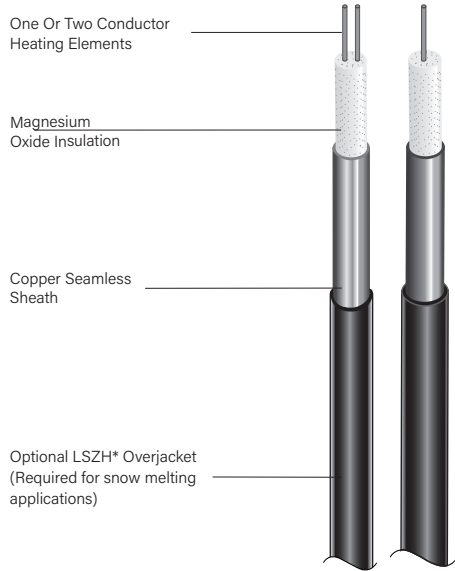
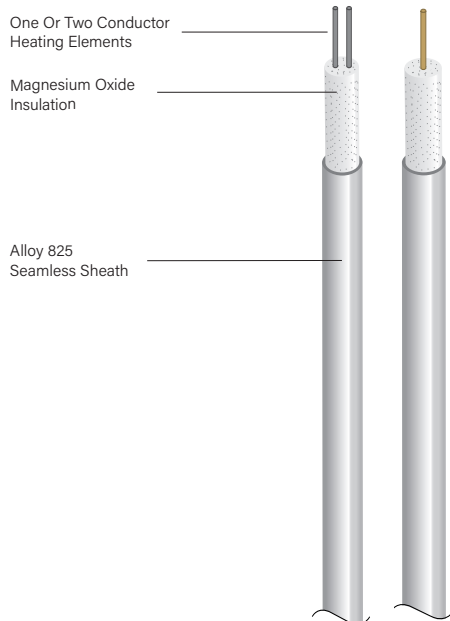


## Mineral Insulated (M.I.) Cable Assembly



\*Low smoke zero halogen

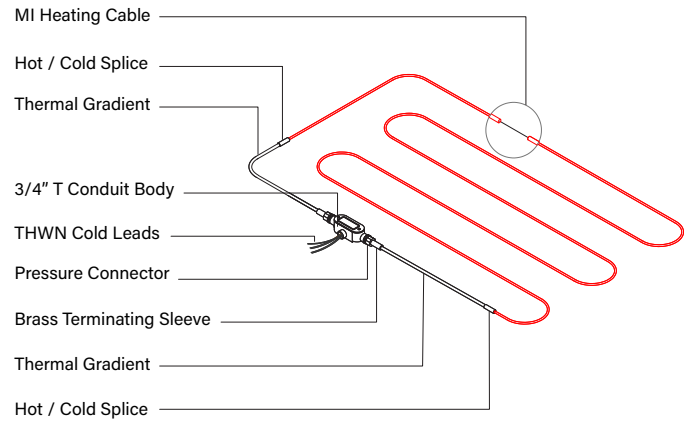


### DESCRIPTION

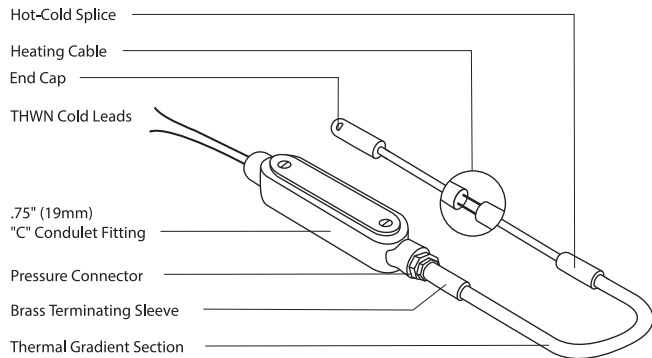
Mineral insulated (M.I.) cable consists of one or two solid conductor heating elements encapsulated in highly compressed magnesium oxide and sheathed in seamless copper or Alloy 825 stainless steel. Application requirements determine resistance value and sheath material. The mineral in Mineral Insulation is MgO.

