



405 E. Santa Clara St., Arcadia, CA 91006-7218
O: (626) 599-8566 • F: (626) 599-9567

**HEATEFLEX
CORPORATION
SX-36-3V-P510
STAINLESS STEEL HEATER
INSTRUCTION MANUAL**



405 E. Santa Clara St., Arcadia, CA 91006-7218
O: (626) 599-8566 • F: (626) 599-9567



MODEL: SX-36-3V-P510

SERIAL NO.: USA-SX0517-1

INDEX

Section I – SX HEATER INSTRUCTION MANUAL

- Table of Contents
- Introduction
- Description
- Equipment Specifications
- Environmental Specifications
- Basic Safety Precautions
- Installation Procedures
- Operating Instructions
- Quality Control Sheet
- Suggested Spare Parts List
- Warranty

Section II – SX HEATER DRAWINGS

- Heater Module Section
- Electrical Component Layout
- Electrical Schematic Diagram

Section III - CONTROLLER MANUALS

- Microprocessor-Based Temperature



MODEL: SX-36-3V-P510

SERIAL NO.: USA-SX0517-1

TABLE OF CONTENTS

SHIPPING INSTRUCTIONS	5
RECEIVING INSPECTION PROCEDURE.....	5
INTRODUCTION.....	6
DESCRIPTION.....	6
EQUIPMENT SPECIFICATIONS	7
ENVIRONMENTAL SPECIFICATIONS	8
BASIC SAFETY PRECAUTIONS.....	9
INSTALLATION PROCEDURES	11
OPERATING INSTRUCTIONS.....	12
BASIC CONTROLLER PARAMETERS	14
QUALITY CONTROL SHEET	ERROR! BOOKMARK NOT DEFINED.
HEATEFLEX CORPORATION MATERIAL WARRANTY.....	17



Shipping Instructions

The proper shipping procedure for the Stainless Steel D.I. Water Heater includes shipping the unit in a horizontal position as shown and described below.

The Stainless Steel D.I. Water Heater is factory tested to insure you receive an operational unit. The unit is packaged and shipped in a horizontal position, face up.

The unit is wrapped in bubble pack, then placed onto a pallet with 2 1/2" piece of impact absorbing foam. The unit is strapped down then covered with a corrugated box or crating material.

Receiving Inspection Procedure

This shipment was carefully inspected, checked and properly packaged at our company and delivered to the carrier in good condition. We fully expect your merchandise to arrive in your hands in good condition.

ALL PRODUCTS ARE SHIPPED F.O.B. FACTORY; THEREFORE, WHEN IT IS DELIVERED TO THE CARRIER, IT BECOMES YOUR PROPERTY. THUS, IT IS IMPORTANT THAT YOU TAKE NOTE OF ANY DAMAGE, WHETHER OBVIOUS OR HIDDEN. REPORT THIS INFORMATION TO THE TRANSPORTATION COMPANY WITHIN 5 DAYS OF RECEIPT OF THE SHIPMENT AT YOUR PREMISES TO AVOID FORFEITING CLAIMS FOR DAMAGE.

WHAT TO DO IF SHIPMENT IS DAMAGED:

- © Leave the items, packing material and carton "as is". Notify your carrier's local office and ask for immediate inspection of the carton and contents.
- © After inspection has been made by the carrier, and you have received acknowledgment in writing as to the damage, please contact our Customer Service Department for return authorization at:
(626) 599-8566
If writing for return authorization, please indicate your purchase order number.
- © We will either repair or replace the merchandise depending upon the extent of the damage.
- © It is your responsibility to follow the above instructions, or the carrier will not honor any claims for damage. If there are any shortages or questions regarding this shipment, please notify us within 10 days.

INTRODUCTION

Your Heateflex Corporation in-line point of use fluid heating system will accurately heat and maintain the temperature of your process fluid through the use of patented Power-To-Flow heating technologies. To obtain the best results from your unit, it is recommended that the user operating this system read completely through this manual and the accompanying component literature to become familiar with all the functions and features of the system.

