

Flexible Heaters

Line Heating

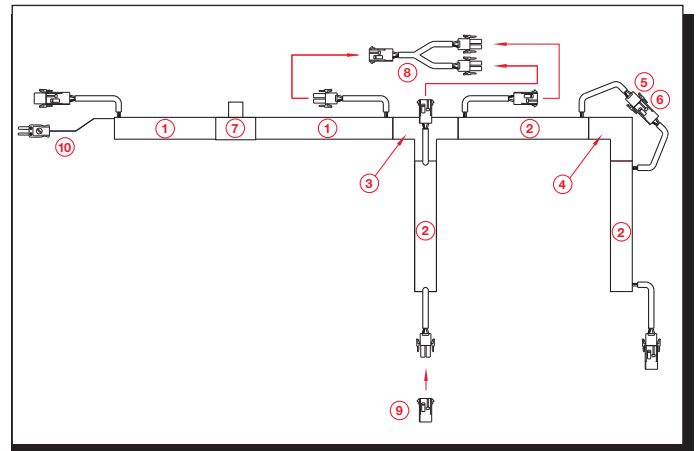
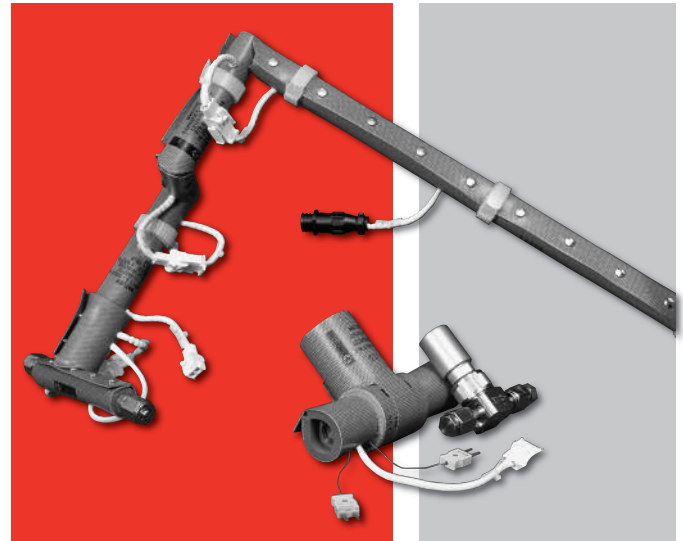
Modular Gas Line Heaters

Gas Delivery

Tetraethyl orthosilicate (TEOS), Boron trichloride (BCl_3), Aluminum Chloride (AlCl_3), Chlorine trifluoride (ClF_3) and Dichlorosilane (DCS) are gases that condense or liquefy due to a phase shift at low temperatures. In semiconductor processes 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 BCl_3 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 of 2.5 W/in^2 (0.4 W/cm^2) 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: $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ in. (6, 9.5, 13, 19 mm)
- 120V standard, other voltages available
- Small metal snaps
- $\frac{3}{8}$ in. (9.5 mm) wall, silicone rubber, closed cell sponge



Upstream Gas Line Heater Assembly

- ① 9 in. (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 in. (152 mm) heater, heater leads, see 1
- ③ Union tee insulator
- ④ 90° union elbow insulator
- ⑤ Male plug, AMP Mate-N-Lok[®] connector part number 1-480698-0; with sockets AMP Mate-N-Lok[®] connector part number 350689-1
- ⑥ Female cap, AMP Mate-N-Lok[®] connector part number 1-480699-0; with pins AMP Mate-N-Lok[®] connector part number 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)

Flexible Heaters

Line Heating

Modular Gas Line Heaters (Continued)

Gas Line Diameter

¼ in. (6 mm) O.D. Tubing

¼ in. (6 mm) Heater I.D. x Length in. (mm)	Description	Volts	Watts	Amperes	Code Number		
					Without T/C RAPID SHIP	With Type J T/C RAPID SHIP	With Type K T/C Standard
6 (152)	Heated straight	120	12	0.10	008060C1	008060C1A	008060C1K
9 (229)	Heated straight	120	18	0.15	008090C1	008090C1A	008090C1K
12 (305)	Heated straight	120	24	0.20	008120C1	008120C1A	008120C1K
18 (457)	Heated straight	120	36	0.30	008180C1	008180C1A	008180C1K
24 (610)	Heated straight	120	48	0.40	008240C1	008240C1A	008240C1K
36 (914)	Heated straight	120	72	0.60	008360C1	008360C1A	008360C1K
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	008180C0		
* Elbow	90° union elbow insulator	N/A	Trim-to-fit	Insulator	008020C0		
* Tee	Union tee insulator	N/A	Trim-to-fit	Insulator	008030C0		

⅜ in. (9.53 mm) O.D. Tubing

¼ in. (6 mm) Heater I.D. x Length in. (mm)	Description	Volts	Watts	Amperes	Code Number		
					Without T/C Standard	With Type J T/C Standard	With Type K T/C Standard
6 (152)	Heated straight	120	18	0.15	012060C1	012060C1A	012060C1K
9 (229)	Heated straight	120	27	0.23	012090C1	012090C1A	012090C1K
12 (305)	Heated straight	120	36	0.30	012120C1	012120C1A	012120C1K
18 (457)	Heated straight	120	54	0.45	012180C1	012180C1A	012180C1K
24 (610)	Heated straight	120	71	0.60	012240C1	012240C1A	012240C1K
36 (914)	Heated straight	120	107	0.90	012360C1	012360C1A	012360C1K
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	012180C0		
* Elbow	90° union elbow insulator	N/A	Trim-to-fit	Insulator	012020C0		
* Tee	Union tee insulator	N/A	Trim-to-fit	Insulator	012030C0		

