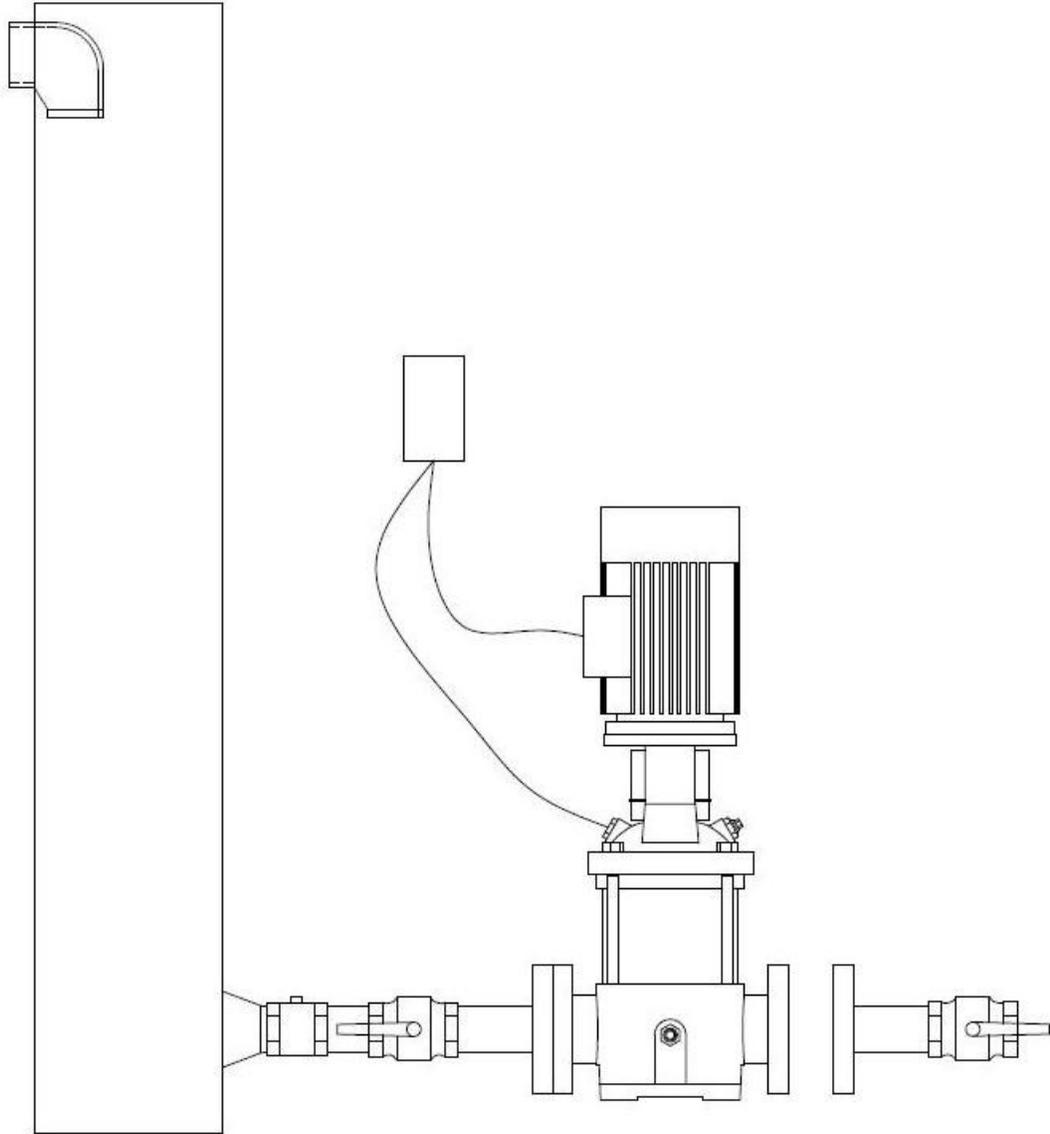


# ***SMART PUMP***

## ***MULTIZONE INSTALLATION & START UP MANUAL***



### **COMMERCIAL FLOW CENTER SERIES**

866-646-6724  
712-652-3424  
[www.bdmfginc.com](http://www.bdmfginc.com)



**B&D**  
MFG, INC.®

ALL THE PUMP YOU NEED AND MORE

# PRODUCT DATA

## System Introduction –

For applications that require a little more than it's Multizone cousin can provide, the Smart Pump Multizone utilizes the latest in "Variable Speed Technology". Designed for the high end residential or commercial application, the Smart Pump Multizone can be used with single phase power to keep things simple. With no added controls to complicate your system, the Smart Pump Multizone is very user friendly, easy adjustable and customized for your source side geothermal systems.

## Efficient Operation –

When you look at pump motor efficiency, you will notice that the smaller the motor, the less efficient its operation. The Smart Pump Multizone utilizes efficient motor technology with its one single motor. In fact, less horse power will be used with a single pump/motor combination, verses several small circulators for your multizone heat pump system.

## Installation Simplicity –

With only one pump and motor to install, contractor installation time is reduced. All the work consists of: setting the GT canister, mounting the pump to the provided flange, mount the motor to the pump, mount the variable speed drive unit on the adjacent wall and the electrical power. Its that simple and your system will be ready to run.

## Competitive Installed Costs –

When you look at the cost of purchasing and installing several pumps, switching to the Smart Pump Multizone will save more than just energy.

## Maintenance Simplicity –

The Smart Pump Multizone utilizes one of the industries most popular in-line circulators. This bullet proof pump is very reliable, however in the event of a pump failure, parts and qualified technicians are readily available.

## Sealable Lid –

Provides for a closed, sealed system, while allowing for ease of access to sample fluid and measure flow rate.

## Inlet Connection –

Stainless Steel MPT connection is provided as standard, with various transitions available upon request. Size based on canister size (see chart— Smart Pump Multizone Dimensions).

## Check Valve –

Provided before the pump, assuring proper flow and reliable pump operation.

## Canister –

Provides a standing column of water on the suction side of the pump to insure a flooded volute and reliable pump operation. Size required is based on max load design flow rate.

## Optional Isolation Valve –

An isolation valve is available on the pump discharge for ease of maintenance (not shown).

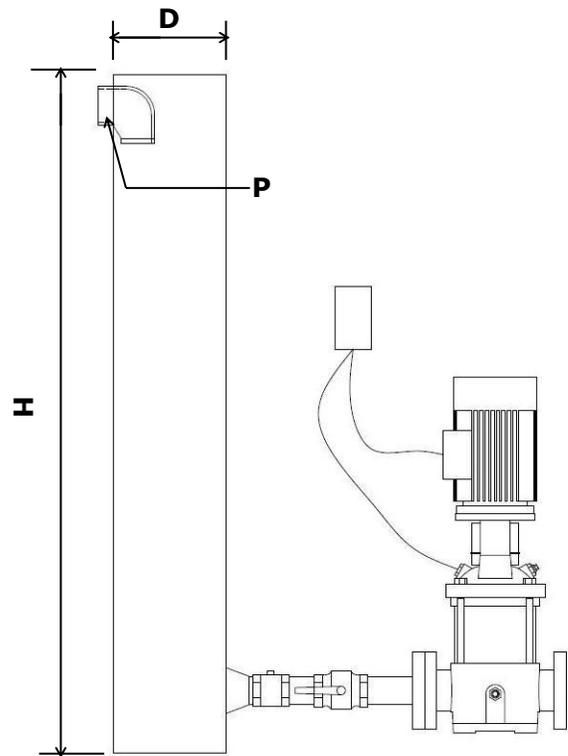
## Variable Speed Pump Control –

The Smart Pump drive is robust and designed to operate in some of the harshest conditions.

