Saving Parameters

Saving parameters to the keypad is recommended after the start-up is performed and you are satisfied with the system operation. If the programming is changed later and your VFD is no longer operating the way you intended it to, you can always load your previously saved parameters from the keypad. Additionally, the programmed keypad can be used to enter parameter settings to another VFD.

Factory Programmed Parameters

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<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter</th>
<th>Description</th>
<th>Basic</th>
<th>Supply Fan</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFD acceleration</td>
<td>SET-11</td>
<td>20 sec</td>
<td>20 sec</td>
<td></td>
</tr>
<tr>
<td>VFD deceleration</td>
<td>SET-12</td>
<td>10 sec</td>
<td>10 sec</td>
<td></td>
</tr>
<tr>
<td>Stop mode</td>
<td>SET-16</td>
<td>Coast</td>
<td>Coast</td>
<td></td>
</tr>
<tr>
<td>PID Operation</td>
<td>SET-21</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Feedback output</td>
<td>SET-22</td>
<td>Cont</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Transducer Range</td>
<td>SET-25</td>
<td>100D</td>
<td>1.00 inWC</td>
<td></td>
</tr>
<tr>
<td>PID Set Point</td>
<td>SET-26</td>
<td>50 sec</td>
<td>0.50 inWC</td>
<td></td>
</tr>
<tr>
<td>PID Scale freq</td>
<td>SET-27</td>
<td>20Hz</td>
<td>20Hz</td>
<td></td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-74</td>
<td>Level detection enable</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-75</td>
<td>Level detection source</td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-76</td>
<td>Level detection freq</td>
<td>59Hz</td>
<td>59Hz</td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-77</td>
<td>Level detection delay time</td>
<td>2 sec</td>
<td>2 sec</td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-78</td>
<td>Level detection trip enable</td>
<td>0.1sec</td>
<td>0.1sec</td>
</tr>
<tr>
<td>Level detection</td>
<td>SET-80</td>
<td>Level detection trip enable</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Save Parameters to Keypad: Change FG2-91 to YES to save parameters to the keypad. After pressing ENTER key, this parameter will go back to NO after saving is done (approximately one minute).

Load Parameters from Keypad: Change FG2-92 to YES to load parameters from the keypad. After pressing ENTER key, this parameter will go back to NO after loading is done (approximately one minute).

(RDP) Redundant VFD Quickstart Guide

Wiring

Warning: Input Power, Motor and Control Wires should be in separate conduits.

Power Wiring

Verify correct input voltage and wiring to RDP power and motor terminals. Connect 3-phase input power wires to MCP disconnect terminals 2, 4 & 6 for single-phase power to terminals 2 & 4. Connect motor wire to terminal blocks T1, T2 & T3 and ground to terminal G.

Connect power source ground and motor ground wires to enclosure ground terminal or stud.

BMS Analog Control Wiring:

Use shielded cable with shield connected on VFD side to analog common or chassis ground for better noise protection in analog signal circuitry. The system will automatically switch analog signal to main VFD.

0-10VDC. Connect BMS 0-10VDC output positive wire to enclosure terminal marked V1 and negative to terminal AG.

4-20mA. Connect BMS 4-20mA output positive wire to enclosure terminal marked I and negative to terminal AG.

VFD Frequency: Connect VFD1 and VFD2 frequency 0-10VDC outputs terminal 59 to BMS positive wire and 50 to negative wire.

Transducer Wiring:

0-10VDC Transducer. Wire the pressure or temperature transducer’s positive (POWER) wire to enclosure terminal marked F1 and negative (COM) wire to terminal -24. The output wire should be connected to terminal V1. The shield wire should be connected to terminal AG or enclosure ground G.

4-20mA Transducer. Wire the pressure transducer’s positive (POWER) wire to enclosure terminal 1 and output (4-20mA Out) wire to terminal 1 with the shield wired to AG or enclosure ground G.

Digital Inputs & Outputs Wiring

Run Command: Connect BMS run contact wires to enclosure terminals 24+ and STR. Run Status: Connect BMS run status input wires to VFD1 and VFD2 terminals A1 and C1 (N.O. relay contact). Fault Status: Connect BMS fault status input wires to VFD1 and VFD2 terminals 3A and 3C (N.O. relay contact).

Mode: Use to cycle through parameter groups: SET>DRV>FG1>FG2>...>SET>.

Loc/Damper Oper.: Connect the Damper switch to Local and Remote operation. In Local letter L will be displayed next to the parameter code.

Enter: Use to enter or exit programming mode of any parameter. A flashing cursor will appear when VFD is in programming mode.

Up & Down: Use to cycle through parameters of the current group or to adjust parameter value or change selection when in programming mode.

Shift: Use to cycle backwards through parameter groups. When in programming mode, use to shift cursor to the right (one position) when changing digits in numerical value.

Rev, Stop/Reset & Fed.: Use to Start and Stop VFD Forward or Reverse in Local mode. Use Stop to reset VFD fault.

