HPS Controls Ltd.

Series 900 PSS Primary/Secondary Stations

Heating and Radiant Floor Zone Control Stations

Installation Instructions



Thank you for purchasing the finest in heating and radiant floor Control Stations. We are confident that you will enjoy years of trouble free service from this Station. As with any product requiring specific installation guidelines, a good understanding of **ALL** the system components and final product is necessary to achieve the optimum results. This manual has been kept as short and uncomplicated as possible.

Please read the entire manual before beginning your installation



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Applications & Features

PSS Zone Control Stations	 Consists of a single pre-piped and pre-wired unit to control up to 6 zones of Hydronic heating. Installer can configure and choose which zones are high or low temperature by setting simple jumpers. Each circulator pump is able to operate a specific zone independently. UPS 15-58FC Grundfos pumps are standard, with optional UPS 26-99FC (Iron), UPS 26-99BFC (Bronze), UPS 15-55SFC (Stainless) and UPS 15-55F/LC (Alpha) Grundfos pumps available.
High Temperature Zones	Used for: Fancoils Indirect Hot Water Tanks Base Board heating Joist heating
Low Temperature Zones	Used for: In-Floor Heating
Circuit Board Technology	 New circuit board technology enables the optimum in complete boiler system control, and simplifies wiring of the system. Features within the circuit board include: Boiler High and Low temperature end switch contacts Various timer settings for pump exercise Low water cut off contacts with indicator Zone one and two priority setting Post purge feature Jumpers for adjustment of all field settings Each zone to be set, supplying either high or low temperature output from a condensing boiler

Zone Control Station Installation

Important	All local code requirements must be followed. Contact your local plumbing inspection department for requirements in your area.
Installation Instructions	Refer to your shipping list and confirm that all of the components have been received and are undamaged. If you received damaged material, please notify the freight forwarder and the supplier immediately.
1.	The Zone Control Station should be installed close to the heating appliance to simplify the piping installation.
	 Fasten the Station to the wall using a minimum of six #10 size screws.
	 When possible fasten a wood backing of either 2x4 or plywood in place to support the Station.
	 Attach a 2x4 to the wall to support the Station from underneath when mounting the Station. Remove after mounting the Station.
2.	The "Main Supply" and "Main Return" lines to the Zone Control Station are 1 ¼" copper.
	1 ¹ / ₄ " ball valves must be installed externally on the main supply and return line to isolate it from the boiler. This will assist in purging of the system and for servicing.
	 Zone 1 supply and return lines are 1" copper and come with attached ball valves on the supply and return.
	 Zone 2 thru 6 supply and return lines are ³/₄" copper and come with attached ball valves on the supply and return.
3.	The $\frac{1}{2}$ " feed water connection located at the bottom of the station is designed to accommodate an external expansion tank, along with a system feeder or fill valve assembly.
4.	The Indirect tank or Domestic water exchanger, in most applications, should be installed on the Zone 1 supply and return. This will allow it to benefit from the priority zone feature and the 1" piping for optimal flow.

Wiring a Station

	Refer to Diagrams "A", "B" and "C" for illustrated circuit board and jumper placement.
Main Power Supply	 Each Zone Control Station comes complete with a: Printed Circuit Board Main Disconnect Switch Both are located in the top right hand corner of the Station. The Zone Control Station is designed to use <u>110V/60HZ/1PH</u> power supply. The power must be connected to the factory installed, black and white, line voltage wires and ground wire attached to the green wire.
Thermostats/ Aquastat	 The thermostats or Aquastat are wired directly to the circuit board. On the larger stations, there are a total of six thermostat connections on the board, each corresponding to a specific zone. When the connections are closed between terminals "R" and "W1", pump number 1 will be energized. The same applies for zones 2 thru 6 if equipped. An 18-2 LVT thermostat wire must be installed. Thermostats that require 24 volts AC, terminal connections "R" and "C" must be used. An 18-3 LVT thermostat wire must be installed. Within the building, place the thermostats in the desired location within the zone on an inside wall. The thermostat must be located where it will not be affected by heat sources such as a fireplace, TV, sun, or heat/ventilation duct. Note: Check that the thermostat heat anticipator is set for 0.40 amps.
Dry Contact for Boiler High Temperature	 This "2 wire terminal can be wired back to the Boiler's high temperature/indirect sensor terminals. This will signal the boiler that a "high temperature" zone requires heating and will allow the boiler to ramp up to its domestic or high temperature setpoint. If the station is installed on a boiler that only utilizes a single input and temperature setpoint, the "2-wire" must then be wired to the Boiler thermostat connections.

