

Installation Tips

- Do not twist buss wires together at end of circuit
- Insulate all conductive parts
- Seal all electrical connections against moisture
- Seal ends of exposed cable during installation
- Do not expose cables to temperatures above their maximum ratings
- Install cable with aluminum tape for use on plastic pipes
- Locate ambient temperature sensors in coldest expected area
- Locate pipe temperature sensors at lowest expected line temperature
- Use sufficient cable to trace additional heat sinks
- Install cable so that valves can be removed without removing cable



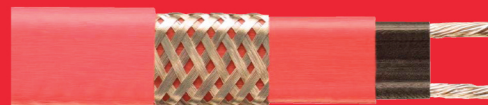
SRL Cable

- 150°F / 65°C Maximum Maintenance
- 185°F / 85°C Maximum Exposure
- 3-10 W/ft / 10-33 W/m
- 16 AWG with Optional TPE or Fluoropolymer Jacket



SRP Cable

- 225°F / 110°C Maintenance Temperature
- 275°F / 135°C Maximum Exposure Temperature
- 5-15 W/ft / 16-49 W/m
- 16 AWG with Optional Fluoropolymer Jacket



SRM Cable

- 302°F / 150°C Maximum Maintenance
- 420°F / 215°C Maximum Exposure
- 5-20 W/ft / 16-66 W/m
- 16 AWG with Optional Fluoropolymer Jacket

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Important Safeguards

Mechanical Inspection

- Inspect all insulation and weatherproofing
- Inspect all junction box, connection box and sensor connections
- Verify all circuits have been properly grounded
- Verify all circuits are connected in proper panel locations
- Verify proper circuit breakers are in place (always use 30mA trip GFI-type breakers)
- Verify all circuit lengths are within manufacturer's specified limits
- Verify all proper safety warnings are in place
- Verify all end seal, splice/tee locations are marked on lagging

Electrical Tests

- Insulation Resistance (Megger)
 - Before tracing pipes
 - After installing terminations
 - Before insulating pipes
 - After insulating pipes
 - Before energizing system
- Circuit Voltage
- Initial Current
 - Note ambient temp and pipe temp
- Stabilized Current (15 minutes of operation)
 - Note ambient temp and pipe temp
- Always use ground fault circuit breakers (30mA trip level)

Tools Needed

- Wire Cutters/Strippers
- Megger
- Phillips Head Screwdriver
- Standard Screwdriver
- Voltmeter
- Utility Knife
- Hammer

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Heat Trace Design Guide

- Heat Trace System Design
- Materials & Components
- Specification Tables



A Pipe Heat Loss Calculations

- Basic Heat Loss:** After determining the difference between the ambient and desired pipe maintenance temperature, T_m , use **Table 1** to figure the basic heat loss for the pipe size and insulation thickness.
- Insulation Adjustment:** Using **Table 2**, find the type of insulation being used and its insulation factor.

Table 1 Pipe Heat Loss Q_b in W/ft Based on Temperature Differential and Insulation Thickness

