Table Of Contents

11. 2 AND 4 CHANNEL STYLE A HEATER SYSTEMS

11.1 DESCRIPTION

The 2 and 4 Channel Style A Heater systems, hereafter referred to as the system, contains a controller, heater, and thermocouple. The 2 Channel Controller Module measures 10.1" (257mm) wide, 10.7" (271mm) deep**,** 5.8" (147mm) high and weighs approximately 8 pounds (3.6 kilograms). The 4 Channel Controller Module measures 14.3" (364mm) wide, 15.4" (391mm) deep**,** 5.8" (147mm) high and weighs approximately 14 pounds (3.4 kilograms). Additional clearance is required at the front and back for connectors. The heater and thermocouple plug into connectors on the controller.

11.1.1 Controller Front Panel (Figure 11.1)

The front panel of the controller contains the interface and controls for operating the system. The front panel contains the following components.

1. Heater Receptacle
2. Thermocouple Receptacle
3. Temperature Controller
4. Tuning Label
5. 1/0 (On/Off) Switch

11.1.1.1 Heater Receptacle (Item 1)

The heater receptacle is the connection point for the heater.

11.1.1.2 Thermocouple Receptacle (Item 2)

The thermocouple receptacle is the connection point for the thermocouple. The thermocouple must be plugged into the controller for the heater to operate correctly.

11.1.1.3 Temperature Controller (Item 3)

The temperature controller is used to set the operating parameters of the system. Refer to the Red Lion Model PXU Instruction Manual (supplied with the equipment) for additional information.

Figure 11.1 Heater Controller Front Panel (2 Channel System Shown)

11.1.1.4 Tuning Label (Item 4)

The Tuning Label indicates for which device the Heater Controller was Auto Tuned for. Refer to Section 11.2.3 for additional information.

11.1.1.5 Power 1/0 (On/Off) Switch (Item 5)

The Power 1/0 (On/Off) switch turns power to the system On and Off.

11.1.2 Controller Rear Panel (Figure 11.2)

The rear panel of the controller contains the power connection, Alarm Out connectors and fuses.

11.1.2.1 Power Entry Module (Item 1)

The Power Entry Module contains a receptacle for a standard IEC power cord, fuse holder and fuses. The design of the power entry module requires the line cord be disconnected before the line fuse is removed. Refer to the Title Page section for fuse information. Refer to section 11.5.2.1 for how to replace the fuses.

11.1.2.2 Alarm Out Connector (Item 2)

The Alarm Out adds contact-closure output signal for “ALARM OUTPUT”.

Each channel has two alarm outputs (AL1 and AL2) that share one common connection “C”. Refer to the Red Lion Model PXU Instruction Manual (supplied with the equipment) for additional information.

11.1.2.3 Control Fuse (Item 3)

The Control Fuse protects the internal circuitry from damage in case of an overcurrent condition. Refer to the Title Page section for fuse information. Refer to section 11.5.2.2 for how to replace the fuses.

11.1.2.4 Heater Fuse (Item 4)

The Heater Fuse prevents the heater and circuitry from a heater failure. Refer to the Title Page section for fuse information. Refer to section 11.5.2.3 for how to replace the fuses.

Figure 11.2 Heater Controller Rear Panel (2 Channel System Shown)

11.1.3 Thermocouple (Figure 11.3)

The thermocouple fastens to the device to be heated and connects to the THERMOCOUPLE receptacle on the controller's front panel.

WARNING

The thermocouple must be securely fastened to the heated device. Failure to do so may cause the device to overheat.

11.1.4 Heater (Figure 11.3)

The heater is made of Alloy 800 (Incoloy 800) and the braid is made of stainless steel. The heater connects to the HEATER receptable on the controller's front panel. Heaters come in a variety of sizes depending on the device to be heated.

WARNING

The heater and heated device get very hot. Special care should be taken when handling these devices.

11.2 OPERATION

The IVEK heater system is used to heat either an IVEK Pump Module or Sonicair Nozzle. The heater system components provide feedback and control to keep the device at the preset temperature.

The system is made up of three main components: a controller, heater, and thermocouple. The controller contains the electronics for controlling the system, the heater provides the heat source and the thermocouple provides the feedback.