## Insulation –

3/8" Armaflex insulation, factory provided, to prevent condensation.

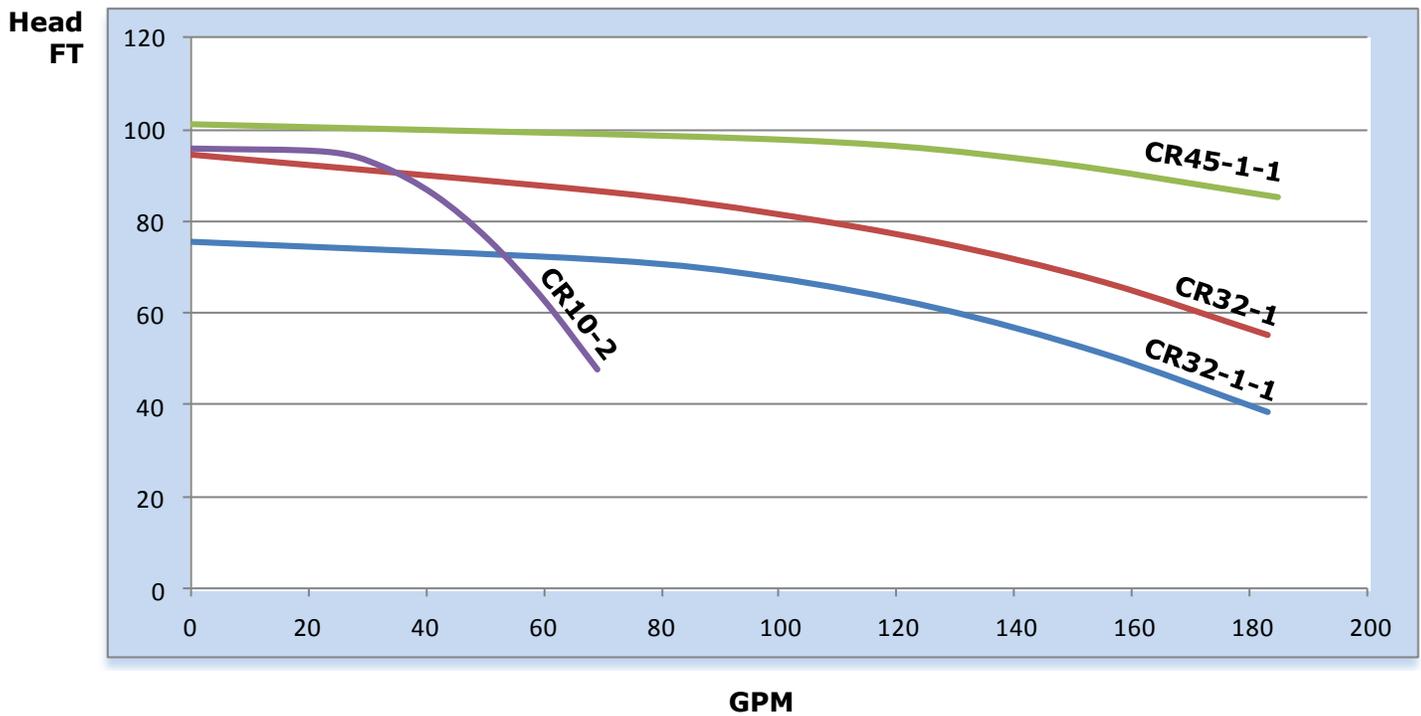
## Dimensions –



Smart Pump Multizone Dimensions (in)				
Size	H	D	P (IPT)	Volume (gal)
B	62	12	2	17.5
C	70	12	3	20.8
D	70	14	4	29.5

# PRODUCT DATA

## Performance Curve -



## Pump Information -

Pump Model	Nominal Flow Rate	Maximum Pump Efficiency (%)	Flow Range (GPM)	Max Operating Pressure (PSI)
CR 10-2	45	66	0-55	30
CR32-1-1	140	76	0-180	35
CR32-1	140	76	0-180	35
CR45-1-1	180	78	0-200	39

# INSTALLATION

## Installation Guidelines & Procedures for B & D MFG., INC. Smart Pump Multizone Flow Center

### SAFETY INSTRUCTIONS:



This safety alert symbol will be used in this manual to draw attention to safety related instructions. When used, the safety alert symbol means: ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!  
*FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.*



**WARNING:** Electrical shock and potential circuit damage. Disconnect power supply before beginning installation. Failure to follow these instructions could result in serious personal injury or death and property damage.



**WARNING:** Improper wiring (including wire used) can cause electric shock and/or fire. Wiring connections must be made in accordance with all applicable electric codes/ordinances. Use copper wire only. Failure to follow these instructions could result in serious personal injury, death and/or property damage.



### Electrical Service & Connections –

The Smart Pump Multizone Flow Center requires a dedicated 240 volt single phase circuit. Wire and fuse sizes shall be in accordance with local codes and that of the National Electric Code. Low voltage wiring must be isolated from primary voltage lines and connections.

### Maximum Rated Amperage of Yaskawa VFD –

Input Voltage: 1x230V

Output Voltage: 3x230V

2HP & 3 HP Drive (0012): 12 Amps

5HP (0018): 17.5 Amps

### Stop Function –

The system must be able to maintain a static pressure between the solenoid valves and the check valve before the pump. If the system is not able to maintain this static pressure, then the system will not have a stop function. This can be done by allowing continuous flow through the smallest heat pump and still allowing the solenoid valves to close on all other heat pumps to reduce the flow. resulting in less energy consumption. (refer to diagram on page 13)

