

Vacuum Technology
www.mksinst.com

Series 48 Heaters

HEATER JACKETS SIZES 1 1/2" TO 4"
(NW 40 TO NW 100)



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Series 48 Heaters

Series 48 heaters have been designed for safety, flexibility, power conservation, and advanced communications. The new design provides greater temperature control, improved thermal uniformity, increased performance, and further decreases system downtime. The heaters are UL listed and CE marked for thermal and electrical safety.

Series 48 heaters incorporate a new Integrated Temperature Controller, which provides improved thermal control versatility and functionality. The new control mechanism, along with optional modular display and communications upgrades, provide the user with the ability to adjust any of the controlling parameters in an easy and user-friendly manner.

Features and Benefits

New Control Module

- User adjustable temperature settings for advanced process control
- Communication and display modules provide greater temperature control versatility and functionality
- Re-settable high temperature safety limit device integrated into controller circuitry, eliminates the need for a thermal fuse
- User-friendly control module allows for easy modification of all controlling parameters
- Local heater digital display and control adjustment
- RS485 communications allows for remote display, control, and diagnostics of individual heater status for up to 256 heaters.
- PID and On/Off control options
- Tuneable no-arc relay greatly increases controller lifetime
- Programmable Low Temperature Alert / High Temperature Alert (LTA/HTA) integrated into controller circuitry
- Multiple LEDs display controller/heater operating and alert conditions and status

Improved Heater Design

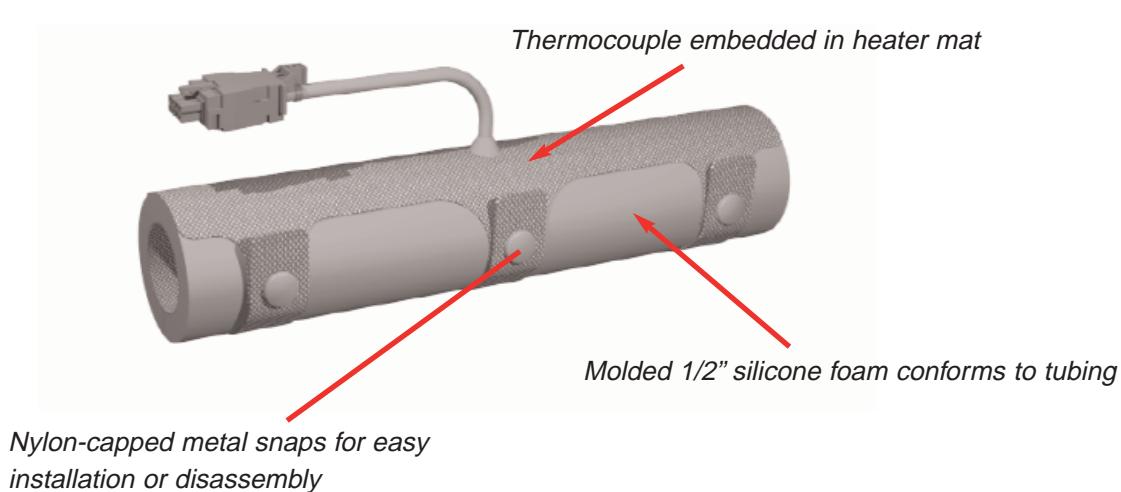
- Control components reside inside controller, away from heat source extending heater life
- Heater mats designed to achieve optimum performance and greater thermal uniformity
- Each heater can be operated with its own unique control parameters

Enhanced Safety

- External heater surfaces safe to touch
- UL listed and CE tested and marked for both electrical and thermal safety
- Optional Ground Fault Equipment Leakage Circuit Interrupter power cord eliminates shock hazard

Additional Features

- Computer software interface available for simplified heater control
- Custom temperatures and pre-sets available upon request
- Fast delivery of standard heaters
- Custom heaters available



Applications

Semiconductor Industry Applications

- Prevent solidification of ammonium chloride (NH_4Cl) in a silicon nitride LPCVD system
- Prevent solidification of aluminum chloride (AlCl_3) in an aluminum etching system
- Reduce solid buildup in other semiconductor processes, such as titanium nitride, tungsten, and TEOS CVD
- Maintain uniform temperature environments in downstream semiconductor and related processes and equipment
- Maintain gas temperature in gas delivery systems

Biopharmaceutical Industry Applications

- Prevent vapor condensation in sterile vent filters and piping systems
- Maintain or promote preferred material viscosities

Custom and R&D Applications

- Heaters for custom and R&D applications can be engineered to meet specific requirements.

Description

Series 48 heaters are designed to deliver adequate heat if the supplied voltage is less than nominal, and to more appropriately distribute that heat to promote a uniform thermal profile. Extensive design and testing have been performed to ensure optimum performance.

The heaters' molded shapes conform to the hardware, minimizing gaps and subsequent heat loss. Using a patented process, silicone foam insulation is bonded to the outside of a reinforced silicone heater mat, resulting in external temperatures that are safe for human contact and meet OSHA safety requirements.

Integrated Temperature Controller

Series 48 heaters feature an Integrated Temperature Controller that provides unsurpassed thermal control. The controller features two microprocessor controlled relays, a safety relay for over-temperature protection and a no-arc relay for power switching. Thermal sensing is achieved via heater-embedded thermocouple feedback. The high-limit safety circuitry eliminates the need for a thermal fuse, thereby eliminating the need for heater replacement due to a single over-temperature event. This significantly reduces downtime potential and the need to stock replacement heaters.



