

SH Series

Inline Heater for Solvent or Gas

Installation and Operation Manual

This instruction manual explains the basic operation of the Process Technology inline solvent or gas heater. We recommend reading this manual carefully prior to operating the heater to help ensure proper use of the equipment . Please supply the model and serial numbers when ordering spare parts or when receiving technical assistance.



www.processtechnology.com

7010 Lindsay Dr., Mentor, OH 44060 Phone: 440-974-1300 Fax: 440-974-9561 USA/CN: 800-621-1998


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Introduction:

Process Technology's **SH** In-Line Heater is designed to provide energy-efficient, safe heating of solvents and non-flammable gasses (such as nitrogen). Wetted surfaces of the heater are constructed of chemically milled (etched) 316 stainless steel. The heater is a compact, completely welded, insulated, pressure resistant vessel. It is designed for use in either Single Pass or Multi-Pass Flow applications.

The **SH** In-Line Heater can withstand operation at a variety of temperature and pressure conditions. The maximum operating condition for the **SH** In-Line Heater is 200°C at 400 PSI.

	<p>Safe operation of the equipment requires that each of the temperature sensors be wired properly into a customer supplied control system, in accordance with local regulations, where applicable. Refer to pages 8 and 9 for additional information. Failure to use the supplied temperature sensors for their intended purposes may void all or part of the equipment warranty. Consult factory for technical assistance.</p>
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The standard SH In-Line Heater consists of:

- * *316 stainless steel fluid path*
- * *304 stainless steel, insulated housing*
- * *Two J- type thermocouple over-temperature sensors*
- * *Bi-metallic, re-settable temperature fuse*

Note: The SH heater does not include conduit or conduit fittings.

Optional Equipment may include:

- * *E or K-type thermocouples*
- * *Custom inlet and outlet connections*

If the Chamber Heater is purchased as part of a system, the following equipment may be included.

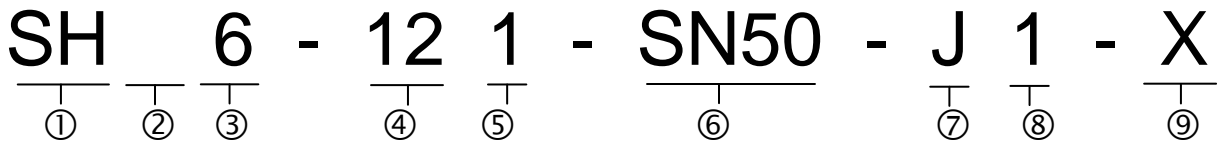
- * *Process Controller*
- * *Proper fusing and electrical disconnect provisions*

Note: The process controller is required for safe operation, and must be customer-supplied if not purchased from Process Technology.

Model Number Explanation:

Provided below is an example of a typical model number along with an explanation of each part. This key will help you understand your model number.

Model number example:



- ① **Heater Series Type.** The model number will always begin with the series type of your heater.
- ② **Heater Revision Level.** If the model number contains a letter here, it represents the revision level of the heater.
- ③ **Heater Wattage.** The first Number in the model number will always be the wattage of your heater. The table provided below identifies the standard available wattage ratings of the SH Series Heater.

Heater Model Number	Heater Wattage (W)
2	2,000
3	3,000
4	4,000
6	6,000
9	9,000
12	12,000
18	18,000

- ④ **Heater Voltage.** The next set of up to (2) characters following the heater Wattage will describe the rated Voltage of the heater.

Heater Model Number	Rated Voltage (V)	Heater Model Number	Rated Voltage (V)
1	208	7	440
2	240	8	575
3	380	9	220
4	400	10	200
5	415	12	120
6	480	14	600

Model Number Explanation (continued):

SH
6
-
12
1
-
SN50
-
J
1
-
X

①
②
③
④
⑤
⑥
⑦
⑧
⑨

- ⑤ **Voltage Supply Phase.** This character indicates if the required voltage supply is to be single phase or 3 phase.

Heater Model Number	Required Phase
1	Single phase
3	Three phase

- ⑥ **Process Inlet/Outlet Plumbing Connections.**
 The characters used to describe the plumbing connections signify the type of connection and its size. The heater inlet and outlet plumbing connections are the same type and size. Please refer to the table below to see the specific plumbing connections provided with the heater:

Heater Model Number	Plumbing Connection Type	Plumbing Connection Size: mm (in)
SN50	tube stub	12mm (1/2-inch)
SN75	tube stub	19mm (3/4-inch)
V50	Swagelok VCR connection	12mm (1/2-inch)
V75	Swagelok VCR connection	19mm (3/4-inch)

- ⑦ **Heater Over-Temperature Sensor Type.** Three heater over-temperature sensor types are available for the Process Technology SH Series Heater. Please refer to the table below for a brief listing of the available options.

