



Installation and User Manual

Vortex Injection Module
VSM80 without Heat Exchanger
And VSMX80 with Heat Exchanger

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This document describes the installation of the Vortex Injection Module complete with pumps, plumbing components and control.

Mounting

Mount the control cabinet on a wall using suitable wall anchors. It must be mounted indoors, in a dry location. The top centre hole may be used as a temporary hanging hook until suitable screws and anchors are used to fasten the four corners to the wall. For the VSMX, the cabinet must be mounted in an up orientation for the air vent and heat exchanger to operate properly.

Electrical

Provide a standard outlet 120vac/1ph/60Hz adjacent to the cabinet or remove the cord and hard wire with appropriate wire (i.e BX cable). A switch for the outlet is recommended but not required.

Low Voltage and Sensors

All low voltage connections are found on the control box beside the controller. All temperature sensors are 10K type 2 NTC thermistors. Wires may be extended with low voltage (thermostat) wire.

Supply Sensor – Is factory installed on the surface of the pipe supplying heated fluid to the heating loops. Cover with at least ½” of pipe insulation.

Return Sensor – Is factory installed on the surface of the pipe returning the fluid from the heating loops. Cover with at least ½” of pipe insulation. Connect to Return therm and Common.

Outdoor Sensor (Optional) – Mount outdoors, preferably on a wall above snow level and out of direct sunlight (North wall). Connect to Outdoor therm and Common. Note: if not present, turn off warm and cold weather shutdown.

Boiler TT – dry contact/low voltage connection to activate a boiler whenever the module comes on. Note: The Primary Pump relay inside the control box can be used to directly run a primary pump (120vac, less than 10 Amps.)

Default configuration

Zone 1R (24v), Zone 1W, Common etc. are for standard 2 or 3-wire room thermostats. R is 24vac supply to the thermostats, W is the 24volt signal from the thermostat to bring on that zone and Common or C is optional for 3-wire thermostats.

Alternate configuration

Zone 1A (dry), Zone 1B (dry), Common, 24vac -- These four connections are for a 4-wire control. For 3-wire (typical), do not connect zone 1B. **Note: 1A and 1B are dry contacts. No voltage must be present or the iStat6 controller will be damaged.**

Plumbing – Boiler Side

Connect the boiler supply and return (top of cabinet) to the boiler or primary loop. The use of close-coupled tees or low loss header is recommended. For filling/purging purposes, install a full port shut off valve and drain valve on the return leg near the connections to the primary loop.

Plumbing – Radiant Floor Side

Connect the manifolds to the supply and return of the module. For VSMX models, a glycol fill system may be desired for areas subject to freezing such as a garage. For VSMX, connect the expansion tank. Verify expansion tank sizing required based on system volume.

Plumbing – Start up

Warning: Do not plug in the unit until it has been filled (both sides) and purged of air. Pump failure due to operating dry is not warranted. Use the external isolation and purge valves to fill the boiler side.

The drain valves and adjacent isolation valve provided can be used to fill and purge air from the system.

This document describes usage and operation of the controller for the Vortex Injection Module Control. It is recommended that the installing contractor read through this short manual in order to become familiar with the correct system setup procedure, and to take advantage of the various features available. The controller may be part of a pre-wired, packaged system including pumps and heat exchangers or it may be a stand-alone control with all pumps field wired. The controller has the capacity for up to 4 separate heating zones. Note: This is controller version 3.

Controller Basics

The controller can operate all pumps as well as a dry contact TT to activate a boiler. Through its LCD display and keypad, important system parameters may be configured and operating conditions may be monitored.

When the controller keypad has not been pressed for a few minutes, the backlight will turn off and the display may go blank. Simply press any one of the buttons to wake up the controller. By default, the controller will display a short message describing the operating status of the system. *Table 1* provides a list of the different possible status messages and their meaning. There are also a number of small icons that may appear around the edges of the display according to the current operating status.

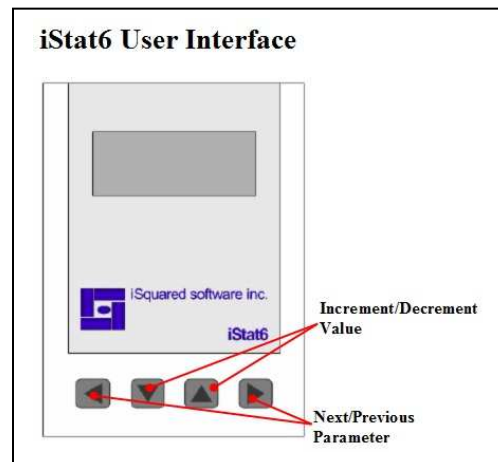
Table 2 below gives an explanation of the different icons.