Base Controller

The Base Controller unit performs all of the controlling functions for its heater, including: temperature control, thermal safety, and operating status notification via three colored LEDs.

The Base Controller is required to operate any Series 48 heater.

Optional Display Module Controller Keys & Indicator Lights



Up Arrow Key
Increases the displayed value

Mode Key
Toggles the display between the set point and process temperature

Down Arrow Key
Decreases the displayed value

Alarm (flashing red)
Indicates process temperature is higher than the set point high limit alarm value

In Range (solid yellow)
Indicates process temperature is between the high alert set point and the low alert set point values

Output (green)
Indicates the process temperature is below the set point, the output is on, and the controller is supplying current to the heater

Optional Display & Communications Modules

The controller has three optional plug and play display and communications modules which provide a user-friendly interface for adjusting control parameters.

Display Module

The Display Module allows the user to *locally* adjust the operating parameters, including temperature set point, high/low temperature alerts, high limit (safety) set point, control mode (on-off/PID) and related parameters. It contains an alphanumeric LED display that displays the heater's current temperature and alert condition.



Display Module

Communications Module

Used in conjunction with the Series 48 software program, the Communications Module allows the user to *remotely* adjust the operating parameters and monitor heater operating status. The Communications Module has Modbus RTU Communications with RS485 interface.



Communications Module

Display & Communications Module

This is a fully functional combination of both the Display Module and the Communications Module. It allows the user to adjust the operating parameters both *locally* and *remotely*.



Display and Communications Module

Series 48 Software

Series 48 heater software is a remote monitoring, diagnostic, and control interface. It allows easy modification of any and all controlling parameters including, but not limited to: operating temperature, low temperature alert, high temperature alert, safety limit temperature, control type (on-off/PID), and PID parameters for up to 256 individual heater controllers. The software also includes data-logging capability, graphic output, and an auto-address function, allowing the user to analyze and optimize the performance of heated lines installed on a process system.

Series 48 heater software is available for download free of charge at www.mksinst.com/vtsw.html.

Software Features

- Adjusts control parameters on individual heaters from a remote location quickly and easily
- Data logging capability
- Monitors temperatures and provides graphical output

Software Requirements

- Windows compatible computer, running Windows 95, 98, 2000, NT or XP
- RS232 or RS485 serial port (RS232 to RS485 converter is available)
- Minimum 64 MB RAM
- Minimum 5 MB free hard drive space



Series 48 Software



Product Specifications

Heater Specifications

Pre-Set Temperature Set Points	150°C (302°F); or 105°C (221°F)
Exterior Range Temperature	Ambient to 85°C (185°F) (dependent on set point)
Interior Range Temperature	Ambient to 185°C (365°F)
Foam Thickness	0.5 in. (12.7 mm)
Materials	Molded silicone foam, fiberglass reinforced sili- cone, Teflon insulated wire
Connectors	Molex Mini-Fit Jr.
Weight Range	0.5 to 6.2 lb (0.73 to 2.8 kg)
Product Safety	UL®/C-UL Listed, CE, Semi S2

Controller Specifications

Enclosure	Black Plastic
Power Requirements	100-240VAC input
Power Consumption	0.3 W
Relay Contact Rating	SPDT, 2 A @ 50 VAC resistive, 1 A @ 30 VDC
Input/Output Wiring	1 Thermal switch line IN 2 Thermal switch line OUT 3 Normally closed 4 Common 5 Normally Open
Dimensions	
Base Unit	3.5" x 2.2" x 1.6" (88.9 x 55.9 x 40.6 mm)
w/ Mounting Bracket	3.5" x 2.2" x 1.9" (88.9 x 55.9 x 48.3 mm)
w/ Upgrade & Bracket	3.5" x 2.2" x 2.5" (88.9 x 55.9 x 63.5 mm)
Product Safety	UL®/C-UL Listed, CE, Semi S2

Ordering Information

Heaters

Before configuring the part number, first determine which heaters will be required to fit the geometry of the system piping (see pages 6 to 13). Series 48 heaters are designed to fit onto standard HPS components, but will often fit onto components from other manufacturers. Select heaters for straight sections, elbows, tees, reducers and hoses.

When fitting a heater, do not use a length that is too long for the fitting. Forcing the heater to compress to fit the component can cause damage to the heater. Instead, try a smaller heater or a combination of heaters. After covering as much of the vacuum line as possible with heaters, select insulators to eliminate cold spots at flanged joints, or gaps between heaters. Insulators can be trimmed to fit the gap.

Warning: Never trim a heater, only an insulator.

Temperature Set Points

After selecting the heaters, determine which temperature set point you require. Heaters can be ordered with two different set points — 105°C or 150°C — that are pre-set at the factory. If no temperature setpoint is specified, the default set point is 150°C.

Control Options

Once the heaters and temperature set points are selected, determine which temperature controller/module combination will best suit the process application:

- **Base Controller Only** (Control Option 0)
- **Controller with Display Module** (Control Option 1)
- **Controller with Communications Module** (Control Option 2)
- **Controller with Display & Communications Module** (Control Option 3)

Cable Forms

Cables are available in two different general form types, including "Standard Tee" and "Standard Terminator." A Tee cable (named for its "T" shape) is used for the first or any intermediate heater in a group of heaters on a single power supply. A Terminator cable is used on the last heater of a heater group from a single power supply, or the only heater on a power supply.

