VFD Programmed for Z-Pro™ / Hemisphere® and Exhaust Fans

921893, 922139, 922358, 922371

Quick Sheet



990274
REV [B]

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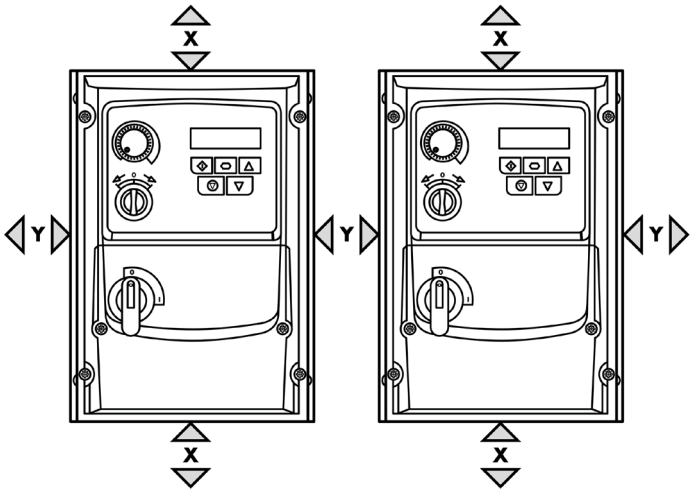
Step 1: Mount VFD

Guidelines for mounting (IP66 Units)

- Before mounting the drive, ensure that the chosen location meets the environmental condition requirements for the drive.
- The drive must be mounted vertically, on a suitable flat surface.
- The minimum mounting clearances shown in the diagram and table below must be observed.
- The mounting site and chosen mountings should be sufficient to support the weight of the drives.
- Using the drive as a template, mark the locations required for drilling.
- The mounting location should be free from vibration.
- Do not mount the drive in any area with excessive humidity, corrosive airborne chemicals or potentially dangerous dust particles.
- Avoid mounting close to high heat sources.
- The drive must not be mounted in direct sunlight. If necessary, install a suitable shade cover.
- Do not restrict the flow of air through the drive heatsink. The drive generates heat which must be naturally allowed to dissipate. Correct air clearance around the drive must be observed.
- If the location is subject to wide ambient temperature and air pressure variation, install a suitable pressure compensation valve in the drive gland plate.

NOTE: If the drive has been in storage for longer than 2 years, the DC link capacitors must be reformed. For guidance, please consult with Valco Tech Support.

Mounting Clearances (Not intended for installation using rigid conduit system.)			
X Above & Below		**Y Either Side**	
mm	**in**	**mm**	**in**
200	7.87	10	0.39
NOTE: Above are guidelines only and the operating ambient temperature of the drive MUST be maintained within the following limits at all times:			
Operational Ambient Temperature Range: -4º – 104ºF (-20º – 40ºC) frost & condensation free			
Maximum Humidity: 95% **Maximum Altitude:** 6,500ft (2000m) : derate above 3,280ft (1000m) : 2.5%/328ft (100m)			



NOTE: VFD recommended to be within 100ft (30m) of fan.
If located over 330ft (100m), dV/dT filter required to maintain warranty.

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Step 2: Wiring the VFD

INPUT POWER SUPPLY REQUIREMENTS				
Supply Voltage	200 – 240 RMS Volts for 230 Volt rated units, 240 Volt RMS Maximum.			
	380 – 480 Volts for 400 Volt rated units, + / - 10% variation allowed, Maximum 500 Volts RMS.			
Imbalance	Maximum 3% voltage variation between phase – phase voltages allowed.			
	All Optidrive E3 units have phase imbalance monitoring. A phase imbalance of > 3% will result in the drive tripping. For input supplies which have supply imbalance greater than 3% (typically the Indian sub-continent & parts of Asia Pacific including China) Invertek Drives recommends the installation of input line reactors.			
Frequency	50 – 60Hz + / - 5% Variation			
Short Circuit Capacity	Voltage Rating	Min kW (HP)	Max kW (HP)	Maximum supply short-circuit current
	230V	0.37 (0.5)	11 (15)	100kA rms (AC)
	400 / 460V	0.75 (1)	22 (30)	100kA rms (AC)
	All the drives are suitable for use on a circuit capable of delivering not more than the above specified maximum short-circuit Amperes symmetrical with the specified maximum supply voltage when protected by Class J fuses.			

