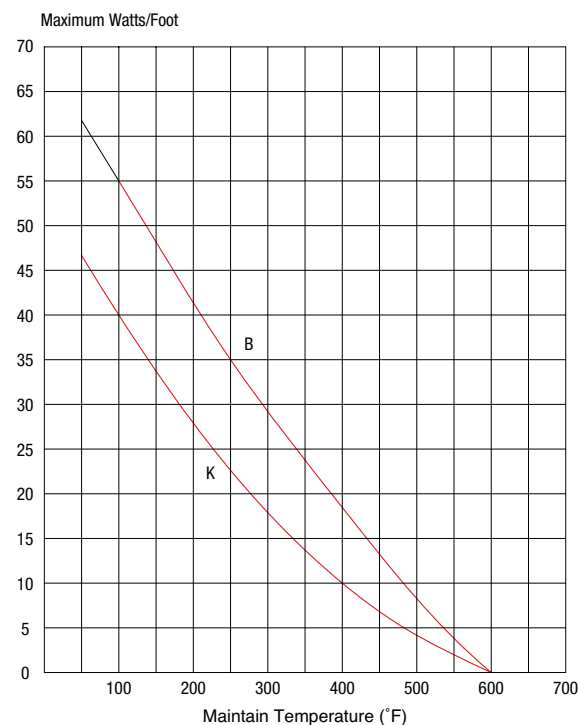
Graph-2

Resistance Correction Factor (Power Off)



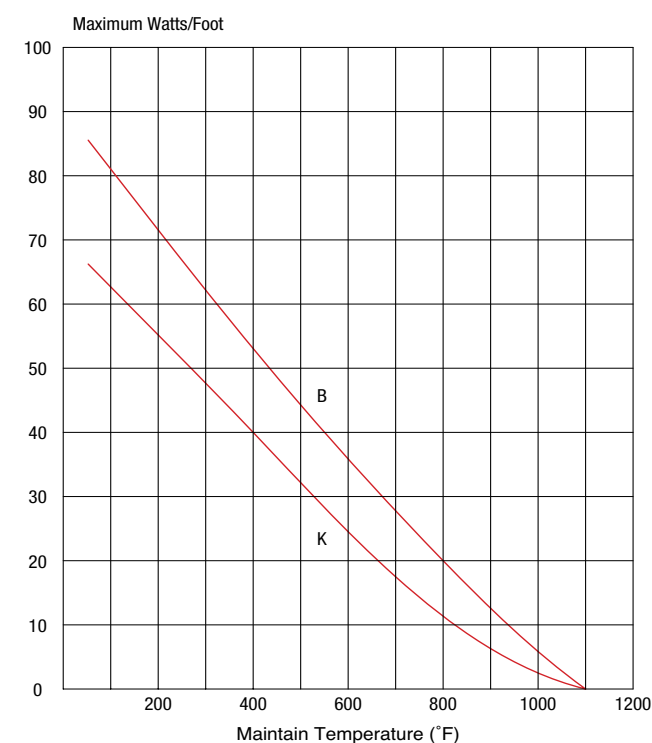
Graph-3

Maximum Wattages - All 600°F Maximum Temperature Cables with Hot/Cold Junction Under Insulation



Graph-4

Maximum Wattages - All 1200°F Maximum Temperature Cables With Hot/Cold Junction Under Insulation



MI
Mineral Insulated High Temperature (cont'd.)

Accessories

HTC-30-1 (392286)
Heat Transfer Cement, 1 Gal. Pail, Non-Stock



HTC-30-5 (392294)
Heat Transfer Cement, 5 Gal. Pail, Non-Stock



SSW-100 (392315)
Stainless Steel Tie Wire, 100ft Roll



JB-7-4 (392307)
Four Hub, NEMA 7 Cast Aluminum
Junction Box, 3/4" NPT



JB-7-MB (399023) Pipe Mounting Kit
Hardware & bracket to attach JB-7-4 Junction Box
to pipe, Stainless Steel. JB-7-4 sold separately



SSPS-82 (392323) Spacer Strip
Stainless Steel Spacer Strip with 1" spaced tabs
for tank and snow melt applications, 50ft roll.



Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Heater Set Design “A” or “E”

	Cable Number (determined by resistance value required for needed wattage output)						
	Cable Heated Section Length in Feet						
	Cable Cold Section Length in Feet (Both cold leads to be same length for "E" style cables)						
	Heater Set Total Wattage (W_{TOTAL})						
	Operating Voltage (V)						
	Fitting Size/Type						
	A	670B	150	04	1477W	120V	F12
Typical Model Number							

(120V, 9.9 w/ft cable, 150 ft heated section, 4ft cold lead section)

HWM

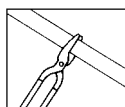
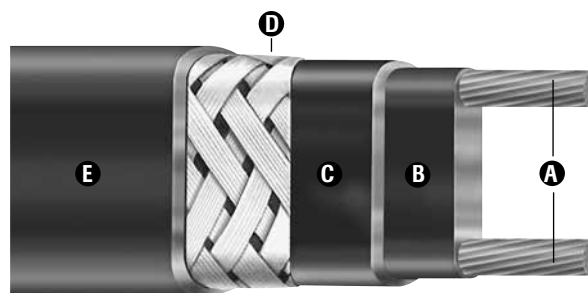
Hot Water Maintenance Heat Trace Cable

- Hot Water Maintenance for Temperatures up to 140°F
- Heat Output Varies Along Pipe Length to Deliver Heat Where Needed
- Circuit Lengths up to 800 ft
- 16 Awg Buss Wires
- Self-Regulating Conductive Core
- Fluoropolymer Jackets
- Wattages at 5 and 10 w/ft
- 120 and 208-277 V Cable Available from Stock

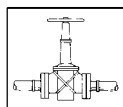
Description

The HWM hot water temperature maintenance system utilizes self-regulating heat trace technology. The system, consisting of the self-regulating cable, connection kits and specialized electronic controls, provides commercial buildings with immediate hot water availability without expensive recirculation systems. It provides a simple, yet energy efficient approach by providing heat at the point where heat loss occurs. Due to the parallel construction of the self-regulating cable, it can be cut to any length, spliced, tee-branched and terminated on site. With this product, energy savings may be derived from multiple sources, such as lower supply line heat loss, eliminated return line heat loss, no pump operating costs and no supply water overheating costs.

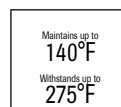
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



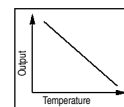
Cut to Length in Field



Can be Overlapped



Medium Temperature



Self Regulating Output

Features

- Energy efficient, self-regulating HWM uses less energy when less heat is required.
- Easy to install, HWM can be cut to any length (up to max. circuit length) in the field.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- HWM can be overlapped without burnout, which simplifies heat tracing of in-line equipment such as valves.
- Because HWM is self-regulating, over-temperature conditions are minimized.
- Chromalox termination, splice, tee and end seal kits reduce installation time.

- C Flame Retardant** – Electrically insulates the matrix and provides corrosion resistance.
- D Metallic Grounding Braid** – Provides additional mechanical protection and a positive ground path.
- E Fluoropolymer Outer Jacket** – Corrosion resistant, flame retardant overjacket is highly effective in many environments. Protects against exposure to organic or corrosive solutions. The overjacket also protects against abrasion and impact damage.

Construction

- A Twin 16 AWG Copper Buss Wires** – Provide reliable electric current capability.
- B Semiconductive Polymer Core Matrix** – “Self-Regulating” component of the cable its electrical resistance varies with temperature. As process temperature drops, the core’s heat output increases; as process temperature rises, the heat output decreases.

Approvals

FM approved for hot water maintenance applications

HWM

Hot Water Maintenance Heat Trace Cables

(cont'd.)

Insulation Requirement

Required thickness of fiberglass insulation is determined by nominal pipe size.

Fiberglass Insulation Thickness Selection	
Pipe size (in)	Insulation Thickness (in)
1/2	1
3/4	1
1	1
1 1/4	1
1-1/2	1-1/2
2	2

HWM Tracing Selection

To select the proper HWM cable for your applications, use the tables below.

Cable Selection	
120V, 240V or 277V Maintain Temperature (°F) Cable	
105	HWM 5
115	HWM 10
125	HWM 10
140	HWM 10
208V Maintain Temperature (°F) Cable	
105	HWM 5
115	HWM 10
125	HWM 10
140	HWM 10

Maximum Circuit Length (Ft.)

Maximum Circuit Length ft			
	15A	20A	30A
HWM5-1CT	200	270	400
HWM5-2CT	400	540	800
HWM10-1CT	130	155	220
HWM10-2CT	260	310	440

HWM

Hot Water Maintenance Heat Trace Cables

(cont'd.)

Ordering Information

Model	Volts	Stock	PCN	Wt./1000' (Lbs.)
HWM5-1CT	120	S	387305	66
HWM5-2CT	208-277	S	387348	66
HWM10-1CT	120	S	387250	66
HWM10-2CT	208-277	S	387313	66
To Order – Specify length, model, PCN and installation accessories.				

Accessories

Accessories	Model	Stock	PCN
Power Connection	UPC	S	393553
Splice and/or Tee	UMC	S	393561
End Seal	UES	S	393570
Hot Water Maintenance Controller w/solid state relay	DTS-HAZ	S	387364
To Order – General Application & Installation Accessories such as tape and warning labels please see page at the end of this section.			

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	Hot Water Maintenance Heating Cable			
HWM				
	Code	Output (W/Ft.)		
	5	Five		
	10	Ten		
		Code	Voltage	
		1	120	
		2	208-277	
			Code	Overcoat
			CT	Fluoropolymer corrosion resistant overjacket over braid for hostile/ corrosive environments
HWM	5 -	2	CT	Typical Model Number

SRF

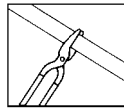
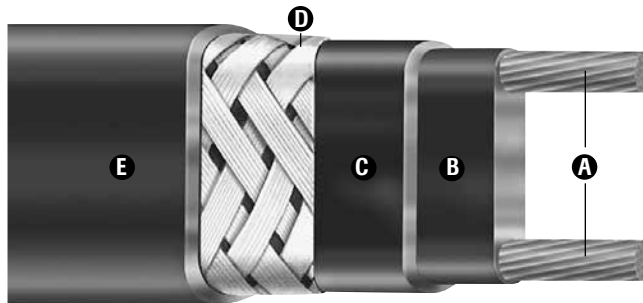
Self-Regulating Freeze Protection

- Self-Regulating, Energy Efficient
- Max. Exposure Temp. 185°F (Power Off)
- Cost Effective for Commercial Construction Freeze Protection Applications
- Freeze Protection of Fire Protection System Piping
- Industrial Grade, 16 AWG Buss Wire
- Standard Braid and Optional Overjacket
- Circuit Lengths, Up to 660 Ft.
- 3, 5 and 8 W/Ft.
- 120, 208 - 277 Volt From Stock
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"
- For Use on Metal and Plastic Pipes

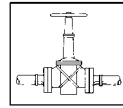
Description

Chromalox SRF cable is ideal for keeping metal and plastic pipes warm in commercial construction and institutional buildings, some industrial freeze protection applications. SRF cable is constructed of a self-regulating polymer core that varies its output along its entire length, saving energy and eliminating hot spots along the pipe. Parallel construction makes it easier to install than zone or series types of cable since it can be cut-to-length at any point on the pipe.

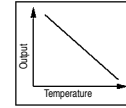
WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.



Cut to Length
in Field



Can be Single
Overlapped



Self Regulating
Output

Features

- Energy efficient, self-regulating SRF uses less energy when less heat is required.
- Easy to install, SRF can be cut to any length (up to max. circuit length) in the field.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- SRF can be overlapped without burnout, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Because SRF is self-regulating, over-temperature conditions are minimized.
- Chromalox termination, splice, tee and end seal kits reduce installation time.

Construction

- A Twin 16 AWG Copper Buss Wires** — Provide high electrical current capability.
- B Semiconductive Polymer Core Matrix** — its electrical resistance varies with temperature. As process temperature drops, the core's heat output increases; conversely, as process temperature rises, the heat output decreases.

- C Polyolefin Jacket** — Flame retardant, electrically insulates the matrix and buss wires. Also provides resistance to water and some inorganic chemical solutions.
- D Tinned Copper Braid** — The braid covering the jacket provides additional mechanical protection in any environment and a positive ground path.
- E High Temperature TPR Overjacket (optional)** — The TPR overcoat protects the braid and provides resistance to certain inorganic chemical solutions.

Approvals

UL Listed for ordinary areas.

UL Listed for fire protection system piping

CSA Certified for ordinary areas.

SRF

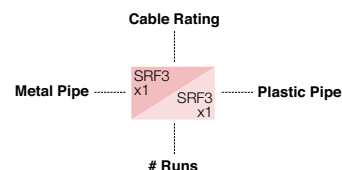
Application & Selection Guidelines

Commercial Freeze Protection SRF Cable Selection Charts

These charts are designed to speed selection of the appropriate wattage of cable when used for freeze protection. Find the diameter of pipe below and cross reference with the expected minimum ambient temperature for the recommended cable.

- Selections suitable for 120 and 208 to 277V applications.

- Design based on straight runs of cable or pipe. Spiralling is not required.
- Heat loss is based on 40°F maintenance temperature and Fiberglas® insulation $k = 0.25$ at 50°F.
- Non-metallic pipe heat losses are based on using Chromalox AT-1 aluminum tape for improving heat transfer.
- Only 3 W/Ft. rating is UL Listed for non-metallic pipe applications, however, 5W/Ft. and 8 W/Ft. can be used.



Each block specifies cable rating and # of runs for metal pipe (dark) and plastic pipe (light).

For larger pipe sizes, refer to the Technical section in the back of this catalog or contact your Local Chromalox Sales office.

Note – AT-1 Aluminum tape must be used on plastic pipe installation

0.50" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1
	1.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1
	1.5	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1
	2.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1

3.00" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF8 x1 SRF8 x1	SRF8 x2 SRF5 x2	SRF5 x2 SRF8 x2	SRF5 x2 SRF8 x2	SRF5 x2 SRF8 x2
	1.0	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1
	1.5	SRF3 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF5 x1 SRF8 x1
	2.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1

1.00" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1
	1.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1
	1.5	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1
	2.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1

4.00" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF5 x1 SRF5 x2	SRF5 x2 SRF8 x2	SRF8 x2 SRF8 x2	SRF8 x2 SRF8 x2	SRF5 x3 SRF8 x3
	1.0	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF5 x2	SRF5 x2 SRF8 x2
	1.5	SRF3 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1
	2.0	SRF3 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF5 x1 SRF8 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1

2.00" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF5 x2	SRF5 x2 SRF8 x2
	1.0	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1
	1.5	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1
	2.0	SRF3 x1 SRF3 x1	SRF5 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1

5.00" Pipe

		Min. Ambient Temp.				
		0°	-10°	-20°	-30°	-40°
Insulation Thickness (In.)	0.5	SRF5 x2 SRF8 x2	SRF8 x2 SRF8 x2	SRF8 x2 SRF8 x3	SRF8 x3 SRF8 x3	SRF8 x3 SRF8 x3
	1.0	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF5 x2	SRF5 x2 SRF8 x2	SRF5 x2 SRF8 x2
	1.5	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF5 x2
	2.0	SRF3 x1 SRF5 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF8 x1	SRF8 x1 SRF8 x1	SRF8 x1 SRF8 x1
	3.0	SRF3 x1 SRF3 x1	SRF3 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF5 x1	SRF5 x1 SRF8 x1

SRF

Application & Selection Guidelines (*cont'd.*)

6.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
0.5	SRF8 x2	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x4
1.0	SRF8 x1	SRF8 x1	SRF5 x2	SRF5 x2	SRF8 x2
1.5	SRF5 x1	SRF5 x1	SRF8 x1	SRF8 x1	SRF5 x2
2.0	SRF5 x1	SRF5 x1	SRF5 x1	SRF8 x1	SRF8 x1
3.0	SRF3 x1	SRF3 x1	SRF5 x1	SRF5 x1	SRF8 x1

14.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x4	SRF8 x4
1.5	SRF8 x1	SRF5 x2	SRF5 x2	SRF8 x3	SRF8 x3
2.0	SRF8 x1	SRF5 x1	SRF5 x2	SRF5 x2	SRF8 x3
3.0	SRF5 x1	SRF8 x1	SRF8 x1	SRF8 x2	SRF5 x2

8.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x1	SRF5 x2	SRF8 x2	SRF8 x2	SRF8 x3
1.5	SRF5 x1	SRF8 x1	SRF8 x1	SRF5 x2	SRF8 x2
2.0	SRF5 x1	SRF5 x1	SRF8 x1	SRF8 x2	SRF8 x2
3.0	SRF5 x1	SRF5 x1	SRF5 x1	SRF5 x1	SRF8 x1

16.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x2	SRF8 x3	SRF8 x4	SRF8 x4	SRF8 x4
1.5	SRF5 x2	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x3
2.0	SRF8 x2	SRF5 x2	SRF5 x2	SRF8 x2	SRF8 x3
3.0	SRF5 x1	SRF8 x1	SRF8 x1	SRF5 x2	SRF5 x2

10.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF5 x2	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x3
1.5	SRF8 x1	SRF8 x1	SRF5 x2	SRF8 x2	SRF8 x2
2.0	SRF5 x1	SRF8 x1	SRF8 x1	SRF5 x2	SRF8 x2
3.0	SRF5 x1	SRF5 x1	SRF5 x1	SRF8 x1	SRF5 x2

18.00" Pipe

	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x2	SRF8 x3	SRF8 x4	SRF8 x4	SRF8 x4
1.5	SRF5 x2	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x4
2.0	SRF8 x1	SRF5 x2	SRF8 x2	SRF8 x3	SRF8 x3
3.0	SRF8 x1	SRF8 x2	SRF8 x1	SRF5 x2	SRF8 x2

12.00" Pipe

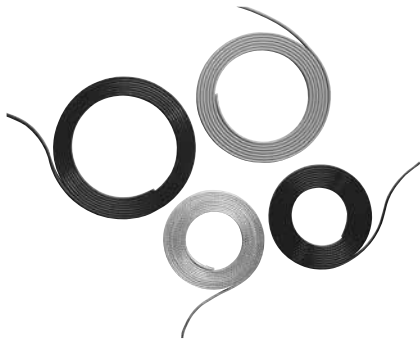
	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x2	SRF8 x3	SRF8 x3	SRF8 x3	SRF8 x4
1.5	SRF8 x1	SRF5 x2	SRF5 x2	SRF8 x2	SRF8 x3
2.0	SRF8 x1	SRF8 x1	SRF5 x2	SRF5 x2	SRF8 x2
3.0	SRF5 x1	SRF5 x1	SRF8 x1	SRF8 x1	SRF8 x2

20.00" Pipe

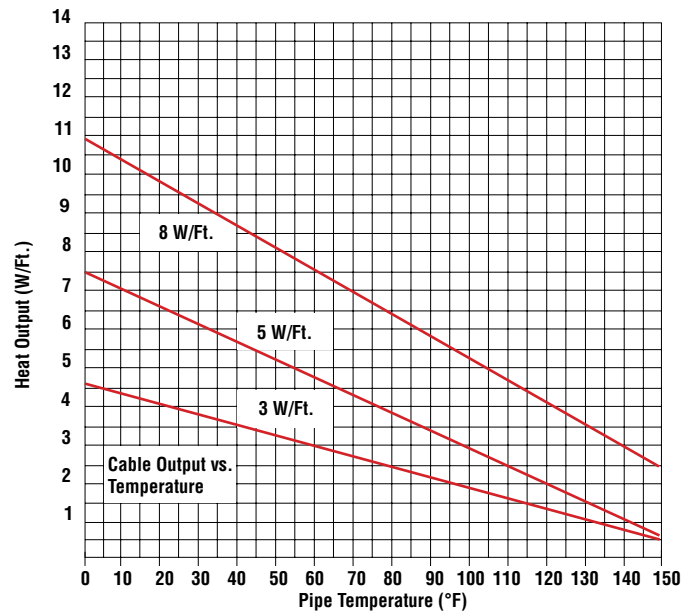
	0°	-10°	-20°	-30°	-40°
Insulation Thickness (in.)	Min. Ambient Temp.				
1.0	SRF8 x3	SRF8 x4	SRF8 x4		
1.5	SRF8 x2	SRF8 x2	SRF8 x3	SRF8 x4	SRF8 x4
2.0	SRF5 x2	SRF5 x2	SRF8 x3	SRF8 x3	SRF8 x3
3.0	SRF8 x1	SRF8 x2	SRF5 x2	SRF8 x2	SRF8 x2

SRF

Self-Regulating Freeze Protection *(cont'd.)*

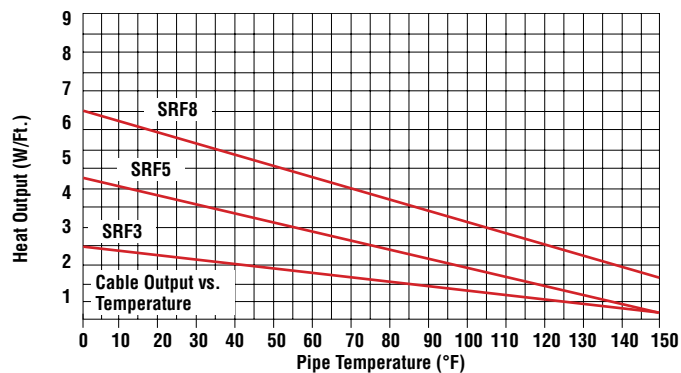


Thermal Output Ratings on Insulated Metal Pipe¹



Note 1 — Thermal output is determined per IEEE 515-2011 Standard for testing, design, installation, and maintenance of electrical resistance heat tracing section 4.1.11 Method C.

Thermal Output Ratings on Plastic Pipe with Aluminum Tape



Output Wattage at Alternate Voltages (W/Ft.)

Model	208V	% Change In Output	220V	% Change In Output	277V	% Change In Output
SRF 3	2.4	-20	2.6	-13	3.4	+15
SRF 5	4.1	-18	4.5	-10	5.6	+13
SRF 8	6.88	-14	7.28	-9	8.96	+12

Circuit Breaker Selection (Max. Circuit Lengths in Ft.)

Cable Rating	40°F Start-Up (Ft.)			0°F Start-Up (Ft.)		
	20A	30A	40A	20A	30A	40A
SRF 3-1C	350	360	NR	270	360	NR
SRF 3-2C	660	NR	NR	555	660	NR
SRF 5-1C	230	270	NR	180	270	NR
SRF 5-2C	450	540	NR	360	540	NR
SRF 8-1C	180	215	NR	145	215	NR
SRF 8-2C	330	420	420	265	395	420

NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

Note — Thermal magnetic circuit breakers are recommended since magnetic circuit breakers could "nuisance trip" at low temperature.

SRF

Self-Regulating Freeze Protection *(cont'd.)*

Ordering Information

Output (W/Ft.)	Volts	Model	Stock	PCN	Wt./1000' (Lbs.)
Output at Rated Voltage					
3 @ 50°F	120	SRF 3-1C	S	386943	53
	208 - 277	SRF 3-2C	S	386951	53
5 @ 50°F	120	SRF 5-1C	S	386960	53
	208 - 277	SRF 5-2C	S	386978	53
8 @ 50°F	120	SRF 8-1C	S	386986	53
	208 - 277	SRF 8-2C	S	386994	53
With Optional Overcoat (CR)					
3 @ 50°F	120	SRF 3-1CR	S	386100	64
	208 - 277	SRF 3-2CR	S	386118	64
5 @ 50°F	120	SRF 5-1CR	S	386142	64
	208 - 277	SRF 5-2CR	S	386150	64
8 @ 50°F	120	SRF 8-1CR	S	386062	64
	208 - 277	SRF 8-2CR	S	386070	64

Accessories

Accessories		U Series	DL	EL
Power Connection	Heat trace to electrical service connection	UPC	RTPC	SSK
Splice & Tee		UMC	RTST	RT-RST
End Seal	For terminating cable	UES	RTES	RT-RES
Thermostat	Ambient air sensing thermostat	UAS	RTAS	THL/TXL
	Line sensing mechanical thermostat	UBC	RTBC	THR/TXR
General Application & Installation Accessories such as tape, pipe straps, warning labels, etc., refer to the U Series and DL & EL General Application Accessories page at the end of this section.				

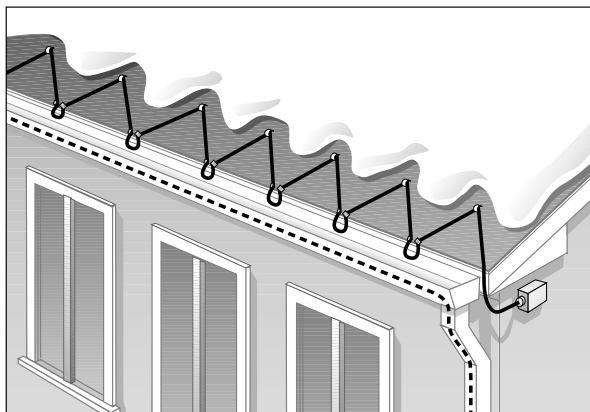
Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

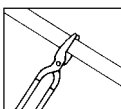
Model	Self-Regulating Medium Temperature			
SRF	Self-Regulating, Freeze Protection Heating Cable			
	Code	Output (W/Ft.)		
	3	Three		
	5	Five		
	8	Eight		
		Code	Voltage	
		1	120	
		2	208 - 277	
		Code	Braid and Overcoat Options	
		C	Standard tinned-copper metallic braid for additional protection and ground path	
		CR	TPR overjacket over braid for protection against certain inorganic chemical solutions	
SRF	5	-	1	C
Typical Model Number				

SRF-RG Self-Regulating Roof & Gutter

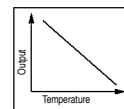
- Roof and Gutter De-Icing
- Fast, Easy Installation
- Cut to Length
- UL Listed
- CSA Certified
- Approximate Size 3/8"W x 1/8"H
- Minimum Bend Radius 1-1/8"



HEAT TRACE AND
ACCESSORIES



Cut to Length
in Field



Self Regulating
Output

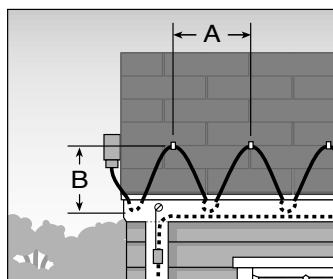
Description

Chromalox SRF-RG self-regulating heating cable provides reliable freeze protection of roofs and gutters. Because SRF-RG is self-regulating, it automatically adjusts to the appropriate heat output as ambient conditions change, making it both energy efficient and cost effective. The protective waterproof outer jacket is suitable for wet applications in downspouts and roof drains.

Likewise, it is easy to apply SRF-RG following the provided instruction sheets and utilizing the required accessory kits. It can be cut-to-length and overlapped. Simply trace the gutter or roof and energize the cable when precipitation is expected. From that point on, SRF-RG will rapidly increase its output when in contact with snow or ice, providing maximum melting power. When the roof and gutters are clear of snow and ice, the SRF-RG cable will regulate its output and save energy.

Applications

1. To calculate the amount of cable needed, multiply roof edge length to be heat traced by the spacing factor. The spacing factor (feet of cable required per foot of roof edge) is determined by the roof overhang, heating width (A) and heating height (B):



2. Add the total gutter length and the total downspout length to the figure calculated in step 1 to get the total length of cable required.

3. Determine how many circuits are required. Divide the total length of cable by the maximum circuit length (see specifications, next page). Round that number up (for example, 2.1 to 3) to get the total number of circuits.

Roof Overhang (In.)	Heating Width A (Ft.)	Heating Height B (In.)	Spacing Factor
12	2	18	2
24	2	30	3
36	2	42	4

For larger roof overhang, determine cable required by using equation below:

$$\text{Spacing factor} = \sqrt{B^2 + A^2}$$

WARNING — A ground fault protection device is required by NEC to minimize the danger of fire if the heating cable is damaged or improperly installed. A minimum trip level of 30mA is recommended to minimize nuisance tripping.

Heating Cable

SRF-RG

Self-Regulating Roof & Gutter *(cont'd.)*

Specifications

Buss Wire	16 AWG, Nickel-Coated Copper	
Ground Braid	Tinned Copper Braid Under Jacket	
Outer Jacket	RG = UV Stabilized Polyolefin RGT = Teflon	
Environmental Use	Use only in Ordinary Areas, 150°F Max. Exposure Temperature	
Output Wattage	12 W/Ft. in Snow or Ice	
Service Voltage	SRF 5-1RG	120 Vac
	SRF 5-2RG	208 - 277 Vac
	SRF 5-1RGT	120 Vac
	SRF 5-2RGT	208 - 277 Vac

Maximum Circuit Length (Ft.)

Start Up	120 Vac			208 - 277 Vac		
	15A	20A	30A	15A	20A	30A
40°F	185	230	270	375	450	540
0°F	135	180	270	270	360	540

Ordering Information

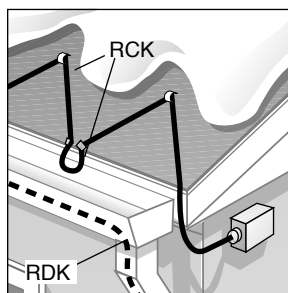
Product	Use	Model	Stock	PCN	Wt./1000' (Lbs.)
Cable					
120V	Cable with braid and UV stabilized polyolefin jacket	SRF 5-1RG	S	386329	64
208 - 277V	Cable with braid and UV stabilized polyolefin jacket	SRF 5-2RG	S	386337	64
120V	Cable with braid and Teflon stabilized polyolefin jacket	SRF 5-1RGT	S	392331	66
208 - 277V	Cable with braid and Teflon stabilized polyolefin jacket	SRF 5-2RGT	S	392340	66
Accessories					
Power Connection Kit	Power termination into junction box with 1 end seal and 2 "Warning-Electric Traced" adhesive labels	RG-PK-1	S	386206	1
Splice Kit	Materials for 1 splice of cable	RG-SK-1	S	386214	1
End Seal Kit	Materials for 1 cable end termination	RG-EK-1	S	386257	1
Roof Clips	To attach cable to standard roofing material, 10 per kit	RCK-1	S	340179	1
Downspout Hangers	To support cable in gutter downspout, 1 pack per carton	RDK-1	S	340160	1
Aluminum Tape	Aluminum foil installation tape with pressure sensitive adhesive, 180 ft. roll. Used to secure cable placement in gutters.	AT-1	S	383355	1
Note — Cables are UL Listed for Snow Melting and De-Icing Equipment. See ETI Catalog pages for control options GF-Pro, PD-Pro and APS 4C					

Roof & Gutter Accessories



RG-PK-1 (386206) Power Connection Kit

Power termination into junction box with one end seal and two "Warning-Electric Traced" labels



RCK-1 & RDK-1 Mounting Kits

RCK-1 (340179)
Roof clips (10) to attach cable

RDK-1 (340160)
Downspout hangers (1) to suspend cable in downspout



RG-SK-1 (386214) Splice Kit

Materials to make one splice connection. Special weatherproof sleeving to insure trouble-free operation

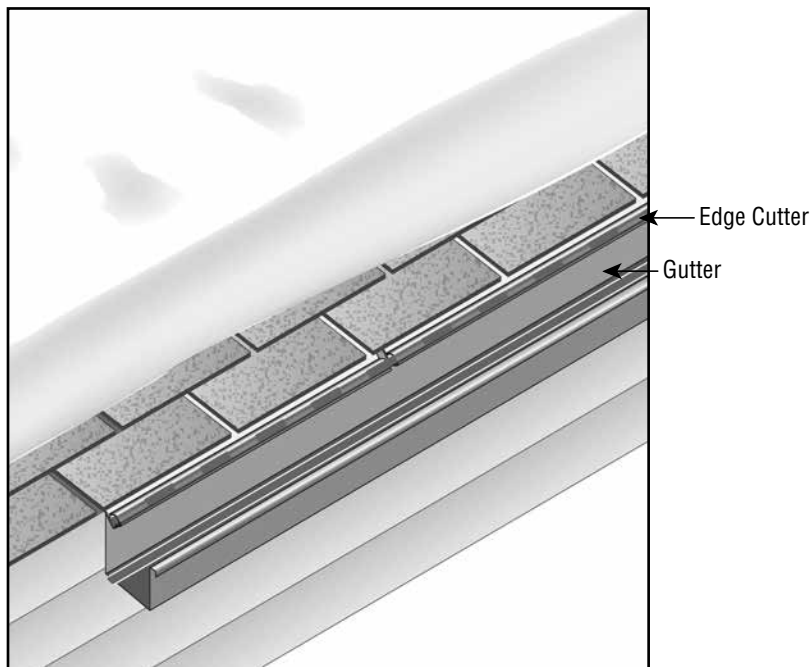


RG-EK-1 (386257) End Seal Kit

Seals cable at end termination

Edge-Cutter® Roof De-Icing System

- Aluminium Construction
- Angled or Flat Surface Designs
- Corrosion Resistant Coating Available



HEAT TRACE AND
ACCESSORIES

Description

Edge-Cutter® is an aluminum flashing designed to be used as a heat conductive plate to aid in keeping snow and ice from roof edges. The system is for use only with self-regulating heating cables certified for use in roof and gutter applications.

Edge-Cutter is designed to be applied between the roofing and the roof substrate. It can be used with various roofing products such as asphalt shingles, aluminum, steel* and even slate.

Valleys on a roof may also be heat traced with Edge-Cutter PLD-ECF (Flat Flashing).

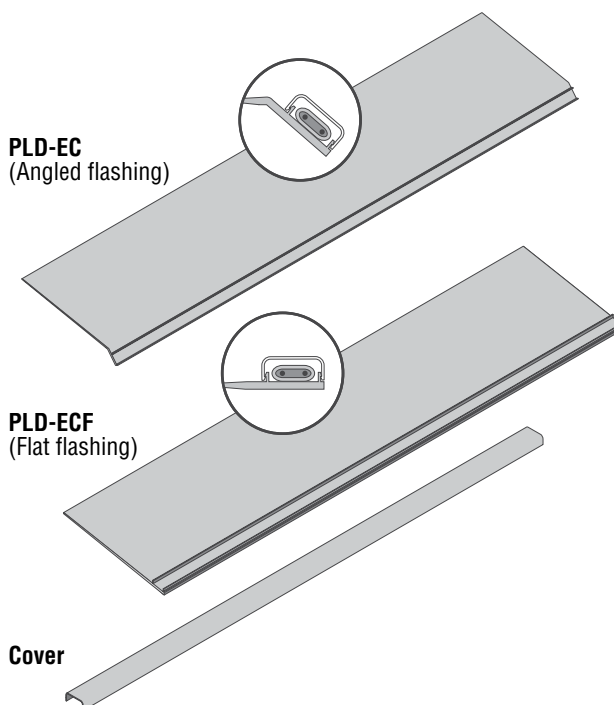
Edge-Cutter can be fastened using various methods including screws or adhesives depending on application and building materials.

*Edge-Cutter can be ordered with a 6 mil urethane membrane applied to help prevent galvanic oxidation or corrosion when in contact with dissimilar metals.

Available Items

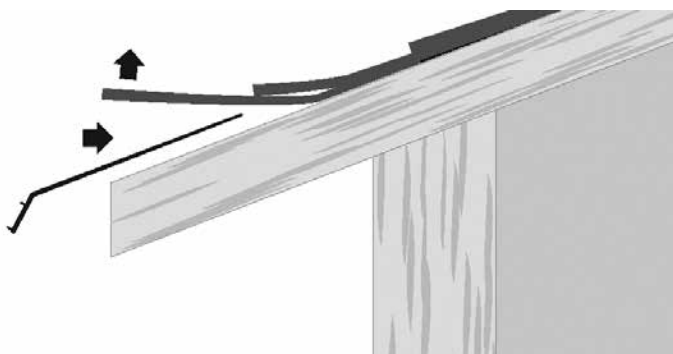
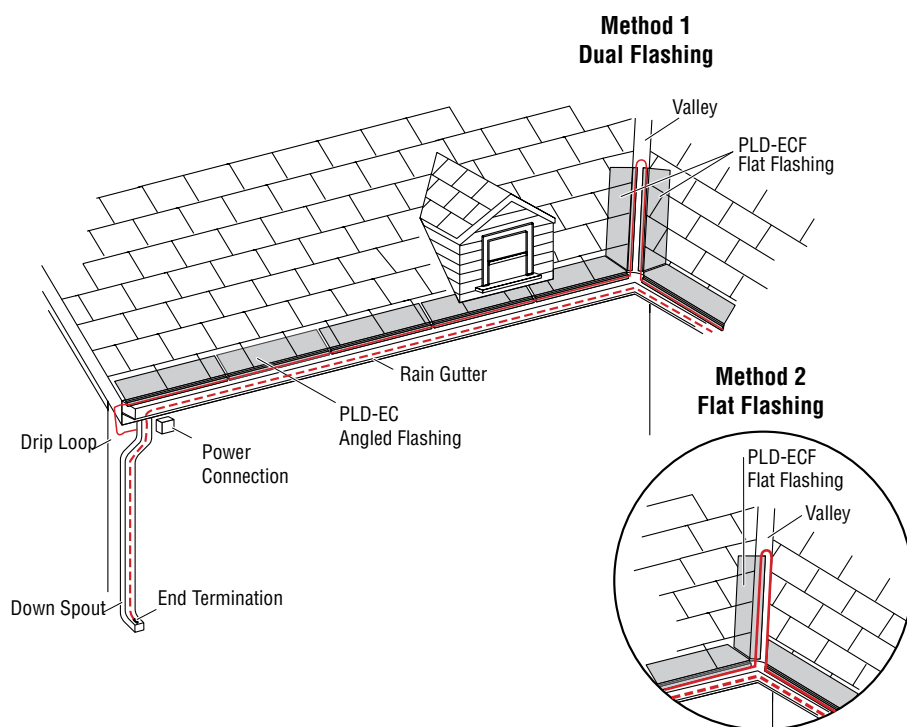
Model	PCN	Stock	Length	Wt (Lbs.)
PLD-EC*	393967	S	4'	1
PLD-ECF*	393975	NS	4'	1
Cover-EC	393983	NS	4'	1

* When ordering, cover is included with these models

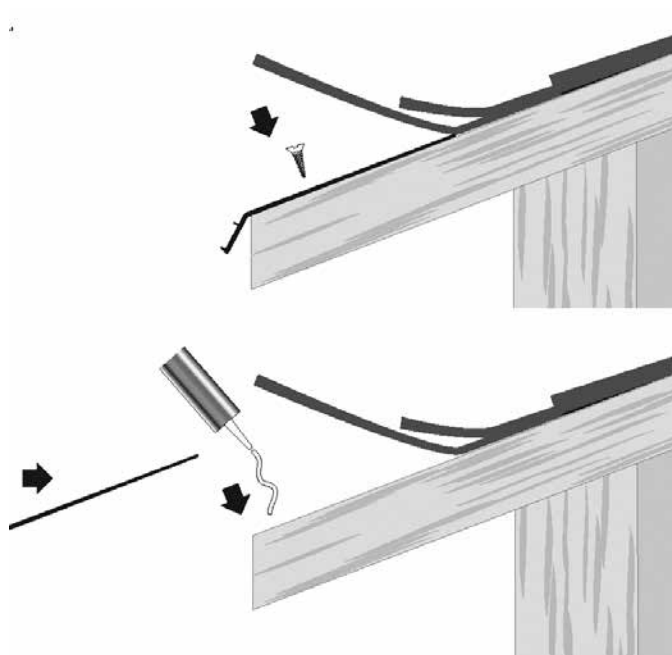


Edge-Cutter® Roof De-Icing System (cont'd.)

Valleys can also be heat traced using Edge-Cutter PLD-ECF flat flashing. Dual or single flashing can be used in the valleys



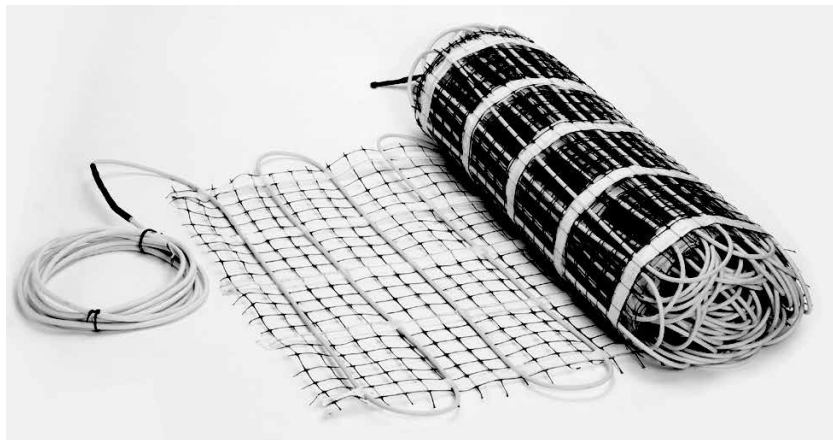
Edge-Cutter flashing can be cut to fit your specific roofing layout. Screws or adhesive can be used to easily attach the Edge-Cutter system to your roof.



Snow Melt Mats

Snow Melt Mats and System Controls

- Operating Voltage: 240V
- Output Rating: ± 50 W/ft²
- Mat Width 2' (.61m)
- Range of Lengths from 15' (4.57m) up to 60' (18.28m)
- Energy Efficient Dual Conductor Heating Cable
- Rated to a Maximum Temperature of 464°F (240°C)
- Cold Lead Length 16.4' (.164m)
- For Other Voltages, Lengths or Widths, Please Consult Factory



HEAT TRACE AND
ACCESSORIES

Description

Each roll of sturdy mesh has a 3" pre-spaced thick heating wire for embedding in concrete, asphalt, or under pavers. The mats come in 2' width, providing 50 watts per square foot. The cable has a layer of shielding and insulation, suitable for low temperatures, UV resistant and environmentally friendly, making them ideal for outdoor use.

Applications

The mats are ideal for snow melting in the following applications:

- Stairs
- Driveways
- Walkways

Features

Snow Melt Mats

- Easy Installation in asphalt, concrete, and pavers
- Cable fixed to Easy Roll out mat for quick and Easy Installation

Snow Melt Controls

- 2 Zone Control in one unit
- Can be switched to standby or forced on to override timer settings in extreme weather
- Economical Control of ice and snow melting.
- Indoor Mounting

Approvals

UL Listed Ordinary Areas

CSA Certified

Applications for Snow Melt Mats



Stairs



Walkways



Driveways

Snow Melt Mats

Snow Melt Mats and System Controls

(cont'd.)

PCN	Model Number	Area (ft²)	Heater Size (ft)	Ohms	Watts	Volts	Amps
Snow Melt Mat							
394206	WSMM-D-1000-240	20.0	2x10	57.6	1000	240	4.17
394214	WSMM-D-2000-240	40.0	2x20	28.8	2000	240	6.25
394222	WSMM-D-2500-240	50.0	2x25	23.0	2500	240	10.42
394230	WSMM-D-5000-240	100.0	2x50	11.5	5000	240	20.83
394249	WSMM-D-6000-240	120.0	2x60	9.6	6000	240	25.00

*Custom options available. Consult Factory for more information.

All-in-One Sensor/Controller

PCN 394134 (30 amp) ASE-DS2

PCN 394142 (60 amp) ASE-DS5

Features and Benefits:

- Sensors and controller in one outdoor unit
- Full access to electronics for manual overrides
- Automatic activation - only on when needed
- Rain, snow and temperature activated
- Adjustable temperature trigger for cost efficiency
- Selectable low temperature cut off
- Heaters Connect directly into unit for simplicity
- Adjustable delay-off drying cycle
- Remote control and monitor capabilities

Technical Data:

Operating Voltage: 240V, ±10%, 50-60 Hz
 Heating Load: 30A @ 240 VAC
 Temperature Range: -40°F to 185°F (-40°C to 85°C)
 Trigger Temperature: 34°F to 44°F (1.1°C to 6.6°C)
 Dimensions: 4.7"H x 7"W x 2.7"D
 Housing: Weatherproof enclosure
 Detects: Temperature and moisture



Thermostat & Mounting Box

Thermostat: PCN 394150 (USET02-4550)

Mounting Box: PCN 394169 (US92023)

Features and Benefits:

- 2 Zone control in one unit
- Can be switched to standby or forced on to override timer settings in extreme weather
- Economical control of ice and snow melting
- Indoor mounting

Technical Data:

Operating Voltage: 240V, ±10%, 50-60 Hz
 Output Rating: 11kW
 Temperature Range: 32°F to 41°F (0°C to 5°C)
 Working Range: -4°F to 41°F (-20°C to 5°C)
 Dimensions (excl. Box): 3.5"H x 6.1"W x 1.8"D
 Dimensions (w/Box): 6.7"H x 6.4"W x 1.8"D
 Housing (Incl. Cover): IP20



Thermostat



Mounting Box

APS-4C

Automatic Snow/Ice Melting System Controller

- Automatic Snow/Ice Melting Control
- Satellite Contactor Interface for Larger Systems
- Energy Management Computer (EMC) Interface
- Accommodates MI, Constant Wattage and Self-Regulating Heaters
- Multiple Sensor Capability
- Advanced Ground Fault Protection
- Heater Hold-On And Test Capabilities
- C-UL-US Listed
- Simple to Install and Operate
- Low System Costs
- Minimum Energy Costs



Description

The APS-4C Snow Switch when used with one, or more, compatible sensors automatically controls snow/ice melting heaters for minimum energy costs. Applications include pavement, sidewalk, loading dock, roof, gutter and down spout snow/ice melting in commercial and industrial environments. The APS-4C is interchangeable with the earlier APS-4.

The adjustable hold-on timer continues heater operation for up to 10 hours after snow stops to ensure complete melting. The optional RCU-4 Remote Control Unit can be located where system operation can be conveniently observed. It duplicates many of the APS-4C front panel functions.

The APS-4C provides advanced patented and patent pending ground fault equipment protection (GFEP) as required by the USA and Canadian National Electric Codes. The GFEP automatically tests itself every time the heater contactors operate and once every 24 hours. The trip current can be set at 60 or 120 mA via an internal switch or retained at the 30 ma default value. As an aid to troubleshooting heater ground faults, the APS-4C provides an output that can indicate the ground current on a service person's portable DVM.

The calibrated 40°F to 90°F (4°C to 32°C) high limit thermostat prevents excessive temperatures when using constant wattage and MI heaters. It also permits safe testing at outdoor temperatures too high for continuous heater operation. The temperature sensor is included.

The APS-4C provides a complete interface for use in environments supervised by an energy management computer (EMC). This feature can also be used for general purpose remote control and annunciation.

All sensor and communications wiring is NEC Class 2. This simplifies installation while enhancing fire and shock safety. The APS-4C can interface up to six sensors from the CIT-1 product family. Using more sensors provides superior performance by better matching the controller to site performance requirements.

The APS-4C is an exceptionally capable deicing controller. For complete information describing its application, installation and features, please contact your local Chromalox Sales Office.

APS-4C

Automatic Snow/Ice Melting System Controller (*cont'd.*)

Specifications

General

Area of use	Nonhazardous locations
-------------	------------------------

Enclosure

Protection	NEMA 3R
Cover attachment	Hinged polycarbonate cover, lockable
Entries	1 × 1-1/16" entry (top) for NEC Class 2 connections 2 × 1-11/16" entries (bottom) for supply and load power, except 277 VAC single phase 2 × 1-1/16" entries (bottom) for supply and load power, 277 VAC single phase only
Material	Polycarbonate
Mounting	Wall mount
Dimensions	5-1/2" (L) × 8-1/8" (W) × 4-3/8" (H) 140mm (L) × 207mm (W) × 112mm (H)

Control

Supply Voltage	PCN 389853	208-240 VAC, 35 VA, three phase 50/60 Hz
	PCN 389895	277 VAC, 45 VA, single phase 50/60 Hz
	PCN 389861	277/480 VAC, 45 VA, three phase 50/60 Hz
	PCN 399525	600 VAC, 50 VA, three phase 50/60 Hz
Load	PCN 389855	208-240 VAC, 50 amp max. resistive
	PCN 389845	277 VAC, 40 amp max. resistive
	PCN 389861	277/480 VAC, 50 amp max. resistive
	PCN 399525	600 VAC, 50 amp max. resistive
Contact Type		3 Form A (NO)
Weight		3 Pounds (not including sensors)
Maximum Ratings		Voltage: 600 VAC
		Current: 50 Amps
Heater Hold-On timer		0 - 10 hours; actuated by snow stopping or toggle switch
System Test		Switch toggles heater contact on and off. If temperature exceeds high limit, heater cycles prevent damage.

Ground Fault Equipment Protection (GFEP)

Set point	30 mA (default); 60 mA & 120 mA selectable by DIP switch
Automatic self-test	Mode A: Verifies GFEP function before contactors operate Mode B: Verifies GFEP and heaters every 24 hours
Manual test/reset	Toggle switch provided for this function
Maintenance facility	DC output proportional to ground current provided for troubleshooting the heater system

Snow/Ice Sensors

Maximum Quantity	Up to 6 sensors from the CIT-1 product family
Circuit Type	NEC Class 2
Lead Length	Up to 500' (152m) using 18 AWG 3-wire jacketed cable Up to 2,000' (609m) using 12 AWG 3-wire jacketed cable

High Limit Thermostat

Adjustment range	40°F to 90°F (4°C to 32°C)
Dead band	1°F (0.6°C)
Circuit type	Thermistor network
Sensor interface	NEC Class 2
Lead length	Up to 500' (152m) using 18 AWG 2-wire jacketed cable Up to 1,000' (304m) using 12 AWG 2-wire jacketed cable

APS-4C

Automatic Snow/Ice Melting System Controller *(cont'd.)*

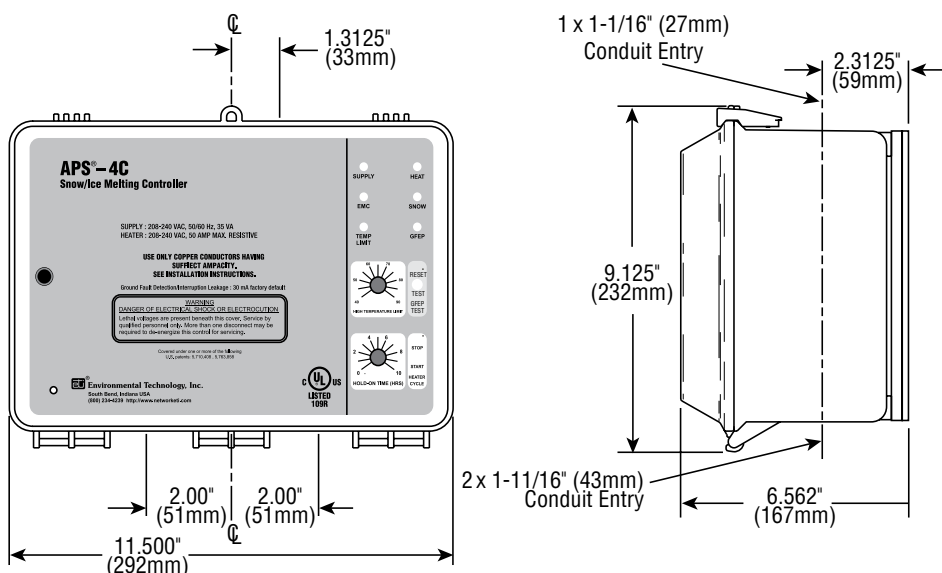
Energy Management Computer (EMC) Interface

Inputs	OVERRIDE ON (10 mA dry switch contact)
	OVERRIDE OFF (10 mA dry switch contact)
Outputs	SUPPLY (10 mA dry switch contact)
	SNOW (10 mA dry switch contact)
	HEAT (10 mA dry switch contact)
	HIGH TEMP (10 mA dry switch contact)
	ALARM (10 mA dry switch contact)

Environmental

Operating temperature	-40°F to 160°F (-40°C to 71°C)
Storage temperature	-50°F to 180°F (-45°C to 82°C)

Dimensions



Specifications and Ordering Information

Model Number	PCN	Stock
APS-4C Control Panel (277 Volt Single Phase)	389845	S
APS-4C Control Panel (208-240 Volt 3-Phase)	389853	S
APS-4C Control Panel (277/480 Volt 3-Phase)	389861	S
APS-4C Control Panel (600 Volt 3-Phase)	399525	NS

Stock Status: S = stock AS = assembly stock NS = non-stock
To Order— Specify model, PCN and quantity.

APS-3C

Automatic Snow/Ice Melting System Controller

- Automatic Snow/Ice Melting Control
- Operates Electrically- And Mechanically- Held Contactors for Pilot Duty Applications
- Energy Management Computer (EMC) Interface
- Accommodates MI, Constant Wattage and Self-Regulating Heaters
- Multiple Sensor Capability
- Heater Hold-On and Test Capabilities
- C-UL-US
- Simple to Install and Operate
- Low System Costs
- Minimum Energy Costs



Description

The APS-3C Snow Switch when used with compatible sensors automatically controls snow/ice melting heaters, ensuring minimum operating costs. Typical applications include pavement, sidewalk, loading dock, roof, gutter and down spout snow/ice melting. The APS-3C is interchangeable with earlier APS-3 models.

The adjustable hold-on timer continues heater operation for up to 10 hours after snow stops to ensure complete melting. The optional RCU-3 Remote Control Unit can be located where system operation can be conveniently observed. It duplicates many of the controls and indicators on the APS-3C front panel. It is used to clear tracked and drifting snow that may not land on a sensor.

The calibrated 40°F to 90°F (4°C to 32°C) high limit thermostat prevents excessive temperatures when using constant wattage and MI heaters. It also permits safe testing at outdoor temperatures too high for continuous heater operation. The temperature sensor is included.

The APS-3C provides a relay closure interface for use with energy management computers (EMC). This feature can also be used for general purpose remote control and annunciation and other advanced applications.

All sensor and communications wiring is NEC Class 2. This simplifies installation while enhancing fire and shock safety. The APS-3C can interface up to six sensors from the CIT-1 product family. Using more sensors provides superior performance by better matching the controller to site performance requirements.

The APS-3C is an exceptionally capable deicing controller. For complete information describing its application, installation and features, please contact your local Chromalox sales office.

APS-3C Automatic Snow/Ice Melting System Controller *(cont'd.)*

Specifications

General

Area of use	Nonhazardous locations
-------------	------------------------

Enclosure

Protection	NEMA 3R
Cover attachment	Hinged polycarbonate cover, lockable
Entries	3 × 1-1/16" entries
Material	Polycarbonate
Mounting	Wall mounted

Control

Supply	PCN 389837	120 VAC, 50/60 Hz, 35 VA
	PCN 389829	208-240 VAC, 50/60 Hz, 35 VA
Load	PCN 389837	120 VAC, 24 amp max. inductive
	PCN 389829	240 VAC, 24 amp max. inductive
Contact type		Form C (NO-C-NC)
Maximum Ratings		Voltage: 240 VAC Current: 24 amps
Heater hold-on timer		0 to 10 hours; actuated by snow stopping or toggle switch System test Switch toggles the heater contact on and off. If temperature exceeds high limit, heater cycles to prevent damage.