Wiring a Station, Continued

Dry Contact for Boiler Low Temperature	This "2 wire" terminal can be wired back to the Boiler's themostat or Central heating terminals. This will signal the boiler that a "low temperature" zone requires heating and will allow the boiler to run on its heating setpoint or reference its outdoor reset setpoint.
High, Low Purge Feature	The high temperature zones always have priority over the low temperature zones. This feature prevents any high water temperature from entering any of the low temperature zones.
	 When a high temperature zone is on and shuts down within 1 minute: Low temperature zone will be allowed to energize. Low temperature end switch will close.
	When a high temperature zone is on and shuts down after 1 minute:
	 High temperature end switch opens. High temperature zone remains on for a 40 second purge cycle to allow the high temperature water in the primary loop piping to dissipate through the zone.
	 After the 40 second purge cycle completes, the low temperature zone will be allowed to energize. The low temperature end switch will close.
	When a high temperature zone is energized while a low temperature zone is on:
	 Low temperature zone will shut down as the high temperature zone has priority.
	Post Purge Feature:
	The last zone to de-energize will remain on for 2 minutes to allow the tempered water in the primary loop piping to dissipate through the zone.
Setting High or Low	Refer to Diagram "C" example of a 4 zone circuit board. The 6 zone model follows the same principle.
Temperature	There are a number of jumpers, located on the circuit board, labelled H10 thru H13 (4 zone board) or H10 thru H15 (6 zone board). These jumpers allow the installer to choose zone designation as "high" or "low".
	By moving the jumper on the circuit board, a specific zone can communicate with the boiler and ask the boiler for "high" or "low" temperature demand.
	Note: Control stations will come preset from the factory configured to the "high" temperature end switch.

Wiring a Station, Continued

Low Water Cutoff	Note: This connection on the circuit board is optional and does not have to be wired in. If a sensor is not going to be wired to the board, the jumper next to the Low Water Level connection terminals must remain in place.
	A Low Water Level Sensor is commonly installed on Boiler piping, and can be wired directly into the circuit board.
	The circuit board is also equipped to provide a "24V HOT" connection to the Low Water sensor if required. The Switch mechanism within the sensor should be wired to the connections labelled "WAT LVL" and "24V COM".
	In the event of a low water situation, the sensor will open, and in turn, open the dry contact to boiler shutting the boiler down.
	The board is also equipped with an LED light that will turn off, if a low water situation should arise.
	Caution: Do not apply any power source to the water sensor switch mechanism other than that from the circuit board.
Boiler Protection Sensor	Note: This connection on the circuit board is also optional and does not have to be wired in. If a sensor is not going to be wired to the board, the jumper must remain in place. If a sensor is desired, it must be a specific sensor supplied only by HPS Controls Ltd.
	This sensor is beneficial when used with cast iron boilers. It prevents cool fluid from returning to the boiler, which reduces the risk of any condensation forming on the boiler heat exchanger.
	If the sensor is used, the sensor itself should be installed on the primary loop return line to the boiler.
	 The boiler protection temperature can be adjusted between 125 and 175 °F. To set, adjust the setscrew labelled "R26" on the circuit board. If the boiler return sensor reads a temperature below the dialled setting, it
	will not allow any of the circulating zone pumps to come on until the minimum temperature setting is measured by the sensor.
	Continued on next page

Wiring a Station, Continued

TimerTo prolong the life of the circulators within the Station, it is equipped with
pump exercise timers.