DESCRIPTION

Your heating system is an electric heating system designed to be used in an ultra-high purity environment. It is a high tech piece of equipment incorporating many design innovations and precautionary measures to insure safe and reliable operation under normal conditions. This heating system incorporates features that enable it to be used with aggressive fluids, such as de-ionized water or acids, and maintain the purity of those process fluids. The construction of the fluid handling components of this unit use high purity stainless steel components all manufactured from 316L grade material. The safety systems used within the unit incorporate over-temperature protection, low flow protection, over-current protection, and a user-controlled emergency disconnect switch. These safeties combined with proven ultra pure technology provide a unit that effectively reaches and maintains process temperature.



EQUIPMENT SPECIFICATIONS

Model No.:	SX-36-3V-P510	Serial No.:	USA-SX0517-1
Description:	STAINLESS STEEL HEATER SYSTEM, 36KW, 480VAC, 3-PH		
Module Construction:	316 Stainless Steel		
Kilowatts:	36 kW		
Voltage:	480 VAC		
Hertz:	60 Hz		
Number of phases:	3-phase		
Current per phase:	43 Amps/Phase		
Inlet Connector:	2-1/2" Sanitary Ferrule		
Outlet Connector:	2-1/2" Sanitary Ferrule		
Drain Port:	1/2" Sanitary Ferrule		
Pressure Relief:	1/2" Compression Tube		
Overall Dim. (H x W x D):	67.44" x 18.63" x 23.25"		
Weight:	250lbs.		

CONTROL SYSTEM

Controller:	Temp. Controller, 100-240VAC, Retrans
Process Temperature Sensor:	Type J Thermocouple
Hi-Limit T/C:	Type J Thermocouple
Pressure Relief Valve:	Set @ 80PSI

ENVIRONMENTAL SPECIFICATIONS

THIS EQUIPMENT MUST ONLY BE USED WITHIN THE RANGE OF ENVIRONMENTAL CONDITIONS LISTED BELOW.

Operational usage:	INDOOR USE ONLY
Maximum operating pressure:	65PSI @ 95°C.
Maximum fluid temperature:	95°C.
Temperature resolution:	+/-1°C.
Maximum operating altitude:	6,600feet(2,000meters)
Ambient temperature range:	5°C. ~ 40°C. (operating) -40°C. ~ 60°C. (storage)
Maximum relative humidity:	80% up to 31°C. 76.7% @ 32°C. 73.3% @ 33°C. 70.0% @ 34°C. 66.7% @ 35°C. 63.3% @ 36°C. 60.0% @ 37°C. 56.7% @ 38°C. 53.3% @ 39°C. 50.0% @ 40°C. and above

THIS EQUIPMENT MUST ONLY BE USED WITH SAFETY COMPONENTS (TEMPERATURE CONTROLLER, LEVEL CONTROLLER, HI-LIMIT CONTROLLER, ETC.) THAT IS APPROVED TO EIC/EN STANDARDS.

BASIC SAFETY PRECAUTIONS

Every effort has been made to insure that this unit will run with a minimum of user input or maintenance. However there are still precautions to be taken whenever operating, performing maintenance, or servicing this unit. This unit makes use of heating elements and electrical components, both of which pose inherent burn, fire, and electrical shock hazards. These hazards can result in injury to personnel, plant, and/or process. Please note the following to aid in the operation of your unit and to decrease risk of the above mentioned hazards.

Precautions:

- Carefully read completely through this and all accompanying literature to verify that you understand the functionality and features of this system. Please become familiar with the integral safeties and controls within this system, and know their function.
- Always disconnect electrical power prior to installing, servicing or replacing electric heating elements and/or assemblies.
- Electrical termination enclosures should be selected to match the application's environment and be able to withstand worst case failures, especially in hazardous locations.
- Avoid fire hazards. Electric heaters and their components can develop temperatures that produce an auto-ignition source. Avoid mounting heaters in atmospheres containing combustible gases, vapor or dust. Article 501 of the National Electrical Code (NEC) requires that the maximum sheath temperature when the heater is continually energized not exceed 80 percent of the surrounding atmosphere's auto-ignition temperature.
- Avoid having heaters come in contact with combustible materials. Keep heaters far enough away from combustible materials to prevent ignition.
- Be aware of labeling on the unit, such as a lightning-bolt warning symbol, which alerts you to a safety hazard which could harm you or the unit.
- While servicing or operating this unit it is advisable to remove all metal from your person. This includes metal bracelets, rings and jewelry, as well as metal rim glasses and wristwatches.
- Keep your clothing, hands, and feet dry at all times whenever working with electrical equipment.
- Pull the fuses, open the circuit breakers, or disconnect the circuits from their source of power to protect yourself, the test equipment and the equipment under test.
- Do not trouble shoot or service a circuit with the primary power applied.
- If it becomes necessary to work on the unit with the power applied, keep one hand free at all times (behind you).
- Be certain that there is no power applied to a circuit when making continuity or resistance checks.
- Use the correct tool (i.e. screwdriver, alignment tool, etc.) for the job.