Snow/Ice Sensors

Sensor type	Up to 6 sensors from the CIT-1 product family
Circuit type	NEC Class 2
Lead length	Up to 500' (152m) using 18 AWG 3-wire jacketed cable Up to 2,000' (609m) using 12 AWG 3-wire jacketed cable

High Limit Thermostat

Adjustment range	40°F to 90°F (4°C to 32°C)
Dead band	1°F (0.6°C)
Sensor type	Thermistor network
Circuit type	NEC Class 2
Lead length	Up to 500' (152m) using 18 AWG 2-wire jacketed cable Up to 1,000' (304m) using 12 AWG 2-wire jacketed cable

Energy Management Computer (EMC) Interface

Inputs	OVERRIDE ON (10 ma dry switch contact) OVERRIDE OFF (10 ma dry switch contact) Outputs SUPPLY (10 ma dry switch contact) SNOW (10 ma dry switch contact) HEAT (10 ma dry switch contact) HIGH TEMP (10 ma dry switch contact) ALARM (10 ma dry switch contact)
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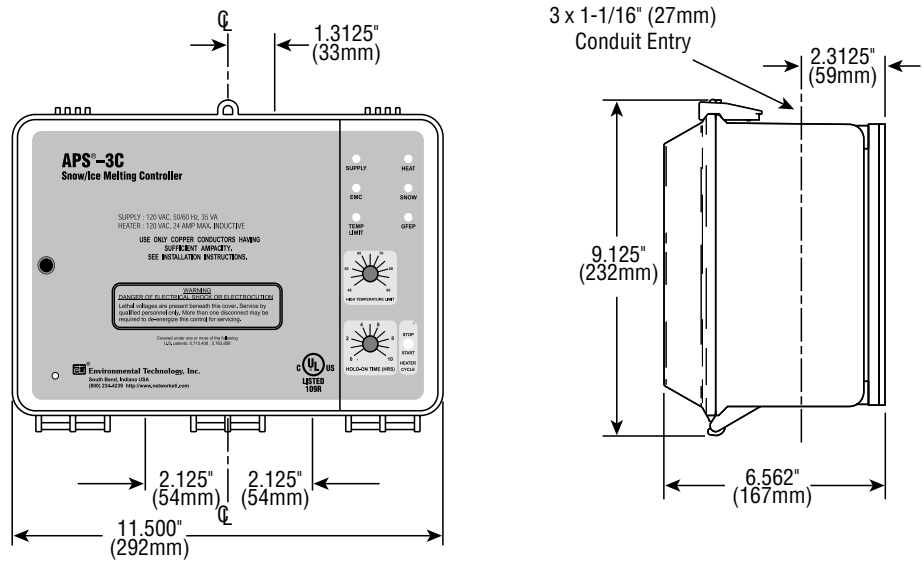
Environmental

Operating temperature	-40°F to 160°F (-40°C to 71°C)
Storage temperature	-50°F to 180°F (-45°C to 82°C)

APS-3C

Automatic Snow/Ice Melting System Controller (*cont'd.*)

Dimensions



Specifications and Ordering Information

Model Number	PCN	Stock
APS-3C Control Panel, 120 VAC	389837	NS
APS-3C Control Panel, 208-240 VAC	389829	S

Stock Status: S = stock AS = assembly stock NS = non-stock
To Order—Specify model, PCN and quantity.

SC-40C

Satellite Contactor

- **Modular Power Control of Automatic Snow Melting Systems**
- **No System Size Limit**
- **Staged Heater Operation for High Power Quality**
- **Energy Management Computer (Emc) Interface**
- **Accommodates MI, Constant Wattage and Self-Regulating Heaters**
- **Advanced Ground Fault Protection**
- **Heater Hold-On and Test Capabilities**
- **C-UL-US**
- **Simple To Install And Operate**
- **Low System Costs**
- **Minimum Energy Costs**



Description

The SC-40C Satellite Contactor answers the need for cost effective modular snow melting heater control. One or more SC-40Cs, when used with an APS-4C Control Panel acting as the master control, allow for modular snow melting system design. There is no limit to the number of SC-40Cs that can be interfaced in a single system. This approach reduces front end design, hardware and installation costs while providing a number of useful features that would be otherwise too expensive and complex to implement.

The SC-40C provides the same advanced patented and patent pending Ground Fault Equipment Protection (GFEP) as required by the USA and Canadian National Electric codes that is found on the APS-4C. Upon sensing a ground fault condition, an SC-40C inhibits operation of its contactor until manually reset. Circuits without a ground fault continue to operate normally thus partitioning defective heaters.

The adjustable hold-on timer can initiate heater operation on each SC-40C for up to 10 hours to ensure complete melting and to compensate for differences between zones.

The optional RCU-4 Remote Control Unit can be located where system operation can be conveniently observed. It duplicates many of the controls and indicators on the SC-40C front panel.

Each SC-40C provides a complete energy management computer (EMC) interface. This feature provides remote access for advanced applications requiring remote or zone control along with remote annunciation.

Each SC-40C maintains communications to and from the APS-4C using a 3-wire cable. Thus, the APS-4C alarms ground faults occurring anywhere in the system. The SC-40C also inserts a short time delay between the operation of each contactor thus improving power quality by limiting the inrush current. The RCU-4 Remote Control Unit supplied permits overriding zone control in applications requiring the capability.

The SC-40C is interchangeable with the earlier SC-40. For complete information describing its application, installation and features, please contact your local Chromalox sales office.

SC-40C Satellite Contactor (cont'd.)

Specifications

General

Area of use Nonhazardous locations

Enclosure

Protection NEMA 3R
Cover attachment Hinged polycarbonate cover, lockable
Entries 1 × 1-1/16" entry (top) for NEC Class 2 connections
2 × 1-11/16" entries (bottom) for supply and load power, except 277 VAC single phase
2 × 1-1/16" entries (bottom) for supply and load power, 277 VAC single phase only
Material Polycarbonate
Mounting Wall mounted

Communications Bus

Number of cascaded units Unlimited
Contactor delay 5 second
Bus-wire type 3-wire jacketed cable
Circuit type NEC Class 2
Lead length Up to 500' (152m) using 18 AWG 3-wire jacketed cable
Up to 1,000' (304m) using 12 AWG 3-wire jacketed cable

Control

Supply PCN 389888 208-240 VAC, 35 VA, three phase 50/60 Hz
PCN 389870 277 VAC, 45 VA, single phase 50/60 Hz
PCN 389896 277/480 VAC, 45 VA, three phase 50/60 Hz
PCN 399533 600 VAC, 50 VA, three phase 50/60 Hz
LOAD PCN 389888 208-240 VAC, 50 amp max. resistive
PCN 389870 277 VAC, 40 amp max. resistive
PCN 389896 277/480 VAC, 50 amp max. resistive
PCN 399533 600 VAC, 50 amp max. resistive

Contact type 3 Form A (NO)
Maximum Ratings Voltage 600 VAC
Current 50 amps
Heater hold-on timer 0 to 10 hours; actuated by toggle switch
System test Switch toggles the heater contact on and off. If temperature exceeds high limit, heater cycles to prevent damage.

Ground Fault Equipment Protection (GFEP)

Set point 30 mA (default); 60 mA & 120 mA selectable by DIP switch
Automatic self-test Mode A: Verifies GFEP function before contactors operate
Mode B: Verifies GFEP and heaters every 24 hours
Manual test/reset Toggle switch provided for this function
Maintenance facility DC output proportional to ground current provided for troubleshooting the heater system

Snow/Ice Sensors

Not Applicable

High Limit Thermostat

Adjustment range 40°F to 90°F (4°C to 32°C)
Dead band 1°F (0.6°C)
Sensor type Thermistor network
Circuit type NEC Class 2
Lead length Up to 500' (152m) using 18 AWG 2-wire jacketed cable
Up to 1,000' (304m) using 12 AWG 2-wire jacketed cable

SC-40C Satellite Contactor (cont'd.)

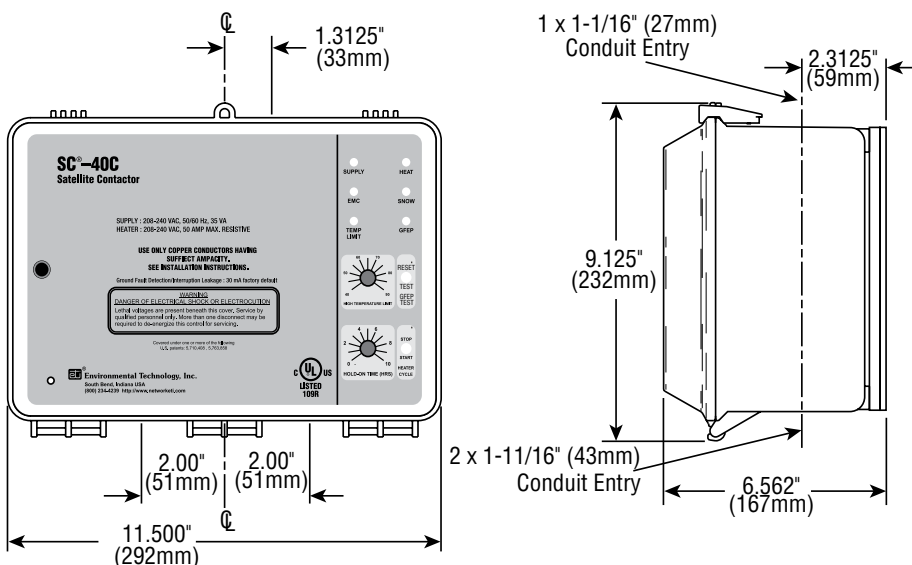
Energy Management Computer (EMC) Interface

Inputs	OVERRIDE ON (10 mA dry switch contact) OVERRIDE OFF (10 mA dry switch contact)
Outputs	SUPPLY (10 mA dry switch contact) SNOW (10 mA dry switch contact) HEAT (10 mA dry switch contact) HIGH TEMP (10 mA dry switch contact) ALARM (10 mA dry switch contact)

Environmental

Operating temperature	-40°F to 160°F (-40°C to 71°C)
Storage temperature	-50°F to 180°F (-45°C to 82°C)

Dimensions



Specifications and Ordering Information

Model Number	PCN	Stock
SC-40C Satellite Contactor, 208-240 VAC 50/60 Hz Three Phase	389888	S
SC-40C Satellite Contactor, 277 VAC 50/60 Hz Single Phase	389870	NS
SC-40C Satellite Contactor, 277/480 VAC 50/60 Hz Three Phase	389896	S
SC-40C Satellite Contactor, 600 VAC 50/60 Hz Three Phase	399533	NS
Stock Status: S = stock AS = assembly stock NS = non-stock To Order— Specify model, PCN and quantity.		

PD Pro Snow Switch

- Automatic Snow and Ice Melting Control Minimizes Operating Costs
- Supply Voltage 100-277 V
- Rated for Up To 7 Amp Inductive Loads for Pilot Duty Applications
- Loads Up To 30 Amps
- Weather-Resistant NEMA 4X Enclosure
- C-UL-US Listed for Temperature Regulating Equipment
- Adjustable Hold-On Timer Continues Heater Operation After Snow and Ice Discontinue to Ensure Complete Melting
- Dual Sensor Capability to Meet Site Performance Requirements
- Automatic and Manual-Override Operator Controls for Changing Environmental Conditions
- Optional Remote Control Operation for Added Convenience



Description

The Snow Switch Model PD Pro is an automatic snow and ice melting control system. Utilizing standard Environmental Technology snow and ice sensors (sold separately), applications include snow and ice detection and melting for pavement, sidewalks, loading docks, roofs, gutters and downspouts in commercial and residential environments.

The PD Pro interfaces with up to two standard Environmental Technology sensors to meet site requirements. The CIT-1, GIT-1, and SIT-6E sensors reliably detect snow and ice melting in gutter and pavement applications. The CIT-1 aerial snow sensor detects falling or blowing precipitation before snow or ice begin to form, allowing the control to begin managing the system. The CIT-1 sensor may be roof or mast mounted and can be paired with the GIT-1 sensor for gutter applications or the SIT-6E sensor for pavement applications. All three sensors detect precipitation as snow at temperatures below 38°F (3.3°C). The PD Pro is signaled only if moisture occurs below this temperature, saving energy and ensuring thorough snow and ice melting. Since 1968, these sensors have been the industry's most versatile and cost-effective automatic snow melting control sensors.

The PD Pro features automatic and manual-override operator controls. The adjustable Hold-On timer continues heater operations up to 8 hours after snow or ice conditions end to ensure complete melting. The Heater Cycle control button allows manual initiation or cancelation of a heating cycle. The optional RCU-3 remote control unit can be located for convenient monitoring and control. These flexible control options provide complete snow melting and water evaporation at a low operating cost.

The PD Pro weighs only 3 pounds and measures 5-1/2" (L) x 8-1/8" (W) x 4-3/8" (H). Comprehensive instruction manuals simplify installation and operation. These products are also supported by Environmental Technology technical support.

The PD Pro is a capable snow and ice control for medium-sized applications whose features and power requirements do not require an APS or EUR Series control panel.

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PD Pro Snow Switch *(cont'd.)*

Specifications

General

Area of use Nonhazardous locations

Enclosure

Protection NEMA 4X
Cover attachment Polycarbonate with machine screws
Entries 2 x 3/4" entry (bottom right) for NEC Class 2 connections
3 x 1-1/16" entries (bottom left) for supply & load power
Material Polycarbonate
Mounting Wall mount
Dimensions 5-1/2" (L) x 8-1/8" (W) x 4-3/8" (H)
140mm (L) x 207mm (W) x 112mm (H)

Control

Supply Voltage 100-277 VAC; 50/60 Hz
Load 7 Amp maximum inductive
30 Amp resistive
Contact Type 2 Form A (NO)
Weight 3 Pounds (not including sensors)
Maximum Ratings Voltage: 277 VAC
Current: 30 Amps
Heater Hold-On timer 0 to 8 hours; actuated by snow stopping or toggle switch
System Test Switch toggles heater contact on and off. If temperature exceeds optional high limit thermistor (45°F), heater shuts off to reduce costs and prevent damage.

Front Panel Interface

Status Indicator SUPPLY (green): Power on
HEAT (yellow): Heating cycle in progress
SNOW (yellow): Sensor(s) detect snow

Snow/Ice Sensors

Maximum Quantity 2 ETI sensors
Circuit Type NEC Class 2
Lead Length Up to 500' (152m) using 18 AWG 3-wire jacketed cable
Up to 2,000' (609m) using 12 AWG 3-wire jacketed cable

Wire and Cable Ratings

Power Cable Size for heater load (30 Amps maximum)
Sensor Wiring #18 AWG jacketed, 3-conductor
Heater Cable Size for maximum heater load
Remote Wiring #22 AWG jacketed, 2-conductor

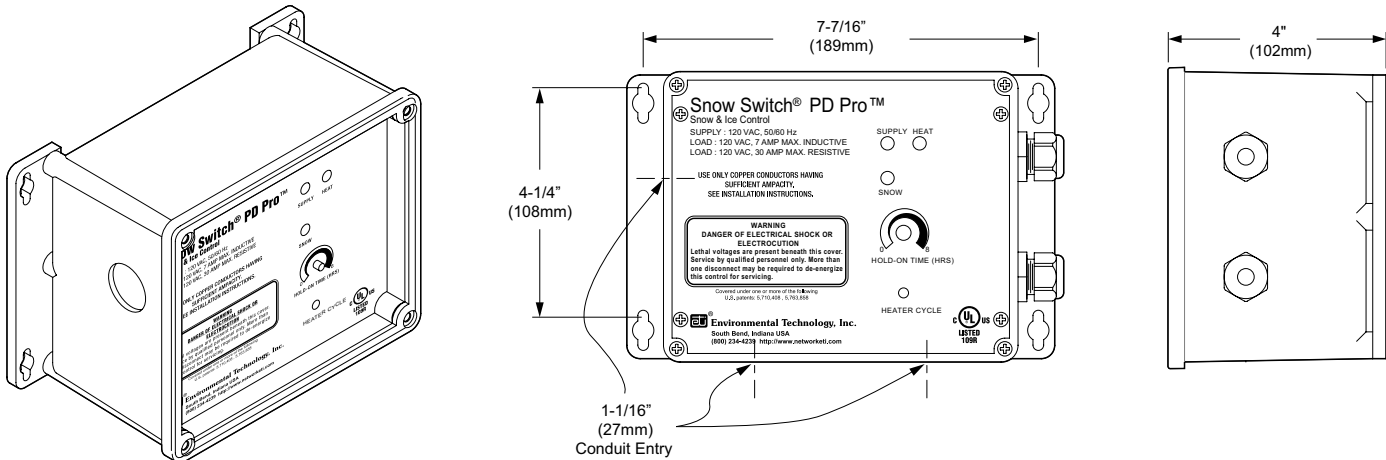
Environmental

Operating temperature -31°F to 130°F (-35°C to 55°C)
Storage temperature -67°F to 167°F (-55°C to 75°C)

PD Pro

Snow Switch (cont'd.)

Dimensions



Specifications and Ordering Information

Model Number	PCN
PD Pro	390010
Accessories	
RCU-3 Remote Control (Optional)	389773
Snow/Ice Sensors (Not Included)	
CIT-1 Aerial Snow Sensor	389749
GIT-1 Gutter Ice Sensor	389757
SIT-6E Pavement Mounted Snow and Ice Sensor	389765
To Order —Specify model, PCN and quantity.	

GF Pro Snow Switch

- **Automatic Snow and Ice Melting Control Minimizes Operating Costs**
- **Supply Voltage 100-277 V**
- **Rated for Up to 30 Amp Resistive Loads**
- **Integral 30 mA of Ground Fault Equipment Protection (GFEP)**
- **Weather-Resistant NEMA 4X Enclosure**
- **C-UL-US Listed for Temperature Regulating Equipment**
- **Adjustable Hold-On Timer Continues Heater Operation After Snow and Ice Discontinue to Ensure Complete Melting**
- **Dual Sensor Capability to Meet Site Performance Requirements**
- **Automatic and Manual-Override Operator Controls for Changing Environmental Conditions**
- **Optional Remote Control Operation for Added Convenience**



SNOW MELTING
CONTROLS



Description

The Snow Switch Model GF Pro is an automatic snow and ice melting control system. Utilizing standard Environmental Technology snow and ice sensors (sold separately), applications include snow and ice detection and melting for pavement, sidewalks, loading docks, roofs, gutters and downspouts in commercial and residential environments.

The GF Pro interfaces with up to two standard Environmental Technology sensors to meet site requirements. The CIT-1 sensor may be roof or mast mounted and can be paired with the GIT-1 sensor for gutter applications or the SIT-6E sensor for pavement applications. All three sensors detect precipitation as snow at temperatures below 38°F (3.3°C), saving energy and ensuring thorough snow and ice melting. Since 1968, these sensors have been the industry's most versatile and cost-effective automatic snow melting control sensors.

The GF Pro features built-in 30 mA, self-testing Ground Fault Equipment Protection (GFEP), digitally filtered to minimize false tripping. A ground fault condition must be manually reset using the Test/Reset switch before heater operation can continue.

The GF Pro uses both automatic and manual-override operator controls. The adjustable Hold-On timer continues heater operations up to 8 hours after snow or ice conditions end to ensure complete melting. The Heater Cycle control button allows manual initiation or cancellation of a heating cycle. The optional RCU-4 remote control unit can be located for convenient monitoring and control. These flexible control options provide complete snow melting and water evaporation at a low operating cost.

The GF Pro weighs only 3 pounds and measures 5 1/2" (L) x 8 1/8" (W) x 4 3/8" (H). Comprehensive instruction manuals simplify installation and operation. These products are also supported by Environmental Technology technical support.

The GF Pro is a capable snow and ice control for medium-sized applications whose features and power requirements do not require an APS or EUR Series control panel.

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GF Pro

Snow Switch (*cont'd.*)

Specifications

General

Area of use	Nonhazardous locations
-------------	------------------------

Enclosure

Protection	IP 66, NEMA 4X
Cover attachment	Polycarbonate with machine screws
Entries	2 x 3/4" entry (bottom right) for NEC Class 2 connections 3 x 1-1/16" entries (bottom left) for supply & load power
Material	Polycarbonate
Mounting	Wall mount
Dimensions	5-1/2" (L) x 8-1/8" (W) x 4-3/8" (H) 140mm (L) x 207mm (W) x 112mm (H)

Control

Supply Voltage	100 - 277 VAC; 50/60 Hz
Load	30 Amp maximum resistive
Contact Type	2 Form A (NO)
Weight	3 Pounds (not including sensors)
Maximum Ratings	Voltage: 277 VAC Current: 30 Amps
Heater Hold-On timer	0 to 8 hours; actuated by snow stopping or toggle switch
System Test	Switch toggles heater contact on and off. If temperature exceeds optional high-limit thermistor (45°F), heater shuts off to reduce costs and prevent damage.

Front Panel Interface

Status Indicator	SUPPLY (green): Power on HEAT (yellow): Heating cycle in progress SNOW (yellow): Sensor(s) detect snow GFEP (red): Ground Fault condition GFEP (red, flashing): Failed GFEP (red, rapid flashing): GFEP test in progress
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Snow/Ice Sensors

Maximum Quantity	2 ETI sensors
Circuit Type	NEC Class 2
Lead Length	Up to 500' (152m) using 18 AWG 3-wire jacketed cable Up to 2,000' (609m) using 12 AWG 3-wire jacketed cable

Wire and Cable Ratings

Power Cable	Size for heater load (30 amps maximum)
Sensor Wiring	#18 AWG jacketed, 3-conductor
Heater Cable	Size for maximum heater load
Remote Wiring	#22 AWG jacketed, 2-conductor

Ground Fault Equipment Protection (GFEP)

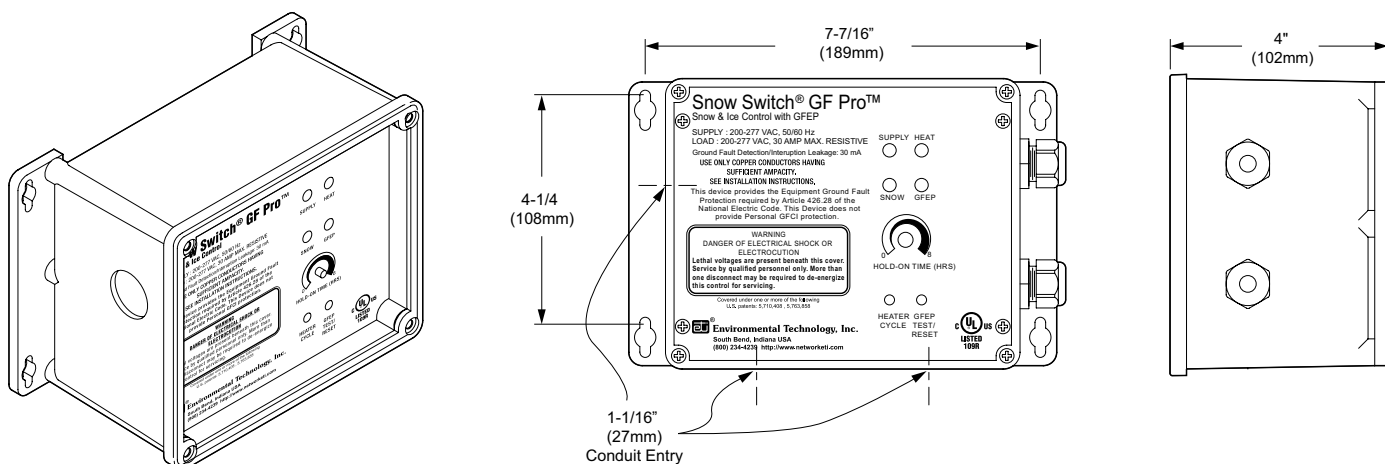
Set Point	30 mA
Automatic Self-Test	GFEP verified before contactors operate; GFEP runs on start-up and every 24 hours
Manual Test/Reset	Test/Reset switch on front panel

Environmental

Operating temperature	-31°F to 130°F (-35°C to 55°C)
Storage temperature	-67°F to 167°F (-55°C to 75°C)

GF Pro Snow Switch *(cont'd.)*

Dimensions



SNOW MELTING
CONTROLS

Specifications and Ordering Information

Model Number	PCN
GF Pro	390029
Accessories	
RCU-4 Remote Control (Optional)	389909
Snow/Ice Sensors (Not Included)	
CIT-1 Aerial Snow Sensor	389749
GIT-1 Gutter Ice Sensor	389757
SIT-6E Pavement Mounted Snow and Ice Sensor	389765
To Order —Specify model, PCN and quantity.	

LCD-8

Configurable Aerial Snow Melting Controller



- Automatic Snow and Ice Melting Controller Minimizes Operating Costs
- Automatic Voltage Selection Operates from 120 Vac – 240 Vac
- 24 Vac Model Available for Hydronic and Building Automation Applications
- Adjustable Hold-On Time and Temperature Set Point Provides Flexibility for a Wide Range of Applications
- Rated for up to 3 Amp Inductive Loads for Pilot Duty Applications and Resistive Loads up to 16 Amps
- Weather-Resistant NEMA 3R Enclosure
- Hold-On Timer Continues Heater Operation After Snow Stops to Ensure Complete Melting
- Sno-Test™ Automatic Testing and Manual Heater Cycle for System Testing
- Simple Four-Wire Installation
- C-UL-US Listed for Temperature Regulating Equipment



Description

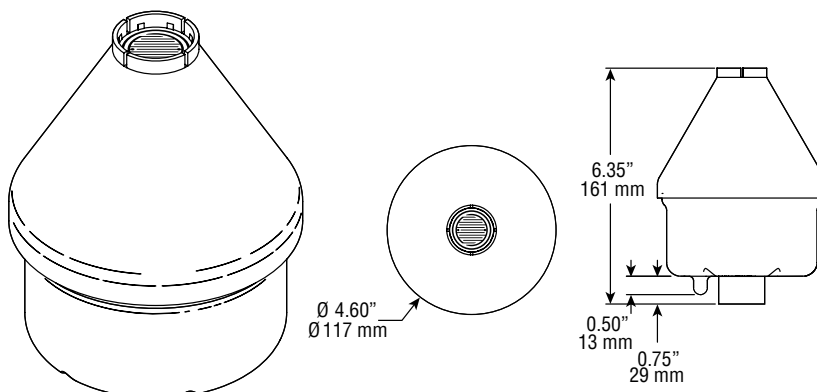
The Snow Switch Model LCD-8 configurable aerial snow melting controller makes automatic snow melting a cost effective alternative in even the smallest applications. Heaters operate at temperatures below the set point, 38°F (3.3°C) default, only when required. The adjustable hold-on period, 3 hours default, continues heater operation after snow stops to ensure complete melting. The LCD-8 controller includes an internal magnetic reed switch used for manual heater cycling, as well as configuring the temperature set point and the hold-on time.

The LCD-8 controller operates from either an automatic selecting 100 VAC - 240 VAC or from 24 VAC. These two voltage options combine with the configurable hold-on time and temperature set point to meet the need of a wide number of applications using just two part numbers.

It controls heater loads up to 16 Amps resistive or 3 Amps inductive. The operating temperature range extends from -40°F to 140°F (-40°C to 60°C). The redesigned, patent pending, rugged polycarbonate enclosure provides excellent protection at temperature extremes, while allowing snow to shed to prevent iglooming over the moisture sensor.

The internal magnetic reed switch allows for both configuration and manual heater operation without the need for external switches, which are susceptible to damage, or the need to open the enclosure.

Verifying system functionality after installation or when troubleshooting used to require spray circuit cooler or ice for controller activation. The Sno-Test™ feature eliminates this need by performing a self-test after power application, and operating heaters in a unique pattern for a few seconds. Reading the test results takes only an AC voltmeter or clamp-on ammeter.



Configurable Aerial Snow Melting Controller *(cont'd.)*

Model Number	PCN	Stock
LCD-8 Snow Melt Controller	389781	S
Stock Status: S = stock AS = assembly stock NS = non-stock To Order —Specify model, PCN and quantity.		

CIT-1

Snow Sensor

- Minimum Snow Melting Cost
- No Supervision Required
- Reliable Snow Sensing
- Senses both Temperature and Precipitation
- Application Flexibility
- Simple Installation
- Field Proven in Thousands of Installations



Description

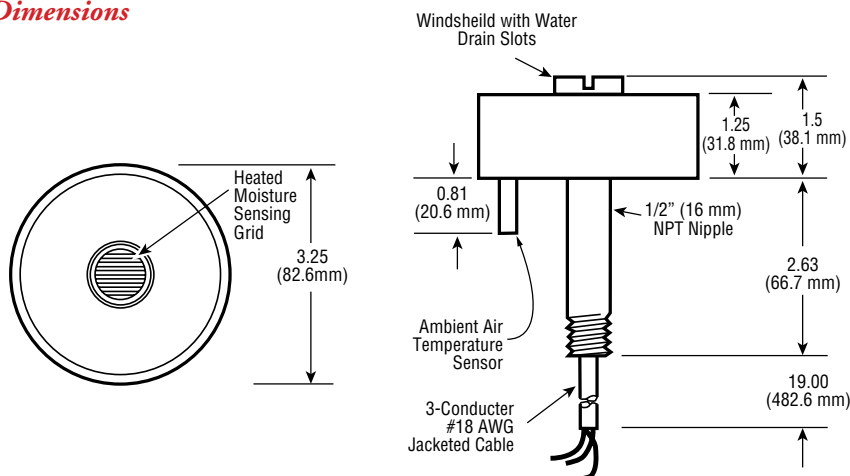
The CIT-1 Snow Sensor detects falling or blowing precipitation as snow at temperatures below 38°F (3.3°C). The CIT-1 provides the industry's most versatile and cost effective automatic snow melting control when used with any APS or EUR series control panel, old or new.

Reliability and sensitivity are key CIT-1 features. The solid state design, combined with a rugged aluminum housing and epoxy potting, ensure many years of trouble free service. Precision precipitation and temperature sensors assure snow detection accuracy.

Typical applications include controlling snow melting systems or sidewalks, doorways, stairs, loading docks, ramps for the physically challenged and parking garages. Easy installation is another key CIT-1 feature. Low voltage operation, up to 2,000' (609.6m) separation from the control panel, mast or roof mounting, and noncritical extension wiring are just a few of the features making this possible.

For complete information describing its application, installation and features, please contact your local Chromalox Sales Office.

Dimensions



Specifications and Ordering Information

Model Number	PCN	Stock
CIT-1 Snow Sensor	389749	S
Stock Status: S = stock AS = assembly stock NS = non-stock To Order—Specify model, PCN and quantity.		

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GIT-1 Gutter Ice Sensor

- Reduces Operating Cost
- Reliable Automatic Deicing Control
- Senses Both Moisture and Temperature
- Gutter-Mounted for Accuracy
- Avoids Ice Bridging
- Rugged Housing
- Simple Low Cost Installation
- Field Proven Reliability



Description

An automatic control system for gutters and downspouts, employs one or more GIT-1 Gutter Ice Sensors and either APS-3C or APS-4C Control Panel. Heaters operate only if moisture occurs at temperatures below 38°F (3.3°C), thus saving energy and ensuring reliable ice melting.

Since the GIT-1 mounts in gutters and downspouts it senses actual environmental conditions. This improves sensing accuracy. Solid state moisture and temperature sensors provide the sensitivity required for effective automatic control.

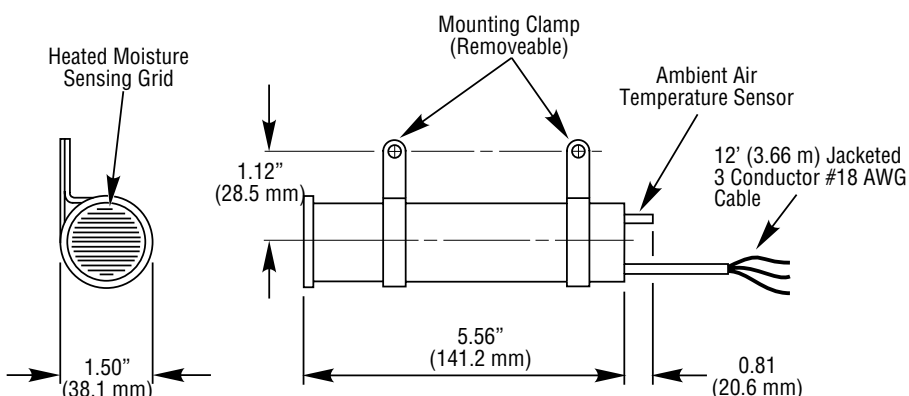
Ice bridging occurs if incomplete melting occurs near the heater or sensor leaving an air space. The air insulates thus preventing effective

heater and sensor operation. The GIT-1's unique microcontroller design frees its moisture sensor from ice bridging. Additional features prevent heater operation under conditions favorable to heater ice tunneling.

Low voltage operation simplifies installation. Sensors can be located up to 2,000' (609.6m) away from the control panel.

For complete information describing its application, installation and features, please contact your local Chromalox Sales office.

Dimensions



Specifications and Ordering Information

Model Number	PCN	Stock
GIT-1 Gutter Sensor	389757	S
Stock Status: S = stock AS = assembly stock NS = non-stock To Order— Specify model, PCN and quantity.		

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SIT-6E Pavement Sensor

- Control Based Upon Pavement Conditions
- Rugged Construction
- Simple Installation
- Low Voltage Operation
- Reliable Snow Melting
- Minimum Energy Cost
- Long Trouble-Free Life



Description

The SIT-6E, which replaces the SIT-5E, reliably detects snow and ice conditions on pavement surfaces when used with any APS series or EUR-5A Control Panel. This ensures that deicing heaters operate only while needed, which minimizes energy costs without sacrificing snow melting effectiveness. A built-in hold-on timer keeps heaters operating for an hour after snow stops to help ensure complete snow melting.

The SIT-6E senses snow as moisture detected between below 38°F (3.3°C). Operation in the 32° to 38°F (0° to 3.3°C) temperature range eliminates otherwise slow melting.

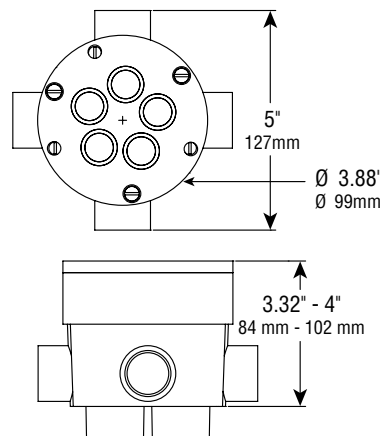
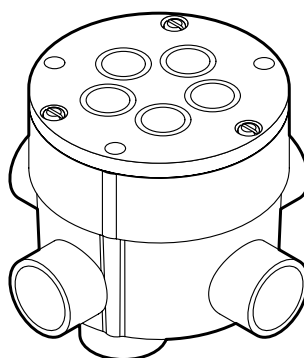
The SIT-6E accurately measures pavement temperature by compensating for its internal heating. This eliminates the cost and complex-

ity of a separate pavement temperature sensor. For improved efficiency, the SIT-6E mounts close to the deicing heaters to ensure that pavement and sensor become dry at about the same time.

The new mounting system helps align the SIT-6E with the pavement surface. Six available conduit locations add to installation flexibility and simplicity. The sensor subassembly is field replaceable without disturbing the pavement. The SIT-6E is a NEC Class 2 low voltage device which simplifies installation.

Only brass, epoxy, and stainless steel are exposed to the pavement surface. Precision machining gives these products a handsome appearance that will please the building owner, engineer, and architect.

Dimensions



Six (6) 3/4" Knockouts on Sides and Bottom

Specifications and Ordering Information

NOTE: The output signal of an SIT-6E pavement sensor is not a contact closure — it is a solid state switch compatible only with Environmental Technology's APS, EUR, and Pro Series control product lines. If a contact closure is desired for an output signal, please select from our HSC series of pavement sensors.

Model Number	PCN	Stock
SIT-6E Pavement Mounted Sensor	389765	S
Stock Status: S = stock AS = assembly stock NS = non-stock To Order—Specify model, PCN and quantity.		

The ETI logo is a registered trademark of Environmental Technology, Inc. SIT is a trademark of Environmental Technology, Inc. Copyright 2000, All rights reserved.

RCU

Remote Control Unit

- Remote System Status Indication
- Convenient Manual Control for Melting Problem Areas
- Low Cost
- Simple Installation



Description

The RCU Remote Control Unit is a companion accessory to the EUR-5, APS-3C and the APS-4C Snow/Ice Melting Controllers. The RCU provides a convenient and economical means to both monitor and manually control a snow/ice melting system from a remote location. The integral heater cycle push button operates heaters for the hold-on time setting on the host Control Panel, permitting tracked slush or drifted snow to be cleared independent of prevailing meteorological conditions. LEDs provide indication of system power supply and heater operation.

The RCU Remote Control Unit employs an attractive single gang metallic device plate suitable for both flush and surface installations. The RCU interfaces with its host Control Panel via a NEC Class 2 circuit which may have an installed length as great as 2,000' (609.6m) utilizing 2-conductor #18 AWG jacketed cable.

Specifications and Ordering Information

Model Number	PCN	Stock	Used with
RCU-3 Remote Control Unit	389773	NS	PD Pro, APS-3C, EUR-5A
RCU-4 Remote Control Unit	389909	S	GF Pro, APS-4C, SC-40C
Stock Status: S = stock AS = assembly stock NS = non-stock To Order— Specify model, PCN and quantity.			

U Series

Heat Trace Connection Kits/Accessories

Single Entry Power Connection Kit

- NEMA 4X
- Entry for 1 Cable
- 3/4" Conduit Hub Opening
- Lighted or Non-Lighted

Multiple Entry Connection Box

- NEMA 4X
- Entry for up to 3 Cables
- Power, Splice or Tee Connection
- 3/4" Conduit Hub Opening

Above Insulation End Seal Kit

- NEMA 4X
- Fits All Pipe Sizes
- Mounts Above the Insulation for Easy Access
- Lighted or Non-Lighted

Pipe Standoff Kit

- Brings Cable Outside Insulation to Customer Supplied Junction Box

Under Insulation End Seal Kit

- 3" Dia. Curved Mounting Surface
- Stainless Steel Hardware
- 1" Wide Strapping Channel for Secure Mounting

Small Pipe Adapter for Pipes Under 1-1/2" Diameter



Description

The U-Series Connection Kits represent cutting edge design in heat tracing accessories. Each model in this series is designed to satisfy the unique demands of a particular operation. These high-quality models combine a variety of functions in a convenient, easy-to-use and economical package.

Applications

These accessories are designed to connect SRL, SRP, SRM/E and CWM heating cables to customer-supplied wiring in any of the following applications:

- Freeze Protection
- Piping Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance

Approvals


Factory Mutual (FM) Approved and CSA certified for ordinary areas. ATEX, IECEx, FM, and CSA Approved for hazardous (classified) areas.

CSA¹ and FM Approved

- Class I, Div. 2 Groups A*, B, C, D (gases, vapors)
- Class II, Div. 2 Groups E*, F, G (combustible dust)
- Class III, Div. 2 (easily ignitable fibers & fillings)
- For T-Ratings See Heating Cable
- UPC, UMC, UES, RTES, UESL, SSK Only

*CSA Only

ATEX Approved

-  III 2 G Ex e II T* Gb Ta -60°C to 195°C
- UPC, UMC, UES, RTES Only

* For T-Ratings See Heating Cable

IECEx Approved:

- ITS 07.0018X Ex e II T* Gb Ta -60°C to 195°C
- UPC, UMC, UES, RTES Only

* For T-Ratings See Heating Cable

¹SSK to have these approvals when a junction box is used that is NEMA 4X rated and certified by appropriate third party agency for use for that application and hazardous locations rating (Div. 2).

Features

- Molded of Durable Polyphenylene Sulphide Plastic Material*
- Maximum Pipe Temperature 482°F (250°C)
- Corrosion Resistant
- Thermal Stability
- Non-Flammable
- High Strength and Rigidity
- Captive Hardware
- Stainless Steel Hardware to Ensure the Integrity of the System
- Liquid Tight Design Prevents Moisture from Reaching the Electrical Connections
- All Models are Rated NEMA 4X.



* This crystalline, high-performance engineering TP is characterized by outstanding high-temperature stability, inherent flame resistance and a broad range of chemical resistance. PPS plastics and compounds provide various combinations of high mechanical strength, impact resistance and electrical insulation, with its high arc resistance and low arc tracking.

U Series Heat Trace Connection Kits/Accessories (cont'd.)

Accessories

UPC Power Connection Box PCN 393553

NEMA 4X rated junction box designed to connect SRL, SRP, SRM/E and CWM cables to customer supplied power wiring. This kit provides water-resistant cable entry for one cable, enclosure support, terminal block, and a water-resistant corrosion-resistant wiring enclosure with a 3/4" opening to accept a conduit hub (CCH-2 or equal). A pipe strap (PS Series) is required to attach this model to a pipe. Small pipe adapter is available for pipe size less than 1-1/2".

Kit Dimensions: 9.78"H x 4.78"W x 3.6"D

Kit Includes:

- 1 Junction box with DIN rail & terminal block
- 1 Compression fitting
- 1 Locknut
- 1 Silicone termination boot
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet



HEAT TRACE AND
ACCESSORIES

UMC Multiple Entry Connection Box PCN 393561

NEMA 4X rated junction box designed to connect two or three SRL, SRP, SRM/E and CWM cables to customer supplied power wiring. This kit provides water-resistant cable entry, enclosure support, terminal block and a water-resistant, corrosion-resistant wiring enclosure. In addition to splicing or teeing cables, this model can be used to provide power connection to up to three cables from one connection kit. A pipe strap (PS series) is required to attach this model to a pipe. Small pipe adapter is available for pipe size less than 1-1/2".

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D

Kit Includes:

- 1 Junction box with din rail and terminal block
- 1 Compression fitting
- 1 Locknut
- 3 Silicone termination boots
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet
- 1 Self-regulating cable grommet insert
- 1 Constant wattage cable grommet insert



SPA Small Pipe Adapter* PCN 393609

*Pipe adapter to be used when pipe size is less than 1-1/2" diameter.

Kit Includes:

- 1 Small pipe adapter



U Series Heat Trace Connection Kits/Accessories (cont'd.)

UES Above Insulation End Seal Kit PCN 393570

NEMA 4X rated end seal designed of to terminate SRL, SRP, SRM/E and CWM cables. This kit provides water-resistant cable entry for one cable, water-resistant and corrosion-resistant pipe support to bring the cable end outside the insulation for easy access. A pipe strap (PS Series) is required to attach this model to a pipe. Small pipe adapter is available for pipe size less than 1-1/2".

Kit Dimensions: 5.5"H x 2.75"W x 2.25"D

Kit Includes:

- 1 End cap
- 1 Pipe standoff
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet



RTES Under Insulation End Seal Kit PCN 389570

NEMA 4X rated enclosure is designed to terminate SRL, SRP, SRM/E and CWM cables. This kit provides water-resistant cable entry for one cable, enclosure support and a water-resistant corrosion-resistant enclosure. The fitting has two different curved mounting surfaces. One side has a 1-1/2" radius curved surface that provides stable support on pipes with a diameter of 3" or more. The other side has a 1/2" radius curved surface which permits a better fit on smaller pipes. A pipe strap (PS Series) is required to attach this model to a pipe. In addition, this side also has four "feet" for installation on flat surfaces.

Kit Dimensions: 1.25"H x 1.75"W x 2"D

Kit Includes:

- 1 End Cap
- 1 Pressure Plate
- 1 GRSR Self-Regulating Cable Sealing Grommet
- 1 GRCW Constant Wattage Cable Sealing Grommet



SSK Single Entry Sealing Kit† PCN 393617

This kit provides water resistant cable entry for one cable, water-resistant and corrosion-resistant pipe support to bring the cable outside the insulation for easy connection to power. A pipe strap (PS Series) is required to attach this model to a pipe. A small pipe adapter is available for pipe sizes less than 1-1/2". Customer supplied junction box required.

† Approved for CSA Class I, Div. 2 groups A, B, C & D and Class II, Div. 2, Groups F, G when junction box that is used is NEMA 4X rated and certified by appropriate third party agency for use for that application and hazardous locations rating (Div. 2)



Kit Includes:

- 1 Compression fitting
- 1 Locknut
- 1 Silicone termination boots
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet
- 2 Uninsulated butt splice 14-16 AWG
- 2 Insulated butt splice 14-16 AWG

U Series Heat Trace Connection Kits/Accessories (cont'd.)

UESL End Seal Signal Light Kit PCN 394257

NEMA 4X rated end seal designed to power or seal one cable and indicate power on with universal voltage 120-277 LED indicator light kit designed for use with SRL, SRP, SRM/E and CWM cables. This model provides water-resistant cable entry and corrosion-resistant wiring enclosure. A pipe strap (PS Series) is required to attach this model to a pipe. Small pipe adapter is available for pipe size less than 1-1/2".

Kit Dimensions: 7"H x 3.25"W x 3.25"D

Kit Includes:

- 1 Pipe standoff
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet
- 1 Universal voltage 120-277V LED light assembly
- 2 Insulated parallel splices



HEAT TRACE AND
ACCESSORIES

UAS Ambient-Sensing Thermostat PCN 394038*

NEMA 4X rated junction box designed to connect a single SRL, SRP, SRM/E or CWM cable run to power and control cable output via ambient air temperature in non-hazardous areas. This kit provides water-resistant cable entry for one cable, enclosure support, terminal block and a water resistant corrosion resistant wiring enclosure with a 3/4" opening to accept a conduit hub (CCH-2 or equal). Stainless steel sheath probe is 9/16" diameter x 3" long. Switch rated for 22 amps SPDT 120-480 volts. Operating temperature range is -40°F to 160°F (-40°C to 71°C). Temperature set point 0° to 225°F (-81°C to 107°C) with 10°F scale divisions.

***Only for ordinary areas.**

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D



Kit Includes:

- 1 Junction box with DIN rail & terminal block
- 1 Compression fitting
- 1 Locknut
- 1 Silicone termination boot
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet

*USL Signal Light Kit * PCN 393588*

NEMA 4X rated end seal designed to power or seal one cable and indicate power on with universal voltage 120-277 LED indicator light kit designed for use with SRL, SRP, SRM/E and CWM cables. This model provides water-resistant cable entry, enclosure support, terminal block, and corrosion-resistant wiring enclosure. A pipe strap (PS Series) is required to attach this model to a pipe. Small pipe adapter is available for pipe size less than 1-1/2".

*** Only Approved for Ordinary Areas.**

Kit Dimensions: 9.78"H x 4.78"W x 3.6"D

Kit Includes:

- 1 Junction box with DIN rail & terminal block
- 1 Compression fitting
- 1 Locknut
- 1 Silicone termination boot
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet
- 1 Universal voltage 120-277V LED light assy.



U Series Heat Trace Connection Kits/Accessories (cont'd.)

*UBC Line-Sensing Thermostat** *PCN 394011*

NEMA 4X rated junction box designed to connect a single SRL, SRP, SRM/E or CWM cable run to power and control cable output via pipe temperature in non-hazardous areas. This kit provides water-resistant cable entry for one cable, enclosure support, terminal block and a water resistant corrosion resistant wiring enclosure with a 3/4" opening to accept a conduit hub (CCH-2 or equal). Stainless steel bulb is 1/4" diameter x 7-1/4" long with 3ft capillary. Switch rated for 22 amps SPDT 120-480 volts. Operating temperature range is -40°F to 160°F (-40°C to 71°C). Temperature set point 0° to 400°F (-18°C to 200°C) with 10°F.

* Only approved for ordinary areas.

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D

Kit Includes:

- 1 Junction box with DIN rail & terminal block
- 1 Compression fitting
- 1 Locknut
- 1 Silicone termination boot
- 1 Pipe standoff
- 1 O-ring
- 1 Self-regulating cable grommet
- 1 Constant wattage cable grommet
- 1 Line-sensing thermostat assembly



AT-1 Aluminum Tape Cable Attachments *PCN 383355*

180' roll aluminum foil installation tape with pressure sensitive acrylic adhesive. 2-mil thickness with high tensile strength; 2-1/2" wide. 200°F (93°C) rating. Minimum application temperatures 40°F (5°C).



FT-3 Fiberglass Tape Cable Attachments *PCN 389941*

66' roll glass cloth installation tape with pressure sensitive thermosetting adhesive. 3/8" wide. 310°F (155°C) rating. Strap at one foot intervals. Minimum application temperature 40°F (5°C).



Tape Type	Rolls Needed per 100' of Pipe									
	Pipe Dia. (In.)									
	1/2"	1	2	3	4	6	8	10	12	
FT-3	1	2	4	4	6	8	10	12	15	

U Series Heat Trace Connection Kits/Accessories (cont'd.)

PS-1, PS-3, PS-10 Stainless Steel Pipe Straps **PCN 382352, 382360, 382379**

Used for attaching U Series kits to pipe.

PS-1 1/2" to 3/4" pipes (PCN 382352)

PS-3 1" to 3-1/2" pipes (PCN 382360)

PS-10 2-1/2" to 9" pipes (PCN 382379)

PS-20 9" to 19.5" pipes (PCN 382256)



Stripping Tool **PCN 393510**

Tool for stripping the base jacket and the conductive matrix from the cable buss wires. The tool is stocked with 16 awg blades for stripping SRL, HSRL, SRM/E, HSRM and SRP and Thermwire products.



Replacement Blades **PCN 393537**

Blade Set for Stripping SRL, HSRL, SRM/E, HSRM and SRP Cables



Conduit Hub w/Grounding Lug **CCH-2 (385650)**

Corrosion resistant hub for 3/4" conduit. Fits opening in PJB, DL, U Series and DTS. Includes ground connector.



U Series

Long Line Heat Trace Connection Accessories



Power Connection Kit

- NEMA 4X
- Entry for 1 Cable
- 3/4" Conduit Hub Opening
- Mounts Above Insulation for Easy Access

Splice Connection Kit

- NEMA 4X
- Entry for 2 Cables
- 3/4" Conduit Hub Opening
- Mounts Above Insulation for Easy Access

End Seal Connection Kit

- NEMA 4X
- Entry for 1 cable
- Mounts Above Insulation for Easy Access

Description

The Chromalox Long Line Heat Trace Connection Accessories are used to provide electrical connection to SLL heat trace cables. These kits contain specialty parts and must be used to ensure proper functioning of the SLL cable, compliance with warranty, code, and approval requirements. All connections kits use a NEMA 4X enclosure and provide all materials in a convenient, easy to use economical package.

Applications

These accessories are designed to connect SLL heating cables to customer supplied wiring in any of the following applications:

- Freeze Protection
- Piping Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance

Approvals

* Approvals are pending

Features

- Molded of Durable Polyphenylene Sulphide Plastic Material*
- Maximum Pipe Temperature 482°F (250°C)
- Corrosion Resistant
- Thermal Stability
- Non-Flammable
- High Strength and Rigidity
- Captive Hardware
- Stainless Steel Hardware to Ensure the Integrity of the System
- Liquid Tight Design Prevents Moisture from Reaching the Electrical Connections
- All Models are Rated NEMA 4X



* This crystalline, high-performance engineering TP is characterized by outstanding high temperature stability, inherent flame resistance and a broad range of chemical resistance. PPS plastics and compounds provide various combinations of high mechanical strength, impact resistance and electrical insulation, with its high arc resistance and low arc tracking.

U Series Long Line Heat Trace Connection Accessories (cont'd.)

Accessories

UPC-LL Power Connection Kit PCN 394302

NEMA 4X rated junction box designed to connect SLL heating cables to customer supplied power wiring. This kit provides water-resistant cable entry for one cable, enclosure support, crimp connections, cold leads, and a water-resistant corrosion-resistant wiring enclosure with an opening to accept a 3/4" conduit hub. A pipe strap (PS series) is required to attach this model to a pipe.

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D

Kit Includes:

- 1 Junction Box
- 1 Pipe Standoff
- 1 Locknut
- 1 Compression Fitting
- 1 O-Ring
- 1 Grommet
- 6 Cold Leads (12 AWG & 4 AWG)
- 9 Crimps
- 4 Tape Strips
- 2 Solder



HEAT TRACE AND
ACCESSORIES

UMC-LL Splice Connection Kit PCN 394310

NEMA 4X rated junction box designed to connect two SLL heating cables to each other. This kit provides water-resistant cable entry for one cable, enclosure support, crimp connections, and a water-resistant corrosion-resistant wiring enclosure with an opening to accept a 3/4" conduit hub. A pipe strap (PS series) is required to attach this model to a pipe.

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D

Kit Includes:

- 1 Junction Box
- 1 Pipe Standoff
- 1 Locknut
- 1 Compression Fitting
- 1 O-Ring
- 1 Grommet
- 1 Brass Locknut
- 1 Conduit Plug
- 9 Crimps
- 4 Tape Strips
- 2 Solder



U Series

Long Line Heat Trace Connection Accessories

(cont'd.)

UES-LL End Seal Connection Kit PCN 394329

NEMA 4X rated junction box designed to terminate SLL heating cables outside of the insulation. This kit provides water-resistant cable entry for one cable, enclosure support, crimp connections, and a water-resistant corrosion-resistant wiring enclosure with an opening to accept a 3/4" conduit hub. A pipe strap (PS series) is required to attach this model to a pipe.

Kit Dimensions: 9.78"H x 8.69"W x 3.6"D

Kit Includes:

- 1 Pipe Standoff
- 1 Locknut
- 1 Compression Fitting
- 1 O-Ring
- 1 Grommet
- 1 Brass Locknut
- 1 Conduit Plug
- 9 Crimps
- 4 Tape Strips
- 2 Solder



DL Integrated Connection Accessories



HEAT TRACE AND
ACCESSORIES

- **Power Connection Box**
 - NEMA 4X Enclosure
 - Cable Entry Up to 3 Cables
 - 3/4" Conduit Hub Opening
- **Splice & Tee Box**
 - NEMA 4X Enclosure
 - Cable Entry Up to 3 Cables
 - Straight or Tee Connections
- **End Seal Fitting**
 - NEMA 4X Enclosure
 - Fits All Pipe Sizes
 - Mounting Feet for Installing on Flat Surfaces
- **Stainless Steel Hardware**
- **Corrosion & Weather Resistant Ryton® Construction**

RTPC



RTST



RTES



Description

The DL Series Installation Accessories for Chromalox heat tracing products represents the state of the art in heat tracing. Each model in the series is designed to satisfy the demands of a particular operation. These high-quality models combine a variety of functions in a convenient, easy to use and economical package.

Applications

Connection of all Rapid Trace Heating Cables to Customer Supplied Power Wiring in any of the following applications:

- Hydrocarbon and Chemical Product Piping
- Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance
- Freeze Protection.

Features

- Molded of Durable Plastic Material (Ryton®, PPS)¹
- High Service Temperature
- Corrosion Resistant
- Integrated Connection Accessories and Controls
- Thermal Stability

- Non-Flammable
- High Strength and Rigidity
- Stainless Steel Hardware to Ensure the Integrity of the System
- Liquid Tight Design prevents moisture from reaching the electrical connections. All models are rated NEMA 4X.

Approvals²

UL, CSA, FM Approved for most models, consult specific product information.

UL Listed for ordinary areas

CSA Certified for ordinary and:

- Class I, Div. 2, Groups A, B, C, D
- Class II, Div. 2, Groups E, F, G

FM Approved for ordinary and:

- Class I, Div. 2, Groups B, C, D
- Class II, Div. 2, Groups E, F
- Class III, Div. 2 Areas.