### Flow Center Canister Placement Requirement –

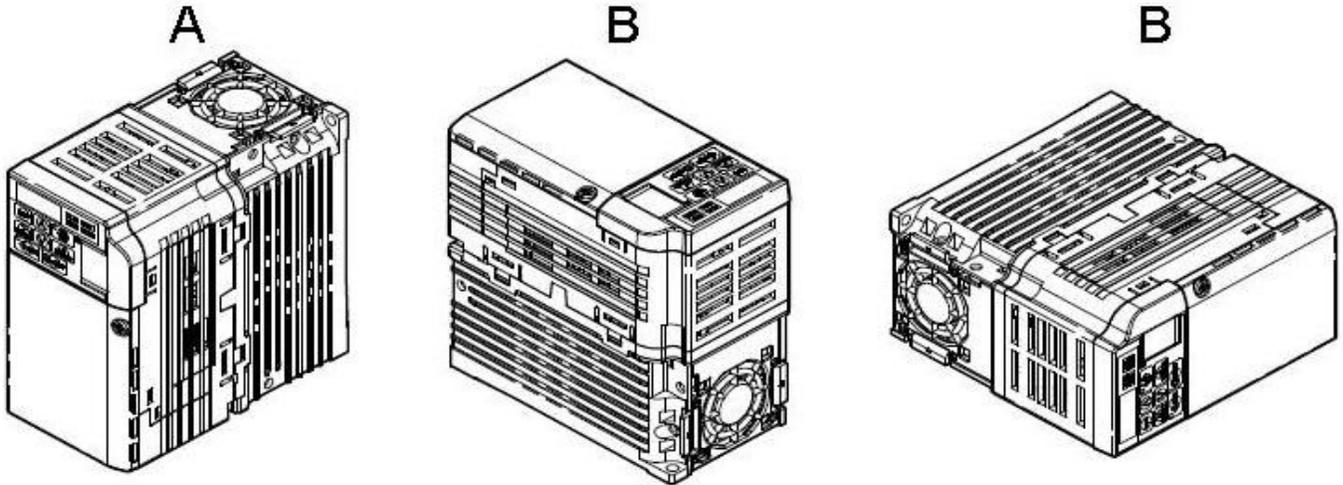
A level location with 36" of clearance around the canister is required. This allows enough room to hook-up the CR series pump and associated piping. An allowance for 36" of clearance on the top of the canister (between lid and ceiling) for insertion of an optional flow meter tool and system fluid access.

# INSTALLATION



**WARNING:** It can be extremely dangerous to touch the electrical parts, even when the main supply has been disconnected. Wait at least four minutes after the input power has been removed before servicing the V1000.

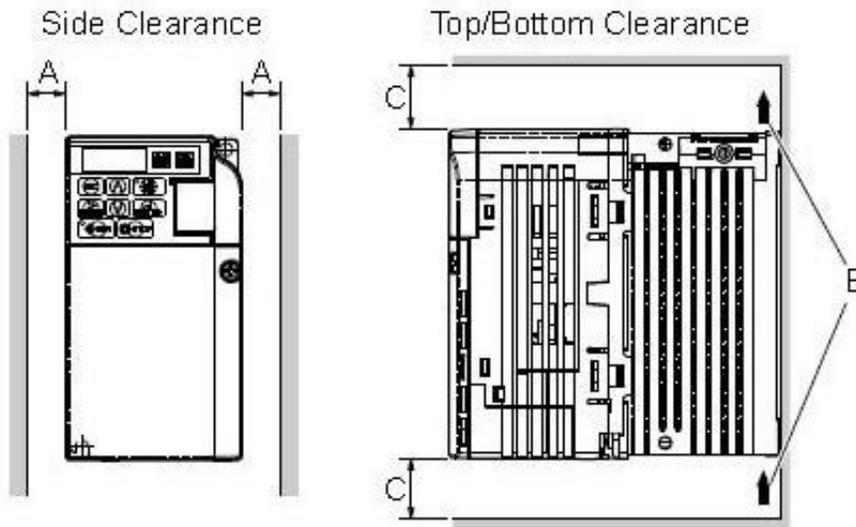
## Variable Speed Drive Placement Requirements –



**A – Correct**

**B – Incorrect**

*Install the drive upright as illustrated to maintain proper cooling.*



### Minimum Clearance Dimensions –

- A = 1.25"
- B = Airflow Direction
- C = 4"

# INSTALLATION

## Installation Recommendations –

- It is recommended that an isolation valve be installed on the discharge side of the pump. This will allow for ease of service and can also aid in the start up procedures.
- All pipe, valves and fittings should be at least the same diameter as the discharge pipe or sized in accordance with good piping practices to reduce excessive fluid velocities and pipe friction losses.
- Before the pump is installed, it is recommended that the discharge piping be pressure checked to at least 40 psi or as required by codes and local regulations.
- Whenever possible avoid high pressure loss fittings, such as elbows or branch tees.
- It is recommended that the discharge pipe is ten pipe diameters in length before the nearest fitting.
- The piping should be adequately supported to reduce thermal and mechanical stresses on the pump.
- Good installation practice recommends that the system be thoroughly cleaned and flushed of all foreign materials and sediment prior to pump installation.
- It is recommended to adequately support all elbows and tees immediately after pump connection. Excess turbulence can be created when pipe fittings are installed close to the pump discharge, causing vibration or movement if not properly supported.



**WARNING:** Be sure to anchor piping properly as two-way control valves may cause water hammer resulting in excessive pipe movement. Possible pump and pipe damage may occur if the system is not properly anchored.

## Unpacking Instructions –

The CR pump end will ship separate from the motor. The seal is not installed, due to the potential damage that may be caused during shipping to the ceramic face. There is a white teflon support bushing holding the pump shaft stationary. The seal carrier must be taken off the pump and the white teflon support bushing must be removed prior to installation.

Located the box with the shaft seal & follow instructions in the shaft seal box.

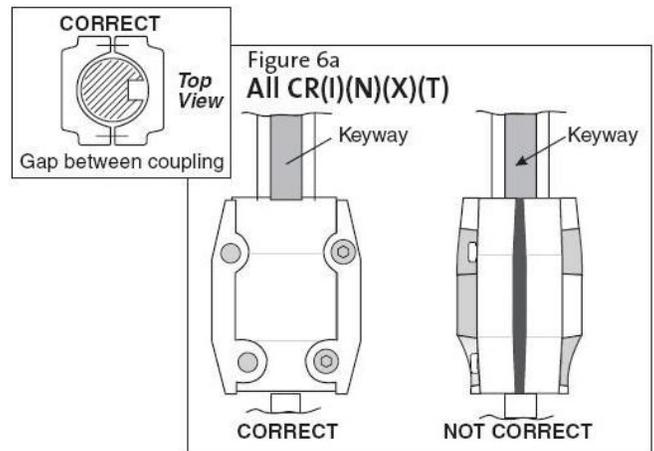
Proceed to the next step.

## Motor/Pump Assembly –



**WARNING:** The following instructions are specific for the pump noted. Please take note of the pump being installed. Pump model is designated as CR\_\_-\_\_ (i.e. CR31-1).