½ in. (13 mm) O.D. Tubing

¼ in. (6 mm) Heater I.D. x Length in. (mm)	Description	Volts	Watts	Amperes	Code Number		
					Without T/C RAPID SHIP	With Type J T/C RAPID SHIP	With Type K T/C Standard
6 (152)	Heated straight	120	24	0.20	016060C1	016060C1A	016060C1K
9 (229)	Heated straight	120	36	0.30	016090C1	016090C1A	016090C1K
12 (305)	Heated straight	120	48	0.40	016120C1	016120C1A	016120C1K
18 (457)	Heated straight	120	72	0.60	016180C1	016180C1A	016180C1K
24 (610)	Heated straight	120	96	0.80	016240C1	016240C1A	016240C1K
36 (914)	Heated straight	120	144	1.20	016360C1	016360C1A	016360C1K
18 (457)	Straight insulator	N/A	Trim-to-fit	Insulator	016180C0		
* Elbow	90° union elbow insulator	N/A	Trim-to-fit	Insulator	016020C0		
* Tee	Union tee insulator	N/A	Trim-to-fit	Insulator	016030C0		

RAPID SHIP

- 2 to 5 day shipment
- Standard delivery, consult your Watlow representative

* For use on Micro-Fit® weld fittings.

Notes: RAPID SHIP items are ready for delivery in limited quantities. Standard delivery items are existing configurations and will be made-to-order, consult your Watlow representative for details.

Flexible Heaters

Line Heating

Modular Gas Line Heaters (Continued)

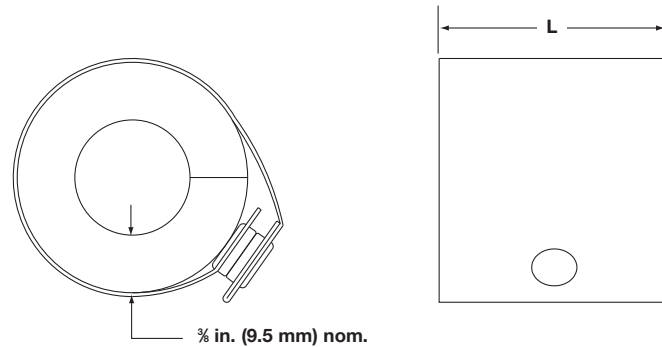
Gas Line Diameter

3/4 In. (19.1 mm) O.D. Tubing

3/4 in. (6 mm) Heater I.D. x Length in. (mm)	Description	Volts	Watts	Amperes	Code Number		
					Without T/C Standard	With Type J T/C Standard	With Type K T/C Standard
6 (152)	Heated straight	120	36	0.30	024060C1	024060C1A	024060C1K
9 (229)	Heated straight	120	54	0.45	024090C1	024090C1A	024090C1K
12 (305)	Heated straight	120	71	0.60	024120C1	024120C1A	024120C1K
18 (457)	Heated straight	120	107	0.90	024180C1	024180C1A	024180C1K
24 (610)	Heated straight	120	142	1.19	024240C1	024240C1A	024240C1K
36 (914)	Heated straight	120	213	1.78	024360C1	024360C1A	024360C1K
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		

* For use on Micro-Fit® weld fittings.

VCR Union Heaters/Insulators



3/8 in. (6 mm) Heater I.D. x Length in. (mm)	Description	Volts	Watts	Amperes	Code Number		
					Without T/C RAPID SHIP	With Type J T/C RAPID SHIP	With Type K T/C Standard
3/8 x 1" (22.2 x 45)	3/8 in. (6 mm) VCR union heater	120	10	0.09	01702783	01702783A	01702783K
3/8 x 1 1/2" (19.0 x 38)	3/8 in. (6 mm) VCR union insulator	N/A	N/A	N/A	02401580	N/A	N/A
1 1/4 x 1 1/2" (32.0 x 38)	1/2 in. (13 mm) VCR union heater	120	12	0.10	03901581	03901581A	03901581K
1 1/4 x 1 1/2" (32.0 x 38)	1/2 in. (13 mm) VCR union insulator	N/A	N/A	N/A	03901580	N/A	N/A

RAPID SHIP

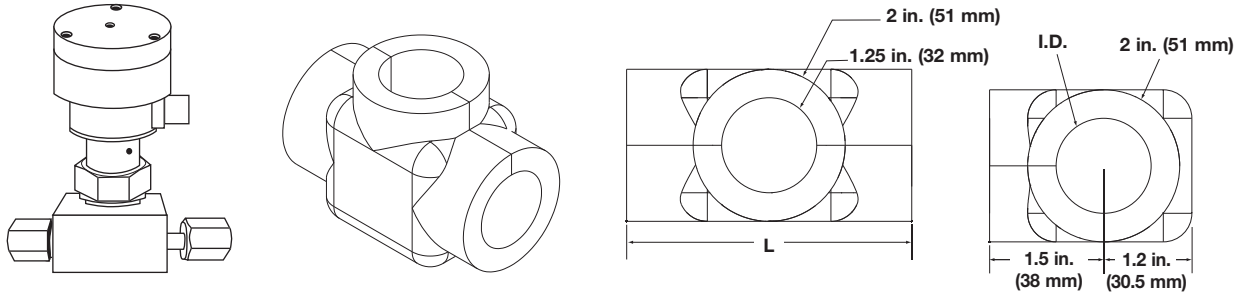
- 2 to 5 day shipment

Flexible Heaters

Line Heating

Modular Gas Line Heaters (Continued)

VCR Valve Heaters



Tube Diameter in. (mm)	I.D. in. (mm)	Fitting Type	Length in. (mm)	Watts	Amperes @ 120V	Code Number
¼ (6)	⅞ (22.2)	Male VCR valve heater	3.00 (76)	18	0.15	03104786
¼ (6)	⅞ (22.2)	Female VCR valve heater	4.75 (121)	28	0.24	04704893
½ (13)	1¼ (32.0)	Male VCR valve heater	3.75 (95)	27	0.23	03804782
½ (13)	1¼ (32.0)	Female VCR valve heater	6.51 (165)	47	0.39	04706690