Cable Lengths

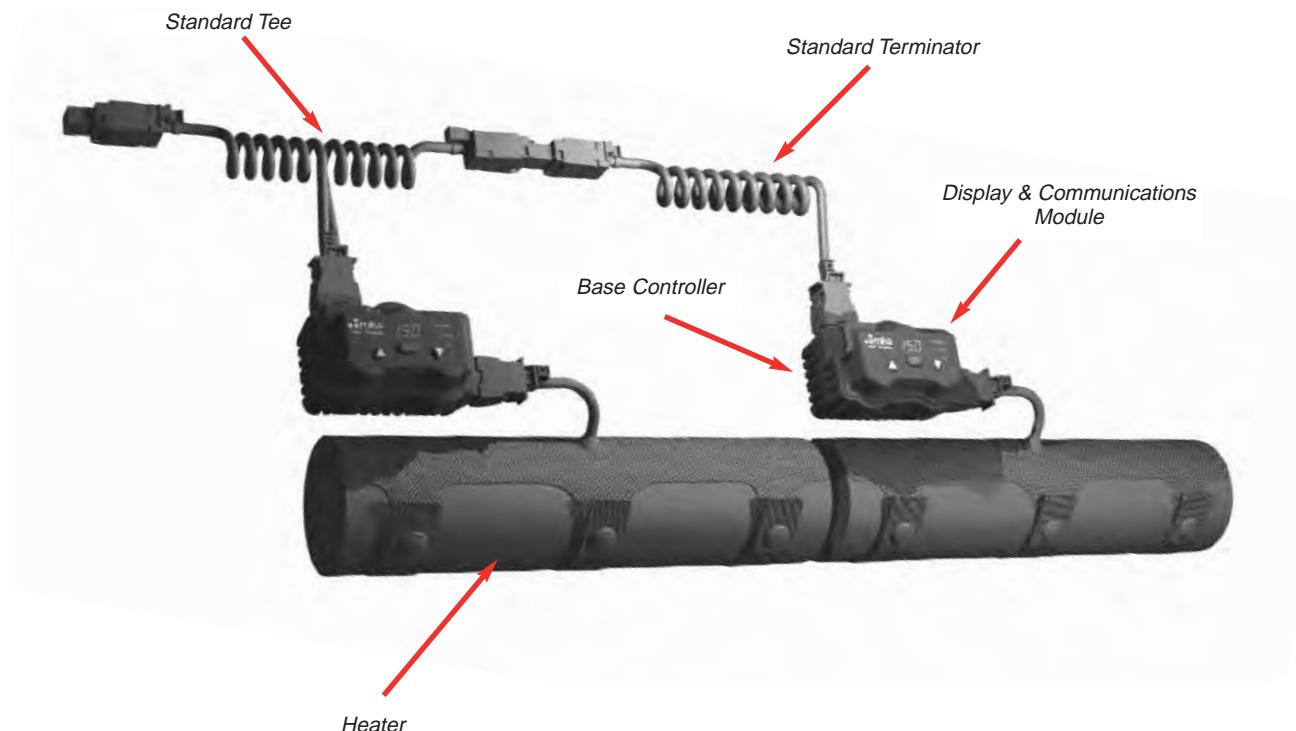
Cable lengths are available in two general lengths: Short and Long. Short cables are intended to be used on all heaters, except straight sections that are 13" or longer. Long cables are for use on straight section heaters that are 13" or longer.

Ordering Information (cont.)

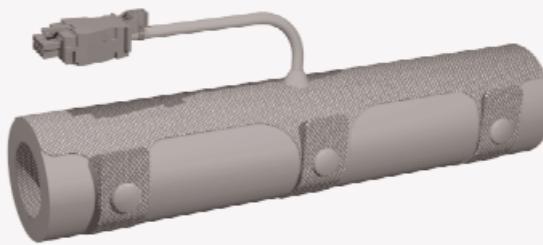
Series 48 Part Number Configurator

Series 48 Heater Part Number 48XX-XXXX	Controller -1	Temperature Setpoint XXX	Control Options -X	Cable Form -X	Cable Length X
4820-0102 (Example)	1	105 105°C 150 150°C (Default)	0 Base Controller (Fixed Setpoint) 1 Controller w/ Display Module 2 Controller w/ Communications Module 3 Controller w/ Display & Communications Module	1 Standard Tee 2 Standard Terminator	1 Short (For all heaters, except straight sections 13" and longer.) 2 Long (For straight sections 13" and longer only.)

Add the price of the base heater to the price of the options. Sample part number:
4820-0102-1105-2-11



Straight Section Heaters, 1.5" Diameter Tubing



120 VAC

Nominal Length in. (mm)	Amps at 120 VAC	Heater Part Number	Price
2" (51)	0.21	4815-0102	
3" (76)	0.28	4815-0103	
4" (102)	0.35	4815-0104	
5" (127)	0.40	4815-0105	
6" (152)	0.44	4815-0106	
7" (178)	0.52	4815-0107	
8" (203)	0.59	4815-0108	
9" (229)	0.67	4815-0109	
10" (254)	0.74	4815-0110	
11" (279)	0.82	4815-0111	
12" (305)	0.89	4815-0112	
13" (330)	0.97	4815-0113	
14" (356)	1.04	4815-0114	
15" (381)	1.12	4815-0115	
16" (406)	1.19	4815-0116	
17" (432)	1.27	4815-0117	
18" (457)	1.34	4815-0118	
19" (483)	1.42	4815-0119	
20" (508)	1.49	4815-0120	
21" (533)	1.56	4815-0121	
22" (559)	1.63	4815-0122	
23" (584)	1.71	4815-0123	
24" (610)	1.78	4815-0124	
30" (762)	2.23	4815-0130	
36" (914)	2.68	4815-0136	