- Do not use metal tools around the connectors when there is power to the unit, as they may cause arcing.
- Turn off power before connecting alligator clips to any circuit.
- Do not take anything for granted when working with inexperienced help. Check every operation before they perform it.
- The operation of this unit creates large amounts of heated process fluid. This fluid is likely to be heated to temperatures above the threshold of safety for human contact. Please be advised of this and take the necessary precautions whenever connecting or disconnecting any plumbing from the system. If you are ever in doubt, turn the unit off, and wait an appropriate amount of time before performing any operations or service involving the plumbing.
- The process fluid within this system may also become pressurized from outside flow sources. It is the user's responsibility to verify that pressure within the system has been relieved externally, in order to prevent exposure to hazardous fluid such heated de-ionized water, or heated acids.
- This unit has several safety interlocks integrated within the system. However, it is the user's responsibility to verify that incoming power has been disconnected from a remote source prior to opening or servicing the unit. This is advised to prevent user exposure to high voltage and current, and reduce the risk of electric shock.
- This function of this unit is to heat process fluid for use in ultra-pure operations. Therefore during normal operation unit will become heated within the plumbing and the heater compartment. It is our recommendation that the unit is allowed a sufficient amount of time to cool before any maintenance or inspections are made to the unit in order to prevent user exposure to heated surfaces or air.
- The processes in which this unit is used involve heated fluids. Whenever heated fluids are involved, certain precautions must be taken in order to avoid user injury. This is especially important since it is highly likely that this unit will be used with aggressive fluids which can further harm or injure an individual, such as de-ionized water and process acids. User exposure to these types of materials can result in burning, scalding, and in some cases deep tissue damage. To avoid injury it is the user's responsibility to take the appropriate precautions as outlined above, and in all cases dealing with heated or aggressive materials, to use the appropriate safety equipment, such as but not limited to safety goggles and glasses, and chemically resistant gloves and garments.

INSTALLATION PROCEDURES

Installation of this unit consists of first verifying that the minimum facility requirements for normal operation can be met. Once the mounting requirements are completely understood and it has been verified that they can be met, the next step would be locating where the unit will be used.

The unit should then be fastened in a manner consistent with the accompanying documentation with the appropriate mounting hardware and then a final check should be made to ensure that all venting and clearance requirements are met before connecting incoming power. It is also recommended that the minimum safety requirements be met, prior to initial unit power-on. The unit must be mounted in such a position that it does not exceed a tilt of 10° in either the vertical or horizontal directions.

Once the unit is secured in its operational position, the water lines can be introduced. The input can be brought directly to the appropriately labeled connector on the left side of the cabinet. For the types of fittings included, refer to the Equipment Specifications on page 5. Once the appropriate plumbing has been connected, water should be run through the system without the power connected to check for leaks. If no leaks are present, incoming power and the appropriate signals may be brought in.

Incoming power should be brought in through the conduit fitting located on the top right of the cabinet. Also, an appropriately sized external disconnect switch should be used with the unit to protect the operator during servicing. Incoming power can be brought into the unit, after the appropriate external fused disconnect switch, or circuit breaker. For the incoming power requirements, refer to the Equipment Specifications on page 5. Please insure that the external disconnect is in the off position while you are attaching the incoming power, and refer and review the “Basic Safety Precautions” section of this manual on pages 7-8 before attempting any electrical work. Once the incoming power connections are secure, be sure that the cabinet door is closed and locked before activating the external disconnect. Once these conditions are met, refer to the section of this manual titled “Basic Operation,” on pages 10-11.

