

Flexible Heaters

NEW PRODUCT

Silicone Rubber

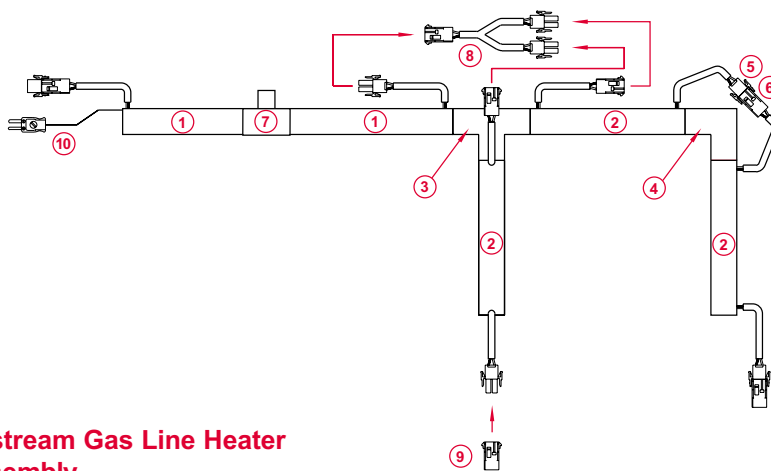
Modular Gas Line Heaters

Gas Delivery

TEOS, BCl₃, AlCl₃, ClF₃ and DCS are gases that condense or liquefy due to a phase shift at low temperatures. The condensation occurs in the gas line and puddles in the shower head before being injected into the vacuum chamber. A substantial number of wafer defects will occur if liquefied gases are injected into the vacuum chamber. Uniform heating of the lines will prevent condensation. TEOS lines are typically heated above 194°F (90°C) and BCl₃ above 86°F (30°C), depending on pressure and flow rate. The optimum line temperature will vary depending on the process parameters.

Specifications

- Watt density: 2.5 W/in² (0.39 W/cm²) on gas line O.D.
- UL® recognized for U.S. and Canadian safety standards
- Heaters and insulators meet UL94-HB flammability requirements
- Insulated straight fillers for 100 percent line coverage—elbows and tees are trim-to-fit to proper length
- I.D. available: ¼, ⅜, ½, ¾ inch (6, 10, 13, 19 mm)
- 120V standard, other voltages available



Upstream Gas Line Heater Assembly

- 1 9 inch (229 mm) heater with thermocouple. Heater leads have male plug on one end and a female cap on the other end. Heater materials UL® rated to 392°F (200°C).
- 2 6 inch (152 mm) heater. Heater leads, see 1.
- 3 Union tee insulator.
- 4 90° union elbow insulator.
- 5 Male plug, amp p/n 1-480698-0 w/ sockets amp p/n 350689-1.
- 6 Female cap, amp p/n 1-480699-0 w/ pins amp p/n 350690-1.
- 7 Valve or regulator.
- 8 Y Connector: one female cap on one end; two male plugs on the other end.
- 9 Dead plug (sealed).
- 10 Type J thermocouple w/ male mini-plug (optional).
- 11 High-temp plastic snaps 212°F (100°C).
- 12 ⅜ inch (10 mm) wall, silicone rubber, closed cell sponge.

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Standard Gas Line Diameter

1/4 Inch (6 mm) O.D. Tubing (Stock)

1/4 Inch (6 mm) Heater I.D. x Length inches (mm)	Description	Volts	Watts	Amps	Watlow Code Number	
					without T/C	with Type J T/C
6 (152)	Heated straight	120	12	0.10	008060C1	008060C1A
9 (229)	Heated straight	120	18	0.15	008090C1	008090C1A
12 (305)	Heated straight	120	24	0.20	008120C1	008120C1A
18 (457)	Heated straight	120	36	0.30	008180C1	008180C1A
24 (610)	Heated straight	120	48	0.40	008240C1	008240C1A
36 (914)	Heated straight	120	72	0.60	008360C1	008360C1A
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	008180C0	
* Elbow	90° Union Elbow insulator	N/A	Trim-to-fit	Insulator	008020C0	
* T	Union Tee insulator	N/A	Trim-to-fit	Insulator	008030C0	