240 VAC

Nominal Length in. (mm)	Amps at 240 VAC	Heater Part Number	Price
3" (76)	0.22	4815-0203	
4" (102)	0.18	4815-0204	
5" (127)	0.20	4815-0205	
6" (152)	0.22	4815-0206	
7" (178)	0.26	4815-0207	
8" (203)	0.30	4815-0208	
9" (229)	0.33	4815-0209	
10" (254)	0.37	4815-0210	
11" (279)	0.41	4815-0211	
12" (305)	0.45	4815-0212	
13" (330)	0.48	4815-0213	
14" (356)	0.52	4815-0214	
15" (381)	0.56	4815-0215	
16" (406)	0.60	4815-0216	
17" (432)	0.63	4815-0217	
18" (457)	0.67	4815-0218	
19" (483)	0.71	4815-0219	
20" (508)	0.75	4815-0220	
21" (533)	0.78	4815-0221	
22" (559)	0.82	4815-0222	
23" (584)	0.85	4815-0223	
24" (610)	0.89	4815-0224	
30" (762)	1.11	4815-0230	
36" (914)	1.34	4815-0236	



Straight Section Heaters, 2.0" Diameter Tubing



120 VAC

Nominal Length in. (mm)	Amps at 120 VAC	Heater Part Number	Price
2" (51)	0.26	4820-0102	
3" (76)	0.36	4820-0103	
4" (102)	0.43	4820-0104	
5" (127)	0.50	4820-0105	
6" (152)	0.55	4820-0106	
7" (178)	0.64	4820-0107	
8" (203)	0.73	4820-0108	
9" (229)	0.83	4820-0109	
10" (254)	0.93	4820-0110	
11" (279)	1.02	4820-0111	
12" (305)	1.11	4820-0112	
13" (330)	1.20	4820-0113	
14" (356)	1.29	4820-0114	
15" (381)	1.38	4820-0115	
16" (406)	1.48	4820-0116	
17" (432)	1.57	4820-0117	
18" (457)	1.66	4820-0118	
19" (483)	1.76	4820-0119	
20" (508)	1.85	4820-0120	
21" (533)	1.93	4820-0121	
22" (559)	2.03	4820-0122	
23" (584)	2.12	4820-0123	
24" (610)	2.22	4820-0124	
30" (762)	2.77	4820-0130	
36" (914)	3.33	4820-0136	

240 VAC

Nominal Length in. (mm)	Amps at 240 VAC	Heater Part Number	Price
2" (51)	0.25	4820-0202	
3" (76)	0.18	4820-0203	
4" (102)	0.22	4820-0204	
5" (127)	0.25	4820-0205	
6" (152)	0.28	4820-0206	
7" (178)	0.32	4820-0207	
8" (203)	0.37	4820-0208	
9" (229)	0.41	4820-0209	
10" (254)	0.46	4820-0210	
11" (279)	0.51	4820-0211	
12" (305)	0.55	4820-0212	
13" (330)	0.60	4820-0213	
14" (356)	0.65	4820-0214	
15" (381)	0.69	4820-0215	
16" (406)	0.74	4820-0216	
17" (432)	0.78	4820-0217	
18" (457)	0.83	4820-0218	
19" (483)	0.88	4820-0219	
20" (508)	0.93	4820-0220	
21" (533)	0.97	4820-0221	
22" (559)	1.01	4820-0222	
23" (584)	1.06	4820-0223	
24" (610)	1.11	4820-0224	
30" (762)	1.38	4820-0230	
36" (914)	1.66	4820-0236	



Straight Section Heaters, 3.0" Diameter Tubing



120 VAC

Nominal Length in. (mm)	Amps at 120 VAC	Heater Part Number	Price
2" (51)	0.36	4830-0102	
3" (76)	0.49	4830-0103	
4" (102)	0.60	4830-0104	
5" (127)	0.68	4830-0105	
6" (152)	0.76	4830-0106	
7" (178)	0.88	4830-0107	
8" (203)	1.01	4830-0108	
9" (229)	1.13	4830-0109	
10" (254)	1.27	4830-0110	
11" (279)	1.39	4830-0111	
12" (305)	1.52	4830-0112	
13" (330)	1.65	4830-0113	
14" (356)	1.78	4830-0114	
15" (381)	1.90	4830-0115	
16" (406)	2.03	4830-0116	
17" (432)	2.16	4830-0117	
18" (457)	2.28	4830-0118	
19" (483)	2.41	4830-0119	
20" (508)	2.53	4830-0120	
21" (533)	2.66	4830-0121	
22" (559)	2.78	4830-0122	
23" (584)	2.91	4830-0123	
24" (610)	3.04	4830-0124	
30" (762)	3.80	4830-0130	
36" (914)	4.57	4830-0136	

240 VAC

Nominal Length in. (mm)	Amps at 240 VAC	Heater Part Number	Price
2" (51)	0.18	4830-0202	
3" (76)	0.25	4830-0203	
4" (102)	0.30	4830-0204	
5" (127)	0.34	4830-0205	
6" (152)	0.38	4830-0206	
7" (178)	0.44	4830-0207	
8" (203)	0.50	4830-0208	
9" (229)	0.57	4830-0209	
10" (254)	0.63	4830-0210	
11" (279)	0.70	4830-0211	
12" (305)	0.76	4830-0212	
13" (330)	0.83	4830-0213	
14" (356)	0.89	4830-0214	
15" (381)	0.95	4830-0215	
16" (406)	1.01	4830-0216	
17" (432)	1.08	4830-0217	
18" (457)	1.14	4830-0218	
19" (483)	1.20	4830-0219	
20" (508)	1.27	4830-0220	
21" (533)	1.33	4830-0221	
22" (559)	1.39	4830-0222	
23" (584)	1.45	4830-0223	
24" (610)	1.52	4830-0224	
30" (762)	1.90	4830-0230	
36" (914)	2.28	4830-0236	