- There are four different timer settings that can be chosen depending on preference.
- The various timing settings are set by adjusting the jumper on terminal H8 located on the bottom right corner of the circuit board.
- Refer to Circuit Board Diagram "A" for the different timer settings available.

When the timer is activated, it will cycle all pumps within the station upon initial power up.

Jumpered	Time Cycle
AB	OFF
BC	5 min every 24 hours
CD	3 min every 10 days
DE	3 minutes every 24 hours

Zone Located on peg terminal "H9".

Priorities

When Zone 1 and/or 2 priority is jumpered, it will shut down Zones 3 thru 6 if there is a demand on Zone 1 or 2.

For example, this feature would be used if prioritized zones were being used as a "high" temperature zone with an indirect hot water heater. This would direct all of the Boiler's capacity into heating the domestic water which, in turn, would result in a higher recovery rate.

Note: The Zone 1 or 2 priority feature does have a "Priority Safe" control that will only allow Zone 1 or 2 to prioritise for 1 hour.

PrintedThe Printed Circuit Board is protected by an internal Polyswitch or
Overcurrent protection device. If the switch trips, it will automatically reset
itself over a short period of time. There are no fuses on this board.BoardA multimeter must be used for all testing required.NOTE: Power surges are not covered under warranty.

System / Station Purging

	Refer to Diagrams "D" for illustrated Zone Stations.
Removing Air from the System	All the air in the system must be removed during the filling of the system. Each zone must be purged independently. The PSS Station comes equipped with a hose bib purge valve to aid in this procedure.
	 Place a garden hose on the purge valve within the Station, run to a convenient drain, and open the purge valve.
	2. The 1 ¼" ball valve located on the primary loop within the station must be shut off for purging.
	 Ensure that the externally installed boiler return ball valve is closed. Close the ball valves on all zone supplies and returns.
	 Open Zone #1 supply and return ball valves. Allow the water to flow through Zone #1 until the water coming out from the hose has no air showing. Continue this for each circuit, purging one zone at a time.
	Note:
	 Close each zone after purging so that only one zone flows at a time. In some instances, if running a zone supply to a distribution manifold for in-floor piping, purge each individual floor loop before purging back to the station. When all zones have been filled and purged, open all valves. If the station is located a long distance from the boiler, it may also be necessary to purge the main boiler supply and return line.
	After all zone and boiler piping has been filled and purged, open all valves.
	<u>Caution</u> : Do not forget to open the valves at the Zone Control Station supply and returns, and all valves at the zone manifolds.
lf using a Floor Drain	Place the hose into the floor drain approximately 3" to 4" below the water line to allow for the bubbles to be seen as they rise to the surface. Completing the purging procedure twice will reduce the chance of any air in the system. As an option, if a system pressure feed tank is being used, the purge hose can dump back into the feeder tank until a constant stream of fluid is established.
Cold Weather Startup <u>Caution</u>	When doing cold weather start up, it is possible that areas of the slab may be below freezing even with temporary heat being provided. The system should not be filled and purged until it is ready to have the system circulating with the boiler in operation and applying heat to the slab. Depending on the starting temperature of the slab, it may take hours or days for the slab to reach radiant floor operational temperature due to the large thermal mass.

Circulator Settings

	Refer to Diagram "E" for the Grundfos pump curves.
Setting Speed of	Once all the piping, wiring, and purging has been done, the circulators within the Station have an adjustable speed setting that needs to be set.
Zone Circulators	Zone Circulators provided within the Station are Grundfos UPS 15-58FC (Iron) , UPS 26-99FC (Iron), UPS 26-99BFC (Bronze), UPS 15-55SFC (Stainless) and UPS 15-55F/LC (Alpha).
	These pumps are very flexible due to the option of setting 3 different operating speeds to match the head loss / g.p.m. of the specific zone/boiler.
	To determine the desired speed setting, refer to "Grundfos Pump Curves" diagrams. Find the curve which best matches your zone head loss and flow rate, then set the speed accordingly.
	 Adjust the Circulator by turning the set lever (located on the side of the circulator housing) to the required setting 1, 2, or 3.