Nominal Pipe Size, in. (ID)	Temperature Difference Between Pipe and Ambient																
	Deg°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	120°F	140°F	160°F	180°F	200°F	220°F	240°F	260°F	
	1" Insulation Thickness																
½"	W/ft	1.4	1.8	2.1	2.5	2.8	3.2	3.5	4.2	5.1	5.9	6.6	7.7	8.5	9.2	10.0	
¾"	W/ft	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.8	5.9	6.7	7.6	8.8	9.7	10.6	11.4	
1"	W/ft	1.8	2.3	2.8	3.2	3.7	4.1	4.6	5.5	6.8	7.7	8.7	10.1	11.1	12.1	13.2	
1½"	W/ft	2.4	3.1	3.7	4.3	4.9	5.5	6.1	7.3	9.0	10.2	11.5	13.4	14.8	16.1	17.4	
2"	W/ft	2.8	3.5	4.1	4.8	5.5	6.2	6.9	8.3	10.1	11.6	13.0	15.2	16.7	18.2	19.7	
2½"	W/ft	3.2	4.0	4.8	5.6	6.4	7.2	8.0	9.6	11.8	13.4	15.1	17.6	19.4	21.1	22.9	
3"	W/ft	3.7	4.7	5.6	6.5	7.4	8.4	9.3	11.2	13.7	15.6	17.6	20.5	22.5	24.6	26.6	
4"	W/ft	4.6	5.8	6.9	8.1	9.2	10.4	11.5	13.8	16.9	19.3	21.7	25.3	27.8	30.4	32.9	
6"	W/ft	6.4	8.0	9.6	11.2	12.8	14.4	16.0	19.2	23.5	26.9	30.2	35.2	38.7	42.2	45.8	
8"	W/ft	8.1	10.1	12.1	14.1	16.2	18.2	20.2	24.2	29.7	33.9	38.2	44.4	48.9	53.3	57.8	
10"	W/ft	9.9	12.4	14.8	17.3	19.8	22.2	24.7	29.6	36.3	41.5	46.7	54.3	59.8	65.2	70.6	
12"	W/ft	11.6	14.5	17.4	20.3	23.2	26.1	29.0	34.8	42.6	48.7	54.8	63.8	70.2	76.6	82.9	
14"	W/ft	12.6	15.8	19.0	22.1	25.3	28.4	31.6	37.9	46.5	53.1	59.7	69.5	76.5	83.4	90.4	
16"	W/ft	14.3	17.9	21.5	25.1	28.7	32.3	35.9	43.0	52.7	60.2	67.8	78.9	86.8	94.6	102.5	
18"	W/ft	16.0	20.1	24.1	28.1	32.1	36.1	40.1	48.1	58.9	67.4	75.8	88.2	97.0	105.9	114.7	
20"	W/ft	17.7	22.2	26.6	31.0	35.4	39.9	44.3	53.2	65.1	74.4	83.7	97.5	107.2	117.0	126.7	
22"	W/ft	19.4	24.3	29.1	34.0	38.8	43.7	48.5	58.2	71.3	81.5	91.7	106.7	117.4	128.0	138.7	
24"	W/ft	21.1	26.4	31.6	36.9	42.2	47.4	52.7	63.2	77.5	88.5	99.6	115.9	127.5	139.1	150.7	
1.5" Insulation Thickness																	
½"	W/ft	1.1	1.4	1.7	2.0	2.2	2.5	2.8	3.5	4.1	4.7	5.5	6.2	6.8	7.4	8.0	
¾"	W/ft	1.2	1.6	1.9	2.2	2.5	2.8	3.1	3.9	4.6	5.2	6.1	6.8	7.5	8.2	8.9	
1"	W/ft	1.4	1.8	2.2	2.5	2.9	3.2	3.6	4.5	5.3	6.0	7.1	7.9	8.7	9.5	10.3	
1½"	W/ft	1.8	2.3	2.8	3.2	3.7	4.1	4.6	5.8	6.8	7.7	9.1	10.1	11.1	12.1	13.2	
2"	W/ft	2.1	2.6	3.1	3.6	4.2	4.7	5.2	6.6	7.6	8.7	10.3	11.4	12.6	13.7	14.9	
2½"	W/ft	2.4	3.0	3.5	4.1	4.7	5.3	5.9	7.4	8.7	9.9	11.7	13.0	14.3	15.6	16.9	
3"	W/ft	2.7	3.4	4.1	4.8	5.4	6.1	6.8	8.6	10.0	11.4	13.5	15.0	16.5	18.0	19.4	
4"	W/ft	3.3	4.2	5.0	5.8	6.6	7.5	8.3	10.5	12.2	13.9	16.4	18.3	20.1	21.9	23.7	
6"	W/ft	4.5	5.7	6.8	7.9	9.0	10.2	11.3	14.2	16.6	19.0	22.4	24.9	27.3	29.8	32.3	
8"	W/ft	5.6	7.1	8.5	9.9	11.3	12.7	14.1	17.8	20.7	23.7	27.9	31.0	34.1	37.2	40.3	
10"	W/ft	6.8	8.0	10.3	12.0	13.7	15.4	17.1	21.5	25.1	28.7	33.9	37.6	41.4	45.1	48.9	
12"	W/ft	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.2	29.4	33.6	39.6	44.0	48.4	52.8	57.2	
14"	W/ft	8.7	10.9	13.0	15.2	17.4	19.5	21.7	27.3	31.9	36.5	43.0	47.7	52.5	57.3	62.1	
16"	W/ft	9.8	12.3	14.8	17.2	19.7	22.1	24.6	31.0	36.2	41.3	48.7	54.1	59.5	64.9	70.4	
18"	W/ft	11.0	13.7	16.4	19.2	21.9	24.7	27.4	34.5	40.3	46.0	54.3	60.3	66.3	72.3	78.4	
20"	W/ft	12.1	15.1	18.1	21.1	24.2	27.2	30.2	38.1	44.4	50.7	59.8	66.4	73.1	79.7	86.4	
22"	W/ft	13.2	16.5	19.8	23.1	26.4	29.7	33.0	41.6	48.5	55.4	65.3	72.6	79.9	87.1	94.4	
24"	W/ft	14.3	17.9	21.5	25.1	28.6	32.2	35.8	45.1	52.6	60.1	70.9	78.8	86.6	94.5	102.4	