Straight Section Heaters, 4.0" Diameter Tubing



120 VAC

Nominal Length in. (mm)	Amps at 120 VAC	Heater Part Number	Price
2" (51)	0.45	4840-0102	
3" (76)	0.63	4840-0103	
4" (102)	0.76	4840-0104	
5" (127)	0.88	4840-0105	
6" (152)	0.97	4840-0106	
7" (178)	1.13	4840-0107	
8" (203)	1.29	4840-0108	
9" (229)	1.45	4840-0109	
10" (254)	1.62	4840-0110	
11" (279)	1.78	4840-0111	
12" (305)	1.94	4840-0112	
13" (330)	2.10	4840-0113	
14" (356)	2.26	4840-0114	
15" (381)	2.43	4840-0115	
16" (406)	2.58	4840-0116	
17" (432)	2.75	4840-0117	
18" (457)	2.91	4840-0118	
19" (483)	3.08	4840-0119	
20" (508)	3.23	4840-0120	
21" (533)	3.39	4840-0121	
22" (559)	3.55	4840-0122	
23" (584)	3.72	4840-0123	
24" (610)	3.88	4840-0124	
30" (762)	4.85	4840-0130	
36" (914)	5.83	4840-0136	

240 VAC

Nominal Length in. (mm)	Amps at 240 VAC	Heater Part Number	Price
2" (51)	0.23	4840-0202	
3" (76)	0.31	4840-0203	
4" (102)	0.38	4840-0204	
5" (127)	0.44	4840-0205	
6" (152)	0.48	4840-0206	
7" (178)	0.56	4840-0207	
8" (203)	0.65	4840-0208	
9" (229)	0.73	4840-0209	
10" (254)	0.81	4840-0210	
11" (279)	0.89	4840-0211	
12" (305)	0.97	4840-0212	
13" (330)	1.05	4840-0213	
14" (356)	1.13	4840-0214	
15" (381)	1.21	4840-0215	
16" (406)	1.29	4840-0216	
17" (432)	1.38	4840-0217	
18" (457)	1.45	4840-0218	
19" (483)	1.54	4840-0219	
20" (508)	1.62	4840-0220	
21" (533)	1.70	4840-0221	
22" (559)	1.78	4840-0222	
23" (584)	1.86	4840-0223	
24" (610)	1.94	4840-0224	
30" (762)	2.43	4840-0230	
36" (914)	2.91	4840-0236	



90° Elbow For ISO Flanged Elbows, Standard Modulus

in./(mm)

120 VAC						
Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	1.50 (38)	0.34	100314505	4815-0161	
2.0"	2.38 (60)	2.00 (51)	0.43	100314506	4820-0161	
3.0"	4.00 (102)	4.50 (114)	0.78	100764608	4830-0163	
4.0"	5.50 (140)	6.00 (152)	1.37	100764610	4840-0163	
240 VAC						
Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	1.50 (38)	0.22	100314505	4815-0261	
2.0"	2.38 (60)	2.00 (51)	0.22	100314506	4820-0261	
3.0"	4.00 (102)	4.50 (114)	0.39	100764608	4830-0263	
4.0"	5.50 (140)	6.00 (152)	0.68	100764610	4840-0263	

90° Elbow for ISO Flanged Elbows, Long Radius

in./(mm)

120 VAC						
Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	4.75 (121)	2.25 (57)	0.63	100314415	4815-0163	
2.0"	5.13 (130)	3.00 (76)	0.83	100314416	4820-0163	
240 VAC						
Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	4.75 (121)	2.25 (57)	0.32	100314415	4815-0263	
2.0"	5.13 (130)	3.00 (76)	0.42	100314416	4820-0263	

90° Elbow For Weld Elbows, Standard Modulus

in./(mm)

120 VAC						
Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	2.25 (57)	0.33	1002390150	4815-0166	
2.0"	3.00 (76)	3.00 (76)	0.48	1002390200	4820-0166	
3.0"	4.50 (114)	4.50 (114)	0.90	1002390300	4830-0166	
4.0"	6.00 (152)	6.00 (152)	1.53	1002390400	4840-0166	
240 VAC						
Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	2.25 (57)	0.25	1002390150	4815-0266	
2.0"	3.00 (76)	3.00 (76)	0.24	1002390200	4820-0266	
3.0"	4.50 (114)	4.50 (114)	0.45	1002390300	4830-0266	
4.0"	6.00 (152)	6.00 (152)	0.77	1002390400	4840-0266	

90° Elbow For Weld Elbows, with Tangents

in./(mm)

120 VAC						
Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	2.88 (73)	2.25 (57)	0.39	1002390WT150	4815-0167	
2.0"	4.00 (102)	3.00 (76)	0.63	1002390WT200	4820-0167	
3.0"	6.25 (159)	4.50 (114)	1.34	1002390WT300	4830-0167	
4.0"	8.25 (210)	6.00 (152)	2.26	1002390WT400	4840-0167	
240 VAC						
Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	2.88 (73)	2.25 (57)	0.20	1002390WT150	4815-0267	
2.0"	4.00 (102)	3.00 (76)	0.31	1002390WT200	4820-0267	
3.0"	6.25 (159)	4.50 (114)	0.67	1002390WT300	4830-0267	
4.0"	8.25 (210)	6.00 (152)	1.13	1002390WT400	4840-0267	