Notes —

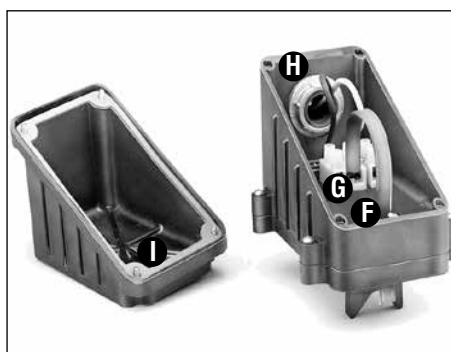
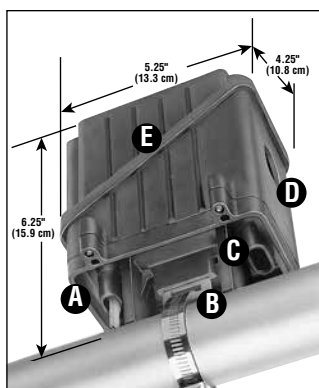
1. Ryton®, is a registered trade name of Phillips Chemical Company.
2. Depends on specific model and cable applied.

DL

Integrated Connection Accessories (cont'd.)

RTPC — Power Connection Kit

RTPC Power Connection Box is a NEMA 4X rated junction box designed to connect all Chromalox Rapid Trace Heating Cables to customer supplied power wiring. This kit provides waterproof cable entry for up to three cables, enclosure support, terminal block and a waterproof, corrosion resistant wiring enclosure with an opening to accept a 3/4" conduit hub (Chromalox CCH-2 or equal). A pipe strap (Chromalox PS or equal) is required to attach this model to a pipe.



RTPC — Power Connection Kit

- 1 molded junction box consisting of:
- 1 base
 - 1 box w/conduit opening
 - 1 lid
 - 1 three position terminal block
 - 1 mounting screw for terminal block
 - 1 GRSR self-regulating cable sealing grommet
 - 1 GRCW constant wattage sealing grommet

Ordering Information — RTPC

Model	PCN	Stock	Wt. (Lbs.)
RTPC	389554	S	1
RTPC-SL1	389626	S	2
RTPC-SL2	389634	S	2
RTPC-SL3	389642	S	2

Construction

- A** Three strategically placed cable entries allow maximum flexibility for insulation (Heating cable cut away for clarity).
- B** Stainless steel tiedown support provides positive attachment to pipes.¹
- C** Heavy duty support legs give stable pipe mounting and provide conduit clearance for applications with up to three inches of insulation.
- D** Opening for 3/4" (20 mm) conduit hub.¹
- E** Oblique sided box and cover allow easy access for wiring.
- F** Cable grommets provide water-tight seal between base, box and cable. Use GRSR with all self-regulating cable. Use GRCW for constant wattage cables. One of each grommet included in kit. See table below for spare grommets.
- G** Three position terminal block for easy wiring.
- H** Power wiring entry. Conduit hub not included.¹
- I** Gasket provides water-tight seal between box and lid. It is affixed to the lid and holds the mounting hardware during assembly.

Note 1 — Refer to DL & EL General Application Accessories at the end of this section.

RTPC-SL — Power Connection Kit w/Signal Light (Ordinary Area Only)

- 1 molded junction box consisting of:
- 1 base
 - 1 box w/conduit opening
 - 1 lid w/signal light installed (LED style)
 - Specify: SL1(120V), SL2(208-240V), SL3(277V) operation
 - 1 three position terminal block
 - 1 mounting screw for terminal block
 - 1 GRSR self-regulating cable sealing grommet
 - 1 GRCW constant wattage sealing grommet

Spare Grommets

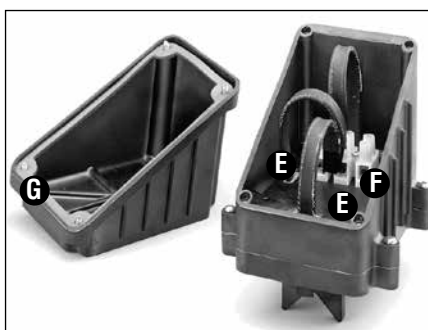
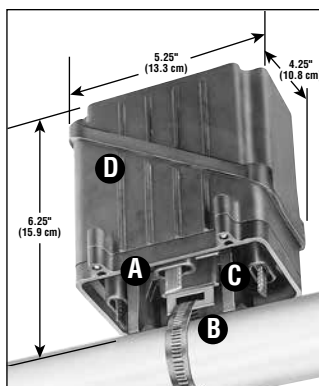
		PCN
GRS	RTD/Capillary type	385000
GRO	Blank	385019
GRSR	Self Regulating type	389714
GRCW	Constant Wattage type	389722

DL

Integrated Connection Accessories *(cont'd.)*

RTST — Splice & Tee Kit

RTST Splice & Tee Box is a NEMA 4X rated junction box designed to make straight or tee splices for all Chromalox Rapid Trace Heating Cables. This model provides waterproof cable entry (for two cables for a splice or three cables for a tee), enclosure support, terminal block and a waterproof, corrosion resistant wiring enclosure. A pipe strap (Chromalox PS or equal) is required to attach this model to a pipe.



RTST — Splice & Tee Kit

- 1 molded junction box consisting of:
 - 1 base
 - 1 box
 - 1 lid
- 1 three position terminal block
- 1 mounting screw for terminal block
- 3 GRSR Self-regulating cable sealing grommet
- 3 GRCW Constant wattage sealing grommets

Ordering Information — RTPC

Model	PCN	Stock	Wt. (Lbs.)
RTST	389562	S	1
RTST-SL1	389650	S	2
RTST-SL2	389669	S	2
RTST-SL3	389677	S	2

Construction

- A** Three strategically placed cable entries allow maximum flexibility for insulation (heating cable cut away for clarity).
- B** Stainless steel tiedown support provides positive attachment to pipes.¹
- C** Heavy duty support legs give stable pipe mounting and provide conduit clearance for applications with up to three inches of insulation.
- D** Oblique sided box and cover allow easy access for wiring.
- E** Cable grommets provide water-tight seal between base, box and cable. Use GRSR with all self-regulating cable. Use GRCW for constant wattage cables. Three of each grommet included in kit. See table below for spare grommets.
- F** Three position terminal block for easy wiring.
- G** Gasket provides water-tight seal between box and lid. It is affixed to the lid and holds the mounting hardware during assembly.

Note 1 — Refer to DL & EL General Application Accessories at the end of this section.

RTST-SL — Splice & Tee Kit w/Signal Light (Ordinary Area Only)

- 1 molded junction box consisting of:
 - 1 base
 - 1 box
 - 1 lid w/signal light installed (LED style)
- Specify: SL1 for 120 Volt, SL2 for 208-240 Volt, SL3 for 277 Volt operation
- 1 three position terminal block
- 1 mounting screw for terminal block
- 1 GRSR Self-regulating cable sealing grommet
- 1 GRCW Constant wattage sealing grommet

Spare Grommets PCN

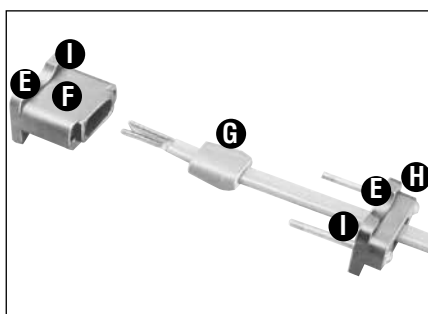
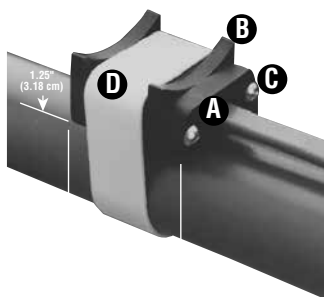
GRS	RTD/Capillary type	385000
GRO	Blank	385019
GRSR	Self Regulating type	389714
GRCW	Constant Wattage type	389722

DL

Integrated Connection Accessories (*cont'd.*)

RTES — End Seal Kit

RTES End Seal Fitting is a NEMA 4X rated enclosure designed to terminate all Chromalox Rapid Trace Heating Cables. This model provides waterproof cable entry for one cable, enclosure support and a waterproof corrosion resistant enclosure. The fitting has two different curved mounting surfaces. One side has a 1-1/2" radius curved surface that provides stable support on pipes with a diameter of 3" or more. The other side has a 1/2" radius curved surface which permits a better fit on smaller pipes. In addition, this side also has four "feet" for installation on flat surfaces.



RTES — End Seal Kit

- 1 end cap
- 1 pressure plate
- 1 GRSR Self-regulating cable sealing grommet
- 1 GRCW Constant wattage cable sealing grommet

DL Accessory Components

MP-1 (385780)



Mounting Plate Kit Attachments

For installing RTPC, RTST, RTAS and RTBC kits on flat surfaces. Kit includes:

- 1 mounting plate
- 1 lock washer
- 1 bolt
- 1 washer
- 1 nut

Note — The complete line of DL & EL Mounting Accessories is located at the end of this section.

Construction

- A** Cable entry.
- B** Three inch diameter curved mounting surface.
- C** Captured stainless steel hardware.
- D** One inch wide strapping channel for secure mounting.
- E** One-half inch radius curved mounting surface.
- F** End cap.
- G** Cable grommet provides water-tight seal between end cap and pressure plate. Use GRSR with all self-regulating cables. Use GRCW with constant wattage cables. One of each grommet included in kit. See table below for spare grommets.
- H** Pressure plate.
- I** Mounting feet for installation on flat surfaces.

Ordering Information — RTES

Model	PCN	Stock	Wt. (Lbs.)
RTES	389570	S	1

Spare Grommets

PCN

GRS	RTD/Capillary type	385000
GRO	Blank	385019
GRSR	Self-Regulating type	389714
GRCW	Constant wattage type	389722

EL

Standard Connection Accessories

- Junction Box Connection Kits for SRL, SRF and CWM Applications
- Splice & Tee Kits for SRL, SRF and CWM Applications
- End Seal Kits for SRL and SRF Applications



Description

Each model in the EL Series Installation Accessories for Chromalox Rapid Trace Heating Cable products is designed to satisfy the demands of a particular operation. These high-quality models combine a variety of functions in a convenient, easy to use and economical package.

Applications

Connection of selected rapid trace heating cables to customer supplied power wiring in any of the following applications:

- Freeze Protection
- Hydrocarbon and Chemical Product Piping
- Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance.

Approvals

- UL*** Listed for ordinary areas
- CSA*** Certified for ordinary areas
- FM**** Approved for ordinary areas

- * Does not include SSK
- ** Does not include SSK and PJB

Ordering Information

Model	Used With
Power Connection Kit	
SSK PJB	SRF-C, SRF-CR, SRL-C, SRL-CR, SRL-CT, CWM-C, CWM-CT, SRP-C, SRP-CT
Splice & Tee Kit	
RT-RST RT-TST	SRL-C, SRL-CR, SRF-C CWM-C, CT, SRP-C, SRP-CT
End Seal Kit	
RT-RES	SRL-C, SRL-CR, SRF-C
To Order — Refer to the DL & EL General Application Accessories in this section.	

EL

Standard Connection Accessories (*cont'd.*)

Accessories



Junction Box Connection Kit SSK (393617)

- (1) compression fitting
- (1) pipe stand off
- (1) tube of RTV sealant
- (1) O-ring
- (1) 1" locknut
- (1) self-regulating cable grommet
- (1) constant wattage cable grommet
- (1) silicone boot
- (2) uninsulated barrel connectors
- (2) insulated barrel connectors



Caution Labels CL-1 (382424)

- (5) electric heat tracing caution labels, weather resistant



Rain Tight Junction Box PJB (393676)

Polycarbonate watertight enclosure for use with SSK



Splice & Tee Kit (for Constant Wattage and SRM/E Cable) RT-TST (383566)

- (5) 7" long large heat shrink tubes
- (10) 1-1/2" long small heat shrink tubes
- (5) 10" lengths of sealant tape
- (15) uninsulated barrel connectors
- (1) tube of RTV sealant



End Seal Kit (for SRL cable) RT-RES (383574)

- (5) 1/2" diameter heat shrink caps



Splice & Tee Kit (for SRL cable) RT-RST (383558)

- (5) 8" long heat shrink tubes
- (5) 1/2" lengths of sealant tape
- (10) insulated barrel connectors
- (5) uninsulated barrel connectors



Conduit Hub w/Grounding Lug CCH-2 (385650)

Corrosion resistant hub for 3/4" conduit. Fits opening in PJB, DL, U Series and DTS. Includes ground connector.



HL

Hazardous Location Connection Kits

Power Connection Kit

- Explosion Proof Box Providing Electrical Connection for 1 Cable

End Seal Kit

- Explosion Proof Box Providing Termination for 1 Cable

Splice Kit

- Explosion Proof Box Providing Cable Entry for 2 cables

Tee Kit

- Explosion Proof Box Providing Cable Entry for 3 Cables

Signal Light Kit

- Explosion Proof Signal Light Kit with LED



HEAT TRACE AND
ACCESSORIES

Description

The HL Series Connection System for Chromalox heating cable products is specifically designed to comply with the requirements of Division 1 hazardous areas.

Applications

- Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance

Features

- High strength aluminum alloy cast bodies
- Corrosion resistant
- Internally threaded junction box body with externally threaded cover
- Seal fitting applicable for use on vertical or horizontal conduit

Approvals

FM - Factory Mutual Certified for use in ordinary areas and:

- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1

CSA Certified for use in ordinary areas and:

- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G

HL Series

Hazardous Location Connection Kits (*cont'd.*)

Available Models

Power Connection Kit for Hazardous Locations HL-PC

The Model HL-PC Hazardous Location Power Connection Kit is a Division 1 certified junction box and seal fitting. The pipe stand-off and seal fitting combination provides a water resistant and explosion proof seal. The junction box has a 3/4" opening with top or side entry for the power connection. Pipe straps (not included) are used to provide a means to attach this model to the pipe.

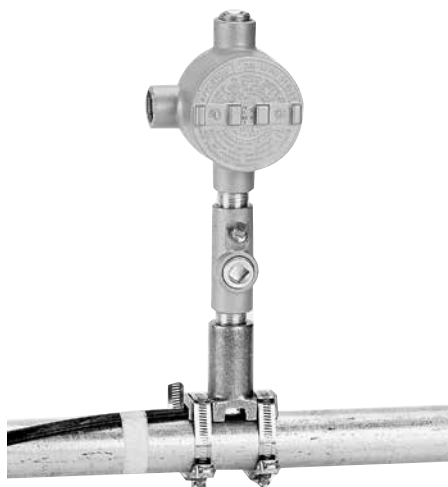
End Seal Kit for Hazardous Locations HL-ES

The Model HL-ES Hazardous Location End Seal Kit is a Division 1 certified junction box and seal fitting. This kit is designed for end of run sealing for self regulating cable in Division 1 areas. The pipe stand-off and seal fitting combination provides a water resistant and explosion proof seal. Pipe straps (not included) are used to provide a means to attach this model to the pipe.

Splice Kit and Tee Kit for Hazardous Locations HL-S and HL-T

The Models HL-S and HL-T Hazardous Location Kits are a Division 1 certified junction box and seal fittings. These kits are designed for the splicing of two or three selfregulating cables in Division 1 areas. The cable entry fitting and seal fitting combination provides a waterresistant and explosion proof seal. Pipe straps (not included) are used to provide a means to attach this model to the pipe.

Exterior Construction



Power Connection Kit

- Pipe standoff allows for easier installation of heat trace insulation system
- Opening for 3/4" male fitting
- Internally threaded junction box body with externally threaded cover allowing for more room when wiring
- Simple sealing compound kit



End Seal Kit

- Pipe standoff allows for easier installation of heat trace insulation system
- Internally threaded junction box body with externally threaded cover allowing for more room when wiring
- Simple sealing compound kit



Splice Kit and Tee Kit

- Internally threaded junction box body with externally threaded cover allowing for more room when wiring
- Cable entry fittings provide water tight seal
- Simple sealing compound kit
- The splice kit provides entry for two cables
- The tee kit provides entry for three cables

HL Series

Hazardous Location Connection Kits (cont'd.)

Ordering Information



End Seal Kit for Hazardous Locations HL-ES 382221

- (1) 3/4" junction box
- (1) Seal fitting
- (1) End seal
- (1) Tube of RTV
- (1) Butt splice
- (1) Pipe stand-off
- (1) Sealing grommet
- (1) Sealing compound
- (1) Ring terminal
- (1) Green grounding wire



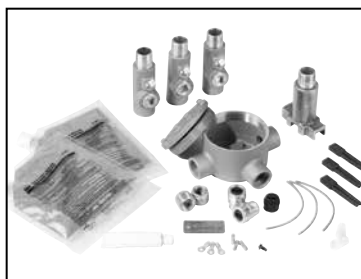
Splice Kit for Hazardous Locations HL-S 382205

- (1) 3/4" box
- (1) Cable entry fitting
- (2) 3/4" Seal fitting with nipple
- (1) Sealing compound & fiber
- (2) 4" 12 AWG leadwires(green)
- (1) Small RTV tube
- (2) Butt splice
- (2) Ring terminal
- (1) Pipe standoff
- (1) Sealing grommet
- (1) Stainless steel label
- (1) Conduit plug
- (1) Extra grounding screw
- (2) Wire nuts
- (2) Power termination seal
- (1) 3/4" to 1/2" reducing bushing



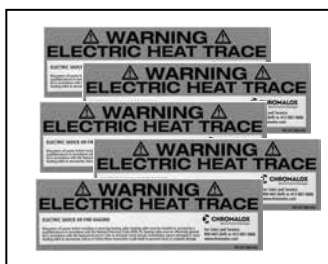
Power Connection Kit for Hazardous Locations HL-PC 382192

- (1) 3/4" junction box
- (1) Seal fitting
- (1) Ring terminal
- (1) Tube of RTV
- (2) Termination seal
- (1) Pipe stand-off
- (1) Sealing grommet
- (1) Conduit plug
- (1) Sealing compound
- (1) Butt splice
- (3) 12 AWG leads
- (4) Wire nuts



Tee Kit for Hazardous Locations HL-T 382213

- (1) 3/4" box
- (2) Cable entry fitting
- (3) 3/4" Seal fitting with nipple
- (2) Sealing compound & fiber
- (3) 4" 12 AWG leadwires (green)
- (1) Small RTV tube
- (3) Butt splice
- (3) Ring terminal
- (1) Pipe standoff
- (1) Sealing grommet
- (1) Stainless steel label
- (1) Extra grounding screw
- (2) Wire nuts
- (3) Power termination seal
- (2) 3/4" to 1/2" reducing bushing



Caution Labels CL-1 382424

- 5) Electric heat tracing caution labels; weather resistant



208 - 240V Division 1 Signal Light Kit D1SL2 393692

Explosion proof pilot light for use with HL-PC kit. Pilot light kit made with 3/4" NPSM threads and 8" flexible leads. Red LED lens. For 208-240V system.



120V Division 1 Signal Light Kit D1SL1 393684

Explosion proof pilot light for use with HL-PC kit. Can be used as a power connection light or end seal light. Pilot light kit made with 3/4" NPSM threads and 8" flexible leads. Red LED lens. For 120V system.

HL Series

Hazardous Location Connection Kits (*cont'd.*)



***Fiberglas® Tape
Cable Attachments
FT-3 389941***

66' Roll of glass cloth tape with pressure-sensitive thermosetting silicone adhesive 3/8" wide. 310°F (155°C) rating. Strap at one foot intervals at minimum application temperatures of -40°F (-40°C)



***Aluminum Tape
Cable Attachments
AT-1 383355***

180' Roll aluminum foil installation tape with pressure-sensitive acrylic adhesive. 2-mil thickness with high tensile strength; 2-1/2" wide. 200°F (93°C) rating. Minimum application temperatures 40°F (5°C)



***Stripping Tool
393510***

Tool for stripping the base jacket and the conductive matrix from the cable buss wires. The tool is stocked with 16 awg blades for stripping SRL, HSRL, SRM/E, HSRM and SRP and Thermwire products.



***Stainless Steel Pipe Strap Kit
Attachments
PS-1, 3, 10 & 20***

PS-1 (382352) 1/2 to 3/4" pipes
PS-3 (382360) 1 to 3-1/2" pipes
PS-10 (382379) 2-1/2 to 9" pipes
PS-20 (382256) 9" to 19.5" pipes



DL Integrated Temperature Controls

- Line or Ambient Sensing Thermostats
- ElectroMechanical Control
- Rugged, Corrosion Resistant Construction
- NEMA 4X Design with Corrosion and Weather Resistant Ryton® Construction
- Ambient Sensing
 - 120 - 480 Vac
 - 0 - 225°F Temp. Rating
 - 9/16" OD x 4" SS Probe
 - Ordinary & Hazardous Area (Div. 2) Approvals
- Bulb & Capillary
 - 120 - 480 Vac
 - 0 - 400°F Setpoint Range
 - 1/4" OD x 7-1/4" SS Bulb and 3 Ft. Capillary
 - Ordinary & Hazardous Area (Div. 2) Approvals

Description

The DL Series Single Point On/Off Temperature Controls from Chromalox represent the state of the art in heat tracing and are available in five models to handle a broad range of applications. Models include two ambient sensing thermostats, two line sensing thermostats and a line sensing solid state controller. These high-quality models combine temperature control and power connection in a convenient, easy to use and economical package.

Applications

- Hydrocarbon and Chemical Product Piping
- Process Temperature Maintenance
- Fluid Flow and Viscosity Maintenance
- Freeze Protection

Features

- Integrated Controls and Power Connections reduce installation hardware
- Molded of Durable Plastic Material (Ryton® PPS)¹
- High Service Temperature
- Corrosion Resistant
- Thermal Stability
- Non-Flammability
- High Strength and Rigidity
- Stainless Steel Sensor Sheath



HEAT TRACE
CONTROLS

- Hermetically Sealed Switches on EP models permit control in Div. 2 hazardous areas
- Stainless Steel Hardware to ensure the integrity of the system
- Cable Terminations inside enclosure reduce installation time and cost
- Liquid Tight Design prevents moisture from reaching the electrical connections. All models are rated NEMA 4X.

Approvals²

UL, CSA, FM is carried by most models, consult specific product information.

UL Listed for ordinary areas

CSA Certified for ordinary and:

- Class I, Div. 2, Groups A, B, C, D
- Class II, Div. 2, Groups E, F, G

FM Approved for ordinary and:

- Class I, Div. 2, Groups B, C, D
- Class II, Div. 2, Groups E, F
- Class III, Div. 2 Areas.

Notes —

1. Ryton® is a registered trade name of Phillips Chemical Company.
2. Depends on specific model and cable applied.

DL

Integrated Temperature Controls (cont'd.)

RTAS & RTAS-EP Ambient Sensing

RTAS is an ambient-sensing thermostat which is generally used for freeze protection in ordinary (non-hazardous) areas. The thermostat is mounted through the end of the oblique sided enclosure lid. In fact, because there is so much room in this model, multiple heating cables can be terminated. The stainless steel sheathed, inverted bellows probe provides good sensitivity, resulting in more accurate control.

RTAS-EP is a modified version of the RTAS which utilizes a hermetically sealed switch. Since this switch has no arcing contacts, it can be used in Division 2 Hazardous Areas.

Specifications

Temp. Setpoint Range — 0 to 225°F (-18 to 107°C) for RTAS/RTAS-EP

Microswitch® Rating — 22 Amps SPDT for RTAS; 11 Amps, RTAS-EP

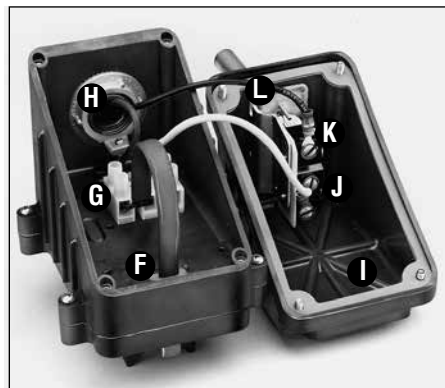
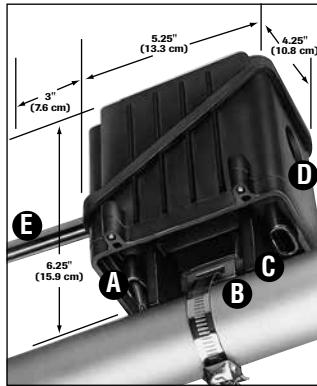
Scale Division — 10°F (5.6°C)

Max. Sensor Exposure Temp. — 250°F (121°C)

Sensor Dimensions — 9/16" Dia. x 3" Long

Operating Ambient Temp. Range — -40°F to 160°F (-40 to 71°C)

Factory Preset and Calibrated — 40°F



Construction

- A** Strategically placed cable entries allow maximum flexibility for insulation (Heating cable cut away for clarity).
- B** Stainless steel tiedown support provides positive attachment to pipes.¹
- C** Heavy duty support legs give stable pipe mounting and provide conduit clearance for applications with up to three inches of insulation.
- D** Opening for 3/4" (20 mm) conduit hub.¹
- E** Stainless steel sheath temperature sensor.
- F** Cable grommets provide water-tight seal between base, box and cable. Use GRSR with all self-regulating cables. Use GRCW with constant wattage cables. One of each grommet included in kit. See table below for spare grommets.
- G** Three position terminal block for easy wiring.
- H** Power wiring entry. Conduit hub not included.
- I** Gasket provides water-tight seal between box and lid. It is affixed to the lid and holds the mounting hardware during assembly.
- J** Thermostat switch.
- K** Setpoint adjustment knob.
- L** Setpoint indicator.

Note 1 — Refer to DL & EL General Application Accessories at the end of this section.

Spare Grommets

PCN

GRS	RTD/Capillary type	385000
GR0	Blank	385019
GRSR	Self-regulating cable type	389714
GRCW	Constant wattage cable type	389722

Ordering Information

Model	PCN	Switch Rating (Amps/Volts)	Max. Continuous Exposure Temp.		Max. Intermittent Exposure Temp.		Wt. (Lbs.)
			°F	°C	°F	°C	
RTAS	389589	22A @ 120 - 480	400	200	500	260	2
RTAS-EP	389597	11A @ 120 - 250	400	200	500	260	2

Stock Status: S = stock NS = non-stock
To Order—Specify model, PCN and quantity.

DL

Integrated Temperature Controls *(cont'd.)*

RTBC & RTBC-EP Bulb & Capillary

RTBC is a line-sensing thermostat which is generally used for process temperature maintenance applications in ordinary (non-hazardous) areas. The thermostat is mounted within the enclosure and the capillary is brought out through one of the openings in the bottom of the box. This design provides extra protection for the capillary, especially when the control is mounted on a pipe, for heat tracing applications. The three foot long stainless steel capillary provides good flexibility in mounting locations.

RTBC-EP is a modified version of the RTBC which utilizes a hermetically sealed switch. Since this switch has no arcing contacts it can be used in Division 2 Hazardous Areas.

Specifications

Temp. Setpoint Range — 0 to 400°F (-18 to 200°C) for RTBC, RTBC-EP

Microswitch® Rating — 22 Amps SPDT for RTBC; 11 Amps, RTBC-EP

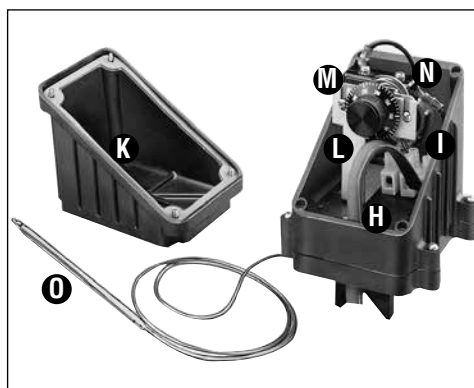
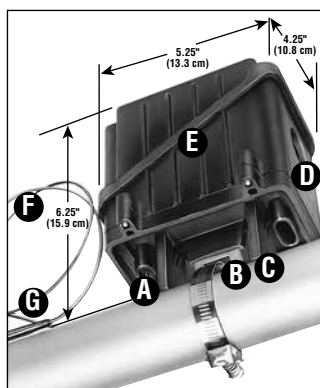
Minor Scale Division — 10°F (5.6°C)

Max. Sensor Exposure Temp. — 450°F (230°C)

Sensor Dimensions — 1/4" (6.4mm) OD x 7-1/4" (18.4cm) L Bulb, 3' (1m) Capillary

Operating Ambient Temp. Range — -40°F to 160°F (-40 to 71°C)

Factory Preset and Calibrated — 200°F (93°C) for RTBC, RTBC-EP



Construction

- A** Strategically placed cable entries allow maximum flexibility for insulation (Heating cable cut away for clarity).
- B** Stainless steel tiedown support provides positive attachment to pipes.¹
- C** Heavy duty support legs give stable pipe mounting and provide conduit clearance for applications with up to three inches of insulation.
- D** Opening for 3/4" (20 mm) conduit hub.¹
- E** Oblique sided box and cover allow easy access for wiring.
- F** Stainless steel capillary (3 ft/1m long).
- G** Stainless steel sensing bulb.
- H** Cable grommets provide water-tight seal between base, box, cable and capillary. Use GRSR with all self-regulating cables. Use GRCW with constant wattage cables. One of each grommet included in kit. See table below for spare grommets.
- I** Three position terminal block for easy wiring.
- J** Power wiring entry. Conduit hub not included.¹
- K** Gasket provides water-tight seal between box and lid. It is affixed to the lid and captures the mounting hardware.
- L** Thermostat mounting bracket.
- M** Setpoint adjustment knob.
- N** Thermostat switch.
- O** Stainless steel sensing bulb.

Note 1 — Refer to DL & EL General Application Accessories at the end of this section.

Spare Grommets

PCN

GRS	RTD/Capillary type	385000
GRO	Blank	385019
GRSR	Self-regulating cable type	389714
GRCW	Constant wattage cable type	389722

Ordering Information — RTBC

Model	PCN	Switch Rating (Amps/Volts)	Max. Continuous Exposure Temp.		Max. Intermittent Exposure Temp.		Wt. (Lbs.)
			°F	°C	°F	°C	
RTBC	389600	22A @ 120 - 480	400	200	500	260	2
RTBC-EP	389618	11A @ 120 - 250	400	200	500	260	2

Stock Status: S = stock NS = non-stock
To Order—Specify model, PCN and quantity.

THR, THL, TXR & TXL

Heat Trace/Freeze Protection Thermostats

- THL & TXL Direct Mount for Freeze Protection (Ambient)
- THR & TXR Remote Mount for Heat Trace (Bulb & Capillary)
- 22 Amp Resistive Switch
- Single and Dual Output Models
- $\pm 1\%$ Setpoint Repeatability
- Fast Response for Protection of Valves and Piping
- NEMA 4X, 7 and 9 Enclosures

Applications

- THR NEMA 4X Line or Pipe Sensing
- THL NEMA 4X Ambient Air Sensing
- TXR NEMA 7 Line or Pipe Sensing
- TXL NEMA 7 Ambient Air Sensing

WARNING: Hazard of Fire. These devices function as temperature controls only. Because they do not fail-safe, an approved temperature and/or pressure safety control must be used for safe operation.

*THR & THL
NEMA 4X*



*TXR & TXL
NEMA 7*



Description

Maintaining proper viscosity and flow is critical in heat trace or freeze protection applications. The THR remote mount thermostats utilize a stainless steel bulb and capillary design to accurately sense temperature at key points along a pipe. The THL direct mount thermostats feature liquid-filled thermal as-

semblies and sense air temperatures from 15 to 140°F. Both models are epoxy coated to seal from moisture and contaminants in compliance with NEMA 4X requirements. NEMA 7 stats TXR and TXL are designed for Class I, Division I and 2, Groups B, C, D, and Class 2, Division I and 2, Group E, F, G.

Specifications

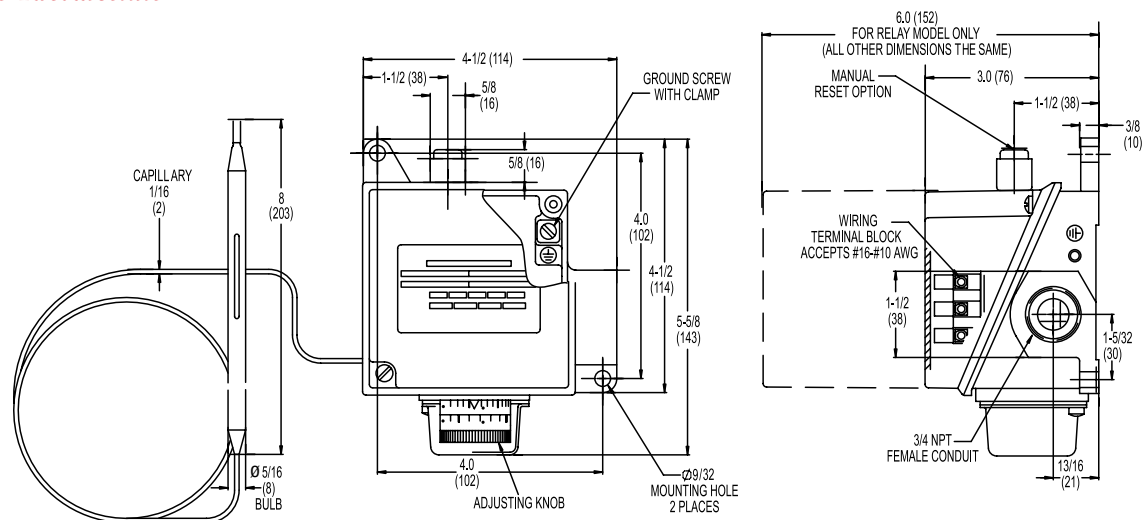
Ambient Temperature Limits	-40° to +160°F (THR, TXR); -58°F to +160°F (THL & TXL) (-40 to +71°C); set point typically shifts
Switch Output	One SPDT (All types); two SPDT
Electrical Rating	22 Amps 125/250/480 Vac resistive
Weight	Types THR, THL: 1.9 lbs., 30.4 oz (.9 kg) Types TXR & TXL: 3.8 lbs., 60.8 oz (1.7 kg.)
Electrical Connection	All Models, 3 Pole Terminal Block
Temperature Assembly	Types THL & TXL: 10 ft. stainless steel bulb & capillary (All Models) Types THL & TXL: 8" x 5/16" Stainless Steel Probe
Fill	Non-toxic oil filled
Temperature Deadband	Typically 2% of range
Bulb Dimensions (TXR & TXL)	Length 8", OD 5/16"
(THL & TXL)	Length 8", OD 5/16"

THR, THL, TXR & TXL

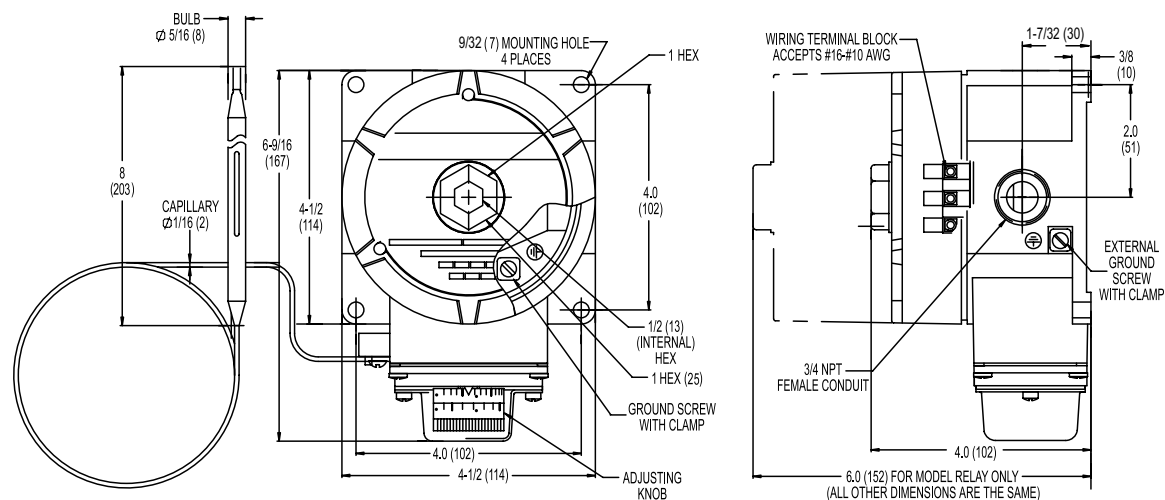
Heat Trace/Freeze Protection Thermostats (*cont'd.*)

Dimensions (In.)

THR & THL Series Thermostats



TXR & TXL Series Thermostats



Ordering Information

Thermostat Type	Model	Switch Output	Enclosure NEMA	Stock Status	PCN
Heat Trace, Remote Bulb and Capillary 25 - 325°F (-5 to +163°C)	THR TXR	Single Output Single Output	4X 4X, 7, 9	S S	387030 387049
Freeze Protection Direct Mount 15 - 140°F (-10 to +60°C)	THL TXL	Single Output Single Output	4X 4X, 7, 9	S S	387014 387022

B100 & E100

Heat Trace/Freeze Protection Thermostats

- **B100 Direct Mount for Freeze Protection (Ambient)**
- **E100 Remote Mount for Heat Trace (Bulb & Capillary)**
- **22 Amp Resistive Switch**
- **Single and Dual Output Models**
- **± 1% Setpoint Repeatability**
- **Fast Response for Protection of Valves and Piping**
- **NEMA 4X, 7 and 9 Enclosures**

B100 / E100
NEMA 4X



B121 / E121
NEMA 7



Applications

- E100 NEMA 4X Line or Pipe Sensing
- B100 NEMA 4X Ambient Air Sensing
- E121/122/ 122P NEMA 7 Line or Pipe Sensing
- B121 NEMA 7 Ambient Air Sensing

Description

Maintaining proper viscosity and flow is critical in heat trace or freeze protection applications. The E100 remote mount thermostats utilize a stainless steel bulb and capillary design to accurately sense temperature at key points along a pipe. The B100 direct mount thermostats feature liquid-filled thermal assemblies and sense air temperatures from 15

to 140°F. Both models are epoxy coated to seal from moisture and contaminants in compliance with NEMA 4X requirements. NEMA 7 stats E121/122/122P and B121 are designed for Class I, Division I and 2, Groups B, C, D, and Class 2, Division I and 2, Group E, F, G.

Specifications

Ambient Temperature Limits	-40° to +160°F (B100); -58°F to +160°F (B121, B122, E122, E121) (-40 to +71°C); set point typically shifts
Switch Output	One SPDT (types B100, E100, B121, E121); two SPDT (types E122, E122P)
Electrical Rating	22 Amps 125/250/480 Vac resistive
Weight	Types B100, E100: 1 lb., 8 oz (0,68 kg) Types B121, E121, E122, E122P: 3 lbs., 10 oz (1,6 kg.)
Electrical Connection	Types E121, E122, E122P, B121: terminal block; Types B100, E100: direct to switch
Temperature Assembly	Types E100, E121, E122, E122P: 10 feet stainless steel bulb and capillary Types B100, B121: immersion stem
Fill	Non-toxic oil filled
Temperature Deadband	Typically 2% of range
Bulb Dimensions (E100, E121, E122)	Length 11-5/8", OD 1/8"
(B100, B121)	Length 2-11/16", OD 9/16"

WARNING: Hazard of Fire. These devices function as temperature controls only. Because they do not fail-safe, an approved temperature and/or pressure safety control must be used for safe operation.

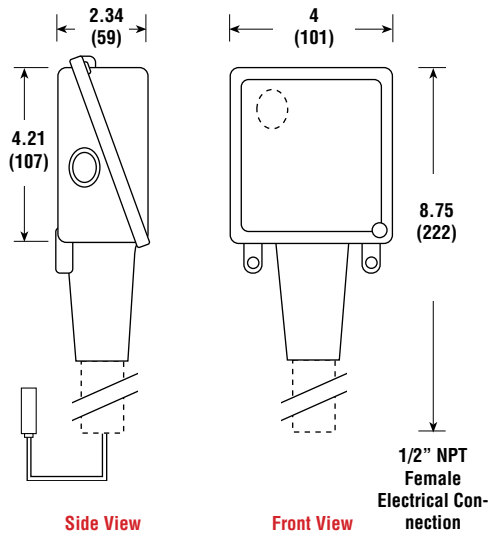
B100 & E100

Heat Trace/Freeze

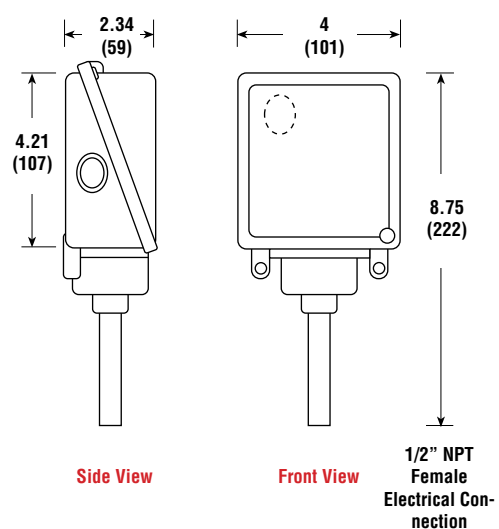
Protection Thermostats (*cont'd.*)

Dimensions

E100 Heat Trace, NEMA 4X
Line and Pipe Sensing

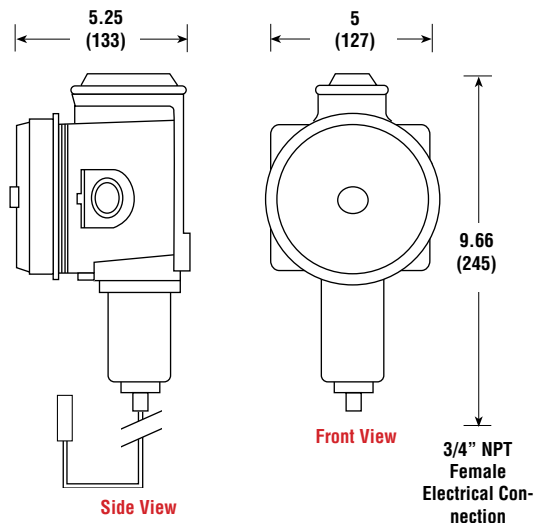


B100 Freeze Protection, NEMA 4X
Ambient Sensing

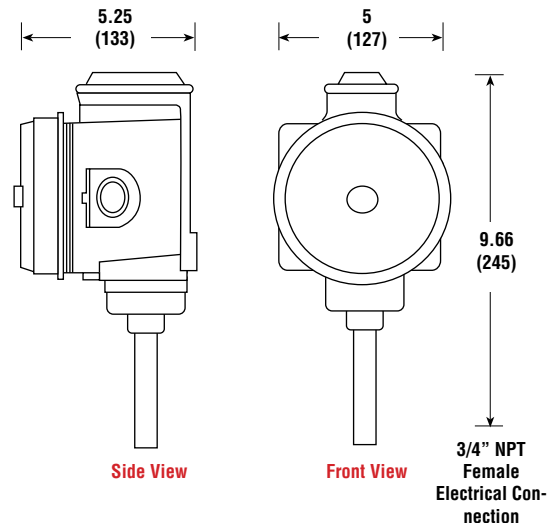


All Dimensions in Inches (mm)

E121/122 Heat Trace, NEMA 7 and 9
Line and Pipe Sensing



B121 Freeze Protection, NEMA 7 and 9
Ambient Sensing

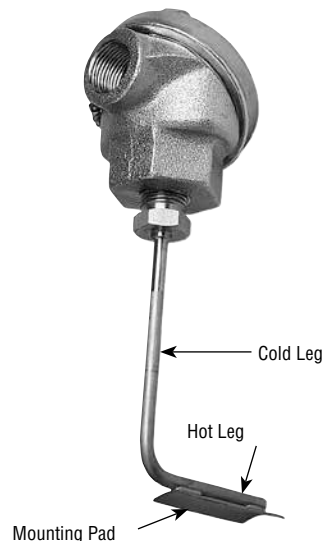


Ordering Information

Thermostat Type	Model	Switch Output	Enclosure NEMA	Stock	PCN
Heat Trace, Remote Bulb and Capillary 25 - 325°F (-5 to +163°C)	E100	Single Output	4X	S	305322
	E121	Single Output	4X, 7, 9	S	384112
	E122	Dual Output, Dual Setpoint	4X, 7, 9	NS	305349
	E122P	Dual Output, Common Setpoint	4X, 7, 9	NS	305357
Freeze Protection Direct Mount 15 - 140°F (-10 to +60°C)	B100	Single Output	4X	S	305365
	B121	Single Output	4X, 7, 9	S	384104

RBF Heat Trace or Pipe Sensor

- Heat Trace or Pipe Sensing Applications
- 316 Stainless Steel Sheath
- Moisture Resistant Heads
- 3/4" or 1/2" NPT Threaded Extension Wire Opening
- 4" to 8" Cold Leg Standard for Varying Insulation Depths
- 100 ohm RTD, $\pm .12\%$ Accuracy
- Fiberglass Insulated RTD Probe
- RTD or Universal Transmitter Available (Must Specify Temperature Range)



Description

For measuring the surface temperature of process piping that is carrying products whose temperatures must be controlled to prevent freeze-up, or to maintain a viscosity level so that the inner medium will flow. The RTD Sensor Element is made up with a 316SS sheath, and with a stainless steel mounting pad. Cold legs are available in customer specified lengths to accommodate pipe insulation thickness.

Model	Sensor	Insulation	Common Junction	Range (°F)	
				Min	Max
RBF185M-HT	RTD	Fiberglass		-100	900
		Sheath Leg Lengths			
		Code		Hot	Cold
		304		3"	4"
		306		3"	6"
		308		3"	8"
		Code	Mounting Pads		
		18RD	Fits All Pipe Sizes*		
			Code	Connection Heads	
			31SB/C	Aluminum	
			49SB/C	Flip top Aluminum Head	
			91SB/C	316L Stainless Steel	
			93SB/C	Aluminum	
			94SB/C	316L Stainless Steel	
RBF-185M-HT	304	18RD	31SB/C		

*Mounting pads conform to pipe with pipe clamps

†Replaces RBF185M-HT-0304-18RD-71SB/C

In Stock:

Model	PCN	Stock Status
RBF185M-HT-304-18RD-31SB/C	317315	ST
RBF185M-HT-304-18RD-93SB/C	317340	ST
RBF185M-HT-304-18RD-49SB/C	399517	NS
RBF185M-HT-304-18RD-91SB/C	317323	NS
RBF185M-HT-304-18RD-94SB/C	399550	NS

Approvals Chart

Connection Head	Approval Agency			
	FM	CSA	ATEX	IECEX
31SB/C	N/A	N/A	N/A	N/A
49SB/C	N/A	N/A	N/A	N/A
91SB/C	N/A	N/A	N/A	N/A
93SB/C	Class I Division 1; Groups A,B,C,D DIP Class II Division 1; Groups E,F,G Class III; Type 4/4X	Class I Division 1; Groups A,B,C,D DIP Class II Division 1; Groups E,F,G Class III; Type 4/4X Class I Zone 1 AEx d IIC Gb; Zone 21 Aex tb IIIC Db; IP66	Ex II 2 GD Ex db IIC Gb; Ex tb IIIC Db; IP66	Ex db IIC Gb; Ex tb IIIC Db; IP66 Ta = -20°C to 100°C
94SB/C	Class I Division 1; Groups A,B,C,D DIP Class II Division 1; Groups E,F,G Class III; Type 4/4X	Class I Division 1; Groups A,B,C,D DIP Class II Division 1; Groups E,F,G Class III; Type 4/4X Class I Zone 1 AEx d IIC Gb; Zone 21 Aex tb IIIC Db; IP66	Ex II 2 GD Ex db IIC Gb; Ex tb IIIC Db; IP66	Ex db IIC Gb; Ex tb IIIC Db; IP66 Ta = -20°C to 100°C



GIC-AMB

Ambient Heat Trace Sensor

- RTD for Heat Trace Applications
- -76°F (-60°C) to 400°F (204°C)
Temperature Range
- Copper Sheath probe protected
by vented 304 SS guard
- 100 ohm RTD, = .00385 ohms/°C
- ±1°F (0.5°C) Accuracy at 32°F
(0°C)
- 1/2"(12.7mm) NPT fitting
- .5/8"L x 1/4" D Probe

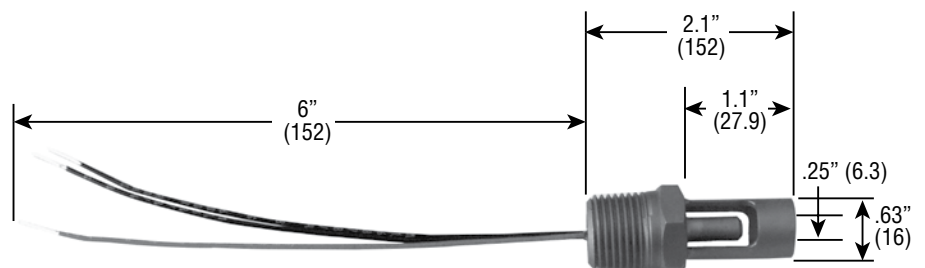


Description

The Chromalox GIC-AMB sensor is used for measuring the ambient air temperature to prevent freeze-up of process piping that is carrying products whose temperature must be kept above freezing so that the inner medium will flow. The RTD sensor element is made up with a Copper sheath and can be installed directly to a controller or junction box using the 1/2" NPT conduit fitting. The 304 SS guard protects the probe against accidental damage.

Ordering Information

Model	PCN	Stock Status
GIC-AMB	392497	S



RBF-HT

RTD Heat Trace Sensors



- RTD for Heat Trace Applications
- -76°F (-60°C) to 400°F (204°C) Temperature Range
- 316 Stainless Steel Sheath
- 100 ohm RTD, ≈ 0.00385 ohms/°C
- $\pm 1^\circ\text{F}$ (0.5°C) Accuracy at 32°F (0°C)
- 1/2" (12.7mm) conduit fitting
- Available in 3', 10', 50' Lengths
- SS Flex Armor outer shield
- 3" L x 3/16" D Probe



Description

The Chromalox RTD-HT sensors are used for measuring the surface temperature of process piping that is carrying products whose temperature must be controlled to prevent freeze-up, or to maintain viscosity level so that the inner medium will flow. The RTD sensor element is made up with a 316 SS sheath and can be installed directly to a controller or junction box using the 1/2" conduit fitting.

Ordering Information

Model	Description	PCN	Stock Status
RBF185L383-003-00-18-T3A036-Z-018-2,Z(Z371)	3' (1 m) Flexible Armor, 18" (457 mm) leads	399031	NS
RBF185L383-003-00-18-T3A120-Z-018-2,Z(Z371)	10' (3 m) Flexible Armor, 18" (457 mm) leads	399040	NS
RBF185L383-003-00-18-T3A600-Z-018-2,Z(Z371)	50' (15.2 m) Flexible Armor, 18" (457 mm) leads	399058	NS

DTS Series

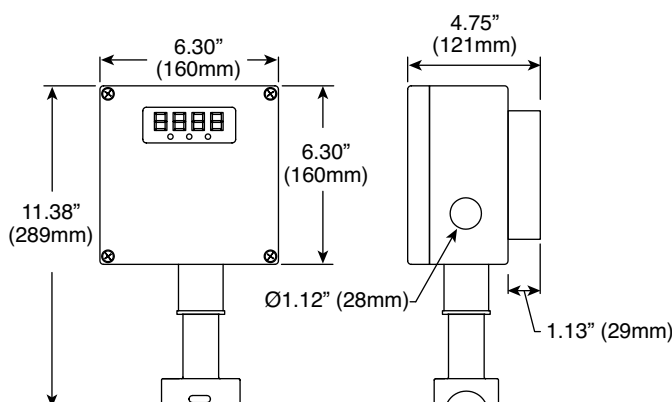
Heat Trace

Digital Thermostat

- 30 Amp Solid State Relay (SSR) Output
- 120 to 277 Vac Operation
- C1D2 Hazardous Area Approval
- ATEX / IECEx Zone II
- On/Off Control With 100 Degree Deadband Programmable In One Degree Increments
- Selectable Soft-Start Feature – Eliminates SR Cable In-Rush
- LED Indication for Power, Alarm and Load
- Large LED Display of Process Variables
- Programmable High & Low Temperature Alarms
- Solid State Alarm for Remote Indication of Alarm Status –
 - AC Alarm: DTS-HAZ
 - DC Alarm: DTS-HAZ-DC
- NEMA 4X Enclosure
- Integral Pipe Stand
- Optional Wall Mount
- 100 Ohm Platinum RTD - Included
- Enclosure Serves as Heating Cable, A/C Power & Sensor Connection
- Works with SR, CWM and MI Cable
- RoHS Compliant
- UL, cUL Listed, CE Approved



HEAT TRACE
CONTROLS



Description

The DTS-HAZ digital thermostat is a microprocessor based temperature control and power connection kit. It is used for freeze protection or process temperature maintenance of pipes or tanks protected by heat tracing products. This thermostat can be used with Constant Wattage, Mineral Insulated or Self-Regulating heating cables in Ordinary area or Class 1, Division 2 and IECEx/ATEX Zone II hazardous area locations.

This unit is designed to provide local temperature control and monitoring for heat traced pipes or tanks across a variety of industries and applications and will switch 30 amperes of current.

The DTS-HAZ provides easy programming of the temperature set point, high and low temperature alarms, the deadband, the temperature units, the soft start function and the alarm state through the front panel push buttons. LED lights are provided for indication of power to the unit, heater power on (load) and alarm status. A Fail Safe solid state alarm is included for wiring to your building

management system to indicate alarm status. This alarm may be set to open or close on all alarm conditions including loss of power, high or low temperature alarm and RTD failure. The loss of power indication qualifies this unit to be used to sense temperature and control heat trace when used in fire protection systems. Choose either the DC or the AC customer supplied voltage alarm variation. The minimum operating ambient temperature is -40°F (-40°C). This unit has programmable high and low temperature alarm set points from -80°F (-62°C) to 1150°F (621°C).

The DTS-HAZ employs a Soft Start feature that uses a proprietary software algorithm which eliminates the inherent self-regulating in-rush current, resulting in less nuisance tripping at cold temperatures. For added flexibility, the user may disable the soft start feature for non-heat trace applications. The alarm contact may be either normally open or normally closed.

A 100 Ohm platinum RTD is provided with a 3 foot (1 M) lead resulting in flexible mounting options for the user.

DTS Series

Heat Trace

Digital Thermostat

(cont'd.)

PCN	Model
387364	DTS-HAZ
316187	DTS-HAZ-DC

Accessories

PCN	Model
318043	DTS Wall Mount Kit
308144	RTD Extension Wire (50 ft/15m)

Applications

- Freeze Protection of Piping
- Process Temperature Maintenance
- Tank Freeze Protection
- Tank Process Temperature Maintenance

Environments

- Hazardous Areas, Class I, Div 2, Groups A,B,C,D – Temperature Rating: T4A
- IECEx, ATEX Zone II, Temperature Rating: T4

Sensors

- 100 OHM PT RTD
 - Probe Length = 4" (10.2 cm)
 - Probe Diameter = 1/4" (6.35 mm)
 - Leadwire Length = 3ft (1 M)*
- * The maximum allowable length of the RTD wire is 50ft (15m) in order to remain UL/cUL compliant.

Markets

- Agriculture
- Alternative Fuels
- Chemical Processing
- Food Processing
- Oil / Gas
- Pharmaceutical
- Power Generation
- Water Treatment
- Building and Construction
- Transportation
- HVAC/Refrigeration

Features

- User Selectable Soft-Start Program
- Small Enclosure. The 6.25 inch by 6.25 inch enclosure houses the temperature control and monitoring unit along with terminals for connecting instrument power, heating cable and RTD.
- 100 Ohm platinum RTD which can be pipe mounted or can be used to sense ambient air temperature.
- Pipe stand-off mount for direct pipe mounting.
- Integral wiring. The wiring of the heating cable, alarm, AC power line and the RTD sensor are all accomplished within the enclosure. This feature reduces both labor and material costs by eliminating the need for an additional heat trace power connection kit as well as the time for the additional wiring.