11.2.1 Heating

The controller contains a Red Lion Model PXU Temperature Controller, hereafter referred to as the temperature controller, and connections for the power, thermocouple, and heater. The temperature controller generates a power output to the heater based on the feedback signal from the thermocouple. The greater the differential between the setpoint temperature and the actual temperature, the greater the power output to the heater.

The Red Lion Model PXU Temperature Controller has been preset at the factory. The factory settings are for in-house purposes only. These settings must be changed by the customer for their own individual operational requirements, (see Sections 11.2.2, 11.2.3, 11.2.4 for instructions)

CAUTION

The maximum operating temperature is 250°F (121.11°C).

11.2.2 Temperature Display

The temperature can be displayed in either °F or °C. To change between these two settings, perform the following steps:

1. Press "P" until CNFP alternating with NO appears on the second line.
2. Press the **"▲"** once to change the display to CNFP alternating with I - IN.
3. Press "P" until SCAL appears on the top line and the current setting °C or °F appears on the second line.
4. Press the **"▲"** to change to °C or "▼" to change to °F.
5. Press "P" until END appears on the second line.

When changing between °F or °C remember to check related parameter values including alarms, setpoints and others as defined in the Red Lion manual.

11.2.3 Auto Tune Procedure

A label on the front panel indicates the device (pump, Sonicair, etc) for which the controller was Auto Tuned at the factory. If the conditions on the machine result in poor temperature regulation, or if the controller will be used for a

different device, then perform the Auto Tune Procedure.

CAUTION

The Auto Tune steps must be followed in order and in a timely manner or the set up will not initiate, if this happens turn the control off then back on and begin the steps over. Thermocouple and heater (s) must be securely installed in the device to be heated before turning on power to the controller.

The Auto Tune sequence should be initiated at the time of system installation. To initiate AutoTune Sequence:

1. Set the temperature on the controller to the desired operating temperature.
2. Press and hold "P" button for three seconds until trnF alternating with Auto appears on the second line of the display, (note **"▲"** and "▼"' can be used to adjust the display)
3. Press "P" until tUnE appears on the display.
4. Press **"▲"** until yEs appears on the display.
5. Press "P" while yEs is displayed to start Auto Tune sequence,
6. The Auto Tune sequence will begin.
7. When Auto Tune has concluded, if the label on the controller does not match the device being heated, remove the existing label, and add a new label.

When Auto Tune has been initiated Aut 1 will be displayed followed by Aut 2, Aut 3, and Aut 4. The AutoTune process can take up to 30 minutes to complete. Once completed, the display will return to its normal view.

11.2.4 Temperature Setpoint Adjustment

The temperature setpoint can be changed using the following steps:

1. The temperature setpoint should be displayed on the lower display. If not, press the "D" button until it appears on the display ("%P" = percent power, "DV" = measured temperature deviation from setpoint).
2. Press the "▲" or "▼" to change the setpoint temperature.

11.3 INSTALLATION

11.3.1 Heater

NOTE

Make sure the Controller is Off and the heater is unplugged from the Controller.

Insert the heater into the device to be heated. Make sure the heater is fully installed and the leads are not bent or pinched. Secure in place using the screw provided.

11.3.2 Controller

Ensure the device being heated matches the label on the front of the controller. If the label does not match, either locate the correct controller or perform the Auto Tune Procedure (Section 11.2.3) and change the label on the controller.

Place the system power switch in the OFF position.

CAUTION

Before plugging in the system, ensure the line voltage rating of the Heater Controller agrees with the available line voltage. This must also match the marking on the heater assembly. Damage to the equipment could result if the two voltages do not match.

Ensure AC power cord is plugged into a properly grounded three-prong Module for electrical safety and to prevent electrical shock.

Plug the thermocouple into the THERMOCOUPLE receptacle on the Controller.

Plug the heater into the HEATER receptacle on the Controller.

11.3.3 Thermocouple

Securely fasten the thermocouple to the device to be heated using the screw provided.

11.4 OPTIONS

There are currently no options available for this Controller Module.

11.5 MAINTENANCE

11.5.1 Thermocouple

Periodically inspect the thermocouple and heater wires for damage. Replace if cracked, worn, or bent.

11.5.2 Assembly/Disassembly

The Heater Controller contains the following replaceable parts.

- Main Power Fuse
- Control Fuse
- Heater Fuse

11.5.2.1 Main Power Fuse (Figure 11.2 Item 1)

The main power fuses located in the Power Entry Module on the rear panel are replaceable. The proper fuse value is described in the Title Page section of this manual.