### M.I. HEATING CABLE ASSEMBLY TERMINOLOGY:

- M.I. Cable - Mineral insulated heating cable.
- Thermal Gradient (TG) Section - Temperature transition section made from non-heating M.I. cable located between the heating M.I. cable and stranded cold lead.
- M.I. Heating Cable Assemblies - Generic term for Delta-Therm's M.I. cable heaters as shown in Details 1 and 2.



**Detail 1.** One conductor cable assembly.



**Detail 2.** Two conductor cable assembly.



# M.I. Series Technical Information

## M.I. HEATING CABLE ASSEMBLY BASE KIT (supplied w/each M.I. heating cable assembly)

- Thermal Gradient (TG) Section.
- THWN 19-Strand Cold Leads.
- Pressure Connectors.
- "A", "T", or "C" Conduit body with gasket and cover.
- Delta Dry (Water repellent powder).
- Duct Seal.
- Installation instructions.
- Factory assembled and tested.

## STANDARD COLD LEAD LENGTHS

20' (6m) 19-strand THWN cold leads are standard on all M.I. heating cable assemblies. If longer cold leads are needed, please specify at time of order. 19-strand THWN cold lead can be of any length up to 200' (61m).

## M.I. HEATING CABLE ASSEMBLY SPLICE KITS Are available. Call Delta-Therm

## COLD LEAD WIRE SIZE

Amps	AWG	Type	1 Conductor conduit body type	2 Conductor conduit body type
0-16	12	Stranded THWN	T	C
16-24	10	Stranded THWN	T	C
24-32	8	Stranded THWN	A	Not available
32-40	6	Stranded THWN	A	Not available

## APPLICATION CHART AND RECOMMENDATIONS

Primary Application	App Type	Prefix	Target watts	Target spacing	Target cable config	Std Thermal Gradient (TG) length	Standard Cold leads	Listing / Certification
Snow Melting (SM)	Pedestrian	S	27	6"	Z1C	2.5'	20"	UL/CSA
	Vehicular	S	22.5	6"	Z1C	2.5'	20"	UL/CSA
	Hangar door	S	25	6"	Z2C	2.5'	20"	UL/CSA
Roof/Gutter (RG)	Metal	R	8	6"	2C	5'	20"	UL/CSA
	Plastic composite	R	6	6"	Z2C	5'	20"	UL/CSA
Radiant (FW)	Floor Warming	F	6	6"	Z2C	2.5'	20"	UL/CSA
Pipe/Tank Trace (PT)	External	P	See design	6"	2C	5'	20"	UL/CSA
	Internal	P	See design	6"	2C	5'	20"	UL/CSA
Permafrost Prev (PF)	In conduit	T	12	48"	2C	3'	20"	vUL/CSA
	Direct burial	F	12	48"	Z1C	3'	20"	UL/CSA
Other	Custom	O	Custom	Custom	Open	Custom	20"	Not listed

## CABLE CONFIGURATOR

CABLE	# CONDUCTORS	SUFFIX	DESIGNATION	VOLTAGE RATING	SHEATH	MAX OUTPUT AIR	MAX OUTPUT CONCRETE	MAX TEMP LIMIT degrees F	MAX AMP/ HEATER
Bare Copper	1	B	1C	600	Copper	22	30	392	40
Bare Copper	2	B	2C	300	Copper	22	30	392	24
Jacketed Copper	1	J	Z1C	600	LSZH Copper	8	30	194	40
Jacketed Copper	2	J	Z2C	300	LSZH Copper	8	30	194	24
Alloy 825	1	SS	S1C	600	825	58	58	1100	40
Alloy 825	2	SS	S2C	600	825	58	58	1100	24

Note: HDPE has been replaced with LSZH (Low Smoke Zero Halogen) covering

# M.I. Series Technical Information



Warning: Mineral Insulated Cable must be installed by a qualified electrician. All assembly, installation, and test instructions must be followed. Improper installation can result in property damage, serious injury, or death due to electric shock. Please call Delta-Therm Corporation at 1-800-526-7887 with any installation or operating questions.