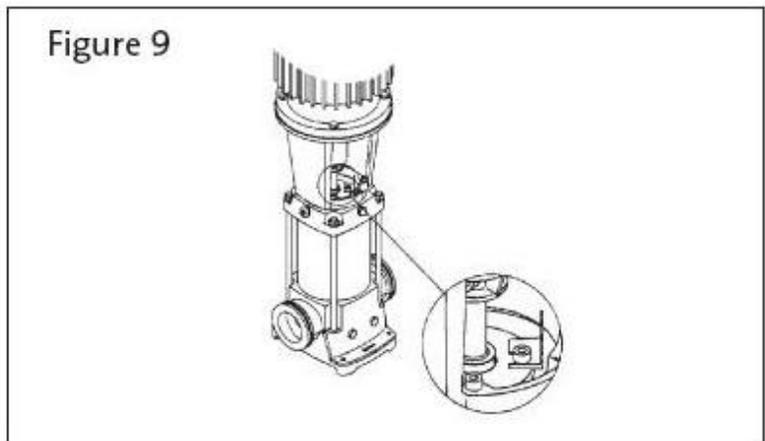
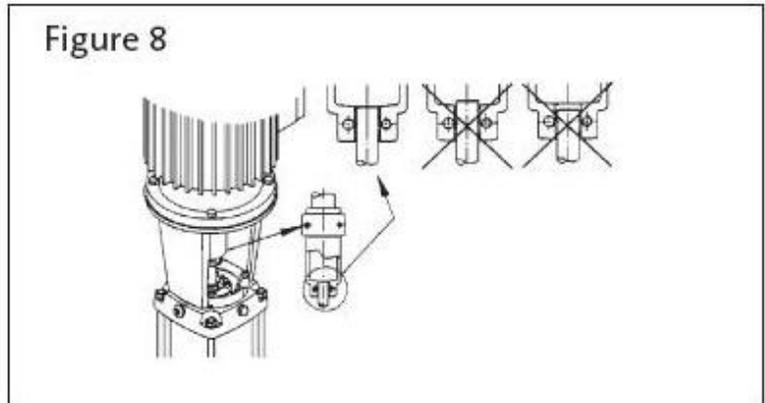
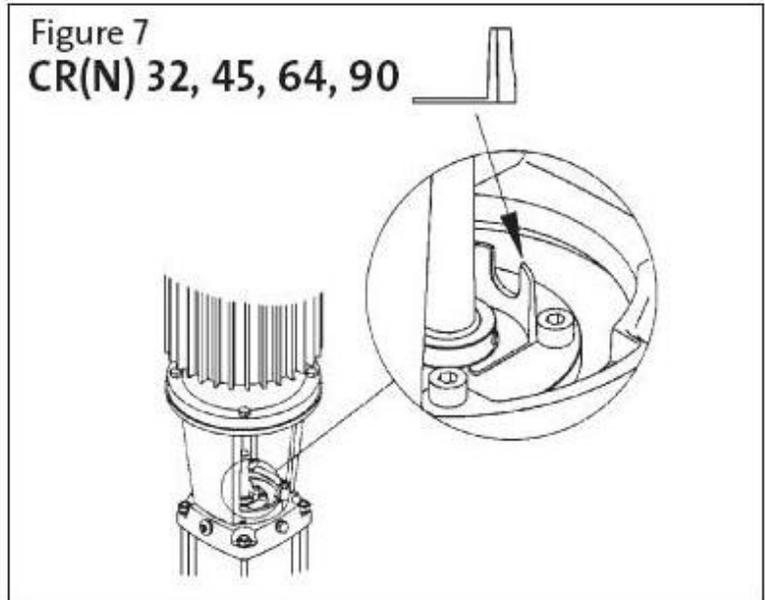
1. Remove key from motor shaft, if present, and discard.
2. Thoroughly clean the surfaces of the motor and pump end mounting flange. The motor and shaft must be clean of all oil/grease and other contaminants where the coupling attaches. Set the motor on the pump end.
3. Place the terminal box in the desired position by rotating the motor.
4. Insert the mounting bolts, then tighten in a cross pattern evenly. For 3/8" bolts (2 HP) torque to 17 ft.-lbs., for 1/2" bolts (3 to 5 HP) torque to 30 ft.-lbs.



# INSTALLATION

## CR 32 & 45 –

1. Place the plastic adjustment fork under the cartridge seal collar (see Figure 7).
2. Fit the coupling on the shaft so that the top of the pump shaft is flush with the bottom of the clearance chamber in the coupling (see Figure 8).
3. Lubricate the coupling screws with an anti-seize and lubricating compound. Tighten the coupling screws (finger tight) while keeping the coupling separation equal on both sides and the motor shaft keyway centered in the coupling as shown in Figure 6a (page 6).
4. When the screws are tight enough to keep the couplings in place, then torque the screws evenly in a crisscross pattern. Torque coupling screws to 62 ft.-lbs.
5. Remove the adjustment fork from under the cartridge seal collar and replace it to the storage location (see Figure 9).
6. Check to see that the gaps between the coupling halves are equal. Loosen and readjust if necessary.
7. Be certain that the pump shaft can be rotated by hand. If the shaft cannot be rotated, or it binds, disassemble and check for misalignment.



**WARNING:** CFC\_ Multizones are a non-pressurized unit and should NEVER be pressurized for any reason.

# ELECTRICAL WIRING INFORMATION

## Electrical Installation –

It is the responsibility of the installer to ensure correct grounding and protection in accordance with national and local standards.



**WARNING:** The voltage of the V1000 is dangerous whenever the drive is connected to AC power. Incorrect installation of the motor or drive may cause damage to the equipment, serious injury or even death. Comply with safety instructions in this manual, as well as local and national safety regulations. Touching electrical parts may be fatal even after equipment has been disconnected from the AC power. Wait at least four minutes for current to dissipate.

## V1000 Main Wiring –

The Smart Pump variable speed drive is capable of taking standard, single phase 230 volt power and converting it to three phase power to run the Baldor motor. Single phase 230 volt power shall be connected to terminals R-L1 and S-L2 as shown in Figure 1b.

The drive has a high leakage current and must be grounded properly for safety. Keep all grounding cables as short as possible. Follow all local and national safety regulations.

## Motor Wiring –

All of the Baldor motors are three phase motors capable of running on either 208-230 voltage or 460 voltage. B & D Mfg, Inc's Smart Pump Multizone must be wired for low voltage 208-230 volt power. Remove wire box cover and follow the wiring schematic for LOW VOLTAGE as the V1000 variable speed drive will provide three phase 230 voltage to the motor. Take extra precaution as all the wires are color coded and are labeled with the appropriate numbers. Motor wire connections L1, L2 and L3 are to be connected to the V1000 variable speed terminals. The motor "L" line connections shall be connected to the drive as follows L1-U, L2-V, L3-W (See Figures 1a & 1b). Follow the wiring diagram on the motor label for the correct motor wiring combination which matches 230 supply voltage. Once this has been confirmed, reconnect the power supply wiring to the motor. Check the direction of rotation by bump-starting the motor (Refer to Start Up Procedure on page 12). Rotation must be left to right (counter-clockwise) when looking directly at the coupling. Shut off the power, then re-install the coupling guards. After the coupling guards have been installed, the power can be turned back on.

## Pressure Transducer Wiring –

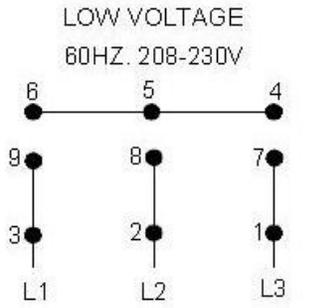
The pump mounted pressure transducer shall be wired on the control terminal block to positions +V and A2 (See Figure 1c). "+V" = **Brown** & "A2" = **Black**


WARNING

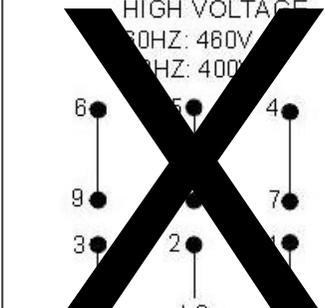
MOTOR MUST BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND LOCAL CODES BY TRAINED PERSONNEL TO PREVENT SERIOUS ELECTRICAL SHOCKS.

TO SERVICE MOTOR, DISCONNECT POWER SOURCE FROM MOTOR AND ANY ACCESSORY DEVICES AND ALLOW MOTOR TO COME TO A COMPLETE STAND STILL.