Heater Model Number	Over-temperature Sensor Description
J	Type "J" Thermocouple
K	Type "K" Thermocouple
E	Type "E" Thermocouple

Model Number Explanation (continued):

SH
6
-
12
1
-
SN50
-
J
1
-
X

①
②
③
④
⑤
⑥
⑦
⑧
⑨


- ⑧ **Thermal Cutoff (TCO) Type.** There are three temperature options available with the Process Technology SH Series heater. Please refer to the table below for a brief listing of the available options.

Heater Model Number	Description
1	Low temp range - for applications between 50-90 °C
2	Medium temp range - for applications between 90-125 °C
3	High temp range - for applications between 125-200 °C

- ⑨ **Options.** Additional options available with the SH heater are listed at the end of the model number. Please refer to the table below for a brief listing of the available options.

Heater Model Number	Description
Blank	No Additional Options
#### (4 digit number)	Mounted in Tytan enclosure with controls


Pre-Installation:

	<ol style="list-style-type: none">1) NEVER exceed recommended temperature and pressure ratings.2) Turn power off at the main disconnect before performing any service.3) Lock and Tag the disconnect to prevent the equipment from accidentally being energized during servicing.4) Read all instructions carefully and understand equipment before operating. Consult factory for assistance if needed.
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Note: Before installation, carefully read this entire section.

Facility Requirements:

Note: This SH Heater is suitable for use in Class I, Division 2, Groups A-D.

	<p>Explosion Hazard – Substitution of Components may Impair Suitability for Class I, Division 2.</p>
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Before installing the **SH** In-Line Heater, confirm each of the following:

- 1) Space: The **SH** In-Line Heater chamber is designed to be mounted vertically or horizontally using the supplied mounting brackets.
- 2) Mounting: The **SH** In-Line Heater is supplied with mounting brackets. Ensure that the mounting location will adequately support the weight of the chamber, its supporting hardware and plumbing, and the fluid in the system. When mounted vertically the process outlet must be above the process inlet.
- 3) Inlet and Outlet Plumbing: The standard **SH** In-Line Heater is supplied with ½ inch stainless steel tube connections. Refer to Model Number Explanation on page 4 for the specific inlet/outlet connections supplied with the heater.
- 4) Electrical: Verify that the incoming power line is rated for the required current draw and is fused correctly. Refer to Model Number Explanation on pages 3 and 4 for power requirements of the unit delivered.

Current Draw And Recommended Power Supply Fusing:

Process Technology recommends the **SH** In-Line Heater be wired per NEC guidelines, latest edition, and according to any additional applicable standards for your installation.

Installation:

Uncrating And Inspection:

- 1) The **SH** In-Line Heater may have been shipped in a horizontal or vertical position.
- 2) Remove the heater chamber from its shipping container.
- 3) Remove box containing all support equipment: interconnect cables and tubing, and manual.
- 4) Remove any protective packaging material and discard.
- 5) Inspect unit for any apparent physical damage.
- 6) Check component list for all parts.

Component Identification:

The following items should be included:

- 1) Heater Chamber Assembly: Consists of 316 stainless steel fluid path with replaceable resistive heating elements enclosed in an insulated 304 stainless steel chamber.
- 2) Mounting Hardware: Mounting brackets are included and attach to the top and bottom of the heater chamber.

Mounting the Heater Chamber:

The **SH** In-Line Heater requires mounting to a physically capable structure. Mounting brackets are supplied. Specific heating chamber dimensions are shown on the dimensional drawing in the Appendix.

Process Connections:

- 1) Remove the protective plastic caps from inlet and outlet connections of the heater chamber assembly.
- 2) Connect appropriate fittings to the Inlet and Outlet of the heater chamber assembly. Refer to Model Number Explanation on page 4 for the specific inlet/outlet connections supplied with the heater.

Electrical Connections:

Main Power:

The **SH** In-Line Heaters are designed to operate on a variety of voltages and phases. Conduit and all ancillary electrical connection requirements are to be supplied by end user. All electrical connections and safety devices must comply with local electrical code guidelines. Refer to Model Number Explanation on pages 3 and 4 for the voltage and phase of the unit shipped.

- 1) Fuse the incoming power supply lines for the rated amperage using an approved electrical disconnect. Process Technology recommends that the electrical disconnect have the following minimum specifications:
 - a) Appropriate voltage and amperage ratings for the specific heating system. Verify that all fused electrical disconnects meet jurisdictional requirements.
 - b) For safety of service and maintenance personnel, this electrical disconnect must be located within sight of the equipment.

- 2) Ensure that all services are off before making electrical and liquid connections.



Use only approved and properly rated wire, conduit and connectors.

- 3) Connect heater leads to an electrical disconnect device in the customer supplied controller. This electrical disconnect must have the proper electrical rating necessary for the equipment. Tighten wire connections to appropriate torque setting, indicated on the electrical component.
- 4) Connect the green ground lead to the proper electrical earth ground.