45° Elbow For ISO Flanged Elbows, Standard Modulus

in./(mm)

**120 VAC**

Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	1.37 (35)	2.25 (57)	0.27	100318705	4815-0162	
2.0"	1.62 (41)	3.00 (76)	0.37	100318706	4820-0162	
3.0"	2.93 (74)	4.50 (114)	0.73	100764408	4830-0162	
4.0"	4.05 (103)	6.00 (152)	1.28	100764410	4840-0162	

240 VAC

Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	1.37 (35)	2.25 (57)	N/A	100318705	9515-0824*	
2.0"	1.62 (41)	3.00 (76)	0.20	100318706	4820-0262	
3.0"	2.93 (74)	4.50 (114)	0.37	100764408	4830-0262	
4.0"	4.05 (103)	6.00 (152)	0.64	100764410	4840-0262	

45° Elbow For Weld Elbows, Standard Modulus

in./(mm)

**120 VAC**

Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	0.93 (24)	2.25 (57)	N/A	1002345150	9515-0806*	
2.0"	1.24 (31)	3.00 (76)	0.30	1002345200	4820-0164	
3.0"	1.86 (47)	4.50 (114)	0.56	1002345300	4830-0164	
4.0"	2.49 (63)	6.00 (152)	0.85	1002345400	4840-0164	

240 VAC

Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	0.93 (24)	2.25 (57)	N/A	1002345150	9515-0806*	
2.0"	1.24 (31)	3.00 (76)	0.27	1002345200	4820-0264	
3.0"	1.86 (47)	4.50 (114)	0.28	1002345300	4830-0264	
4.0"	2.49 (63)	6.00 (152)	0.43	1002345400	4840-0264	

45° Elbow For Weld Elbows, with Tangents

in./(mm)

**120 VAC**

Tube Size	Modulus	Bend Radius	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	1.56 (40)	2.25 (57)	0.29	1002345WT150	4815-0165	
2.0"	2.24 (57)	3.00 (76)	0.47	1002345WT200	4820-0165	
3.0"	3.61 (92)	4.50 (114)	0.89	1002345WT300	4830-0165	
4.0"	4.74 (120)	6.00 (152)	1.49	1002345WT400	4840-0165	

240 VAC

Tube Size	Modulus	Bend Radius	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	1.56 (40)	2.25 (57)	N/A	1002345WT150	9515-0869*	
2.0"	2.24 (57)	3.00 (76)	0.23	1002345WT200	4820-0265	
3.0"	3.61 (92)	4.50 (114)	0.45	1002345WT300	4830-0265	
4.0"	4.74 (120)	6.00 (152)	0.75	1002345WT400	4840-0265	

* Insulator Only. Do not configure with temperature controller.



Tee - For ISO Flanged Tees

in./(mm)

**120 VAC**

Tube Size	Modulus	Length	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	4.50 (114)	0.49	100314605	4815-0138	
2.0"	2.38 (60)	4.75 (121)	0.60	100314606	4820-0138	
3.0"	3.00 (76)	6.00 (152)	0.90	100761408	4830-0138	
4.0"	3.38 (86)	6.75 (171)	1.23	100761410	4840-0138	

240 VAC

Tube Size	Modulus	Length	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	2.25 (57)	4.50 (114)	0.25	100314605	4815-0238	
2.0"	2.38 (60)	4.75 (121)	0.30	100314606	4820-0238	
3.0"	3.00 (76)	6.00 (152)	0.45	100761408	4830-0238	
4.0"	3.38 (86)	6.75 (171)	0.62	100761410	4840-0238	

Tee - For Weld Tees

in./(mm)

**120 VAC**

Tube Size	Modulus	Length	Amps at 120 VAC	For Use With	Heater Part Number	Price
1.5"	2.19 (56)	4.38 (111)	0.48	10023T150	4815-0139	
2.0"	2.94 (75)	5.88 (149)	0.70	10023T200	4820-0139	
3.0"	3.19 (81)	6.38 (162)	0.98	10023T300	4830-0139	
4.0"	3.81 (97)	7.63 (194)	1.44	10023T400	4840-0139	

240 VAC

Tube Size	Modulus	Length	Amps at 240 VAC	For Use With	Heater Part Number	Price
1.5"	2.19 (56)	4.38 (111)	0.24	10023T150	4815-0239	
2.0"	2.94 (75)	5.88 (149)	0.35	10023T200	4820-0239	
3.0"	3.19 (81)	6.38 (162)	0.49	10023T300	4830-0239	
4.0"	3.81 (97)	7.63 (194)	0.72	10023T400	4840-0239	

Bellows - For ISO Flanged Bellows

in./(mm)

**120 VAC**

Tube Size	Length	Bellows Diameter	Heater O.D.	Amps at 120V	For Use With	Heater Part Number	Price
1.5"	2.81 (71)	1.84 (47)	3.00 (76)	0.19	100314915	4815-0169	
2.0"	2.69 (68)	2.43 (62)	3.50 (89)	0.23	100314916	4820-0169	
3.0"	3.56 (90)	3.83 (97)	5.00 (127)	0.43	100763508	4830-0169	
4.0"	3.56 (90)	4.70 (119)	6.00 (152)	0.48	100763510	4840-0169	