Table 2 Insulation Adjustment Factors

Pipe Insulation Type	Insulation Factor
Glass fiber (ASTM C547)	1.00
Calcium silicate (ASTM C533)	1.48
Cellular glass (ASTM C552)	1.48
Rigid cellular urethane (ASTM C591)	0.64

Pipe Insulation Type	Insulation Factor
Foamed elastomer (ASTM C534)	1.16
Mineral fiber blanket (ASTM C553)	1.16
Expanded perlite (ASTM C610)	1.90

B Chromalox Cable Selection

- Select Heating Cable Family:** Based on the maximum maintenance temperature rating, maximum exposure temperature rating, and area classification, select the heating cable family from **Table 3**. (See Chromalox Heat Trace Cable Product Information Sheets for cable construction options, voltage ratings, and wattage outputs available.)
- Select Thermal Output Rating:**
 - For Metal Pipes – Use Figures 1, 2 or 4
 - For Plastic Pipes – Use Figure 3 by finding the intersection of the calculated heat loss, Q_b , and pipe maintenance temperature, T_m . Select the cable with a thermal output that equals or exceeds Q_b at T_m .

Table 3 Heating Cable Families

Heating Cable Family	Area Classification	Pipe Material	Maximum Maintenance Temperature	Maximum Exposure Temperature (Power Off)	Approvals	
					U.S.	Other
SRL (Self-Regulating Low Temperature)	Ordinary	Plastic/Metal	150°F / 65°C	185°F / 85°C	UL, CSA, FM	GOST, Cenelec, CE, ATEX
	Class I, Div.2, Gr. B, C, D				CSA, FM, (Gr. A, CSA Only)	GOST, Cenelec, CE, ATEX
	Class II, Div.2, Gr. E, F, G				CSA, FM, (Gr. E, CSA Only)	GOST, Cenelec, CE
	Class III, Div.2				FM Only	GOST, Cenelec, CE, ATEX
SRM/E (Self-Regulating Medium Temperature)	Ordinary	Metal Only	302°F / 150°C	420°F / 215°C	UL, CSA, FM	GOST, Cenelec, CE, ATEX
	Class I, Div.2, Gr. A, B, C, D				CSA, FM, (Gr. A, CSA Only)	GOST, Cenelec, CE, ATEX
	Class II, Div.2, Gr. F, G				CSA Only	GOST, Cenelec, CE, ATEX
SRP (Self-Regulating Medium Temperature)	Ordinary	Metal Only	225°F / 110°C	275°F / 135°C	UL, CSA, FM Pending	GOST, Cenelec, CE, ATEX Pending
	Class I, Div.2, Gr. B, C, D					
	Class II, Div.2, Gr. F, G					
HSRL (H-Self-Regulating Low Temperature)	Class I, Div.1, Gr. B, C, D	Plastic/Metal	150°F / 65°C	185°F / 85°C	CSA, FM	
	Class II, Div.1, Gr. E, F, G				CSA, FM	
	Class III, Div.1				CSA, FM	
HSRM (H-Self-Regulating Medium Temperature)	Class I, Div.1, Gr. B, C, D	Metal Only	302°F / 150°C	420°F / 215°C	CSA, FM	
	Class II, Div.1, Gr. E, F, G				CSA, FM	
	Class III, Div.1				CSA, FM	
CWM (Constant Wattage)	Ordinary	Metal Only	Consult Factory	392°F / 200°C	UL, CSA	
	Hazardous Area, Consult Factory					
MI (Mineral Insulated)	Ordinary	Metal Only	Consult Factory	1,100°F / 595°C	CSA, FM	
	Class I, Div.2, Gr. B, C, D				CSA, FM	
	Class II, Div.2, Gr. E, F, G				CSA, FM	
	Class III				CSA, FM	

NOTE: It is the responsibility of the facility manager or engineer to determine the classification of an area where heat trace will be installed. The factory can help determine a suitable cable based on the information provided.