Check all connections before applying power.

Temperature Sensors and over-temperature control:

The **SH** In-Line Heater chamber is equipped with redundant temperature monitoring capabilities to better ensure safe temperature levels. These sensors must be installed into a customer-supplied control package to protect the equipment from accidental damage and to ensure operator safety. Refer to Model Number Explanation on pages 4 and 5 for the specific temperature sensors supplied with the heater.

Note: Failure to use the supplied sensors for their intended purposes may void all or part of the equipment warranty. Consult Process Technology for technical assistance.

Process Fluid Control Sensor (only included with temperature control system):

The Process Control Temperature Sensor measures the temperature of the process fluid exiting the heater chamber. This sensor is intended to be used as the primary control input for the process temperature controller.



It is recommended that this sensor be used as the primary input for process control. However, in the event an external sensor is used to control the heater, locate the sensor as close to the process fluid outlet as possible. Ensure proper function of the heater's over-temperature sensors.


The secondary Process Temperature Sensor (if included) may be used for over-temperature control of the process fluid.

Element Over-Temperature Sensors:

The Element Over-Temperature measures the operating temperature of the heating element. Refer to Model Number Explanation on page 4 for the specific sensor included with the heater. Activation of the element over-temperature sensor must be wired to disable the heater and require manual reset to re-enable heating.

Element TCO (Thermal Cutoff):

The TCO must be connected to interrupt the operation of the control circuit if it is activated by element over-temperature. Refer to Model Number Explanation on page 5 for the specific sensor included with the heater. Activation of the over-temperature protection should require manual reset to enable heating.


	<p>Do not connect the TCO in series with the heating element/main load. The TCO is designed to be wired into the heater's control circuit, connected in series with the coil of the magnetic contactor for the main load.</p>
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	<p>Do not attempt to replace the thermal cut off device. Contact Process Technology for assistance.</p>
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Start Up Procedures:

- 1) Initiate process flow.
- 2) Energize heater control and ensure proper setting of control and over-temperature setpoints.
- 3) Engage control to energize heater.

Shut-Down Procedure:

	<p>The heater unit may contain residual process fluid. This residual should be handled with the same care and precautions as any process chemical.</p>
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- 1) Turn off heater control. Maintain process fluid flow.
- 2) Allow heater to cool to within near ambient inlet fluid temperature before stopping flow.

WARRANTY:

All PROCESS TECHNOLOGY equipment, heaters and controls have been carefully inspected before shipping and are warranted to be free from defects in workmanship and materials for a period of one year from date of purchase on a pro-rated basis. At its option, PROCESS TECHNOLOGY will repair or replace any defects that are exhibited under proper and normal use. PROCESS TECHNOLOGY disclaims any responsibility for misuse, misapplication, negligence or improper installation of equipment, tempering or other operating conditions that are beyond its control (such as excessively high or low purge gas supply pressure). PROCESS TECHNOLOGY makes no warranty or representation regarding the fitness for use or the application of its products by the customer.

All products and components not manufactured by PROCESS TECHNOLOGY will carry the original manufacturer's warranty, copies of which are available upon request. PROCESS TECHNOLOGY makes no warranty or representation, expressed or implied, with respect to the products not manufactured by PROCESS TECHNOLOGY.

Products must be installed and maintained in accordance with PROCESS TECHNOLOGY instructions.

PROCESS TECHNOLOGY is not liable for labor costs incurred in removal, reinstallation, or unauthorized repair of the product or for damage of any type including incidental or consequential damage.

PROCESS TECHNOLOGY neither assumes nor authorizes any representative of PROCESS TECHNOLOGY or any other person to assume for it any other liabilities in connection with the sale of the products. This warranty may not be verbally changed or modified by any representative of PROCESS TECHNOLOGY.

Shipping Damages:

Claims against freight carriers for damage in transit must be filed by the customer at the time of delivery or as soon as possible.

Returns:

No product shall be returned to PROCESS TECHNOLOGY without first obtaining a return material authorization (RMA) number from a PROCESS TECHNOLOGY representative. All returns must be freight prepaid. Freight collect or shipments without authorization will be refused.

Information:

PROCESS TECHNOLOGY will endeavor to furnish such advice as it may be able to supply with reference to the use by buyer of any material purchased, but PROCESS TECHNOLOGY makes no guarantees and assumes no obligation or liability for advice given verbally or in print or the results obtained. Buyer assumes all risk and liability that may result from the use of any material, whether used by itself or in combination with other products. No suggestion for product use shall be construed as a recommendation for its use in infringement on any existing patent.

Conflict Between Documents:

Acceptance of this offer is expressly conditioned upon agreement to all terms and conditions contained herein. In the event of a conflict between the terms and conditions of purchaser's purchase order, and PROCESS TECHNOLOGY's terms and conditions, proposal or offer, the latter shall govern.