Specifications

Operating Voltage	120 to 277 VAC, 50/60 Hz, Single Phase		
Operating Temperature	-40°F to 104°F (-40°C to 40°C)		
- Hazardous Areas	-40°F to 140°F (-40°C to 60°C)		
- Ordinary Areas			
Input	100 Ohm platinum RTD		
Output	30 amp solid state relay		
Alarms	High temp to 1150°F (621°C) Low temp to -80°F (-62°C) RTD Failure Red LED alarm status indicator on front panel		
Solid State Alarm Rating - AC	12-277 VAC, 1.8 Amps RMS - Customer Supplied		
Solid State Alarm Rating - DC	0-42 VDC, 1.8 Amps RMS- Customer Supplied		
Alarm Function:	Mode	Default	Optional
	Normal Operation	Closed	Open
	Alarm Condition	Open	Closed
	Power Off	Open	Open
Deadband	1°F (or °C) to 100°F (or °C), programmable		
Set Points	-80°F to 1100°F programmable (-62°C to 593°C)		
Units of Temperature	°F or °C, selectable		
Control Mode	On/Off control		
Soft Start	User selectable integral soft start, patent pending software algorithm, which eliminates nuisance breaker tripping associated with self-regulating cable in-rush		

Current Approvals

- CE, UL, cUL Listed
- Ordinary Areas
- Hazardous Area
- Class I, Div. 2 – Groups A, B, C, D
- ATEX/IECEx Zone II (Ex nA IIC)

IntelliTrace

ITC1 & ITC2

Digital Heat Trace Controller 1 & 2 Circuit

- 1 & 2 Circuit Models
- 40 Amps per Circuit
- SSR Control
- 100 – 277 VAC, 50/60 Hz
- Hazardous (Class I, Division 2) or Non Hazardous Areas
- Soft Start Feature
- Operating Temperature: -40°F to 104°F (-40°C to 40°C)
- Modbus RTU/RS485, RS422 & TCP/Ethernet
- 10" x 8" x 6" (26cm x 21cm x 15cm) NEMA 4X FG Wall Mount Enclosure
- High Resolution Color TFT Display
- LED Indication for Power, Load & Alarm per Circuit
- Front Panel Capacitive Touch Switches
- PID, On/Off or Manual Control Modes
- One or Two Sensor Inputs / Circuit – Min, Max & Averaging
- 2 Circuit Ambient Control from 1 RTD Sensor
- Full Monitoring & Alarms
 - High / Low Temperature & Current, GFEP & Sensor Failure
- Programmable Duty Cycle On Sensor Failure
- AC & DC Alarms
- Password Protected Security Levels
- CE, UL/cUL



HEAT TRACE
CONTROLS

Description

The Chromalox IntelliTRACE ITC series is designed for line or ambient sensing heat trace applications such as freeze protection and/or process temperature control. This controller may be used with constant wattage, mineral insulated or self regulating heating cables. The ITC is intended for use in industrial locations in either hazardous (Class I, Division 2) or non-hazardous environments.

The ITC Series is offered in either a single circuit or an independently controlled and monitored dual circuit platform. They provide a unique, industry-leading combination of heating capacity, application flexibility and technology.

The ITC is a microprocessor based system with SSR (Solid State Relay) power control which switches an impressive 40 Amps per circuit at 100-277 VAC.

There are three user-selectable control modes available on the ITC: Manual, Off or Auto. An output of 1% to 100% is available while in Manual Mode and you may choose either PID or ON/OFF control while in the Auto Control Mode.

You may employ one or two RTD sensors for either circuit. When using two RTD sensors, the ITC may be set to Low, High or Average. The ITC may also be configured as a 2-circuit ambient sensing controller that uses only one RTD to control both circuits. This provides the owner with much more flexibility and redundancy to help meet their ever-varying process demands.

The ITC employs a soft start feature that uses a proprietary software algorithm which eliminates the inherent self-regulating in-rush

current, resulting in less nuisance tripping at cold temperatures. The soft start feature is selectable which allows this controller to be employed in non-heat trace applications as well.

All process conditions may be monitored and managed both locally and remotely. All process variable, communication and alarm settings and security codes are user-adjustable via simple page menu navigation.

In terms of system supervision, the ITC controller monitors temperature, current load and ground fault equipment protection leakage current (GFEP). Additionally, the alarms on the ITC consist of high and low temperature, high and low current, high GFEP current and sensor failure.

Should the ITC unit realize a failed sensor, the controller automatically switches into a user adjustable manual output duty cycle. To eliminate abrupt current spikes, the Chromalox ITC employs bumpless transfer power switching when switching over from either manual or auto mode.

The ITC unit is housed in a compact wall mountable, NEMA 4X FG or optional 316 SS enclosure and it features a high resolution TFT display, LED indication of Load, Power & Alarm status for each circuit and front panel capacitive touch user interface buttons which are mounted on a hinged door.

The ITC enclosure provides electrical connections for the heating cable, the AC Power and the RTD Sensors and it comes complete with stainless steel mounting brackets.

ITC1 & ITC2

Digital Heat Trace Controller

1 & 2 Circuit

(cont'd.)

Specifications

Input

Sensor Type	3-wire RTD, 100 Ω PT, 0.00385 $\Omega/\Omega^{\circ}\text{C}$, 20 Ω balanced lead wire
Number of Sensor Inputs	1 or 2 per Circuit
Sensing Configuration	Range: Single, Low, High, Average, Use RTD1 to control both circuits

Output

Power Switching	SSR
Number of Circuits	1 or 2
Capacity	40 Amps per Circuit

Control Types

PID	Control mode must be set to Auto
Autotune	On or Off
Proportional Band, ($^{\circ}\text{F}$)	Range: 1 – 100
Integral (sec/repeat)	Range: 0 – 9,999
Rate or Derivative, (seconds)	Range: 0 – 500
On/Off	Control mode must be set to Auto
Dead band, ($^{\circ}\text{F}$)	Range: 2 – 100
Manual	Range: 0 – 100%
Soft Start, Current Clamping	Enable or Disable

Settings

Temperature (PV)	Range: -80 $^{\circ}\text{F}$ to +1100 $^{\circ}\text{F}$ (-62 $^{\circ}\text{C}$ to +593 $^{\circ}\text{C}$)
Low Temperature Alarm	Range: -80 $^{\circ}\text{F}$ to +1050 $^{\circ}\text{F}$, Off (-62 $^{\circ}\text{C}$ to +566 $^{\circ}\text{C}$, Off)
High Temperature Alarm	Range: -80 $^{\circ}\text{F}$ to +1150 $^{\circ}\text{F}$, Off (-62 $^{\circ}\text{C}$ to +621 $^{\circ}\text{C}$, Off)
Low Current Alarm	Range: 0.1 A – 50.0 A, Off
High Current Alarm	Range: 0.1 A – 50.0 A, Off
GFEP	Range: 30 mA – 150 mA
GFEP Alarm Condition	Alarm Only, Alarm & Trip, Alarm & Latch, Alarm & Trip & Latch
Output on Sensor Failure	Range: 0–100%, Bumpless Transfer to Manual Mode
Calendar	Year, Month, Day, Date, Hour & Minute
Audible button depress	Range: On, Off
Security	3 Levels of password protected security
Alarm State	Normally Open, Normally Closed

Display, HMI, Indication

Display	3.5" 320 x 240 RGB Full color graphic TFT module
Human Interface	5 Capacitive Touch Input Buttons
LED Indication	Power (Green), Load (Amber), Alarm (Red) – Per Ckt

Alarms

Alarm Types	Low & High Temperature, Low & High Current, High GFEP, Sensor Failure		
Alarm Relays	1 x DC Alarm Output, 1.8 Amp, 0 - 50 VDC 1 x AC Alarm Output, 1.8 Amp, 12 - 240 VAC		
Alarm Contact State	<u>Mode</u>	<u>Default</u>	<u>Optional</u>
	Normal Operation	Closed	Open
	Alarm Condition	Open	Closed
	Power Off	Open	Open

Communications

Modbus	RTU/RS-485 (2 or 4 wire)
Modbus	TCP/Ethernet (optional)
Webserver/Ethernet IP	(Optional)

Operating & Environmental

Temperature	-40 $^{\circ}\text{F}$ to 104 $^{\circ}\text{F}$ (-40 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$)
Power Supply	100 to 277V 50/60Hz
Protection	IEC IP66
Enclosure rating	NEMA 4X FG (Optional Stainless Steel)
Approvals	UL/cUL Ordinary and Class I, Division 2, Groups A,B,C,D Hazardous Locations. (UL File: E347725)
	CE

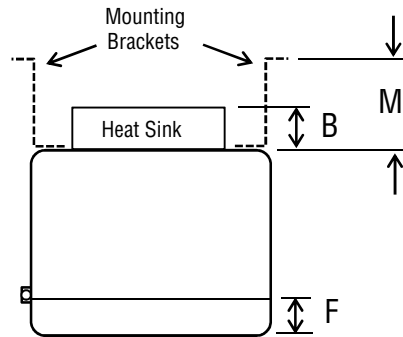
ITC1 & ITC2

Digital Heat Trace Controller

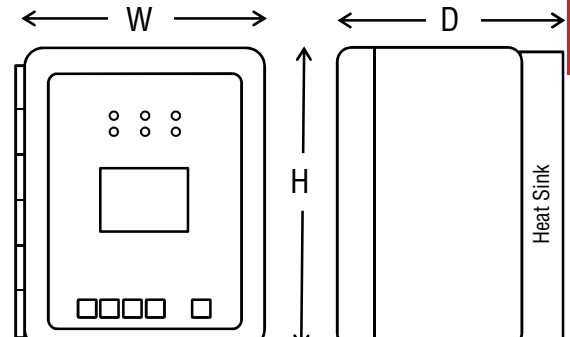
1 & 2 Circuit (cont'd.)

Dimensions

		H	W	D	F	B	M
316 SS Enclosure	Inch	11.8	9.9	7.6	0.7	1.8	3.0
	cm	30.2	25.1	19.4	1.7	4.4	7.6
Fiberglass Enclosure	Inch	10.3	8.5	8.0	1.2	1.8	3.0
	cm	26.2	21.3	19.7	3.2	4.4	7.6



Top View



Front View

Side View

HEAT TRACE CONTROLS

Ordering Information

To Order —
Complete the Model Number using the Matrix provided.

Model Product Description

ITC The Chromalox ITC series IntelliTRACE Controller will control 1 or 2 circuits and is designed for industrial Heat Trace Line and/or Ambient Sensing applications in Non-Hazardous or Hazardous (Class I, Division 2) areas. The ITC is a wall mounted device that operates at 100-277 VAC and rated at 40A per circuit in a -40°F to 104°F (-40°C to 40°C) Ambient. Standard features: NEMA 4X FG enclosure, 3.5" High Resolution TFT Display with integral display heater, front panel capacitive touch switches & LED Indication of Power, Load & Alarm. ON/OFF, PID or Manual SSR power control with a selectable Soft Start program. The ITC accepts up to 2 RTD sensors per circuit for Ambient and/or Line Sensing applications. With multiple sensors, output behavior is based on min, max, average temperature or as 2-circuit ambient sensing control from a single RTD. Other standard features include: 2 x common alarm outputs (1 x AC, 1 x DC), Alarms for Low/High Temperature & Current, GFEP (Ground Fault Equipment Protection) & Sensor Failure, ModBus RTU/RS485 (or /RS422) Communications and user selectable manual output on failed sensor. 16 gage Stainless Steel wall mounting brackets are included. UL/cUL & CE Optional features include: NEMA 4X 316 SS Enclosure, ModBus TCP/Ethernet, Webserver/Ethernet or BACnet communications. Standard 1 year warranty.

Code Number of Circuits

1	1 Circuit
2	2 Circuits

Code Communications

0	ModBus RTU/RS485 (& RS422)
1	ModBus TCP/Ethernet
2	Webserver/Ethernet
3	BACnet/Ethernet
9	Other Communications

Code Enclosure Enclosure Size H x W x D, In (cm)

0	NEMA 4X Fiberglas	10 x 8 x 8 (25 x 21 x 20)
1	NEMA 4X 316 SS	12 x 10 x 8 (30 x 25 x 19)

Code Add to Complete Model Number

0

ITC 2- 0 0 0 Typical Model Number

Note: The ITC comes complete with one set of 16 gauge stainless steel wall mounting brackets.

Model	Description	PCN	Model	Description	PCN
ITC1-000	ITC 1 Loop, FG ENC, RS485	316101	ITC1-010	ITC 1 LOOP, SS ENC, RS485	316494
ITC2-000	ITC 2 Loop, FG ENC, RS485	316110	ITC2-010	ITC 2 LOOP, SS ENC, RS485	316507
ITC1-100	ITC 1 Loop, FG ENC, Ethernet	316128	ITC1-110	ITC 1 LOOP, SS ENC, Ethernet	316929
ITC2-100	ITC 2 LOOP, FG ENC, Ethernet	316136	ITC2-110	ITC 2 LOOP, SS ENC, Ethernet	316937

IntelliTrace

Ambient Sensing

ITAS Base Panel

ITAS-EXT Extender Panel

Line Sensing

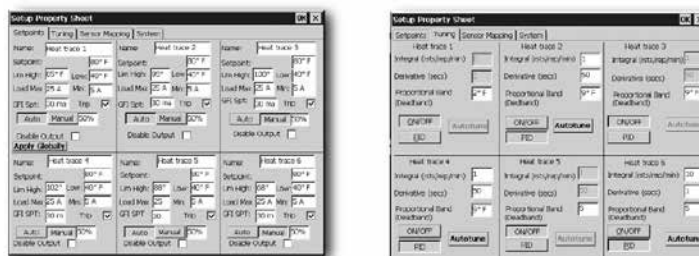
ITLS Base Panel

ITLS-EXT Extender Panel

Heat Tracing Control Panel
for Ordinary Areas



- 10" VGA Touch Screen HMI
- 40 Amps/Loop @ 100 – 600 VAC
- 6 Loops to 72 Loops
- NEMA 4 or NEMA 4X Enclosure
- SCR Control
- Optional Wireless Temperature Sensing
- Integral Circuit Panel with Circuit Breakers
- Optional Main Disconnect
- Soft Start Feature
- Full Communications and Enhanced Data Logging
- Full Alarm and Monitoring Capabilities on GFEP, Temperature, Sensor, Current Load & Communications
- Optional Customizable I/O Mapping
- Optional Enclosure Heater
- UL, cUL
- Optional CE



The 10" Touch Screen Computer provides real time display of process variable, set point, load current, load demand (%), operation mode type, alarm status and alarm type for any 6 loops at time as well as alarm status for all other loops.

The Quick Launch buttons take you to any other 6-loop real time display screen as well as the Setup, Fault, Log or Communication Screen. All set point, alarm, security, time, loop identification, I/O mapping, tuning, communications and control type mode settings are easily accomplished through the intuitive & familiar Windows based menu screens. All of these functions are achievable locally or remotely via wired or wireless communications.

Description

The IntelliTRACE ITAS and ITLS Series is a micro-processor based Control/Monitoring and Power Management system for Ambient Sensing, Line Sensing or a combination of Line and Ambient Sensing Heat Trace Applications and is suitable for use in ordinary areas.

The base panels will handle 6 - 36 loops and may be increased up to 72 loops with the Extension Panels. Each circuit has a 40 Amperage capacity and accepts 100 to 600 VAC service. The SCR Control may be set to Automatic, which includes PID or On/Off control or to Manual, which spans a 0% to 100% control output.

The HMI is a 10" (25 cm) user friendly touch screen computer. It displays the process variable, temperature setpoint, alarm status, current load, control mode, sensor failure manual override output for any 6 loops at a time as well as the alarm status for all other loops.

The standard enclosure is rated for NEMA 4 environments and an optional NEMA 4X 304 SS enclosure is available.

The ITAS / ITLS Control Panel Series provide alarms for high and low temperatures, current load, communications, sensor faults and ground fault leakage. There are several output/control behavior scenarios for the ground fault (GFEP) alarm condition. Choices include Trip and/or Latch options in which both, either or none may be enabled. Trip sets the output to zero %, while Latch requires a manual reset. Alarm events are automatically logged and stored for easy access.

Advanced standard features include a proprietary soft start function, off duty Auto Cycle maintenance program and either Modbus RTU/RS485 or Ethernet communications. Optional features include an industry leading I/O (Sensor & Output) Mapping** function, remote monitoring and wireless communications.

IntelliTrace

Ambient Sensing

ITAS Base Panel

ITAS-EXT Extender Panel

Line Sensing

ITLS Base Panel

ITLS-EXT Extender Panel

Heat Tracing Control Panel for Ordinary Areas

Advanced Features

Soft Start Feature

Certain heating cables exhibit inherent current inrush in colder temperatures. This inrush can cause nuisance breaker tripping. To limit inrush current on the overall system, a proprietary Soft Start algorithm is applied during system start-up. This will ONLY occur while the operation mode is set to AUTO. After the Soft Start program completes its cycle, the Control Mode of the system will either be PID or ON/OFF Control Mode, depending what was selected by the user. The default setting of the Soft Start Feature for each circuit is "enabled". However, the Soft Start Feature may be disabled if so desired by the owner. The owner has the option to independently manage the Soft Start Feature on each circuit.

Auto Cycle Feature

During prolonged down time periods, typically during the summer months, it advisable to intermittently exercise the system circuits. This exercising of the loops is accomplished via the Autocycle feature. On a sequential circuit basis, the Autocycle feature periodically monitors system performance between 1-999 hours. This provides a certain level of predictive maintenance of the system as Faults (Alarms) will present themselves accordingly. Problem areas may be addressed during non-essential operating periods. The owner has the option to engage or disengage the Autocycle feature at any time.

I/O (Sensor & Output) Mapping**

When factory enabled, the ITLS & ITLSC1D2 Models provide the owner with customizable I/O Mapping. This becomes a very powerful and desirable feature when the owner needs added flexibility in controlling the circuit outputs beyond the standard single sensor input.

There are two types of I/O Mapping: Sensor Mapping and Output Mapping. Sensor Mapping is the assignment of one or more Sensor Inputs to one or more output circuits. Output Mapping is the assignment of one or more Power Outputs to one or more output circuits.

More on Sensor Mapping

Ambient or Line Sensing - Single Sensor:

A single sensor (RTD) may be mapped (or linked) to multiple Output Circuits. This allows several circuits to be controlled by a single sensor.

Minimum, Maximum, Averaging

Several sensors may be mapped to a single output circuit. This allows a single circuit to be controlled by the Minimum or the Maximum or the Average temperature of all of the sensors mapped to that output circuit. This may be desirable on long runs or zones which realize varying temperatures or weather conditions at different times of the day.

Multiple Sensor Mapping

A single sensor may be used independently or combined with other sensors to control more than one circuit.

Combining Sensing Types

The owner may need to have multiple Line and/or Ambient Sensing control scenarios occurring simultaneously.

More on Output Mapping

Output Power Sensing

A single Output demand value may be mapped to multiple Circuits. This allows several circuits to be controlled by a single Output demand value.

Minimum, Maximum, Averaging

Several Output demand values may be mapped to a single output circuit. This allows a circuit to be controlled by the Minimum or the Maximum or the Average Output demand value of all of the Outputs that are mapped to that single Circuit.

Multiple Output Mapping

A single output demand value may be used independently or combined with other output demand values to control more than one circuit.

** Available only on ITLS & ITLS-EXT

Touch Screen Computer:

- 6 Loops displayed / screen
- Quick launch to any 6 loop group, Setup Menu or System Screens
- Full User Setting Capabilities - Specific Loop Naming/Identification, Baud rate, set points, units, alarms, etc.
- Remote Desktop Monitoring

Optional Features:

- NEMA 4X 304 SS Enclosure
- Fully Customizable I/O (Sensor and Output) Mapping**
- Enclosure Heater

IntelliTrace

Ambient Sensing

ITAS Base Panel

ITAS-EXT Extender Panel

Line Sensing

ITLS Base Panel

ITLS-EXT Extender Panel

Heat Tracing Control Panel for Ordinary Areas

Technical Specifications

Panel Specifications

Supply Voltage:	100 - 600 VAC, 3 phase
Operating Environment:	-40 to +104°F (-40 to +40°C)
Enclosure:	NEMA 4 or Optional NEMA 4X 304 SS
Enclosure Size:	See Model Description Tables
Communications:	Modbus RTU/RS-485, Ethernet
Alarms:	Hi/Lo Temp, GFEP – 20 mA to 150 mA, Hi/Lo Current – 0.1 to 50A or off
Input:	100Ω Platinum 3-wire RTD
Output:	SCR, Zero cross fired
Current Maximum:	40 Amps/Circuit at 104°F (40°C)
Auto-Cycle:	1-999 hours/off
Failed Sensor Output Setting:	0 – 100%
Control Mode:	Auto, Manual (Hand), Off Auto: PID or ON/OFF with adjustable dead band Manual: 0% - 100% output, 1% increment
Load Management:	DOT (Demand On Transfer) timing, with Soft Start
Approvals:	UL, cUL Listed. Optional CE & ATEX Certification
Area Classifications:	Ordinary Areas
Temperature Rating:	T4A (UL)

IntelliTrace

Ambient Sensing

ITAS Base Panel

Heat Tracing Control Panel for Ordinary Areas

Technical Notes:

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. See ITASC1D2-EXT Extension Panel Order Table to increase total circuits

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Model Product Description

ITAS ITAS series Intelligent Ambient Sensing Heat Trace Panel. Designed for Industrial applications in Non-Hazardous Areas. ITAS series offers the following standard features: NEMA 4 enclosure, Industrial 10" Digital CE Computer Touchscreen Operator Interface, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits (Expandable to Seventy-Two Circuits*), Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment Protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Thermostat Controlled Enclosure Heater, Remote Monitoring Capability, Wireless Ethernet Communications, CE Third Party Compliance

NEMA 4 Enclosure Size (HxWxD In. (cm))					
Code	Circuits	1 Pole	2 Pole	Panelboard Size	Panelboard Rating
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)	N/A	N/A
12	12 Circuits	36 x 30 x 12 (92 x 76 x 31)	-----	18 position	up to 100 A
12	12 Circuits	48 x 36 x 12 (122 x 92 x 31)	48 x 36 x 12 (122 x 92 x 31)	30 position	up to 400 A
18	18 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
18	18 Circuits	-----	60 x 36 x 12 (152 x 92 x 31)	42 position	up to 600 A
24	24 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
24	24 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	30 position (X2)	up to 400 A
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	30 position	up to 600 A
30	30 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	42 position	up to 600 A
36	36 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A

Code Line Voltage Cable Voltage Circuit Breaker Rating - Type (1/Loop)

1	208/120 VAC, 3 Phase 4 Wire	120 VAC	120 V-1 Pole
2	208/120 VAC, 3 Phase 4 Wire	208 VAC	208/240V-2 Pole
3	240/120 VAC, Single Phase 3 Wire	240 VAC	208/240V-2 Pole
4	480/277 VAC, 3 Phase 4 Wire	277 VAC	277V-1 Pole
5	480/277 VAC, 3 Phase 4 Wire	480 VAC	480V-2 Pole
6	240/120 VAC, Single Phase 3 Wire	120 VAC	120 V-1 Pole
9	Multiple Line Voltage Requirement	-----	-----

Code Cable Load Circuit Breaker Rating

1	15A Thermal Magnetic	4	40A Thermal Magnetic
2	20A Thermal Magnetic	5	50A Thermal Magnetic
3	30A Thermal Magnetic	9	Multiple Breaker Ratings (Consult Sales)

Code Main Disconnect / Circuit Breaker

0	None	A	100A Thermal Magnetic
1	100A Disconnect	B	150A Thermal Magnetic
2	150A Disconnect	C	225A Thermal Magnetic
3	250A Disconnect	D	250A Thermal Magnetic
4	400A Disconnect	E	400A Thermal Magnetic
5	600A Disconnect	F	600A Thermal Magnetic

Code Enclosure

1	NEMA 4 Single-Door Wall-Mount Steel Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 24 x 24 x 12 In. (61 x 61 x 31) (cm)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 36 x 30 x 12 In. (92 x 76 x 31) (cm)
4	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 48 x 36 x 12 In. (122 x 92 x 31) (cm)
5	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 60 x 36 x 12 In. (152 x 92 x 31) (cm)
6	NEMA 4X 304 Stainless Steel Floor-Mount Enclosure: 62 x 60 x 12 In. (157 x 152 x 31) (cm)

Code Enclosure Heater

0	No Enclosure Heater
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)
2	Thermostat Controlled Enclosure Heater (to 0°F, -18°C Ambient)
3	Thermostat Controlled Enclosure Heater (to -40°F/-4°C Ambient)

Code Input Options

0	Standard Sensor Input
1	Dry Contact Closure from Ambient Sensing Thermostat
2	Remote Snow Sensor Input (i.e. SIT, GIT & CIT Type Sensors)
9	Special Configuration

Code Communications

0	Standard: Modbus RTU/ RS485 or Modbus TCP/Ethernet
1	Modbus TCP/Wireless
2	BACnet
9	Other

Code Temperature Sensing Options

0	Standard Wired Sensing
1	Wireless Temperature Sensing
9	Other

ITAS- 24 1 3 3- 1 1 1 0 0 Typical Model Number

IntelliTrace

Ambient Sensing

ITAS-EXT Extender Panel

Heat Tracing Control Panel
for Ordinary Areas

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Model Product Description

ITAS-EXT ITAS-EXT series Intelligent Ambient Sensing Heat Trace Extension Panel. Designed for industrial applications in non-hazardous areas. Intended to be used with ITAS Heat Trace Ambient Sensing Panel to increase circuit service. ITAS series offers the following standard features: NEMA 4 enclosure, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits, Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Remote Monitoring Capability, Thermostat Controlled Enclosure Heater, CE Third Party Compliance

Code	Circuits	NEMA 4 Enclosure Size (HxWxD In. (cm))		Panelboard Size	Panelboard Rating
		1 Pole	2 Pole		
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)	N/A	N/A
12	12 Circuits	36 x 30 x 12 (92 x 76 x 31)	-----	18 position	up to 100 A
12	12 Circuits	48 x 36 x 12 (122 x 92 x 31)	48 x 36 x 12 (122 x 92 x 31)	30 position	up to 400 A
18	18 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
18	18 Circuits	-----	60 x 36 x 12 (152 x 92 x 31)	42 position	up to 600 A
24	24 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
24	24 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	30 position (X2)	up to 400 A
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	30 position	up to 600 A
30	30 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	42 position	up to 600 A
36	36 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A

Code Line Voltage Cable Voltage Circuit Breaker Rating - Type (1/Loop)

1	208/120 VAC, 3 Phase 4 Wire	120 VAC	120 V-1 Pole
2	208/120 VAC, 3 Phase 4 Wire	208 VAC	208/240V-2 Pole
3	240/120 VAC, Single Phase 3 Wire	240 VAC	208/240V-2 Pole
4	480/277 VAC, 3 Phase 4 Wire	277 VAC	277V-1 Pole
5	480/277 VAC, 3 Phase 4 Wire	480 VAC	480V-2 Pole
6	240/120 VAC, Single Phase 3 Wire	120 VAC	120 V-1 Pole
9	Multiple Line Voltage Requirement	-----	-----

Code Cable Load Circuit Breaker Rating

1	15A Thermal Magnetic
2	20A Thermal Magnetic
3	30A Thermal Magnetic
4	40A Thermal Magnetic
5	50A Thermal Magnetic
9	Multiple Breaker Ratings - Consult Sales

Code Main Disconnect / Circuit Breaker

0	None	A	100A Thermal Magnetic
1	100A Disconnect	B	150A Thermal Magnetic
2	150A Disconnect	C	225A Thermal Magnetic
3	250A Disconnect	D	250A Thermal Magnetic
4	400A Disconnect	E	400A Thermal Magnetic
5	600A Disconnect	F	600A Thermal Magnetic

Code Enclosure

1	NEMA 4 Single-Door Wall-Mount Steel Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 24 x 24 x 12 In, (61 x 61 x 31) (cm)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 36 x 30 x 12 In, (92 x 76 x 31) (cm)
4	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 48 x 36 x 12 In, (122 x 92 x 31) (cm)
5	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 60 x 36 x 12 In, (152 x 92 x 31) (cm)
6	NEMA 4X 304 Stainless Steel Floor-Mount Enclosure: 62 x 60 x 12 In, (157 x 152 x 31) (cm)

Code Enclosure Heater

0	No Enclosure Heater
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)
2	Thermostat Controlled Enclosure Heater (to 0°F, -18°C Ambient)
3	Thermostat Controlled Enclosure Heater (to -40°F/-C Ambient)

ITAS-EXT- 24 1 3 1- 1 0 Typical Model Number

*Designed to be paired with an ITAS Panel

IntelliTrace

Ambient Sensing

ITAS Base Panel

ITAS-EXT Extender Panel

Heat Tracing Control Panel
for Ordinary Areas

Model Number Note

-XXXX Indicates that the design has varied from the order table parameters. This could include one or more of the following non-standard considerations: Special Software or Configuration, Private Branding, Remote Monitoring/Touch-Screen Computer, Sunshield or other Protective Covering, Third Party Approval, Floor Stands, Mounting Options, Special Materials (316 SS) or Coatings, Additional Venting or Cooling, Special Indication or Alarms.

ATEX Certification: Consult Sales on all models.

Technical Notes

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. These Extension Panels are to be paired with an ITAS Panel.

Spare/Replacement Parts for ITAS & ITAS-EXT

Part Number	Description
0135-02261	SSR/GFI Power Control Assy, with Heat Sink
0135-02262	RTD Sensor Input Board Assembly
0135-02263	Digital Distribution Comm Board Assembly
0002-60054	SSR, 40 Amp rated
0029-00640	SSR Thermstrate Material
0025-05227	Common Alarm Relay
0081-10063	Power Supply 5VDC 6A 30W DIN Rail Mount
0081-10047	Power Supply 24VDC 2.5A 60W DIN Rail Mount
0135-30490	ITAS-Digital Control 10" (250mm) Display, programmed
0017-42931	15A 1P Thermal Mag Circuit Breaker (120V)
0017-43355	20A 1P Thermal Mag Circuit Breaker (120V)
0017-43356	30A 1P Thermal Mag Circuit Breaker (120V)
0017-43427	40A 1P Thermal Mag Circuit Breaker (120V)
0017-43428	50A 1P Thermal Mag Circuit Breaker (120V)
0017-43373	15A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43374	20A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43345	30A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43375	40A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43429	50A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43013	15A 1P Thermal Mag Circuit Breaker (277V)
0017-42912	20A 1P Thermal Mag Circuit Breaker (277V)
0017-42913	30A 1P Thermal Mag Circuit Breaker (277V)
0017-43349	40A 1P Thermal Mag Circuit Breaker (277V)
0017-42966	50A 1P Thermal Mag Circuit Breaker (277V)
0017-42970	15A 2P Thermal Mag Circuit Breaker (480V)
0017-43000	20A 2P Thermal Mag Circuit Breaker (480V)
0017-42928	30A 2P Thermal Mag Circuit Breaker (480V)
0017-43430	40A 2P Thermal Mag Circuit Breaker (480V)
0017-43431	50A 2P Thermal Mag Circuit Breaker (480V)
0023-15097-0001	6" (15 cm) Ribbon Cable with Connectors
0023-15097-0002	72" (180 cm) Ribbon Cable with Connectors

HEAT TRACE
CONTROLS

Accessories for ITAS & ITAS-EXT

Part Number	Description
Contact Sales	Power Transformers
317315	RTD Aluminum, NEMA 4
317340	RTD, Expl. Resist., Cast Iron/Alum., NEMA 4
308144	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 50 FT
317342	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 200 FT
0076-15392	HMI Sunscreen, Painted Steel (ITLS/ITAS-6-72)
0076-12009	Floor Stand Kit, 12" (30 cm) Deep, Steel
0076-12050	Floor Stand Kit, 12" (30 cm) Deep, 304 SS
Contact Sales	Floor Stand Kit, 12" (30 cm) Deep, 316 SS

IntelliTrace

Line Sensing

ITLS Base Panel Heat Tracing Control Panel for Ordinary Areas

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

*42 - 72 circuit service via ITLS-EXT Extension Panel. See ITLS-EXT Heat Tracing Extension Panel - Line Sensing Order Table

Model Product Description

ITLS ITLS series Intelligent Line Sensing Heat Trace Panel. Designed for Industrial applications in Non-Hazardous Areas. ITLS series offers the following standard features: NEMA 4 enclosure, Industrial 10" Digital CE Computer Touchscreen Operator Interface, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Two to Thirty-Six Circuits (Expandable to Seventy-Two Circuits*), Common Alarm Output, Hand/Off/Auto Operation, 120 Volt Instrument Power Included, Current Monitoring, 30 mA Ground Fault Equipment Protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Remote Monitoring Capability, Thermostat Controlled Enclosure Heater, Customizable I/O Mapping, Wireless Ethernet Communications, CE Third Party Compliance.

NEMA 4 Enclosure Size (HxWxD In. (cm))					
Code	Circuits	1 Pole	2 Pole	Panelboard Size	Panelboard Rating
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)	N/A	N/A
12	12 Circuits	36 x 30 x 12 (92 x 76 x 31)	-----	18 position	up to 100 A
12	12 Circuits	48 x 36 x 12 (122 x 92 x 31)	48 x 36 x 12 (122 x 92 x 31)	30 position	up to 400 A
18	18 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
18	18 Circuits	-----	60 x 36 x 12 (152 x 92 x 31)	42 position	up to 600 A
24	24 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
24	24 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	30 position (X2)	up to 400 A
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	30 position	up to 600 A
30	30 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	42 position	up to 600 A
36	36 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A

Code	Line Voltage	Cable Voltage	Circuit Breaker Rating - Type (1/Loop)
1	208/120 VAC, 3 Phase 4 Wire	120 VAC	120 V-1 Pole
2	208/120 VAC, 3 Phase 4 Wire	208 VAC	208/240V-2 Pole
3	240/120 VAC, Single Phase 3 Wire	240 VAC	208/240V-2 Pole
4	480/277 VAC, 3 Phase 4 Wire	277 VAC	277V-1 Pole
5	480/277 VAC, 3 Phase 4 Wire	480 VAC	480V-2 Pole
6	240/120 VAC, Single Phase 3 Wire	120 VAC	120 V-1 Pole
9	Multiple Line Voltage Requirement	-----	-----

Code	Cable Load	Circuit Breaker Rating
1	15A Thermal Magnetic	4 40A Thermal Magnetic
2	20A Thermal Magnetic	5 50A Thermal Magnetic
3	30A Thermal Magnetic	9 Multiple Breaker Ratings - Consult Sales

Code	Main Disconnect / Circuit Breaker
0	None
1	100A Disconnect
2	150A Disconnect
3	250A Disconnect
4	400A Disconnect
5	600A Disconnect
A	100A Thermal Magnetic
B	150A Thermal Magnetic
C	225A Thermal Magnetic
D	250A Thermal Magnetic
E	400A Thermal Magnetic
F	600A Thermal Magnetic

Code	Enclosure
1	NEMA 4 Single-Door Wall-Mount Steel Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 24 x 24 x 12 In. (61 x 61 x 31) (cm)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 36 x 30 x 12 In. (92 x 76 x 31) (cm)
4	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 48 x 36 x 12 In. (122 x 92 x 31) (cm)
5	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 60 x 36 x 12 In. (152 x 92 x 31) (cm)
6	NEMA 4X 304 Stainless Steel Floor-Mount Enclosure: 62 x 60 x 12 In. (157 x 152 x 31) (cm)

Code	Enclosure Heater
0	No Enclosure Heater
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)
2	Thermostat Controlled Enclosure Heater (to -0°F Ambient)
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)

Code**	Inputs/Circuit	I/O Mapping
0	1	No I/O Mapping
1	1	Full I/O Mapping
2	2	Full I/O Mapping
3	3	Full I/O Mapping
9	X	Special Configuration

Code	Communications
0	Standard Modbus RTU/ RS485 or Modbus TCP/Ethernet
1	Modbus TCP/Wireless
2	BACnet
9	Other

Code	Monitoring
0	Standard Wired Sensing
1	Wireless Temp Sensing (Must select Full I/O Mapping)
	See Wireless Guidelines
9	Other

ITLS - 24 1 3 3- 1 1 1 0 0 Typical Model Number

IntelliTrace

Line Sensing

ITLS-EXT Extender Panel

Heat Tracing Control Panel for Ordinary Areas

Ordering Information

To Order — Complete the Model Number using the Matrix provided.

Model Product Description

ITLS-EXT ITLS-EXT series Intelligent Line Sensing Heat Trace Extension Panel. Designed for industrial applications in non-hazardous areas. Intended to be used with ITLS Heat Trace Line Sensing Panel to increase circuit service. ITLS-EXT series offers the following standard features: NEMA 4 enclosure, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits, Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Thermostat Controlled Enclosure Heater, Customizable I/O Mapping, Remote Monitoring Capability, CE Third Party Compliance

NEMA 4 Enclosure Size (HxWxD In. (cm))					
Code	Circuits	1 Pole	2 Pole	Panelboard Size	Panelboard Rating
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)	N/A	N/A
12	12 Circuits	36 x 30 x 12 (92 x 76 x 31)	-----	18 position	up to 100 A
12	12 Circuits	48 x 36 x 12 (122 x 92 x 31)	48 x 36 x 12 (122 x 92 x 31)	30 position	up to 400 A
18	18 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
18	18 Circuits	-----	60 x 36 x 12 (152 x 92 x 31)	42 position	up to 600 A
24	24 Circuits	48 x 36 x 12 (122 x 92 x 31)	-----	30 position	up to 400 A
24	24 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	30 position (X2)	up to 400 A
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	30 position	up to 600 A
30	30 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	-----	42 position	up to 600 A
36	36 Circuits	-----	62 x 60 x 12 (157 x 152 x 31)	42 position (X2)	up to 600 A

Code Line Voltage Cable Voltage Circuit Breaker Rating - Type (1/Loop)

1	208/120 VAC, 3 Phase 4 Wire	120 VAC	120 V-1 Pole
2	208/120 VAC, 3 Phase 4 Wire	208 VAC	208/240V-2 Pole
3	240/120 VAC, Single Phase 3 Wire	240 VAC	208/240V-2 Pole
4	480/277 VAC, 3 Phase 4 Wire	277 VAC	277V-1 Pole
5	480/277 VAC, 3 Phase 4 Wire	480 VAC	480V-2 Pole
6	240/120 VAC, Single Phase 3 Wire	120 VAC	120 V-1 Pole
9	Multiple Line Voltage Requirement	-----	-----

Code Cable Load Circuit Breaker Rating

1	15A Thermal Magnetic
2	20A Thermal Magnetic
3	30A Thermal Magnetic
4	40A Thermal Magnetic
5	50A Thermal Magnetic
9	Multiple Breaker Ratings - Consult Sales

Code Main Disconnect / Circuit Breaker

0	None	A	100A Thermal Magnetic
1	100A Disconnect	B	150A Thermal Magnetic
2	150A Disconnect	C	225A Thermal Magnetic
3	250A Disconnect	D	250A Thermal Magnetic
4	400A Disconnect	E	400A Thermal Magnetic
5	600A Disconnect	F	600A Thermal Magnetic

Code Enclosure (Choose the Size that aligns with the Number of INPUTS PER CIRCUIT)

1	NEMA 4 Single-Door Wall-Mount Steel Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 24 x 24 x 12 In, (61 x 61 x 31) (cm)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 36 x 30 x 12 In, (92 x 76 x 31) (cm)
4	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 48 x 36 x 12 In, (122 x 92 x 31) (cm)
5	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure: 60 x 36 x 12 In, (152 x 92 x 31) (cm)
6	NEMA 4X 304 Stainless Steel Floor-Mount Enclosure: 62 x 60 x 12 In, (157 x 152 x 31) (cm)

Code Enclosure Heater

0	No Enclosure Heater
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)
2	Thermostat Controlled Enclosure Heater (to 0°F Ambient)
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)

Code** Inputs/Circuit I/O Mapping

0	1	No I/O Mapping	Use Enclosure sizes from above
1	1	Full I/O Mapping	
2	2	Full I/O Mapping	See ITLS I/O mapping: Enclosure size on accessory page
3	3	Full I/O Mapping	
9	X	Special Configuration	

ITLS-EXT- 24 1 3 3- 1 1 1 Typical Model Number

*Designed to be paired with an ITLS Panel

IntelliTrace

Line Sensing

ITLS Base Panel

ITLS-EXT Extender Panel

Heat Tracing Control Panel

for Ordinary Areas

ITLS & ITLS-EXT I/O Mapping: Enclosure Size

Circuits - Poles	Enclosure Size - H x W x D In (cm)	
	2 Inputs / Output	3 Inputs / Output
06 - 1	24 x 24 x 12	36 x 30 x 12
06 - 2	24 x 24 x 12	36 x 30 x 12
12 - 1	36 x 30 x 12	48 x 36 x 12
12 - 1	48 x 36 x 12	48 x 36 x 12
12 - 2	48 x 36 x 12	48 x 36 x 12
18 - 1	48 x 36 x 12	48 x 36 x 12
18 - 2	60 x 36 x 12	60 x 36 x 12
24 - 1	48 x 36 x 12	48 x 36 x 12
24 - 2	62 x 60 x 12	62 x 60 x 12
30 - 1	60 x 36 x 12	Consult Sales
30 - 2	62 x 60 x 12	Consult Sales
36 - 1	60 x 36 x 12	Consult Sales
36 - 2	62 x 60 x 12	Consult Sales

1. The MAXIMUM number of Inputs for any ITLS System, including Extension Panel, is 252.
2. When **Full I/O Mapping** is selected from the Order Table, any individual sensor or output may be mapped to more than one circuit. For Example: The average temperature of Sensors 1, 2 & 3 is used to control Circuit 1, while simultaneously the maximum temperature of Sensors 3, 4 & 5 is used to control Circuit 2.
3. The maximum amount of inputs for each panel design is as shown in Inputs Table.

Spare/Replacement Parts for ITAS & ITAS-EXT

Part Number	Description
0135-02261	SSR/GFI Power Control Assy, with Heat Sink
0135-02262	RTD Sensor Input Board Assembly
0135-02263	Digital Distribution Comm Board Assembly
0002-60054	SSR, 40 Amp rated
0029-00640	SSR Thermstrate Material
0025-05227	Common Alarm Relay
0081-10063	Power Supply 5VDC 6A 30W DIN Rail Mount
0081-10047	Power Supply 24VDC 2.5A 60W DIN Rail Mount
0135-30490	ITAS-Digital Control 10" (250mm) Display, programmed
0017-42931	15A 1P Thermal Mag Circuit Breaker (120V)
0017-43355	20A 1P Thermal Mag Circuit Breaker (120V)
0017-43356	30A 1P Thermal Mag Circuit Breaker (120V)
0017-43427	40A 1P Thermal Mag Circuit Breaker (120V)
0017-43428	50A 1P Thermal Mag Circuit Breaker (120V)
0017-43373	15A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43374	20A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43345	30A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43375	40A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43429	50A 2P Thermal Mag Circuit Breaker (208/240V)
0017-43013	15A 1P Thermal Mag Circuit Breaker (277V)
0017-42912	20A 1P Thermal Mag Circuit Breaker (277V)
0017-42913	30A 1P Thermal Mag Circuit Breaker (277V)
0017-43349	40A 1P Thermal Mag Circuit Breaker (277V)
0017-42966	50A 1P Thermal Mag Circuit Breaker (277V)
0017-42970	15A 2P Thermal Mag Circuit Breaker (480V)
0017-43000	20A 2P Thermal Mag Circuit Breaker (480V)
0017-42928	30A 2P Thermal Mag Circuit Breaker (480V)
0017-43430	40A 2P Thermal Mag Circuit Breaker (480V)
0017-43431	50A 2P Thermal Mag Circuit Breaker (480V)
0023-15097-0001	6" (15 cm) Ribbon Cable with Connectors
0023-15097-0002	72" (180 cm) Ribbon Cable with Connectors

Accessories for ITLS & ITLS-EXT

Part Number	Description
Contact Sales	Power Transformers
317315	RTD Aluminum, NEMA 4
317340	RTD, Expl. Resist., Cast Iron/Alum., NEMA 4
308144	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 50 FT
317342	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 200 FT
0076-15392	HMI Sunscreen, Painted Steel (ITLS/ITAS 6-72)
0076-12009	Floor Stand Kit, 12" (30 cm) Deep, Steel
0076-12050	Floor Stand Kit, 12" (30 cm) Deep, 304 SS
Contact Sales	Floor Stand Kit, 12" (30 cm) Deep, 316 SS

Total Number of Available Inputs per Panel Design for ITLS & ITLS-EXT

Number of Circuits	Inputs / Circuit Code from Order Table			
	1	2	3	9
06	06	12	18	252
12	12	24	36	252
18	18	36	54	252
24	24	48	72	252
30	30	60	90	252
36	36	72	108	252

IntelliTrace

Ambient Sensing

ITASC1D2 Base Panel

ITASC1D2-EXT Extender Panel

Line Sensing

ITLSC1D2 Base Panel

ITLSC1D2-EXT Extender Panel

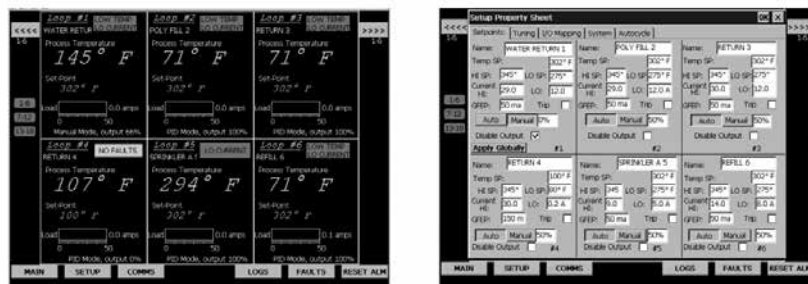
Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops



HEAT TRACE
CONTROLS

- **Class I, Division 2 Hazardous Environments - Groups A,B,C,D**
- **12" VGA Touch Screen HMI**
- **40 Amps/Loop @ 100 – 600 VAC**
- **SCR Control – PID, On/Off or Manual Control**
- **6 Loops to 72 Loops**
- **NEMA 4 or NEMA 4X Enclosure**
- **User Selectable Soft Start Feature**
- **Optional Customizable I/O Mapping**
- **Full Communications**
- **Enhanced Data Logging**
- **Full Alarm & Monitoring Capabilities on GFEP, Temperature, Sensor, Current Load & Communications**
- **UL, cUL Listed**
- **Optional CE Certification**



The 12" Touch Screen Computer provides real time display of process variable, set point, load current, load demand (%), operation mode type, alarm status and alarm type for any 6 loops at time as well as alarm status for all other loops.

The Quick Launch buttons take you to any other 6-loop real time display screen as well as the Setup, Fault, Log or Communication Screen. All set point, alarm, security, time, loop identification, I/O mapping, tuning, communications and control type mode settings are easily accomplished through the intuitive & familiar Windows based menu screens. All of these functions are achievable locally or remotely via wired or wireless communications.

Description

The IntelliTRACE ITASC1D2 and ITLSC1D2 Series is a micro-processor based Control/Monitoring and Power Management system for Ambient Sensing, Line Sensing or a combination of Line and Ambient Sensing Heat Trace Applications and is suitable for use in Class I, Division 2 environments.

The base panels will handle 6 - 36 loops and may be increased up to 72 loops with the Extension Panels. Each circuit has a 40 Amperage capacity and accepts 100 to 480 VAC service. The SCR Control may be set to Automatic, which includes PID or On/Off control or to Manual, which spans a 0% to 100% control output.

The HMI is a 12" (30 cm) user friendly touch screen computer. It displays the process variable, temperature setpoint, alarm status, current load, control mode, sensor failure manual override output for any 6 loops at a time as well as the alarm status for all other loops.

The standard enclosure is rated for NEMA 4 environments and an optional NEMA 4X 304 SS enclosure is available.

The ITASC1D2 / ITLSC1D2 Control Panel Series provide alarms for high and low temperatures, current load, communications, sensor faults and ground fault leakage. There are several output/control behavior scenarios for the ground fault (GFEP) alarm condition. Choices include Trip and/or Latch options in which both, either or none may be enabled. Trip sets the output to zero %, while Latch requires a manual reset. Alarm events are automatically logged and stored for easy access.

Advanced standard features include a proprietary soft start function, off duty Auto Cycle maintenance program and either Modbus RTU/RS485 or Ethernet communications. Optional features include an industry leading I/O (Sensor & Output) Mapping** function, remote monitoring and wireless communications.

IntelliTrace

Ambient Sensing

ITASC1D2 Base Panel

ITASC1D2-EXT Extender Panel

Line Sensing

ITLSC1D2 Base Panel

ITLSC1D2-EXT Extender Panel

Heat Tracing Control Panel Class I, Div. 2, 6-72 Loops

Advanced Features

Soft Start Feature

Certain heating cables exhibit inherent current inrush in colder temperatures. This inrush can cause nuisance breaker tripping. To limit inrush current on the overall system, a proprietary Soft Start algorithm is applied during system start-up. This will ONLY occur while the operation mode is set to AUTO. After the Soft Start program completes its cycle, the Control Mode of the system will either be PID or ON/OFF Control Mode, depending what was selected by the user. The default setting of the Soft Start Feature for each circuit is "enabled". However, the Soft Start Feature may be disabled if so desired by the owner. The owner has the option to independently manage the Soft Start Feature on each circuit.

Auto Cycle Feature

During prolonged down time periods, typically during the summer months, it is advisable to intermittently exercise the system circuits. This exercising of the loops is accomplished via the Autocycle feature. On a sequential circuit basis, the Autocycle feature periodically monitors system performance between 1-999 hours. This provides a certain level of predictive maintenance of the system as Faults (Alarms) will present themselves accordingly. Problem areas may be addressed during non-essential operating periods. The owner has the option to engage or disengage the Autocycle feature at any time.

I/O (Sensor & Output) Mapping**

When factory enabled, the ITLS & ITLSC1D2 Models provide the owner with customizable I/O Mapping. This becomes a very powerful and desirable feature when the owner needs added flexibility in controlling the circuit outputs beyond the standard single sensor input.

There are two types of I/O Mapping: Sensor Mapping and Output Mapping. Sensor Mapping is the assignment of one or more Sensor Inputs to one or more output circuits. Output Mapping is the assignment of one or more Power Outputs to one or more output circuits.

More on Sensor Mapping

Ambient or Line Sensing - Single Sensor:

A single sensor (RTD) may be mapped (or linked) to multiple Output Circuits. This allows several circuits to be controlled by a single sensor.

Minimum, Maximum, Averaging

Several sensors may be mapped to a single output circuit. This allows a single circuit to be controlled by the Minimum or the Maximum or the Average temperature of all of the sensors mapped to that output circuit. This may be desirable on long runs or zones which realize varying temperatures or weather conditions at different times of the day.

Multiple Sensor Mapping

A single sensor may be used independently or combined with other sensors to control more than one circuit.

Combining Sensing Types

The owner may need to have multiple Line and/or Ambient Sensing control scenarios occurring simultaneously.

More on Output Mapping

Output Power Sensing

A single Output demand value may be mapped to multiple Circuits. This allows several circuits to be controlled by a single Output demand value.

Minimum, Maximum, Averaging

Several Output demand values may be mapped to a single output circuit. This allows a circuit to be controlled by the Minimum or the Maximum or the Average Output demand value of all of the Outputs that are mapped to that single Circuit.

Multiple Output Mapping

A single output demand value may be used independently or combined with other output demand values to control more than one circuit.

** Available only on ITLSC1D2 & ITLSC1D2-EXT

Touch Screen Computer:

- 6 Loops displayed / screen
- Quick launch to any 6 loop group, Setup Menu or System Screens
- Full User Setting Capabilities - Specific Loop Naming/Identification, Baud rate, set points, units, alarms, etc.
- Remote Desktop Monitoring

Optional Features:

- NEMA 4X 304 SS Enclosure
- Fully Customizable I/O (Sensor and Output) Mapping**
- Enclosure Heater

IntelliTrace

Ambient Sensing

ITASC1D2 Base Panel

ITASC1D2-EXT Extender Panel

Line Sensing

ITLSC1D2 Base Panel

ITLSC1D2-EXT Extender Panel

Heat Tracing Control Panel Class I, Div. 2, 6-72 Loops

HEAT TRACE
CONTROLS

Technical Specifications

Panel Specifications

Supply Voltage:	100 - 600 VAC, 3 phase
Operating Environment:	-40 to +104°F (-40 to +40°C)
Enclosure:	NEMA 4 or Optional NEMA 4X 304 SS
Enclosure Size:	See Model Description Tables
Communications:	Modbus RTU/RS-485, Ethernet
Alarms:	Hi/Lo Temp, GFEP – 20mA to 150 mA, Hi/Lo Current – 0.1 to 50A or off
Input:	100Ω Platinum 3-wire RTD
Output:	SCR, Zero cross fired
Current Maximum:	40 Amps/Circuit at 104°F (40°C)
Auto-Cycle:	1-999 hours/off
Failed Sensor Output Setting:	0 – 100%
Control Mode:	Auto, Manual (Hand), Off Auto: PID or ON/OFF with adjustable dead band Manual: 0% - 100% output, 1% increment
Load Management:	DOT (Demand On Transfer) timing, with Soft Start
Approvals:	UL, cUL Listed. Optional CE & ATEX Certification
Area Classifications:	HAZ Class 1 Div 2
Temperature Rating:	T4A

IntelliTrace

Ambient Sensing

ITASC1D2 Base Panel

Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops

Technical Notes:

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. See ITASC1D2-EXT Extension Panel Order Table to increase total circuits

Model Product Description

ITASC1D2 ITASC1D2 series Intelligent Ambient Sensing Heat Trace Panel. Designed for Industrial applications and suitable for Class I, Division 2 Hazardous Areas. The ITASC1D2 series offers the following standard features: NEMA 4 enclosure, Industrial 12" (30 cm) Digital CE Computer Touchscreen Operator Interface, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits (Expandable to Seventy-Two Circuits*), Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment Protection, ModBus RTU/RS485 or TCP/Ethernet Communications, Remote Monitoring Capability, Selectable Soft Start Operation, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Thermostat Controlled Enclosure Heater and CE & ATEX Certification.

Code	Circuits	Enclosure Size HxWxD In (cm)	Line Voltage	Line Phase	Cable Voltage
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
12	12 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
18	18 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
24	24 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480

Code	Enclosure Rating, Material & Size	HxWxD In (cm)	Enclosure Mounting
1	NEMA 4 Painted Steel	Size is per design selection	Wall-Mount Enclosure
2	NEMA 4X 304 SS	24 x 24 x 12 (61 x 61 x 31)	Wall-Mount Enclosure
3	NEMA 4X 304 SS	42 x 36 x 12 (107 x 92 x 31)	Wall-Mount Enclosure
4	NEMA 4X 304 SS	48 x 36 x 12 (122 x 92 x 31)	Wall-Mount Enclosure
5	NEMA 4X 304 SS	60 x 36 x 12 (152 x 92 x 31)	Wall-Mount Enclosure

Code Enclosure Heater Class 1, Div 2

0	No Enclosure Heater	
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 6 & 12 circuit designs
2	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 6 & 12 circuit designs
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 6 & 12 circuit designs
4	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 18, 24, 30 & 36 circuit designs
5	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 18, 24, 30 & 36 circuit designs
6	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 18, 24, 30 & 36 circuit designs

Code Input Options

0	Standard Sensor Input
1	Dry Contact Closure from Ambient Sensing Thermostat
2	Remote Snow Sensor Input (i.e. SIT, GIT & CIT Type Sensors)
9	Special Configuration

Code Communications

0	Standard: Modbus RTU/RS485 or Modbus TCP/Ethernet
1	ModBus TCP/Wireless
2	BACNet
9	Other

Code Temperature Sensing Options

0	Standard Wired Sensing
1	Wireless Temperature Sensing - See Wireless Guidelines
9	Other

ITASC1D2 - 24 1 4 0 - 0 1 **Typical Model Number**

*42 - 72 circuit service via ITASC1D2-EXT Extension Panel. See ITASC1D2-EXT heat Tracing Extension Panel - Ambient Sensing - Class 1, Division 2 Order Table.