RAPID SHIP

- 2 to 5 day shipment

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

Accessories

Part	Description	Code Number
Y connector*	Power splitter: 1 female, 2 male	Z5303-2
Y connector*	Power splitter: 2 female, 1 male	Z6333
Female dead plug*	Insulating plug for last connector in chain	Z5309-2
Male dead plug*	Insulating plug for last connector in chain	Z6332
Type J thermocouple	12 in. (305 mm) 24 ga Type J Teflon® with mini plug	Z5786
Type J thermocouple extension	10 ft (3048 mm) Type K Teflon® thermocouple with mini plug and mini jack	Z6271
Type K thermocouple	12 in. (305 mm) 24 ga Type K Teflon® with mini plug	Z5639
Adapter*	Female to male	Z6334
Adapter*	Male to female	Z6335
Power extension*	6 in. (152 mm)	Z6374
Power extension*	3 ft (914 mm)	A000136
Power extension*	6 ft (1829 mm)	A000137
Power extension*	10 ft (3048 mm)	A000138
Strap extension	1 in. (25 mm) long pump line strap extension	010010116
Strap extension	2 in. (51 mm) long pump line strap extension	010020113
Strap extension	3 in. (76 mm) long pump line strap extension	010030124

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

- Y-adapters and dead plugs
- Sensor pocket thermocouple: 12 in. (305 mm) long, Type J or K, Teflon® insulated, #24 AWG,
- Two-prong mini-plug connector

Flexible Heaters

Line Heating

STRETCH-TO-LENGTH® Heaters

In semiconductor processes condensation of many critical gases occurs due to a phase shift at low temperatures. Burning of the gases will occur if the delivery line is too hot. High or low temperature condition may result in undesirable particulates and cause costly device defects and tool maintenance.

The Watlow STRETCH-TO-LENGTH® (S-T-L) gas line heater system was developed as an easy to assemble temperature solution with performance superior to heat tape. S-T-L's preformed construction gives engineers the ability to wrap it around the delivery line with consistent heater/gas line contact for improved temperature uniformity. S-T-L's flexibility gives engineers the ability to compensate for the size of different components thus reducing the potential for hot and cold spots.

The S-T-L system includes a 2 W/in² S-T-L heater and silicone rubber foam insulation.

Features and Benefits

Easy to install two part system

- Conveniently fits on most gas line configurations

Flexible heater design

- Gives engineers the flexibility to easily customize the thermal profile for each gas line application
- Allows quick prototyping to determine energy distribution requirements for process improvements

Flexible standard system components

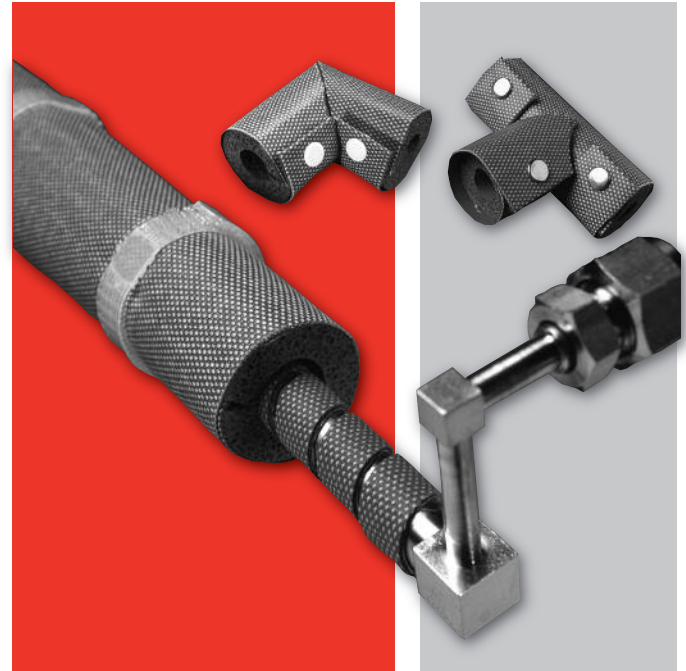
- Eliminates unnecessary lead times for custom designs

Typical Applications

Gas deliver lines

- Boron trichloride, BCl₃
- Chlorine trifluoride, ClF₃
- Dichlorosilane, (DCS), SiH₂Cl₂
- Tetra ethyl orthosilicate, TEOS
- Tungsten hexafluoride, WF₃
- Process gas line qualification

Agency Certification, Recognition Compliance and Approvals



Contact factory for specific application and approvals

- Semi S2-93 compatible with a high-limit thermocouple and controller
- UL® recognized for U.S. safety standards

Specifications

- Heater and insulation jacket material reinforced silicone rubber fabric
 - Color:
 - Insulation and outer jacket – orange
 - Heater – orange
- Clean room strap fasteners
- Voltage: 120 and 240VAC
- Max. operating temperature: 392°F (200°C)
- Heater watt density: 2 W/in² (0.31W/cm²) – Watlow recommends 80% line wrap for optimum performance
- Power lead wires: 12 in. (305 mm); #18 AWG UL® 1180 CSA, rated 10A, lead wire pair encapsulated in reinforced silicone rubber sleeving
- Heater interconnectable up to a 10A circuit
- Material rated UL® 94-HB
- Heater materials are UL® rated to 392°F (200°C)

Flexible Heaters

Line Heating

STRETCH-TO-LENGTH Heaters (Continued)

S-T-L heaters are specified by their straight length. In actual applications the engineer can wrap the heaters to achieve optimum temperature profile. Coverage lengths of approximately 60 and 80 percent on ¼ (6 mm) and ½ in. (13 mm) diameter tubes are provided as a guide in

selecting heater lengths for actual gas line dimensions. A gas line with 100 percent coverage would be approximately 2 W/in², 80 percent coverage 1.6 W/in² or 60 percent coverage 1.2 W/in².