Figure 1 SRL & HSRL – Thermal Output Ratings on Insulated Metal Pipe

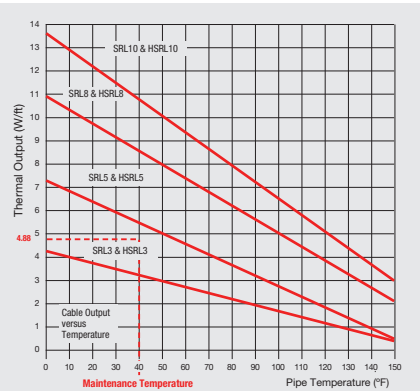
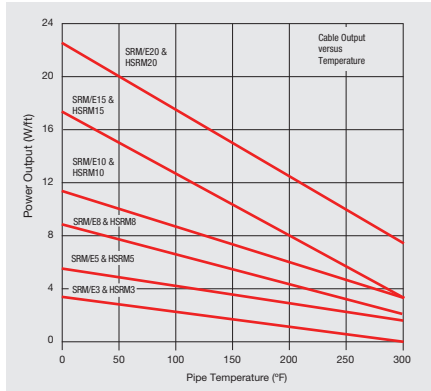


Figure 2 SRM/E & HSRM – Thermal Output Ratings on Insulated Metal Pipe



- Calculate Q_b :** Multiply the basic heat loss figure from **Table 1** by the adjustment factor from **Table 2** to calculate the estimated heat loss, Q_e , in watts per foot of pipe length.

- Correct for Indoor Location/ Wind Speed:** If location is indoors, multiply Q_e by 0.9. **Table 1** is based on 10% safety factor and 20 mph wind speed; add 5% margin for each 5 mph over 20 mph wind speed.