IntelliTrace

Ambient Sensing

ITASC1D2-EXT Extender Panel

Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops

Technical Notes:

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. These Extension Panels are to be paired with an ITASC1D2 Panel.

Model Product Description

ITASC1D2-EXT ITASC1D2-EXT series Intelligent Ambient Sensing Heat Trace Extension Panel. Designed for Industrial applications and suitable for Class I, Division 2 Hazardous Areas. Designed to be used with ITASC1D2 Heat Trace Line Sensing Panel to increase circuit service. ITASC1D2-EXT series offers the following standard features: NEMA 4 enclosure, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits, Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Thermostat Controlled Enclosure Heater and CE & ATEX Certification

Code	Circuits	Enclosure Size HxWxD In. (cm)	Line Voltage	Line Phase	Cable Voltage
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
12	12 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
18	18 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
24	24 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480

Code	Enclosure Rating, Material & Size	HxWxD In (cm)	Enclosure Mounting
1	NEMA 4 Painted Steel	Size is per design selection	Wall-Mount Enclosure
2	NEMA 4X 304 SS	24 x 24 x 12 (61 x 61 x 31)	Wall-Mount Enclosure
3	NEMA 4X 304 SS	42 x 36 x 12 (107 x 92 x 31)	Wall-Mount Enclosure
4	NEMA 4X 304 SS	48 x 36 x 12 (122 x 92 x 31)	Wall-Mount Enclosure
5	NEMA 4X 304 SS	60 x 36 x 12 (152 x 92 x 31)	Wall-Mount Enclosure

Code Enclosure Heater Class 1, Div 2

0	No Enclosure Heater	
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 6 & 12 circuit designs
2	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 6 & 12 circuit designs
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 6 & 12 circuit designs
4	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 18, 24, 30 & 36 circuit designs
5	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 18, 24, 30 & 36 circuit designs
6	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 18, 24, 30 & 36 circuit designs

ITASC1D2-EXT -24 1 4 Typical Model Number

Spare/Replacement Parts – ITASC1D2 & ITASC1D2-EXT

Part Number	Description
0135-02261	SSR/GFI Power Control
0135-02262	RTD Sensor Input Board Assembly
0135-02263	Digital Distribution Comm Board Assembly
0002-60054	SSR, 40 Amp rated
0029-00640	SSR Thermstrate Material
0025-05227	Common Alarm Relay
0081-10063	Power Supply 5 VDC 6A 30W DIN Rail Mount
0081-10047	Power Supply 24 VDC 2.5A 60W DIN Rail Mount
0023-15097-0001	6" (15 cm) Ribbon Cable with Connectors
0023-15097-0002	72" (180 cm) Ribbon Cable with Connectors

Accessories for ITASC1D2 & ITASC1D2-EXT

Part Number	Description
Contact Sales	Power Transformers
317315	RTD Aluminum, NEMA 4
317340	RTD, Expl. Resist., Cast Iron/Alum., NEMA 4
308144	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 50 ft
317342	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 200 ft
0076-15392	HMI Sunscreen, Painted Steel (ITLS/ITAS-6-72)
0076-12009	Floor Stand Kit, 12" (30 cm) Deep, Steel
0076-12050	Floor Stand Kit, 12" (30 cm) Deep, 304 SS
Contact Sales	Floor Stand Kit, 12" (30 cm) Deep, 316 SS

IntelliTrace

Line Sensing

ITLSC1D2 Base Panel

Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops

Technical Notes:

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. See ITLSC1D2-EXT Extension Panel Order Table to increase total circuits

Model Product Description

ITLSC1D2 ITLSC1D2 series Intelligent Line Sensing Heat Trace Panel. Designed for Industrial applications and suitable for Class I, Division 2 Hazardous Areas. The ITLSC1D2 series offers the following standard features: NEMA 4 enclosure, Industrial 12" (30 cm) Digital CE Computer Touchscreen Operator Interface, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits (Expandable to Seventy-Two Circuits*), Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment Protection, ModBus RTU/RS485 or TCP/Ethernet Communications, Remote Monitoring Capability, Selectable Soft Start Operation, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Customized I/O (Sensor & Output) Mapping, Thermostat Controlled Enclosure Heater and CE & ATEX Certification.

Code	Circuits	Enclosure Size HxWxD In (cm)	Line Voltage	Line Phase	Cable Voltage
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
12	12 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
18	18 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
24	24 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480

Code	Enclosure Rating, Material & Size	HxWxD In (cm)	Enclosure Mounting
1	NEMA 4 Painted Steel	Size is per design selection	Wall-Mount Enclosure
2	NEMA 4X 304 SS	24 x 24 x 12 (61 x 61 x 31)	Wall-Mount Enclosure
3	NEMA 4X 304 SS	42 x 36 x 12 (107 x 92 x 31)	Wall-Mount Enclosure
4	NEMA 4X 304 SS	48 x 36 x 12 (122 x 92 x 31)	Wall-Mount Enclosure
5	NEMA 4X 304 SS	60 x 36 x 12 (152 x 92 x 31)	Wall-Mount Enclosure

Code Enclosure Heater Class 1, Div 2

0	No Enclosure Heater	
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 6 & 12 circuit designs
2	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 6 & 12 circuit designs
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 6 & 12 circuit designs
4	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 18, 24, 30 & 36 circuit designs
5	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 18, 24, 30 & 36 circuit designs
6	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 18, 24, 30 & 36 circuit designs

Code	Inputs/Circuit	I/O Mapping
0	1	No I/O Mapping Use Enclosure Sizes from Above
1	1	Full I/O Mapping
2	2	Full I/O Mapping
3	3	Full I/O Mapping
9	X	Special Configuration

Code Communications

0	Standard: Modbus RTU/RS485 or Modbus TCP/Ethernet
1	ModBus TCP/Wireless
2	BACNet
9	Other

Code Temperature Sensing Options

0	Standard Wired Sensing
1	Wireless Temperature Sensing (Must select Full I/O Mapping) See Wireless Guidelines
9	Other

ITLSC1D2 - 24 1 4 3 - 0 0 **Typical Model Number**

*42 - 72 circuit service via ITLSC1D2-EXT Extension Panel. See ITLSC1D2-EXT heat Tracing Extension Panel - Line Sensing - Class 1, Division 2 Order table.

IntelliTrace

Line Sensing

ITLSC1D2-EXT Extender Panel

Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops

HEAT TRACE
CONTROLS

Technical Notes:

1. 120-264V customer supplied instrument power supply
2. Our standard SCCR is 5 KA. Consult sales if a different SCCR is needed.
3. Do Not Exceed 80% of Panelboard Rating
4. These Extension Panels are to be paired with an ITLSC1D2 Panel

Model Product Description

ITLSC1D2-EXT ITLSC1D2-EXT series Intelligent Line Sensing Heat Trace Extension Panel. Designed for Industrial applications and suitable for Class I, Division 2 Hazardous Areas. Designed to be used with ITLSC1D2 Heat Trace Line Sensing Panel to increase circuit service. ITLSC1D2-EXT series offers the following standard features: NEMA 4 enclosure, PID SCR Power Controller Rated at 40A Per Circuit at 104°F (40°C) Ambient, Six to Thirty-Six Circuits, Common Alarm Output, Hand/Off/Auto Operation, Current Monitoring, 30 mA Ground Fault Equipment protection, ModBus RTU/RS485 or TCP/Ethernet Communications, UL & cUL Third Party Compliance. Options Include: NEMA 4XSS Enclosure, Thermostat Controlled Enclosure Heater, Customized I/O (Sensor & Output) Mapping, Remote Monitoring Capability, CE & ATEX Certification.

Code	Circuits	Enclosure Size HxWxD In. (cm)	Line Voltage	Line Phase	Cable Voltage
06	6 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
12	12 Circuits	24 x 24 x 12 (61 x 61 x 31)	120/208/240/277/480	1	120/208/240/277/480
18	18 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
24	24 Circuits	42 x 36 x 12 (107 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
30	30 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480
36	36 Circuits	60 x 36 x 12 (152 x 92 x 31)	120/208/240/277/480	1	120/208/240/277/480

Code	Enclosure Rating, Material & Size	HxWxD, In (cm)	Enclosure Mounting
1	NEMA 4 Painted Steel	Size is per design selection	Wall-Mount Enclosure
2	NEMA 4X 304 SS	24 x 24 x 12 (61 x 61 x 31)	Wall-Mount Enclosure
3	NEMA 4X 304 SS	42 x 36 x 12 (107 x 92 x 31)	Wall-Mount Enclosure
4	NEMA 4X 304 SS	48 x 36 x 12 (122 x 92 x 31)	Wall-Mount Enclosure
5	NEMA 4X 304 SS	60 x 36 x 12 (152 x 92 x 31)	Wall-Mount Enclosure

Code Enclosure Heater Class 1, Div 2

0	No Enclosure Heater	
1	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 6 & 12 circuit designs
2	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 6 & 12 circuit designs
3	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 6 & 12 circuit designs
4	Thermostat Controlled Enclosure Heater (Anti-Condensation Heater)	For use with 18, 24, 30 & 36 circuit designs
5	Thermostat Controlled Enclosure Heater (to 0°F Ambient)	For use with 18, 24, 30 & 36 circuit designs
6	Thermostat Controlled Enclosure Heater (to -40°F Ambient)	For use with 18, 24, 30 & 36 circuit designs

Code	Inputs/Circuit	I/O Mapping
0	1	No I/O Mapping Use Enclosure Sizes from Above
1	1	Full I/O Mapping
2	2	Full I/O Mapping
3	3	Full I/O Mapping
9	X	Special Configuration

ITLSC1D2-EXT -24 1 4 3 Typical Model Number

** This code MUST match the same code on the Base ITLSC1D2 Panel

IntelliTrace

Line Sensing

ITLSC1D2 Base Panel

ITLSC1D2-EXT Extender Panel

Heat Tracing Control Panel

Class I, Div. 2, 6-72 Loops

Spare/Replacement Parts for ITLSC1D2 & ITLSC1D2-EXT

Part Number	Description
0135-02261	SSR/GFI Power Control
0135-02262	RTD Sensor Input Board Assembly
0135-02263	Digital Distribution Comm Board Assembly
0002-60054	SSR, 40 Amp rated
0029-00640	SSR Thermstrate Material
0025-05227	Common Alarm Relay
0081-10063	Power Supply 5 VDC 6A 30W DIN Rail Mount
0081-10047	Power Supply 24 VDC 2.5A 60W DIN Rail Mount
0023-15097-0001	6" (15 cm) Ribbon Cable with Connectors
0023-15097-0002	72" (180 cm) Ribbon Cable with Connectors

Accessories for ITLSC1D2 & ITLSC1D2-EXT

Part Number	Description
Contact Sales	Power Transformers
317315	RTD Aluminum, NEMA 4
317340	RTD, Expl. Resist., Cast Iron/Alum., NEMA 4
308056	RTD, Snap Lid, Alum., Ambient Sensing
308144	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 50 FT
317342	RTD Ext Wire, 3-wire, 16 ga, Cu, shielded, 200 FT
0076-12009	Floor Stand Kit, 12" (30 cm) Deep, Steel
0076-12050	Floor Stand Kit, 12" (30 cm) Deep, 304 SS
Contact Sales	Floor Stand Kit, 12" (30 cm) Deep, 316 SS

ITLSC1D2 & ITLSC1D2-EXT I/O Mapping:

Enclosure Sizes

Circuits	Enclosure Size - H x W x D, In (cm)	
	2 Inputs / Output	3 Inputs / Output
06	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)
12	24 x 24 x 12 (61 x 61 x 31)	24 x 24 x 12 (61 x 61 x 31)
18	42 x 36 x 12 (107 x 92 x 31)	42 x 36 x 12 (107 x 92 x 31)
24	42 x 36 x 12 (107 x 92 x 31)	48 x 36 x 12 (122 x 92 x 31)
30	60 x 36 x 12 (152 x 92 x 31)	60 x 36 x 12 (152 x 92 x 31)
36	60 x 36 x 12 (152 x 92 x 31)	60 x 36 x 12 (152 x 92 x 31)

1. The MAXIMUM number of Inputs for any ITLSC1D2 System, including Extension Panel, is 252.
2. When **Full I/O Mapping** is selected from the Order Table, any individual sensor or output may be mapped to more than one circuit. For Example: The average temperature of Sensors 1, 2 & 3 is used to control Circuit 1, while simultaneously the maximum temperature of Sensors 3, 4 & 5 is used to control Circuit 2.
3. The maximum amount of inputs for each panel design is as follows:

Total Number of Available Inputs per Panel Design for ITLSC1D2 & ITLSC1D2-EXT

Number of Circuits	Inputs / Circuit Code from Above Order Table			
	1	2	3	9
06	06	12	18	252
12	12	24	36	252
18	18	36	54	252
24	24	48	72	252
30	30	60	90	252
36	36	72	108	252

Wireless Guidelines - Please see ITLS/ITAS Installation & Instruction Manual for full details

1. Chromalox employs WirelessHART as its standard wireless protocol.
2. Wireless Transmitters require an RTD. Choose the appropriate connection/design for your sensing needs.

IntelliTrace

Wireless Temperature Sensing Solutions

- Seamlessly Integrates with ITLS & ITAS Heat Trace Control Systems
- Line or Ambient Sensing
- Ordinary and Hazardous Locations
- **WirelessHART** Certified
- Ideal for New Installations, Expansions & System Upgrades
- Local or Remote Locations
- Added Redundancy & Improved Safety
- Process Temperature Control Optimization
- System Testing Flexibility
- Industry Leading Components
- 360° Pipe or Structure Mounting



Wireless Temperature Transmitter



ITLS/ITAS IntelliTrace Heat Trace Control System



HEAT TRACE CONTROLS

WirelessHART

Description

Wireless is rapidly becoming the preferred sensing technology of choice in many commercial and industrial systems. Wireless sensing can greatly reduce installation costs and more easily solve geographically and structurally challenging sensing applications. Chromalox now provides fully integrated Wireless Temperature Sensing Solutions for Heat Trace applications in ordinary and hazardous areas. Whether you are designing a new heat trace system, expanding an existing one or need to optimize your process, and you are considering wireless temperature sensing, the Chromalox IntelliTrace ITLS & ITAS heat trace control panels are an ideal choice.

Wireless System Overview

System

The Wireless Temperature Sensing components of the Chromalox Heat Trace system include our IntelliTrace ITLS or ITAS Control Panel, which is configured for wireless sensing, and a specified industrial Wireless Transmitter, that is paired with an appropriate temperature sensor. We vigorously field-tested and validated the highest rated and most recognized industrial components available. Full wireless temperature sensing installation details and considerations are found in our ITLS & ITAS Installation Manual, PK497.

Control Panel

When the wireless temperature sensing feature is selected, our IntelliTrace Control Panel is internally equipped with an industrial-duty **WirelessHART** certified wireless gateway, antenna and the necessary communication accessories. The panel firmware facilitates wired and wireless temperature sensor inputs seamlessly. Our large 10" (250 mm) touchscreen computer HMI distinguishes wireless circuits from wired ones. Each wireless circuit has its own sensor battery life meter. This provides three levels of remaining battery life so that you may properly plan service before it is needed.

Wireless Transmitter

Chromalox has chosen the Rosemount® 248 Wireless Temperature Transmitter, which is an industry standard in the industrial wireless community. This transmitter is **WirelessHART** certified and it may be pipe or structure mounted. The 248 Transmitter is offered in either an aluminum or polymer housing and is available with or without the universal mounting bracket.

Temperature Sensor

We have standardized on an RTD type temperature sensor. See the heat trace temperature sensor table for several heat trace sensor choices.



IntelliTrace

Wireless Temperature Sensing Solutions

(cont'd.)

Wireless Sensing Components and Accessories

Wireless Temperature Transmitter

Rosemount 248 Wireless Temperature Transmitter, USA Intrinsically Safe and Non-incendive, Aluminum or Polymer Housing, with 1/2-14 NPT Conduit Entry Size, WirelessHART, 2.4 GHz, External Omni-directional Antenna (Aluminum Housing only), 5-point Calibration, External ground lug, 60Hz & 3 Year Warranty

Description	Part Number
Aluminum Housing with universal mounting bracket (248DXI5D2NSWA3WK1B5C4Q4G1WR3)	0108-70477
Aluminum Housing without universal mounting bracket (248DXI5D2NSWA3WK1C4Q4G1WR3)	0108-70478
Polymer Housing with universal mounting bracket (248DXI5P2NSWA3WP5B5C4Q4WR3)	0108-70479
Polymer Housing without universal mounting bracket (248DXI5P2NSWA3WP5C4Q4WR3)	0108-70480
Battery for 248 Wireless Transmitter with Aluminum Housing Only	0108-70432
Battery for 248 Wireless Transmitter with Polymer Housing Only	0108-70481

Rosemount 248 Wireless Temperature Transmitter



Polymer Housing



Aluminum Housing

Rosemount 248 Wireless Temperature Transmitter with Universal Mounting Bracket



Pipe Mounting



Structure Mount

IntelliTrace

Wireless Temperature Sensing Solutions *(cont'd.)*



RBF185M Heat Trace Sensor
Pipe Mounted with
Connection Head

Heat Trace Temperature Sensor - 100 Ohm, 3-Wire RTD

Pipe Mounted Heat Trace Sensor with Connection Head – 316 SS Sheath, 1/2" or 3/4" NPT Connection Port.

Model Number & Description	Part Number
RBF185M-HT30418RD31SB/C Aluminum - NEMA 4X	317315
RBF185M-HT30418RD91SB/C 316L Stainless Steel - NEMA 4X	317323
RBF185M-HT30418RD93SB/C Aluminum - Class I, Div's 1 & 2, NEMA 4X, IP66	317340
RBF185M-HT30418RD94SB/C 316L Stainless Steel - Class I, Div's 1 & 2, NEMA 4X, IP66	399550

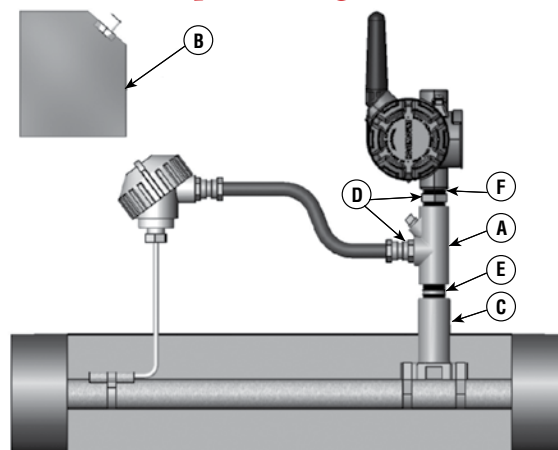
Wireless Transmitter Pipe Mounting Option0

Industrial grade components for mounting the wireless transmitter onto insulated or non-insulated piping.

Note: The conduit (customer supplied) from the transmitter fitting to the sensor must be rated for the environment in which it is being installed.

Description			Part Number	
PIPE STANDOFF KIT, DIVISION 1 & DIVISION 2			394337	
Item	Qty.	Component	Div. 1	Div. 2
A	1	3/4" Seal fitting	Yes	Yes
B	1	Sealing compound & fiber	Yes	No
C	1	Pipe standoff	Yes	Yes
D	2	3/4" x 1/2" NPT reducer with hex head	Yes	Yes
E	1	All-thread	Yes	Yes
F	1	1/2" NPT X 1" Nipple	Yes	Yes

Pipe Mounting Kit

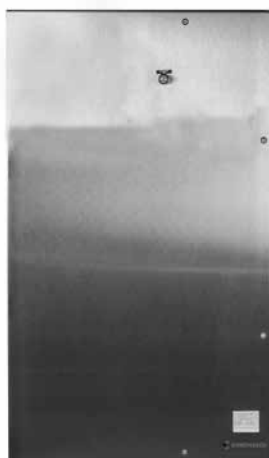


IntelliTrace

RSP

Remote Sensor Panel

- Consolidates Multiple Temperature Sensor Signals into a Single Enclosure
- Facilitates 1-252 Sensor Inputs
- Fully Integrated Package
- Works Seamlessly with ITAS & ITLS Heat Trace Control Systems
- Ordinary and Hazardous Locations
- Significant Installation Cost Savings
- Ideal for New Installations, Expansions & System Upgrades
- Local or Remote Locations
- Optional Wireless Communication
- Optional Enclosure Heater
- IP 66, NEMA 4 & 4X Enclosures
- UL/cUL, CE



Remote Sensor Panel



ITLS/ITAS IntelliTrace Heat Trace Control System



Description

The Chromalox RSP - Remote Sensor Panel greatly reduces installation costs as it facilitates the monitoring of 1 - 252 heat trace temperature sensor inputs within a single enclosure.

The RSP is a completely integrated package and it works seamlessly with the Chromalox IntelliTrace ITLS/ITAS heat trace control panels in either ordinary or hazardous areas.

The RSP communicates with the base panel via a single, twisted-pair wire return or via a wirelessly transmitted signal. Multiple RSP modules may be linked together for added convenience.

The RSP comes standard with NEMA 4 Painted Steel, NEMA 4X Fiberglass or NEMA 4X 304 SS wall mounted enclosure for Ordinary or Hazardous (Class I, Division 2) Areas, DIN rail mounted components, wired communication connection to the ITAS/ITLS Heat Trace Control Panel, Power-On lamp.

In addition, enclosure heaters for either ordinary or Class I, Division 2 areas as well as wireless communication between the RSP and base ITAS or ITLS control panels are available options.

Approvals

UL, cUL, CE

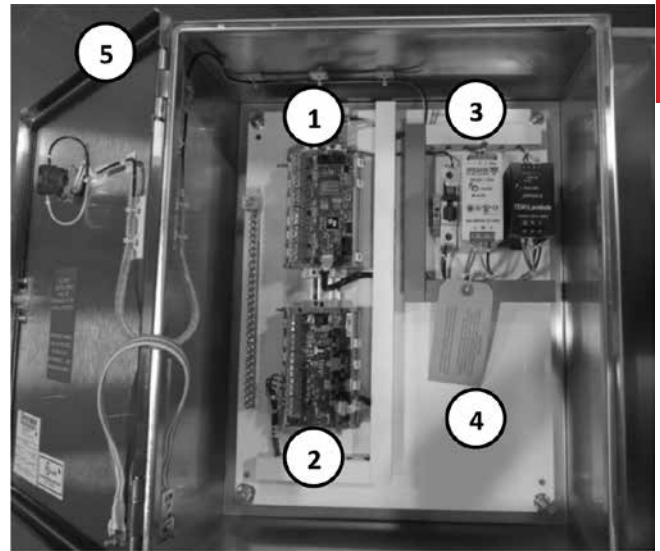
IntelliTrace

RSP

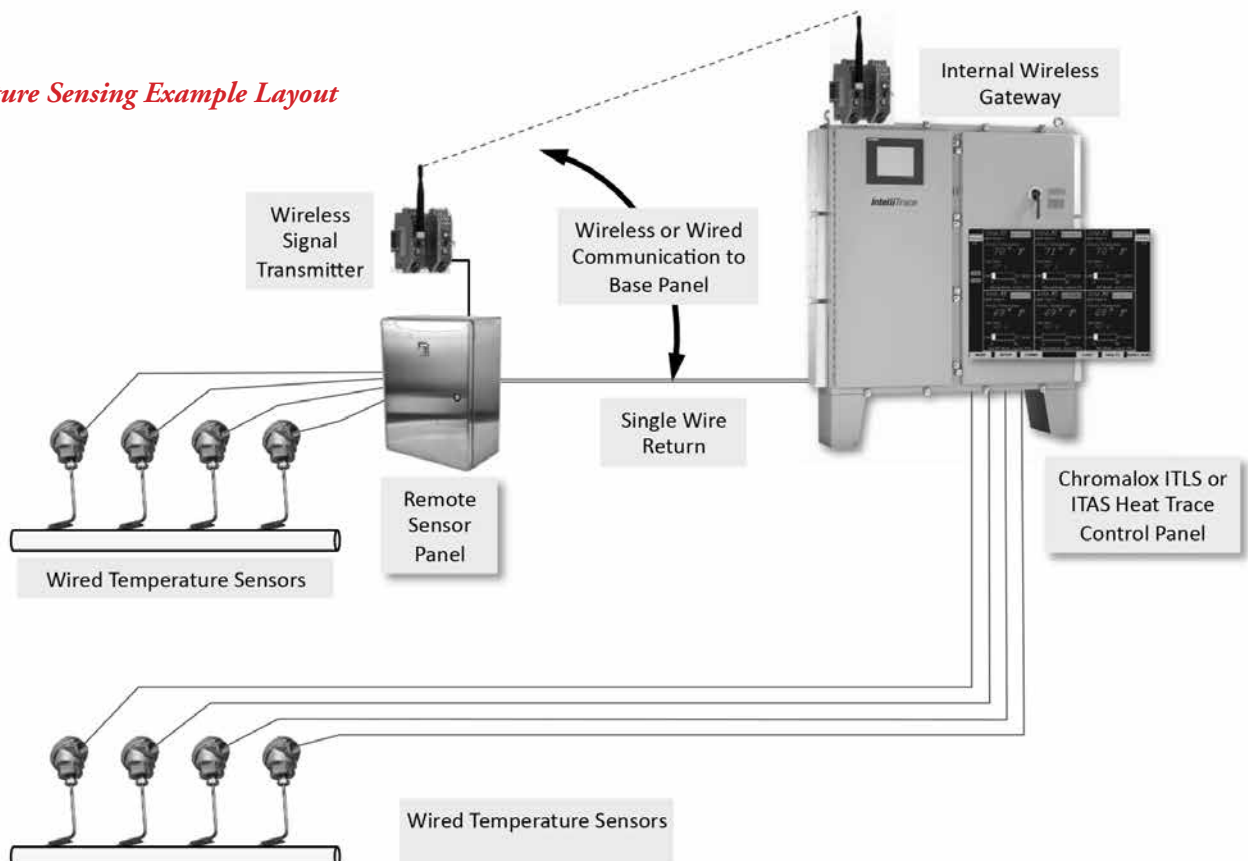
Remote Sensor Panel (cont'd.)

Remote Sensor Panel Example

1. **RTD Sensor Board** – facilitates the connection of up to 6 RTD sensor inputs per RTD Sensor board. Multiple boards may be employed in each enclosure.
2. **Communication / Distribution Board** – facilitates the intra-panel connection via Modbus RS485 (twisted pair). Wireless communication is available.
3. **Power Supply** – 100 – 240 VAC IN, 5 VDC out
4. **Enclosure Heater** – (not shown) Both ordinary area and Class I, Div. 2 designs are available
5. **Enclosure** – Fibreglas, Painted Steel or 304 Stainless Steel (316 SS is available as an option)



Temperature Sensing Example Layout



WeatherTrace

Freeze Protection Heat Trace Panels

- Standard NEMA 4 Enclosures
- NEMA 4X Stainless Steel Enclosure Option
- Hand/Off/Auto Selector Switch
- 12, 18, 20, 30, and 42 Position Panelboards
- 15, 25, 30, and 40 Amp Single-pole and Double-pole 30 mA Ground Fault Thermal-Magnetic Circuit Breakers
- 100 and 225 Amp Main Bus
- Single-phase 120/240 VAC
- Three-phase 120/208 VAC 4-Wire
- Three-phase 277 VAC 4-Wire
- 100 and 250 Amp Main Disconnect Switch Option
- Ambient and Line Sensing Control
- WeatherTrace Sentinel Monitoring with Common Alarm and Re-Ring Feature*
- Z-Purge Pressurization System for Class 1, Division 2 Option
- Enclosure Heater Option for Subzero Ambients
- UL and cUL Third Party Approvals

* The re-ring feature allows the WeatherTrace panel to communicate additional alarm conditions in the system by momentarily clearing and resetting the alarm output contact. The customer's monitoring device such as a PLC or DCS would interpret this condition to alert the operators of an additional alarm occurring.



Description

The Chromalox FPAS, FPLS, FPASM, and FPLSM series freeze protection heat trace panels offer power-distribution, ground-fault protection, individual circuit alarming, line and ambient sensing control.

The panels are housed in NEMA 4 enclosures for indoor/outdoor applications. NEMA 4X 304 stainless steel enclosures may be selected as an option for more harsh environments.

The standard models are available in 12, 18, 20, 30, and 42 position panelboards with 100 and 225 amp bus ratings in Single and Three-Phase configurations.

Branch circuit breakers are available in 20, 25, 30, and 40 amp single-pole and two-pole configurations with 30 mA ground-fault equipment protection.

FPAS – Freeze Protection Ambient Sensing Series

The FPAS series controls multiple heat trace circuits via an ambient sensing external thermostat, external electronic controller or via an ambient sensing, door mounted 1601E controller. Chromalox recommended controllers include: RTAS, RTAS-EP, B100, E100 or the 1601E microprocessor controller.

The FPAS may be operated in two modes; automatically with the external controller, or in manual override via the Hand/Off/Auto selector switch.

FPLS – Freeze Protection Line Sensing Series

The FPLS series controls each heat trace line with individual Chromalox RTBC, RTBC-EP, E-100 or E121 pipe line sensing controls. Each circuit should be controlled by an individual sensor/controller. Depending on the application, controllers can switch more than one circuit.

FPASM – Freeze Protection Ambient Sensing Monitor Series

The FPASM WeatherTrace with the Sentinel System, continually monitors the supply voltage to each individual heat trace circuit. Loss of voltage or a ground fault condition will trigger an automatic alarm condition, alerting plant personnel of critical process problems and reducing downtime. An annunciator panel then identifies the faulted zone and a Common Alarm is activated with the re-ring feature.*

The FPASM series controls multiple heat trace circuits via an ambient sensing external thermostat, external electronic controller or via an ambient sensing, door mounted 1601E controller. Chromalox recommended controllers include: RTAS, RTAS-EP, B100, E100 or the 1601E microprocessor controller.

The FPASM may be operated in two modes; automatically with the external controller or in manual override via the Hand/Off/Auto selector switch.

FPLSM – Freeze Protection Line Sensing Monitor Series

The FPLSM series controls heat trace lines with individual Chromalox RTBC, RTBC-EP, E100 or E121 pipe line sensing controls. Each circuit should be controlled by an individual sensor/controller. Depending on the application, controllers can switch more than one circuit.

The FPLSM is identical to the FPLS Plug. It features the WeatherTrace Sentinel which continually monitors the supply voltage to each individual heat trace circuit without the need for additional staff. Loss of voltage or a ground fault condition triggers an automatic alarm condition, alerting plant personnel of critical process problems and reducing downtime. An annunciator panel then identifies the faulted zone and a Common Alarm is activated with the re-ring feature.*

WeatherTrace

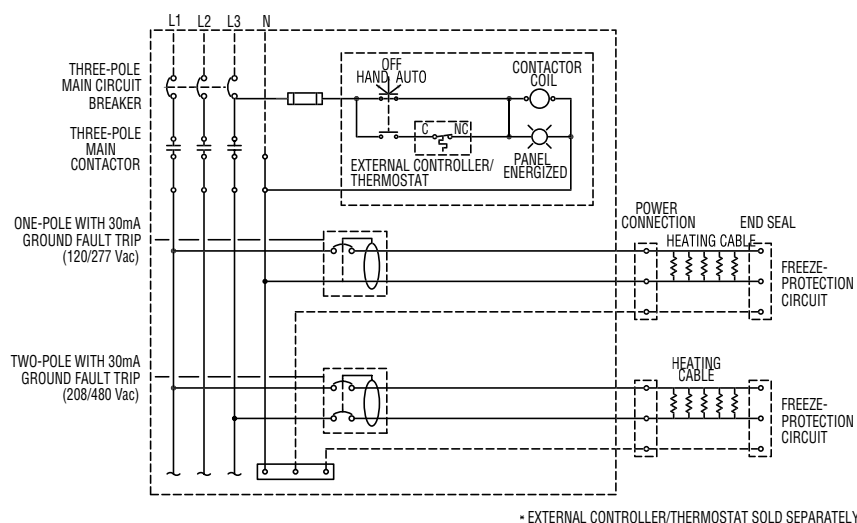
Freeze Protection Heat Trace Panels

(cont'd.)

Specifications

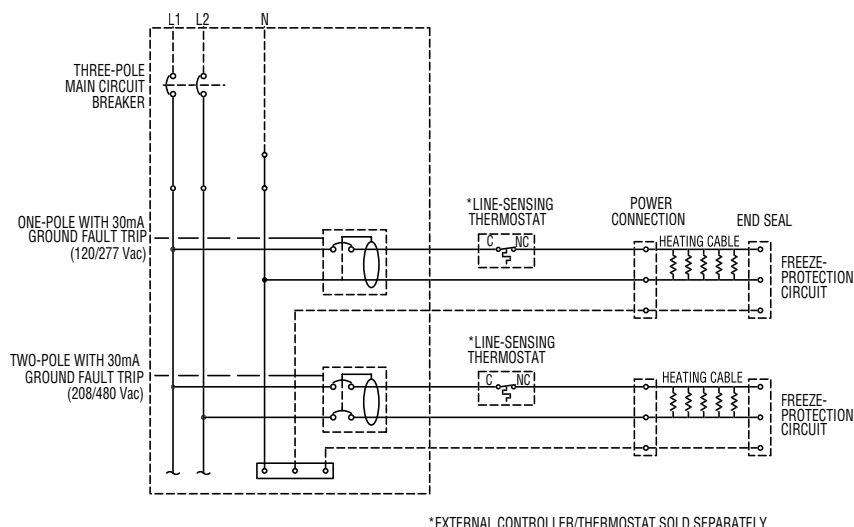
Power Source	120/240 VAC Single Phase 120/208 VAC Three-Phase 4-Wire 277/480 VAC Three-Phase 4-Wire
Ambient Operating Temperature	-32°F to 122°F (With Enclosure Heater)
Field Wire Size	14 - 18 AWG (15 - 30 Amp C.B.), 8 - 4 AWG (40 Amp C.B.)
Ground Fault Breaker Type	30mA Ground Fault Equipment Protection
Enclosure	NEMA 4 or NEMA 4X 304 Stainless Steel (option)
Main Bus Size	100 Amp and 225 Amp
Main Breaker Size	100 Amp Two-Pole Main Disconnect Switch with through Door Rotary Handle 250 Amp Three-Pole Main Disconnect Switch with through Door Rotary Handle
Pressurization System	Type Z Purge Pressurization System for Class 1 Division 2 Area
Approvals	UL and cUL

HEAT TRACE
CONTROLS



**Ambient Sensing
Three Phase
208/120 4-Wire or 480/277 4-Wire**

**Line Sensing
Single Phase
240/120**



WeatherTrace

Freeze Protection Heat Trace Panels (cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Remote Mounted Control Accessories	PCN
RTAS Thermostat	389589
RTAS-EP Division 2 Thermostat	389597
B-100 NEMA 4X Thermostat	305365
B-121 Division 2 Thermostat	384104
THL NEMA 4X Thermostat	387014
TXL Division 2 Thermostat	387022
LCD-1 Snow Switch	389781

Model 240/120 VAC Single-Phase, 208/120 VAC Three-Phase 4-Wire

FPAS FPAS series Ambient Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPAS series offers the following standard features: NEMA 4 enclosure, Hand/Off/Auto Selector Switch, Load Energized Indicator Lamp, Main Power On Lamp, Main Contactor, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Remote or Local Ambient Temperature Controller, Enclosure Heater, and Type Z Pressurization System. The FPAS series panels have UL and cUL Third Party Approvals.

Code	Panelboard	Available Breaker Poles	Enclosure Size HxWxD In. (cm)
12	12 Positions (100 Amp Main Rating)	(12) 1-pole breakers or (6) 2-pole Breakers	48 x 36 x 10 (122 x 92 x 25)
20	20 Positions (100 Amp Main Rating)	(20) 1-pole breakers or (10) 2-pole Breakers	48 x 36 x 10 (122 x 92 x 25)
30	30 Positions (225 Amp Main Rating)	(30) 1-pole breakers or (14) 2-pole Breakers	60 x 36 x 10 (152 x 92 x 25)
42	42 Positions (225 Amp Main Rating)	(42) 1-pole breakers or (20) 2-pole Breakers	60 x 36 x 10 (152 x 92 x 25)

Code	Line Voltage	Heater Load
1	240/120 VAC Single Phase, 3-Wire	120 VAC
2	208/120 VAC 3-Phase, 4-Wire	120 VAC
3	208/120 VAC 3-Phase, 4-Wire	208 VAC (240 VAC Cable)
4	240/120 VAC Single Phase, 3-Wire	240 VAC

Code	Enclosure Rating
1	NEMA 4 Single Door, Steel Wall-Mount Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 12 & 20)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 30 & 42)

Code	Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)
1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
3(*)	25 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
4(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
5(*)	15 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
6(*)	20 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
7(*)	25 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
8(*)	30 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
9(*)	40 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load

Code	Main Disconnect or Main Circuit Breaker Selection
0	None
	Disconnects
1	100 Amp with 65K Fault Protection (Code 12 & 20 Only)
2	250 Amp with 65K Fault Protection (Code 30 & 42 Only)
	Main Circuit Breakers for 240/120V line Voltage
A	80 Amp, 2 Pole Circuit Breaker
B	175 Amp, 2 Pole Circuit Breaker
C	250 Amp, 2 Pole Circuit Breaker
	Main Circuit Breakers for 208/120V line Voltage
F	50 Amp, 3 Pole Circuit Breaker
G	100 Amp, 3 Pole Circuit Breaker
H	150 Amp, 3 Pole Circuit Breaker
J	225 Amp, 3 Pole Circuit Breaker

Code	Ambient Controller
0	None (See Accessories)
5	6040-R00000 1/16 DIN Controller (Panel Door Mounted)

Code	Enclosure Heater
0	None
1	Thermostat Controlled Enclosure Heater

Code	Pressurization Control System
0	None
1	Type Z Class 1, Division 2

FPAS- 42 2 1 1(20) 2 5 0 0 Typical Model Number

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

100 Amp Panel Board		Breaker Rating					225 Panel Board		Breaker Rating				
Line Voltage		Maximum Number of Breakers					Line Voltage		Maximum Number of Breakers				
		15 Amp	20 Amp	25 Amp	30 Amp	40 Amp			15 Amp	20 Amp	25 Amp	30 Amp	40 Amp
Code 1 (1 Pole CB)		16	12	10	8		Code 1 (1 Pole CB)		37	28	22	18	
Code 2 (1 Pole CB)		20	18	15	12		Code 2 (1 Pole CB)		42	42	33	28	
Code 3 (2 Pole CB)		10	10	8	7	5	Code 3 (2 Pole CB)		20	20	19	16	14
Code 4 (2 Pole CB)		8	6	5	4	3	Code 4 (2 Pole CB)		18	14	11	9	7

WeatherTrace

Freeze Protection

Heat Trace Panels

(cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	277 VAC 4-Wire									
FPAS	FPAS series Ambient Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPAS series offers the following standard features: NEMA 4 enclosure, Hand/Off/Auto Selector Switch, Load Energized Indicator Lamp, Main Power On Lamp, Main Contactor, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Remote or Local Ambient Temperature Controller, Enclosure Heater, and Type Z Pressurization System. The FPAS series panels have UL and cUL Third Party Approvals.									
	Code	Panelboard				Available Breaker Poles			Enclosure Size HxWxD In, (cm)	
	181	18 Positions (100 Amp Main Rating)				(8) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)	
	301	30 Positions (100 Amp Main Rating)				(14) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)	
	421	42 Positions (100 Amp Main Rating)				(20) 1-pole breakers			60 x 36 x 10 (152 x 92 x 25)	
	302	30 Positions (225 Amp Main Rating)				(14) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)	
	422	42 Positions (225 Amp Main Rating)				(20) 1-pole breakers			60 x 36 x 10 (152 x 92 x 25)	
	Code	Power Source				Load Voltage				
	1	3 Phase Power, 277/480 VAC 4-Wire				277 VAC (240 VAC Cable)				
	Code	Enclosure Rating								
	1	NEMA 4 Single-Door, Wall-Mount Steel Enclosure								
	2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 181, 301 & 302)								
	3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 421 & 422)								
	Code	Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)								
	1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	3(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	4(*)	40 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	Code	Main Disconnect or Main Circuit Breaker Selection								
	0	None								
		Disconnects								
	1	100 Amp with 65K Fault Protection (Code 12 & 20 Only)								
	2	250 Amp with 65K Fault Protection (Code 30 & 42 Only)								
		Main Circuit Breakers								
	A	30 Amp, 3 Pole Circuit Breaker								
	B	50 Amp, 3 Pole Circuit Breaker								
	C	70 Amp, 3 Pole Circuit Breaker								
	F	125 Amp, 3 Pole Circuit Breaker								
	G	175Amp, 3 Pole Circuit Breaker								
	J	225 Amp, 3 Pole Circuit Breaker								
	Code	Ambient Controller								
	0	None (See Accessories)								
	5	6040-R00000 1/16 DIN Controller (Panel Door Mounted)								
	Code	Enclosure Heater								
	0	None								
	1	Thermostat Controlled Enclosure Heater								
	Code	Pressurization Control System								
	0	None								
	1	Type Z Class 1, Division 2								
FPAS-	302	1	1	2(10)	2	5	1	0	Typical Model Number	

FPAS- 302 1 1 2(10) 2 5 1 0 Typical Model Number

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

277 VAC	Breaker Rating			
	Maximum Number of Breakers			
	15 Amp	20 Amp	30 Amp	40 Amp
100 amp Panel Board	20	18	12	9
225 amp Panel Board	20	20	20	20

Remote Mounted Control Accessories	PCN
RTAS Thermostat	389589
RTAS-EP Division 2 Thermostat	389597
B-100 NEMA 4X Thermostat	305365
B-121 Division 2 TThermostat	384104
THL NEMA 4X Thermostat	387014
TXL Division 2 Thermostat	387022
LCD-1 Snow Switch	389781

WeatherTrace

Freeze Protection Heat Trace Panels (cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	240/120 VAC Single-Phase, 208/120 VAC Three-Phase 4-Wire							
FPLS	FPLS series Line Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPLS series offers the following standard features: NEMA 4 enclosure, Main Power on Lamp and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Enclosure Heater, and Type Z Pressurization System. The FPLS series have UL and cUL Third Party Approvals..							
Code	Panelboard	Available Breaker Poles		Enclosure Size HxWxD In. (cm)				
12	12 Positions (100 Amp Main Rating)	(12)	1-pole breakers or (6) 2-pole Breakers	48 x 36 x 10	(122 x 92 x 25)			
20	20 Positions (100 Amp Main Rating)	(20)	1-pole breakers or (10) 2-pole Breakers	48 x 36 x 10	(122 x 92 x 25)			
30	30 Positions (225 Amp Main Rating)	(30)	1-pole breakers or (14) 2-pole Breakers	60 x 36 x 10	(152 x 92 x 25)			
42	42 Positions (225 Amp Main Rating)	(42)	1-pole breakers or (20) 2-pole Breakers	60 x 36 x 10	(152 x 92 x 25)			
Code	Line Voltage	Heater Load						
1	240/120 VAC, Single Phase, 3 Wire	120 VAC						
2	208/120 VAC, 3 Phase, 4 Wire	120 VAC						
3	208/120 VAC, 3 Phase, 4 Wire	208 VAC (240 VAC Cable)						
4	240/120 VAC, Single Phase, 3 Wire	240 VAC						
Code	Enclosure	Rating						
1	NEMA 4 Single-Door, Wall-Mount Steel Enclosure							
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 12 & 20)							
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 30 & 42)							
Code	Branch Circuit Breaker (DO NOT EXCEED MAIN RATING)							
1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
3(*)	25 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
4(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
5(*)	15 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load							
6(*)	20 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load							
7(*)	25 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load							
8(*)	30 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load							
9(*)	40 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load							
Code	Main Disconnect Switch Selection							
0	None							
Disconnects								
1	100 Amp with 65K Fault Protection (Code 12 & 20 Only)							
2	250 Amp with 65K Fault Protection (Code 30 & 42 Only)							
Main Circuit Breakers for 240/120V line Voltage								
A	80 Amp, 2 Pole Circuit Breaker							
B	175 Amp, 2 Pole Circuit Breaker							
C	250 Amp, 2 Pole Circuit Breaker							
Main Circuit Breakers for 208/120V line Voltage								
F	50 Amp, 3 Pole Circuit Breaker							
G	100 Amp, 3 Pole Circuit Breaker							
H	150 Amp, 3 Pole Circuit Breaker							
J	225 Amp, 3 Pole Circuit Breaker							
Code	Enclosure Heater							
0	None							
1	Thermostat Controlled Enclosure Heater							
Code	Pressurization Control System							
0	None							
1	Type Z Class 1, Division 2							
FPLS-	20	1	1	1(4)	2	0	0	Typical Model Number
Technical Notes: (*) Enter number of circuit breakers in parenthesis								

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

100 Amp Panel Board		Breaker Rating				225 Panel Board		Breaker Rating			
Line Voltage		Maximum Number of Breakers				Line Voltage		Maximum Number of Breakers			
		15 Amp	20 Amp	25 Amp	30 Amp			15 Amp	20 Amp	25 Amp	30 Amp
Code 1 (1 Pole CB)		16	12	10	8	Code 1 (1 Pole CB)		37	28	22	18
Code 2 (1 Pole CB)		20	18	15	12	Code 2 (1 Pole CB)		42	42	33	28
Code 3 (2 Pole CB)		10	10	8	7	Code 3 (2 Pole CB)		20	20	19	16
Code 4 (2 Pole CB)		8	6	5	4	Code 4 (2 Pole CB)		18	14	11	9

WeatherTrace

Freeze Protection

Heat Trace Panels

(cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model	277 VAC 4-Wire							
FPLS	FPLS series Line Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPLS series offers the following standard features: NEMA 4 enclosure, Main Power on Lamp and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Enclosure Heater, and Type Z Pressurization System. The FPLS series have UL and cUL Third Party Approvals.							
Code	Panelboard	Available Breaker Poles			Enclosure Size HxWxD In. (cm)			
181	18 Positions (100 Amp Main Rating)	(8) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)			
301	30 Positions (100 Amp Main Rating)	(14) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)			
421	42 Positions (100 Amp Main Rating)	(20) 1-pole breakers			60 x 36 x 10 (152 x 92 x 25)			
302	30 Positions (225 Amp Main Rating)	(14) 1-pole breakers			48 x 36 x 10 (122 x 92 x 25)			
422	42 Positions (225 Amp Main Rating)	(20) 1-pole breakers			60 x 36 x 10 (152 x 92 x 25)			
Code	Power Source	Load Voltage						
1	3 Phase Power, 277/480 VAC 4-Wire	277 VAC (240 VAC Cable)						
Code	Enclosure Rating							
1	NEMA 4 Single-Door, Steel Wall-Mount Enclosure							
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 181, 301 & 302)							
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 421 & 422)							
Code	Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)							
1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
3(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load							
Code	Main Disconnect or Main Circuit Breaker Selection							
0	None							
Disconnects								
1	100 Amp with 25K Fault Protection (Code 181, 301 & 421 Only)							
2	250 Amp with 35K Fault Protection							
Main Circuit Breakers								
A	30 Amp, 3 Pole Circuit Breaker							
B	50 Amp, 3 Pole Circuit Breaker							
C	70 Amp, 3 Pole Circuit Breaker							
F	125 Amp, 3 Pole Circuit Breaker							
G	175 Amp, 3 Pole Circuit Breaker							
J	225 Amp, 3 Pole Circuit Breaker							
Code	Enclosure Heater							
0	None							
1	Thermostat Controlled Enclosure Heater							
Code	Pressurization Control System							
0	None							
1	Type Z Class 1, Division 2							
FPLS-	181	2	1	1(4)	1	1	0	Typical Model Number

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

277 VAC	Breaker Rating		
	Maximum Number of Breakers		
	15 Amp	20 Amp	30 Amp
100 amp Panel B	20	18	12
225 amp Panel B	20	20	20

WeatherTrace Freeze Protection Heat Trace Panels (cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Remote Mounted Control Accessories	PCN
RTAS Thermostat	389589
RTAS-EP Division 2 Thermostat	389597
B-100 NEMA 4X Thermostat	305365
B-121 Division 2 Thermostat	384104
THL NEMA 4X Thermostat	387014
TXL Division 2 Thermostat	387022
LCD-1 Snow Switch	389781

Model	FPASM 240/120 VAC Single-Phase, 208/120 VAC Three-Phase Wire									
FPASM	FPASM series Ambient Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPASM series offers the following standard features: NEMA 4 enclosure, Hand/Off/Auto Selector Switch, Load Energized Indicator Lamp, Main Power On Lamp, Main Contactor, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. The FPASM weatherTRACE Sentinel continually monitors the supply voltage to each individual heat trace circuit. Loss of voltage or ground fault condition triggers automatic alarm condition to an annunciator panel which identifies the faulted zone and a Common Alarm is activated with the Re-Ring Feature. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Remote or Local Ambient Temperature Controller, Enclosure Heater, and Type Z Pressurization System. The FPASM series have UL and cUL Third Party Approvals.									
Code	Panelboard	Available Breaker Poles				Enclosure Size HxWxD In. (cm)				
12	12 Positions (100 Amp Main Rating)	(12)	1-pole breakers or		(6)	2-pole Breakers		48 x 36 x 10	(122 x 92 x 25)	
20	20 Positions (100 Amp Main Rating)	(20)	1-pole breakers or		(10)	2-pole Breakers		48 x 36 x 10	(122 x 92 x 25)	
30	30 Positions (225 Amp Main Rating)	(30)	1-pole breakers or		(14)	2-pole Breakers		60 x 36 x 10	(152 x 92 x 25)	
42	42 Positions (225 Amp Main Rating)	(42)	1-pole breakers or		(20)	2-pole Breakers		60 x 36 x 10	(152 x 92 x 25)	
	Code	Line Voltage	Heater Load							
	1	240/120 VAC, Single Phase, 3 Wire	120 VAC							
	2	208/120 VAC, 3 Phase, 4 Wire	120 VAC							
	3	208/120 VAC, 3 Phase, 4 Wire	208 VAC (240 VAC Cable)							
	4	240/120 VAC, Single Phase, 3 Wire	240 VAC							
	Code	Enclosure Rating								
	1	NEMA 4 Single-Door, Wall-Mount Steel Enclosure								
	2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 12 & 20)								
	3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 30 & 42)								
	Code	Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)								
	1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	3(*)	25 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	4(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load								
	5(*)	15 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load								
	6(*)	20 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load								
	7(*)	25 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load								
	8(*)	30 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load								
	9(*)	40 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load								
	Code	Main Disconnect or Main Circuit Breaker Selection								
	0	None								
		Disconnects								
	1	100 Amp with 65K Fault Protection (Code 12 & 20 Only)								
	2	250 Amp with 65K Fault Protection (Code 30 & 42 Only)								
		Main Circuit Breakers for 240/120V line Voltage								
	A	80 Amp, 2 Pole Circuit Breaker								
	B	175 Amp, 2 Pole Circuit Breaker								
	C	250 Amp, 2 Pole Circuit Breaker								
		Main Circuit Breakers for 208/120V line Voltage								
	F	50 Amp, 3 Pole Circuit Breaker								
	G	100 Amp, 3 Pole Circuit Breaker								
	H	150 Amp, 3 Pole Circuit Breaker								
	J	225 Amp, 3 Pole Circuit Breaker								
	Code	Ambient Controller								
	0	None (See Accessories)								
	5	6040-R00000 1/16 DIN Controller (Panel Door Mounted)								
	Code	Enclosure Heater								
	0	None								
	1	Thermostat Controlled Enclosure Heater								
	Code	Pressurization Control System								
	0	None								
	1	Type Z Class 1, Division 2								
FPASM-	42	2	1	5(20)	2	5	0	0	Typical Model Number	

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

100 Amp Panel Board		Breaker Rating					225 Panel Board		Breaker Rating				
		Maximum Number of Breakers							Maximum Number of Breakers				
Line Voltage		15 Amp	20 Amp	25 Amp	30 Amp	40 Amp	Line Voltage		15 Amp	20 Amp	25 Amp	30 Amp	40 Amp
Code 1 (1 Pole CB)		16	12	10	8		Code 1 (1 Pole CB)		37	28	22	18	
Code 2 (1 Pole CB)		20	18	15	12		Code 2 (1 Pole CB)		42	42	33	28	
Code 3 (2 Pole CB)		10	10	8	7	5	Code 3 (2 Pole CB)		20	20	19	16	14
Code 4 (2 Pole CB)		8	6	5	4	3	Code 4 (2 Pole CB)		18	14	11	9	7

WeatherTrace

Freeze Protection

Heat Trace Panels

(cont'd.)

Ordering Information

To Order —
Complete the Model Number using the Matrix provided.

Model 277 VAC 4-Wire; ambient rating 40°C (104°F)

FPASM FPASM series Ambient Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPASM series offers the following standard features: NEMA 4 enclosure, Hand/Off/Auto Selector Switch, Load Energized Indicator Lamp, Main Power On Lamp, Main Contactor, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. The FPASM weatherTRACE Sentinel continually monitors the supply voltage to each individual heat trace circuit. Loss of voltage or ground fault condition triggers automatic alarm condition to an annunciator panel which identifies the faulted zone and a Common Alarm is activated with the Re-Ring Feature. Options include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Remote or Local Ambient Temperature Controller, Enclosure Heater, and Type Z Pressurization System. The FPASM series have UL and cUL Third Party Approvals..