Disassembly

1. Remove the power cord.
2. Using a small flat blade screwdriver, open the power entry module's cover.
3. Slide the fuse tray out and remove the fuses.

Assembly

1. Install the new fuses into the fuse tray and slide the tray in. The covered side on the fuse holder should be up.
2. Close the power entry module's cover.
3. Connect the power cord.

11.5.2.2 Control Fuses (Figure 11.2 Item 3)

The Control fuses located in the fuse holders on the rear panel are replaceable. The proper fuse value is described in the Title Page section of this manual.

Disassembly

1. Turn power off.
2. Disconnect the power cord from the Heater Controller.
3. Turn the fuse holder knob counterclockwise and remove.

Assembly

1. Install the new fuse into the fuse holder knob and slide it into the fuse holder body.
2. Turn the fuse holder knob clockwise to tighten.
3. Connect the power cord.

11.5.2.3 Heater Fuses (Figure 11.2 Item 4)

The Heater fuses located in the fuse holders on the rear panel are replaceable. The proper fuse value is described in the Title Page section of this manual.
Disassembly

1. Turn power off.
2. Disconnect the power cord from the Heater Controller.
3. Turn the fuse holder knob counterclockwise and remove.

Assembly

1. Install the new fuse into the fuse holder knob and slide it into the fuse holder body.
2. Turn the fuse holder knob clockwise to tighten.
3. Connect the power cord.

11.6 PROBLEM GUIDE

Refer to Table 11.1 for a list of possible problems and solutions.

11.7 SPECIFICATIONS

Heater Cable Length:	5'(1.524m)
Thermocouple Cable Length:	5' (1.524m)
Macro Linear Pump Thermocouple Cable Length:	7' (2.134m)
Macro Linear Pump Power Cordset Length:	6' (1.828m)
032151-1 Heater Assembly Length:	14 inches (0.356m)
032151-2 Heater Assembly Length:	14 inches (0.356m)
092270-4 Heater Assembly Length:	16 inches (0.406m)
092270-5 Heater Assembly Length:	16 inches (0.406m)
102180-3 Heater Assembly Length:	16 inches (0.406m)
102180-4 Heater Assembly Length:	16 inches (0.406m)
142398-3 Heater Assembly Length:	16 inches (0.406m)
142398-4 Heater Assembly Length:	16 inches (0.406m)
Thermocouple Type:	T
Alarm Output Option Relay Rating:	Resistive Load: 3A at 250VAC or 30VDC Inductive Load: 1/10 HP at 120VAC

Reference the Red Lion Model PXU Instruction Manual (supplied with the equipment) for additional information.

Following are the available heated devices, the associated heater part number and the specifications for each one.

Heated Device	Heater Part Number	Total Watts	Power Limit From Controller	Setpoint Limit In Controller
Macro Linear Pump Module	032151	100	75%	250^{0}F (121.11^{0}C)
Split Case Pump Module	092270-4	200	75%	250^{0}F (121.11^{0}C)
Split Case Pump Module	092270-6	200	75%	250^{0}F (121.11^{0}C)
Split Case Pump Module	092270-5	350	75%	250^{0}F (121.11^{0}C)
Split Case Pump Module	092270-7	350	75%	250^{0}F (121.11^{0}C)
Sonicair Nozzle	142398	100	40%	250^{0}F (121.11^{0}C)
Air Heater Assembly	142761	25	75%	250^{0}F (121.11^{0}C)
Micro Rotary & Linear Pumps	102180	200	75%	250^{0}F (121.11^{0}C)

11.8 MODEL NUMBER

The model number provides important information about the specifics of your Heater Controller and Heaters. Refer to this number when calling IVEK Technical support. Refer to the Title Page section of this manual or the rear of the Heater Controller for the model number for your Heater Controller.

(2 Channel) 520232- # #

Alarm Output
C - Output Alarm

Power Connection / CE
C - 115 VAC, CE
D - 230 VAC, CE

(4 Channel) 520220- # #

Alarm Output
C - Output Alarm

Power Connection / CE
C - 115 VAC, CE
D - 230 VAC, CE

11.9 ILLUSTRATED PARTS BREAKDOWN

The illustrated parts breakdown (Figure 11.3) contains replacement parts for the Heater System.