Powering up the Station

Powering up the Station	To power up the station follow these instructions:
	1. Turn on the power from the main electrical disconnect.
	2. Turn on the ON/OFF switch located on the Zone Control Station.
	 Be sure the power indicator light is ON, showing power to the Zone Control Station.
	Note: Any time power is applied to the Zone Control Station the timer system will activate if any of the timer jumpers are in place.
	 Check that the Timer-LED light on the circuit board is flashing. This is the Normal Condition.
	 If light is ON continuously, this is an Abnormal Condition. There may be a problem with an external low voltage connection to the board. Check all thermostat and end switch connections.
	If light is OFF, this is also an Abnormal Condition.Check power supply.
	5. Wait for the pump timer override period to finish if activated. Turn up the thermostat for each zone in turn. Confirm that each zone is operating properly, and that the correct end switch is closing.
	 On a demand from the thermostat, the zone specific circulator will start along with the primary circulator, giving flow to the activated zone. The LED light for each zone will light up on the Circuit Board
	• The LED light for each zone will light up on the Circuit Board.
	<u>Note:</u>

To troubleshoot possible problems, check operating temperature of pumps. If a pump seems to be running much hotter than any of the others, there may be too much head pressure within that zone, or the zone may be air locked. In many cases if air is still present in the system, the air can move around and air lock zones that were previously purged.

Diagram A (4 Zone PSS Circuit Board)



Diagram B (6 Zone PSS Circuit Board)



Diagram C (Circuit Board Jumper Placement Example)

This example also applies to a 6 Zone Circuit Board

CAUTION

Before start-up proper jumper placement must be performed



For EACH ZONE: Set the jumpers to the appropriate positions as shown below



Example: Two HIGH - Two LOW - with Primary Pump







Diagram E (Grundfos Pump Curves)



UPS 15-58FC/FRC Super Brute





ALPHA 15-55F/SF

UPS 26-99FC/BFC Super Brute



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Warranty

Hydronic Zone Control Stations

LIMITED MANUFACTURER'S WARRANTY

We warrant products manufactured by HPS Controls to be free from defects for a period of one year from the factory date of purchase. In the event of any claim under this warranty or otherwise with respect to our products which is made within such period, we will at our options, repair or replace such products or refund the purchase price paid to us by you for such products. In no event shall HPS Controls be liable for any other loss or damage, whether direct, indirect, incidental, or consequential. This warranty is your exclusive remedy and shall be in place of any other warranty or guarantee, express or implied, including, without limitation, any warranty of merchantability or fitness for a particular purpose. This warranty may not be assigned or transferred and any unauthorized transfer or assignment thereof shall be void and of no force or effect.

CONDITIONS OF SALE

TERMS: Net 30 days. Invoice date is the date of shipment. Subject to credit approval. Past due invoices are subject to 2% per month (24% per annum) late charge.

Shipments are F.O.B: HPS Controls Ltd, Edmonton, AB. It is the responsibility of the buyer to supply the freight company with account number on the purchase order.

RETURNS: Product must be returned within 90 days of the factory date of purchase. Unopened products will only be considered. Factory authorization is required prior to any return; the return must be made within (30) days of such authorization. Product to be returned must be shipped in the original packaging, freight/duty/customs fees/taxes prepaid, and is subject to a 25% handling charge. RMA form required with model number, serial number, proof-of-purchase date and a detailed description of reason for return. Credit will only be issued on inspection approval.

Returns will not be accepted on special order (custom built) items.

CLAIMS: Claims for shortage or error in shipment must be made within (5) days of receipt. Claims for damage or loss in transit must be made directly to the delivering carrier.



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