HEAT TRACE
CONTROLS

Code	Panelboard	Available Breaker Poles	Enclosure Size HxWxD In. (cm)
181	18 Positions (100 Amp Main Rating)	(8) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
301	30 Positions (100 Amp Main Rating)	(14) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
421	42 Positions (100 Amp Main Rating)	(20) 1-pole breakers	60 x 36 x 10 (152 x 92 x 25)
302	30 Positions (225 Amp Main Rating)	(14) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
422	42 Positions (225 Amp Main Rating)	(20) 1-pole breakers	60 x 36 x 10 (152 x 92 x 25)

Code	Power Source	Heater Load
1	3 Phase Power, 277/480 VAC 4-Wire	277 VAC (240 VAC Cable)

Code	Enclosure Rating
1	NEMA 4 Single-Door, Wall-Mount Steel Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 181, 301 & 302)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 421 & 422)

Code	Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)
1(*)	15 Amp 1-Pole GFI Circuit Breaker for 277 VAC load
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 277 VAC load
3(*)	30 Amp 1-Pole GFI Circuit Breaker for 277 VAC load
4(*)	40 Amp 1-Pole GFI Circuit Breaker for 277 VAC load

Code	Main Disconnect or Main Circuit Breaker Selection
0	None
1	Disconnect
2	100 Amp with 25K Fault Protection (Code 181, 301 & 421 Only)
2	250 Amp with 35K Fault Protection
Main Circuit Breakers	
A	30 Amp, 3 Pole Circuit Breaker
B	50 Amp, 3 Pole Circuit Breaker
C	70 Amp, 3 Pole Circuit Breaker
F	125 Amp, 3 Pole Circuit Breaker
G	175 Amp, 3 Pole Circuit Breaker
J	225 Amp, 3 Pole Circuit Breaker

Code	Ambient Controller
0	None (See Accessories)
5	6040-R00000 1/16 DIN Controller (Panel Door Mounted)

Code	Enclosure Heater
0	None
1	Thermostat Controlled Enclosure Heater

Code	Pressurization Control System
0	None
1	Type Z Class 1, Division 2

FPASM-	422	1	1	1(20)	2	5	0	0	Typical Model Number
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Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

	Breaker Rating			
	Maximum Number of Breakers			
277 VAC	15 Amp	20 Amp	30 Amp	40 Amp
100 amp Panel Board	20	18	12	9
225 amp Panel Board	20	20	20	20

Remote Mounted Control Accessories	PCN
RTAS Thermostat	389589
RTAS-EP Division 2 Thermostat	389597
B-100 NEMA 4X Thermostat	305365
B-121 Division 2 TThermostat	384104
THL NEMA 4X Thermostat	387014
TXL Division 2 Thermostat	387022
LCD-1 Snow Switch	389781

WeatherTrace

Freeze Protection Heat Trace Panels (cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model 240/120 VAC Single-Phase, 208/120 VAC Three-Phase 4-Wire

FPLSM FPLSM series Line Sensing Heat Trace Panels are designed for use in industrial Freeze Protection and Snow Melt applications. The Chromalox FPLSM series offers the following standard features: NEMA 4 enclosure, Main Power On Lamp, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. The FPLSM WeatherTRACE Sentinel continually monitors the supply voltage to each individual heat trace circuit. Loss of voltage or a ground fault condition triggers and automatic alarm to an annunciator panel which identifies the faulted zone and a Common Alarm is activated with the Re-Ring Feature. Options Include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Cabinet Heater, and Type Z Pressurization System. The FPLSM series panels have UL and cUL Third Party Approvals.

Code	Panelboard	Available Breaker Poles	Enclosure Size HxWxD In. (cm)
12	12 Positions (100 Amp Main Rating)	(12) 1-pole breakers or (6) 2-pole Breakers	48 x 36 x 10 (122 x 92 x 25)
20	20 Positions (100 Amp Main Rating)	(20) 1-pole breakers or (10) 2-pole Breakers	48 x 36 x 10 (122 x 92 x 25)
30	30 Positions (225 Amp Main Rating)	(30) 1-pole breakers or (14) 2-pole Breakers	60 x 36 x 10 (152 x 92 x 25)
42	42 Positions (225 Amp Main Rating)	(42) 1-pole breakers or (20) 2-pole Breakers	60 x 36 x 10 (152 x 92 x 25)

Code	Line Voltage	Heater Load
1	240/120 VAC, Single Phase, 3 Wire	120 VAC
2	208/120 VAC 3-Phase, 4-Wire	120 VAC
3	208/120 VAC 3-Phase, 4-Wire	208 VAC (240 VAC Cable)
4	240/120 VAC Single Phase, 3 Wire	240 VAC

Code	Enclosure Rating
1	NEMA 4 Single Door, Steel Wall-Mount Enclosure
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 12 & 20)
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure (Codes 30 & 42)

Code Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)

1(*)	15 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
3(*)	25 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
4(*)	30 Amp 1-Pole GFI Circuit Breaker for 120 VAC load
5(*)	15 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
6(*)	20 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
7(*)	25 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load
8(*)	30 Amp 2-Pole GFI Circuit Breaker for 208/240 VAC load

Code Main Disconnect or Main Circuit Breaker Selection

0	None
1	100 Amp with 65K Fault Protection (Code 12 & 20 Only)
2	250 Amp with 65K Fault Protection (Code 30 & 42 Only)
Main Circuit Breakers for 240/120V Line Voltage	
A	80 Amp, 2 Pole Circuit Breaker
B	175 Amp, 2 Pole Circuit Breaker
C	250 Amp, 2 Pole Circuit Breaker
Main Circuit Breakers for 208/120V Line Voltage	
F	50 Amp, 3 Pole Circuit Breaker
G	100 Amp, 3 Pole Circuit Breaker
H	150 Amp, 3 Pole Circuit Breaker
J	225 Amp, 3 Pole Circuit Breaker

Code Enclosure Heater

0	None
1	Thermostat Controlled Enclosure Heater

Code Pressurization Control System

0	None
1	Type Z Class 1, Division 2

FPLSM- 30 2 1 2(30) 3 5 0 Typical Model Number

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

100 Amp Panel Board		Breaker Rating				225 Panel Board		Breaker Rating			
Line Voltage		Maximum Number of Breakers				Line Voltage		Maximum Number of Breakers			
		15 Amp	20 Amp	25 Amp	30 Amp			15 Amp	20 Amp	25 Amp	30 Amp
Code 1 (1 Pole CB)		16	12	10	8	Code 1 (1 Pole CB)		37	28	22	18
Code 2 (1 Pole CB)		20	18	15	12	Code 2 (1 Pole CB)		42	42	33	28
Code 3 (2 Pole CB)		10	10	8	7	Code 3 (2 Pole CB)		20	20	19	16
Code 4 (2 Pole CB)		8	6	5	4	Code 4 (2 Pole CB)		18	14	11	9

WeatherTrace

Freeze Protection

Heat Trace Panels

(cont'd.)

Ordering Information

To Order —
Complete the
Model Number
using the Matrix
provided.

Model 277 VAC 4-Wire; Ambient Rating 40°C (104°F)

FPLSM FPLSM series Line Sensing Heat Trace Panels are designed for use in Freeze Protection and Snow Melt applications. The Chromalox FPLSM series offers the following standard features: NEMA 4 enclosure, Main Power On Lamp, and Thermal Magnetic Branch Circuit Breakers with 30mA Ground Fault Equipment Protection. The FPLSM WeatherTRACE Sentinel continually monitors the supply voltage to each individual heat trace circuit. Loss of voltage or a ground fault condition triggers and automatic alarm to an annunciator panel which identifies the faulted zone and a Common Alarm is activated with the Re-Ring Feature. The FPLSM Options Include: NEMA 4X 304 Stainless Steel Enclosures, Main Disconnect Switch, Enclosure Heater, and Type Z Pressurization System. The FPLSM series panels have UL and cUL Third Party Approvals.

Code	Panelboard	Available Breaker Poles	Enclosure Size HxWxD In, (cm)
181	18 Positions (100 Amp Main Rating)	(8) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
301	30 Positions (100 Amp Main Rating)	(14) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
421	42 Positions (100 Amp Main Rating)	(20) 1-pole breakers	60 x 36 x 10 (152 x 92 x 25)
302	30 Positions (225 Amp Main Rating)	(14) 1-pole breakers	48 x 36 x 10 (122 x 92 x 25)
422	42 Positions (225 Amp Main Rating)	(20) 1-pole breakers	60 x 36 x 10 (152 x 92 x 25)

Code	Power Source	Heater Load
1	3 Phase Power, 277/480 VAC 4-Wire	277 VAC (240 VAC Cable)

Code	Enclosure	Rating
1	NEMA 4 Single-Door, Wall-Mount Steel Enclosure	
2	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 181, 301 & 302)	
3	NEMA 4X 304 Stainless Steel Wall-Mount Enclosure; (Code 421 & 422)	

Code Branch Circuit Breaker Selection (DO NOT EXCEED MAIN RATING)

1(*)	15 Amp 1-Pole GFI Circuit Breaker for 277 VAC load
2(*)	20 Amp 1-Pole GFI Circuit Breaker for 277 VAC load
3(*)	30 Amp 1-Pole GFI Circuit Breaker for 277 VAC load

Code Main Disconnect or Main Circuit Breaker Selection

0	None
Disconnects	
1	100 Amp with 25K Fault Protection (Code 181, 301 & 421 Only)
2	250 Amp with 35K Fault Protection
Main Circuit Breakers	
A	30 Amp, 3 Pole Circuit Breaker
B	50 Amp, 3 Pole Circuit Breaker
C	70 Amp, 3 Pole Circuit Breaker
F	125 Amp, 3 Pole Circuit Breaker
G	175 Amp, 3 Pole Circuit Breaker
J	225 Amp, 3 Pole Circuit Breaker

Code Enclosure Heater

0	None
1	Thermostat Controlled Enclosure Heater

Code Pressurization Control System

0	None
1	Type Z Class 1, Division 2

FPLSM- 181 1 1 1(5) 1 0 0 Typical Model Number

Technical Notes: (*) Enter number of circuit breakers in parenthesis

Note: Maximum number of circuit breakers is dependent on the panelboard size (see panelboard selection) and the current capacity of the panelboard (see table below)

277 VAC	Breaker Rating		
	Maximum Number of Breakers		
	15 Amp	20 Amp	30 Amp
100 amp Panel Board	20	18	12
225 amp Panel Board	20	20	20

Technical Information

Heat Transfer Fundamentals & Thermodynamic Properties

Heat Transfer Fundamentals

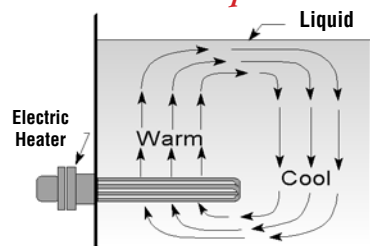
The principles of heat transfer are well understood and are briefly described below. Heat energy is transferred by three basic modes. All heating applications involve each mode to a greater or lesser degree.

- Conduction
- Convection
- Radiation

Conduction is the transfer of heat energy through a solid material. Metals such as copper and aluminum are good conductors of heat energy. Glass, ceramics and plastics are relatively poor conductors of heat energy and are frequently used as thermal insulators. All gases are poor conductors of heat energy. A combination of expanded glass or ceramic fiber filled with air is excellent thermal insulation. Typical conduction heating applications include platen heating (cartridge heaters), tank heating (strip and ring heaters), pipe tracing and other applications where the heater is in direct contact with the material being heated.

Convection is the transfer of heat energy by circulation and diffusion of the heated media. It is the most common method of heating fluids or gases and also the most frequent application of electric tubular elements and assemblies. Fluid or gas in direct contact with a heat source is heated by conduction causing it to expand. The expanded material is less dense or lighter than its surroundings and tends to rise. As it rises, gravity replaces it with colder, denser material which is then heated, repeating the cycle. This circulation pattern distributes the heat energy throughout the media. Forced convection uses the same principle except that pumps or fans move the liquid or gas instead of gravity.

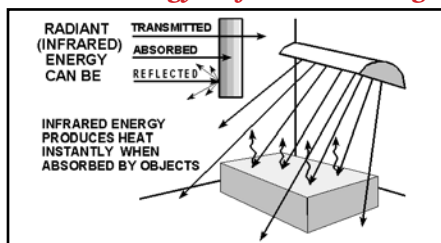
Convection in a Liquid



Typical convection heating applications include water and oil immersion heating, air heating, gas heating and comfort air heating.

Radiation is the transfer of heat energy by electromagnetic (infrared) waves and is very different from conduction and convection. Conduction and convection take place when the material being heated is in direct contact with the heat source. In infrared heating, there is no direct contact with the heat source. Infrared energy travels in straight lines through space or vacuum (similar to light) and does not produce heat energy until absorbed. The converted heat energy is then transferred in the material by conduction or convection.

Radiant Energy (Infrared) Heating



All objects above “absolute zero” temperature radiate infrared energy with warmer objects radiating more energy than cooler objects. Infrared energy radiating from a hot object (heating element) strikes the surface of a cooler object (work piece), is absorbed and converted to heat energy. Paint drying by radiant heaters is a typical application of infrared heating. The most important principle in infrared heating is that infrared energy radiates from the source in straight lines and **does not become heat energy until absorbed by the work product.**

Thermodynamic Properties

All materials have basic physical constants and thermodynamic properties. These constants are used in the evaluation of the materials and in heat energy calculations. The constants and properties most often used are:

- Specific Heat (C_p)
- Heat of Fusion (H_{fus})
- Heat of Vaporization (H_{vap})
- Thermal Conductivity (k)
- Thermal Resistivity (R)

Specific Heat (Quantity of Heat Energy) — All materials contain or absorb heat energy in differing amounts. The quantity of heat energy or thermal capacity of a particular material is called its **specific heat**.

The specific heat of a substance is defined as the amount of heat energy required to raise one pound of the material by one degree Fahrenheit. Specific heat factors are usually defined as British thermal units per pound per degree Fahrenheit (**Btu/lb/°F**). The specific heat of most materials is constant at only one temperature and usually varies to some degree with temperature. Water has a specific heat of 1.0 and absorbs large quantities of heat energy. Air, with a specific heat of 0.24, absorbs considerably less heat energy per pound.

Heat of Fusion or Vaporization — Many materials can change from a solid to a liquid to a gas. For the change of state to occur, heat energy must be added or released. Water is a prime example in that it changes from a solid (ice) to a liquid (water) to a gas (steam or vapor). If the change is from a solid to a liquid to a gas, heat energy is added. If the change is from a gas to a liquid to a solid, heat energy is released. These energy requirements are called the **heat of fusion** and the **heat of vaporization**. They are expressed as Btu per pound (**Btu/lb**).

- **Heat of Fusion** is the amount of energy required to transform a material from a solid to a liquid (or the reverse) at the same temperature. Water has a heat of fusion of 143 Btu/lb.
- **Heat of Vaporization** is the amount of energy required to transform a material from a liquid to a gas (or the reverse) at the same temperature. Water has a high heat of vaporization, 965 Btu/lb. Water can transfer large amounts of heat energy in the form of condensing steam.

Thermal Conductivity is the ability of a material to transmit heat energy by conduction. Thermal conductivity is identified as “ k ” and is usually expressed in British thermal units per linear inch (or foot) per hour per square foot of area per degree Fahrenheit. (**Btu/in/hr/ft²/°F**) or (**Btu/ft/hr/ft²/°F**). “ k ” factors are used extensively in comfort heating applications to rate the effectiveness of building construction and other materials as thermal insulation. “ k ” factors are also used in the calculation of heat losses through pipe and tank insulation.

Thermal Resistivity or “ R ” is the inverse of thermal conductivity. Insulating materials are rated by “ R ” factors. The higher the “ R ” factor, the more effective the insulation.

Technical Information

Determining Heat Energy Requirements

General Applications

The objective of any heating application is to raise or maintain the temperature of a solid, liquid or gas to or at a level suitable for a particular process or application. Most heating applications can be divided into two basic situations; applications which require the maintenance of a constant temperature and applications or processes which require work product to be heated to various temperatures. The principles and calculation procedures are similar for either situation.

Constant Temperature Applications

Most constant temperature applications are special cases where the temperature of a solid, liquid or gas is maintained at a constant value regardless of ambient temperature. Design factors and calculations are based on steady state conditions at a fixed difference in temperature. Heat loss and energy requirements are estimated using "worst case" conditions. For this reason, determining heat energy requirements for a constant temperature application is relatively simple. Comfort heating (constant air temperature) and freeze protection for piping are typical examples of constant temperature applications. The equations and procedures for calculating heat requirements for several applications are discussed later in this section.

Variable Temperature Applications

Variable temperature (process) applications usually involve a start-up sequence and have numerous operating variables. The total heat energy requirements for process applications are determined as the sum of these calculated variables. As a result, the heat energy calculations are usually more complex than for constant temperature applications. The variables are:

Total Heat Energy Absorbed — The sum of all the heat energy absorbed during start-up or operation including the work product, the latent heat of fusion (or vaporization), make up materials, containers and equipment.

Total Heat Energy Lost — The sum of the heat energy lost by conduction, convection, radiation, ventilation and evaporation during start-up or operation.

Design Safety Factor — A factor to compensate for unknowns in the process or application.

Process Applications

The selection and sizing of the installed equipment in a process application is based on the **larger of two calculated heat energy requirements**. In most process applications, the start-up and operating parameters represent two distinctly different conditions in the same process. The heat energy required for start-up is usually considerably different than the energy required for operating conditions. In order to accurately assess the heat requirements for an application, each condition must be evaluated. The comparative values are defined as follows:

- **Calculated heat energy required for process start-up over a specific time period.**
- **Calculated heat energy required to maintain process temperatures and operating conditions over a specific cycle time.**

Determining Heat Energy Absorbed

The first step in determining total heat energy requirements is to determine the heat energy absorbed. If a change of state occurs as a direct or indirect part of the process, the heat energy required for the change of state must be included in the calculations. This rule applies whether the change occurs during start-up or later when the material is at operating temperature. Factors to be considered in the heat absorption calculations are shown below:

Start-Up Requirements (Initial Heat-Up)

- Heat absorbed during start-up by:
 - Work product and materials
 - Equipment (tanks, racks, etc.)
- Latent heat absorption at or during start-up:
 - Heat of fusion
 - Heat of vaporization
- Time factor

Operating Requirements (Process)

- Heat absorbed during operation by:
 - Work product in process
 - Equipment loading (belts, racks, etc.)
 - Make up materials
- Latent heat absorption during operation:
 - Heat of fusion
 - Heat of vaporization
- Time (or cycle) factor, if applicable

Determining Heat Energy Lost

Objects or materials at temperatures above the surrounding ambient lose heat energy by conduction, convection and radiation. Liquid surfaces exposed to the atmosphere lose heat energy through evaporation. The calculation of total heat energy requirements must take these losses into consideration and provide sufficient energy to offset them. Heat losses are estimated for both start-up and operating conditions and are added into the appropriate calculation.

Heat Losses at Start-Up — Initially, heat losses at start-up are zero since the materials and equipment are all at ambient temperature. Heat losses increase to a maximum at operating temperature. Consequently, start-up heat losses are usually based on an average of the loss at start-up and the loss at operating temperature.

Heat Losses at Operating Temperature — Heat losses are at a maximum at operating temperature. Heat losses at operating temperature are taken at full value and added to the total energy requirements.

Estimating Heat Loss Factors

The heat losses just discussed can be estimated by using factors from the charts and graphs provided in this section. Total losses include radiation, convection and conduction from various surfaces and are expressed in watts per hour per unit of surface area per degree of temperature ($W/hr/ft^2/^\circ F$).

Note — Since the values in the charts are already expressed in watts per hour, they are not influenced by the time factor "t" in the heat energy equations.

Design Safety Factors

In many heating applications, the actual operating conditions, heat losses and other factors affecting the process can only be estimated. A safety factor is recommended in most calculations to compensate for unknowns such as ventilation air, thermal insulation, make up materials and voltage fluctuations. As an example, a voltage fluctuation (or drop) of 5% creates a 10% change in the wattage output of a heater.

Safety factors vary from 10 to 25% depending on the level of confidence of the designer in the estimate of the unknowns. The safety factor is applied to the sum of the calculated values for heat energy absorbed and heat energy lost.

Technical Information

Determining Heat Energy Requirements (*cont'd.*)

Comfort Heating

For complete building and space heating applications, it is recommended that a detailed analysis of the building construction heat losses (walls, ceilings, floors, windows, etc.) be performed using ASHRAE guidelines. This is the most accurate and cost effective estimating procedure. However, a quick estimate of the kW requirements for room and supplemental heating or freeze protection can be obtained using the chart to the right.

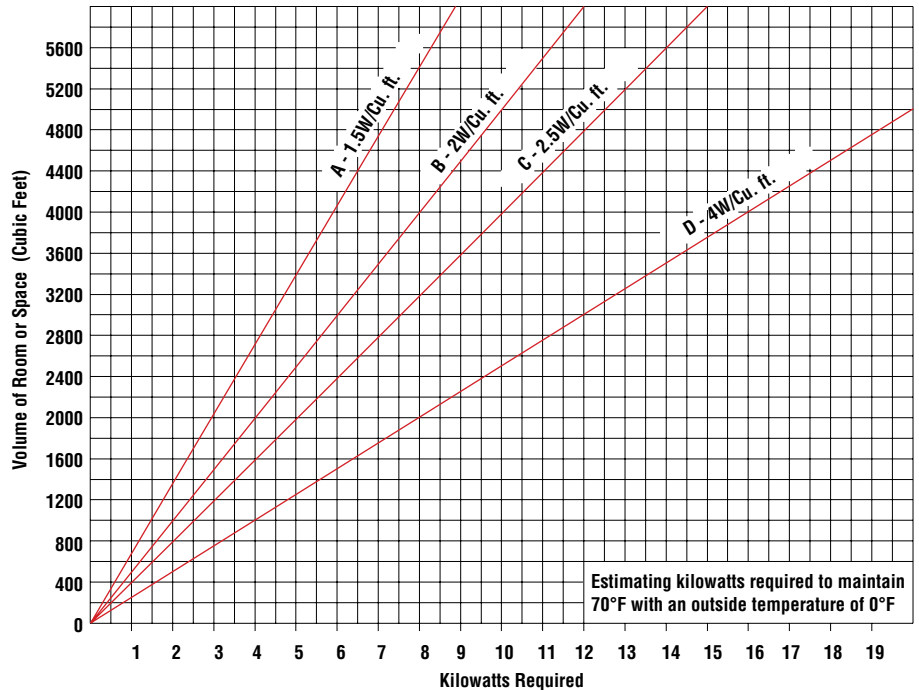
Problem — A warehouse extension measures 20 ft long x 13 ft wide x 9 ft high. The building is not insulated. Construction is bare concrete block walls and an open ceiling with a plywood deck and built-up roof. Determine the kW required to maintain the warehouse at 70°F when the outside temperature is 0°F.

Solution —

1. **Calculate** the volume of the room.
 $20 \text{ ft} \times 13 \text{ ft} \times 9 \text{ ft} = 2,340 \text{ ft}^3$
2. **Refer** to the chart, use Curve D which corresponds to the building construction.
3. **Find** the intersection of 2,340 ft³ with curve D. The kilowatts required are 9.3 kW. Suggest using a 10 kW unit blower heater.

Note — If the volume of the room is larger

Comfort Heating Chart



Curve A — Rooms with little or no outside exposure. No roof or floor with outside exposure; only 1 wall exposed with not over 15% door and window area.

Curve B — Rooms with average exposure. Roof and 2 or 3 walls exposed, up to 30% door and window area. But with roof, walls and floor insulated if exposed to outside temperatures.

Curve C — Rooms with roof, walls and floor uninsulated but with inside facing on walls and ceiling.

Curve D — Exposed guard houses, pump houses, cabins and poorly constructed rooms with reasonably tight joints but no insulation. Typical construction of corrugated metal or plywood siding, single layer roofs.

than the chart values, divide by 2, 3, 4, etc. until the trial volume fits the curve. Then select heater from this volume. Multiply heaters selected by the number used to select the trial volume.

Technical Information

General Industrial Sizing Guide

CHROMALOX

General Industrial Sizing Guide

Heat Loss Calculation- Indoor

Job Name: _____

Location: _____

Bid Number: _____

Date: _____

Room: _____

Reference: _____

Voltage: _____ V Phase: _____

Room Size

Length: _____ ft. Width: _____ ft. Ceiling Height: _____ ft.

Total Square Footage: _____ square feet

Heater Mounting Height: _____ ft.

Design Information

Ceiling R-Factor: _____

Wall R-Factor: _____

Outside Design Temperature: _____ F

Desired Inside Temperature: _____ F

Temperature Rise: F

Air Changes Per Hour: _____ cubic foot per hour

Calculation

Item	Area	sq-ft	X	U-Factor	=	BTU/Hr/Degree F
Windows	_____	sq-ft	X	_____	=	_____
Doors	_____	sq-ft	X	_____	=	_____
Net Wall	_____	sq-ft	X	_____	=	_____
Roof	_____	sq-ft	X	_____	=	_____
Floor Perimeter *	_____	ft	X	_____	=	_____
TOTAL =						<input type="text"/> BTU/Hr/degree F

* For floor perimeter use U-factor of 1.2, 0.7, or 0.6 for exposed, 1" insulation, or 2" insulation respectively

Item A

Air Change Loss Cubic foot per hour X 0.019 BTU/cubic ft. = BTU/hr/degree F

Item B

_____ cubic ft./hr X 0.019 BTU/cubic ft. =

TOTAL Item A + Item B = BTU/Hr/degree F

Item C

Convert to Watts = Total / 3.412 = Watts/Hr/degree F

TOTAL HEATING REQUIREMENT

Item C x Temperature Rise = Watts/Hr

Watts/Hr/degree F X degree F =

Total Watts/Hr.

Technical Information

Typical Outside Design Temperatures for the United States

State	City	Mean Wind Speed: MPH ³	Heating Degree Days ¹	Yearly Snowfall Mean ⁴	Outside Design Temp. ²
Arkansas	Ft. Smith	7.6	3336	5.7	12.0
	Little Rock	8.1	3354	5.1	15.0
California	Bakersfield	6.4	2185	0.0	30.0
	Bishop	N/A	4313	8.6	10.0
	Fresno	6.3	2650	0.1	28.0
	Los Angeles	7.4	1819	0.0	37.0
	Sacramento	8.3	2843	0.1	30.0
	San Diego	6.7	1507	0.0	42.0
	San Francisco/Oakland	8.2	3080	0.1	35.0
Colorado	Colorado Springs	10.4	6473	39.3	-3.0
	Denver	9.1	6016	59.0	-5.0
	Grand Junction	8.1	5605	26.3	2.0
	Pueblo	8.7	5394	30.9	-7.0
Connecticut	Hartford	8.9	6350	53.0	3.0
	New Haven	N/A	6026	N/A	3.0
	Bridgeport	12.0	5461	26.8	6.0
Delaware	Wilmington	9.1	4940	19.9	10.0
D.C.	Washington DC	9.3	4211	16.3	14.0
Florida	Daytona Beach	9.0	902	0.0	32.0
	Jacksonville	8.5	1327	0.0	29.0
	Miami	9.1	206	0.0	44.0
	Orlando	8.7	733	0.0	44.0
	Pensacola	8.3	1578	0.3	25.0
	Tallahassee	6.9	1563	0.0	27.0
	Tampa	8.8	718	0.0	36.0
Georgia	Atlanta	9.1	3095	1.5	17.0
	Augusta	6.6	2547	0.9	20.0
	Columbus/Lawson	6.9	2378	0.4	21.0
	Macon	7.8	2240	1.0	21.0
	Rome	N/A	3342	2.0	17.0
	Savannah/Travis Fld.	8.1	1952	0.4	24.0
Idaho	Boise	9.0	5833	21.5	3.0
	Lewiston	N/A	5464	17.9	-1.0
	Pocatello	10.3	7063	40.0	-8.0
Illinois	Rockford	9.9	6845	34.1	-9.0
	Moline	9.9	6395	30.3	-9.0
	Peoria	10.3	6098	24.3	-8.0
	Springfield	11.4	5558	23.1	-3.0
	Chicago	10.3	6497	37.4	-8.0

Technical Information

Typical Outside Design Temperatures for the United States (*cont'd.*)

State	City	Mean Wind Speed: MPH ³	Heating Degree Days ¹	Yearly Snowfall Mean ⁴	Outside Design Temp. ²
Indiana	Evansville	8.2	4629	13.4	4
	Fort Wayne	10.3	6209	31.5	-4
	Indianapolis	9.7	5577	21.6	-2
	South Bend	10.6	6462	68.5	-3
	Terre Haute	N/A	5366	N/A	-2
Iowa	Burlington	10.3	6149	25.7	-7
	Des Moines	11.1	6710	33.1	-10
	Dubuque	N/A	7277	42.6	-12
	Sioux City	10.9	6953	30.6	-11
	Waterloo	10.7	7415	31.2	-15
Kansas	Dodge City	14.1	5046	18.2	0
	Goodland	12.7	6119	33.6	-5
	Topeka	10.4	5243	20.8	0
	Wichita	12.5	4687	15.1	3
Kentucky	Lexington	9.7	4729	15.9	3
	Louisville	8.4	4645	17.6	5
Louisiana	Baton Rouge	7.9	1670	0.0	25
	Lake Charles	8.8	1498	0.0	27
	New Orleans	8.3	1465	0.0	29
	Shreveport	8.8	2167	0.0	20
Maine	Caribou	11.2	9632	112.9	-8
	Portland	8.8	7498	74.5	-6
Maryland	Baltimore	9.4	4729	21.2	10
Massachusetts	Boston	12.6	5621	42.1	6
	Worcester	10.4	6848	74.2	0
Michigan	Alpena	7.6	8518	84.9	-11
	Detroit/Metro.	10.4	6419	39.9	3
	Flint	10.4	7041	45.3	-4
	Grand Rapids	10.0	6801	76.6	1
	Lansing	10.3	6904	48.7	-3
	Marquette	8.3	8351	107.3	-12
	Muskegon	10.9	6890	95.9	2
	Sault Ste. Marie	9.6	9193	110.8	-12
Minnesota	Duluth	11.4	9756	77.8	-21
	International Falls	9.1	10547	60.1	-29
	Mpls./St. Paul	10.5	8159	46.1	-19
	Rochester	12.7	8227	44.4	-17
	St. Cloud	8	8868	43.1	-15
Mississippi	Jackson	7.6	2300	0.0	21
	Meridian	6	2388	0.0	19
Missouri	Columbia	9.9	5083	22.0	-1
	Kansas City	10.3	5357	20.0	2
	St. Joseph	10	5440	19.2	-3
	St. Louis	9.5	4750	18.5 2	
	Springfield	11.1	4570	15.5	3

Technical Information

Typical Outside Design Temperatures for the United States (*cont'd.*)

State	City	Mean Wind Speed: MPH ³	Heating Degree Days ¹	Yearly Snowfall Mean ⁴	Outside Design Temp. ²
Nebraska	Grand Island	12.0	6425	29.0	-8
	Lincoln	10.6	6218	28.4	-5
	Norfolk	12.6	6981	28.8	-8
	North Platte	10.3	6747	29.9	-8
	Omaha	10.8	6049	32.0	-8
	Scottsbluff	10.7	6774	38.0	-8
Nevada	Elko	6.0	7483	38.9	-8
	Ely	10.5	7814	47.6	-10
	Las Vegas	9.0	2601	1.4	25
	Reno	6.4	6022	26.5	5
New Hampshire	Concord	6.7	7360	64.8	-8
New Jersey	Atlantic City	10.6	4940	15.8	10
	Newark	10.1	5034	27.3	10
	Trenton	9.0	4952	22.7	11
New Mexico	Albuquerque	9.0	4292	10.5	12
New York	Albany	8.9	6962	65.7	-6
	Binghamton	10.3	7285	86.9	-2
	Buffalo	12.3	6927	92.9	2
	New York/LaGuardia	12.2	4909	26.2	11
	Rochester	9.7	6719	86.9	1
	Syracuse	9.9	6678	110.7	-3
North Carolina	Asheville	7.8	4237	17.4	10
	Charlotte	7.6	3218	5.3	18
	Greensboro/Winston-Salem	7.7	3825	8.7	15
	Raleigh/Durham	7.9	3514	6.8	16
	Wilmington	9.0	2433	1.9	23
North Dakota	Bismarck	10.5	9044	38.7	-23
	Fargo	12.7	9271	35.5	-22
	Grand Forks	N/A	9871	N/A	-26
Ohio	Akron/Canton	9.9	6224	47.8	1
	Cincinnati	9.1	5070	23.9	1
	Cleveland	10.8	6154	52.2	1
	Columbus	8.7	5702	27.7	0
	Dayton	10.2	5641	27.8	-1
	Mansfield	11.1	5818	41.2	0
	Toledo	9.5	6381	38.9	-3
	Youngstown	10.1	6426	57.6	-1
Oklahoma	Oklahoma City	12.8	3695	8.8	9
	Tulsa	10.6	3680	9.1	8
Oregon	Baker	N/A	7087	N/A	-1
	Eugene	7.6	4739	7.6	17
	Medford	4.8	4930	8.7	19
	Pendleton	9.2	5240	17.7	-2
	Portland	7.8	4632	7.4	17

Technical Information

Typical Outside Design Temperatures for the United States (*cont'd.*)

State	City	Mean Wind Speed: MPH ³	Heating Degree Days ¹	Yearly Snowfall Mean ⁴	Outside Design Temp. ²
Pennsylvania	Allentown	9.4	5827	31.5	4
	Erie	11.4	6851	83.3	4
	Harrisburg	7.7	5224	34.5	7
	Philadelphia	9.6	4865	20.2	10
	Pittsburgh	9.4	5930	45.3	1
	Williamsport	7.9	5982	43.8	2
Rhode Island	Providence	10.7	5972	38.0	5
South Carolina	Charleston	8.8	2146	0.0	24
	Columbia	6.9	2598	1.7	20
	Greenville	6.8	3163	5.7	18
South Dakota	Aberdeen	11.2	8616	36.4	-19
	Huron	11.9	8054	39.5	-18
	Pierre	N/A	7283	N/A	-15
	Rapid City	11.3	7324	39.3	-11
	Sioux Falls	11.2	7838	39.1	-15
Tennessee	Bristol	5.6	4306	15.6	9
	Chattanooga	6.3	3505	4.0	13
	Knoxville	7.3	3478	12.2	13
	Memphis	9.1	3227	5.5	13
	Nashville	8.0	3696	10.9	9
Texas	Abilene	12.2	2610	4.5	15
	Amarillo	13.7	4183	14.3	6
	Austin	9.3	1737	1.0	24
	Brownsville	11.8	650	0.0	35
	Dallas/Ft. Worth	10.9	2382	2.9	17
	El Paso	9.5	2678	4.7	20
	Galveston	11.0	1224	0.3	31
	Houston	7.6	1434	0.4	27
	San Antonio	9.4	1570	0.5	18
Utah	Milford	N/A	6412	43.8	5
	Salt Lake City	8.7	5983	58.3	3
Vermont	Burlington	8.8	7876	79.3	-12
Virginia	Lynchburg	7.9	4233	18.1	12
	Norfolk	10.6	3488	7.0	20
	Richmond	7.5	3939	13.9	14
	Roanoke	8.4	4307	24.1	12
Washington	Olympia	6.7	5530	19.2	16
	Seattle	9.2	5185	14.6	21
	Spokane	8.7	6835	53.3	-6
	Walla Walla	5.3	4835	20.0	0
	Yakima	7.2	6009	24.5	-2
West Virginia	Beckley	9.5	5613	55.8	-2
	Charleston	6.5	4590	29.6	7
	Huntingdon	6.4	4624	24.1	5

Technical Information

Typical Outside Design Temperatures for the United States (*cont'd.*)

State	City	Mean Wind Speed: MPH ³	Heating Degree Days ¹	Yearly Snowfall Mean ⁴	Outside Design Temp. ²
Wisconsin	Green Bay	10.2	8098	44.6	-13
	LaCrosse	8.8	7417	42.9	-13
	Madison	9.9	7730	40.2	-11
	Milwaukee	11.8	7444	45.9	-8
Wyoming	Casper	13.1	7555	73.9	-11
	Cheyenne	13.3	7255	51.2	-9

¹**Heating Degree Days** – A unit based upon temperature difference and time, used in estimating fuel consumption and specifying nominal heating load of a building in winter. For any one-day, when the mean temperature is less than 65°F, there exist as many degree-days as there are Fahrenheit degrees difference in temperature between the mean temperature for the day and 65°F. These heating degree-days (as listed in above chart) were compiled during the 1941-1970 period as published by the National Climate Center.

²**Outside Design Temperature** – This figure represents the temperature which will include 99% of all the winterhour Fahrenheit temperatures. A base of 2160 hours (total hours in Dec., Jan., and Feb.) was used. Therefore, using this figure, as a design temperature will, on an average, cover all but 22 hours of expected winter temperatures. **ASRAE 1976 SYSTEMS HANDBOOK.**

³**Mean Wind Speed: MPH** – This figure was arrived at through existing and comparable exposures. This information was obtained from the Local Climatological Data, 1977. (This figure is for reference only – not required in computation)

⁴**Yearly Snowfall: Mean** – This mean value is for the period beginning 1944 through 1977. This information was obtained from the Local Climatological Data, 1977.

Technical Information

Radiant Infrared Heating - Comfort Heating

Indoor Spot Heating

Infrared spot heating of work stations and personnel in large unheated structures or areas has proven to be economical and satisfactory. The following guidelines may be used for spot heating applications (areas with length or width less than 50 feet).

- Determine** the coldest anticipated inside ambient temperature the system must overcome. If freeze protection is provided by another heating system, this temperature will be 40°F.
- Determine** the equivalent ambient temperature desired (normally 70°F is the nominal average).
- Subtract** 1 from 2 to determine the theoretical increase in ambient temperature (ΔT) expected from the infrared system. If drafts are present in the occupied area (air movement over 44 feet per minute (0.5 mph) velocity), wind shielding or protection from drafts should be considered.
- Determine** the area to be heated in ft². This is termed the "design or work area" (A_D) (Fig. 1).
- Multiply** the design area by one watt per square foot times the theoretical temperature increase (ΔT) desired as determined in Step 3 (minimum of 12 watts per square foot). The design factor of one watt per square foot density assumes a fixture mounting height of 10 feet. Add 5% for each foot greater than 10 feet in mounting height. Avoid mounting fixtures below 8 feet.
- Determine** fixture mounting locations
 - In areas where the width dimension is 25 feet or less, use at least two fixtures mounted opposite each other at the perimeter of the area and tilted at an angle. This provides a greater area of exposure to the infrared energy by personnel in the work area. Tilt the fixtures so that the upper limit of the fixture pattern is at approximately six feet above the center of the work station area (Figure 2).
 - When locating fixtures, be sure to allow adequate height clearance for large moving equipment such as cranes and lift trucks.
 - Avoid directing infrared onto outside walls.
- Estimate** (tentatively) the radiated pattern area. Add length of fixture to the fixture pattern width (W) to establish pattern length (L). Pattern Area = $L \times W$ (Fig. 3).

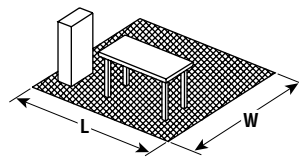


Figure 1 — Design Area

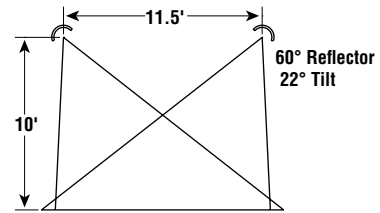


Figure 2 — Tilted Infrared Fixtures for Spot Heating

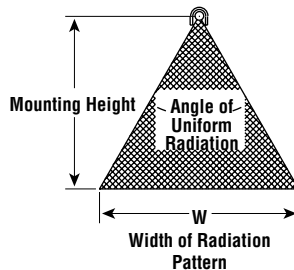


Figure 3 — Pattern Area

- Divide** the design area (Step 4) into the pattern area (Step 7).

$$Q = \frac{\text{Pattern Area}}{\text{Design Area}}$$

If the pattern area is equal to or greater than the design area, quotient (Q) will be equal to or greater than 1 and coverage is adequate. If Q is less than 1, the design area exceeds the pattern area of individual fixtures. Adjust the heater locations and patterns or add additional fixtures with patterns overlapping as necessary, to ensure adequate coverage.

- Multiply** quotient (Q in Step 8) by the increase in theoretical temperature (ΔT of Step 3) by the design area (A_D of Step 4) to determine the amount of radiation to be installed.

$$\text{Radiation (Watts)} = Q \times \Delta T \times A_D$$

- Many Types** of radiant heaters are available for comfort heating applications including ceiling, wall and portable floor standing models. Choose specific fixtures from the product pages. It is preferred that half the wattage requirements be installed on each side of the work station in the design area.

Controls — Manual control by percentage timers may be adequate for a small installation. To provide better control of comfort levels in varying ambient temperatures, divide the total heat required into two or three circuits so that each fixture or heating element circuit can be switched on in sequence. Staging can be

accomplished by using multistage air thermostats set at different temperatures.

Indoor Area Heating

In many industrial environments, area heating (areas with length or width greater than 50 ft) can be accomplished economically with multiple infrared heaters. For quick estimates, determine the minimum inside temperature and use a factor of 0.5 watts per square foot of design area for each degree of theoretical temperature. If the calculated heat loss of the structure, including infiltration or ventilation air, is less than the quick estimate, select the lower value. Locate heaters uniformly throughout the area with at least a 30% overlap in radiation pattern.

Outdoor Spot Heating

The same guidelines outlined under Indoor Spot Heating should be followed except that watts per square foot for each degree of theoretical ambient temperature increase should be doubled (approximately 2 watts per square foot for each 1°F). This factor applies to outdoor heating applications with little or no wind chill effect on personnel. If wind velocities are a factor in the application, determine the equivalent air temperature from the Wind Chill Chart in NEMA publication HE3-1971 or other information source.

Note — Increasing the infrared radiation to massive levels to offset wind chill can create discomfort and thermal stress. In outdoor exposed applications, a wind break or shielding is usually more effective.

Technical Information

Watt Density for Typical Applications vs. Temperature Rise

Application	Condition	Density Watts / Square Foot Desired Comfort Temperature Rise °F				
		5°F	10°F	15°F	20°F	25°F
Indoor Supplementry Heat		15 to 30 Watts / Square Foot				
Indoor Personnel Comfort	No Drafts/No Cold Walls	5 to 6	11 to 13	17 to 20	22 to 26	28 to 33
Indoor Personnel Comfort	Average Conditions	7 to 9	15 to 18	23 to 28	30 to 36	39 to 47
Indoor Personnel Comfort	Drafty Are/Cold Walls	10 to 12	20 to 24	30 to 36	40 to 48	50 to 60
Indoor Personnel Comfort	Large Mall Type Buildings	40 TO 60 WATTS / SQUARE FOOT				
Indoor Moisture	Removal and Control	15 TO 30 WATTS / SQUARE FOOT				
Outdoor Loading Dock	Protected Area W/Wind Shield	80 TO 120 WATTS / SQUARE FOOT				
Outdoor Marquee Heating	Snow & Ice Melting 20 ft. Mounting Hgt.	Use Table B				
Outdoor Personnel Comfort	Not Open To Sky Protected Area No Wind	10 to 12	20 to 24	30 to 36	40 to 48	50 to 60

Radiant Fixtures for spot heating of individuals should be mounted 10 to 12 feet from the floor with coverage from at least two (2) sides and directed at the individuals waist and never directly overhead. If fixture must be mounted over 12' from the floor, add 25% to the indicated watt density up to a maximum of 15'.

Snow Control Design Guidelines

Outside Design Temperature (°F)	Annual Snowfall Inches	Exposed* w/ sq.ft.	Semi-Protected* w/ sq.ft.	Protected* w/ sq.ft.
-20 to -60	80 to 115	200	185	160
-20 to -60	50 to 79	175	160	145
-20 to -60	20 to 49	125	110	100
-20 to -60	10 to 19	110	100	90
-20 to -60	0 to 9	100	90	85
-10 to -19	80 to 115	175	160	145
-10 to -19	50 to 79	125	110	100
-10 to -19	20 to 49	110	100	90
-10 to -19	10 to 19	100	90	85
-10 to -19	0 to 9	100	80	75
0 to -9	80 to 115	125	110	100
0 to -9	50 to 79	110	100	90
0 to -9	20 to 49	100	90	85
0 to -9	10 to 19	100	80	75
0 to -9	0 to 9	100	70	65
19 to 1	80 to 115	110	100	90
19 to 1	50 to 79	100	90	85
19 to 1	20 to 49	100	80	75
19 to 1	10 to 19	100	70	65
19 to 1	0 to 9	100	70	60
40 to 18	80 to 115	100	70	60
40 to 18	50 to 79	100	70	60
40 to 18	20 to 49	100	70	60
40 to 18	10 to 19	100	70	60
40 to 18	0 to 9	100	70	60

* Exposed = Totally open area

* Semi-Protected = One side closed plus roof or overhang

* Protected = Three sides plus roof or overhang

Heater Selection Guidelines

1. Always use clear quartz lamps as the correct element selection
2. Use CRDS or CRTS stainless steel enclosures for outdoor locations
3. For best results use 30° symmetric units. 60° symmetric or assymetric enclosures are generally satisfactory in semi-protected or shielded areas. **Never use 90° reflectors.**

Technical Information

90° Symmetrical Reflector Table for Single Element RBC-1

Mounting Height Ft.	Area (WxL) Ft.	Square Ft.	Metal Sheath Element Radiant Efficiency 60%			
			1 kW w/sq. ft.	1.5 kW w/sq. ft.	2 kW w/sq. ft.	2.5 kW w/sq. ft.
8	16 X 16	256	2.3	3.5	4.7	5.9
9	18 X 18	324	1.9	2.8	3.7	4.6
10	20 X 20	400	1.5	2.3	3.0	3.8
11	22 X 22	484	1.2	1.9	2.5	3.1
12	24 X 24	576	1.0	1.6	2.1	2.6
13	26 X 26	676	0.9	1.3	1.8	2.2
14	28 X 28	784	0.8	1.1	1.5	1.9
15	30 X 30	900	0.7	1.0	1.3	1.7

60° Symmetrical Reflector Table for 1 and 3 Element STAR Infrared Heaters

Mounting Height Ft.	Area (WxL) Ft.	Square Ft.	Metal Sheath Element Radiant Efficiency 60%%				
			1.5 kW w/sq. ft.	2 kW w/sq. ft.	4.5 kW w/sq. ft.	6 kW w/sq. ft.	13.5 kW w/sq. ft.
8	9.2 X 9.2	85	10.6	14.2	31.9	42.5	95.7
9	10.35 X 10.35	107	8.4	11.2	25.2	33.6	75.6
10	11.5 X 11.5	132	6.8	9.1	20.4	27.2	61.2
11	12.65 X 12.65	160	5.6	7.5	16.9	22.5	50.6
12	13.8 X 13.8	190	4.7	6.3	14.2	18.9	42.5
13	14.95 X 14.95	224	4.0	5.4	12.1	16.1	36.2
14	16.1 X 16.1	259	3.5	4.6	10.4	13.9	31.2
15	17.25 X 17.25	298	3.0	4.0	9.1	12.1	27.2
16	18.4 X 18.4	339	2.7	3.5	8.0	10.6	23.9
17	19.55 X 19.55	382	2.4	3.1	7.1	9.4	21.2
18	20.7 X 20.7	428	2.1	2.8	6.3	8.4	18.9
19	21.85 X 21.85	477	1.9	2.5	5.7	7.5	17.0
20	23 X 23	529	1.7	2.3	5.1	6.8	15.3
21	24.15 X 24.15	583	1.5	2.1	4.6	6.2	13.9
22	25.3 X 25.3	640	1.4	1.9	4.2	5.6	12.7
23	26.45 X 26.45	700	1.3	1.7	3.9	5.1	11.6
24	27.6 X 27.6	762	1.2	1.6	3.5	4.7	10.6

Technical Information

90° Symmetrical Reflectors for 2 & 3 Element High-Intensity Infrared Heaters

			METAL SHEATH ELEMENT RADIANT EFFICIENCY 60%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 1.6 KW w/sq.ft.	3 Element 2.5 KW w/sq.ft.	2 Element 3 KW w/sq.ft.	3 Element 4.5 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.
5	10 X 10	100	9.6	15.0	18.0	27.0	24.0	36.0
6	12 X 12	144	6.7	10.4	12.5	18.8	16.7	25.0
7	14 X 14	196	4.9	7.7	9.2	13.8	12.2	18.4
8	16 X 16	256	3.8	5.9	7.0	10.5	9.4	14.1
9	18 X 18	324	3.0	4.6	5.6	8.3	7.4	11.1
10	20 X 20	400	2.4	3.8	4.5	6.8	6.0	9.0
11	22 X 22	484	2.0	3.1	3.7	5.6	5.0	7.4
12	24 X 24	576	1.7	2.6	3.1	4.7	4.2	6.3
13	26 X 26	676	1.4	2.2	2.7	4.0	3.6	5.3
14	28 X 28	784	1.2	1.9	2.3	3.4	3.1	4.6
15	30 X 30	900	1.1	1.7	2.0	3.0	2.7	4.0
16	32 X 32	1024		1.5	1.8	2.6	2.3	3.5
17	34 X 34	1156		1.3	1.6	2.3	2.1	3.1
18	36 X 36	1296		1.2	1.4	2.1	1.9	2.8
19	38 X 38	1444		1.0	1.2	1.9	1.7	2.5
20	40 X 40	1600			1.1	1.7	1.5	2.3
			QUARTZ TUBE ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 2 KW w/sq.ft.	3 Element 3 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.	2 Element 6 KW w/sq.ft.	3 Element 9 KW w/sq.ft.
5	10 X 10	100	16.0	24.0	32.0	48.0	48.0	72.0
6	12 X 12	144	11.1	16.7	22.2	33.3	33.3	50.0
7	14 X 14	196	8.2	7.7	16.3	24.5	24.5	36.7
8	16 X 16	256	6.3	12.2	12.5	18.8	18.8	28.1
9	18 X 18	324	4.9	9.4	9.9	14.8	14.8	22.2
10	20 X 20	400	4.0	6.0	8.0	12.0	12.0	18.0
11	22 X 22	484	3.3	5.0	6.6	9.9	9.9	14.9
12	24 X 24	576	2.8	4.2	5.6	8.3	8.3	12.5
13	26 X 26	676	2.4	3.6	4.7	7.1	7.1	10.7
14	28 X 28	784	2.0	3.1	4.1	6.1	6.1	9.2
15	30 X 30	900	1.8	2.7	3.6	5.3	5.3	8.0
16	32 X 32	1024	1.6	2.3	3.1	4.7	4.7	7.0
17	34 X 34	1156	1.4	2.1	2.8	4.2	4.2	6.2
18	36 X 36	1296	1.2	1.9	2.5	3.7	3.7	5.6
19	38 X 38	1444	1.1	1.7	2.2	3.3	3.3	5.0
20	40 X 40	1600	1.0	1.5	2.0	3.0	3.0	4.5
			QUARTZ LAMP ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 3.2 KW w/sq.ft.	3 Element 4.8 KW w/sq.ft.	2 Element 5 KW w/sq.ft.	3 Element 7.5 KW w/sq.ft.	2 Element 7.3 KW w/sq.ft.	3 Element 10.95 KW w/sq.ft.
5	10 X 10	100	25.6	38.4	40.0	60.0	58.4	87.6
6	12 X 12	144	17.8	26.7	27.8	41.7	40.6	60.8
7	14 X 14	196	13.1	19.6	20.4	30.6	29.8	44.7
8	16 X 16	256	10.0	15.0	15.6	23.4	22.8	34.2
9	18 X 18	324	7.9	11.9	12.3	18.5	18.0	27.0
10	20 X 20	400	6.4	9.6	10.0	15.0	14.6	21.9
11	22 X 22	484	5.3	7.9	8.3	12.4	12.1	18.1
12	24 X 24	576	4.4	6.7	6.9	10.4	10.1	15.2
13	26 X 26	676	3.8	5.7	5.9	8.9	8.6	13.0
14	28 X 28	784	3.3	4.9	5.1	7.7	7.4	11.2
15	30 X 30	900	2.8	4.3	4.4	6.7	6.5	9.7
16	32 X 32	1024	2.5	3.8	3.9	5.9	5.7	8.6
17	34 X 34	1156	2.2	3.3	3.5	5.2	5.1	7.6
18	36 X 36	1296	2.0	3.0	3.1	4.6	4.5	6.8
19	38 X 38	1444	1.8	2.7	2.8	4.2	4.0	6.1
20	40 X 40	1600	1.6	2.4	2.5	3.8	3.7	5.5

Technical Information

60° Symmetrical Reflectors for 2 & 3 Element High-Intensity Infrared Heaters

			METAL SHEATH ELEMENT RADIANT EFFICIENCY 60%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 1.6 KW w/sq.ft.	3 Element 2.5 KW w/sq.ft.	2 Element 3 KW w/sq.ft.	3 Element 4.5 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.
5	5.8 X 10	57.5	16.7	26.1	31.3	47.0	41.7	62.6
6	6.9 X 12	82.8	11.6	18.1	21.7	32.6	29.0	43.5
7	8.1 X 14	112.7	8.5	13.3	16.0	24.0	21.3	31.9
8	9.2 X 16	147.2	6.5	10.2	12.2	18.3	16.3	24.5
9	10.4 X 18	186.3	5.2	8.1	9.7	14.5	12.9	19.3
10	11.5 X 20	230.0	4.2	6.5	7.8	11.7	10.4	15.7
11	12.7 X 22	278.3	3.4	5.4	6.5	9.7	8.6	12.9
12	13.8 X 24	331.2	2.9	4.5	5.4	8.2	7.2	10.9
13	15.0 X 26	388.7	2.5	3.9	4.6	6.9	6.2	9.3
14	16.1 X 28	450.8	2.1	3.3	4.0	6.0	5.3	8.0
15	17.3 X 30	517.5	1.9	2.9	3.5	5.2	4.6	7.0
16	18.4 X 32	588.8	1.6	2.5	3.1	4.6	4.1	6.1
17	19.6 X 34	664.7	1.4	2.3	2.7	4.1	3.6	5.4
18	20.7 X 36	745.2	1.3	2.0	2.4	3.6	3.2	4.8
19	21.9 X 38	830.3	1.2	1.8	2.2	3.3	2.9	4.3
20	23.0 X 40	920.0	1.0	1.6	2.0	2.9	2.6	3.9
			QUARTZ TUBE ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 2 KW w/sq.ft.	3 Element 3 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.	2 Element 6 KW w/sq.ft.	3 Element 9 KW w/sq.ft.
5	5.8 X 10	57.5	27.8	41.7	55.7	83.5	83.5	125.2
6	6.9 X 12	82.8	19.3	29.0	38.6	58.0	58.0	87.0
7	8.1 X 14	112.7	14.2	21.3	28.4	42.6	42.6	63.9
8	9.2 X 16	147.2	10.9	16.3	21.7	32.6	32.6	48.9
9	10.4 X 18	186.3	8.6	12.9	17.2	25.8	25.8	38.6
10	11.5 X 20	230.0	7.0	10.4	13.9	20.9	20.9	31.3
11	12.7 X 22	278.3	5.7	8.6	11.5	17.2	17.2	25.9
12	13.8 X 24	331.2	4.8	7.2	9.7	14.5	14.5	21.7
13	15.0 X 26	388.7	4.1	6.2	8.2	12.3	12.3	18.5
14	16.1 X 28	450.8	3.5	5.3	7.1	10.6	10.6	16.0
15	17.3 X 30	517.5	3.1	4.6	6.2	9.3	9.3	13.9
16	18.4 X 32	588.8	2.7	4.1	5.4	8.2	8.2	12.2
17	19.6 X 34	664.7	2.4	3.6	4.8	7.2	7.2	10.8
18	20.7 X 36	745.2	2.1	3.2	4.3	6.4	6.4	9.7
19	21.9 X 38	830.3	1.9	2.9	3.9	5.8	5.8	8.7
20	23.0 X 40	920.0	1.7	2.6	3.5	5.2	5.2	7.8
			QUARTZ LAMP ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 3.2 KW w/sq.ft.	3 Element 4.8 KW w/sq.ft.	2 Element 5 KW w/sq.ft.	3 Element 7.5 KW w/sq.ft.	2 Element 7.3 KW w/sq.ft.	3 Element 10.95 KW w/sq.ft.
5	5.8 X 10	57.5	44.5	66.8	69.6	104.3	101.6	152.3
6	6.9 X 12	82.8	30.9	46.4	48.3	72.5	70.5	105.8
7	8.1 X 14	112.7	22.7	34.1	35.5	53.2	51.8	77.7
8	9.2 X 16	147.2	17.4	26.1	27.2	40.8	39.7	59.5
9	10.4 X 18	186.3	13.7	20.6	21.5	32.2	31.3	47.0
10	11.5 X 20	230.0	11.1	16.7	17.4	26.1	25.4	38.1
11	12.7 X 22	278.3	9.2	13.8	14.4	21.6	21.0	31.5
12	13.8 X 24	331.2	7.7	11.6	12.1	18.1	17.6	26.4
13	15.0 X 26	388.7	6.6	9.9	10.3	15.4	15.0	22.5
14	16.1 X 28	450.8	5.7	8.5	8.9	13.3	13.0	19.4
15	17.3 X 30	517.5	4.9	7.4	7.7	11.6	11.3	16.9
16	18.4 X 32	588.8	4.3	6.5	6.8	10.2	9.9	14.9
17	19.6 X 34	664.7	3.9	5.8	6.0	9.0	8.8	13.2
18	20.7 X 36	745.2	3.4	5.2	5.4	8.1	7.8	11.8
19	21.9 X 38	830.3	3.1	4.6	4.8	7.2	7.0	10.6
20	23.0 X 40	920.0	2.8	4.2	4.3	6.5	6.3	9.5