Table 11.1 Common Operational Problems And Solutions

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
No power, nothing works.	AC power may be absent or inadequate. Unit not plugged in.	Ensure AC power cord is plugged into a properly grounded three-prong outlet capable of supplying the voltage and current specified in the Title Page section of this manual.
	Fuse is blown.	Unplug main power cord from outlet. Remove fuse from fuse holder. Test fuse conductivity. Install good fuse in rear panel fuse holder.
Heater temperature cannot be controlled.	Thermocouple not connected properly.	Disconnect and reconnect.
	Thermocouple cable is damaged.	Inspect cable, replace thermocouple if necessary. **NOTE:** Red is negative wire, blue is positive wire.
Heater does not function properly.	Heater cable is damaged.	Inspect cable, replace heater if necessary.
Temperature overshoots and undershoots before settling on correct temperature.	Controller "out of tune".	Follow Autotune procedure. (A summarized version of the AutoTune procedure found in the Red Lion Model PXU (Ref 690049) Instruction Manual is included on page 4 Section 11.2.3.)

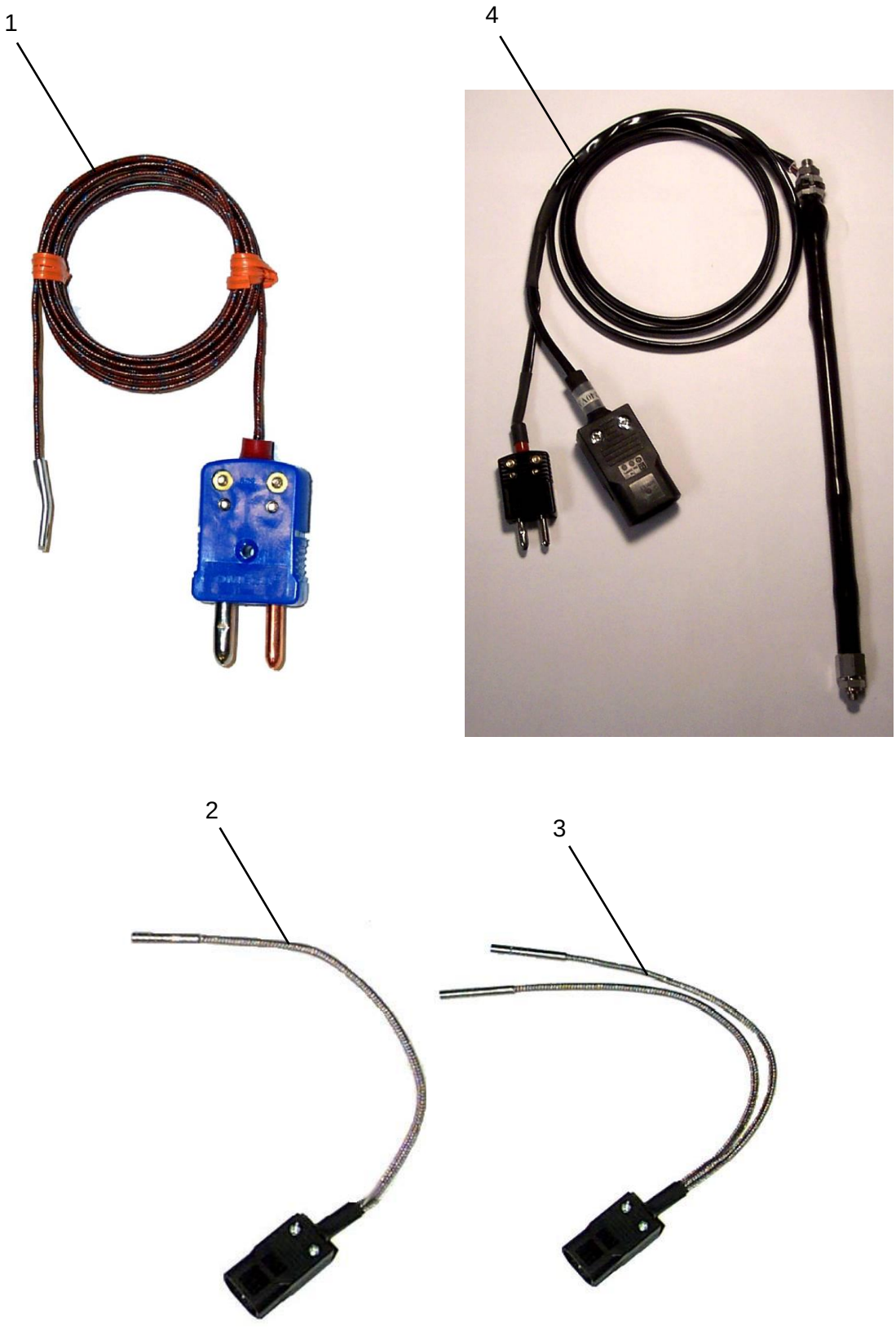

Figure 11.3 Heater System (Sheet 1 of 2)