S-T-L Heater Ranges - ¼ in. (6 mm) O.D. Tubing

0.25 60% Coverage	0.25 80% Coverage	120V Version Code Number	Amperes	240V Version Code Number	Amperes
10.20	8.04	005120500	0.10	N/A	N/A
14.45	11.39	005170500	0.14	N/A	N/A
18.70	14.74	005220500	0.18	005220501	0.09
23.80	18.76	005280500	0.23	005280501	0.12
30.60	24.12	005360500	0.30	005360501	0.15
39.95	31.49	005470500	0.39	005470501	0.20
51.00	40.20	005600502	0.50	005600503	0.25
63.75	50.25	005750500	0.63	005750501	0.31
76.50	60.30	005900500	0.75	005900501	0.38

S-T-L Heater Ranges - ½ in. (13 mm) O.D. Tubing

0.50 60% Coverage	0.50 80% Coverage	120V Version Code Number	Amperes	240V Version Code Number	Amperes
10.20	6.63	005170501	0.14	N/A	N/A
15.00	9.75	005250501	0.21	N/A	N/A
21.00	13.65	005350502	0.29	005350503	0.15
29.40	19.11	005490502	0.41	005490503	0.20
38.40	24.96	005640502	0.53	005640503	0.27
47.40	30.81	005790502	0.66	005790503	0.33
59.40	38.61	005990502	0.82	005990503	0.41
73.80	49.97	005F103502	1.02	005F103503	0.51
92.40	60.06	005F128502	1.28	005F128503	0.64

¼ in. (6 mm) O.D. Tubing Insulators

¼ in. (6.4 mm) Heater I.D. x Length	Description	Code Number
18 in. (457 mm)	Straight insulator	012180500
36 in. (914 mm)	Straight insulator	012360500
Elbow	90° union elbow insulator	012020500
Tee	Union tee insulator	012030500
	VCR fitting	015030500

½ in. (13 mm) O.D. Tubing Insulators

½ in. (13 mm) Heater I.D. x Length	Description	Code Number
18 in. (457 mm)	Straight insulator	024180500
36 in. (914 mm)	Straight insulator	024360500
Elbow	90° union elbow insulator	020024500
Tee	Union tee insulator	024030500
	VCR fitting	015042500

Flexible Heaters

Line Heating

STRETCH-TO-LENGTH Heaters (Continued)

3/8 in. (9.5 mm) O.D. Tubing Insulators

3/8 in. (9.5 mm) Heater I.D. x Length	Description	Code Number
18 in. (457 mm)	Straight insulator	016180500
36 in. (914 mm)	Straight insulator	016360500
Elbow	90° union elbow insulator	016020500
Tee	Union tee insulator	016030501
	VCR fitting	015042500

Extensions

Description	Code Number
3 ft (914 mm)	A000136
6 ft (1829 mm)	A000137
10 ft (3048 mm)	A000138

Accessories

Description	Code Number
Power cord 6 ft 18-2 SJ	Z5302-2
Wiring Y connector – 1F-2M	Z5303-2
Wiring Y connector – 1M-2F	Z6333
Female termination plug	Z5309-2
Male termination plug	Z6332
12 in. 24 ga. Type J T/C w/mini plug	Z5786
12 in. 24 ga. Type K T/C w/mini plug	Z5639
Gender changer – M-F	Z6334
Gender changer – F-M	Z6335
6 in. power extension	Z6374
10 ft Type J T/C extension	Z6271

Note: All power connectors use AMP Mate-N-Lok®

Flexible Heaters

Line Heating

Modular Pump Line Heaters

The tight contact fit of Watlow's pump line heaters provide superior, uniform heating of transfer lines.

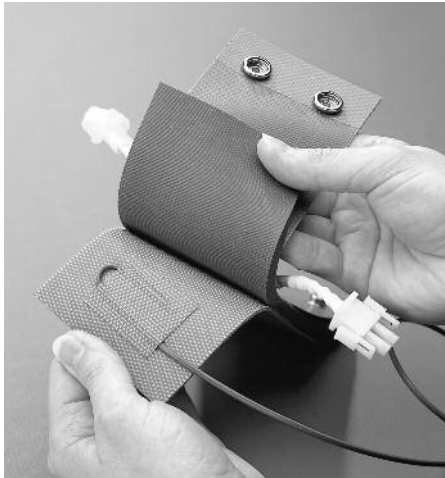
Agency Certification, Recognition Compliance, and Approvals

(Contact your Watlow representative for specific application and approvals.)

- Complies with SEMI S2-93 standards
- UL® recognized for U.S. and Canadian safety standards
- CE, VDE
- National Electrical Code (NEC), Article #427-23
- UL® Listed available

