

Smart Pump - Fill & Start Procedure

Note: The Smart Pump Multizone is not designed to do a full system purge

Default: "STUP" Setup Menu

Description	Parameter	Default Setting
Stop Frequency	B5-15	25HZ
System Pressure	B5-19	0 PSI
Dry Run	B5-12	"0" Disabled
		"0" Key Pad
Key Pad Control of On/Off Buttons:	B5-02	Enabled

- Fill canister by water source until the water level reaches 2" below down tube on the return of the canister to prevent the system from being air locked (If pump is running for several minutes and no water is returning to canister you are air locked. You must verify this by looking inside the canister to inspect flow returning to canister.)
- Open vent plug on top of pump head until you air no longer heard and solid stream of water is view
- Tighten vent plug
- Apply Power to Drive
- You will see the home screen "u" = 0 (frequency reference)
- Hit the down arrow 3 times until you see "STUP"(Setup Menu) and press Enter
- "APPL" (Application) Menu will be shown
- Hit up arrow until you see B5-19 and press enter
- change system pressure from "0" (0000.0) to 15 psi (0005.0) by pressing the "right arrow/reset" key over to the desired integer and change by hitting the up arrow to 15 psi (0005.0) and press enter
- The B5-19 will be shown and blink
- Hit escape key 2 times (Home screen frequency reference "u" = 0
 - **NOTE: Drive will only operate on "home screen/frequency reference"**

Operating the Drive/ System Start Up:

- **NOTE: Do not start the following process without a sufficient supply of clean potable water and a person to monitor water level in canister**
- All valves in the system should valves should be in the fully open position with exception of the supply and return loop field valves after bypass should be in the closed position (**refer to diagram**)
- If using Smart Pump Multizone to purge interior piping, then you must have a bypass after the heat pumps diverting water/air from supply of loop field to return of loop field (**refer to diagram**)
- Press "Run" button to start drive and begin filling your system while checking fluid level and supplying as necessary to keep water level above the return down tube in canister.

Smart Pump - Typical Start-Up Check List

- Make sure you have Single Phase x 230V power supply to Yaskawa VFD
- Motor wired for 3 Phase x 230V or low voltage diagram on motor terminal cover
- Has the loop field been purged?
 - How is the loop field separated? 12 loop circuit max purging capacity of this pump
 - Is there a bypass around the loop field? You don't want to send air to the loop.
 - Do a water level check to verify if air is present in the system. No more than 2 inch drop against a closed return valve to the canister.

SET UP MENU (STUP): This is where the contractor will need to adjust values

System Pressure: b5-19 = ? Note: VFD will not run until a value has been placed here

- Once the loop field has been purged pick the largest pressure drop of the system (heat pump size and distance) and allow water to flow only through this unit only.
- Measure psi drop from water inlet and outlet connections on the unit according to manufactures specs. Start with b5-19 setting at 15 psi and determine if flow rate has been achieved. If not increase by 2 psi increments until pressure drop is satisfied with a fully open ball valve. This value will be the system operating pressure needed.
- Bring on next unit while the 1st unit is running and set pressure drop by restricting a valve to set the correct GPM through the unit. This can be verified by psi drop from inlet to outlet connection of the heat pump from the manufactures specifications. Continue bringing all units on line and adjusting the correct flow rate.

STOP FUNCTION: b5-15

- Allow flow to the smallest unit (GPM) and make note of the running frequency.
- Set B5-15 to 1-3 Hz below the operating frequency of the smallest unit.
- Close the valve and to see if the motor shuts down
- Go to "Mon" (Monitor Menu) and look at U5-01 to see if it can hold a static pressure
- On short runs of pipe, you may need a bladder tank (pre charge = 70% of drive pressure)
- You can use 24V relays to remotely open or close a contact on the VFD to start/stop the VFD (S1-SC Jumper).

Dry Run Setting: b5-12 = 02

- Activating this setting will shut the system VFD down on feedback loss "fbl" is the sensor see less than 1 psi for 20 seconds.