STAINLESS STEEL GAS HEATING SYSTEM **OPERATING INSTRUCTIONS**

Prior to any operation of this unit, it is highly recommended that the operator read completely through and understands the Basic Safety Precautions on pages 7-8 of this manual. After understanding these items, the procedure below details the basic operation of the unit.

Basic operation of the unit consists of verifying that all safety conditions are met, and then setting the operational parameters. Once these two steps are complete, the unit should provide process fluid at the required temperature, and run with no normal user intervention.

Ensuring that safety conditions are met prior to initial unit power-on consists of checking that fluid is actually flowing to the unit, and verifying that all minimum safety requirements are met. Once this has been established, the unit can be powered on for the first time. Once all the conditions are met, and the unit is powered on, it will return a low flow condition and a high limit failure by default. Press the "Low Flow Reset" button for three seconds. The unit will check for an adequate flow condition, and if one exists it will begin to bring the temperature to the set point. Then the "Hi-Limit Reset" button should be depressed, in a fashion similar to the "Low Flow Reset". If the condition is safe the unit will begin to bring the fluid temperature to setpoint. Every time the unit is powered on, the "Low Flow Reset" and "Hi-Limit Reset" buttons will need to be depressed. The next step then is to set the process set point to the required temperature. This is accomplished by the following:

- Refer to the temperature controls panel.
- Verify that it is displaying the process temperature in the proper units. If it is not, refer to the accompanying temperature controller manual.
- Once the controller is displaying the proper units, the set point can be adjusted by first momentarily pressing either the up or down key on the controller to view the current set point.
- Momentarily pressing either the up or down key on the controller will then change which numerical position is to be adjusted. The flashing digit is the highlighted digit.
- Pressing and then holding either the up arrow key, or the down arrow key will either increment or decrement the highlighted value.
- By momentarily pressing the up or down key on the controller, you can select the next value of the temperature you wish to adjust. Repeat the procedure in step five to adjust the next value of the temperature you have selected.
- After approximately 10 seconds of user inactivity, the controller will return to operation, and will try to control the temperature to the current set point.
- The first time the unit is powered up, it is also recommended that the Auto Tune procedure be run. Once the set point has been adjusted to normal operating conditions, the Auto Tune procedure can be run. To start the Auto Tune procedure, press and hold the up arrow and down arrow keys simultaneously for 3.2 seconds, then release. The display will begin flashing, and will continue to flash throughout the Auto Tune process. For more details of the Auto Tune process, refer to the accompanying controller manual.
- You will not need to run the Auto Tune procedure again unless you significantly change the value of the set point, or if system stability is unacceptable.

-
- Once you have completed the above mentioned procedures, the unit is ready to heat fluid to the required temperature. No further calibration or set up is necessary for the controls in order to process the fluid at the correct temperature.
 - The automatic temperature controller included with this unit uses a combination of PID and fuzzy logic. Due to the manner in which this unit operates, it does not require regular re-calibration or maintenance. The only sort of calibration that is required is the Auto-Tuning process. This process is used to provide the controller with the reference values for the P, I, and D parameters of the controller. The Auto-Tuning process only needs to be completed upon the initial operation of the unit, if the set-point of the unit has been changed by a large amount, or if system stability is unacceptable. To Auto-Tune your unit please refer to page 19 of the accompanying controller manual for the details of this procedure.

BASIC CONTROLLER PARAMETERS
 Temperature Controller (PN: 306551)

