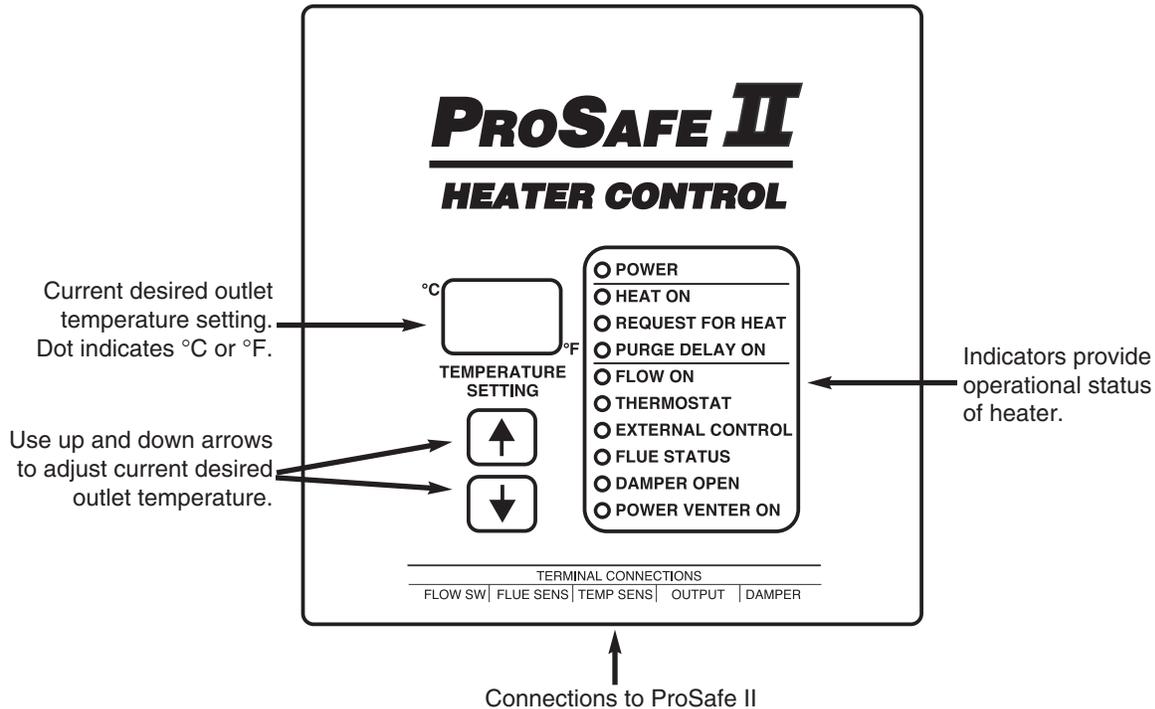


## 6.0 PROSAFE II CONTROL



The HWG20 and HWG40 heaters are designed to provide hot water on demand at a given temperature setting. These heaters will automatically regulate the temperature of the outlet water to that which you desire by cycling on and off as required. Because these heaters are not storage type heaters, they must also cycle on and off dependent on whether or not there is water flow.

The operation of the heater is controlled and monitored by the *PROSAFE II* industrial heater control, an advanced microcontroller that monitors several aspects of the heater operation in order to provide safe and effective control of the heater. The *PROSAFE II* control provides visual status to the operator of the heater through it's front panel display on the heater. It also provides the setting for the outlet water temperature desired from the heater.

Should some condition arise which results in the heater exceeding its normal operating temperature, the *PROSAFE II* control provides overheat lockout protection, thus protecting the heater and operator from the dangers of a heater overheat condition. The *PROSAFE II* control also provides coil protection via a coil freeze warning should the temperature in the flue ever drop near the freezing point. Other conditions which affect the operation of the heater are detected and displayed to the operator by the *PROSAFE II* control.

Following is a description of the indicators and their function on the *PROSAFE II* control.

### 6.1 TEMPERATURE SETTING

The temperature setting display on the *PROSAFE II* control displays the current desired outlet water temperature from the heater. To change the temperature setting press the up or down arrow buttons located below the temperature setting display. Pressing and holding either of the up or down arrow buttons will result in the temperature setting changing slowly until a change of 5°, after which the setting will change rapidly until either button is released.

The temperature setting ranges from 40 to 200°F or 5 to 95°C depending on the temperature scale chosen. The current temperature scale is indicated by a red dot next to either the °C or the °F by the temperature setting display.

The temperature setting display is also used to indicate any error condition detected by the *PROSAFE II* control. When an error condition exists the current desired outlet water temperature is replaced by a flashing error code(s). Refer to the section 7.0 *PROSAFE II* ERRORS & WARNINGS for diagnosing error conditions.