LOW VOLTAGE  
60HZ. 208-230V



HIGH VOLTAGE  
60HZ: 460V  
60HZ: 400V



96569464

INTERCHANGE ANY TWO LINE WRES TO REVERSE ROTATION

THERMOSTAT LE ADS (WHEN PROVIDED)

—● J  
—● J

Figure 1a

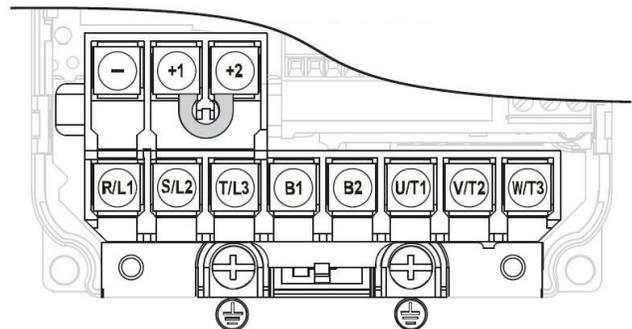


Figure 1b

**NOTE:**

S1, SC & HC, H1 are factory provided jumper wires.

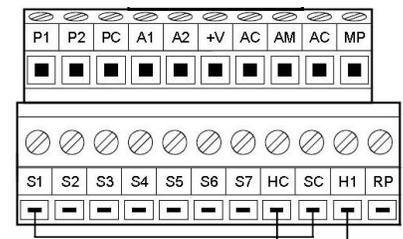
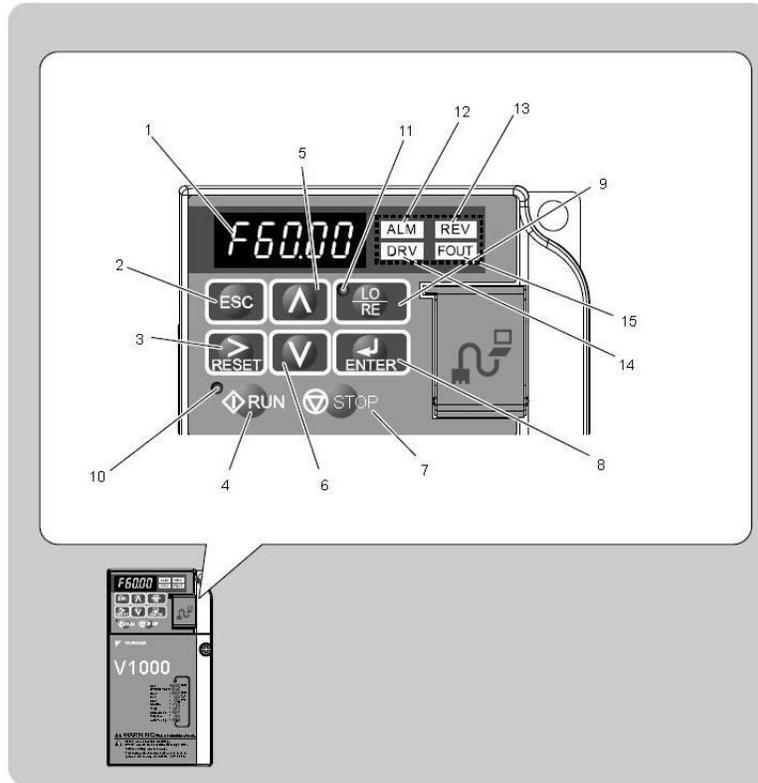


Figure 1c

# DRIVE DISPLAY/OPERATION



No.	Display	Name	Function
1		Data Display Area	Displays the frequency reference, parameter number, etc.
2		ESC Key	Returns to the previous menu.
3		RESET Key	Moves the cursor to the right. Resets the drive to clear a fault situation.
4		RUN Key	Starts the drive.
5		Up Arrow Key	Scrolls up to select parameter numbers, setting values, etc.
6		Down Arrow Key	Scrolls down to select parameter numbers, setting values, etc.
7		STOP Key	Stops the drive. <b>Note:</b> Stop priority circuit. A fast stop is available by pressing the STOP key when the drive detects a danger, even if the drive is running by a signal from the multi-function contact input terminal (REMOTE is set). To avoid stoppage by using the STOP key, set o2-02 (STOP Key Function Selection) to 0 (Disabled).
8		ENTER Key	Selects all modes, parameters, settings, etc. Selects a menu item to move from one display screen to the next.
9		RUN Light	Lit while the drive is operating the motor.

# DRIVE DISPLAY/OPERATION

## Navigating and Changing Drive Parameters –

The start screen on the LED will be a *frequency reference*. This will show the operating frequency of the drive.

**NOTE: Drive must be on this screen to start operation.**

Pressing the up arrow  on the display face will allow navigation for multiple levels of information on the drive.

 Displays "For" on the LED. This indicates the drive will turn the motor in a forward direction only.

**NOTE: If the drive is NOT ABLE to produce pressure greater than 20 psi, the motor could be wired incorrectly. Check motor rotation to verify. Rotate any two of the three motor leads for terminals U, V & W on the drive to correct rotation.**

 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 displays system operations, such as:

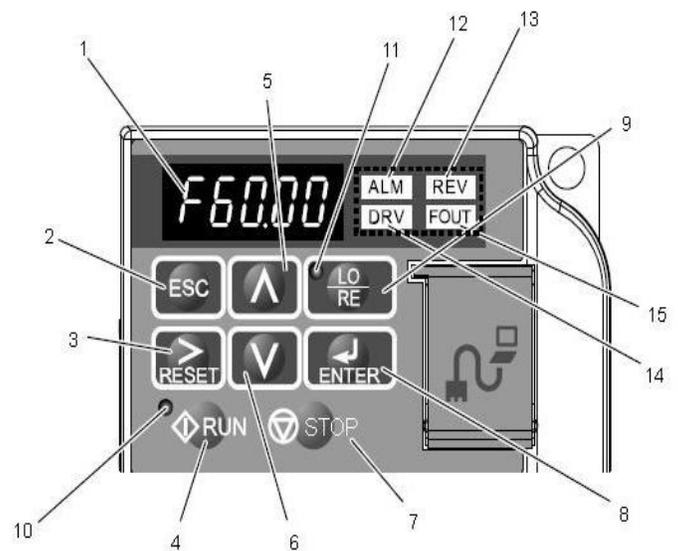
- Real-time output power of drive (kW): U1-08
- Current fault : U3-01
- Previous fault: U3-02
- Accumulated operation time (hrs): U4-01
- Total power consumption (kW): U4-10
- Sensor feedback level: U5-01

  Displays "STUP", referring to the Set Up Menu. This allows navigation of the four parameters that can be adjusted. (Instruction to follow on a later page.)