Fuse / Circuit Breaker Selection:

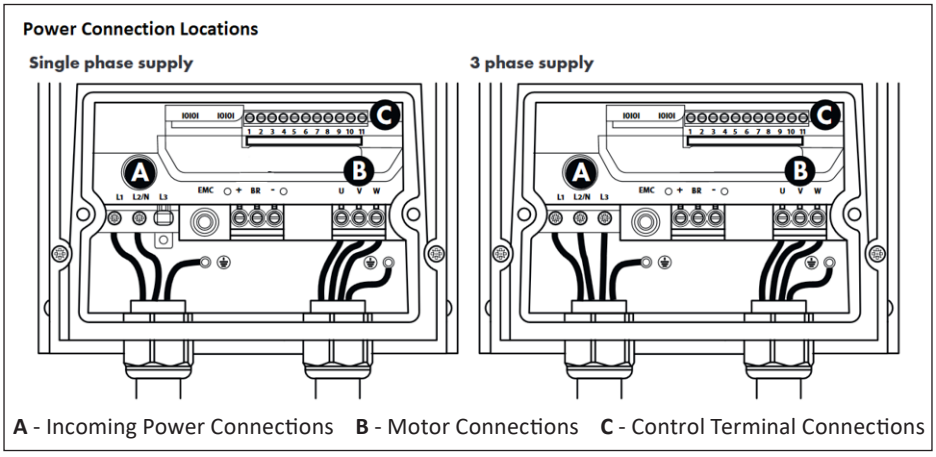
- Suitable fuses to provide wiring protection of the input power cable should be installed in the incoming supply line, as shown in the table below. The fuses must comply with any local codes or regulations in place. In general, type gG (IEC 60269) or UL type J fuses are suitable; however in some cases type aR fuses may be required. The operating time of the fuses must be below 0.5 seconds.
- Where allowed by local regulations, suitably dimensioned type B MCB circuit breakers of equivalent rating may be utilised in place of fuses, providing that the clearing capacity is sufficient for the installation.
- The maximum permissible short circuit current at the Optidrive Power terminals as defined in IEC60439-1 is 100kA.
- The cables should be dimensioned according to any local codes or regulations.

Each fan requires individual branch circuit protection in the form of either a circuit breaker (molded case) or a fused disconnect. The current ratings of these protection devices depend on the model of fan you have purchased. Please reference the table below for guidance on how to size your branch circuit protection. Also, correctly sizing the incoming supply wires to the fan is important. The wire gauge recommendations given in the table are minimum gauge sizes per the National Electric Code, however your local jurisdiction may have differing regulations, and for wire runs greater than 100ft, please consult with a certified electrician for correctly sizing the supply wiring. If a fused disconnect is chosen to protect your fan, use only fuse types gG, J, or aR to maintain UL compliance.

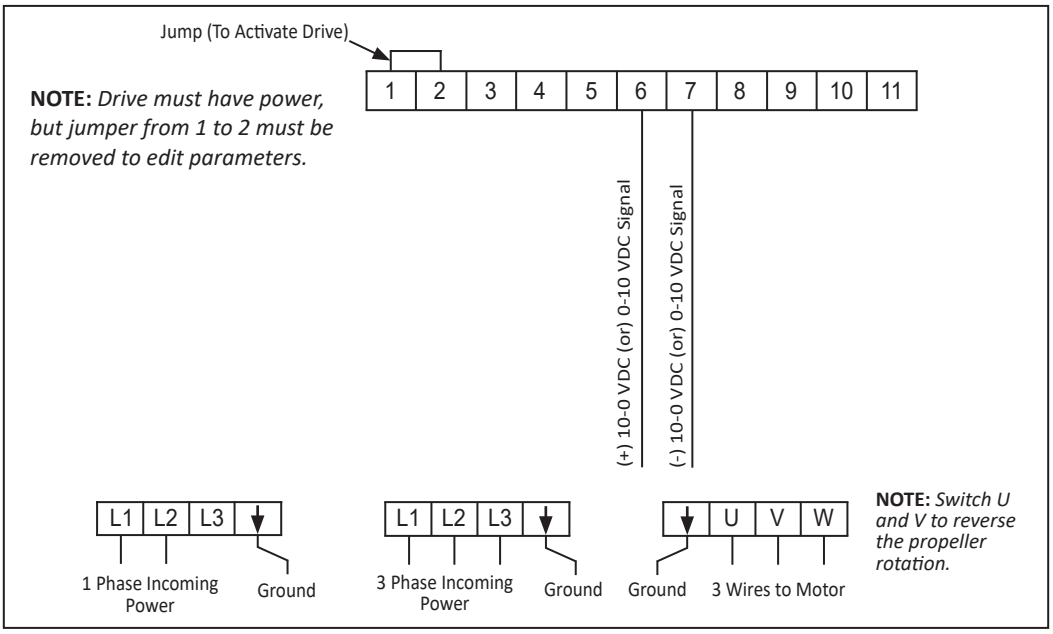
Current Ratings Per Fan Part Number			
		UL FUSE /	NEC MINIMUM
DRIVE TYPE (PART NUMBER)	INPUT CURRENT (A)	CIRCUIT BREAKER RATING (A)	SUPPLY WIRE GAUGE
921893	12.9	16	8 AWG
922139	9.5	16	8 AWG
922358	12.9	16	8 AWG
922371	5.6	16	8 AWG