## 6.2 POWER INDICATOR

The power-up state to the heater and the *PROSAFE II* control is indicated by the buzzer sounding and the temperature setting displaying 888 for 1 second. Following power-up, the POWER indicator on the *PROSAFE II* control should remain on.

## 6.3 HEAT ON INDICATOR

For electronic ignition (HSI) heaters the HEAT ON indicator on the *PROSAFE II* control indicates that the SmartValve gas valve has provided positive feedback that the intermittent pilot is lit and the main section of the gas valve is open.

For standing pilot heaters the HEAT ON indicator simply follows the on and off action of the REQUEST FOR HEAT indicator.

## 6.4 REQUEST FOR HEAT INDICATOR

The REQUEST FOR HEAT indicator on the *PROSAFE II* control indicates whether all conditions have been met to request that heat be turned on. The conditions required to request for heat are flow on, thermostat call for heat, external control on, flue status good, damper is open, power venter is on, and purge delay is off. Essentially if the six indicators FLOW ON, THERMOSTAT, EXTERNAL CONTROL, FLUE STATUS, DAMPER OPEN, and POWER VENTER ON are all on, and PURGE DELAY ON indicator is off, then REQUEST FOR HEAT will turn on. Should any of the six indicators turn off, then REQUEST FOR HEAT will turn off as well.

## 6.5 PURGE DELAY ON INDICATOR

The PURGE DELAY ON indicator on the *PROSAFE II* control indicates that the heater is currently in a purge delay. The purge delay is intended to provide a delay to eliminate rapid on/off cycling of the gas valve.

The purge delay occurs when there is an end to the current request for heat and the REQUEST FOR HEAT indicator turns off. At this point the PURGE DELAY ON indicator turns on and remains on for a period of six seconds. During this period if all conditions required to request for heat are met, the REQUEST FOR HEAT indicator will not turn on. If the conditions required to request for heat remain, the REQUEST FOR HEAT indicator will turn on once the purge delay is over and the PURGE DELAY ON indicator turns off.

## 6.6 FLOW ON INDICATOR

The FLOW ON indicator on the *PROSAFE II* control indicates whether there is water flow through the heater or not. If the indicator is on then there is water flow through heater. If the indicator is off then there is no flow of water through the heater.

If the FLOW ON indicator is flashing slow, the *PROSAFE II* control is indicating a warning that there is water flow through the heater and that it has been continuous for at least 10 minutes. This warning is strictly for information purposes as it may indicate a problem with the flow switch, since the wash gun in high pressure washing applications is typically not held open continuously for 10 minutes.

If the wash gun is held open continuously for more than 10 minutes in your operation, or your heater is being used in a different application where water flows through the heater continuously for more than 10 minute periods, then simply disregard the flashing FLOW ON indicator. If, however, the FLOW ON indicator is flashing and you have **not** had the wash gun open continuously for more than 10 minutes, the flow switch may not be operating correctly. **You should immediately turn off the gas flow to the main burners by manually turning the knob on the gas valve from ON to pilot (standing pilot heaters) or from ON to OFF (for electronic ignition heaters). This is important as the main burners of the heater may be continuing to fire with no water flow through the heater.** Following this, the operation of the flow switch must be checked. The FLOW ON indicator should be on when there is water flow through the heater and off when there is no water flow through the heater. If the FLOW ON indicator remains on or continues to flash even after flow through the heater has stopped, see section 9.1 FLOW SWITCH for servicing the flow switch.

## 6.7 THERMOSTAT INDICATOR

The THERMOSTAT indicator on the *PROSAFE II* control indicates whether the temperature of the outlet water of the heater is below, at, or greater than the current temperature setting on the temperature setting display. If the THERMOSTAT indicator is on, then the outlet water temperature of the heater is below the current temperature setting. If the THERMOSTAT indicator is off, then the outlet water temperature of the heater is at or above the current temperature setting.

If the THERMOSTAT indicator is flashing fast and the temperature setting display is flashing an error code, the *PROSAFE II* control is indicating that an error condition exists. Refer to section 7.0 *PROSAFE II* ERRORS & WARNINGS for diagnosing error conditions.

## 6.8 EXTERNAL CONTROL INDICATOR

The action displayed by the EXTERNAL CONTROL indicator is dependent on how this option was setup with your heater. The EXTERNAL CONTROL is intended to show whether an external control has enabled or disabled the heater from operating.

For installations that utilize a Magikist control panel, the EXTERNAL CONTROL indicator should be on only when the pump is running.