B5-19 System Pressure Setting	Default = 0 psi ( <b>Must be set for pump to operate.</b> )
B5-15 Sleep Frequency	Default = 25 Hz (disabled)
B5-12 Dry Run Protection	Default = 0 (disabled)
B1-02 Key Pad Enabled	Default = 0 (enabled)

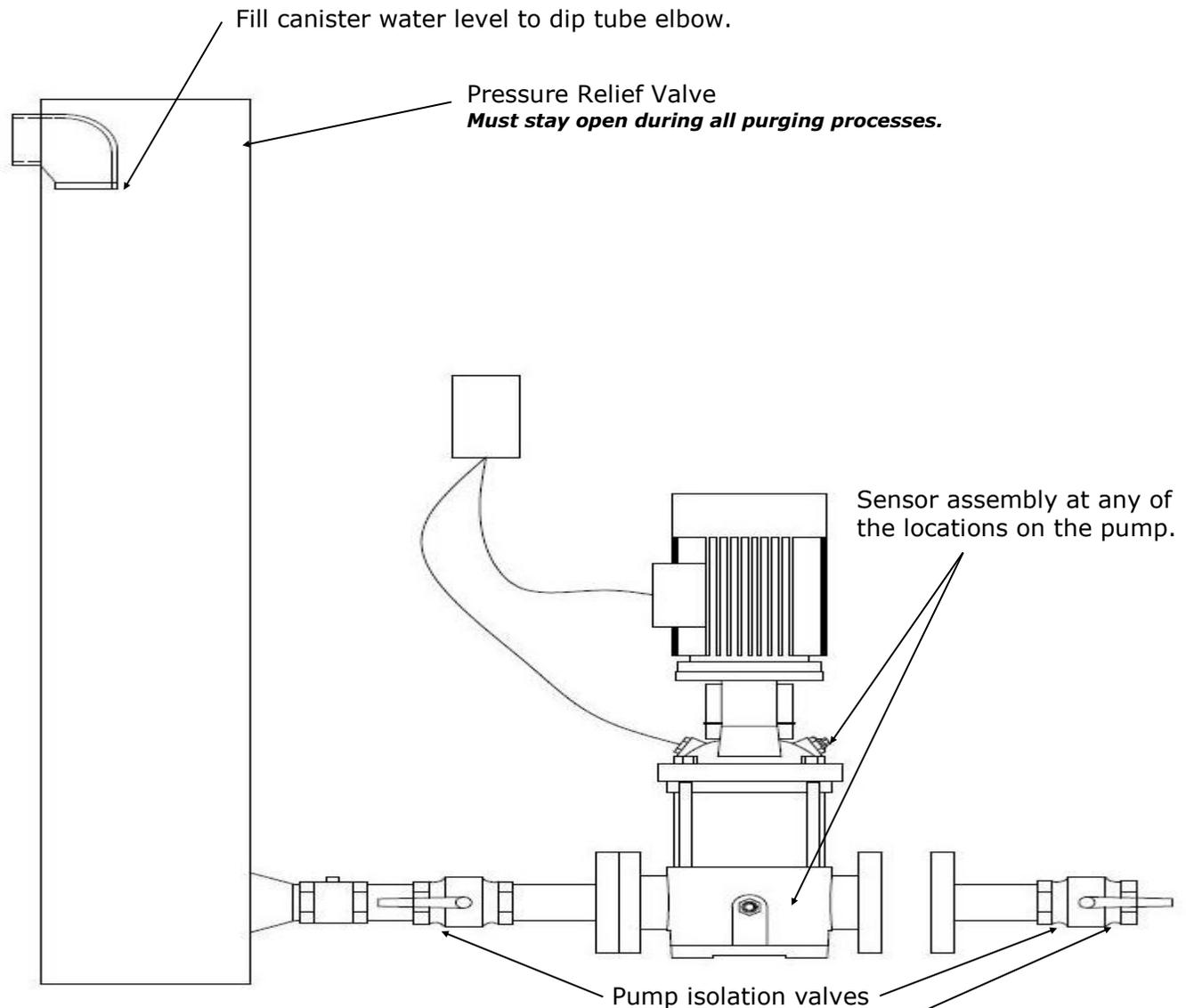
**NOTE: Pressing the ESC (escape) button allows the drive menu to go back one step.**

**NOTE: The drive will not allow operation unless the start screen is displayed (frequency reference). This screen can be displayed by pressing the ESC key several times.**



# SYSTEM START UP PROCEDURE

Figure 2



**\*\*Valve and flange adapter not included and are available as an option only\*\***



**WARNING:** BE SURE THE MUTIZONE CANISTER **DOES NOT** RUN OUT OF WATER.



**WARNING:** During the purging process, the rate of flow is not equal. When air returns to the canister you may see an overflow. You can control this by adjusting the flow back to the canister by a valve. Pressure relief valve must remain open until all air is purged or the canister may collapse. Do not completely seal the canister from outside air during this process.

# FILL AND START PROCEDURE

## Fill and Start Procedure: Smart Pump –

**NOTE:** The Smart Pump Multizone is not designed to do a full system purge. You can use the flow center to purge the interior piping by isolating the loop field and running a hose from the flush port to the flow center below water level.

### Default: "STUP" Set Up Menu

Description	Parameter	Default Setting
Stop Frequency	B5-15	25 Hz
System Pressure	B5-19	0 PSI
Dry Run	B5-12	"0" Disabled
Key Pad Control of On/Off Buttons:	B1-02	"0" Key Pad 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 may be air locked. Verify this by looking inside the canister to see if water is returning to the canister.)
- Open vent plug on top of pump head until air is no longer heard and a solid stream of water is viewed, then tighten vent plug.
- Apply power to drive. You will then see the home screen "u" = 0 (frequency reference).
- Hit the down arrow three times until you see "STUP" (Set Up Menu), then press Enter. "APPL" (Application Menu) will then be shown.
- Hit up arrow until you see B5-19, then press Enter. Change system pressure from "0" (0000.0) to 25 psi (0025.0) by pressing the "right arrow/reset" key over to the desired integer, change the number by hitting the up arrow to the desired 25 psi (0025.0), then press Enter.
- The B5-19 will then be shown blinking.
- Hit escape key two times (Home screen frequency reference "u" = 0).

**NOTE: Drive will only operate on "home screen/frequency reference".**

- Press the "Run" button to begin drive operation. Read the gauge pressure to ensure the pump is creating 25 psi. *If the gauge pressure is 20 psi or less, then the motor may be rotating backwards. Disconnect power and rotate two of the three motor leads on the drive connection.*
- Stop the drive and continue to the next step.

