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 copy same parameter settings to another VFD.

FG2 ▸ Para.Read
91   Yes

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).

FG2 ▸ Para.Write
92   Yes

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).

Factory Programmed Parameters

Function	Parameter	Description	Basic	Supply Fan
	SET-11	VFD acceleration time	20 sec	20 sec
	SET-12	VFD deceleration time	10 sec	30 sec
	SET-16	Stop mode	Coast	Coast
PID Control	SET-20	PID Operation	No	No
	SET-21	PID Feedback Signal	I (4-20mA)	I (4-20mA)
	SET-22	Feedback unit	Cust	inWC
	SET-25	Transducer Range	100.0	1.00 inWC
	SET-26 & DRV-00	PID Set-Point	50.0	0.50 inWC
	SET-27	PID low limit frequency	20.0Hz	20.0Hz
Underload Belt Loss	SET-74	Level detection enable	No	No
	SET-75	Level detection source	Current	Current
	SET-76	Level detection frequency	59.0Hz	59.0Hz
	SET-77	Level detection delay time	2sec	2sec
	SET-78	LDT Level	0.0A	0.0A
	SET-80	Level detection trip enable	No	No

List of Available Features and Selections by PLC POT1 and POT2

Alternation:
1. * By pulse on ALT input — Close contact between 24+ and ALT terminals for 2 seconds to altetrnate.
2. At Start — Alternation at every start.
3. 7-Days — Alternation after 7 days of main VFD run time
4. 90-Days — Alternation after 90 days of Main VFD run time
5. By State of the ALT input — Close contact between 24+ and ALT for VFD2 and open for VFD1

Alternation at Fault:
1. * Enabled — System will alternate VFD's at main VFD fault.
2. Disabled — System will not start standby VFD at main VFD fault.
3. N/A — (Spare)

Standby VFD Power up:
4. Disabled — System will not run scheduled 30-minute power up for standby VFD.
5. * 90-Days — System will power up for 30 minutes a standby VFD every 90 days of main VFD run time.

Fireman's SW:
1. * Shutdown N.C. — Open contact between 24+ and FMS terminals to stop and disable both VFDs in any HOA SW mode.
2. Shutdown N.O. — Close contact between 24+ and FMS terminals to stop and disable both VFDs in any HOA SW mode.
3. Override N.C. — Open contact between 24+ and FMS terminals to start main VFD and standby at main VFD fault.
4. Override N.O. — Close contact between 24+ and FMS terminals to start main VFD and standby at main VFD fault.
5. N/A — (Spare)

Alternation by VFD SW:
1. * In Hand Mode Only — Alternate VFD by changing a VFD SW position only in HAND mode.
2. In Hand & Auto Modes — Alternate VFD by changing a VFD SW position in HAND or AUTO mode.
3. N/A — (Spare)
4. N/A — (Spare)
5. N/A — (Spare)

Fault Delay:
1. * 35 sec. — System will generate fault output if main VFD run relay is not closed in 35 seconds.
2. 65 sec. — System will generate fault output if main VFD run relay is not closed in 65 seconds.
3. 185 sec. — System will generate fault output if main VFD run relay is not closed in 185 seconds.
4. 365 sec. — System will generate fault output if main VFD run relay is not closed in 365 seconds.
5. Disabled — System does not monitor VFD run relay and trips in 15 seconds only by open VFD ready relay or OUT contactor fault.

Note: The [*] sign indicates that this is a default selection for the corresponding feature.

(RDP) Redundant VFD Quickstart Guide

FRANKLIN CONTROL SYSTEMS

Wiring

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

Power Wiring
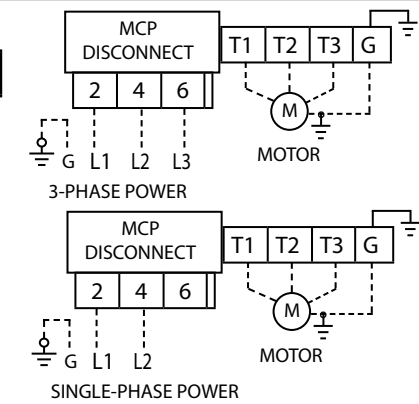
R	S	T	G	P1	P2	N	U	V	W

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** or single-phase power wires to terminals **2 & 4**. Connect motor wires 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 **S0** to BMS positive wire and **5G** to negative wire.
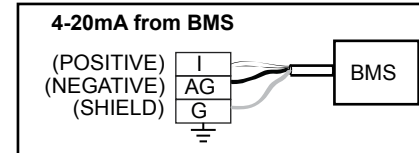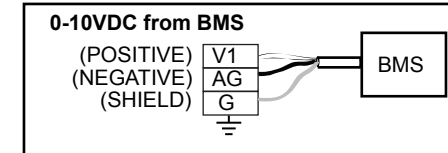
Transducer Wiring:

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

4-20mA Transducer. Wire the pressure transducer's positive (POWER) wire to enclosure terminal **24+** and the output (4-20mA Out) wire to terminal **I** with the shield wired to **AG** or enclosure ground **G**.
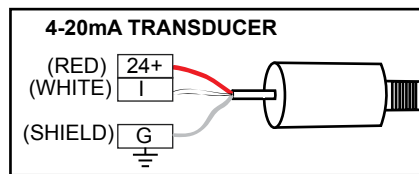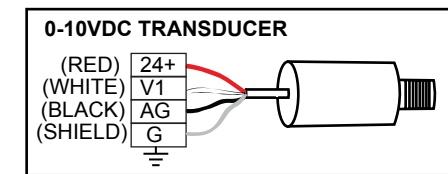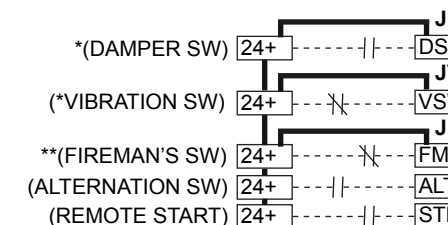

Digital Inputs & Outputs Wiring:

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).