Nominal Pipe Size, in. (ID)	Temperature Difference Between Pipe and Ambient																
	Deg°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	120°F	140°F	160°F	180°F	200°F	220°F	240°F	260°F	
2" Insulation Thickness																	
½"	W/ft	1.0	1.2	1.4	1.7	1.9	2.2	2.4	3.0	3.5	4.0	4.8	5.3	5.8	6.3	7.2	
¾"	W/ft	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.4	4.0	4.5	5.3	5.9	6.5	7.1	8.1	
1"	W/ft	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.8	4.4	5.0	5.9	6.6	7.3	7.9	9.0	
1½"	W/ft	1.5	1.9	2.3	2.7	3.0	3.4	3.8	4.8	5.6	6.4	7.5	8.4	9.2	10.0	11.4	
2"	W/ft	1.7	2.2	2.6	3.0	3.4	3.9	4.3	5.4	6.3	7.2	8.5	9.5	10.4	11.4	12.9	
2½"	W/ft	1.9	2.4	2.9	3.4	3.8	4.3	4.8	6.0	7.1	8.1	9.5	10.6	11.6	12.7	14.4	
3"	W/ft	2.2	2.8	3.3	3.9	4.4	5.0	5.5	6.9	8.1	9.2	10.9	12.1	13.3	14.5	16.4	
4"	W/ft	2.6	3.3	4.0	4.6	5.3	5.9	6.6	8.3	9.7	11.1	13.1	14.5	16.0	17.4	19.7	
6"	W/ft	3.6	4.5	5.3	6.2	7.1	8.0	8.9	11.2	13.1	15.0	17.6	19.6	21.5	23.5	26.6	
8"	W/ft	4.4	5.6	6.7	7.8	8.9	10.0	11.1	14.0	16.3	18.6	22.0	24.4	26.9	29.3	33.2	
10"	W/ft	5.3	6.7	8.0	9.3	10.6	12.0	13.3	16.8	19.6	22.3	26.3	29.3	32.2	35.1	39.8	
12"	W/ft	6.2	7.8	9.3	10.9	12.4	14.0	15.5	19.5	22.8	26.0	30.7	34.1	37.5	40.9	46.3	
14"	W/ft	6.7	8.4	10.1	11.8	13.4	15.1	16.8	21.2	24.7	28.2	33.3	37.0	40.7	44.4	50.2	
16"	W/ft	7.6	9.5	11.3	13.2	15.1	17.0	18.9	23.8	27.8	31.8	37.4	41.6	45.7	49.9	56.5	
18"	W/ft	8.4	10.5	12.6	14.7	16.8	18.9	21.0	26.5	30.9	35.3	41.6	46.2	50.8	55.4	62.8	
20"	W/ft	9.2	11.6	13.9	16.2	18.5	20.8	23.1	29.1	34.0	38.8	45.7	50.8	55.9	61.0	69.1	
22"	W/ft	10.1	12.6	15.2	17.7	20.2	22.7	25.3	31.8	37.1	42.4	50.0	55.6	61.1	66.7	75.5	
24"	W/ft	11.0	13.7	16.4	19.2	21.9	24.7	27.4	34.5	40.3	46.0	54.3	60.3	66.3	72.3	81.9	
3" Insulation Thickness																	
½"	W/ft	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.5	2.9	3.4	4.0	4.4	4.8	5.5	6.0	
¾"	W/ft	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.8	3.2	3.7	4.4	4.8	5.3	6.1	6.67	
1"	W/ft	1.0	1.3	1.5	1.8	2.0	2.3	2.5	3.2	3.7	4.2	5.0	5.5	6.1	6.9	7.5	
1½"	W/ft	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.8	4.4	5.0	5.9	6.6	7.3	8.3	9.0	
2"	W/ft	1.3	1.7	2.0	2.3	2.6	3.0	3.3	4.2	4.9	5.5	6.5	7.3	8.0	9.1	9.9	
2½"	W/ft	1.5	1.9	2.2	2.6	3.0	3.3	3.7	4.7	5.4	6.2	7.3	8.1	9.0	10.2	11.1	
3"	W/ft	1.7	2.1	2.5	2.9	3.4	3.8	4.2	5.3	6.2	7.1	8.3	9.2	10.2	11.6	12.6	
4"	W/ft	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.3	7.4	8.4	9.9	11.0	12.1	13.8	15.0	
6"	W/ft	2.6	3.3	3.9	4.6	5.2	5.9	6.5	8.2	9.6	10.9	12.9	14.3	15.7	17.9	19.4	
8"	W/ft	3.2	4.0	4.8	5.6	6.4	7.2	8.0	10.1	11.8	13.4	15.8	17.6	19.4	22.1	23.9	
10"	W/ft	3.8	4.8	5.7	6.7	7.6	8.6	9.5	12.0	14.0	16.0	18.8	20.9	23.0	26.2	28.4	
12"	W/ft	4.4	5.5	6.5	7.6	8.7	9.8	10.9	13.7	16.0	18.3	21.6	24.0	26.4	30.1	32.6	
14"	W/ft	4.7	5.9	7.1	8.3	9.4	10.6	11.8	14.9	17.3	19.8	23.4	26.0	28.6	32.6	35.3	
16"	W/ft	5.3	6.7	8.0	9.3	10.6	12.0	13.3	16.8	19.6	22.3	26.3	29.3	32.2	36.7	39.8	
18"	W/ft	5.9	7.4	8.8	10.3	11.8	13.2	14.7	18.5	21.6	24.7	29.1	32.3	35.6	40.6	44.0	
20"	W/ft	6.4	8.1	9.7	11.3	12.9	14.5	16.1	20.3	23.7	27.0	31.9	35.4	39.0	44.4	48.1	
22"	W/ft	7.0	8.8	10.5	12.3	14.0	15.8	17.5	22.1	25.7	29.4	34.7	38.5	42.4	48.3	52.3	
24"	W/ft	7.6	9.5	11.3	13.2	15.1	17.0	18.9	23.8	27.8	31.8	37.4	41.6	45.7	52.2	56.5	

CONTROL SYSTEMS

intelliTRACE



- 1 to 4, 6 to 72 loops
- Fully wired. GFI, current, temperature, and sensor alarm/monitoring
- Owner sensor mapping, soft start, user-friendly touchscreen HMI

Now suitable for Class 1, Division 2 areas!

weatherTRACE



- Up to 40 loops
- Pre-wired and assembled monitoring and distribution (saves time on installation)
- Includes the Sentinel monitoring system

Combination Single Point Temperature Controls & Power Connection Boxes

UAS
Ambient-Sensing



- 0°-225°F / 0°-107°C temperature rating
- 120-480 VAC, 22A switching capability
- Freeze protection applications

UBC
Line-Sensing



- 0°-400°F / 0°-205°C set points
- 120-480 VAC, 22A switching capability
- Freeze protection applications