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Step 2 (continued): Wiring the VFD



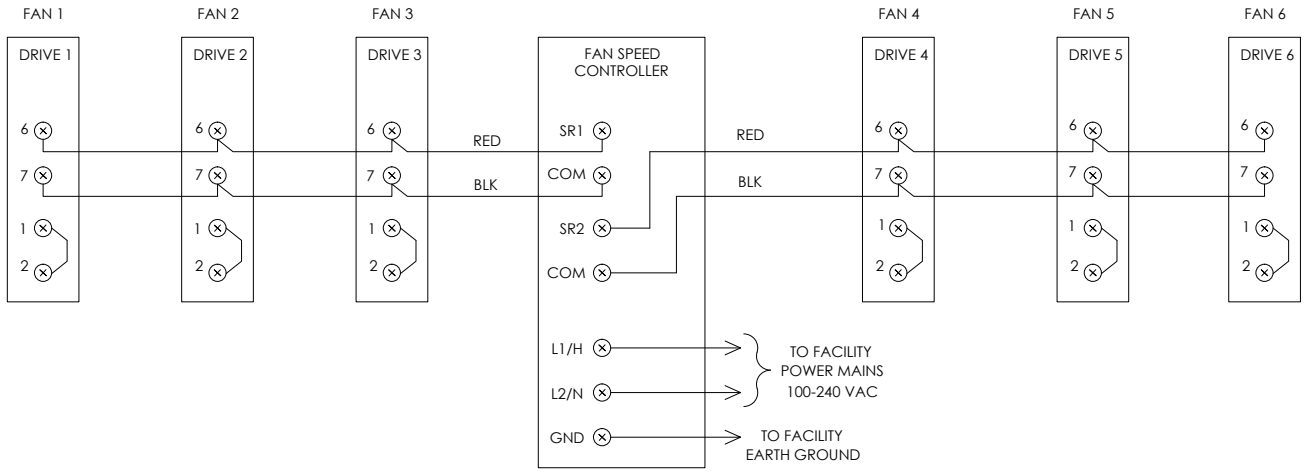
1. Connect the incoming power to L1, L2, L3 and ground for 3 phase (phase sequence is not important) and L1 / L, L2 / N and ground for single phase. Please reference Power Connection Locations Diagram above.
   IMPORTANT: *Do not exceed 13 inch-pounds (1.5Nm) of torque on the power terminal connections.*
   Wire gauge not to exceed 8 gauge for power connection terminals.
2. Control Terminal Wiring:
   - All analog signal cables should be suitably shielded. Twisted pair cables are recommended.
   - Power and Control Signal cables should be routed separately where possible, and must not be routed parallel to each other.
   - Signal levels of different voltages e.g. 24 Volt DC and 110 Volt AC, should not be routed in the same cable.
   - Maximum control terminal tightening torque is 0.5Nm.
   - Control Cable entry conductor size: 0.05 – 2.5mm2 / 30 – 12 AWG.
3. This drive is programmed to work with a whole house controller that supports VFD fans via an analog output. Please reference the wiring diagram below. A jumper is provided, taped to the inside of the VFD cover.
   IMPORTANT: *Do not exceed 4.4 inch-pounds (.5Nm) of torque on any control terminal connections.*
4. Each Optidrive should be individually connected directly to the site ground.
5. Connect the VFD to your whole house controller or a fan speed controller (921885). Your whole house controller must have 0-10 volt DC output control, otherwise order 921885. Connect the controller variable output to terminals 6 and 7. Please reference wiring diagram below.
6. Tighten all cord grips when finished wiring the VFD.



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Step 3: Install Signal Cable Wires

Install signal cable wires connecting all fans that are to run together either back to a whole house controller or the fan speed controller (921885) as shown in the wiring diagram below.