**TO ORDER:**

<b>Prefix</b> (Please refer to M.I. heating cable assembly prefix)	
<b># of conductors</b> -Chart 3	
<b>Ohms / Ft.</b> -Chart 4	
<b>Length per hot section</b> (Measurement in feet)	
<b>Voltage</b> (120 -480 VAC)	
<b>Amperage</b> (Ohms Law V/R)	
<b>kW</b> (Ohms Law $A \times V/1000$ )	
<b>Watts per linear foot</b> (kW x 1000/L)	
<b>Suffix H, B, or SS</b> (Refer to Chart 3)	
<b>Cold Lead Size</b> (Refer to Chart 1)	
<b>Cold length</b> (Length required to reach junction box NOTE: voltage drop not to exceed 3%)	

Cable Assemblies																					
<b>1 Conductor CU-LSZH</b>	Ohms/Ft.	0.610	0.390	0.300	0.200	0.150	0.105	0.080	0.060	0.040	0.030	0.020	0.010								
	Voltage Rating	600	600	600	600	600	600	600	600	600	600	600	600								
<b>2 Conductor CU-LSZH*</b>	Ohms/Ft.	0.800	0.600	0.400	0.300	0.200	0.125	0.100	0.070	0.044	0.028										
	Voltage Rating	300	300	300	300	300	300	300	600	600	600										
<b>1 Conductor Alloy 825</b>	Ohms/Ft.	2.0	1.60	1.30	1.00	0.850	0.700	0.500	0.280	0.200	0.150	0.118	0.0732	0.0581	0.467	0.0366	0.0290	0.0231	0.0183	0.0145	0.0133
	Voltage Rating	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
<b>2 Conductor Alloy 825</b>	Ohms/Ft.	11.00	9.00	6.00	4.14	2.00	1.15	0.700	0.505	0.286	0.200	0.150	0.100	0.0775	0.0561	0.0402	0.0281	0.0200			
	Voltage Rating	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600			

Some 2-conductor M.I. cable assemblies are limited to 277VAC.

# M.I. Series Technical Information

## CONTROLS

<b>Snow Melting</b>	DTC24-S	Automatic snow melt control
	MPS	Automatic snow melt control
<b>Roof De-icing</b>	DTC24-R	Automatic roof de-icing control
	MPS	Automatic roof de-icing control
<b>Radiant Heating</b>	UDG-4999	Electronic floor warming thermostat
<b>Pipe/Tank Trace or Permafrost Prevention</b>	OTS-F1	Ambient or line sensing thermostat
	A421ABC-2C	Electronic line thermostat and display NEMA 1
	A421AEC-2C	Electronic line thermostat and display NEMA 4X

## M.I. HEATING CABLE ASSEMBLY ACCESSORIES / OPTIONS

- Heater Assembly only - Factory terminated cable.
- Custom 19-strand THWN lengths.
- Custom length thermal gradient section.
- Reversing glands for internal trace
- Hazardous Location rated assemblies

## FEATURES /BENEFITS OF M.I. HEATING CABLE ASSEMBLIES

### VOLTAGES

Delta-Therm can design M.I. snow melting cable assemblies for voltages from 120VAC to 480VAC\*.

### FLEXIBLE

M.I. cable is annealed (annealing tempers metal and removes brittleness) and easy to form and install. Irregular areas and obstacles are easily accommodated.

### CORROSION-RESISTANT

Copper jacketed cable and Alloy 825 are corrosion-resistant. They resist oils, solvents, gasoline, and numerous acids. Copper jacketed cables can also be ordered with a Low Smoke Zero Halogen (LSZH) jacket for added protection against corrosive chemicals.

### LSZH JACKETING

Flame retardant Low Smoke Zero Halogen (LSZH) jacketing is made of non-halogenic thermoplastic compounds that inhibit smoke and toxic fumes when exposed to flames or other sources of extreme heat. Not available on Alloy 825.