Technical Information

30° Symmetrical Reflectors for 2 & 3 Element High-Intensity Infrared Heaters

			METAL SHEATH ELEMENT RADIANT EFFICIENCY 60%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 1.6 KW w/sq.ft.	3 Element 2.5 KW w/sq.ft.	2 Element 3 KW w/sq.ft.	3 Element 4.5 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.
5	2.7 X 10	27.0	35.6	55.6	66.7	100.0	88.9	133.3
6	3.2 X 12	38.9	24.7	38.6	46.3	69.4	61.7	92.6
7	3.8 X 14	52.9	18.1	28.3	34.0	51.0	45.4	68.0
8	4.3 X 16	69.1	13.9	21.7	26.0	39.1	34.7	52.1
9	4.9 X 18	87.5	11.0	17.1	20.6	30.9	27.4	41.2
10	5.4 X 20	108.0	8.9	13.9	16.7	25.0	22.2	33.3
11	5.9 X 22	130.7	7.3	11.5	13.8	20.7	18.4	27.5
12	6.5 X 24	155.5	6.2	9.6	11.6	17.4	15.4	23.1
13	7.0 X 26	182.5	5.3	8.2	9.9	14.8	13.1	19.7
14	7.6 X 28	211.7	4.5	7.1	8.5	12.8	11.3	17.0
15	8.1 X 30	243.0	4.0	6.2	7.4	11.1	9.9	14.8
16	8.6 X 32	276.5	3.5	5.4	6.5	9.8	8.7	13.0
17	9.2 X 34	312.1	3.1	4.8	5.8	8.7	7.7	11.5
18	9.7 X 36	349.9	2.7	4.3	5.1	7.7	6.9	10.3
19	10.3 X 38	389.9	2.5	3.8	4.6	6.9	6.2	9.2
20	10.8 X 40	432.0	2.2	3.5	4.2	6.3	5.6	8.3
			QUARTZ TUBE ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 2 KW w/sq.ft.	3 Element 3 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.	2 Element 6 KW w/sq.ft.	3 Element 9 KW w/sq.ft.
5	2.7 X 10	27.0	59.3	88.9	118.5	177.8	177.8	266.7
6	3.2 X 12	38.9	41.2	61.7	82.3	123.5	123.5	185.2
7	3.8 X 14	52.9	30.2	45.4	60.5	90.7	90.7	136.1
8	4.3 X 16	69.1	23.1	34.7	46.3	69.4	69.4	104.2
9	4.9 X 18	87.5	18.3	27.4	36.6	54.9	54.9	82.3
10	5.4 X 20	108.0	14.8	22.2	29.6	44.4	44.4	66.7
11	5.9 X 22	130.7	12.2	18.4	24.5	36.7	36.7	55.1
12	6.5 X 24	155.5	10.3	15.4	20.6	30.9	30.9	46.3
13	7.0 X 26	182.5	8.8	13.1	17.5	26.3	26.3	39.4
14	7.6 X 28	211.7	7.6	11.3	15.1	22.7	22.7	34.0
15	8.1 X 30	243.0	6.6	9.9	13.2	19.8	19.8	29.6
16	8.6 X 32	276.5	5.8	8.7	11.6	17.4	17.4	26.0
17	9.2 X 34	312.1	5.1	7.7	10.3	15.4	15.4	23.1
18	9.7 X 36	349.9	4.6	6.9	9.1	13.7	13.7	20.6
19	10.3 X 38	389.9	4.1	6.2	8.2	12.3	12.3	18.5
20	10.8 X 40	432.0	3.7	5.6	7.4	11.1	11.1	16.7
			QUARTZ LAMP ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 3.2 KW w/sq.ft.	3 Element 4.8 KW w/sq.ft.	2 Element 5 KW w/sq.ft.	3 Element 7.5 KW w/sq.ft.	2 Element 7.3 KW w/sq.ft.	3 Element 10.95 KW w/sq.ft.
5	2.7 X 10	27.0	94.8	142.2	148.1	222.2	216.3	324.4
6	3.2 X 12	38.9	65.8	98.8	102.9	154.3	150.2	225.3
7	3.8 X 14	52.9	48.4	72.6	75.6	113.4	110.4	165.5
8	4.3 X 16	69.1	37.0	55.6	57.9	86.8	84.5	126.7
9	4.9 X 18	87.5	29.3	43.9	45.7	68.6	66.8	100.1
10	5.4 X 20	108.0	23.7	35.6	37.0	55.6	54.1	81.1
11	5.9 X 22	130.7	19.6	29.4	30.6	45.9	44.7	67.0
12	6.5 X 24	155.5	16.5	24.7	25.7	38.6	37.6	56.3
13	7.0 X 26	182.5	14.0	21.0	21.9	32.9	32.0	48.0
14	7.6 X 28	211.7	12.1	18.1	18.9	28.3	27.6	41.4
15	8.1 X 30	243.0	10.5	15.8	16.5	24.7	24.0	36.0
16	8.6 X 32	276.5	9.3	13.9	14.5	21.7	21.1	31.7
17	9.2 X 34	312.1	8.2	12.3	12.8	19.2	18.7	28.1
18	9.7 X 36	349.9	7.3	11.0	11.4	17.1	16.7	25.0
19	10.3 X 38	389.9	6.6	9.8	10.3	15.4	15.0	22.5
20	10.8 X 40	432.0	5.9	8.9	9.3	13.9	13.5	20.3

Technical Information

60° Asymmetrical Reflectors for 2 & 3 Element High-Intensity Infrared Heaters

			METAL SHEATH ELEMENT RADIANT EFFICIENCY 60%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 1.6 KW w/sq.ft.	3 Element 2.5 KW w/sq.ft.	2 Element 3 KW w/sq.ft.	3 Element 4.5 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.
5	6 X 10	63	15.4	24.0	28.8	43.2	38.4	57.6
6	8 X 12	90	10.7	16.7	20.0	30.0	26.7	40.0
7	9 X 14	123	7.8	12.2	14.7	22.0	19.6	29.4
8	10 X 16	160	6.0	9.4	11.3	16.9	15.0	22.5
9	11 X 18	203	4.7	7.4	8.9	13.3	11.9	17.8
10	13 X 20	250	3.8	6.0	7.2	10.8	9.6	14.4
11	14 X 22	303	3.2	5.0	6.0	8.9	7.9	11.9
12	15 X 24	360	2.7	4.2	5.0	7.5	6.7	10.0
13	16 X 26	423	2.3	3.6	4.3	6.4	5.7	8.5
14	18 X 28	490	2.0	3.1	3.7	5.5	4.9	7.3
15	19 X 30	563	1.7	2.7	3.2	4.8	4.3	6.4
16	20 X 32	640	1.5	2.3	2.8	4.2	3.8	5.6
17	21 X 34	723	1.3	2.1	2.5	3.7	3.3	5.0
18	23 X 36	810	1.2	1.9	2.2	3.3	3.0	4.4
19	24 X 38	903	1.1	1.7	2.0	3.0	2.7	4.0
20	25 X 40	1000	1.0	1.5	1.8	2.7	2.4	3.6
			QUARTZ TUBE ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 2 KW w/sq.ft.	3 Element 3 KW w/sq.ft.	2 Element 4 KW w/sq.ft.	3 Element 6 KW w/sq.ft.	2 Element 6 KW w/sq.ft.	3 Element 9 KW w/sq.ft.
5	6 X 10	63	25.6	38.4	51.2	76.8	76.8	115.2
6	8 X 12	90	17.8	26.7	35.6	53.3	53.3	80.0
7	9 X 14	123	13.1	19.6	26.1	39.2	39.2	58.8
8	10 X 16	160	10.0	15.0	20.0	30.0	30.0	45.0
9	11 X 18	203	7.9	11.9	15.8	23.7	23.7	35.6
10	13 X 20	250	6.4	9.6	12.8	19.2	19.2	28.8
11	14 X 22	303	5.3	7.9	10.6	15.9	15.9	23.8
12	15 X 24	360	4.4	6.7	8.9	13.3	13.3	20.0
13	16 X 26	423	3.8	5.7	7.6	11.4	11.4	17.0
14	18 X 28	490	3.3	4.9	6.5	9.8	9.8	14.7
15	19 X 30	563	2.8	4.3	5.7	8.5	8.5	12.8
16	20 X 32	640	2.5	3.8	5.0	7.5	7.5	11.3
17	21 X 34	723	2.2	3.3	4.4	6.6	6.6	10.0
18	23 X 36	810	2.0	3.0	4.0	5.9	5.9	8.9
19	24 X 38	903	1.8	2.7	3.5	5.3	5.3	8.0
20	25 X 40	1000	1.6	2.4	3.2	4.8	4.8	7.2
			QUARTZ LAMP ELEMENT RADIANT EFFICIENCY 80%					
			24" Enclosure		33" Enclosure		46" Enclosure	
Mounting Height Ft.	Area (W X L) Ft.	Square Ft.	2 Element 3.2 KW w/sq.ft.	3 Element 4.8 KW w/sq.ft.	2 Element 5 KW w/sq.ft.	3 Element 7.5 KW w/sq.ft.	2 Element 7.3 KW w/sq.ft.	3 Element 10.95 KW w/sq.ft.
5	6 X 10	63	41.0	61.4	64.0	96.0	93.4	140.2
6	8 X 12	90	28.4	42.7	44.4	66.7	64.9	97.3
7	9 X 14	123	20.9	31.3	32.7	49.0	47.7	71.5
8	10 X 16	160	16.0	24.0	25.0	37.5	36.5	54.8
9	11 X 18	203	12.6	19.0	19.8	29.6	28.8	43.3
10	13 X 20	250	10.2	15.4	16.0	24.0	23.4	35.0
11	14 X 22	303	8.5	12.7	13.2	19.8	19.3	29.0
12	15 X 24	360	7.1	10.7	11.1	16.7	16.2	24.3
13	16 X 26	423	6.1	9.1	9.5	14.2	13.8	20.7
14	18 X 28	490	5.2	7.8	8.2	12.2	11.9	17.9
15	19 X 30	563	4.6	6.8	7.1	10.7	10.4	15.6
16	20 X 32	640	4.0	6.0	6.3	9.4	9.1	13.7
17	21 X 34	723	3.5	5.3	5.5	8.3	8.1	12.1
18	23 X 36	810	3.2	4.7	4.9	7.4	7.2	10.8
19	24 X 38	903	2.8	4.3	4.4	6.6	6.5	9.7
20	25 X 40	1000	2.6	3.8	4.0	6.0	5.8	8.8

Technical Information

Determining Heat Energy Requirements

Pipe & Tank Tracing

The following tables can be used to determine the heat losses from insulated pipes and tanks for heat tracing applications. To use these tables, determine the following design factors:

- Temperature differential $\Delta T = T_M - T_A$
Where:
 T_M = Desired maintenance temperature °F
 T_A = Minimum expected ambient temperature °F
- Type and thickness of insulation
- Diameter of pipe or surface area of tank
- Outdoor or indoor application
- Maximum expected wind velocity (if outdoors).

Pipe Tracing Example — Maintain a 1-1/2 inch IPS pipe at 100°F to keep a process fluid flowing. The pipe is located outdoors and is insulated with 2 inch thick Fiberglas® insulation. The minimum expected ambient temperature is 0°F and the maximum expected wind velocity is 35 mph. Determine heat losses per foot of pipe.

- Heat Loss Rate** — Using Table 1, determine the heat loss rate in W/ft of pipe per °F temperature differential. Enter table with insulation ID or IPS pipe size (1-1/2 in.) and insulation thickness (2 in.).
Rate = 0.038 Watts/ft/°F.
- Heat Loss per Foot** — Calculated heat loss per foot of pipe equals the maximum temperature differential (ΔT) times heat loss rate in Watts/ft/°F.
 $\Delta T = 100^\circ\text{F} - 0^\circ\text{F} = 100^\circ\text{F}$
 $Q = (\Delta T)(\text{heat loss rate per } ^\circ\text{F})$
 $Q = (100^\circ\text{F})(0.038 \text{ W/ft}) = 3.80 \text{ W/ft}$
- Insulation Factor** — Table 1 is based on Fiberglas® insulation and a 50°F ΔT . Adjust Q for thermal conductivity (k factor) and temperature as necessary, using adjustment factors from Table 2.
Adjusted $Q = (Q)(1.08) = 3.80 \text{ W/ft} \times 1.08$
 $Q = 4.10 \text{ W/ft}$
- Wind Factor** — Table 1 is based on 20 mph wind velocity. Adjust Q for wind velocity as necessary by adding 5% for each 5 mph over 20 mph. Do not add more than 15% regardless of wind speed.
Adjusted $Q = (Q)(1.15) = 4.10 \text{ W/ft} \times 1.15$
Design heat loss per linear foot
 $Q = 4.72 \text{ W/ft}$

Note — For indoor installations, multiply Q by 0.9.

Table 1 — Heat Losses from Insulated Metal Pipes (Watts per foot of pipe per °F temperature differential ¹)

Pipe Size (IPS)	Insul. I.D. (In.)	Insulation Thickness (In.)							
		1/2	3/4	1	1-1/2	2	2-1/2	3	4
1/2	0.840	0.054	0.041	0.035	0.028	0.024	0.022	0.020	0.018
3/4	1.050	0.063	0.048	0.040	0.031	0.027	0.024	0.022	0.020
1	1.315	0.075	0.055	0.046	0.036	0.030	0.027	0.025	0.022
1-1/4	1.660	0.090	0.066	0.053	0.041	0.034	0.030	0.028	0.024
1-1/2	1.990	0.104	0.075	0.061	0.046	0.038	0.034	0.030	0.026
2	2.375	0.120	0.086	0.069	0.052	0.043	0.037	0.033	0.029
2-1/2	2.875	0.141	0.101	0.080	0.059	0.048	0.042	0.037	0.032
3	3.500	0.168	0.118	0.093	0.068	0.055	0.048	0.042	0.035
3-1/2	4.000	0.189	0.133	0.104	0.075	0.061	0.052	0.046	0.038
4	4.500	0.210	0.147	0.115	0.083	0.066	0.056	0.050	0.041
—	5.000	0.231	0.161	0.125	0.090	0.072	0.061	0.054	0.044
5	5.563	0.255	0.177	0.137	0.098	0.078	0.066	0.058	0.047
6	6.625	0.300	0.207	0.160	0.113	0.089	0.075	0.065	0.053
—	7.625	0.342	0.235	0.181	0.127	0.100	0.084	0.073	0.059
8	8.625	0.385	0.263	0.202	0.141	0.111	0.092	0.080	0.064
—	9.625	0.427	0.291	0.224	0.156	0.121	0.101	0.087	0.070
10	10.75	0.474	0.323	0.247	0.171	0.133	0.110	0.095	0.076
12	12.75	0.559	0.379	0.290	0.200	0.155	0.128	0.109	0.087
14	14.00	0.612	0.415	0.316	0.217	0.168	0.138	0.118	0.093
16	16.00	0.696	0.471	0.358	0.246	0.189	0.155	0.133	0.104
18	18.00	0.781	0.527	0.401	0.274	0.210	0.172	0.147	0.115
20	20.00	0.865	0.584	0.443	0.302	0.231	0.189	0.161	0.125
24	24.00	1.034	0.696	0.527	0.358	0.274	0.223	0.189	0.147

1. Values in Table 1 are based on a pipe temperature of 50°F, an ambient of 0°F, a wind velocity of 20 mph and a "k" factor of 0.25 (Fiberglas®). Values are calculated using the following formula plus a 10% safety margin:
Watts/ft of pipe = $2 \pi k (\Delta T) \div (Z) \ln (D_o/D_i)$
Where: k = Thermal conductivity (Btu/in./hr/ft²/°F) D_i = Inside diameter of insulation (in.)
 ΔT = Temperature differential (°F) Z = 40.944 Btu/in./W/hr/ft
 D_o = Outside diameter of insulation (in.) \ln = Natural Log of D_o/D_i Quotient

Table 2 — Thermal Conductivity (k) Factor of Typical Pipe Insulation Materials (Btu/in./hr/ft²/°F)

Insulation Type		Pipe Maintenance Temperature (°F)							
		0	50	100	150	200	300	400	500
Fiberglas® or Mineral Fiber Based on ASTM C-547	k value	0.23	0.25	0.27	0.30	0.32	0.37	0.41	0.45
	Adjustment factor	(0.92)	(1.00)	(1.08)	(1.20)	(1.28)	(1.48)	(1.64)	(1.80)
Calcium Silicate² Based on ASTM C-533	k value	0.35	0.37	0.40	0.43	0.45	0.50	0.55	0.60
	Adjustment factor	(1.52)	(1.48)	(1.60)	(1.72)	(1.80)	(2.00)	(2.20)	(2.40)
Foamed Glass² Based on ASTM C-552	k value	0.38	0.40	0.43	0.47	0.51	0.60	0.70	0.81
	Adjustment factor	(1.52)	(1.60)	(1.72)	(1.88)	(2.04)	(2.40)	(2.8)	(3.24)
Foamed Urethane Based on ASTM C-591	k value	0.18	0.17	0.18	0.21	0.25	Not Recommended		
	Adjustment factor	(0.72)	(0.68)	(0.72)	(0.84)	(1.00)			

2. When using rigid insulation, select an inside diameter one size larger than the pipe on pipe sizes through 9 in. IPS. Over 9 in. IPS, use same size insulation.

Table 3 — Heat Losses from Insulated Metal Tanks (W/ft²/°F)³

Insulation Thickness (In.)										
1/2	3/4	1	1-1/2	2	2-1/2	3	3-1/2	4	5	6
0.161	0.107	0.081	0.054	0.040	0.032	0.027	0.023	0.020	0.016	0.013

3. Values in Table 3 are based on a tank temperature of 50°F, an ambient of 0°F, a wind velocity of 20 mph and a "k" factor of 0.25 (Fiberglas®). Values are calculated using the following formula plus a 10% safety margin:
Watts/ft² = $Y k (\Delta T) \div X$
Where: Y = 0.293 W/hr/btu k = Thermal conductivity
 X = Thickness of insulation (in.)
 ΔT = Temperature differential (°F)

Note — The above information is presented as a guide for solving typical heat tracing applications. Contact your Local Chromalox Sales office for assistance in heater selection and for pipes made of materials other than metal.

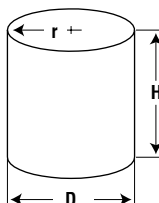
Technical Information

Determining Heat Energy Requirements

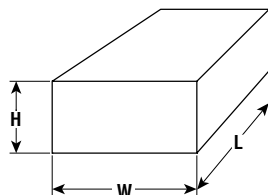
Pipe & Tank Tracing (cont'd.)

Tank tracing requires an additional calculation of the total exposed surface area. To calculate the surface area:

Cylindrical Tanks —
 $\text{Area} = 2 \pi r^2 + \pi DH$
 $A = \pi D (r + H)$



Horizontal Tanks —
 $\text{Area} = 2[(W \times L) + (L \times H) + (H \times W)]$



Tank Tracing Example — Maintain a metal tank with 2 inch thick Fiberglas® insulation at 50°F. The tank is located outdoors, is 4 feet in diameter, 12 feet long and is exposed at both ends. The minimum ambient temperature is 0°F and the maximum expected wind speed is 15 mph.

1. Surface Area — Calculate the surface area of the tank.
 $A = \pi D (r + H)$
 $A = \pi 4 (2 + 12)$
 $A = 175.9 \text{ ft}^2$

2. Temperature Differential (ΔT)

$$\Delta T = T_M - T_A = 50^\circ\text{F} - 0^\circ\text{F} = 50^\circ\text{F}$$

3. Heat Loss Per Foot² — Obtain the heat loss per square foot per degree from Table 3.

$$\text{Heat loss/ft}^2/\text{°F} = 0.04 \text{ W/ft}^2/\text{°F}$$

4. Insulation Factor — Table 3 is based on Fiberglas® insulation and a 50°F ΔT . Adjust Q for thermal conductivity (k factor) and temperature as necessary, using factors from Table 2.

5. Wind Factor — Table 3 is based on 20 mph wind velocity. Adjust Q for wind velocity as necessary, by adding 5% for each 5 mph over 20 mph. Do not add more than 15% regardless of wind speed.

Note — For indoor installations, multiply Q by 0.9.

6. Calculate Total Heat Loss for Tank — Multiply the adjusted heat loss per square foot per °F figure by the temperature differential. Multiply the loss per square foot by the area.

$$Q = 0.04 \text{ W/ft}^2/\text{°F} \times 50^\circ\text{F} \Delta T = 2 \text{ W/ft}^2$$

$$Q = \text{Adjusted W/ft}^2 \times \text{tank surface area}$$

$$Q = 2 \text{ W/ft}^2 \times 175.9 \text{ ft}^2$$

Heat Loss from Tank = 351.8 Watts

Technical Information

Properties of Steam

Saturated Steam

The thermodynamic properties of saturated steam are shown in the table to the right. Saturated steam is pure steam in direct contact with the liquid water from which it was generated and at the same temperature and pressure as the water. For example, saturated steam at 50 psig has a temperature of 298°F.

Steam pressure is commonly expressed as **psia** or **psig**. Psia is pounds per square inch absolute with reference to a perfect vacuum. Psig is pounds per square inch gauge with reference to atmospheric pressure of 14.7 psi psia = psig + 14.7 psi (1 atmosphere).

The heat content of liquid is the heat energy in Btu/lb required to heat the liquid to the condition indicated starting with water at 32°F.

Latent heat is the heat energy in Btu/lb absorbed when a pound of boiling water is converted to a pound of steam at the same temperature. The same amount of heat is released when the steam condenses back to water at the same temperature. Latent heat varies with temperature.

Saturated Steam — Thermodynamic Properties (nearest even digit)

Gauge Press. (psig)	Temp. (°F)	Btu/lb			Sat. Vapor (ft³/lb)	Gauge Press. (psig)	Temp. (°F)	Btu/lb			Sat. Vapor (ft³/lb)
		Liquid Heat	Latent Heat	Steam Total				Liquid Heat	Latent Heat	Steam Total	
0	212	180	970	1150	27.0	70	316	286	898	1184	5.2
1	216	183	968	1151	25.0	75	320	290	895	1185	4.9
2	219	187	965	1152	24.0	80	324	294	892	1186	4.7
3	222	190	964	1154	22.5	85	328	298	889	1187	4.4
4	224	193	962	1155	21.0	90	331	302	886	1188	4.2
5	227	195	961	1156	20.0	95	335	306	883	1189	4.0
6	230	198	959	1157	19.5	100	338	309	881	1190	3.9
7	232	201	957	1158	18.5	110	344	316	876	1192	3.6
8	235	203	956	1159	18.0	120	350	322	871	1193	3.3
9	237	206	954	1160	17.0	125	353	325	868	1193	3.2
10	240	208	952	1160	16.5	130	356	328	866	1194	3.1
15	250	218	945	1163	14.0	140	361	334	861	1195	2.9
20	259	227	940	1167	12.0	150	366	339	857	1196	2.7
25	267	236	934	1170	10.5	160	371	344	853	1197	2.6
30	274	243	929	1172	9.5	170	375	348	849	1197	2.5
35	281	250	924	1174	8.5	180	380	353	845	1198	2.3
40	287	256	920	1176	8.0	190	384	358	841	1199	2.2
45	292	262	915	1177	7.0	200	388	362	837	1199	2.1
50	298	267	912	1179	6.7	220	395	370	830	1200	2.0
55	303	272	908	1180	6.2	240	403	378	823	1201	1.8
60	307	277	905	1182	5.8	250	406	381	820	1201	1.75
65	312	282	901	1183	5.5	300	422	399	805	1204	1.48

TECHNICAL

Boiler Feed Water Temperature

The temperature of boiler feed water directly affects the steam output of a boiler. The following table can be used to determine the kilowatt rating of a boiler when the steam load, gauge pressure and boiler feed water temperature are known.

Example — A process requires 450 lbs of steam per hour at 75 psig. The available feed water temperature is 50°F. From the chart, read the kW/lb required for 50°F water and a gauge pressure of 75 psig. Multiply the factor by the pounds of steam: 0.3417 x 450 lbs = 153.8 kW.

Boiler Feed Water Temperature Vs. kW Required per Pound of Steam

Feed Water (°F)	Steam Gauge Pressure (psig)										
	0	2	10	15	25	40	50	75	100	125	150
40	.3347	.3355	.3375	.3388	.3406	.3422	.3431	.3447	.3458	.3464	.3470
50	.3318	.3326	.3345	.3359	.3376	.3392	.3401	.3417	.3429	.3435	.3441
60	.3288	.3296	.3316	.3329	.3347	.3363	.3372	.3388	.3400	.3407	.3411
70	.3259	.3267	.3287	.3300	.3318	.3334	.3343	.3359	.3370	.3376	.3382
80	.3229	.3238	.3278	.3271	.3288	.3305	.3313	.3329	.3341	.3347	.3353
90	.3200	.3208	.3238	.3242	.3259	.3275	.3284	.3300	.3312	.3318	.3324
100	.3171	.3179	.3199	.3212	.3229	.3246	.3255	.3271	.3283	.3288	.3294
110	.3142	.3150	.317	.3183	.3200	.3217	.3225	.3242	.3253	.3259	.3265
120	.3112	.3210	.314	.3154	.3171	.3187	.3196	.3212	.3224	.3230	.3236
130	.3083	.3091	.3111	.3124	.3142	.3160	.3167	.3183	.3195	.3200	.3206
140	.3054	.3062	.3082	.3095	.3113	.3129	.3137	.3154	.3165	.3171	.3177
150	.3025	.3032	.3052	.3066	.3083	.3099	.3108	.3124	.3136	.3142	.3148
160	.2995	.3003	.3029	.3036	.3054	.3070	.3079	.3095	.3107	.3113	.3118
170	.2966	.2974	.2994	.3001	.3025	.3041	.3050	.3066	.3077	.3083	.3089
180	.2937	.2945	.2964	.2978	.2995	.3011	.3020	.3036	.3048	.3054	.3060
190	.2907	.2915	.2935	.2948	.2966	.2982	.2981	.3007	.3019	.3025	.3030
200	.2878	.2886	.2906	.2919	.2937	.2953	.2962	.2978	.2989	.2995	.3001

Technical Information

Electrical Fundamentals & Three Phase Calculations

Ohm's Law

The relationship between Wattage (heat) output and the applied Voltage of electric resistance heating elements is determined by a precise physical rule defined as Ohm's Law which states that the current in a resistance heating element is directly proportional to the applied Voltage. Ohm's Law is traditionally expressed as:

$$I = \frac{E}{R} \quad \text{Where: } I = \text{Amperes (Current)} \\ E = \text{Voltage} \\ R = \text{Ohms (Resistance)}$$

The same equation using the conventional abbreviation for voltage is:

$$I = \frac{V}{R} \quad \text{Where: } I = \text{Amperes (Current)} \\ V = \text{Voltage} \\ R = \text{Ohms (Resistance)}$$

An unknown electrical value can be derived by using any two known values in one of the variations of Ohm's Law shown at the right.

VOLTS

$$\text{VOLTS} = \sqrt{\text{WATTS} \times \text{OHMS}}$$

$$\text{VOLTS} = \frac{\text{WATTS}}{\text{AMPERES}}$$

$$\text{VOLTS} = \text{AMPERES} \times \text{OHMS}$$

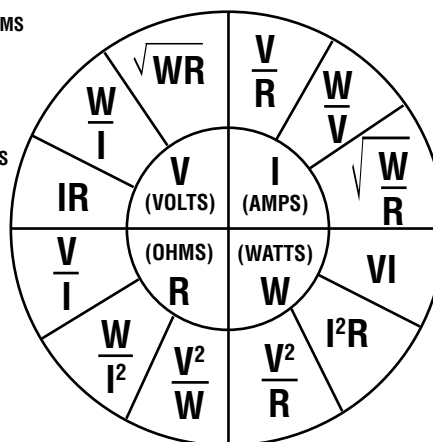
OHMS

$$\text{OHMS} = \frac{\text{VOLTS}}{\text{AMPERES}}$$

$$\text{OHMS} = \frac{\text{WATTS}}{\text{AMPERES}^2}$$

$$\text{OHMS} = \frac{\text{VOLTS}^2}{\text{WATTS}}$$

OHM'S LAW



AMPERES

$$\text{AMPERES} = \frac{\text{VOLTS}}{\text{OHMS}}$$

$$\text{AMPERES} = \frac{\text{WATTS}}{\text{VOLTS}}$$

$$\text{AMPERES} = \sqrt{\frac{\text{WATTS}}{\text{OHMS}}}$$

WATTS

$$\text{WATTS} = \text{VOLTS} \times \text{AMPERES}$$

$$\text{WATTS} = \text{AMPERES}^2 \times \text{OHMS}$$

$$\text{WATTS} = \frac{\text{VOLTS}^2}{\text{OHMS}}$$

Voltage & Wattage Relationships

An electric resistance element only produces rated Wattage at rated Voltage. It is common for electric heating elements and assemblies to be connected to a wide range of operating Voltages. Since the Wattage output varies directly with the ratio of the square of the Voltages, the actual Wattage can be calculated for any applied Voltage. The relationship is expressed by the equation below,

$$W_A = W_R \times \left(\frac{V_A^2}{V_R^2} \right) \quad \text{Where: } W_A = \text{Actual Wattage} \\ W_R = \text{Rated Wattage} \\ V_A = \text{Applied Voltage} \\ V_R = \text{Rated Voltage}$$

Percent of Rated Wattage for Various Applied Voltages

Applied Voltage	Rated Voltage														
	110	115	120	208	220	230	240	277	380	415	440	460	480	575	
110	100	91	84	28	25	23	21	16	8.4	7.0	6.2	5.7	5.2	3.7	
115	109	100	92	31	27	25	23	17	9.0	7.6	6.7	6.2	5.7	4.0	
120	119	109	100	33	30	27	25	19	10	8.4	7.4	6.8	6.3	4.3	
208	—	—	300	100	89	82	75	56	30	25	22	20	19	13	
220	—	—	—	112	100	91	84	63	34	28	25	23	21	15	
230	—	—	—	122	109	100	92	69	37	31	27	25	23	16	
240	—	—	—	133	119	109	100	75	40	33	30	27	25	17	
277	—	—	—	—	—	—	133	100	53	45	40	36	33	23	
380	—	—	—	—	—	—	—	188	100	84	74	68	63	44	
415	—	—	—	—	—	—	—	—	119	100	89	81	75	52	
440	—	—	—	—	—	—	—	—	—	112	100	91	84	58	
460	—	—	—	—	—	—	—	—	—	123	109	100	92	64	
480	—	—	—	—	—	—	—	—	—	—	119	109	100	70	
550	—	—	—	—	—	—	—	—	—	—	156	143	131	91	
575	—	—	—	—	—	—	—	—	—	—	171	156	144	100	
600	—	—	—	—	—	—	—	—	—	—	186	170	156	109	

Three Phase Equations (Balanced)

Ohm's Law, as stated above, applies to electrical resistance elements operated on single phase circuits. Ohm's Law can be modified to calculate three phase values by adding a correction factor for the phase Voltage relationships. The three phase equations shown can be applied to any balanced Delta or Wye circuit. The terms used in the equations are identified below:

V_L = Line Voltage

V_P = Phase Voltage

I_L = Line Current (Amps)

I_P = Phase Current (Amps)

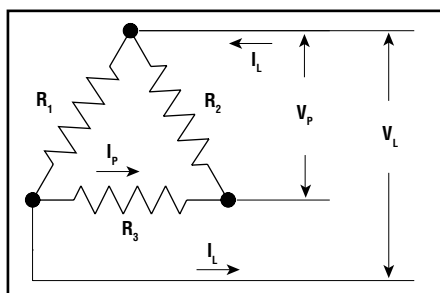
W_T = Total Watts

$R_1 = R_2 = R_3$ = Element Resistance

W_c = Wattage per Circuit (Equal Circuits)

R_c = Circuit Resistance in Ohms Measured Phase to Phase

3Ø Delta



$$V_P = V_L$$

$$W_T = 1.73 I_L \times V_L$$

$$I_P = I_L \div 1.73$$

$$W_c = 1.73 I_L \times V_L \div \# \text{ Circuits}$$

$$R_c = (2 \times V_L^2) \div W_c$$

$$V_L = V_P$$

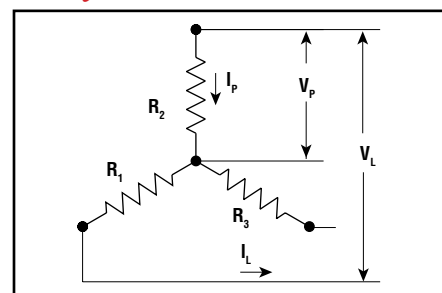
$$W_T = 3 (V_L^2 \div R_1)$$

$$I_L = I_P \times 1.73$$

$$R_c = V_L^2 \div 0.5 W_c$$

Note — For Open Delta connections, see next page.

3Ø Wye



$$V_P = V_L \div 1.73$$

$$W_T = 1.73 I_L \times V_L$$

$$I_P = I_L$$

$$W_c = 1.73 I_L \times V_L \div \# \text{ Circuits}$$

$$R_c = (2 \times V_L^2) \div W_c$$

$$V_L = V_P \times 1.73$$

$$W_T = V_L^2 \div R_1$$

$$I_L = I_P$$

$$R_c = V_L^2 \div 0.5 W_c$$

Note — For Open Wye connections, see next page.

Technical Information

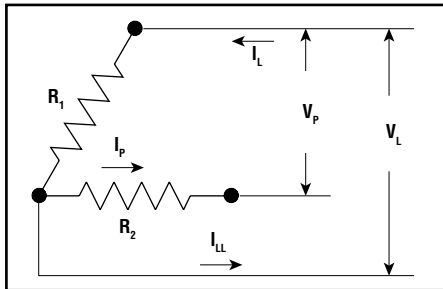
Three Phase Equations & Heater Wiring Diagrams

Open Delta & Wye

Three phase heating circuits are most efficient when operated under balanced conditions. If it is necessary to operate an unbalanced load, the equations below can be used to calculate the circuit values for open three phase Delta or Wye circuits. The terms used in the equations are identified below:

V_L = Line Voltage
 V_P = Phase (Element) Voltage
 I_L = Line Current (Amps)
 I_{LL} = Line Current (Unbalanced Phase)
 I_P = Phase Current (Amps)
 W_T = Total Watts
 $R_1 = R_2 = R_3$ = Element Resistance
 R_c = Circuit Resistance in Ohms Measured from Phase to Phase

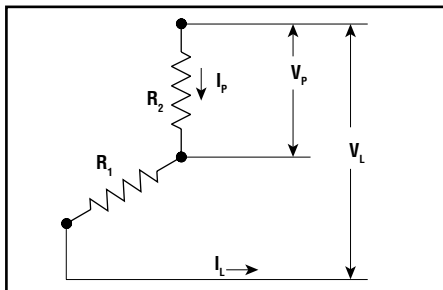
3Ø Open Delta



$V_P = V_L$
 $W_T = 2V_L \times I_L$
 $I_P = I_L$
 $W_c = 2V_P \times I_P$
 $V_L = V_P$
 $W_T = 2(V_L^2 \div R_1)$
 $I_L = I_P$
 $I_{LL} = 1.73 \times I_P$

The loss of a phase or failure of an element in a three (3) element Delta circuit will reduce the wattage output by 33%.

3Ø Open Wye

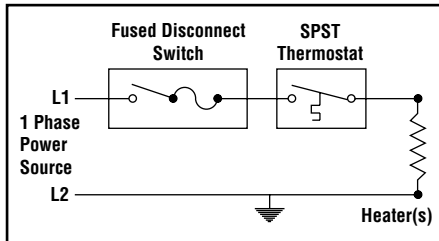


$V_P = V_L \div 2$
 $W_T = I_L \times V_L$
 $I_P = I_L$
 $R_c = V_L^2 \div W_c$
 $V_L = V_P \times 2$
 $W_T = V_L^2 \div 2R_1$
 $I_L = I_P$

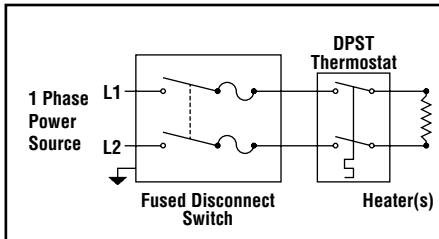
The loss of a phase or failure of an element in a three (3) element Wye circuit will reduce the wattage output by 50%. Heating elements are basically in series on single phase power.

Typical Heater Wiring Diagrams

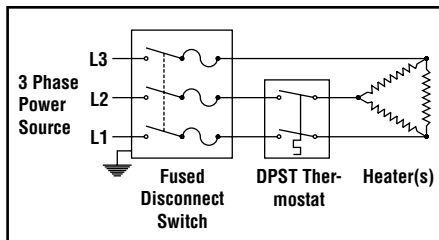
The following diagrams show typical heater wiring schematics.



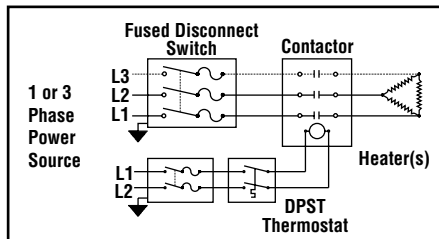
Single Phase 120 VAC heater circuit where line voltage and current do not exceed thermostat rating.



Single Phase AC circuits where line voltage and current do not exceed thermostat rating.

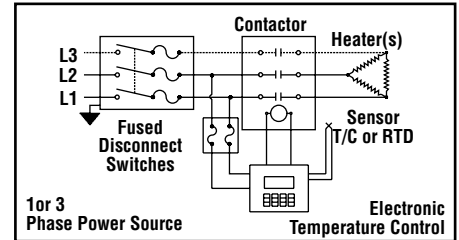


Three Phase AC heater circuit where line voltage and current do not exceed thermostat rating. Circuit does not have a "positive" off.

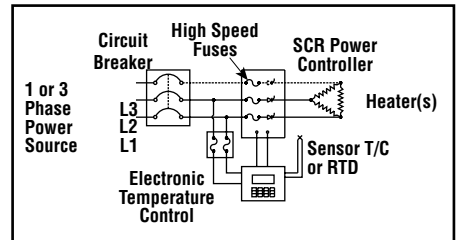


Single or Three Phase AC heater circuit where line voltage and current exceed thermostat rating. Separate control circuit can use a single pole or double pole thermostat. Control circuit requires over-current protection.

WARNING — Hazard of Electric Shock. Any installation involving electric heaters must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.



Single or Three Phase AC heater circuit using electronic temperature controllers and contactors. Controller and contactor holding coil must be rated for the same voltage as the heater circuit. Control circuit requires over-current protection.



Single or Three Phase AC heater circuit using an electronic temperature controller and a SCR (solid state) power controller. Controller must be rated the same voltage as the heater circuit. Control circuit requires over-current protection. All electrical wiring to electric heaters must be installed in accordance with the National Electrical Code or local electrical codes by a qualified person.

Wiring & Ambient Temperatures

Ambient temperatures must be considered when selecting wiring materials for electric heater circuits. Heating equipment and processes may cause associated wiring to operate well above ambient temperatures. These temperatures may result from heat conducted from the heater terminals, radiation from heated surfaces or simply high ambient air temperatures. Nickel plated copper or nickel alloy conductors with high temperature insulation should always be used in high temperature areas. Outside these areas, conventional wiring materials can usually be used. 60°C building wire is usually not suitable unless otherwise indicated.

Wiring in Severe Conditions

Moist or wet locations require gasketed terminal and junction boxes to protect equipment and wiring. Rigid conduit is recommended. Hazardous Locations require the use of approved explosion-proof terminal and junction boxes. Rigid conduit or mineral insulated (MI) cable is mandatory in Division 1 areas. Some Hazardous Locations may require conduit seals (EYS) adjacent to the equipment.

Technical Information

Wiring Practices for Electric Heaters

Wire Insulation & Conductors

The selection of wiring materials to be used in a particular application depends upon the service Voltage and the anticipated operating temperatures. The table below lists some of the more common code wire constructions according to their temperature limitations. Insulated wires should be derated for elevated ambient temperatures and should never be used above their temperature rating. The operating temperature of unplated copper wire should be limited to 200°C (392°F) maximum. A complete listing of wire construction and allowable current carrying capacities is shown in the National Electric Code Article 310.

General Purpose Wiring

Max. Conductor Temperature		Wire Type (600V)	Construction (Copper Conductors)
°C	°F		
60	140	TW	Thermoplastic
75	167	RHW	Rubber
90	194	THW	Thermoplastic
		RHH	Heat Resistant Rubber
		THWN	Heat Resistant Thermoplastic
		XHHN	Heat Resistant Cross-link Thermoplastic
200	392	MTW	Heat Resistant Cross-link Thermoplastic
		FEP	Teflon®

High Temperature Wiring Materials

Max. Conductor Temperature		Wire Type (600V)	Construction (Nickel Plated Copper or Nickel Conductors)
°C	°F		
250	482	TGT	Teflon® - Glass - Teflon®
450	842	TGGT	
		MGS	Mica - Glass - Silicone
594	1100	MGT	Mica - Glass - Teflon®
		Bare	Manganese Nickel Wire or Bus Bars with Ceramic Insulators

Note — High temperature wiring materials are available for field application.

Contactors Sizing

Contactors are normally rated for inductive and resistive loads. Most electric resistance heaters have negligible inrush or inductive current. Select contactors based on resistive load ratings. Using the formulas shown in the paragraphs on wire sizing to determine the amp load per pole (phase). Select a contactor with the next highest current rating. Use a two pole contactor for single phase (two-wire) power and a three pole contactor for balanced Delta or Wye three phase loads. For heater loads with high inrush current, refer to product data information for maximum amperage.

Thermocouple Wire & Cable

Thermocouples and extension lead wires are color coded to aid in identification and to avoid inadvertent cross wiring. The following charts indicate the colors used of different alloys.

Thermocouple Color Coding

Type	Positive Color (+)	Alloys
J	White	Iron/Constantan
K	Yellow	Chromel/Alumel
T	Blue	Copper/Constantan
E	Purple	Chromel/Constantan
R	Black	Platinum/Platinum (with 13% Rhodium)
S	Black	Platinum/Platinum (with 6% Rhodium)
N	Orange	Nicrosil/Nisil

Note — Negative (-) conductor identified with red colored insulation.

Thermocouple Extension Wire Colors

Type	Positive	Negative	Color Overall	Positive Color (+)
T	TPX	TNX	Blue	Blue
J	JPX	JNX	Black	White
E	EPX	ENX	Purple	Purple
K	KPX	KNX	Yellow	Yellow
R or S	SPX	SNX	Green	Black
B	BPX	BNX	Gray	Gray

Note — Negative (-) conductor identified with red colored insulation.

Electrical Noise & Controls

Electrical "noise" refers to extraneous electrical voltages that interfere with legitimate control signals. Most electrical noise is introduced by electromagnetic coupling with fluorescent lights, contactors, power wiring, switches and other arcing devices. Shield control circuit wiring and keep thermocouple wires separate from power wiring. Trace shielded thermocouple lead wires in a separate conduit for maximum protection.

Temperature Limits for Controls

Most mechanical controls and thermostats (control bodies) can withstand a wide range of ambient temperatures ranging from below freezing to over 140°F. Electronic controls, transformers, contactors and other electrical devices are more temperature sensitive and extreme temperatures will usually shorten the life of the component. Most electrical and electronic equipment will function accurately in ambient temperatures ranging from about 30°F to about 130°F. Triacs and SCR controls frequently require special cooling for full load ratings when operated over 120°F. Refer to the installation instructions or contact the device manufacturer for recommendations.

Wiring Hints for Electric Heaters

The following are some general recommendations for wiring electric heating elements and assemblies. These recommendations are only suggestions and are not intended to conflict with the National Electric Code or local codes.

WARNING — Hazard of Electric Shock. Any installation involving electric heaters must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard. All electrical wiring to electric heaters must be installed in accordance with the National Electrical code or local electrical codes by a qualified person.

1. Repetitive heating and cooling can cause wiring connections to loosen over time. High amperage through a loose terminal can cause overheating and terminal failure. All heater terminal connections should be tightened to a maximum torque consistent with terminal strength. Use a second wrench or pliers to prevent twisting heater terminals.
2. Use stranded wire in applications where the power wires to heater terminal connections may be subject to movement. When using solid wire or bus bar on heater terminals, provide expansion loops between points of support to minimize damaging stresses due to expansion and contraction.
3. Solder or silver braze lead connections to heating elements that may be subject to extreme temperatures or vibration. Use a minimum of flux to complete the connection and keep flux from contaminating the heating element. Remove residual flux to prevent corrosion of the electrical joint.
4. Keep thermostat capillary tubing and thermocouple wiring clear of heater terminals to prevent accidental short circuits. Sleeving or insulated tubing is recommended.
5. Use wiring suitable for the anticipated operating temperatures. Unless the heater is specifically marked for use with low temperature copper wiring, high temperature alloy conductors are recommended for connections to the heater terminals.
6. Do not use rubber, wax impregnated or plastic covered wire inside terminal enclosures of heaters in high temperature applications. These insulations will deteriorate and give off fumes which can contaminate the heating elements and cause short circuits.

Technical Information

Wiring Practices for Electric Heaters (cont'd.)

Selecting Wire Size (AWG)

The size (wire gauge) of the electrical conductor for a particular application will depend upon the Amperage (current) which the heating load will draw from the power source. Current can be calculated by Ohm's Law. To calculate amperage, use the following formulas. On a single phase (two-wire) power supply, the amperage per line is calculated by:

$$1 \text{ Ph Amperage} = \frac{\text{Total Circuit Wattage}}{\text{Line Voltage}}$$

On three phase power circuits with balanced Delta or Wye heating loads, line amperage is calculated by:

$$3 \text{ Ph Amperage} = \frac{\text{Total Circuit Wattage}}{\text{Line Voltage} \times 1.73}$$

Table II lists amperages for common kW ratings.

Allowable Ampacities

Once the load current has been determined, wire size for the calculated amperage may be selected from tables in Article 310 of the National Electrical Code (NEC). As a guide, Table III at the right lists recommended ampacities for the more common insulated wires for high temperature applications. Current ratings for 90°C wire in a 30°C ambient are included for reference.

Corrections for Elevated Ambient Temperatures

The recommended current carrying capacities of 200°C and 250°C wire are valid if conductor temperatures do not exceed 104°F (40°C). Operating temperatures in excess of 104°F (40°C) require the application of a temperature correction factor for the corresponding wire.

Example — Size 14 AWG, type TGT wire is capable of handling 39 Amperes at 104°F (40°C) but must be reduced to 0.85 (85%) or 33 Amperes when operated at 212°F (100°C).

Multiple Insulated Wires in Conduit

The wire size selected above may be used in the heating circuit with three (3) wires enclosed in rigid or flexible conduit to protect the wiring. If more than 3 conductors are installed in the same conduit, another current correction factor must be used. For 4 to 6 conductors in a single conduit use 80% of the recommended current-carrying capacity. For 7 to 24 conductors use 70%.

Table II — Amperage (Current) for Typical kW Heater Ratings

kW	Single Phase					Three Phase Balanced Load				
	120V	208V	240V	440V	480V	208V	240V	440V	480V	575V
1	8.4	4.8	4.2	2.3	2.1	2.8	2.5	1.4	1.3	1.0
2	16.7	9.7	8.4	4.6	4.2	5.6	4.9	2.7	2.5	2.0
3	25.0	14.5	12.5	6.9	6.3	8.4	7.3	4	3.7	3.0
4	33.4	19.3	16.7	9.1	8.4	11.2	9.7	5.3	4.9	4.0
5	41.7	24.1	20.9	11.4	10.5	13.9	12.1	6.6	6.1	5.0
6	50.0	28.9	25.0	13.7	12.5	16.7	14.5	7.9	7.3	6.0
7.5	62.5	36.1	31.3	17.1	15.7	20.9	18.1	9.9	9.1	7.5
10	83.4	48.1	41.7	22.8	20.9	27.8	24.1	13.2	12.1	10.0
12	100.0	57.7	50.0	27.3	25	33.4	29	15.8	14.5	12.1
15	125.0	72.2	62.5	34.1	31.2	41.7	36.2	19.7	18.1	15.1
20	167.0	96.2	83.4	45.5	41.7	55.6	48.2	26.3	24.1	20.1
25	209.0	121	105	56.9	52.1	69.5	60.3	32.9	30.1	25.1
30	—	145	125	68.2	62.5	83.4	72.3	39.4	36.2	30.2
50	—	241	209	114	105	139	121	65.7	60.3	50.3
75	—	—	313	171	157	209	181	98.6	90.4	75.4
100	—	—	417	228	209	278	241	132	121.0	100.0

Table III — Allowable Ampacities

Three Insulated Conductors in a Raceway or Conduit				Single Conductor ^{1,2} in Free Air (200°C Ambient)		
Conductor Type	Copper	Copper	Nickel or Nickel Coated Copper	Nickel Coated Copper	Nickel	
Insulation Type	THHN XHHW MTW	FEP PFA SRG	TGT TGGT TFE	MGT MGS	MGT MGS	
Ambient Temp.	30°C (86°F)	40°C (104°F)	40°C (104°F)	200°C (392°F)	200°C (392°F)	
Maximum Conductor Temperature (Insulation Limits)						
Size AWG	90°C (194°F)	200°C (392°F)	250°C (482°F)	450°C (842°F)	450°C (842°F)	
14	25	36	39	44	23	
12	30	45	54	58	31	
10	40	60	73	77	42	
8	55	83	93	100	53	
6	75	110	117	—	—	
Correction Factors for Elevated Ambient Temperatures						
Ambient (°C)	For ambient temperature exceeding the values in the above table, multiply the allowable ampacities by the appropriate factor below. (°F)			Ambient		
36 - 40	0.91	1.00	1.00	—	—	96 - 104
41 - 45	0.87	0.97	0.98	—	—	105 - 113
46 - 50	0.82	0.96	0.97	—	—	114 - 122
51 - 55	0.76	0.95	0.95	—	—	123 - 131
56 - 60	0.71	0.94	0.94	—	—	132 - 140
61 - 70	0.58	0.9	0.93	—	—	141 - 158
71 - 80	0.41	0.87	0.9	—	—	159 - 176
81 - 90	—	0.83	0.87	—	—	177 - 194
91 - 100	—	0.79	0.85	1.22	—	195 - 212
101 - 120	—	0.71	0.79	1.19	—	213 - 248
121 - 140	—	0.61	0.72	1.16	1.16	249 - 284
141 - 160	—	0.5	0.65	1.12	1.12	285 - 320
161 - 180	—	0.35	0.58	1.06	1.06	321 - 356
181 - 200	—	—	0.49	1.00	1.00	357 - 392
201 - 225	—	—	0.35	0.92	0.92	393 - 437
226 - 250	—	—	—	0.87	0.87	438 - 542
250 - 300	—	—	—	0.70	0.70	543 - 572
300 - 350	—	—	—	0.49	0.49	573 - 662

1. Data derived or extrapolated from values and criteria set forth in NEC Article 310.
2. MGT & MGS insulated wire is intended to be used for interconnection of strip heaters and elements located in high temperature ambients and is not intended for general purpose wiring. Do not use these Amp ratings for three insulated conductors inside raceways or conduits.

Reference Data

Pressure-Temperature Ratings of Common Flange Materials

Recommended Maximum Pressure-Temperature Ratings¹ for Catalog Flange Immersion & Circulation Heaters²

Temp. (°F)	Class 150 (Pressures in psig)							Class 300 (Pressures in psig)							Class 600 (Pressures in psig)							Temp (°F)
	B-16.5 Material Group Number																					
	1.1	1.9	2.1	2.2	2.3	2.4	2.5	1.1	1.9	2.1	2.2	2.3	2.4	2.5	1.1	1.9	2.1	2.2	2.3	2.4	2.5	
	Car-	Alloy	Austenitic Steels					Car-	Alloy	Austenitic Steels					Car-	Alloy	Austenitic Steels					
	bon Steel	Steel 1-½ Cr-½ Mo	Type 304	Type 316	Type 304L 316L	Type 321	Type 347, 348	bon Steel	Steel 1-½ Cr-½ Mo	Type 304	Type 316	Type 304L 316L	Type 321	Type 347, 348	bon Steel	Steel 1-½ Cr-½ Mo	Type 304	Type 316	Type 304L 316L	Type 321	Type 347, 348	
-20 to	285	290	275	275	230	275	275	740	750	720	720	600	720	720	1,480	1,500	1,440	144	1,200	1,440	1,440	-20 to
100	260	260	235	240	195	235	245	675	710	600	620	505	610	635	1,350	1,425	1,200	124	1,015	1,220	1,270	100
200	230	230	205	215	175	210	225	655	675	530	560	455	545	590	1,315	1,345	1,055	112	910	1,090	1,175	200
300	200	200	180	195	160	190	200	635	660	470	515	415	495	555	1,270	1,315	940	103	825	990	1,110	300
400	170	170	170	170	145	170	170	600	640	435	480	380	460	520	1,200	1,285	875	955	765	915	1,035	400
500	140	140	140	140	140	140	140	550	605	415	450	360	435	490	1,095	1,210	830	905	720	875	985	500
600	125	125	125	125	125	125	125	535	590	410	445	350	430	480	1,075	1,175	815	890	700	855	960	600
650	110	110	110	110	110	110	110	535	570	405	430	345	420	470	1,065	1,135	805	865	685	840	935	700
700	95	95	95	95	95	95	95	505	530	400	425	335	415	460	1,010	1,065	795	845	670	830	920	750
750	80	80	80	80	80	80	80	410	510	395	415	330	415	455	825	1,015	790	830	660	825	910	800
800	65	65	65	65	65	65	65	270	485	390	405	320	410	445	535	975	780	810	645	815	890	850
850	50	50	50	50	50	50	50	170	450	385	395	—	405	430	345	900	770	790	—	810	865	900
900	35	35	35	35	35	35	35	105	380	375	385	—	385	385	205	755	750	775	—	775	775	950
950	20	20	20	20	20	20	20	50	225	325	365	—	355	365	105	445	645	725	—	715	725	1000
1000	Material Groups							Notes	140	310	360	—	345	360	—	275	620	720	—	695	720	1050
1050	1.1 A-105, A516-70							A, B	95	260	325	—	300	325	—	190	515	645	—	605	645	1100
1100	1.1 A350-LF2							C	50	195	275	—	235	275	—	105	390	550	—	475	550	1150
1150	1.9 A182-F11, A182-F12							D	35	155	205	—	180	170	—	70	310	410	—	365	345	1200
1200	2.1 A182-F304, F304H and A240-304							—	—	—	—	—	—	125	—	—	220	365	—	280	245	1250
1250	2.2 A182-F316, F316H and A240-316							—	—	85	140	—	105	95	—	—	165	275	—	210	185	1300
1300	2.3 A182-F304L, F316L and A240-304L							E, F	—	60	105	—	80	70	—	—	125	205	—	165	135	1350
1350	2.4 A182-F321, F321H and A240-321, 321H							G	—	50	75	—	60	50	—	—	90	150	—	125	105	1400
1400	2.5 A182-F347, F347H and A240-347, 347H							H	—	35	60	—	50	40	—	—	70	115	—	95	80	1450
1450								—	—	25	40	—	40	35	—	—	50	85	—	75	70	1500

- The above table is in accordance with ANSI B16.5, 1988 Edition. For other materials, critical applications or for higher pressure-temperature requirements, refer to ANSI Std. B16.5 or contact your Local Chromalox Sales office.
- Pressure-temperature ratings for ASME pressure vessels and flanges may vary from the values shown in the above table due to Code requirements, re-inforcement and ligament calculations. Contact your Local Chromalox Sales office for further information and specific recommendations for ASME Coded flanges and heaters.