240 VAC

Tube Size	Length	Bellows Diameter	Heater O.D.	Amps at 240V	For Use With	Heater Part Number	Price
1.5"	2.81 (71)	1.84 (47)	3.00 (76)	0.19	100314915	4815-0269	
2.0"	2.69 (68)	2.43 (62)	3.50 (89)	0.15	100314916	4820-0269	
3.0"	3.56 (90)	3.83 (97)	5.00 (127)	0.21	100763508	4830-0269	
4.0"	3.56 (90)	4.70 (119)	6.00 (152)	0.24	100763510	4840-0269	

Reducer - For ISO Flanged Reducers

in./(mm)



120 VAC							
Tube Size (in.)	Length	Large End Tangent	Small End Tangent	Amps at 120V	For Use With	Heater Part Number	Price
3.0 x 1.5	3.59 (91)	0.06 (2)	0.91 (23)	0.35	100765016	4830-0143	
3.0 x 2.0	3.55 (90)	0.20 (5)	0.93 (24)	0.36	100765008	4830-0147	
4.0 x 2.0	3.60 (91)	0.05 (1)	0.93 (24)	0.46	100765018	4840-0143	
4.0 x 3.0	2.73 (69)	0.05 (1)	0.05 (1)	0.51	100764908	4840-0147	

240 VAC							
Tube Size (in.)	Length	Large End Tangent	Small End Tangent	Amps at 240V	For Use With	Heater Part Number	Price
3.0 x 1.5	3.59 (91)	0.06 (2)	0.91 (23)	0.21	100765016	4830-0243	
3.0 x 2.0	3.55 (90)	0.20 (5)	0.93 (24)	0.20	100765008	4830-0247	
4.0 x 2.0	3.60 (91)	0.05 (1)	0.93 (24)	0.23	100765018	4840-0243	
4.0 x 3.0	2.73 (69)	0.05 (1)	0.05 (1)	0.25	100764908	4840-0247	

Reducer - For Weld Reducers

in./(mm)



120 VAC							
Tube Size (in.)	Length	Large End Tangent	Small End Tangent	Amps at 120V	For Use With	Heater Part Number	Price
2.0 x 1.5	2.38 (60)	0.50 (13)	0.50 (13)	0.25	10023200CR150	4820-0145	
3.0 x 1.5	3.63 (92)	0.50 (13)	0.50 (13)	0.35	10023300CR150	4830-0141	
3.0 x 2.0	3.63 (92)	0.70 (18)	0.50 (13)	0.45	10023300CR200	4830-0145	
4.0 x 2.0	3.63 (92)	0.50 (13)	0.50 (13)	0.46	10023400CR200	4840-0141	
4.0 x 3.0	3.63 (92)	0.50 (13)	0.50 (13)	0.51	10023400CR300	4840-0145	

240 VAC							
Tube Size (in.)	Length	Large End Tangent	Small End Tangent	Amps at 240V	For Use With	Heater Part Number	Price
2.0 x 1.5	2.38 (60)	0.50 (13)	0.50 (13)	N/A	10023200CR150	9520-0800*	
3.0 x 1.5	3.63 (92)	0.50 (13)	0.50 (13)	0.21	10023300CR150	4830-0241	
3.0 x 2.0	3.63 (92)	0.70 (18)	0.50 (13)	0.23	10023300CR200	4830-0245	
4.0 x 2.0	3.63 (92)	0.50 (13)	0.50 (13)	0.23	10023400CR200	4840-0241	
4.0 x 3.0	3.63 (92)	0.50 (13)	0.50 (13)	0.25	10023400CR300	4840-0245	

Hose - For ISO-KF Flanged Thin Wall Hose

in./(mm)



120 VAC							
Tube Size (in.)	Length	Bellows Diameter	Heater O.D.	Amps at 120V	For Use With	Heater Part Number	Price
1.5"	8.69 (221)	1.94 (49)	3.00 (76)	0.63	100317415	4815-0177	
2.0"	8.56 (217)	2.47 (63)	3.50 (89)	0.77	100317416	4820-0177	

240 VAC							
Tube Size (in.)	Length	Bellows Diameter	Heater O.D.	Amps at 240V	For Use With	Heater Part Number	Price
1.5"	8.69 (221)	1.94 (49)	3.00 (76)	0.32	100317415	4815-0277	
2.0"	8.56 (217)	2.47 (63)	3.50 (89)	0.38	100317416	4820-0277	

Hose - For ISO-KF Flanged Thick Wall Hose

in./(mm)



120 VAC							
Tube Size (in.)	Length	Bellows Diameter	Heater O.D.	Amps at 120V	For Use With	Heater Part Number	Price
1.5"	8.69 (221)	2.13 (54)	3.50 (89)	0.60	100315905	4815-0179	
2.0"	8.56 (217)	2.58 (66)	4.00 (102)	0.67	100315906	4820-0179	

240 VAC							
Tube Size (in.)	Length	Bellows Diameter	Heater O.D.	Amps at 240V	For Use With	Heater Part Number	Price
1.5"	8.69 (221)	2.13 (54)	3.50 (89)	0.30	100315905	4815-0279	
2.0"	8.56 (217)	2.58 (66)	4.00 (102)	0.33	100315906	4820-0279	

* Insulator Only. Do not configure with temperature controller.