3/8 Inch (10 mm) O.D. Tubing

3/8 Inch (6 mm) Heater I.D. x Length inches (mm)	Description	Volts	Watts	Amps	Watlow Code Number	
					without T/C	with Type J T/C
6 (152)	Heated straight	120	18	0.15	012060C1	012060C1A
9 (229)	Heated straight	120	27	0.23	012090C1	012090C1A
12 (305)	Heated straight	120	36	0.30	012120C1	012120C1A
18 (457)	Heated straight	120	54	0.45	012180C1	012180C1A
24 (610)	Heated straight	120	71	0.60	012240C1	012240C1A
36 (914)	Heated straight	120	107	0.90	012360C1	012360C1A
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	012180C0	
* Elbow	90° Union Elbow insulator	N/A	Trim-to-fit	Insulator	012020C0	
* T	Union Tee insulator	N/A	Trim-to-fit	Insulator	012030C0	

1/2 Inch (13 mm) O.D. Tubing (Stock)

1/2 Inch (6 mm) Heater I.D. x Length inches (mm)	Description	Volts	Watts	Amps	Watlow Code Number	
					without T/C	with Type J T/C
6 (152)	Heated straight	120	24	0.20	016060C1	016060C1A
9 (229)	Heated straight	120	36	0.30	016090C1	016090C1A
12 (305)	Heated straight	120	48	0.40	016120C1	016120C1A
18 (457)	Heated straight	120	72	0.60	016180C1	016180C1A
24 (610)	Heated straight	120	96	0.80	016240C1	016240C1A
36 (914)	Heated straight	120	144	1.20	016360C1	016360C1A
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	016180C0	
* Elbow	90° Union Elbow insulator	N/A	Trim-to-fit	Insulator	016020C0	
* T	Union Tee insulator	N/A	Trim-to-fit	Insulator	016030C0	

* For use on Micro-Fit® weld fittings.

Micro-Fit® is a registered trademark of CAJON Company, A SWAGELOK® Company.

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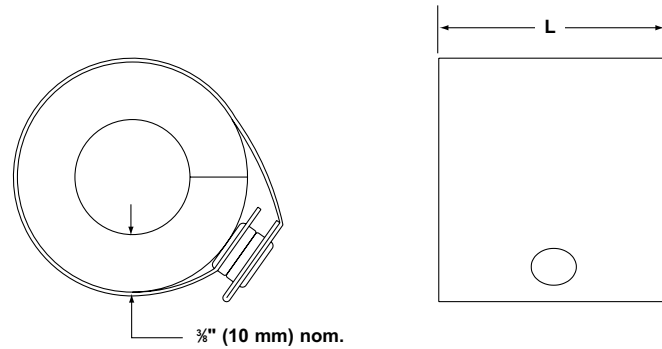
Standard Gas Line Diameter

3/4 Inch (19 mm) O.D. Tubing

3/4 Inch (19 mm) Heater I.D. x Length inches (mm)	Description	Volts	Watts	Amps	Watlow Code Number	
					without T/C	with Type J T/C
6 (152)	Heated straight	120	36	0.30	024060C1	024060C1A
9 (229)	Heated straight	120	54	0.45	024090C1	024090C1A
12 (305)	Heated straight	120	71	0.60	024120C1	024120C1A
18 (457)	Heated straight	120	107	0.90	024180C1	024180C1A
24 (610)	Heated straight	120	142	1.19	024240C1	024240C1A
36 (914)	Heated straight	120	213	1.78	024360C1	024360C1A
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	024180C0	
* Elbow	90° Union Elbow insulator	N/A	Trim-to-fit	Insulator	024020C0	
* T	Union Tee insulator	N/A	Trim-to-fit	Insulator	024030C0	