DTS-HAZ
Digital ThermoStat / Power Connection
Line- or Ambient-Sensing



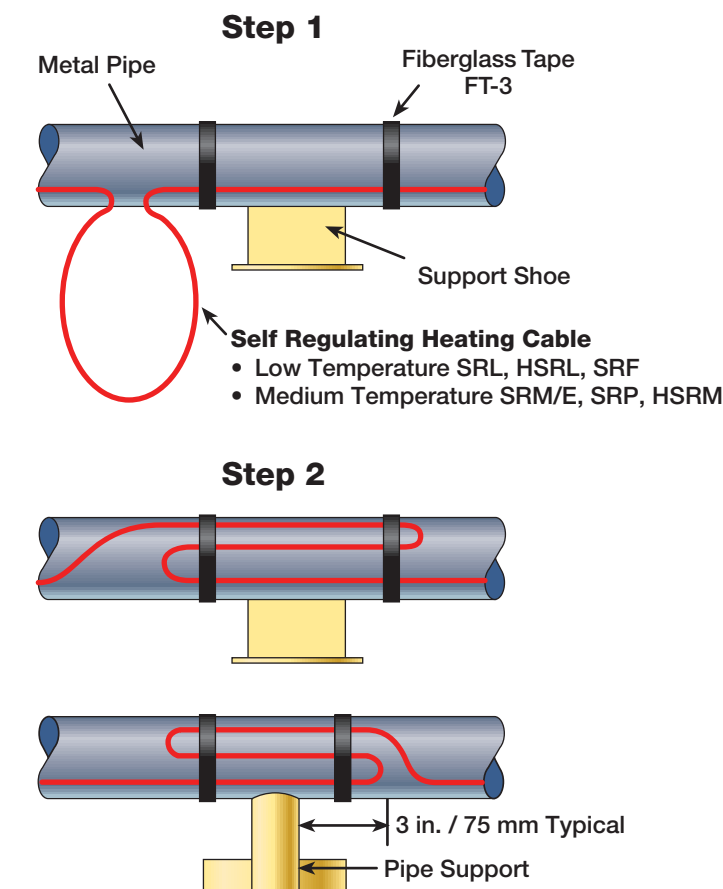
- Ordinary or hazardous areas (Class 1, Division 2)
- -45°-485°F/-43°-252°C programmable
- 100-277 VAC, 30A SSR, soft start, large LED display
- Freeze protection & process temperature maintenance applications

Chromalox[®]