For installations that do not utilize a Magikist control panel, the EXTERNAL CONTROL, as supplied from the factory, will always be on. If the installer has chosen to use the EXTERNAL CONTROL with an external switch, relay, or contactor, the EXTERNAL CONTROL indicator will follow the opening and closing action of that device.

#### **6.9 FLUE STATUS INDICATOR**

The FLUE STATUS indicator provides status as to one of the key safety components of your heater, the flue sensor. For normal operation of the heater the FLUE STATUS indicator remains on.

If the FLUE STATUS indicator is flashing fast and the temperature setting display is flashing an error code, the *PROSAFE II* control is indicating that an error condition exists. Refer to section 7.0 *PROSAFE II* ERRORS & WARNINGS for diagnosing error conditions.

If the FLUE STATUS indicator is flashing slow, the *PROSAFE II* control is indicating that a warning condition exists. Refer to section 7.0 *PROSAFE II* ERRORS & WARNINGS for diagnosing error conditions.

#### **6.10 DAMPER OPEN INDICATOR**

The *PROSAFE II* control provides the necessary control to operate the Magikist damper effectively and safely. The *PROSAFE II* control will open your damper whenever there is water flow through the heater. In addition the *PROSAFE II* control will close the damper only after there is no water flow for a preset period of time. This eliminates the

on/off cycling a damper experiences in high pressure wash systems where wash guns are opened and closed frequently.

If your heater is not equipped with an automatic vent damper, the DAMPER OPEN indicator will be on whenever there is power to the heater.

If your heater is equipped with a Magikist automatic vent damper, the DAMPER OPEN indicator is on when the damper is in the open position and off when the damper is closed or in the process of opening or closing. Because of the time required to open and close the damper, there will be a delay of approximately 15 to 20 seconds from the time the FLOW ON indicator turns on (indicating water flow through the heater) and the DAMPER OPEN indicator turns on.

#### **6.11 POWER VENTER ON INDICATOR**

The *PROSAFE II* control provides the necessary control to operate the Magikist power venter effectively and safely. The *PROSAFE II* control will turn on your power venter whenever there is water flow through the heater. In addition the *PROSAFE II* control will shut off the power venter only after there is no water flow for a preset period of time. This eliminates the on/off cycling a power venter experiences in high pressure wash systems where wash guns are opened and closed frequently.

If your heater is not equipped with a power venter, the POWER VENTER ON indicator will be on whenever there is power to the heater.

If your heater is equipped with a Magikist power venter, the POWER VENTER ON indicator is on only when air flow in the power venter is proven.

# 7.0 *PROSAFE II* ERRORS & WARNINGS

## 7.1 ERROR CONDITIONS

The *PROSAFE II* control indicates error conditions via the indicator lights and the temperature setting display. Error conditions require immediate attention in order to ensure continued operation of the heater. Whenever an error condition is present, the heater will not fire. Some error conditions lockout the operation of the heater until the error is cleared by a power down/up sequence. The alarm buzzer sounds on all errors.

Should an error condition arise, the indicator light that relates to the error condition will flash on and off at a fast rate. In addition, the temperature setting display will no longer show the desired outlet water temperature, but instead will display a flashing error code Exx where xx is the error code.

Please see section 11.0 TROUBLESHOOTING for diagnosing error conditions.

## 7.2 WARNING CONDITIONS

The *PROSAFE II* control indicates warning conditions via the indicator lights. Unlike error conditions, warning conditions do not prevent the heater from firing. Warning conditions should be attended to promptly in order to ensure the continued safe operation of the heater.

Should a warning condition arise, the indicator light that relates to the warning condition will flash on and off at a slow rate.

Please see section 11.0 TROUBLESHOOTING for diagnosing warning conditions.

*Table 7.1 - ERROR CONDITIONS*

Temperature Setting Display Flashes	Indicator Light Flashing Fast	Description	Requires Power Down/Up Sequence to Clear
E10	FLUE STATUS	Problem with communication to flue sensor (open).	No
E11	FLUE STATUS	Problem with communication to flue sensor (short).	No
E15	FLUE STATUS	Flue overheat condition.	Yes
E20	THERMOSTAT	Problem with communication to temperature sensor (open).	No
E21	THERMOSTAT	Problem with communication to temperature sensor (short).	No
E30	REQUEST FOR HEAT	Problem with OUTPUT driver (open).	Yes
E31	REQUEST FOR HEAT	Problem with OUTPUT driver (short).	Yes
E59	(none)	Problem with internal memory.	Yes

*Table 7.2- WARNING CONDITIONS*

Indicator Light Flashing Slow	Description
FLUE STATUS	Temperature in flue is near or below freezing. Water in heater coil is in danger of freezing and damaging coil.
FLOW ON	Flow has been asserted for more than 10 minutes.