Table 1 - status messages

| Message | Meaning |
|---------|---|
| READY | No calls, but system is ready |
| IDLE ON | No calls, pumps running in idle mode |
| NORMAL | At least one zone on and operating normally |
| SuppLmt | System is on but supply temperature limited due to low return temperature |
| OffDly | Off delay – system is running for set period after end of snowmelt call |
| TooCOLD | Cold weather shutdown, too cold outside to run |
| TooWARM | Warm weather shutdown, too warm outside to run |
| FreezeX | Heat Exchanger is below freeze setting |
| Test | All pumps running for testing |

Table 2 - display icons

| Icon | Meaning |
|-----------|-------------------|
| Flame | Injection pump on |
| Snowflake | Zone 1 call |
| Sun | Zone 2 call |
| Moon | Zone 3 call |
| Fan | Idle on |



Controller Keypad

By using the *option* and *setting* keys, different parameters and their settings may be displayed and modified. Use the *option* key to scroll through the available parameters, and use the *setting* key to modify the parameter's current setting (if available). By default, the control will remain in 'user' mode, in which a limited selection of parameters may be accessed. By entering 'admin' mode, additional parameters may be made available. Please exercise caution while in 'admin' mode, as these settings are meant to be accessed by the experienced user or installing contractor. A description of each of the modes is found below.

USER MODE

This is the basic display and operating mode, in which only a limited selection of parameters may be accessed and modified. Refer to **Error! Reference source not found.** for description of each item displayed.

Table 3 - User Mode Parameters

| Line 1 | Line 2 | Set.* | Description | Notes |
|---------|-----------|-------|---|-----------------|
| Vortex | ##### | D | Displays operating condition | Default Display |
| Outdoor | ###.# oC | D | Outdoor Temperature (C) | |
| Sup_Tst | ### oC | D | Target supply fluid temperature (deg. C) | |
| Supply | ###.# oC | D | Supply fluid temperature going out to the loops | |
| Return | ###.# oC | D | Return fluid temperature coming back from the loops | |
| Inj Spd | ### % | D | Speed of injection pump | |
| HeatExc | ###.# oC | D | Heat exchanger temperature (if present) | |
| VIM4 | ##.## Rev | D | Program revision number | 3.00 |

* Note: "D" in the set column indicates this parameter is for display only, and cannot be modified using the controller.

ADMIN MODE

This is the advanced display and configuration mode. It is intended only for the properly trained contractor. To enter 'admin' mode, press any button to illuminate the display backlight, then press and hold the two *outside* buttons at the same time ('user' will be displayed at first, hold until 'admin' is displayed). You can now scroll through the display items by using the inner two *option* buttons, and adjust certain values using the upper two *setting* buttons. To return the control to 'user' mode simply wait a few minutes or press and hold both *outside* buttons. Use *Table 4* as a quick reference on the items available in this mode. Detailed descriptions on important parameters are found below.

VSM Operation

There following parameters may be useful in system commissioning and troubleshooting.

CWS_ON Enable the cold weather shutdown feature. If disabled, snowmelt can operate down to any outdoor temperature.

CWS_SP (default is -20°C) – Below this outdoor temperature it is too cold for the snowmelt or idle to operate.

WWS_ON Enable the warm weather shutdown feature. If disabled, snowmelt can operate up to any outdoor temperature.

WWS_SP (default is 5°C) – Above this outdoor temperature it is too warm for snowmelt or idle to operate.

Note: If both WWS_ON and CWS_ON are set to off, the outdoor temperature sensor is ignored and not required. A jumper resistor is also not required.

Sup_Tst – The target supply fluid setting when in snow melt or idle mode. Equal to Supp_SP or Return + MAX_DT; whatever is less.

Supp_SP (default is 40°C) – The supply fluid setting when in snow melt or idle mode.

MAX_DT (default is 30°C) – Maximum allowable difference between supply and return temperatures.

IDLE_ON Enable idle mode. Loop pump will run continuously the cold weather shutdown feature. If disabled, snowmelt can operate down to any temperature.

IDLE_BLR In idle mode, the boiler comes on with the injection pump (AUTO) or is always available (HOT_BLR).

IDLE_SP (default is 2°C) – The return fluid setting when idle mode is on. Typically slightly above or below freezing.