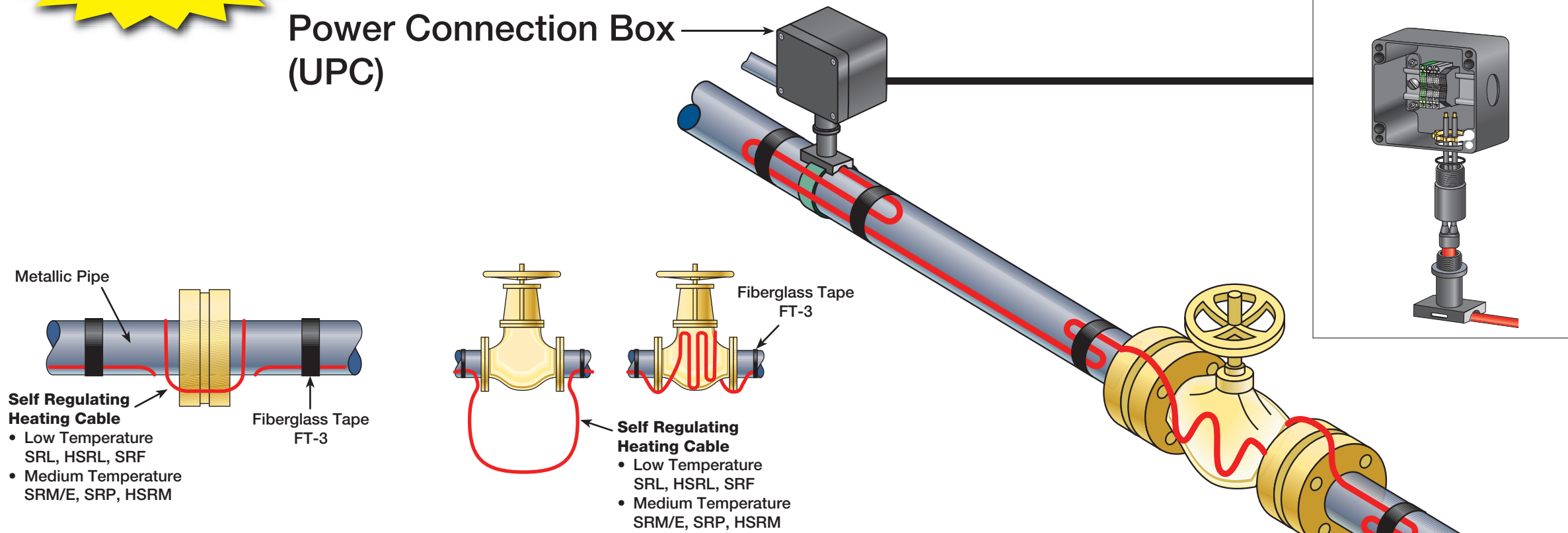
PRECISION HEAT AND CONTROL

Electric Heat Trace Quick Install Guide

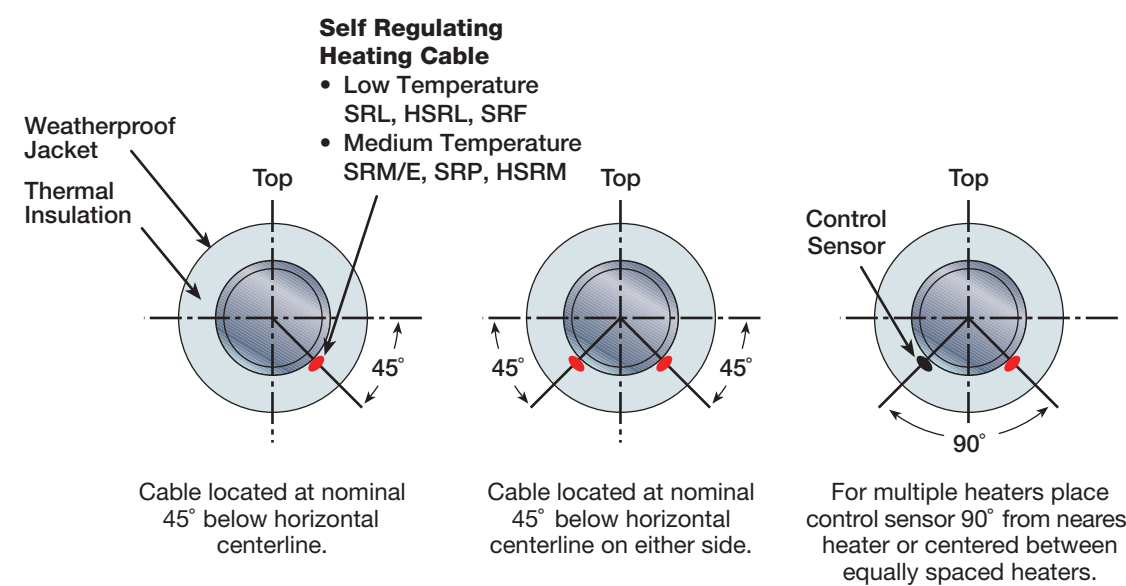
Quick Install Guide is a specification tool only. Always refer to proper installation instructions when installing heat trace cable.



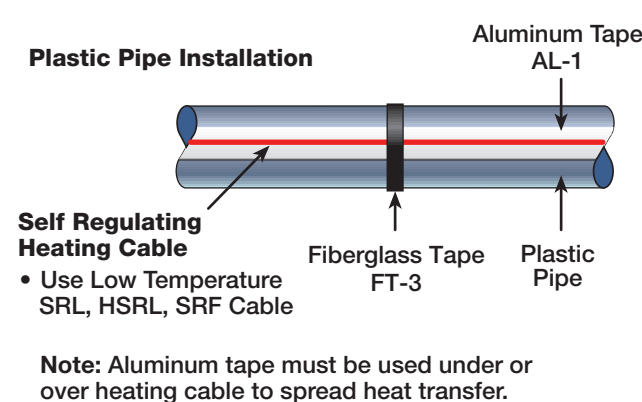
Power Connection Box (UPC)



Heating Cable/Sensor Location



Heating Cable

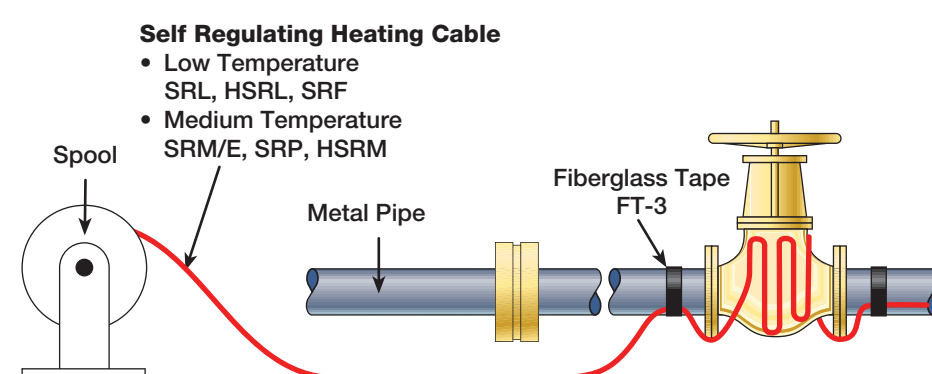


Installation Tips

- Temporarily position cable on pipe and equipment to ensure proper distribution.
- Leave a loop of cable at heat sinks such as valves, pipe supports and flange sets. Use FT-3 fiberglass tape to secure cable to pipe at 18 in. / 455 mm (nom) intervals using recommended method.
- Always observe minimum bend radius.