POWER UP COMMAND: b1-02 = 01

- Press the local/remote key in the top right hand corner of the drive. Press the run button until the VFD begins to operate. When in operation, shut down the breaker to supplying power to the VFD until the LED screen is blank. Re-apply power and the VFD should begin operation again. NOTE: The jumper between 51 & SC must be in place.
- If running a backup generator and the switching of power is 5 seconds or less, then setting of parameter L2-01 needs changed to L2-01= 02 **(See troubleshooting page for the step by step information)**

Smart Pump – Start-up Procedure

How to Navigate the Menu:

- The start screen on the LED will be a Frequency Reference. This will show the operating frequency of the drive.
- ⬆ Displays “For” on the LED. This means the drive is allow the motor turn in a forward direction only. **NOTE:** If the drive is not able to produce pressure great than 20 psi on start up the motor is spinning backwards. Please rotate any 2 of the 3 motor leads for UVW on the drive.
- ⬆ Displays the **Output Frequency** of the Drive to the motor.
- ⬆ Displays the **Output Amps** to the motor.
- ⬆ Displays the **Output Voltage** to the motor.
- ⬆ Displays “Mon” for **Monitoring Menu**. This menu allows you to visually see many useful items. See List Below:
 - Current Fault: U3-01
 - Previous Fault: U3-02
 - Accumulated Operation Time (hrs): U4-01
 - Total Power Consumption: U4-10
 - Sensor Feedback Level: U5-01
- ⬆ ⬆ Displays “STUP” referring to **Set Up Menu**. This is where you will adjust the following settings:
 - B5-19 (System Pressure Setting) Default = 30 psi
 - B5-15 (Sleep Frequency) Default = 25 Hz (Disabled)
 - B5-12 (Dry Run Protection) Default = 0 (Disabled)
- By pressing the ESC (Escape) button, this allows you to go back to the previous screen. **NOTE: The drive will not allow operation unless on the start screen. (Frequency Reference) You can always navigate to the start screen by pressing ESC multiple times. Be sure that the jumper between S1 & SC is in place.**

Initial Operation and Start Up Procedure:

1. Make sure power supply (1x230V) is applied to the wall mounted V1000 (Variable Frequency Drive)
2. Make sure that all solenoid valves are closed.
3. Press the “ON” switch located on the V1000, this will activate the drive system. Be sure the Jumper between S1 & SC is in place.
NOTE: The jumper between S1 & SC allows forward operation of the motor and will allow the drive to retain its memory in case of a power loss. If at any point the off button is pushed on the drive, you must cycle the jumper between S1 & SC and press the “ON” button to begin operation of the V1000 drive.
4. Allow the pump to dead head against the closed discharge valve and open the vent plug on the pump head to evacuate the air. Close the vent plug when a steady stream of water exits the vent plug. This will ensure that water is forced against the seal face.
5. Slowly open discharge side valve to allow a fully open discharge.
6. Run the pump at 30 psi with all solenoid valves open to allow for purging. (Process could take 24 hours)
NOTE: If your pressure gauge does not display 30 PSI and only shows 17 PSI the motor is running the wrong direction. Shut down power to the V1000. Rotate any 2 of the 3 motor leads (UVW) to correct the rotation and repeat step 6.

Smart Pump – Start-up Procedure Continued

Balancing of the system: Parameter (B5-19) System Pressure

1. When all air is purged from system we can begin to adjust the flow rates per unit.
2. Make sure all solenoid valves are closed.
3. All flow to the unit with the largest pressure drop by manually opening the circuit solenoid valve.
4. Set the drive to operate at the following:
 - All Units = 30 Tons or less (Set drive setting B5-12 = 15) System pressure should now be 15 PSI.
 - All Units = 60 Ton to 30 Tons = 18PSI (Set drive setting B5-12=18) System pressure should now be 18 PSI.

NOTE: To change any drive setting you may remove one side of the jumper from either S1 or SC. This will allow you to change the pressure setting. To resume operation close the circuit between S1 & SC.

5. Check the flow through the unit by measuring the pressure drop across the coil (pressure drop across coil provided by manufacture of the geothermal unit). If the pressure drop is not able to be accomplished, stop the drive by removing one side of the jumper between S1 & SC. In the quick set menu, go to B5-19 and increase the PSI setting by increments of 2 (ie. Start point “B5-19= 15” now change to “B5-19=17”)
NOTE: The flow rate through the unit is adjusted with a ball valve on the water-out side of the circuit piping. By opening the valve this will allow a greater pressure drop across the coil.
6. Repeat this procedure until you are able to get the correct pressure drop across the coil. This will enable to correct amount of flow through the unit.
7. When the correct flow rate is established allow flow to a 2nd heat pump and adjust the flow rate through the coil by reading the pressure drop between the inlet and outlet of the coil.
8. Repeat this procedure until the flow rates are adjusted for all heat pumps.