Engineering Parameters

<u>Function</u>	<u>Symbol</u>	<u>Setting</u>	<u>Function</u>	<u>Symbol</u>	<u>Setting</u>
1. F10	SPCH	1	46. F43	ES3	0
2. F10	dE	1	47. F43	Eho3	0
3. F10	Deut	100	48. F43	E1L3	0
4. F10	dSoP	0	49. F43	EH3	2.0
5. F11	Fn1	0	50. F43	EVT3	0.0
6. F11	Fn2	0	51. F43	EEo3	0
7. F11	Fn3	0	52. F44	ES4	0
8. F11	Fn	1	53. F44	Eho4	0
9. F21	InP	1	54. F44	E1L4	0
10. F21	UnIT	0 [°C]	55. F44	EH4	2.0
11. F21	PGdP	1	56. F44	EVT4	0.0
12. F21	PGSH	100	57. F44	EEo4	0
13. F21	PGSL	0.0	58. F45	CTr1	800
14. F21	PoV	105.0	59. F45	CTA1	0
15. F21	Pun	-5.0	60. F45	HbS1	1
16. F21	boS	0	61. F45	HbC1	5
17. F21	sQr	0	62. F46	CTr2	800
18. F21	PFRQ	1 [60Hz]	63. F46	CTA2	0
19. F21	SMP	1	64. F46	HbS2	1
20. F22	rInP	15 [4- 20mA]	65. F46	Hbc2	5
21. F23	d1sL	6	66. F50	Pd	0
22. F30	LoGC	2	67. F50	PdA	3
23. F30	oTT1	0.0	68. F50	CAM	0
24. F30	oTT2	0.0	69. F50	MCH	0
25. F30	oTT3	0.0	70. F50	TrK	1
26. F30	oTT4	0.0	71. F50	MVTS	0
27. F30	EXC	0000	72. F50	PVTS	0
28. F30	ALC1	1111	73. F51	oS	1
29. F30	ALC2	0011	74. F51	1ddP	0
30. F30	55	0011	75. F51	DGA	6.0
31. F33	Ao	1	76. F51	oHH	1.0
32. F33	AHS	100.0	77. F51	oHL	1.0
33. F33	ALS	0.0	78. F51	AoVE	0
34. F41	ES1	5	79. F51	AunE	0
35. F41	EHo1	0	80. F51	PSM	0.0
36. F41	E1L1	0	81. F51	rMV1	-5.0
37. F41	EH1	2.0	82. F51	rMV2	-5.0
38. F41	EVT1	0.0	83. F51	orU	0.0
39. F41	Eeo1	0	84. F51	ord	0.0
40. F42	ES2	0	85. F51	oLH	105.0
41. F42	Eho2	0	86. F51	oLL	-5.0
42. F42	E1L2	0	87. F51	orU2	0.0
43. F42	EH2	2	88. F51	ord2	0.0
44. F42	EVT2	0.0	89. F51	oLH2	105.0
45. F42	EEo2	0	90. F51	oLL2	-5.0

BASIC CONTROLLER PARAMETERS (CONTINUED)

Temperature Controller (PN: 306551)

Engineering Parameters (Continued)

<u>Function</u>	<u>Symbol</u>	<u>Setting</u>
91. F51	PFF	0
92. F51	PFFS	1.00
93. F51	dTP	0
94. F51	US	1.000
95. F52	ATB	0
96. F52	ATC	1
97. F52	ATH	10.0
98. F52	ATon	105.0
99. F52	AToF	-105.0
100. F52	PLH	50.0
101. F52	PLL	0
102. F52	1LH	3600
103. F52	1LL	0
104. F52	dLH	3600
105. F52	dLL	0
106. F52	PcLH	50.0
107. F52	PcLL	1.0
108. P52	1cLH	3600
109. F52	1cLL	0
110. F52	dcLH	3600
111. F52	dcLL	0
112. F52	PAJ	1.00
113. F52	1AJ	1.00
114. F52	dAJ	1.00
115. F52	PcAJ	1.00
116. F52	1cAJ	1.00
117. F52	dcAJ	1.00
118. F53	Ydb	2.0
119. F53	YHS	1
120. F53	Ybr	0
121. F53	PoS	Adj
122. F53	moT	10
123. F53	oLA	150.0
124. F53	VAL	0
125. F54	STS	0
126. F54	STPK	1.00
127. F54	ST1K	1.00
128. F54	STdK	1.00
129. F55	CHrG	0
130. F55	rSG	0
131. F55	CHrd	10.0
132. F55	CHrT	1.0
133. F60	CmP1	0
134. F60	CmP2	2
135. F70	SVrT	60

<u>Function</u>	<u>Symbol</u>	<u>Setting</u>
136. F70	STdP	1
137. F71	SLH	100
138. F71	SLL	0.0

Operation Parameters

<u>Symbol</u>	<u>Setting</u>
1. ATU	Off
*Note: Auto Tune done at Temp. S.P. of 40°C, Flow of 1.5GPM water.	
2. STU	oFF
3. A-M	Auto
4. r-L	LoC
5. r-S	rUn
*Note: Must be changed to STOP when entering Temperature Controller parameters.	