## Operating the Drive/System Start Up –

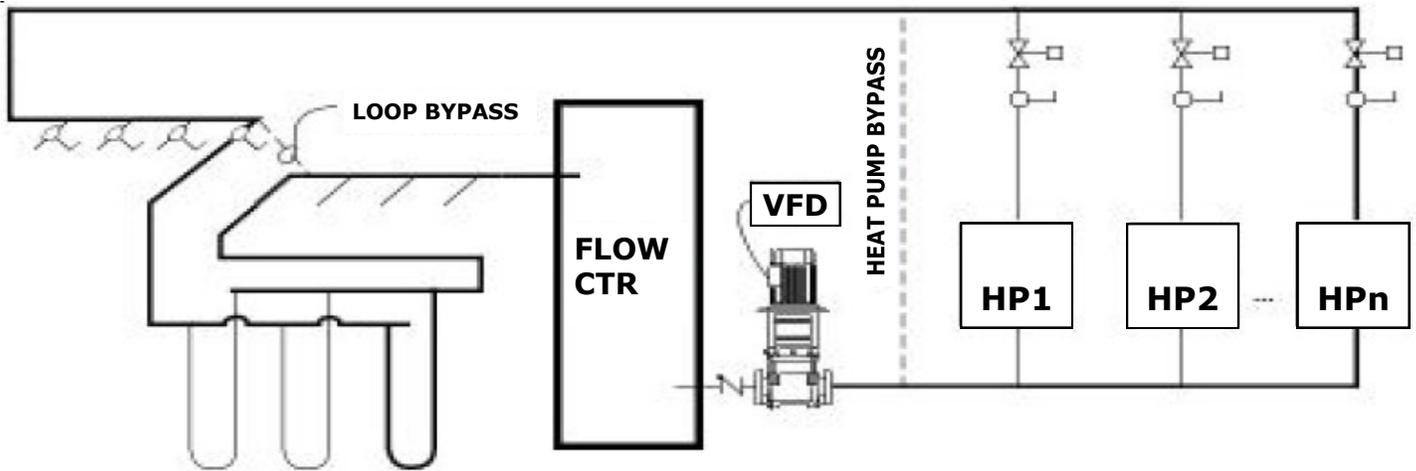
**NOTE:** Do not start the following process without a sufficient supply of clean potable water and a person to help monitor the water level in the canister.

- All valves in the system should be in the fully open position, with the exception of the supply and return loop field valves after bypass, these should be in the closed position (refer to diagram on pg 13).
- If using the 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 on pg 13).
- Press "Run" button to start drive and begin filling your system while checking fluid level and supplying clean potable water as necessary to keep the water level above the return down tube in canister.
- When all air is purged from the interior piping, you can then open up the loop field to circulate fluid through the entire system.
- Inspect the level in the canister and run the system until there are no micro-bubbles returning to the canister (may need up to a twenty-four hour run-time period).
- Proceed to heat pump balancing and system pressure adjustment.



ALL THE PUMP YOU NEED AND MORE  
Revised 7-5-12

# FILL AND START PROCEDURE



## Heat Pump Balancing Procedure: How to set drive pressure setting –

1. After the complete piping system is purged of air, each heat pump circuit can then be balanced for proper flow.
2. Make sure all control valves are in a closed position.
3. Allow flow to the heat pump with the largest pressure drop by manually opening the control valve.
4. Set the drive parameters B5-19 to operate at the following, based on nominal size of the complete heat pump system (3 GPM/ton).
  - Systems 30 tons or less (set drive parameter B5-19 to '15'). Drive pressure set to 15 psi.
  - Systems 30-60 tons (set drive parameter B5-19 to '18'). Drive pressure set to 18 psi.
5. Measure the pressure drop across this coil to ensure the proper flow rate.
  - If the flow rate is greater than required flow, then close a valve on the dedicated circuit until the desired flow rate is reached.
  - If the flow rate is not to the design flow, then proceed to the next step.
6. You must hit the "STOP" button on the drive. Go to the Set Up Menu by hitting the up arrow until the LED shows "STUP".
  - You will see the home screen "u" = 0 (frequency reference).
  - Hit the down arrow three times until you see "STUP" (Set Up Menu), then press Enter. "APPL" (Application Menu) will then be shown.
  - Hit up arrow until you see B5-19, then press Enter. Change system pressure from "0" (0015.0) to psi (0017.0) by pressing the "right arrow/reset" key over to the desired integer, change the number by hitting the up arrow to desired psi (0017.0), then press Enter.
  - The B5-19 will then be shown blinking
  - Hit escape key two times (Home screen frequency reference "u" = 0).
7. Press the "Run" button on the drive, then return to Step 5 above, to evaluate the flow rate for the one heat pump, by pressure drop across the coil.
8. Once you have reached this flow rate and this is the largest pressure drop, you can then set the remaining flow rates of the other heat pumps. This can be done by allowing flow to the next heat pump in line, while the first one remains running.
9. The remaining heat pumps can be adjusted for flow by restricting the flow of the water outside of the heat pumps. You must follow the manufacturer's recommendation for pressure drop to evaluate the flow rate through each of the units. If you have any questions, please call your local distributor for further instructions.

# SYSTEM START UP PROCEDURE

---

## Adjusting Sleep Function –

### Parameter B5-15 in Set Up Menu “STUP”

#### Perform system static pressure test:

- With pump running, allow all the control valves to close.
- Make note of the pressure on the liquid filled gauge assembly.
- Press the “STOP” button on the drive. Wait between one and five minutes to see if the system is able to hold the static pressure between the check valve before the pump and the control valves. If the system is not able to hold the pressure maintained on the drive, please refer to the troubleshooting section of this manual (page 17).

**NOTE: Use good quality 2-way control valves that will provide a 100% closed seal with no leakage.**

- If the system is able to maintain pressure, then allow flow to the smallest capacity (GPM) heat pump.
- Press the “RUN” button on the drive to allow flow to the smallest unit. Make note of the frequency (Hz) on the home screen of the drive during this operation.
- To enable the stop function, you must change parameter B5-15 to 1-3 Hz below the operating frequency on the smallest unit.

**NOTE: The drive must be in the stop position to make this change.**

- After this has been set, go back to the home screen by pressing “ESC” key three times.
- Press the “RUN” button At this point the stop function has been set. You can cycle through all the individual heat pumps to ensure that the stop function is working properly. If the motor is not stopping or cycling, please refer to page 17 to troubleshoot the stop function.

**NOTE: If you have any questions, please contract your distributor.**

## Setting the Dry Run Protection –

### Parameter B5-12

- By default the drive setting for Parameter B5-12 = 0 (disabled).
- Go to the Set Up Menu “STUP” and change B5-12 = 2 (Dry Run Enabled) Refer to page 10 to navigate the drive menu. *This setting ensures that there is the proper amount of water in the canister.*

**NOTE: The Dry Run Protection (B5-12 = 2) must be enabled to prevent damage to the pump, motor and piping. This setting will shut down the pump if the canister were to run dry due to a leak.**

# SYSTEM CHECKS

## System Checks –

1. Once the system settings have been adjusted and the V1000 adjusts/reacts to the heat pump outlet valves opening and closing, the system is ready to operate on its own.
2. Return each heat pump 2-way control valve to its normal operating setting, so it is allowed to open and close based on the heat pump status.
3. Monitor the system as it reacts to the heat pump 2-way control valves. It is recommended that each heat pump shall manually meet its set point to allow the 2-way control valve to close, ensuring they provide a 100% off position, allowing the V1000 to power down.
4. Once all the set up procedures and tests have been performed, the Smart Pump Multizone can now operate as a self contained system.

## FINAL DRIVE PARAMETERS

Description	Parameter	Default Setting
Stop Frequency	B5-15	1-3 Hz Below Minimum Operating Frequency
System Pressure	B5-19	User Input (PSI)
Dry Run	B5-12	"2" Enabled
Key Pad Control of On/Off Buttons:	B1-02	"1" Key Pad Disabled ( <i>Allows memory in case of power outage.</i> )

- **STOP FREQUENCY:** This parameter needs to be set 1-3 Hz below minimum operating frequency for the lowest flow rate heat pump.
- **SYSTEM PRESSURE:** This parameter is what allows the smart pump to maintain pressure and allows efficient operation o the geothermal system.
- **DRY RUN:** This parameter must be set to ensure pump protection in case the canister runs dry.
- **KEY PAD CONTROL OF ON/OFF BUTTONS:** This can be selected in the field.