Flange Insulators - Standard, fits most clamps

in. / (mm)

	Flange Size NW	Hole 1 I.D.	Hole 2 I.D.	O.D.	For Use With	Heater Part Number	Price
	40	2.50 (64)	2.50 (64)	6.20 (157)	HPS ISO-KF Clamps	4515-0016	
	40	2.50 (64)	3.00 (76)	6.20 (157)	HPS ISO-KF Clamps	4515-0017	
	50	3.00 (76)	3.00 (76)	7.78 (198)	HPS ISO-KF Clamps	4520-0016	
	50	3.00 (76)	4.00 (102)	7.78 (198)	HPS ISO-KF Clamps	4520-0017	
	80	4.00 (102)	4.00 (102)	6.68 (170)	HPS Double Claw Clamp 100761106	4530-0016	
	80	4.00 (102)	5.00 (127)	6.68 (170)	HPS Double Claw Clamp 100761106	4530-0017	
	100	5.00 (127)	5.00 (127)	7.42 (188)	HPS Double Claw Clamp 100761106	4540-0016	
	100	5.00 (127)	6.00 (152)	7.42 (188)	HPS Double Claw Clamp 100761106	4540-0017	

Flange Insulators - ISO-KF Flanges, on Short Radius Elbows

in. / (mm)

	Flange Size NW	Hole 1 I.D.	Hole 2 I.D.	O.D.	For Use With (will only work with HPS clamps)	Heater Part Number	Price
	40	2.50 (64)	2.50 (64)	4.00 (102)	100314505 & 100312905	4515-0036	
	50	3.00 (76)	3.00 (76)	4.75 (121)	100314506 & 100312906	4520-0036	

Flange Insulators - ISO-KF Flanges, Compact

in. / (mm)

	Flange Size NW	Hole 1 I.D.	Hole 2 I.D.	O.D.	For Use With (will only work with HPS clamps)	Part Number	Price
	40	2.50 (64)	2.50 (64)	4.20 (107)	HPS Wing Nut Clamp 100312905	9515-0269	
	40	2.50 (64)	3.00 (76)	4.20 (107)	HPS Wing Nut Clamp 100312905	9515-0270	
	40	2.50 (64)	3.50 (89)	4.20 (107)	HPS Wing Nut Clamp 100312905	9515-0280	
	50	3.00 (76)	3.00 (76)	5.16 (131)	HPS Wing Nut Clamp 100312906	9520-0247	
	50	3.00 (76)	3.50 (89)	5.16 (131)	HPS Wing Nut Clamp 100312906	9520-0285	
	50	3.00 (76)	4.00 (102)	5.16 (131)	HPS Wing Nut Clamp 100312906	9520-0248	

Tube Insulators - Foam Only

in. / (mm)

Tube Size	Length	Use	Part Number	Price
Trim and use to fill straight gaps on line. Attaching straps must be ordered separately.	1.5" 2.0" 3.0" 4.0"	12.00 (305) 12.00 (305) 12.00 (305) 12.00 (305)	Insulating gaps on 1.5 inch tube systems Insulating gaps on 2.0 inch tube systems Insulating gaps on 3.0 inch tube systems Insulating gaps on 4.0 inch tube systems	4515-0000 4520-0000 4530-0000 4540-0000

Tube Insulators - Foam with Straps

in. / (mm)

Tube Size	Length	Use	Part Number	Price
Trim and use to fill straight gaps on line.	1.5" 2.0" 3.0" 4.0"	1.00 (25) 1.00 (25) 1.00 (25) 1.00 (25)	Insulating gaps on 1.5 inch tube systems Insulating gaps on 2.0 inch tube systems Insulating gaps on 3.0 inch tube systems Insulating gaps on 4.0 inch tube systems	4515-0001 4520-0001 4530-0001 4540-0001

Straps with Snaps

in. / (mm)

Tube Size	Quantity	For Use With	Part Number	Price
For installing foam only tube insulators.	1.5" 2.0" 3.0" 4.0"	10 10 10 10	4515-0000 4520-0000 4530-0000 4540-0000	4515-SNAP 4520-SNAP 4530-SNAP 4540-SNAP



Spare Parts, Cables & Accessories

Base Controller, Display & Communications Modules

	Description	Part Number	Price
	Base Controller	4800-1150	
	Display Module	4800-0001	
	Communications Module	4800-0002	
	Display & Communications Module	4800-0003	

Power Cables

Description	Part Number	Price
Coiled Tee Cable, Short	4800-0011	
Coiled Tee Cable, Long	4800-0012	
Coiled Terminator Cable, Short	4800-0021	
Coiled Terminator Cable, Long	4800-0022	
High temperature cable ties (package of 12)	100014821	
Data cable, 14"	100014853	
Data cable, 26"	100014854	
Data cable, 38"	100014855	
Data cable, 50"	100014856	
RS232 to RS485 Converter	100014850	
Power cable, 6 ft. (1.83 m), 120 VAC	48PWRCORD01	
Power cable, 12 ft. (3.66 m), 120 VAC	48PWRCORD03	
Power cable, 120 VAC, with ground fault leakage circuit interrupter, 6 ft. (1.83 m)	48PWRCORD04	
Power cable, 120 VAC, with ground fault leakage circuit interrupter, 12 ft. (3.66 m)	48PWRCORD06	
Power cable, 240 VAC, with ground fault leakage circuit interrupter, 6 ft. (1.83 m)	48PWRCORD11	
The power cables are not included with heaters and must be ordered separately. Do not exceed 12 amps draw per power cord.		

Accessories

Description	Part Number	Price
Double claw clamp, grounding, ISO-Universal NW 80 and NW 100	100007322	
Spare fuse, 12 amps, (quantity of 1)	100006985	
Kit, LTA lead, with male & female connector & 10 ft. of wire	100008680	
Kit, LTA jumper, with male & female connector & 6 in. of wire	100008683	
Low Temperature Alert Monitor, 120V	100010832	
Low Temperature Alert Monitor, 240V	100010925	



Bulletin 02/08 - Series 48 Heaters
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