Parameter Settings

<u>Symbol</u>	<u>Setting</u>
1. EV1	100
2. P	32.8
3. 1	55
4. d	14
5. rPT	1
6. SVrU	oFF
7. SVrd	oFF
8. AST	0
9. LnKA	oFF

Setup Parameters

<u>Symbol</u>	<u>Setting</u>
1. Pb	0
2. dF	oFF
3. Pr	1.000
4. rb	000.0
5. dF2	oFF
6. rr	1.000
7. T	002.0
8. LCK	0000



SUGGESTED SPARE PARTS LIST
SX-36-3V-P510

<u>Item No.</u>	<u>Qty.</u>	<u>Part No.</u>	<u>Description</u>
1.	1	840176A	Htr. Assy., 316SS, 36kW, 480VAC, 3-PH.
2.	1	F30101	SX Vessel, 316SS, 4" Flange, 2-1/2" TRC.
3.	1	F30003A	Flange Gasket, Teflon, #150, 4" DIA.
4.	1	306265A	Thermocouple, 316SS, Type "J", Braided.
5.	1	402129A	Pressure Relief Valve, 316SS, 1/2" Compression.
6.	1	1000830	Contactora, 3-P, AF40, NO-NC, 24-60VAC.
7.	1	F30014	Buzzer, Speaker Alarm.
8.	3	301400	Fuse, DFJ, 600V, 70Amps.
9.	1	300851	DIN-SCR, 3-PH, 2LEG, 56A, 600V.
10.	1	305110	Circuit Breaker, 2A, 480VAC, 2 Poles.
11.	1	309810	Transformer, 380-480VAC/120V, 24V, 12V.
12.	1	300377	Contactora, 3P, 24VAC, 50/60Hz.
13.	4	300108	Relay, DPDT, 24VAC/DC Coil.
14.	4	300107	Relay, SPDT, 24VAC/DC Coil.
15.	1	301010	Fuse, GDC 5A, 250VAC, Time Delay.
16.	1	301007	Fuse, 0.5A, 250VAC, Time Delay, Dual Element.
17.	1	306551	Temp. Ctrl, 100-240VAC, Retrans.
18.	1	306021	Limit Ctrl, 0-160C, Type "J", 120VAC, SPDT.
19.	1	307815A	Float Switch, 316SS, Horizontal Mount, 3/4" MNPT.
20.	1	304349-A1	PB Illuminated, MOM, 16mm., Green, SPDT, 24V.
21.	4	304350-A1	PB Illuminated, MOM, 16mm., Red, SPDT, 24V.
22.	1	304355-A1	PB, MOM, 16mm., Red SPDT, (Power Off).
23.	2	304379-A	Switch Selector, 16mm., DPDT, 90D, 2-POS.
24.	1	304342-A1	Indicating Light, 16mm., Red, 24V AC/DC, LED.
25.	1	305110	Circuit Breaker, 2A, 480VAC, 2 Poles.
26.	1	301008	Fuse, 2.5A, 250VAC.



January 03, 2017

HEATEFLEX CORPORATION MATERIAL WARRANTY

Heateflex Corporation warrants the equipment offered to be free from defects in material and workmanship, under normal handling and proper usage, for a period of one year from the date of shipment. All products purchased from manufacturers by Heateflex Corporation will carry that manufacturer's warranty period. This expressed warranty is in lieu of, and excludes all other representations made by advertisements or by agents. There are no implied warranties for the equipment.

Heateflex Corporation agrees to correct any defect in workmanship or material which may develop under normal handling and proper usage during a period of one year from the date of shipment or, by its option, to repair or replace the defective equipment F.O.B. Arcadia, California, USA. Purchaser's remedies shall be limited exclusively to the right of repair or replacement. Heateflex Corporation shall not be liable for any expenses incurred by the purchaser or any other person by reason of the use, misuse, sale, or fabrication of the equipment regardless of whether the equipment conforms to the specifications.

Items returned for warranty repair must be prepaid and insured for shipment. Warranty claims are processed on the condition that prompt notification of a defect is given within the warranty period. Heateflex Corporation shall have the sole right to determine whether, in fact, a warranty situation exists.