A.If the B1-02 = 0 the "RUN" and "STOP" buttons are ACTIVE on the drive. This is helpful during set up.

**NOTE: If the drive experiences a power loss in this mode, then the drive will have to be manually restarted by pressing the "RUN" button.**

B.If the B1-02 = 1, then the "RUN" and "STOP" buttons are DISABLED on the drive. This allows the drive to keep its memory in case of a power loss to the drive and there'll be no need to restart the drive manually.

**NOTE: Faults can not be reset unless the jumper between S1 and SC is cycled, or parameter B1-02 is changed to "0".**

# TROUBLESHOOTING- FAULTS

Faults	Description	Reason(s)	Suggestion(s)
oL1/ oL2	Motor/Drive Overload	Motor/Drive current has exceeded service factor amps.	<ul style="list-style-type: none"> <li>• Leave power to drive off for three minutes. Check to make sure the motor coupling spins freely by hand.</li> <li>• System may not be balanced for flow.</li> <li>• Exceeding the flow rate of the pump design.</li> <li>• Supply voltage too low.</li> </ul>
oC	Over Current	<ul style="list-style-type: none"> <li>• Motor insulation damage.</li> <li>• One of the motor cables has shorted.</li> <li>• Load too heavy.</li> <li>• Pressure set too high.</li> </ul>	<ul style="list-style-type: none"> <li>• Meg the motor to determine the insulation resistance is within specification (refer to back of manual).</li> <li>• Inspect the motor leads and terminal wires for exposed shorts or grounds.</li> <li>• Leave power to drive off for three minutes. Check to make sure the motor coupling spins freely by hand.</li> <li>• Maximum PSI Ratings: CR32-1-1 = 30 PSI CR32-1 = 35 PSI CR45-1-1 = 39 PSI</li> </ul>
FbL	Feedback Loss	Transducer out of range.	<ul style="list-style-type: none"> <li>• Make sure the wiring for the transducer is correct. Check for loose wires on the connection of the transducer "+V" and "A2".  +V = Brown A2 = Black</li> <li>• Check water level in canister.—Must have a minimum of three feet of water above inlet.</li> </ul>
OH	Heatsink Over Temperature	Temperature limit of the drive is exceeded.	<ul style="list-style-type: none"> <li>• Make sure the fan is in operation when the drive is operating.</li> </ul>
LF	Phase Loss on Output Side of Drive	Wiring issue.	<ul style="list-style-type: none"> <li>• Make sure all leads to motor are connected to the drive and are solid connections. Motor may be incorrectly wired for 3x460V, the motor <u>MUST</u> be wired for 3x230V.</li> <li>• Wire connections in motor terminal box may be loose, double check connections.</li> </ul>
oU	Over Voltage	Main out of range.	<ul style="list-style-type: none"> <li>• Make sure voltage supply (1x230) to the V1000 is between 200 and 240 volts.</li> </ul>
Uu	Under Voltage	Main out of range.	<ul style="list-style-type: none"> <li>• Make sure voltage supply (1x230) to the V1000 is between 200 and 240 volts.</li> </ul>

# TROUBLESHOOTING- STOP FUNCTION

## The "STOP Function" for the Yaskawa V1000 Drive is Based on Two Conditions –

1. When all solenoid valves are closed and the pump is in a 'no flow' condition, the pump must be able to maintain system pressure as set in parameter B5-19 (Constant Pressure Setting).
2. The drive setting for the "STOP Function" B5-15 should be 1-3 Hz below the operating Hz for the lowest capacity (GPM) heat pump in the system. Refer to page 14 for "Adjusting the Sleep Function".

## Addition of a Bladder Tank to the System –

1. If the piping between the pump and the solenoid valves isn't a significant distance (less than fifteen feet), a bladder tank may be need to enable the stop function.

**NOTE: Attempt the "STOP Function" before adding a bladder tank. A 2.2 gallon bladder tank set to a pre-charge of 70% of the system pressure in parameter B5-19.**

**Example: B5-19 = 20 psi, then the pre-charge pressure of the bladder should be at 14 psi.**

## Static Pressure Test –

This test will determine if the system is able to maintain pressure. The system must be able to hold pressure to enable the stop function. Follow the steps below to determine if you have any bypass of fluid in the system past the solenoid valves or the check valve prior to the pump.

1. Go into the Set Up Menu "STUP" and change B1-02 from "1" to "0". This will enable you to start/stop the drive via the "Run/Stop" button on the face of the drive (Refer to menu navigation on page 10).
2. Press the "RUN" button on the drive and visually look at the gauge to determine the pressure setting and make note of this pressure.
3. Allow all solenoid valves to close in the system.
4. Immediately hit the "Off" button on the drive and wait three to five minutes.
5. Determine if the pressure gauge is able to hold the original pressure. (The pressure is trapped between the check valve before the pump and the solenoid valves.)
6. If the gauge doesn't hold pressure, you have fluid bypassing the valves in the system.
7. Hit the run button on the drive until it reaches the set pressure.
8. If ball valves are placed in the system before the solenoid valves, then close all but one to see if the system is losing pressure because the exposed solenoid valve is bypassing fluid.
9. If this isn't the case, open the next ball valve to see if the additional solenoid valve is losing pressure. Continue this process until all solenoid valves are exposed to the pressure created by the pump.
10. If there is a solenoid valve that is allowing the fluid to bypass (pressure loss due to not fully seating), then the valve must be cleaned and checked for proper operation.

If the system is still having problems or loss of static pressure, please contact your local distributor for help. If the VFD is cycling on and off continuously, this could result in motor failure.

# MOTOR TESTING

## Motor Winding Resistance –

(Lead to Lead)

1. Turn the power "OFF".
2. Disconnect all electrical leads to motor.
3. Set the scale selector on the ohmmeter to  $R \times 1$  (if you expect ohm values under 10 or  $R \times 10$  (for ohm values over 10).
4. Touch the leads of the ohmmeter to the two motor leads. Touching the leads of the ohmmeter to any two hot leads will measure the winding's resistance. Repeat for all three possible lead combinations (L1 and L2; L2 and L3; L1 and L3).
5. Watch the ohmmeter scale and compare this figure with the appropriate chart.



## Evaluation –

If all ohm values are normal, the motor windings are neither shorted nor open. If any one ohm value is less than normal, then that motor winding may be starting to short. If any one ohm value is greater than normal, then that winding may be starting to open. If some ohm values are greater than normal (more than 25%), then the leads may be connected incorrectly.

## Insulation Resistance –

(Lead to Ground)

1. Turn the power "OFF".
2. Disconnect all electrical leads to motor.
3. Set the scale selector on the megohmmeter to  $R \times 100$ , touch its leads together and adjust the indicator to zero.
4. Touch the leads of the megohmmeter to each of the motor leads as you connect to the ground (i.e. L1 to ground, then L2 to ground, etc.).
5. Watch the megohmmeter scale and compare this figure with the appropriate chart.



## Evaluation –

The resistance values of new motors must exceed 1,000,000 ohms. If they do not, replace the motor.