Adjusting the Sleep Function: (Parameter B5-15) Sleep Frequency

1. Perform a static pressure test:
 - Allow all of the solenoid valves to close.
 - Make note of the operating frequency on the drive and the pressure on the liquid filled gauge assembly when the drive is operating at a no flow condition
 - Pull one side of the jumper between S1 & SC to disable the drive.
 - Wait between 1 to 5 minutes to see if the system is able to hold the static pressure between the check valve before the pump and the solenoid valves. If the system is not able to hold the pressure maintained on the drive please refer to the troubleshooting section of the manual.
2. If the system is able to maintain pressure then change in the quick setting menu parameter B5-15 to 3 Hz below the operating frequency noted before.
NOTE: The drive by default is set up at 25Hz. You must change this to 3 Hz below the operating of the drive at a no flow condition.
3. This will enable the stop function of the drive. Cycle all heat pumps to ensure proper operation of the stop function.

Setting the Dry Run Protection: Parameter B5-12

1. By default the drive setting for Parameter B5-12=0 (Disabled)
2. Pull out one side of the jumper between S1 & SC to disable the drive.
3. Go to the Quick Start Menu and change B5-12 = 1 (Dry Run Enabled)
NOTE: The dry setting ensures that there is proper water level in the canister.

Smart Pump -Yaskawa V1000 Troubleshooting

Pressure Transducer: 4-20mA, 0-120psi

Connections: Brown = +V, Black = A2

- NOTE: At the VFD you can arrow up to the “mon” (monitor menu) and select U5-01 to see a digital reference to the pressure sensor reading.
- “0” Psi could be that the wires are backwards or in the wrong terminal
- Digital reference does not match the liquid filled gauge. (Check rotation of the motor or if the you can reference frequency on the home screen “u = 60 Hz” and the pressure is 70% of the rated head/psi) Most of our systems will top out at 20-25psi spinning incorrectly even though 30-40 psi is in the setting of “b5-19”
- The drive should output 0-10V between “+V” & “Common” to read the sensor correctly

Nuisance Faults: Can be reset by pressing local/remote key (top right button of VFD) and then pressing reset

- “FbI” (feedback loss), it is possible that the dry run is activated (b5-12 = 02). The first VFD’s needed 1 psi for 4 seconds not to generate this fault. I have changed the programming to trip after 20 seconds.
- Alternating Control: Switching between drives you must change the parameter “H2-01”. The factory setting is “00E”. By changing this “H2-01” setting it is jogging the contacts on the VFD on speed control or frequency. The setting needs to be changed to “001” when alternation is needed.

Setting the Power Up Command: b1-02 = 01

- Press the local/remote key in the top right hand corner of the drive. Press the run button until the VFD begins to operate. When in operation, shut down the breaker to supplying power to the VFD until the LED screen is blank. Re-apply power and the VFD should begin operation again. NOTE: The jumper between S1 & SC must be in place.
- If running a backup generator and the switching of power is 5 seconds or less then setting of parameter (L2-01= 02) needs to be done. Continue below on directions to change this setting to “01”

To Change this L2-01, move cursor by right arrow key on keypad, up and down arrow changes units

- Press up arrow until you see the Parameter Menu (Par)
- Press Enter and “A” on the A1-01 should be flashing
- Use up arrow to change A to L
- Navigate with right arrow and use the up arrow to change the display L1-01 to display L2-01
- Then navigate with right arrow to 01
- Press Enter to display parameter
- Navigate with right arrow to change the number 01 parameter to 02 by using the up arrow
- Press Enter
- Hit Escape button 5 times to exit the Parameters Menu

How to Enter the Parameter Menu: (Changing A1-01 = 002) (Advanced Level)

Note: Move cursor by right arrow key on keypad, up and down arrow changes units

- Press up arrow until you see the Parameter Menu (Par)
- Press Enter and “A” on the A1-01 should be flashing
- Navigate with right arrow to 01
- Press Enter to display parameter
- Navigate with right arrow to change the number to 0002 by using the up arrow
- Press Enter
- Hit Escape button 5 times to exit the Parameters Menu