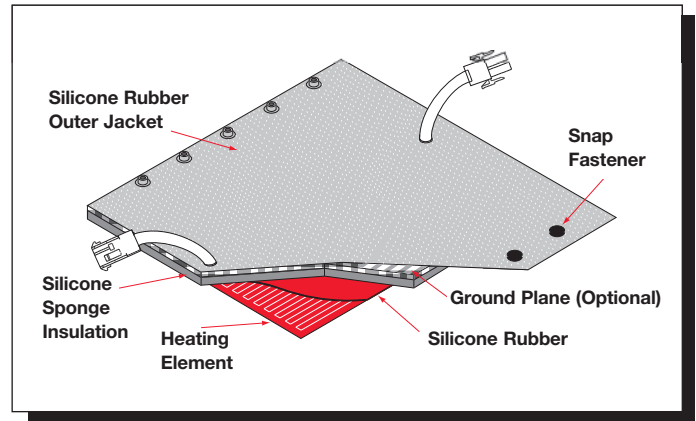
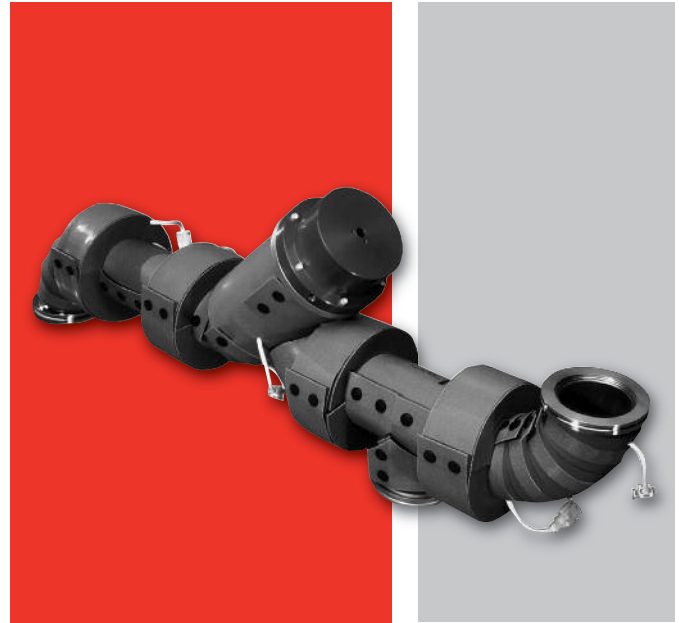
General Specifications

- Heater and jacket material: reinforced silicone rubber fabric
- Color: insulation and outer jacket is gray, heater is red-orange



Sensor Pocket Built-in to all Straight Length Heaters 3 in. (76 mm) Long and Greater; One Per Heater.

- Snap type fasteners: ½ in. (13 mm) nominal diameter metal construction with nylon cover; max. operating temperature 392°F (200°C)
- Hook and latch fasteners available
- 120 and 208VAC standard, contact your Watlow representative for other voltages
- Power lead wires: 3 in. (76 mm) #18 AWG UL® 1180/CSA Teflon® insulated, rated 10A, lead wire pair encapsulated in reinforced silicone rubber sleeving
- Heaters interconnectable up to a 10A circuit
- **Low watt density:**
 - 1.5-2 in. (38-51 mm) diameter, 1.5 W/in² (0.23 W/cm²)
 - 3-4 in. (76-102 mm) diameter, 1.25 W/in² (0.19 W/cm²)



to Order Call 1.800.345.0369

Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

Tube O.D. in. (mm)	Length "L" in. (mm)	Watts	Amperes @120V	Amperes @208V	Features	Base Code Number*
1.5 (38)	2 (51)	15	0.13	0.08	—	020050A
1.5 (38)	2T (51T)	8	0.07	NA	Trim-to-fit	020050T
1.5 (38)	3 (76)	22	0.19	0.11	Sensor Pocket	030050A
1.5 (38)	3T (76T)	15	0.13	0.08	Trim-to-fit	030050T
1.5 (38)	4 (102)	29	0.25	0.14	Sensor Pocket	040050A
1.5 (38)	4T (102T)	22	0.19	0.11	Trim-to-fit	040050T
1.5 (38)	5 (127)	36	0.30	0.18	Sensor Pocket	050050A
1.5 (38)	5T (127T)	29	0.25	0.14	Trim-to-fit	050050T
1.5 (38)	6 (152)	43	0.36	0.21	Sensor Pocket	050060A
1.5 (38)	6T (152T)	36	0.30	0.17	Trim-to-fit	050060T
1.5 (38)	7 (178)	50	0.42	0.24	Sensor Pocket	050070A
1.5 (38)	8 (203)	57	0.48	0.27	Sensor Pocket	050080A
1.5 (38)	9 (229)	64	0.53	0.31	Sensor Pocket	050090A
1.5 (38)	10 (254)	71	0.59	0.34	Sensor Pocket	050100A
1.5 (38)	12 (305)	85	0.71	0.41	Sensor Pocket	050120A
1.5 (38)	18 (457)	128	1.07	0.62	Sensor Pocket	050180A
1.5 (38)	24 (610)	170	1.42	0.82	Sensor Pocket	050240A
1.5 (38)	30 (762)	213	1.78	1.03	Sensor Pocket	050300A
1.5 (38)	36 (914)	255	2.13	1.23	Sensor Pocket	050360A
1.5 (38)	36 (914)	Insulator	NA	NA	—	050360B
2.0 (51)	2 (51)	19	0.16	0.10	—	020066A
2.0 (51)	2T (51T)	10	0.09	NA	Trim-to-fit	020066T
2.0 (51)	3 (76)	29	0.25	0.14	Sensor Pocket	030066A
2.0 (51)	3T (76T)	19	0.16	0.10	Trim-to-fit	030066T
2.0 (51)	4 (102)	38	0.32	0.19	Sensor Pocket	040066A
2.0 (51)	4T (102T)	29	0.25	0.14	Trim-to-fit	040066T
2.0 (51)	5 (127)	48	0.40	0.24	Sensor Pocket	050066A
2.0 (51)	5T (127T)	38	0.32	0.19	Trim-to-fit	050066T
2.0 (51)	6 (152)	57	0.48	0.28	Sensor Pocket	060066A
2.0 (51)	6T (152T)	47	0.39	0.23	Trim-to-fit	060066T
2.0 (51)	7 (178)	66	0.55	0.32	Sensor Pocket	066070A
2.0 (51)	8 (203)	76	0.63	0.37	Sensor Pocket	066080A
2.0 (51)	9 (229)	85	0.71	0.41	Sensor Pocket	066090A
2.0 (51)	10 (254)	95	0.79	0.46	Sensor Pocket	066100A
2.0 (51)	12 (305)	114	0.95	0.55	Sensor Pocket	066120A
2.0 (51)	18 (457)	170	1.42	0.82	Sensor Pocket	066180A
2.0 (51)	24 (610)	227	1.90	1.10	Sensor Pocket	066240A
2.0 (51)	30 (762)	283	2.36	1.37	Sensor Pocket	066300A
2.0 (51)	36 (914)	340	2.84	1.64	Sensor Pocket	066360A
2.0 (51)	36 (914)	Insulator	NA	NA	—	066360B