Main Display:

Drive Wiring

Drive - Current parameter group. (SET, DRV, FG1, FG2, V0, APP, EXT & COM)

00L - Shown shows the current parameter number within a current group. An L’ will appear when VFD is in Local control mode activated by either LOC/REM key or digital input.

T - Shows source of VFD start/stop operation (T = Remote, K = keypad, O = Communication).

K - Shows source of VFD frequency command (K = Key, V = 0-10VDC, L = 4-20mA, O = Communication)

0.0A - Shows the actual motor current

0.0Hz - Shows current reference or PID set-point in VFD stop mode and actual VFD output frequency in VFD run mode.

Keypad Programming

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Verify VFD’s Basic Settings

1. Press the [MODE] or [SHIFT] key until the desired parameter group is displayed.
2. Press UP [▲] or DOWN [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
3. Press [ENTER] key to enter the programming mode, which is indicated by a flashing cursor. Some parameters cannot be changed during VFD run or fault modes. Refer to the manual to check if desired parameter can be programmed during run.
4. For selectable parameters press [▲] or [▼] keys to change parameter selection.

Parameter Programming Description

1) Press the [MODE] or [SHIFT] key until the desired parameter group is displayed.
2) Press UP [▲] or DOWN [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
3) Press [ENTER] key to enter the programming mode, which is indicated by a flashing cursor. Some parameters cannot be changed during VFD run or fault modes. Refer to the manual to check if desired parameter can be programmed during run.
4) For selectable parameters press [▲] or [▼] keys to change parameter selection.

When programming a numerical value, the value will change from maximum to minimum by pressing [▲] or [▼] key. In order to change any digit in a numeric value, use the [SHIFT] key to move the flashing cursor to that digit and [▲] or [▼] key to adjust the selected digit.

Verify VFD’s Basic Settings

The HOA switch should be in OFF position, VFD selector switch in VFD1, MMS1 and MMS2 in ON position. Turn on MCP disconnect and RDP will be powered up. The main VFD will be powered. Change VFD selector from VFD1 to VFD2 and back to VFD1 to power up second VFD for 30 minutes. Check motor settings in SET group.

The HOA switch knob to HAINDS position with VFD SW in VFD1 position and the VFD1 will begin to run the motor at 20Hz. Verify a proper motor rotation. Put VFD switch in VFD2 position, the VFD1 should stop and VFD2 will start. Verify a proper motor rotation. If rotation is incorrect, stop VFD by putting HOA in OFF position, turn the RDP power off and swap any two motor leads to change the motor rotation.

System Adjustments and Run Test

1. Set [▲] or [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
2. Press UP [▲] or DOWN [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
3. Press [ENTER] key to enter the programming mode, which is indicated by a flashing cursor. Some parameters cannot be changed during VFD run or fault modes. Refer to the manual to check if desired parameter can be programmed during run.
4. For selectable parameters press [▲] or [▼] keys to change parameter selection.

When programming a numerical value, the value will change from maximum to minimum by pressing [▲] or [▼] key. In order to change any digit in a numeric value, use the [SHIFT] key to move the flashing cursor to that digit and [▲] or [▼] key to adjust the selected digit.

Verify Motor Shaft Rotation

The default setting for I/O-20, I/O-21 and I/O-22 parameters are Damper and Damper SW. The damper timer I/O-69 parameter sets a time delay for a damper fault when damper N.O. switch is not closed. The default setting is 30 seconds and it should be adjusted to a time enough to open a damper. The PLC selection of fault delay should be greater than I/O-69 setting. Remove the JUMPER J46 to wire a damper switch. If damper does not have a damper switch and VFD should start after damper is open, set parameter I/O-21 to [Reserved] and parameter I/O-69 to time enough to open a damper. In this case the damper fault code is disabled.

Vibration SW. The default setting for I/O-22 is EXT. TRIP. And bit #3 in I/O-95 is set to [1], which is N.C. contact. Remove the jumper JVS to wire a vibration switch. When contact between 24+ and VSW terminals is open, the VFD trips on External Trip and can be reset by pressing stop key on the keypad via after key is reset.

Alternation. The default setting for alternation is by main VFD fault or 2 second pulse on ALT terminal (contact between 24+ and ALT should be closed for 2 sec.). Close ALT input for 2 seconds and main VFD should stop and standby VFD starts. There are following settings for alternation: At Fault, At Start, By Pulse, 7 days, 90-days and by the state of contact between 24+ and ALT (open for VFD1 and closed for VFD2). Refer to manual for alternation mode selection details.

Fireman’s Input. The default setting is Shutdown with N.C. contact. When contact is open, the system will stop and disable VFD’s. Remove jumper JFS to wire Shutdown or Override contact between 24+ and ALT should be closed for 2 sec.). Close ALT input for 2 seconds and main VFD should stop and standby VFD starts. There are following settings for alternation: At Fault, At Start, By Pulse, 7 days, 90-days and by the state of contact between 24+ and ALT (open for VFD1 and closed for VFD2). Refer to manual for alternation mode selection details.