* Remove jumpers **JDS** & **JVS** to wire N.O. damper and N.C. vibration switches.
** Remove jumper **JFS** to wire Fireman's switch. The Fireman's switch (Shutdown/Override) N.O. or N.C. configuration can be selected in feature programming mode. Please refer to the manual.

Keypad Programming
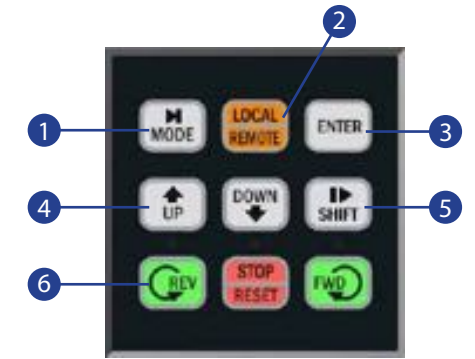
❶ **Mode:** Use to cycle through parameter groups: SET>DRV>FG1>FG2>....>SET>..

❷ **Loc/Rem:** Toggles between Local and Remote operation. In Local letter **L** will be displayed next to the parameter code #.

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

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

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

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

Main Display:

DRV ▸ T/K	0.0A
00L STP	0.00Hz

DRV - Current parameter group. (SET, DRV, FG1, FG2, I/O, APP, EXT & COM)

00L - 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=** Keypad, **V=** 0-10VDC, **I=** 4-20mA, **O=** Communication)

0.0A - Shows the actual motor current

STP - Shows the current status of the VFD (**STP** = Stop, **FWD** = Forward, **REV** = Reverse)

0.00Hz - Shows frequency reference or PID set-point in VFD stop mode and actual VFD output frequency in VFD run mode.

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 number in the first parameter #00 "Jump code" of any parameter group (except SET and 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 be changed 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.

SET ▸ Motor HP
02   7.5 HP

Rated Motor HP: Put the motor horsepower rating from the motor nameplate.

SET ▸ Motor FLA
03   2.2 A

Rated Motor Current: Put the motor FLA (Full Load Amps) rating from the motor nameplate.

SET▸ Low Limit
13   20.00 Hz

Frequency low Limit: Default setting is 20.00Hz which is enough to provide some cooling air flow for the motor. It can be changed from 0.00Hz to Maximum Frequency.

Verify Motor Shaft Rotation

Move HOA switch knob to HAND 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 wswap any two motor leads to change the rotation (swapping input power wires will not change the motor rotation).

System Adjustments and Run Test

When RDP is powered, put HOA switch in AUTO position and when remote start contact between **24+** and **STR** terminals is closed, the VFD1 will begin to run the motor based on speed reference signal. Turn the VFD1 MMS disconnect off and after 35 second delay the system will activate alarm relay and fault light, disengage OUT1 contactor, engage IN2 and OUT2 contactors and start VFD2.
Fault Reset. In order to reset fault, turn the VFD MMS disconnect on and change HOA position from Auto to OFF and to Auto again.

Damper SW. The default settings for VFD I/O-68, I/O-78 and I/O-21 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 **JDS** 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 feature 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 VFD keypad after switch 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 selections 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 **FMS** terminals based on its type selection. There are following settings for Fireman's SW: N.C. or N.O. Shutdown and N.C. or N.O. Override. The selection of the Fireman's SW type should match the VFD's I/O-24 & I/O-95 parameters selections. Refer to manual for Fireman's SW 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 has following selections: 35sec., 65sec., 185sec., 365sec. and Disabled. If damper timer (time to open the damper) is set to 120 seconds, the 185 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 capacitiors.

BMS or Transducer Signal Verification:

V1 1240 V2   0
V1S   0   I   3980

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.
4-20mA. Devide I value by 204 and result will be a mA value. This value should be more than 800 if not, verify transducer wiring.
0-10VDC. Devide **V1** value by 337 and result will be a VDC value. Compare this vlaue 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 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

The SET-10 parameter should be changed to Keypad-1 to adjust a PID set-point value from VFD keypad.

SET▸ PID Mode
20   Yes

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-20 parameter enables the internal PID control.

SET▸   PID F/B
21   I

PID Feedback. Select pressure transducer output type: I for 4-20mA or **V1** for 0-10VDC. If 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. Default selection is I for 4-20mA.

SET▸F/B Unit Max
25   1.00 inWC

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.

SET▸PID SetPoint
26   0.25 inWC

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

SET▸ PID Limit-L
27   20.00 Hz

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.

SET ▸ Level Detect
74   Under Level

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

SET▸   LDT Delay
77   2 sec

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

SET ▸ LDT Level
78   0.0 A

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).
3. Put HOA switch in AUTO position and when start contact from BMS is closed, the VFD will start and run at speed set by BMS via analog signal or at minimum speed limit if BMS signal is lower than minimum limit.
4. 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.
If everything works well, your VFD is ready for normal operation.