\* Some 2-conductor M.I. cable assemblies are limited to 277VAC

## RELAY PANELS

<b>DT-XXPXXX</b>	Enclosed Contactor
<b>GFPE-X-X</b>	Power Control Panel w/GFPE
<b>LNR-X</b>	Low Noise Relay Panel
Custom Control/Monitor/Alarm Panels	

## ACCESSORIES

<b>Snow Melting</b>	PPS-GS-75	Galvanized strapping for asphalt
	PPS-SS-75	Stainless steel strapping for pavers
	NEC Plaque	Embedded heating system marker
<b>Roof De-icing</b>	DT-AS-50	Roof clips for asphalt or metal roofs (50 count)
	RM-25-AL	Aluminum clips for metal roofs (25 count)
	Specialty Clips	Specialty clips for roof materials other than metal or asphalt
	DSH	Downspout hanger
<b>Radiant Heating</b>	PPS-GS-75	Galvanized steel strapping
<b>Pipe / Tank Trace</b>	T-ALXXX	Aluminum heat distribution tape
	T-FXXX	Fiberglass banding tape
	CL-X	Caution labels
	PC1	Polycarbonate junction box

## FIRE RESISTANT

M.I. cable is made from inorganic materials that will not burn or support combustion.

## NO DEGRADATION

Delta-Therm M.I. cable is made of inorganic materials. Degradation of M.I. cable is negligible when compared to cables made of organic materials such as plastic.

## CUSTOM LENGTH COLD LEADS

Our termination design allows for custom length cold leads so that junction boxes can be located in dry locations, and field terminations can be protected from moisture.

## COMPREHENSIVE FACTORY TESTING

Each cable undergoes hi-pot, Insulation Resistance (IR), and Total Resistance (TR) tests both before and after overnight immersion in water.

## LOW INSTALLATION COSTS

M.I. cable arrives ready to install. Since terminations are done at the factory, electricians can expedite the installation, helping to reduce overall installation costs.

# M.I. Series Technical Information

## For Internal Tracing of Metal Pipes - Two Conductor Only

### DESCRIPTION

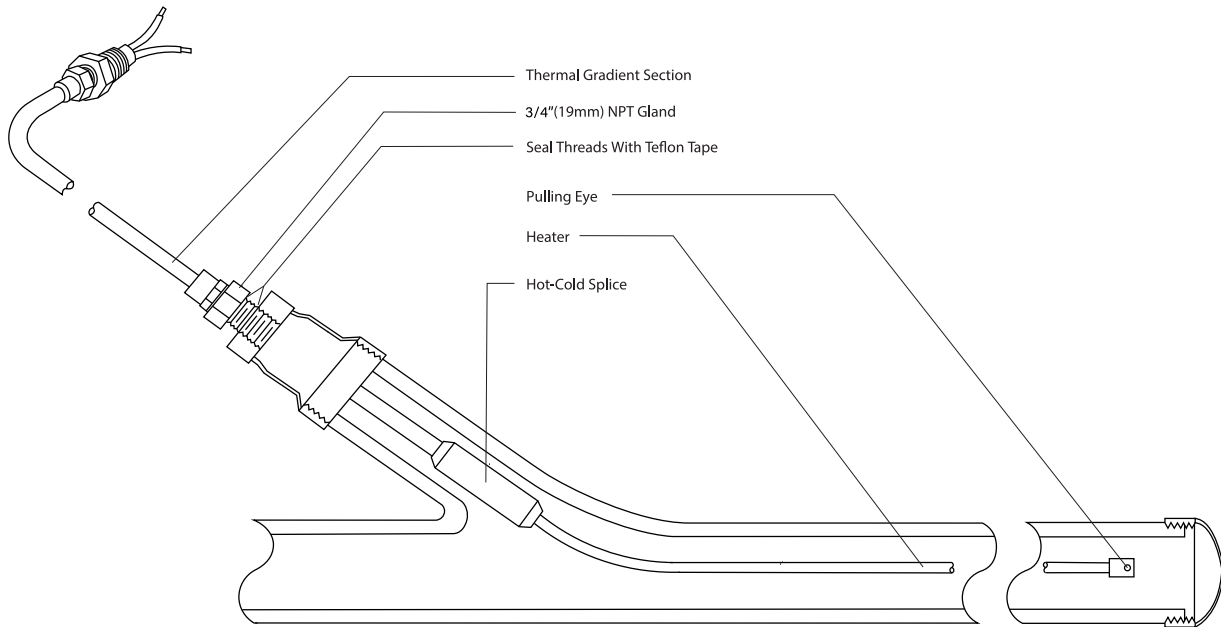
Where possible, pipes should be traced externally to permit cleaning of the line without removing the heater. However, for existing buried lines, internal tracing will save expensive excavation and avoid removal of insulation if a failure occurs.