Fault Delay. The system monitors a main VFD run status, ready status and OUT contactor auxiliary contact during run to determine a VFD failure. The default time delay setting for Fault by run status is 35 seconds and for the following selections: 35sec, 60sec, 90Sec, 180Sec, 360sec, and Disabled. If damper timer (time to open the damper) is set to 120 seconds, the 180 second fault delay should be selected. If OUT contactor or VFD Ready relay is open, the system will initiate a fault mode after 15 second delay.

Standby VFD power up. The Standby VFD can be powered at any time by turning VFD SW from VFD1 to VFD2 and back to VFD1 position. The RDP monitors if standby VFD was not powered for more than 90 days and turns its IN contactor on for 30 minutes to provide charge/discharge cycle for DC bus capacitors.

BMS or Transducer Signal Verification:

1. Press [▲] key from the main display DRV-00 until you see display with analog inputs V1, V2, V1S, and I. The readings shown on this display are raw VFD AD converter values from 0 to 4095.
2. Devide I value by 204 and result will be a mA value. This value should be more than 800 if not, verify transducer wiring.
3. 0-10VDC. Devide V value by 337 and result will be a VDC value. Compare this value to voltage on VFD terminals V1 and 5G or CM (based on VFD HP rating). If signal has some electrical noise, the VFD can stay at maximum value when speed reference is decreased. Increase setting for filter time in parameter I/O-01 for 0-10VDC and I/O-06 for 4-20mA.

Advanced Control Features

These parameters with optimal and safe settings for Exhaust or Supply Fan application are not enabled by default and can be enabled at any time. You may need to adjust some parameters to provide better control for your system.

PID (Proportional-Integral) Control with Pressure Transducer

1. Set [▲] or [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
2. Press UP [▲] or DOWN [▼] keys to scroll to the desired parameter. If you know the desired parameter number, you can set its value directly by entering the parameter group number (e.g., press 00 for DRV groups) and after pressing [ENTER] key display will show that parameter.
3. Press [ENTER] key to enter the programming mode, which is indicated by a flashing cursor. Some parameters cannot be changed during VFD run or fault modes. Refer to the manual to check if desired parameter can be programmed during run.
4. For selectable parameters press [▲] or [▼] keys to change parameter selection.

When programming a numerical value, the value will change from maximum to minimum by pressing [▲] or [▼] key. In order to change any digit in a numeric value, use the [SHIFT] key to move the flashing cursor to that digit and [▲] or [▼] key to adjust the selected digit.

PID Enable. The PID control allows the VFD to maintain a process value (pressure, temperature etc.) by varying the output frequency based on the difference between a set point and actual feedback (transducer signal) value. The SET-26 parameter enables the internal PID control.

PID Feedback. Select transducer pressure output type: I for 4-20mA or V for 0-10VDC. This transducer signal has some electrical noise, increase setting for filter time in parameter I/O-01 for 0-10VDC and I/O-06 for 4-20mA.

Transducer Range. Set a pressure transducer range. Example: If transducer range is 0-2.5inWC, enter 2.50inWC in parameter SET-25. Default setting is 1.00inWC.

PID Set-point. Set a desired pressure in parameter SET-26. The VFD will maintain this pressure by changing the speed of the motor. Default setting is 0.00inWC.

PID Frequency Low Limit. Set a low limit for VFD output with PID control in parameter SET-27. Default setting is 20.00Hz.

UnderLevel Protection (Belt Loss)

Underlevel trip (known as Belt Loss protection) is designed to trip the VFD when the motor current draw is less than SET-78 for SET-77 time delay when VFD output frequency is above SET-76. For Fan application it is typically 30-35% of the motor FLA.

Level Detection Selection: Change SET-74 from NO to UnderLevel to enable Belt Loss protection.

Level Detection Delay: SET-77 is a delay before VFD trips on Underlevel fault.

Level Detection Level: If motor nameplate does not show a no-load current, set parameter SET-78 to 30-35% of motor FLA or below the run current at minimum speed. Check with motor manufacturer for motor no-load current.

System Operation Validation

1. Put HOA switch in Hand position. The VFD should start and run at minimum speed limit if Hand mode speed is lower than minimum limit. Increase speed to 60Hz by pressing ENTER key then up key and ENTER again and run for a minute. The motor current should be less than motor FLA rating. If it is higher than FLA, check motor rotation, motor windings configuration and mechanical load on the motor shaft.
2. Put HOA switch in OFF position. The VFD should stop based on Stop Mode selection (Deceleration or Coast). If VFD follows the BMS speed signal up but does not properly follow it down, there is a high level electrical noise in analog signal. Check analog cable shield connection to enclosure ground. Increase filter time in parameter I/O-01 for 0-10VDC and I/O-06 for 4-20mA up to 500ms.
3. If everything works well, your VFD is ready for normal operation.