CONTINUED

*To complete the code number, please reference the *Build-a-Code* chart on page 174.

Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

Tube O.D. in. (mm)	Length "L" in. (mm)	Watts	Amperes @120V	Amperes @208V	Features	Base Code Number*
3 (76)	2 (51)	24	0.20	0.12	—	020096A
3 (76)	2T (51T)	12	0.10	0.06	Trim-to-fit	020096T
3 (76)	3 (76)	36	0.30	0.18	Sensor Pocket	030096A
3 (76)	3T (76T)	24	0.20	0.12	Trim-to-fit	030096T
3 (76)	4 (102)	48	0.40	0.24	Sensor Pocket	040096A
3 (76)	4T (102T)	36	0.30	0.18	Trim-to-fit	040096T
3 (76)	5 (127)	59	0.50	0.29	Sensor Pocket	050096A
3 (76)	5T (127T)	48	0.40	0.24	Trim-to-fit	050096T
3 (76)	6 (152)	71	0.60	0.35	Sensor Pocket	060096A
3 (76)	6T (152T)	59	0.49	0.28	Trim-to-fit	060096T
3 (76)	7 (178)	83	0.69	0.4	Sensor Pocket	070096A
3 (76)	8 (203)	95	0.79	0.46	Sensor Pocket	080096A
3 (76)	9 (229)	106	0.88	0.51	Sensor Pocket	090096A
3 (76)	10 (254)	118	0.98	0.57	Sensor Pocket	096100A
3 (76)	12 (305)	142	1.19	0.69	Sensor Pocket	096120A
3 (76)	18 (457)	213	1.78	1.03	Sensor Pocket	096180A
3 (76)	24 (610)	283	2.36	1.37	Sensor Pocket	096240A
3 (76)	30 (762)	354	2.95	1.71	Sensor Pocket	096300A
3 (76)	36 (914)	425	3.55	2.05	Sensor Pocket	096360A
3 (76)	36 (914)	Insulator	NA	NA	—	096360B
4 (102)	2 (51)	32	0.27	0.16	—	020128A
4 (102)	2T (51T)	16	0.14	0.08	Trim-to-fit	020128T
4 (102)	3 (76)	48	0.40	0.24	Sensor Pocket	030128A
4 (102)	3T (76T)	32	0.27	0.16	Trim-to-fit	030128T
4 (102)	4 (102)	63	0.53	0.31	Sensor Pocket	040128A
4 (102)	4T (102T)	48	0.40	0.24	Trim-to-fit	040128T
4 (102)	5 (127)	79	0.66	0.38	Sensor Pocket	050128A
4 (102)	5T (127T)	63	0.53	0.31	Trim-to-fit	050128T
4 (102)	6 (152)	95	0.80	0.46	Sensor Pocket	060128A
4 (102)	6T (152T)	79	0.66	0.38	Trim-to-fit	060128T
4 (102)	7 (178)	110	0.92	0.53	Sensor Pocket	070128A
4 (102)	8 (203)	126	1.05	0.61	Sensor Pocket	080128A
4 (102)	9 (229)	142	1.18	0.68	Sensor Pocket	090128A
4 (102)	10 (254)	157	1.31	0.75	Sensor Pocket	100128A
4 (102)	12 (305)	189	1.58	0.91	Sensor Pocket	120128A
4 (102)	18 (457)	283	2.36	1.37	Sensor Pocket	128180A
4 (102)	24 (610)	377	3.15	1.82	Sensor Pocket	128240A
4 (102)	30 (762)	472	3.94	2.27	Sensor Pocket	128300A
4 (102)	36 (914)	566	4.72	2.73	Sensor Pocket	128360A
4 (102)	36 (914)	Insulator	NA	NA	—	128360B

*To complete the code number, please reference the *Build-a-Code* chart on page 174.

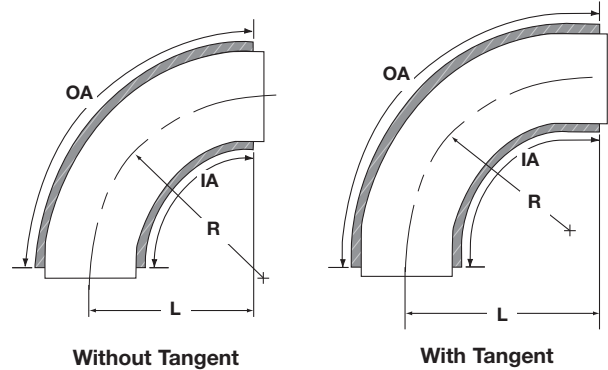
Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