INJ_TYPE Variable speed or fixed speed (on/off). VARIABLE requires a variable speed pump.

INJ_MAX Maximum speed limit of injection pump.

FRZ_ON Enable the heat exchanger freeze protection. If disabled, a heat exchanger thermistor or jumper resistor is not required. Set to OFF if no heat exchanger present.

FRZ_SP (default is 4°C) – Below this heat exchanger temperature, the snow melt will not operate. Slab pump shuts off; injection pump continues to operate.

Off1_Dly (zones 1, 2, 3, 4) – The system will continue to run for # hours after the call has ended. Useful if the snow sensor is in a poor location and an area requires extra melting.

RUN_ALL (Test Mode) Run all pumps for testing or purging. The display will show “Test”. Be sure to turn if OFF for normal operation. **OR** Push the small black button under the control to run all pumps for 20 seconds.

Pmp_Exr (Pump Exerciser) Set to ON to run all pumps for 30 seconds once a day. Useful to prevent pump seizing during off season. Default is OFF.

Table 4 – Admin Mode Parameters

| Line 1 | Line 2 | Set.* | Description | Notes |
|----------|----------------|-------|---|------------------------|
| SnowMlt | #### | D | Displays operating condition | Default Display |
| Outdoor | ###.# oC | D | Outdoor Temperature (C) | |
| CWS_ON | ON/OFF | | Enable cold weather shutdown feature | Default is ON |
| CWS_SP | ##.# oC | | Setpoint outdoor temperature for cold weather shutdown (low limit) | Default setting is -20 |
| WWS_ON | ON/OFF | | Enable warm weather shutdown feature | Default is ON |
| WWS_SP | #### oC | | Setpoint outdoor temperature for warm weather shutdown (high limit) | Default setting is 5 |
| Sup_Tst | ### oC | D | Target supply fluid temperature (deg. C) | |
| Supply | ###.# oC | D | Supply fluid temperature (C) to snowmelt loops | |
| Supp_SP | #### oC | | Setpoint fluid supply temperature | Default setting is 30 |
| Return | ###.# oC | D | Return fluid temperature (C) from snowmelt loops | |
| IDLE_ON | ON/OFF | | Enables idle function | Default is OFF |
| IDLE_BLR | AUTO/HOT_BLR | | In idle mode, boiler comes on with injection (AUTO) or always hot (HOT_BLR) | Default is AUTO |
| IDLE_SP | #### oC | | Setpoint fluid return temperature for idle mode | Default setting is -2 |
| Inj Spd | ### % | D | Speed of the injection pump | |
| INJ_TYPE | VARIABLE/FIXED | | Injection pump – variable speed or fixed (ON/OFF) | Factory set |
| INJ_MAX | ### % | | Maximum injection speed | Default is 100% |
| PID_PROP | ## %/oC | | PID speed control – proportional value | Default is 3.0 |
| PID_INT | ### %/sec | | PID speed control – integral value | Default is 0.20 |
| PID_DB | ## oC | | PID speed control – deadband value | Default is 0.5 |
| PID_RAMP | ## %/sec | | PID speed control – ramp rate value | Default is 5.0 |
| HeatExc | ###.# oC | D | Heat Exchanger surface temperature used for freeze protection | |
| FRZ_ON | ON/OFF | | Enable freeze protection for heat exchanger | ON if HX is present |
| FRZ_SP | #### oC | | Heat exchanger freeze setpoint | Default setting is 4 |
| Off1_Dly | ### hr | | Hours zone 1 will continue to run after call ends | Default is 0 |
| Off2_Dly | ### hr | | Hours zone 2 will continue to run after call ends | Default is 0 |
| Off3_Dly | ### hr | | Hours zone 3 will continue to run after call ends | Default is 0 |
| Off4_Dly | ### hr | | Hours zone 4 will continue to run after call ends | Default is 0 |
| RUN_ALL | ON/OFF | | Manually run all pumps for initial test and purge | Default is OFF |
| Pmp_Exr | ON/OFF | | Runs all pumps for 30sec. once a day | Default is OFF |
| VIM4 | ### Rev | D | Program revision number | 3.00 |
| Modbus | #### | | Modbus address for Net/Web Communications | Default setting is 189 |

* Note: "D" in the set column indicates this parameter is for display only, and cannot be modified using the controller.

Test Mode

Push the button under the control to run all pumps for 20 seconds or from Admin Mode turn ON RUN_ALL to run all pumps. They stay on until RUN_ALL is turned OFF.