NOTE: To wire in more than 3 drives per side, jump from Terminal 6 in the last drive to the next Drive Terminal 6 and from the last Drive Terminal 7 to the next Drive Terminal 7.

Maximum number of fans for 921885 per speed reference control is 10.

Step 4: Install Jumper

With power disconnected, install jumper which is taped to the back of the VFD cover to terminals 1 & 2 and then reinstall cover.



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Step 5: Adjusting Parameters

The following instructions explain how to adjust parameters. The drive comes preprogrammed to run using 0-10V input. To adjust parameters, make sure terminals 1 & 2 are not connected.

5.1 Auto-Tune Procedure

To achieve optimal performance, it is recommended that the drive be auto-tuned to the motor. The steps below walk you through how to accomplish this. This is only required if the motor and VFD were not shipped together as the drive was already auto-tuned before shipping.

⚠	The Auto-Tune is non-rotating and can be carried out with the load coupled or a motor brake still applied. However, some rotation may still occur and the user should ensure that no risk arises from the possible movement of the motor shaft.

NOTE: Refer to Drive Operation for keypad interface information and operation.

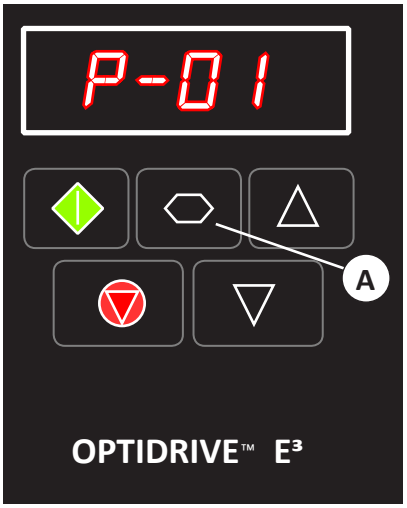
1. Power up the drive, as shown in Figure 1. The screen will display “StoP”.

Figure 1



2. Press and hold the navigate button (A) >2 seconds, as shown in Figure 2. This will enter the parameter menu. The parameter last visited will display. In this case, parameter 1 (P-01).

Figure 2



A	Navigate Button

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3. Use the up/down arrow buttons (B and C) until the motor parameter Auto-Tune is displayed (P-52), as shown in Figure 3, then press the navigate button (A) once to enter the extended parameter settings, as shown in Figure 4. The screen will display “0”.

Figure 3

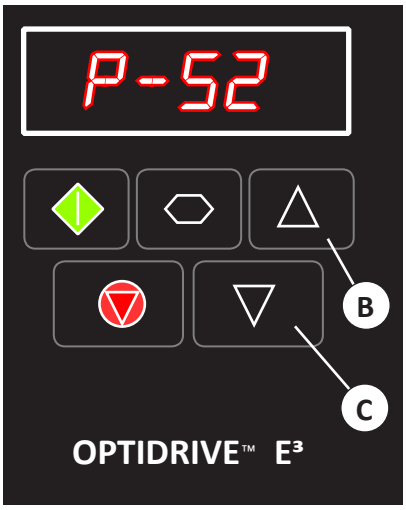
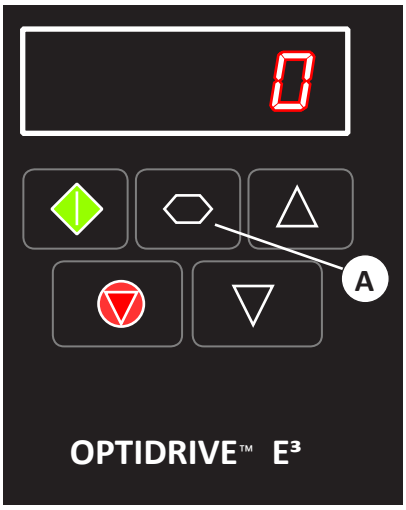