Standard Designs

VCR Union Heaters/Insulators



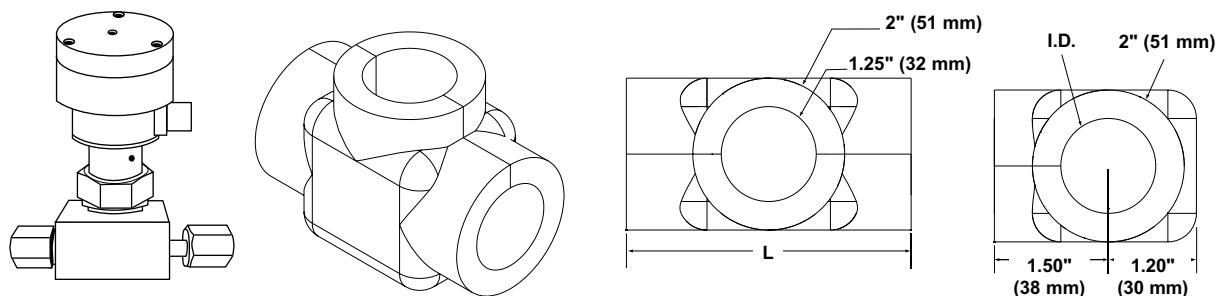
I.D. x Length inches (mm)	Description	Volts	Watts	Amps	Watlow Code Number	
					without T/C	with Type J T/C
7/8 x 1 3/4 (22 x 44)	7/8" (6 mm) VCR Union heater	120	10	0.09	01702783	01702783A
3/4 x 1 1/2 (19 x 38)	7/8" (6 mm) VCR Union insulator	N/A	N/A	N/A	02401580	N/A
1 1/4 x 1 1/2 (32 x 38)	1/2" (13 mm) VCR Union heater	120	12	0.10	03901581	0301581A
1 1/4 x 1 1/2 (32 x 38)	1/2" (13 mm) VCR Union insulator	N/A	N/A	N/A	03901580	N/A

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VCR Valve Heaters



Tube Diameter inch (mm)	I.D. inch (mm)	Fitting Type	Length inches (mm)	Watts	Amps @ 120V	Watlow Code Number
¼ (6)	⅞ (22)	Male VCR Valve heater	3.00 (76)	18	0.15	03104786
¼ (6)	⅞ (22)	Female VCR Valve heater	4.75 (121)	28	0.24	04704893
½ (13)	1 ¼ (32)	Male VCR Valve heater	3.75 (95)	27	0.23	03804782
½ (13)	1 ¼ (32)	Female VCR Valve heater	6.51 (165)	47	0.39	04706690

Note: Heaters fit Nupro® BN and BK series valves.

Accessories

Part	Description	Watlow Code Number
Y Connector*	Power splitter: 1 female, 2 male	Z5303-2
Female Dead Plug*	Insulating plug for last connector in chain	Z5309-2
Type J Thermocouple	12 inch (305 mm) 24 ga Type J Teflon® w/mini plug	Z5786
Type K Thermocouple	12 inch (305 mm) 24 ga Type K Teflon® w/mini plug	Z5639
Male Dead Plugs*	Insulating plug for last connector in chain	Z6332
Y Connector*	Power splitter: 2 female, 1 male	Z6333
Adaptor*	Female to male	Z6334
Adaptor*	Male to female	Z6335
Extender*	6 inch (152 mm)	Z6374

*All connectors use AMP Mate-N-Lok® connectors.

Y-adaptors and dead plugs

Sensor Pocket thermocouple: 12 in (305 mm) long, Type J or K, Teflon® insulated, #24 AWG, 2-prong mini-plug connector

Interconnects with Watlow temperature control consoles

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Teflon® is a registered trademark of E.I. du Pont de Nemours & Company.