#### Induction Motor with Invertek ODV VFD Simple Programming Guide

This document is intended to assist with the initial setup and programming of Invertek variable frequency drives (VFDs) provided by PennBarry for use on PennBarry air moving equipment. It is assumed that prior to using this document, the VFD and fan motor have been wired and installed according to local codes and guidelines. For further information on the drives and how to safely install and operate them, please visit <a href="https://www.invertekdrives.com/">https://www.invertekdrives.com/</a> and review the user guide(s) for the corresponding VFD model.

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## Basic Programming for Keypad Control

This setup will make the fan run while allowing the user to adjust the drive's output frequency with the keypad arrows. This is the starting point for all subsequent setups.

Parameter Number	Parameter Setting	Description	
P1-07	[motor nameplate voltage]	Motor rated voltage (V)	
P1-08	[motor nameplate FLA]	Motor rated current (A)	
P1-09	[motor nameplate frequency]	Motor rated frequency (Hz)	
P1-12	1	Uni-directional Keypad	
		Control	
P1-13	9	Digital Input Configuration 9	
P1-14	101 Unlock parameter §		
		and 8	
P4-14	1	Current limit reduction	

Install a jumper wire or wire in a switch between control terminals 1 & 2 to enable the drive. An additional jumper wire is required between terminals 1 & 4 to allow local keypad control.



If the fan runs backwards, once it is safe to do so, set parameter P4-13 = 1 to reverse the polarity of the VFD output to the motor.

#### Auto-Tune

Auto-tune has the drive measure data from the motor to optimize its operation. The auto-tune process should only be done once all the motor related parameters are entered per the *Basic Programming for Keypad Control*.

Parameter Number	Parameter Setting	Description			
P4-02	P4-02 1 Enable Auto				
* <b>Caution:</b> The auto-tune process will begin immediately upon setting P4-02 to 1 and the					
<mark>motor shaft may move.</mark>					

## Auto-Restart

Auto-restart tells the drive to return to the selected frequency setting when power to the drive is restored after an outage. Enter at least the *Basic Programming for Keypad Control* parameters before setting up auto-restart.

Parameter Number	Parameter Setting	Description
P2-26	1	Enable Spin Start

Set parameters P2-36 and P2-37 to the desired settings per the following table.

Par.	Parameter Name	Minimum	Maximum	Default	Units
P2-36	Start Mode Select / Automatic Restart	See	Below	Ed9E-r	-
	Defines the behaviour of the drive relating to the enable digital input and also configures the Automatic Restart function. Ed9E-r : Following Power on or reset, the drive will not start if Digital Input 1 remains closed. The Input must be closed after a power on or reset to start the drive. RUEo-0 : Following a Power On or Reset, the drive will automatically start if Digital Input 1 is closed. RUEo-1 to RUEo-5 : Following a trip, the drive will make up to 5 attempts to restart at 20 second intervals. The drive must be powered down to reset the counter. The number of restart attempts are counted, and if the drive fails to start on the final attempt, the drive will remain in the fault condition with the last active trip code, and will require the user to manually reset the fault.				
P2-37	Let safety needs to be considered.	0	7	2	-
	Options 0 to 3 are only active when P1-12 = 1 or 2 (keypad Mode). With these settings, the drive waits for the keypad start button to be pressed before running. <b>0: Minimum speed, keypad start.</b> Following a stop and restart, the drive will always initially run at the minimum speed P1-02. <b>1: Previous speed, keypad start.</b> Following a stop and restart, the drive will return to the last keypad set-point speed used prior to stopping. <b>2: Current speed, keypad start.</b> Where the Optidrive is configured for multiple speed references (typically Hand / Auto control or Local / Remote control), when switched to keypad mode by a digital input, the drive will continue to operate at the last operating speed. <b>3: Preset speed 4, keypad start.</b> Following a stop and restart, the Optidrive will always initially run at Preset Speed 4 (P2-04).				
	Options 4 to 7 are active in all control modes. Drive starting in these modes is controlled by the enable digital input on the control terminals. 4 : Minimum speed, terminal start. Following a stop and restart, the drive will always initially run at the minimum speed P1-02. 5 : Previous speed, terminal start. Following a stop and restart, the drive will return to the last keypad set-point speed used prior to stopping.				
	<ul> <li>6: Current speed, terminal start. Where the Optidrive is configured for multiple speed references (typically Hand / Auto control or Local / Remote control), when switched to keypad mode by a digital input, the drive will continue to operate at the last operating speed.</li> <li>7: Preset speed 4, terminal start. Following a stop and restart, the Optidrive will always initially run at Preset Speed 4 (P2-04).</li> </ul>				

\*Opening and re-closing the enable jumper circuit on control terminals 1 and 2 may be required after entering the auto-restart parameters for them to take effect.

# Start/Stop

If using the *Basic Programming for Keypad Control* setup, the fan/motor can be started and stopped using the START and STOP buttons respectively.

When the drive is set up to <u>Auto-Restart</u>, the START and STOP buttons are overridden and a switch will need to be installed between control terminals 1 and 2 to close/open the circuit if the fan needs to be started/stopped.

# 0-10VDC / 4-20mA Control

The following changes to the *Basic Programming for Keypad Control* setup allow the drive to adjust the output frequency using a 0-10VDC or 4-20mA signal.

Parameter Number	Parameter Setting	Description
P1-12	0	Terminal Control Mode

	P2-30 (see below)		Analog	g input 1 sigi	nal format
Par.	Parameter Name	Minimum	Maximum	Default	Units
P2-30	Analog Input 1 Format	See	Below	U 0- 10	
<ul> <li>U 0- 10 = 0 to 10 Volt Signal (Uni-polar).</li> <li>U 10-0 = 10 to 0 Volt Signal (Uni-polar).</li> <li>- 10 = 10 to + 10 Volt Signal (Bi-polar).</li> <li>R 0-20 = 0 to 20mA Signal.</li> <li>E 4-20 = 4 to 20mA Signal, the Optidrive will trip and show the fault code 4-20F if the signal level falls below 3</li> <li>r 4-20 = 4 to 20mA Signal, the Optidrive will ramp to preset speed 4 (P2-04) if the signal level falls below 3mA E 20-4 = 20 to 4mA Signal, the Optidrive will trip and show the fault code 4-20F if the signal level falls below 3mA</li> </ul>			vel falls below 3m/ falls below 3mA. vel falls below 3m/ falls below 3mA.	A.	

The jumper wire between control terminals 1 & 4 must be opened/removed and install the control terminal wiring below for local 0-10VDC potentiometer connection.



## **Multi-Speed**

Multi-speed (or 2-speed) control runs the fan at user defined frequencies instead of keypad control and a switch can be used to swap between the 2 preset frequencies. Begin with the *Basic Programming for Keypad Control* setup and adjust the following parameters for multi-speed control.

Parameter Number	Parameter Setting	Description
P1-12	0	Terminal Control Mode
P1-13	5	Digital Input Function 5
P2-01	[1 <sup>st</sup> preset speed frequency] Preset Frequence	
P2-02	[2 <sup>nd</sup> preset speed frequency]	Preset Frequency 2 (Hz)

The wiring diagrams below show the control terminal connections to achieve each preset frequency.

Preset Frequency 1

Preset Frequency 2





#### **BMS and More Complex Control Schemes**

For BMS or other more complex control schemes please refer to Invertek's corresponding quick start guide or user guide. The Invertek ODV model is capable of Modbus RTU or BACnet MSTP Native. For additional support on more complex control schemes, Invertek's USA headquarters can be reached at 847-549-3669 or info@invertekdrives.com.



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