90° Radius Elbow Heaters

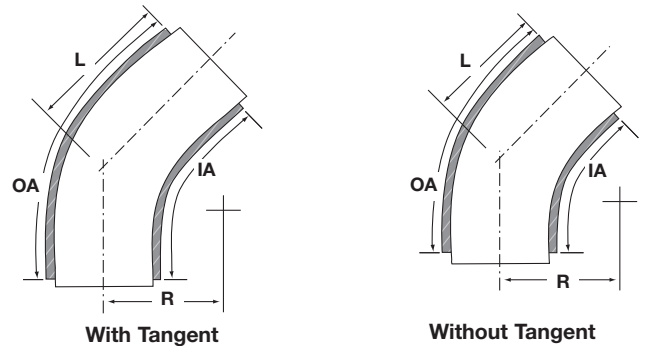
- 0.25 in. (6 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- With or without tangents
- Will fit both butt-weld and flanged style tubing elbows



Tube O.D. in. (mm)	Length "L" in. (mm)	Radius (R) in. (mm)	Watts	Outer Arc Length (OA)	Inside Arc Length (IA)	Amperes @120V	Amperes @208V	Base Code Number*
1.5 (38)	2.00 (51)	2.25 (57)	26	4.21	1.85	0.22	0.13	042050A
1.5 (38)	2.68 (68.1)	2.25 (57)	36	5.58	3.22	0.30	0.18	050055A
2.0 (51)	2.75 (70)	3.00 (76)	45	5.78	2.64	0.38	0.22	057066A
2.0 (51)	3.81 (96.8)	3.00 (76)	65	7.91	4.77	0.55	0.32	066079A
3.0 (76)	4.00 (102)	4.50 (114)	84	8.42	3.71	0.70	0.41	089097A
3.0 (76)	5.81 (147.6)	4.50 (114)	127	12.05	7.33	1.06	0.62	097125A
4.0 (102)	5.50 (140)	6.00 (152)	149	11.56	5.28	1.25	0.72	116128A
4.0 (102)	7.81 (198.4)	6.00 (152)	222	16.18	9.00	1.85	1.07	128166A

45° Radius Elbow Heaters

- 0.25 in. (6.4 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- With or without tangents
- Will fit both butt-weld and flanged style tubing elbows



Tube O.D. in. (mm)	Length "L" in. (mm)	Radius (R) in. (mm)	Watts	Outer Arc Length (OA)	Inside Arc Length (IA)	Amperes @120V	Amperes @208V	Base Code Number*
1.5 (38)	0.69 (17.5)	2.25 (57)	14	1.85	0.67	0.12	NA	018050A
1.5 (38)	1.38 (35.1)	2.25 (57)	23	3.23	2.04	0.20	0.12	032050A
2.0 (51)	1.00 (25)	3.00 (76)	23	2.64	1.07	0.20	0.12	026066A
2.0 (51)	2.06 (52.3)	3.00 (76)	44	4.77	3.20	0.37	0.22	047066A
3.0 (76)	1.37 (34.8)	4.50 (114)	43	3.71	1.35	0.36	0.21	042097A
3.0 (76)	3.18 (80.8)	4.50 (114)	85	7.33	4.97	0.71	0.41	078097A
4.0 (102)	2.00 (51)	6.00 (152)	75	5.28	2.14	0.63	0.37	057128A
4.0 (102)	4.31 (109.5)	6.00 (152)	148	9.90	6.76	1.24	0.72	104128A

*To complete the code number, please reference the *Build-a-Code* chart on page 174.

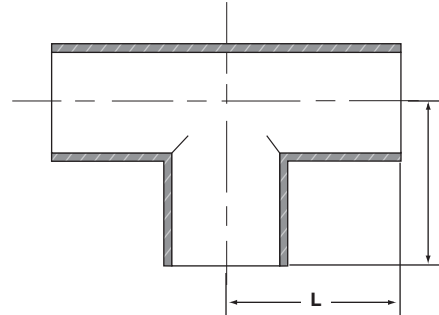
Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

Tee Section Heaters

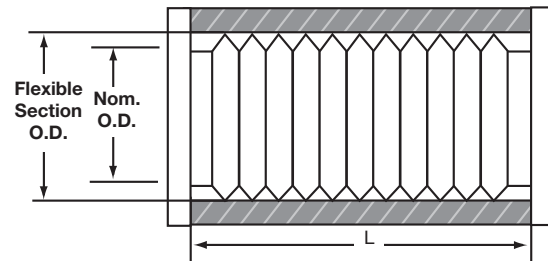
- 0.25 in. (6 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- Will fit both butt-weld and flanged style tee sections



Tube O.D. in. (mm)	Length "L" in. (mm)	Watts	Amperes @120V	Amperes @208V	Base Code Number*
1.5 (38)	2.00 (51)	38	0.32	0.19	047064A
2.0 (51)	2.75 (70)	69	0.58	0.34	062081A
3.0 (76)	3.00 (76)	89	0.75	0.43	095120A
4.0 (102)	3.63 (92)	140	1.17	0.69	125155A

Bellows Section Heaters

- 0.25 in. (6 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- Will fit both butt-weld and flanged style flexible sections



Tube O.D. in. (mm)	Bellows Section O.D. in. (mm)	Length "L" in. (mm)	Watts	Amperes @120V	Amperes @208V	Base Code Number*
1.5 (38)	1.92 (48.9)	3 (76)	26	0.22	0.13	030056A
1.5 (38)	1.92 (48.9)	3T (76T)	18	0.15	0.09	030056T
1.5 (38)	1.92 (48.9)	6 (152)	51	0.43	0.25	056060A
1.5 (38)	1.92 (48.9)	6T (152T)	44	0.37	0.21	056060T
2.0 (51)	2.47 (62.7)	3 (76)	34	0.29	0.17	030077A
2.0 (51)	2.47 (62.7)	3T (76T)	24	0.2	0.12	030077T
2.0 (51)	2.47 (62.7)	6 (152)	68	0.57	0.33	060077A
2.0 (51)	2.47 (62.7)	6T (152T)	59	0.49	0.28	060077T
3.0 (76)	3.77 (95.8)	3 (76)	44	0.37	0.22	030117A
3.0 (76)	3.77 (95.8)	3T (76T)	30	0.25	0.14	030117T
3.0 (76)	3.77 (95.8)	6 (152)	88	0.74	0.43	060117A
3.0 (76)	3.77 (95.8)	6T (152T)	74	0.62	0.36	060117T
3.0 (76)	3.77 (95.8)	12 (305)	175	1.46	0.85	117120A
4.0 (102)	4.75 (121)	3 (76)	56	0.47	0.27	030149A
4.0 (102)	4.75 (121)	3T (76T)	38	0.32	0.18	030149T
4.0 (102)	4.75 (121)	6 (152)	111	0.93	0.54	060149A
4.0 (102)	4.75 (121)	6T (152T)	94	0.78	0.45	060149T
4.0 (102)	4.75 (121)	12 (305)	222	1.85	1.07	120149A