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY
		Heater System	1

Heater Controller

NS	520232- **	Controller Module, Heater, 2 Channel, Style A
NS	520220- **	Controller Module, Heater, 4 Channel, Style A

** When ordering a Heater Controller, include the two digit suffix included in the model number from the Title Page section.

Parts for Model Numbers ending in C (i.e. 520232-CC or 520220-CC)

1	810008-051R	Thermocouple, Type "T" Wshr, W/ Connector; 5' (1.524m), #6	1
1	810008-071R	Thermocouple, Type "T" Wshr, W/ Connector; 7' (2.134m), #6	1
2	032151-1	Heater Assy, Macro Linear Pump; 120 VAC	1
2	142398-3	Heater Assembly, Sonicair; 120 VAC, 100W, 16 In. Char 03	1
3	102180-3	Heater Assy, Microspense Pump, AP Rotary And Linear; 120 VAC, Ch 03	1
3	092270-4	Heater Assembly, Split Case Pump; 120 VAC, 100 W, Char 4	1
4	142761-101	Heater Assy, Air, SS Tube W/TC and Fuse, A; 120VAC, 25W, Ch01	1
NS	540106-05	Cable Assembly, Power Extension; 5' (1.524m)	1
NS	682071	Power Cord, Domestic, IEC to 3 Prong	1
NS (or)	682201-06	Power Cordset, Y, IEC320-C14, IEC320-C13, 10A-250V; 6 Ft	1

Replacement Heater Kits

NS	142399-3	Heater Kit, Sonicair; 120 VAC, 100W, 16 In, Char 3
NS	102181-3	Heater Kit, Mcrs AP 120 VAC, 100W, 16 In, Char 03
NS	092271-3	Heater Kit, Split Pump Case; 120 VAC, 100W, 16 In, Char 3
NS	032152-1	Heater Kit, Macro Linear Pump; 120 VAC

NOTE

Heater Kits include a thermocouple, heater, cable and fasteners for the heater and thermocouple.

Parts for Model Numbers ending in D (i.e. 520232-CD or 520220-CD)

1	810008-051R	Thermocouple, Type "T" Wshr, W/ Connector; 5' (1,524m), #6	1
1	810008-071R	Thermocouple, Type "T" Wshr, W/ Connector; 7' (2.134m), #6	1
2	032151-2	Heater Assy, Macro Linear Pump; 240 VAC	1
2	142398-4	Heater Assembly, Sonicair; 240 VAC, 100W, 16 In, Char 04	1
3	102180-4	Heater Assy, Microspense Pump, AP Rotary And Linear; 240 VAC Ch 4	1
3	092270-5	Heater Assembly, Split Pump Case; 240 VAC, 175 W, Char 5	1
4	142761-201	Heater Assy, Air, SS Tube W/TC and Fuse, A; 120VAC, 25W, Ch01	1
NS	540106-05	Cable Assembly, Power Extension; 5'(1.524m)	1
NS	682006	Power Cord, Domestic, IEC to 3 Prong	1
NS (or)	682201-06	Power Cordset, Y, IEC320-C14, IEC320-C13, 10A-250V; 6 Ft	1

Replacement Heater Kits

NS	142399-4	Heater Kit, Sonicair; 240 VAC, 100W, 16 In, Char 4
NS	102181-4	Heater Kit, Mcrs AP; 240 VAC, 16 In, Char 04
NS	092271-4	Heater Kit, Split Pump Case; 240 VAC, 175W, 16 In, Char 4
NS	032152-2	Heater Kit, Macro Linear Pump; 240 VAC

NS = Not Shown

NOTE

Heater Kits include a thermocouple, heater, cable and fasteners for the heater and thermocouple.

Figure 11.3 Heater System (Sheet 2 of 2)