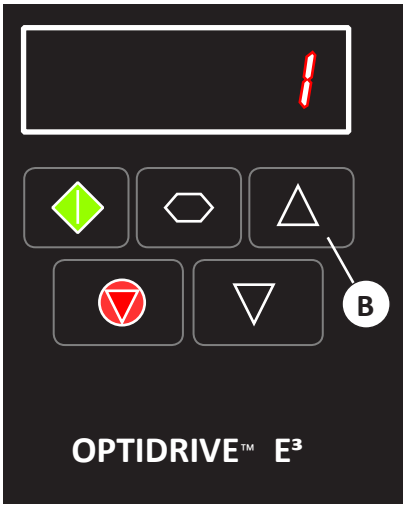
Figure 4



A	Navigate Button
B	Up Arrow Button
C	Down Arrow Button

4. Press the up arrow button (B) to set the value of (P-52) to “1”, as shown in Figure 5.

Figure 5



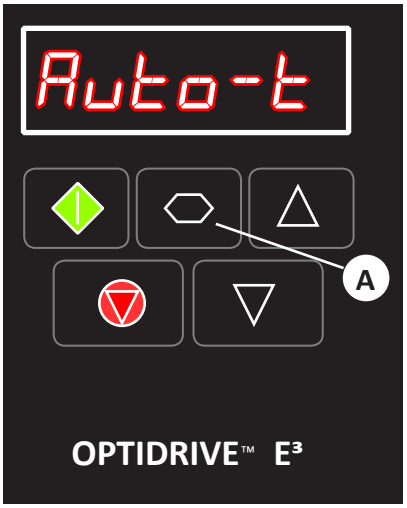
B	Up Arrow Button

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5. Press the Navigate button (A) for <1 second to select, as shown in Figure 6. The screen will display “Auto-t”, which means the drive is in the Auto-Tune process.

NOTE: The motor will make a slight humming noise and take a few seconds to complete the Auto-Tune process.

Figure 6



A	Navigate Button

The Drive is programmed to run with 0-10V input. If you want to run using 10-0V input, P16 will need to be changed to 10-0V. It is done similarly to the autotuning process.

5.2 Operating Displays

If the drive is disabled, STOP should be displayed on the screen.

If the drive is enabled, the drive could say “STANDBY” if it is not running, or it could display the output frequency in Hz, motor current in amps, motor power in kW, or the motor speed in RPM. To flip between these displays, press the Navigate key (A) for <1 second to change to different displays.

5.3 Resetting a Fault

If a fault is displayed on the screen, press the Stop Key to reset it.

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Fault Code Messages

Display Fault Code	Fault Number	Description	Corrective Action
StoP	00	Drive is healthy and in a stopped condition. The motor is not energized. No enable signal is present to start the drive.	
O-I	03	Instantaneous over current on the drive output. Excess load or shock load on the motor.	**Fault occurs immediately on drive enable** Check the output wiring connections to the motor and the motor for short circuits phase to phase and phase to earth. **Fault occurs during motor starting** Check the motor is free to rotate and there are no mechanical blockages. **Fault occurs when motor operating at constant speed** Investigate overload or malfunction.
I_t-trP	04	Motor thermal overload protection trip. The drive has tripped after delivering >100% of allowable motor current for a period of time to prevent damage to the motor.	Check the load mechanically to ensure it is free, and that no jams, blockages or other mechanical faults exist.
PS-trP	05	Hardware over current.	Check the wiring to motor and the motor for phase to phase and phase to earth short circuits. Disconnect the motor and motor cable and retest. If the drive trips with no motor connected, it must be replaced and the system fully checked and retested before a replacement unit is installed.
O:Uo lt	06	Over voltage on DC bus.	Check the supply voltage is within the allowed tolerance for the drive.
U:Uo lt	07	Under voltage on DC bus.	The incoming supply voltage is too low. This trip occurs routinely when power is removed from the drive. If it occurs during running, check the incoming power supply voltage and all components in the power feed line to the drive.
O-t	08	Heatsink over temperature.	The drive is too hot. Check the ambient temperature around the drive is within the drive specification. Ensure sufficient cooling air is free to circulate around the drive. Ensure sufficient cooling air can enter the drive, and that the bottom entry and top exit vents are not blocked or obstructed.
U-t	09	Under temperature.	Trip occurs when ambient temperature is less than -20°C. Temperature must be raised over -20°C in order to start the drive.
th-Flt	10	Faulty thermistor on heatsink.	Internal drive fault, consult dealer.
P-LOSS	0E	Input phase loss trip.	Drive intended for use with a 3 phase supply has lost one input phase.
SPI n-F	0F	Spin start failed.	Spin start function failed to detect the motor speed.
dAtA-F	11	Internal memory fault.	Loss of memory, internal fault, consult dealer.
SC-FLt	-	Internal drive fault.	Consult dealer.
FAULtY	-	Internal drive fault.	Consult dealer.

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Customer Service

Dealer Name: _____

Street / PO Box _____

City _____

State / Province _____

Zip / Postal _____

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