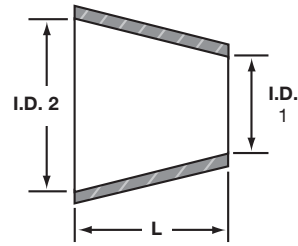
*To complete the code number, please reference the *Build-a-Code* chart on page 174.

Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

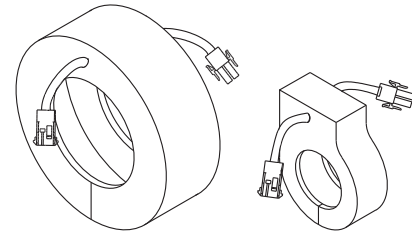
Reducers



Tube I.D. 2 to I.D. 1		Length "L"		Watts	Amperes @120V	Amperes @208V	Base Code Number*
in.	(mm)	in.	(mm)				
2 (51)	to 1.5 (38)	1.38	(35.1)	12	0.10	0.06	020062A
3 (76)	to 2.0 (51)	2.42	(61.5)	24	0.20	0.12	034090A
4 (102)	to 2.0 (51)	2.63	(66.8)	31	0.26	0.15	044103A
4 (102)	to 3.0 (76)	2.60	(66.0)	36	0.30	0.18	040121A

Flange Heaters

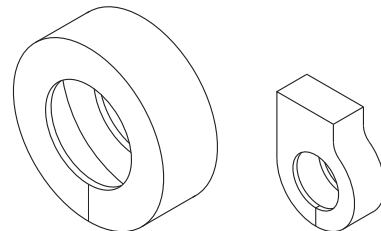
- 0.25 in. (6 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- For both KF screw flanges and ISO clamp flanges



Tube O.D. in.	Nominal Tube O.D. (mm)		Watts @120V	Amperes @120V	Amperes @ 208V	Base Code Number*
KF-40	1.5	(38)	10	0.09	NA	035040A
KF-50	2.0	(51)	15	0.13	0.07	045050A
ISO-80	3.0	(76)	70	0.59	0.34	020176A
ISO-100	4.0	(102)	82	0.69	0.40	020204A
CF 2½ in.	1.5	(38)	21	0.18	0.10	016089A

Flange Insulators

- 0.25 in. (6 mm) or 0.5 in. (13 mm) silicone rubber sponge insulation available
- For both KF screw flanges and ISO clamp flanges



Tube O.D. in.	Nominal Tube O.D. (mm)		Base Code Number*
KF-40	1.50	(38)	035040B
KF-50	2.00	(51)	045050B
ISO-80	3.00	(76)	020176B
ISO-100	4.00	(102)	020204B
CF 1½ in.	0.75	(19)	010044B
CF 2½ in.	1.50	(38)	016089B

*To complete the code number, please reference the *Build-a-Code* chart on page 174.

Flexible Heaters

Line Heating

Modular Pump Line Heaters (Continued)

Ordering Information

To order, complete the code number to the right with the information below:

XXXXXXX -

Base Code Number _____

Heater Voltage _____

CO = Insulator
C1 = 120V
C4 = 208V

Insulation _____

A = 0.25 in. (6 mm) insulation w/UL® 94-HB jacket
B = 0.5 in. (13 mm) insulation w/UL® 94V-0 jacket
C = 0.25 in. (6 mm) insulation w/UL® 94-HB jacket and ground grid
D = 0.5 in. (13 mm) insulation w/UL® 94V-0 jacket and ground grid

Connectors _____

0 = None
A = AMP Universal Mate-N-Lok® connector
B = AMP CPC connector

Sensors _____

0 = None
A = Thermal fuse 378°F (192°C)
B = Type J thermocouple
C = Type K thermocouple
D = Thermal fuse + Type J thermocouple
E = Thermal fuse + Type K thermocouple

Future Options _____

0 = None

Future Options _____

0 = None

Note: Not all options are available for every base code number.

Description	CE	SEMI S2-93	UL® Listing	NEC	VDE
0.25 in. (6 mm) insulation w/HOT marking	x	x	x		x
0.5 in. (13 mm) insulation	o	o	o		o
Ground grid	o	o	o	x	o
AMP Mate-N-Lok® connectors ①	x	x	x		x
AMP CPC connectors ②	o	o	o		o
Jacket w/UL® 94V-0 rating	o	o	o		o
Jacket w/UL® 94-HB rating	x	x	x		x
Thermal cut-off	o	x	x		o

x = Min. requirements
o = Optional features

① Male plug: AMP p/n 1-480698-0, w/sockets AMP p/n 350689-1.
Female cap: AMP p/n 1-480699-0, w/pins AMP p/n 350690-1.

② Plug: AMP p/n 206060-1, w/socket AMP p/n 66101-3.
Receptacle: AMP p/n 206153-1, w/pin AMP p/n 66099-3, w/ground pin p/n 164164-2 if ground grid option is chosen.