Other Notes —

- Not recommended for prolonged use above 800°F.
- Do not use A105 flanges above 1000°F or A516-70 plate over 850°F.
- Do not use A350-LF2 flanges above 650°F.
- Not recommended for prolonged use above 1100°F.
- Do not use A182-F304L flanges or A240-304L plate above 800°F.
- Do not use A182-F316L flanges or A240-316L plate above 850°F.
- Do not use A182-F321 flanges or A240-321 over 1000°F.
- Do not use A182-F347 flanges or A240-347 plate above 1000°F.

Pipe Specifications — Standard (Schedule 40) Steel & Stainless Pipe

Nominal Pipe Size	Pipe Schedule	Outside Dia. (In.)	Wall Thickness (In.)	Inside Dia. (In.)	Inside Area (In ²)	Weight (Lbs./Ft.)	Volume (Gal./Ft.)	Wt. Water (Lbs./Ft.)	Thds./In. (NPT)
1/8	Sch 40 (Std)	0.405	0.068	0.269	0.0568	0.245	0.0030	0.0246	27
1/4	Sch 40 (Std)	0.540	0.088	0.364	0.1041	0.425	0.0054	0.0451	18
3/8	Sch 40 (Std)	0.675	0.091	0.493	0.191	0.568	0.0099	0.0827	18
1/2	Sch 40 (Std)	0.840	0.109	0.622	0.304	0.851	0.0157	0.1316	14
3/4	Sch 40 (Std)	1.050	0.113	0.824	0.533	1.131	0.0277	0.2301	14
1	Sch 40 (Std)	1.315	0.133	1.049	0.864	1.679	0.0449	0.374	11-1/2
1-1/4	Sch 40 (Std)	1.660	0.140	1.380	1.496	2.273	0.0779	0.648	11-1/2
1-1/2	Sch 40 (Std)	1.900	0.145	1.610	2.036	2.718	0.106	0.882	11-1/2
2	Sch 40 (Std)	2.375	0.154	2.067	3.360	3.653	0.174	1.455	11-1/2
2-1/2	Sch 40 (Std)	2.875	0.203	2.469	4.079	5.793	0.249	2.076	8
3	Sch 40 (Std)	3.500	0.216	3.068	7.039	7.578	0.384	3.20	8
3-1/2	Sch 40 (Std)	4.000	0.226	3.548	9.89	9.11	0.514	4.28	8
4	Sch 40 (Std)	4.500	0.237	4.026	12.73	10.79	0.661	5.51	8
5	Sch 40 (Std)	5.563	0.258	5.047	20.01	14.62	1.04	8.66	8
6	Sch 40 (Std)	6.625	0.280	6.065	28.89	18.97	1.50	12.51	8
8	Sch 40 (Std)	8.625	0.322	7.981	50.00	28.55	2.66	21.69	8
10	Sch 40 (Std)	10.75	0.365	10.02	78.90	40.48	4.19	34.10	8
12	Standard	12.75	0.375	12.00	113.10	49.56	5.96	49.00	8
14	Standard	14.00	0.375	13.25	137.90	54.57	7.19	59.70	8

Reference Data

Physical & Thermodynamic Properties of Common Liquids

Substance	Density ¹ (Lbs/Ft ³)	Specific Heat (Btu/lb/°F)	Thermal Conductivity (Btu/in/hr/ft ² /°F)	Melting Point (°F)	Latent Heat of Fusion (Btu/lb)	Boiling Point (°F)	Latent Heat of Vaporization (Btu/lb)	Viscosity Centipoise
Acetic Acid	65.5	0.522	1.19	62	84	245	174.2	1.222
Acetone	49.42	0.514	1.22	-140	42.1	133	224	0.31
Allyl Alcohol	53.31	0.665	1.25	-200	—	206	294.1	1.363
Ammonia	43.5	1.099	3.48	107	142.9	-28	583	—
Amyl Alcohol	51.06	0.65	1.13	-110	—	280	216.3	—
Aniline	63.77	0.512	1.2	21	48.8	364	186.6	4.467
Bromine	194.7	0.107	—	19	28.5	138	79.4	1.005
Butyl Alcohol	50.54	0.563	1.07	-130	54	244	254	2.948
Butyric Acid	60.2	0.515	1.13	20	54.1	326	217	1.54
Carbolic Acid (Phenol)	66.7	0.561	—	106	52.3	360	—	12.74
Carbon Disulfide	78.9	0.24	1.12	-169	—	115	148.8	0.376
Carbon Tetrachloride	99.47	0.201	0.744	-9	12.8	170	83.5	0.975
Caustic Soda (50% Solution)	95.4	0.78	—	—	—	—	—	—
Decane	45.6	0.5	1.03	-21	86.9	345	—	0.77
Di-ethyl Ether	44.61	0.541	—	-177	42.4	94	151	0.245
Ether	46	0.503	0.97	—	—	95	160	—
Ethyl Acetate	52.3	0.468	1.21	-116	—	171	183.8	0.45
Ethyl Alcohol	49.27	0.68	1.26	-174	46.4	173	367.5	1.2
Ethyl Bromide	90.5	0.215	—	-182	—	101	107.8	0.402
Ethyl Chloride	56.05	0.368	2.15	-214	—	54	165.9	—
Ethyl Iodide	120.8	0.161	2.57	-163	—	162	82	0.592
Ethylene Glycol	69.2	0.555	1	—	—	388	344	—
Ethylene Bromide	136.5	0.173	—	50	—	269	99.2	1.721
Ethylene Chloride	71.75	0.294	—	-35	—	183	139.2	0.838
Formic Acid	76.13	0.526	1.25	47	118.9	213	216	1.784
Glycerin	78.69	0.576	1.36	68	85.5	554	—	830
Heat Transfer Fluids								
Dowtherm A	66.1	0.377	—	54	42.2	494	127	—
Dowtherm G	65.4	0.377	—	40	42.2	551	123	—
Mobiltherm 603	53.7	0.592	—	—	—	—	—	—
Therminol VP-1	65.9	0.377	—	—	—	495	130.6	—
Heptane	42.68	0.532	0.89	-132	—	210	137.3	0.416
Hexane	41.18	0.6	0.86	-40	—	155	142.5	0.326
Linseed Oil	58.28	0.44	—	-4	—	548	—	33.1
Methyl Acetate	57.84	0.468	1.12	-144	—	134	176.6	0.388
Methyl Alcohol	49.42	0.601	1.49	-144	42.7	148	473	0.596
Methyl Iodide	142.58	—	—	-87	—	108	82.6	0.5
Nitric Acid (100%)	94.41	0.42	1.92	-42	71.5	187	270	—
Nitrobenzene	75.63	0.35	11.52	42	40.5	412	142.4	2.1
Octane	44.12	0.51	1	-70	—	258	131.7	0.542
Olive Oil	57.28	0.471	—	—	—	~ 572	—	84
Pentane	39.37	0.558	0.79	-202	—	97	153.6	0.24
Petroleum Products								
Asphalt	62.3	0.42	5.04	—	—	—	—	—
Benzene (Benzol)	54.85	0.412	1.02	42	54.2	176	169.4	0.654
Kerosene	49.9	0.5	1.03	—	—	—	—	—
Fuel Oil #6	58.5	0.41	0.85	—	—	—	—	—
Gasoline	41.2	0.5	0.936	—	—	128 - 164	—	—
Lube Oils	55.4	0.43	—	—	—	—	—	—
Naphthalene	71.4	0.4	—	176	64	411	136	4
Paraffin (Melted)	44.3	0.71	1.68	—	—	~ 525	—	—
Toluene	54.03	0.404	1.08	-139	—	231	155.7	0.59
Propionic Acid	61.77	0.473	1.2	-5	—	286	177.8	1.102
Propyl Alcohol	50.16	0.57	—	-197	—	208	296	2.256
Soy Bean Oil	57.35	~ 0.28	—	—	—	—	—	40.6
Sulfur (Melted)	14.6	0.234	—	—	—	833	—	—
Sulfuric Acid (100%)	114.25	0.344	—	51	43.3	638	219.7	50
Tallow (Lard)	58.66	0.64	—	50 - 106	—	—	—	17.6
Turpentine	54.48	0.42	0.876	14	—	319	123.5	1.487
Water	62.4	1	4.17	32	143.6	212	972	1.005
Xylene (Ortho)	55	0.411	1.08	-13	—	291	149.2	0.881

1. Where the temperature is not given, room temperature of 68°F (20°C) is understood.

Other Notes —

- A. Dowtherm is a trademark of the Dow Chemical Company.
- B. Mobiltherm is a trademark of the Mobil Oil Corporation.
- C. Therminol is a trademark of the Monsanto Company.

Reference Data

Physical & Thermodynamic Properties of Common Solids

Properties of Metals (Solid)

Substance	Density (Lb/Ft ³)	Specific Heat (Btu/ lb/°F)	Thermal Conductivity (Btu/ in/hr/ft ² /°F)	Melting Point (°F)	Latent Heat Fusion (Btu/lb)
Aluminum	169	0.226	1536	1220	167.4
Antimony	413	0.0504	127	1167	70.2
Babbitt - Tin	462	0.071	278	465	279
Barium	218	0.068	—	1562	—
Beryllium	113	0.425	960	2462	572.4
Bismuth	610	0.0294	62	520	22.5
Brass (Yellow)	529	0.092	768	~ 1680	—
Cadmium	540	0.0552	644	609	23
Calcium	97	0.168	910	1490	140
Carbon	165	0.165	165	> 6400	—
Chromium	432	0.111	480	2940	126
Cobalt	544	0.1001	336	2696	115.2
Copper	555	0.0928	2784	1981	88.7
Gold	1204	0.0312	2352	1945	28.6
INCOLOY® 800	495	0.108	80	2475	—
INCONEL® 600	525	0.106	103	2470	—
Iridium	1399	0.0323	448	4449	47
Iron (99.97%)	491	0.1075	498	2795	117
Lead	708	0.0306	243	621	10.8
Lithium	33	0.79	516	357	217
Magnesium	108	0.246	1188	1204	126
Manganese	449	0.1211	81	2300	116
Mercury	845	0.0333	58	-38	4.98
Molybdenum	636	0.065	948	4748	126
MONEL® 400	551	0.11	144	2370	—
Nickel	552	0.1032	432	2624	131.4
Platinum	1333	0.0319	492	3224	48.4
Potassium	54	0.177	720	146	26.3
Rhodium	776	0.058	666	3570	—
Silver	665	0.0557	2904	1761	46.6
Sodium	60	0.283	970	208	48.6
Solder 50%Sn - 50%Pb	550	0.04	340	~ 440	17
Steel, Carbon	487	0.12	315	2548	—
Steel, SS	501	0.12	113	2550	—
Tantalum	1035	0.036	384	5162	—
Tin	454	0.0548	432	449	25.9
Titanium	281	0.1125	108	3272	—
Type Metal 85%Pb - 15%Sb	625	0.04	180	~ 479	14
Tungsten	1204	0.032	1104	6119	79
Uranium	397	0.028	168	< 3362	—
Vanadium	349	0.1153	240	3110	—
Zinc	445	0.0931	780	787	47.9
Zirconium	408	0.066	132	3452	108

Note — Where temperature is not given, 68°F (20°C) temperature is understood.

Properties of Metals (Liquid)

Metal	Melting Point (°F)	Latent Ht. of Fusion (Btu/lb)	Liquid Temp. (°F)	Density (Lbs/ft ³)	Specific Heat (Btu/ Lb/°F)	Thermal Conductivity (Btu/ in/hr/ft ² /°F)
Aluminum	1220	173	1220	148.6	0.26	—
	—	—	1292	147.7	0.26	717
	—	—	1454	—	0.26	842
Bismuth	520	21.6	600	625	0.034	114
	—	—	1000	608	0.037	108
	—	—	1400	591	0.039	108
Cadmium	609	23.8	626	500	0.063	—
	—	—	660	499	0.063	308
	—	—	752	495	0.063	—
Gold	1945	26.9	2012	1,076	0.036	—
Lead	621	10.6	700	658	0.038	126
	—	—	900	650	0.037	137
	—	—	1300	633	—	—
Lithium	357	284	392	31.7	1	262
	—	—	752	31	1	—
Magnesium	1204	148	1204	98	0.317	—
	—	—	1328	94	—	—
	—	—	1341	—	0.321	—
Mercury	-38	5	50	847	0.033	56
	—	—	300	826	0.033	80
	—	—	600	802	0.032	97
Potassium	146	26.3	300	50.4	0.190	312
	—	—	800	46.3	0.183	274
	—	—	1300	42.1	0.180	229
Silver	1761	44.8	1761	581	0.069	—
	—	—	1832	578	0.069	—
	—	—	2000	574	0.069	—
Sodium	208	48.7	200	58	0.33	598
	—	—	400	56	0.32	557
	—	—	700	54	0.31	502
	—	—	1300	49	0.30	414
Solder 50%Sn - 50%	421	17	—	—	0.056	—
60%Sn - 40%	375	28	—	—	0.058	—
Tin	449	26.1	482	—	0.058	—
	—	—	768	427	—	—
	—	—	783	—	—	229
Zinc	787	43.9	787	432	0.12	—
	—	—	932	—	—	400
	—	—	1112	425	0.117	394

Reference Data

Physical & Thermodynamic Properties of Common Solids (*cont'd.*)

Properties of Non-Metallic Solids

Substance	Density (Lbs/Ft ³)	Specific Heat (Btu/lb/°F 20°C 68°F)	Thermal Conductivity (Btu/in/ hr/ft ² /°F)	Melting Point (°F)
Alumina	231	0.19	205	—
Aluminum Silicate (Lava)	130	0.25	9	—
Asbestos (Insul.)	36	0.2	1.1	—
Asbestos - Cement Board	120	0.24	4	—
Asphalt	81	0.4	5.2	250
Bakelite	81	0.35	116	—
Basalt	184	0.2	—	—
Beeswax	60	—	—	144
Boron Nitride (Comp.)	130	0.32	150	—
Brick, Building	123	0.22	4.8	—
Carbon, Powder	131	0.168	2.4	6400
Graphite, Solid	140	0.165	1044	—
Graphite, Powder	130	0.165	1.27	—
Diamond	219	0.16	15840	—
Cellulose (Pulp)	3.4	0.35	0.32	—
Chalk	143	0.215	5.76	—
Charcoal (Oak)	33	0.2	0.36	—
Clay	115	0.22	9	—
Coal (Anthracite)	97	0.3	1.18	—
Coke	75	0.36	6.6	—
Concrete, Sand	144	0.22	12.6	—
Concrete, Cinder	97	0.21	4.92	—
Cordierite	138	0.35	23	—
Cork (Granulated)	5.4	0.485	0.336	—
Earth (42% H ₂ O)	108	0.9	7.44	—
Earth (Dry, Packed)	95	0.42	0.9	—
Earth (Dry, Stony)	127	0.44	3.6	—
Fiberglas® (Insul.)	0.75	—	0.29	—
Fiberglas® (Insul.)	3	—	0.22	—
Firebrick (Clay)	112	0.198	6.96	—
Fosterite	174	0.23	26	—
Fused Silica (Quartz)	137	0.31	9.96	—
Glass				
Normal	139	0.199	7.08	2200
Crown	154	0.161	7.08	—
Flint (Leaded)	200	0.117	9.48	—
Pyrex	139	0.20	7.08	—
Granite	159	0.192	13 - 28	—
Ice -0°C (32°F)	57.5	0.465	15.6	32
Limestone	153	0.217	6.48	—

Properties of Non-Metallic Solids

Substance	Density (Lbs/Ft ³)	Specific Heat (Btu/lb/°F 20°C 68°F)	Thermal Conductivity (Btu/in/ hr/ft ² /°F)	Melting Point (°F)
Magnesia 85% (Insul.)	12	0.222	4.2	—
Magnesium Oxide	135	0.25	17.6	—
Marble	170	0.21	18	—
Mica	165	0.206	3	—
Paper	58	0.32	0.9	—
Plastics				
ABS	62.2	0.3 - 0.4	1.56	—
Cellulose Acetate	82.9	0.3 - 0.42	2.28	—
Epoxy (Resin)	71.8	0.4 - 0.5	1.2 - 3.5	—
Fluoroplastic (PTFE)	133	0.25	1.68	—
Nylon	69.1	0.4	1.2	—
Phenolic	82.9	0.35	0.097 - 0.3	—
Polyethylene	57	0.55	2.28	—
Polystyrene	64.8	0.32	0.7 - 1.08	—
Polystyrene (Exp.)	1.7	0.29	0.252	—
Polypropylene	56.7	0.45	1.21 - 1.36	—
Polyurethane (Exp.)	1.5	0.38	0.228	—
Polyvinyl	86.4	0.2 - 0.3	0.84 - 1.20	—
Paraffin	56	0.69	1.68	133
Porcelain	145	0.26	15.6	—
Pyroceram	163	0.233	23.4	—
Quartz	138	0.17	27.6	3150
Rigid Insulation				
Fiber Board	14.8		0.28	—
Inorganic Bonded	10 - 15		0.45	—
Rock Salt	136	0.21	—	1472
Rubber Soft	68.6	0.48	0.96	—
Rubber, Hard	74.3	0.48	1.104	—
Sand	94	0.195	2.25	—
Silicon	145	0.181	—	2577
Sodium Carbonate	135	0.30	—	1546
Sodium Chloride	135	0.22	—	1440
Sodium Cyanide	94	0.3	—	1015
Sodium Nitrate	141	0.29	—	555
Sodium Nitrite	135	0.3	—	490
Steatite	158	0.2	23.2	—
Sugar	105	0.3	—	160
Sulfur	129	0.181	1.8	—
Woods (Average)	23 - 70	0.45 - 0.67	0.78 - 1.78	—
Oak, Red	42	0.57	1.188	—
Pine, White	25	0.67	0.72	—

Reference Data

Equivalents & Conversions

Temperature Equivalents (°F and °C)

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-50	-58	95	203	240	464	385	725	530	986	675	1247	820	1508
-45	-49	100	212	245	473	390	734	535	995	680	1256	825	1517
-40	-40	105	221	250	482	395	743	540	1004	685	1265	830	1526
-35	-31	110	230	255	491	400	752	545	1013	690	1274	835	1535
-30	-22	115	239	260	500	405	761	550	1022	695	1283	840	1544
-25	-13	120	248	265	509	410	770	555	1031	700	1292	845	1553
-20	-4	125	257	270	518	415	779	560	1040	705	1301	850	1562
-15	-5	130	266	275	527	420	788	565	1049	710	1310	855	1571
-10	14	135	275	280	536	425	797	570	1058	715	1319	860	1580
-5	23	140	284	285	545	430	806	575	1067	720	1328	865	1589
0	32	145	293	290	554	435	815	580	1076	725	1337	870	1598
5	41	150	302	295	563	440	824	585	1085	730	1346	875	1607
10	50	155	311	300	572	445	833	590	1094	735	1355	880	1616
15	59	160	320	305	581	450	842	595	1103	740	1364	885	1625
20	68	165	329	310	590	455	851	600	1112	745	1373	890	1634
25	77	170	338	315	599	460	860	605	1121	750	1382	895	1643
30	86	175	347	320	608	465	869	610	1130	755	1391	900	1652
35	95	180	356	325	617	470	878	615	1139	760	1400	905	1661
40	104	185	365	330	626	475	887	620	1148	765	1409	910	1670
45	113	190	374	335	635	480	896	625	1157	770	1418	915	1679
50	122	195	383	340	644	485	905	630	1166	775	1427	920	1688
55	131	200	392	345	653	490	914	635	1175	780	1436	925	1697
60	140	205	401	350	662	495	923	640	1184	785	1445	930	1706
65	149	210	410	355	671	500	932	645	1193	790	1454	935	1715
70	158	215	419	360	680	505	941	650	1202	795	1463	940	1724
75	167	220	428	365	689	510	950	655	1211	800	1472	945	1733
80	176	225	437	370	698	515	959	660	1220	805	1481	950	1742
85	185	230	446	375	707	520	968	665	1229	810	1490	955	1751
90	194	235	455	380	716	525	977	670	1238	815	1499	960	1760

Values for Interpolation in Above Table

1°C = 1.8°F	6°C = 10.8°F	1°F = 0.55°C	6°F = 3.33°C
2°C = 3.6°F	7°C = 12.6°F	2°F = 1.11°C	7°F = 3.88°C
3°C = 5.4°F	8°C = 14.4°F	3°F = 1.66°C	8°F = 4.44°C
4°C = 7.2°F	9°C = 16.2°F	4°F = 2.22°C	9°F = 5°C
5°C = 9°F		5°F = 2.77°C	

Formula for Converting Temperature Scales

Fahrenheit to Celsius	°F = 1.8°C + 32
Celsius to Fahrenheit	°C = 5/9 x (°F - 32)
Fahrenheit to Rankine (absolute)	°R = °F + 460
Celsius to Kelvin (absolute)	°K = °C + 273

Note — All decimals are exact. All decimals are repeating decimals.

Pressure Equivalents

Unit	Lbs/in ²	Kg/cm ²	Atm	Bar	Pascals	mm Hg. (0°C)	In. Hg (32°F)	Ft H ₂ O (60°F)
1 lbs/in ²	1	0.0703	0.06804	0.06895	6,895	51.715	2.036	2.3086
1 kg/cm. ²	14.22	1	0.9678	0.98066	98,066	735.56	28.96	32.843
1 Atmosphere (atm)	14.696	1.0333	1	1.01325	101,326	760	29.921	33.925
1 Bar	14.504	1.019716	0.9869	1	1 x 10 ⁵	750.06	29.53	33.49
1 Pascal (N/m ²)	14.5 x 10 ⁻⁵	1.03 x 10 ⁻⁵	1 x 10 ⁻⁵	1 x 10 ⁻⁵	1	7.5 x 10 ⁻⁵	0.000295	0.000335
1 mm Hg. (0°C)	0.01934	1.35951	0.1316	0.1333	13,330	1	0.03937	0.04465
1 in. Hg. (32°F)	0.4912	0.034532	0.03342	0.03386	3,386	25.4	1	1.1342
1 ft. H ₂ O (60°F)	0.4331	0.03045	0.02947	0.02986	2,987	22.396	0.88175	1
100 ft H ₂ O (60°F)	43.31	3.0448	2.9469	2.9859	298,700	2239.6	88.175	100

Notes —

- A. 1 inch of Hg (Mercury) = 13.6 inches of water.
- B. 1 pound per square inch (psi) = 2.31 feet of water.
- C. 1 foot of water = 0.4331 pounds per square inch (psi).

Reference Data

Engineering Constants & Conversions

Common Conversion Factors

To Convert	Units	Multiply By	To Obtain	Units
Atmospheres	atm	1.0133	Bar	
Atmospheres	atm	29.92	Inches Mercury	in. Hg
Bar		0.9869	Atmospheres	atm
Bar		14.504	Pounds/square inch	psi
British thermal unit	Btu	1,055	Joules	J
British thermal unit	Btu	0.0002931	Kilowatts	kW
British thermal unit	Btu	0.2931	Watts	W
British thermal unit	Btu	0.252	Kilocalories	kcal
Brit. ther. units/hr	Btuh	0.2931	Joules/second	J/s
Brit. ther. units/hr	Btuh	0.2931	Watt/hours	Wh
Brit. ther. units/hr	Btuh	0.0002931	Kilowatt/hours	kWh
Brit. ther. units/ Btu/in/h/		0.1442	Watts/meter/°C	W/m°C
inch/hour/sqft/°F	ft²/°F			
Brit. ther. units/hr	Btuh	0.252	Kilocalories/hour	kcal/h
Calories	cal	4.187	Joules	J
Centimeter	cm	0.03281	Feet	ft
Centimeter	cm	0.3937	Inches	in.
Centimeters/second	cm/s	1.969	Feet/minute	fpm
Cubic centimeter	cm³	0.061	Cubic inches	in³
Cubic feet	ft³	62.43	Pounds of water	lb
Cubic feet	ft³	28.32	Cubic centimeters	cm³
Cubic feet	ft³	0.02832	Cubic meters	m³
Cubic feet	ft³	7.481	Gallons, U.S.	gal
Cubic feet	ft³	28.32	Liters	l
Cubic feet/minute	cfm	1.699	Cubic meters/hour	m³/h
Cubic feet/minute	term	0.000472	Cubic meters/sec	m³/s
Cubic feet/minute	cfm	0.4719	Liters/second	l/s
Cubic inch	in³	16.39	Cubic centimeters	cm³
Cubic meter	m³	35.32	Cubic feet	ft³
Cubic meter	m³	264.2	Gallons, U.S.	gal
Cubic meter	m³	1,000	Liters	l
Cubic meters/hr	m³/h	0.5885	Cubic feet/min.	cfm
Cubic meters/hr	m³/h	4.403	Gallons/min.	gpm
Cubic meters/sec	m³/s	2,119	Cubic feet/min.	cfm
Feet	ft	30.48	Centimeters	cm
Feet	ft	0.3048	Meters	m
Feet/minute	fpm	0.508	Centimeters/sec.	cm/s
Feet/minute	fpm	0.00508	Meters/sec.	m/s
Gallon, Imperial		1.201	Gallons, U.S.	gal
Gallon, U.S.	gal	231	Cubic inches	in³
Gallon, U.S.	gal	0.1337	Cubic feet	ft³
Gallon, U.S.	gal	8.337	Pounds of water	lb
Gallon, U.S.	gal	0.8327	Gallon Imperial	
Gallon, U.S.	gal	3.785	Liters	l
Gallon, U.S.	gal	0.003785	Cubic meters	m³
Gallons/minute	gpm	0.2271	Cubic meters/hr	m³/h
Gallons/minute	gpm	0.06309	Liters/sec.	l/s
Grams	g	0.035274	Ounces	oz
Grams	g	0.002205	Pounds	lb
Grams/cu centimeter/cm³		1,000	Kilograms/cu meter kg/m³	
Grams/cu centimeter/cm³		62.43	Pounds/cubic foot lb/ft³	
Grams/cu centimeter/cm³		0.03613	Pounds/cubic inch lb/in³	
Horsepower	hp	0.7457	Kilowatts	kW
Horsepower	hp	2,545	British thermal units	Btu
Horsepower	hp	33,000	Foot-lbs/min	ft-lb/min
Horsepower, boiler	bhp	9.803	Kilowatts	kW
Horsepower, boiler	bhp	3,352	British ther. units/hr	Btuh
Inches	in.	2.54	Centimeters	cm
Inches	in.	25.4	Millimeters	mm
Inches Mercury	in. Hg	0.03342	Atmospheres	atm
Inches Mercury	in. Hg	0.03937	Torr	

Common Conversion Factors

To Convert	Units	Multiply By	To Obtain	Units
Joules	J	0.000948	British thermal unit	Btu
Joules	J	0.2388	Calories	cal
Joules	J	0.0002778	Watt/hrs	Wh
Joules/second	J/s	1	Watts	W
Kilocalories/hour	kcal/h	3.969	British ther. units/hr	Btuh
Kilograms	kg	2.205	Pounds	lb
Kilo./cubic meter	kg/m³	0.001	Grams/cu centimeter/cm³	
Kilo./cubic meter	kg/m³	0.06243	Pounds/cubic foot lb/ft³	
Kilograms/sq cm	kg/cm²	14.22	Pounds/square inch	psi
Kilojoule	kJ	0.2778	Watt/hrs	Wh
Kilometers/hour	km/h	0.6315	Miles/hr	mph
Kilopascal	kPa	0.145	Pounds/square inch	psi
Kilowatt/hours	kWh	3,412	British ther. units/hr	Btuh
Kilowatt	kW	3,412	British thermal units	Btu
Liter	l	0.03532	Cubic feet	ft³
Liter	l	0.001	Cubic meters	m³
Liter	l	0.2642	Gallon, U.S.	gal
Liters/second	l/s	2.119	Cubic feet/min.	cfm
Liters/second	l/s	15.85	Gallons/min.	gpm
Meter	m	3.281	Feet	ft
Meter	m	39.37	Inches	in.
Meters/second	m/s	196.9	Feet/min.	fpm
Miles/hour	mph	1.609	Kilometers/hr	km/h
Milliliter	ml	1	Cubic centimeters	cm³
Millimeter	mm	0.03937	Inches	in.
Newtons/sq meter	N/m²	0.000145	Pounds/square inch	psi
Ounce	oz	28.35	Grams	g
Pound	lb	453.6	Grams	g
Pound	lb	0.4536	Kilograms	kg
Pounds/cubic foot	lb/ft³	0.01602	Grams/cu centimeter/cm³	
Pounds/cubic foot	lb/ft³	16.02	Kilograms/cu meter kg/m³	
Pounds/cubic inch	lb/in³	27.68	Grams/cu centimeter/cm³	
Pounds/square inch	psi	0.06805	Atmospheres	atm
Pounds/square inch	psi	0.06895	Bar	
Pounds/square inch	psi	0.07031	Kilograms/sq cm	kg/cm²
Pounds/square inch	psi	6.895	Kilopascals	kPa
Pounds/square inch	psi	6.895	Newtons/sq meter	N/m²
Pounds/square inch	psi	51.71	Torr	
Square centimeters	cm²	0.001076	Square feet	ft²
Square centimeters	cm²	0.155	Square inches	in²
Square feet	ft²	929	Square centimeters	cm²
Square feet	ft²	0.0929	Square meters	m²
Square inches	in²	6.452	Square centimeters	cm²
Square meters	m²	10.76	Square feet	ft²
Torr		0.001316	Atmospheres	atm
Torr		25.4	Inches Mercury	in. Hg
Watt-hours	Wh	3,600	Joules	J
Watt-hours	Wh	3.412	British ther. units/hr	Btuh
Watt-hours	Wh	3.6	Kilojoules	kJ
Watt-hours	Wh	0.001	Kilowatt-hours	kWh
Watts	W	1	Joules/second	J/s
Watts	W	3.412	British thermal units	Btu
Watts	W	0.001	Kilowatts	kW
Watts/meter/°C	W/m°C	6.934	British ther. units/Btu/in./hr	
			inch/hour/sqft/°F	ft²/°F
Watts/sq centimeter	W/cm²	6.452	Watts/square inch	W/in²
Watts/square inch	W/in²	0.155	Watts/sq centimeter	W/cm²
Yards	yd	0.944	Meters	m

Technical Information

NEMA Enclosures & Chromalox Equivalents

NEMA Enclosures for Non-Hazardous Areas

The National Electrical Manufacturer's Association (NEMA) publishes a classification system for electrical enclosures. The NEMA classification or type indicates the exposure or environment for which the enclosure was designed. While Chromalox E1, E2, E3 and E4 enclosures are designed for applications similar to the NEMA types, they are not identical due to modifications required to adapt the housings to heater configurations. Condensed descriptions of the NEMA non-hazardous enclosure types are listed below with the Chromalox equivalents indicated. The condensed descriptions are not intended to be complete representations of the National Electrical Manufacturers Association standards for electrical enclosures. For complete details on NEMA enclosure requirements refer to NEMA Std. No. 250.

Type 1 Enclosures — are for indoor use in locations where unusual service conditions do not exist. Intended primarily to provide protection against contact with the enclosed equipment and limited amounts of falling dirt. **(Chromalox E1 or General Purpose enclosures.)**

Type 2 Enclosures — are for indoor use providing protection against limited amounts of falling water and dirt.

Type 3 Enclosures — are for outdoor use providing protection against windblown dust, rain, and sleet and damage from external ice formation on the enclosure.

Type 3R Enclosures — are similar to Type 3 except Type 3R provides protection against falling rain.

Type 3S Enclosures — are for outdoor use protecting against windblown dust, rain, and sleet and providing for operation of external mechanisms when ice laden.

Type 4 Enclosures — are for indoor or outdoor use providing protection against windblown dust and rain, splashing water, and hose-directed water and remain undamaged by the formation of ice on the enclosure. **(Chromalox E4 Moisture Resistant or E2 Moisture and Explosion Resistant enclosures.)**

Type 4X Enclosures — are similar to Type 4 except Type 4X also protects against corrosion.

Type 5 Enclosures — are for indoor use and protects against dust and falling dirt.

Type 6 Enclosures — are for indoor or outdoor use providing protection against the entry of water during temporary submersion at a limited depth and remain undamaged by ice on the enclosure.

Type 6P Enclosures — are similar to Type 6 except Type 6P protects against the entry of water during prolonged submersion at a limited depth.

Type 12 Enclosures — are intended for indoor use providing protection against dust, falling dirt and dripping non-corrosive liquids. **(Chromalox E2 and E4 enclosures.)**

Type 12K Enclosures (knockouts) — are similar to Type 12 except they are provided with knockouts. Knockouts only permitted in either or both the top or bottom walls.

Type 13 Enclosures — are for indoor use providing protection against lint, dust, spraying of water, oil and non-corrosive coolant. **(Chromalox E2 enclosures may be used.)**

The table below lists a comparison of the characteristics of NEMA and Chromalox enclosures for Non-Hazardous areas.

Note — For Classified (Hazardous) Location enclosures, refer to NEMA Enclosures and Hazardous Location Heaters elsewhere in this section.



Comparison of Specific Applications of Enclosures for Non-Hazardous Locations

Provides a Degree of Protection Against the following Environmental Conditions	Type of Enclosure														Chromalox®			
	1	2	3	3R	3S	4	4X	5	6	6P	11	12	12K	13	E1	E2	E3	E4
Incidental contact with the enclosed equipment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Falling dirt	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Falling liquids and light splashing		X				X	X		X	X	X	X	X	X		X	X	X
Dust, lint, fibers and flyings — Not Class III						X	X	X	X	X		X	X	X		X	X	X
Hosedown and splashing water						X	X		X	X						X		X
Oil and coolant seepage												X	X	X		X	X	X
Oil or coolant spraying and splashing														X		X		
Windblown dust			X		X	X	X		X	X						X	X	X
Rain, snow and sleet			X	X	X	X	X		X	X						X		
Sleet					X													
Corrosive agents							X			X	X							
Occasional temporary submersion									X	X								
Occasional prolonged submersion										X								

Technical Information

NEMA Enclosures & Hazardous Location Heaters

NEMA Enclosures for Classified Locations (Hazardous)

The following are condensed descriptions of the NEMA enclosure types for Classified (Hazardous) Locations. The Chromalox enclosures equivalent to the NEMA description are indicated. The Chromalox enclosure may not be identical to the NEMA description due to modifications required to adapt the housing to heater configurations. The NEMA enclosure descriptions are not intended to be complete representations of the National Electrical Manufacturers Association standards for electrical enclosures. For complete details on NEMA enclosure requirements, refer to NEMA Std. No. 250.

Type 7 Enclosures — are intended for indoor use in locations classified as Class I, Groups A, B, C and D as defined in the National Electrical Code. **(Chromalox E2, E3 or Explosion Resistant enclosures.)**²

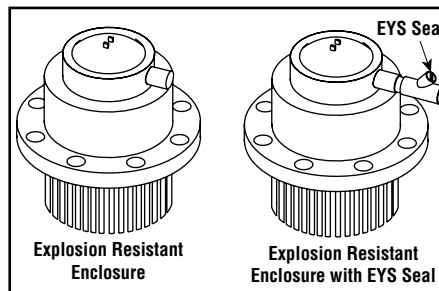
Type 8 Enclosures — are intended for indoor or outdoor use in locations classified as Class I, Groups A, B, C and D as defined in the National Electrical Code. **(Chromalox E2 enclosures.)**²

Type 9 Enclosures — are intended for indoor use in locations classified as Class II, Groups E, F and G as defined in the National Electrical Code. **(Chromalox E2, E3 or Explosion Resistant enclosures.)**

Type 10 Enclosures (MSHA) shall be capable of meeting the requirements of the Mine Safety and Health Administration, 30 C.F.R., Part 18.

Chromalox Enclosures for Electric Heaters in Classified Locations

Chromalox has terminal enclosures specifically designed for use on electric heaters installed in Classified (Hazardous) areas. These enclosures are identified as Type E2 and E3. Typical flange heaters with E2 hazardous area terminal enclosures are shown below.



E2 enclosures are supplied with gaskets and are suitable for both indoor and outdoor locations. E2 enclosures meet the moisture and explosion-resistant requirements for NEMA 4, 12, 7, 8 and 9 applications. E3 enclosures are usually not furnished with gaskets and are intended primarily for indoor and dry locations. See table below.

Electric Heaters for Hazardous Locations

Chromalox provides a wide variety of electric immersion and air heaters for use in hazardous locations. These heaters are listed by Underwriters Laboratories (UL) or certified by Canadian Standards Association (CSA). Heaters designed and certified for Class I or II Division 1 hazardous locations can be used in Division 2 areas in the same class.

Immersion Heaters — Screw plug and flanged immersion heaters are available with terminal enclosures CSA or CSA NRTL/C certified for Class I, Groups B, C and D and Class II Groups E, F and G. Supplemental low-liquid level controls are required for maximum safety and equipment protection when immersion heaters are used in hazardous locations.²

Circulation Heaters — Many water and oil circulation heaters are available with terminal enclosures CSA or CSA NRTL/C certified Class I, Groups B, C and D and Class II, Groups E, F and G. Supplemental controls are required for maximum safety and equipment protection when circulation heaters are used in hazardous locations

Air Heaters — Blower type air heaters (CXH-A) are available for Class I, Division I, Groups C and D and Class II, Division I, Groups E, F and G with UL, UL-C, and/or CSA certification. Convection type air heaters (CVEP) are available for use in Class I, Division I, Groups B, C and D hazardous locations. Convection type air heaters (FPEP and CEP) are available for use in Class I, Division I, Groups C and D and Class II, Division I Groups E, F and G.

Specialty Products & Components — Chromalox has designed, manufactured and provided certification on a large number of specialty products for hazardous areas and other special applications. These products include UL Recognized Components (finned tubular elements), duct heaters and special aircraft ground support equipment. Contact your Local Chromalox Sales office for assistance in designing equipment or solving any unique electric heating application for hazardous areas.



Comparison of Specific Applications of Enclosures for Indoor Hazardous Locations

Atmospheres Containing	Class	Group	NEMA				Chromalox®	
			7	8	9	10	E2	E3
Acetylene	I	A	X	X				
Hydrogen, Manufactured Gas	I	B	X	X			X ^{1,2}	X ^{1,2}
Diethyl Ether, Ethylene, Cyclopropane	I	C	X	X			X	X
Gasoline, Hexane, Butane, Naptha, Propane, Acetone Toluene or Isoprene	I	D	X	X			X	X
Metal Dust	II	E			X		X	X
Carbon Black, Coal Dust, Coke Dust	II	F			X		X	X
Flour, Starch, Grain Dust	II	G			X		X	X
Fibers, Flyings	III	G			X		X	X
Methane with or without Coal Dust	MSHA					X		

- Requires seals in the conduit adjacent to the terminal enclosure.
- For EMT and MT styles, Class 1 Group B; Divisions 1 & 2, consult factory.

Technical Information

Hazardous Locations & Electric Heater Applications

Hazardous Locations (NEC)⁵

Articles 500 to 504 in the National Electrical Code (NEC) define the requirements for electrical and electronic equipment and wiring in locations where fire or explosion hazards may exist. In Article 500, hazardous locations are categorized by class. Classes are defined as follows:

Class I — Groups A, B, C & D - Division 1 or 2 Temperature Rating T1 - T6

Class II — Groups E, F & G - Division 1 or 2 Temperature Rating T1 - T6

Class III — Division 1 or 2

Class I, II & III (NEC 500)

Hazardous location classes are identified based on the explosive material present. The following information is an interpretation and summary of each class and a discussion of some of the conditions to be considered when using electric heaters in these areas. Refer to the National Electrical Code and local authorities for the proper classification and requirements of a specific hazardous location.

Class I Locations (Gases) are areas where flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures (NEC 500-5).

Class II Locations (Dust) are areas where the presence of combustible dust presents a fire or explosion hazard (NEC 500-6).

Class III Locations (Fibers) are areas made hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures (NEC 500-7).

Group Classification, Class I & II⁶

Certain chemicals create higher explosive pressures and more heat than others when ignited. In Class I and II hazardous locations, chemical families are further classified by Groups. Group classification involves determination of the maximum explosion pressures, the maximum safe clearance or gap between clamped enclosure joints and the minimum ignition temperature of the atmospheric mixture for a particular chemical.

NEC requires that any electrical equipment approved for use in a hazardous location must be approved for the class and for the specific group (gas or dust) that will be present. Groups are identified as A, B, C, D, E, F and G and are explained as follows:

Class I — Gases⁶(NEC 500-3a)

Combustible and flammable gases and vapors in Class I are sub-divided into four groups A, B, C and D. Group A gases create the most explosive pressure and therefore are the most difficult to contain. Group B is next, then Group C with Group D being the lowest. Third party listings of electrical equipment for Group A or B are more difficult to obtain than Group C or D. Individual gases are further defined by ignition temperature (see Temperature Ratings).

Group A —

Gases include:	Ignition Temperature	
	°C	°F
Acetylene	305	581

Group B —

Gases include:	Ignition Temperature	
	°C	°F
Butadiene ¹	420	788
Ethylene oxide ²	429	804
Hydrogen & mfg gases > 30% hydrogen (by volume)	400	752
Propylene oxide ³	449	840

Group C —

Gases include:	Ignition Temperature	
	°C	°F
Acetaldehyde	175	347
Cyclopropane	500	932
Diethyl ether	160	320
Ethylene	450	842
Dimethyl hydrazine	249	480

Group D — is the largest group and includes many of the common petroleum products.

Gases include:	Ignition Temperature	
	°C	°F
Acetone	465	869
Alcohol's		
1-butanol (butyl)	365	689
Amyl alcohol	300	572
Butyl alcohol (ter)	480	896
Ethanol (ethyl)	356	689
Isobutyl alcohol	427	800
Isopropyl alcohol	399	750
Methanol (methyl)	385	725
Propyl alcohol	440	824
Ammonia ³	651	1204
Benzene	560	1040
Butane	405	761
Ethane	515	959

Gases include:

	Ignition Temperature	
	°C	°F
Ethyl acetate	427	800
Ethylene dichloride	413	775
Gasoline		
(56 - 60 octane)	280	536
(100 octane)	456	853
Heptanes	280	536
Hexanes	225	437
Isobutyl acetate	421	790
Isoprene	220	428
Methane (Nat. gas)	482/632	900/1170
Methyl ethyl ketone	516	960
Petroleum naphtha ⁴	288	550
Octanes	220	428
Pentanes	260	500
Propane	450	842
Vinyl acetate	427	800
Vinyl chloride	472	882
Xylenes	530	986

Notes —

- Group D** equipment may be used for this atmosphere if isolated in accordance with Section 501-5(a) by sealing all conduit(s) 1/2 inch or larger (within 18 inches of the enclosure).
- Group C** equipment may be used for this atmosphere if isolated in accordance with Section 501-5(a) by sealing all conduit(s) 1/2 inch or larger (within 18 inches of the enclosure).
- For Classification of Ammonia Atmospheres** see Safety Code for Mechanical Refrigeration (ANSI/ASHRAE 15-1992) and Safety Requirements for the Storage and Handling of Anhydrous Ammonia (ANSI/CGA G2.1-1989).
- Also Known By** the synonyms benzine, ligroin, petroleum ether or naphtha.
- NEC and National Electrical Code** are registered trademarks of the National Fire Protection Association.
- For a Complete List** defining properties of flammable liquids, gases, solids or dusts, refer to the latest edition of **NFPA 325, NFPA 497 or NFPA 499**.

Technical Information

Hazardous Locations & Electric Heater Applications (cont'd.)

Class II — Dust¹ (NEC 500-3b)

Groups E, F and G (Class II) — Combustible dusts are divided into Groups E, F and G. Classification involves investigation and testing of the assembled enclosure including the clamped joints, clearances and shaft openings. The blanketing effect of layers of dust, the electrical conductivity and the ignition temperature of the dust are also evaluated.

Group E Atmospheres contain metal dust, including aluminum, magnesium, their commercial alloys and other metals of similarly hazardous characteristics having resistivity less than 10^5 Ohm-cm.

Group F Atmospheres contain combustible carbonaceous dusts, charcoal, coal or other atmospheres containing these dusts sensitized by other hazardous materials and having resistivity greater than 10^2 through 10^8 Ohm-cm.

Group G Atmospheres contain combustible dusts such as flour, grain, wood and chemicals having resistivity of 10^5 Ohm-cm, or greater.

Class III — Fibers (NEC 500-7a)¹

Atmospheres containing easily ignitable fibers such as rayon, cotton, flax, jute, hemp, kapok, excelsior and similar materials.

Divisions in Hazardous Locations

The NEC further sub-divides hazardous locations into Divisions (Div. 1 and 2). The requirements for Division 2 are less stringent than for Division 1. The two divisions are discussed in the following paragraphs.

Division 1 Locations

Class I, Division 1 — NEC 500-5(a) is an area where the hazard can exist under normal operating conditions. Included are areas where flammable or combustible liquids are transferred from one container to another, open vats, paint spray booths or any location where ignitable mixtures are used. Also included are locations where a hazard is caused by frequent maintenance, repair or equipment failure.

Class II, Division 1 — NEC 500-6(a) is an area where combustible dust is normally in the air in sufficient quantities to produce ignit-

able mixtures or where mechanical failure or abnormal equipment operation might produce ignitable mixtures. Locations also include operations where hazards exist because of frequent mechanical failure of machinery or equipment and where electrically conductive combustible dusts (all Group E and some Group F) are present in hazardous quantities.

Class III, Division 1 — NEC 500-7(a) is an area where easily ignitable fibers or materials producing combustible flyings are handled, manufactured or used.

Division 2 Locations

Class I, Division 2 — NEC 500-5(b) is an area where ignitable gases or vapors are handled, processed or used, but which are normally in closed containers or closed systems from which they can only escape through accidental rupture or breakdown of such containers or systems.

Class II, Division 2 — NEC 500-6(b) is an area where combustible dust is not normally in the air in sufficient quantities to produce ignitable mixtures or interfere with the operation of electrical equipment, or where dust is present as a result of infrequent malfunctioning of processing or handling equipment. Included are situations where combustible dust accumulations may interfere with the safe dissipation of heat from electrical equipment. No electrically conductive dusts as defined in NEC 502-1, (last sentence) are included in Class II, Div. 2 atmospheres.

Note — There is no Division 2 classification for Class II, Group E.

Class III, Division 2 — NEC 500-7(b) is an area where easily ignitable fibers are stored or handled.

Class I — Adjacent Divisions

In most indoor areas with adequate partitions, Div. 1 and 2 are self-contained areas. With partitions, a Div. 1 area may exist adjacent to a non-hazardous area. However, outdoors or in large indoor areas with few or no partitions, Class I, Div. 1 and Class 1, Div. 2 areas usually exist adjacent to each other. The Div. 1 location being near the point of vapor release and Division 2 is at a given distance from the

release point of the flammable liquid. Where the spread of flammable vapors and gases is not contained by adequate partitions, the area designated as Class I, Div. 2 serves as a “transition zone” between the hazardous and non-hazardous area. Div. 1 is the hazardous area where flammable gases or vapors are released from the liquid. Div. 2 is the area further away from the point of release, where the gases or vapors are not normally of sufficient concentration to produce an ignitable mixture.

Class I & II — Temperature Ratings

Originally, equipment in each group had one maximum temperature rating. The maximum for Groups A, B and D was 280°C (536°F) and Group C was 180°C (356°F). Recognizing that chemicals and gases have different ignition temperatures, NEC revised the temperature ratings accordingly. Heat producing equipment must now be identified by Class, Group, Division and “T” rating. The “T” rating shall not exceed the ignition temperature of the specific gas, vapor or dust present. Values for “T” ratings for Class I and II equipment are shown in the table below:

T-Ratings for Class I and II

Maximum Degrees (°C)	Temperature Degrees (°F)	Identification “T” Number
450	842	T1
300	572	T2
280	536	T2A
260	500	T2B
230	446	T2C
215	419	T2D
200	392	T3
180	356	T3A
165	329	T3B
160	320	T3C
135	275	T4
120	248	T4A
100	212	T5
85	185	T6

Note 1 — For a complete list defining properties of flammable liquids, gases, solids or dusts, refer to the latest edition of NFPA 325, NFPA 497 or NFPA 499.

Technical Information

Hazardous Locations & Electric Heater Applications (*cont'd.*)

CENELEC (& IEC) Zone Classification System

Introduced to North America in 1996, the European CENELEC (and IEC) system of classification of hazardous locations is also permitted to apply to installations in the U.S. and Canada as an alternative in Class I Locations, and is now part of the NEC (Article 505) and CE Code (Section 18).

Class I, Zone 0 - A location in which explosive gas atmospheres are present continuously or for long periods of time.

Class I, Zone 1 - A location in which explosive gas atmospheres are likely to exist in normal operation or may exist frequently because of repairs, maintenance operations, and leakage or where equipment breakdowns could release gases or vapors and also cause simultaneous failure of electrical equipment in a mode to cause the electrical equipment to become a source of ignition.

Class I, Zone 2 - A location in which explosive gas atmospheres are not likely to occur in normal operation and, if they do occur, will exist for a short time only; or where volatile flammable liquids, flammable gas, or flammable vapors are handled, processed, or used, but are normally confined within closed containers or systems from which they can escape only as a result of accidental rupture or breakdown of the containers or system, or as a result of abnormal operation of the equipment with which the liquids or gases are handled, processed, or used; or where ignitable concentrations of flammable gases or vapors are normally prevented by adequate ventilation, but which may occur as a result of failure or abnormal operation of the ventilation system.

Class I Groups

Group I - Atmospheres containing explosive gas in underground coal mines. Electrical apparatus that is intended for use in underground mines.

Group IIC - Atmospheres containing acetylene, hydrogen (H₂), or gases of equivalent hazard.

Group IIB - Atmospheres containing acet-aldehyde, ethylene, or gases or vapors of equivalent hazard.

Group IIA - Atmospheres containing acetone, ammonia, ethyl alcohol, gasoline, methane, propane, or gases or vapors of equivalent hazard. **Note:** There is potential for confusion between the NEC/CE and IEC gas classification systems since the Group letters are reversed

and even combined. Care should also be taken to avoid confusing Group II and Class II, since both use Roman numerals. An unintended result of specifying the IEC gas groups, which combine the traditional Groups A and B into Group IIC, is that equipment approved for hydrogen (H₂) would also have to be approved for acetylene. Since very little equipment is designed for acetylene, the wording as originally adopted severely limits the availability of equipment for hydrogen applications. As a result, NEC Section 505-7(d) now allows for equipment to be listed for a specific gas or vapor, specific mixtures of gases or vapors, or any specific combination of gases or vapors. One common example is equipment marked for "IIB + H₂". At present, the NEC or CE Code does not recognize any CENELEC or IEC dust classifications.

Combustion Principles

Three basic conditions must be satisfied for a fire or explosion to occur. First, a flammable liquid, vapor or combustible dust must be present in sufficient quantity. Second, the flammable liquid, vapor or combustible dust must be mixed with air or oxygen in the proportions required to produce an explosive mixture. Finally, a source of energy must be applied to the explosive mixture.

In applying these principles, the quantity of the flammable liquid or vapor that may be liberated and its physical characteristics must be recognized. Vapors from flammable liquids also have a natural tendency to disperse into the atmosphere, and rapidly become diluted to concentrations below the lower explosion limit, particularly when there is natural or mechanical ventilation. In order to have an explosive gas atmosphere, the concentration of the gas or vapor must be above the Lower Explosive Limit (LEL) but below the Upper Explosive Limit (UEL). The possibility that the gas concentration may be above the upper explosion limit does not afford any degree of safety, as the concentration must first pass through the explosive range to reach the upper explosion limit.

Equipment Marking Requirements

Electrical equipment permitted for use in hazardous locations must be marked to show the Class, Division (or Zone under NEC Article 505 and CE Section 18), Group, and maximum surface operating temperature or temperature code referenced to a 40°C (104°F) ambient temperature (some exceptions apply). Note

that the maximum external temperature of the equipment shall not exceed the minimum ignition temperature of the atmosphere that the equipment is located in.

Electrical equipment approved for operation at ambient temperatures exceeding 40°C shall be marked with the maximum ambient temperature for which the equipment is approved, and the operating temperature or temperature range at that ambient temperature.

Equipment not marked to indicate a division, or marked "Division 1" or "Div. 1", is suitable for both Division 1 and 2 locations. Equipment marked "Division 2" or "Div. 2" is suitable for Division 2 locations only. Equipment that is listed for a Zone 0 location shall be permitted in a Zone 1 or Zone 2 location of the same gas or vapor. Equipment that is listed for a Zone 1 location shall be permitted in a Zone 2 location of the same gas or vapor.

Explosion-Proof Enclosures

Maximum Surface Temperature Codes		
Maximum Surface Temperature °C (°F)	Identification Number NEC/CE T-Code	IEC T-Code
450° C (842°F)	T1	T1
300° C (572°F)	T2	T2
280° C (536°F)	T2A	
260° C (500°F)	T2B	
230° C (446°F)	T2C	
215° C (419°F)	T2D	
200° C (392°F)	T3	T3
180° C (356°F)	T3A	
165° C (329°F)	T3B	
160° C (320°F)	T3C	
135° C (275°F)	T4	T4
120° C (248°F)	T4A	
100° C (212°F)	T5	T5
85° C (185°F)	T6	T6

An enclosure which will withstand an internal explosion of a gas or vapor without rupture and without causing the ignition of an external gas or vapor.

Explosion-proof enclosures are not water-proof. They are designed to contain and dissipate explosions but they are not water-proof.

To prevent the ignition of an external explosive atmosphere, the enclosure must not only be strong enough to withstand the internal explosion pressure, but all of the openings (e.g., cover joints, conduit or cable entries, operating shafts, etc.) must be tight enough to cool the hot burning gases before they can come into contact with the external atmosphere.

General Information

The facts and the recommendations made in this publication are based on our own research and the research of others, and are believed to be accurate.

We cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We reserve the right

to change materials or methods without prior notice. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combination for their own purposes.

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