

Introduction:

The motor control system selected for this experiment utilizes a PowerFlex 40 Variable Frequency Drive (VFD) to energize one of its 3 Φ Induction Motors. The VFD's operation will, in-turn, be controlled by the CompactLogix PLC via the Ethernet network.

The VFD contains, within its memory, a set of parameters that define the operational characteristics of the drive. Although the drive arrives with a default set of parameter values that are often sufficient for stand-alone operation of the drive, the parameters can be modified to tailor the drive's operation for use within a specific control system. These parameters include:

Display Group Parameters	
No.	Parameter
d001	Output Freq.
d003	Output Current
d004	Output Voltage
Basic Program Group Parameters	
P033	Motor OL Current
P034	Minimum Freq.
P035	Maximum Freq.
P036	Start Source
P037	Stop Mode
P038	Speed Reference
P039	Accel Time 1
P040	Decel Time 1
P041	Reset To Defaults

Note – Refer to the PowerFlex 40 **User Manual** that is available in the lab or the **Quick Start Guide** that is available within the Final Project section of the course webpage for detailed information regarding all of the drive's operating parameters.

During part “B” of this experiment, you will reset the drive back to its default configuration, after which you will reconfigure the required parameters to allow for the drive to receive both “Start” commands and frequency values via its Comm port from the PLC. Additionally, you will increase the rate at which the drive accelerates and decelerates when changing its output frequency, and you will check to make sure that the drive's web-browser interface is enabled.

Procedure:

Unless instructed otherwise, perform this entire procedure, in order, without skipping any sections.

LabVolt Power Supply

1. Switch ON the main LabVolt power supply.

If already ON, cycle the power ON⇒OFF⇒ON.

REMINDER
TURN-OFF the main power supply immediately
if any unexpected operation occurs while the
supply is energized (ON).

Configuration of the PowerFlex 40 Operating Parameters

The PowerFlex 40 maintains its operating parameters even when fully de-energized. Since another operator may have previously reconfigured the drive, you will first reset the parameters back to their default values before setting the parameters required for this experiment.

2. Reset the VFD to its **default configuration** by changing the value stored in the VFD's **Basic Program Group P041** to one (1) using the following procedure:

- a) Press the **Esc** button on the front panel of the PF40 two times. The left-most character ("d" for **Display Group**) in the LED display should be flashing.
- b) Press the **▲** button once such that the left-most character changes to a "P" for **Basic Program Group**. This allows you to view and/or change the settings within this group.
- c) Press the **Sel** button once such that the right-most character of the display is flashing, and then use the **▲** or the **▼** button to change to program "P041". Once "P041" is displayed, press the **↵** button to choose this program.
- d) Use the **▲** or **▼** button to change the displayed value from a "0" to a "1" and press **↵**. This will reset the PF40 to default conditions.
- e) The PF40's display should now be flashing "F048". Fault code 48 occurs when the VFD's parameters were reset to their default values.
- f) Press the **Stop** button on the control panel of the PF40 to acknowledge/clear the fault.

3. In a similar manner, change the following parameter(s) values as listed below:

- | | | |
|---------------|---|--|
| ▪ P036 | From "0" to "5"
(<i>Start Source</i>) | This allows the PF40 to receive the "Start" command from the " <i>Comm Port</i> " instead of the keypad. |
| ▪ P038 | From "0" to "5"
(<i>Speed Reference</i>) | This allows the PF40 to receive its Output Frequency from the " <i>Comm Port</i> " instead of its front panel. |
| ▪ P039 | From "10" to "2"
(<i>Accel Time 1</i>) | This decreases the length of time that it takes to PF40 to increase its <i>output frequency</i> from 10sec down to 2sec. |
| ▪ P040 | From "10" to "2"
(<i>Decel Time 1</i>) | This decreases the length of time that it takes to PF40 to decrease its <i>output frequency</i> from 10sec down to 2sec. |

4. Change to **Display Group "d012"** and verify that it displays "55". This group displays the current settings of **P036** and **P038** as a 2-digit number.

Enabling the PowerFlex 40's Web Browser Interface

5. Check (and correct if necessary) the setting of the 2 DIP-switches next to the Ethernet jack on the front of the PF-40. **Correct Settings: Switch1 → Off Switch 2 → On**

Switch 1 is used to set the VFD for either single (off) or multiple drive operation (on).

Switch 2 disables (off) or enables (on) the VFD's web browser interface.

Completion of Part B

If the physical control system is properly setup as described in **PLC-1A** and the VFD is properly configured as described in **PLC-1B** (this document), then you are ready to complete the next portion of this experiment: **PLC-1C: Communication Network – Configuration**