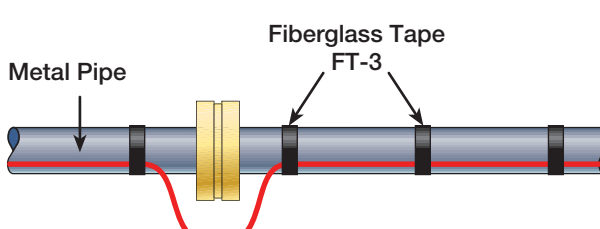
Step 1

Start tracing at the end of the pipe and work your way back to spool.

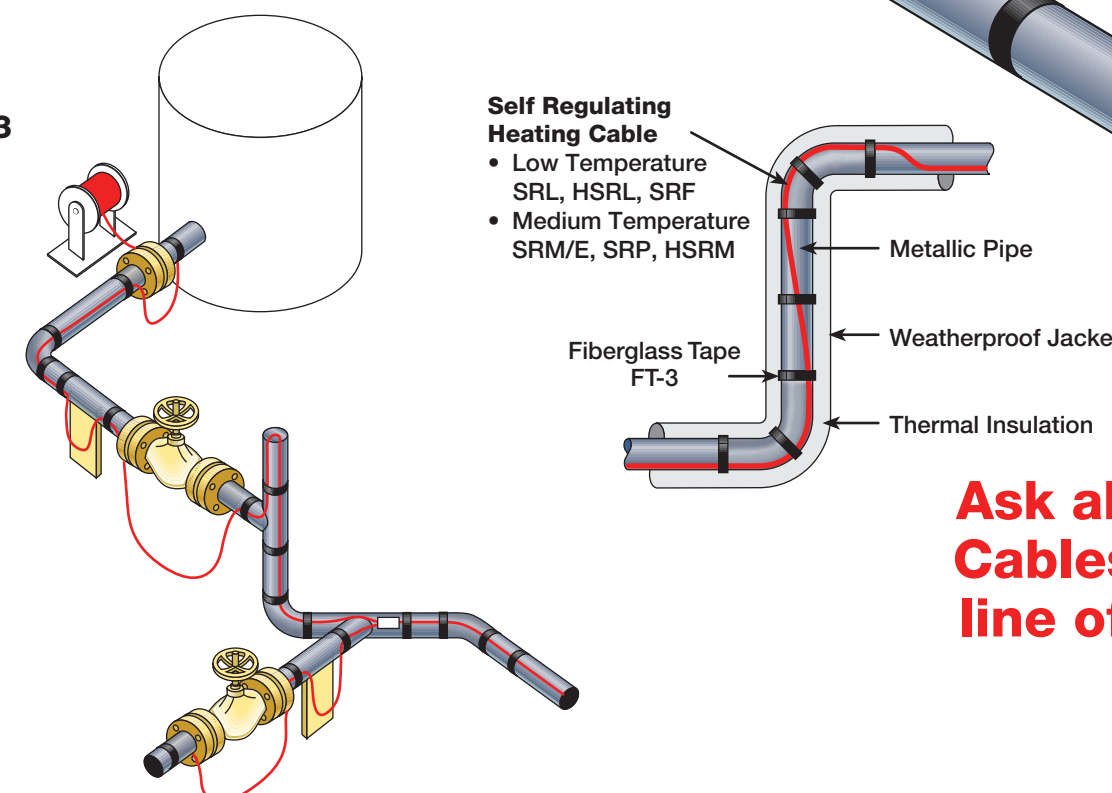


Step 2

Leave a loop of cable at heat sinks such as valves, pipe supports and flange sets. Use FT-3 fiberglass tape to secure cable to pipe at 18 in. / 455 mm intervals.



Step 3



Multiple Entry Connection (UMC)

Pipe Strap

Fiberglass Tape FT-3

Below Insulation Cable End Seal (RTES)

Ask about Chromalox Class 1 Div. 1 Cables & Accessories as well as a full line of High-Temperature Cables.