### DESIGN REQUIREMENT

Heat loss calculations are the same as with external pipe tracing although excess cable is not allowed. The heater length must match the pipe length as the heater is pulled into the pipe and excess cable cannot be used. Valves and pumps must be traced externally.

3/4" (19mm) NPT gland connectors are supplied to provide a liquid tight seal where the thermal gradient section emerges from the pipe. Typical cable output can range from 3 to 20 watts per linear foot (10 to 66 watts per linear meter) of cable. (Output may be higher than required due to restrictions such as voltage and cable length.)

\* The system should be controlled by a thermostat.



Detail 1. Typical Detail For Internal Tracing/Metal Pipes.



Warning: Pulsating conditions may cause fatigue failure. Do not pull through valves or pumps. More than 45° of bend in a pipe may cause cable to bind during installation. Fitting may require soft solder "sweating" to maintain watertight connection. System must be grounded.

# M.I. Mineral Insulated Alloy 825 Heat Trace Cable

## One and Two Conductor

### DESCRIPTION

Delta-Therm seamless Alloy 825 sheath was developed to meet the demands of corrosive environments and high temperature applications. Delta-Therm uses only seamless Alloy 825 sheathing to avoid the potential problems associated with seam-welded tube.

Alloy 825 is resistant to reducing environments, stress corrosion and oxidizing environments. The relatively high nickel content of alloy 825, plus molybdenum and copper, makes it considerably more resistant to reducing environments (such as sulfuric or phosphoric acids) than most of the common stainless steels. It also effects a high resistance to stress corrosion cracking in chloride or alkaline environments. The chromium content, in combination with the nickel, makes the alloy resistant to a variety of oxidizing environments such as nitric acid solutions, nitrates and oxidizing salts.

Alloy 825 can be used at temperatures up to 1100° F (800° C) in normal atmospheres.

### ALLOY 825 LIMITING CHEMICAL COMPOSITION, % BY WT:

Nickel	38 - 46
Carbon	0.05 Max.
Manganese	1.0 Max.
Iron	Balance
Sulfur	0.03 Max.
Silicon	0.5 Max.
Copper	1.5 - 3.0
Chromium	19.5 - 23.5
Aluminum	0.2 Max.
Titanium	0.6 - 1.2
Molybdenum	2.5 - 3.5

### ALLOY 825 HEAT TRACE CABLE QUICK REFERENCE GUIDE\*

Alloy	Description	Nominal Chemical Composition, % (Major Element)				Corrosion Resistance															
		Nickel (+Cobalt)	Iron	Chromium	Other	Oxidation	Carburization	Sulfuric Acid	Hydrochloric Acid	Hydrofluoric	Phosphoric Acid	Nitric Acid	Organic Acid	Alkalis	Salts	Seawater	Chloride Cracking	G-E = Good to excellent NR = Not recommended		A = Acceptable X = Check for specific data	
INCOLOY Alloy 825 Nickel - Iron-Chromium	Excellent resistance to wide variety of corrosives. Resists pitting and intergranular type corrosion, reducing acids and oxidizing chemicals.	42	30	21.5	Mo 3.0 Cu 2.2	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	

\*Excerpt from Huntington Alloys Publication 78-348-2