

# POWERTEC INDUSTRIAL MOTORS

2606 Eden Terrace  
Rock Hill, SC 29730  
Phone 803-328-1888  
Fax 803-328-1870  
[www.powertecmotors.com](http://www.powertecmotors.com)

## MEMO

Date : 10/9/02

Updated:11/12/12

To : Users Replacing Millennium Drives

From : Ed Lee

Subject : Flexmax/Millennium Conversions

Information in the Flexmax manual referenced in this document for wiring can be found on our website at:

[www.powertecmotors.com](http://www.powertecmotors.com). Then select **FlexmaxDrives**. Then Select **Manuals**. Then select **ManualPX-EV Flexmax EV.pdf**

1. **AC Power:** The Flexmax drive requires high-speed SCR type fuses for the AC input. They are not mounted on the drive. These fuses are described in the manual on page 66 where both European and US manufacturers types are shown. For instance for a PX-300 being used at 150 hp, 460 vac input, the fuse type would be FWP400 or A70P400. Of course you will need appropriate fuse blocks on which to mount them. If the Genesis drive is being scrapped, the fuses and blocks from it can be used. AC power input is marked on the drive as L1, L2, L3 as well as being marked in the European designation of U1, W1, V1. An appropriately sized thermal and magnetic trip breaker can be used in lieu of the fuses. Additionally on drives larger than PX 125, the fans must be powered by an external 120 vac source, or 230 vac source (single phase, 1 amp or less). Details are shown on page 39 of the manual, chapter 3. If you are using 125 vac then jumper 1V3 and U3 together and connect the 125 vac to 2V3 and 1V3. This power should be on all the time, not switched on an off with the drive run.

2. **Input Inductance:** Either an appropriately sized input transformer (approximately 1 kva per HP) or line chokes should be used in the AC

input lines going to the drive. This is to provide for both line harmonic current reduction and for DI/DT protection of the input power diodes and assure normal life for the bus capacitors. We consider the chokes (or transformer) mandatory for drives larger than PX-30. Chokes can be purchased through Powertec or directly from the several US manufacturers of AC drive line chokes. Sizing is straightforward and done by HP rating and voltage. 2 to 3% impedance is appropriate.

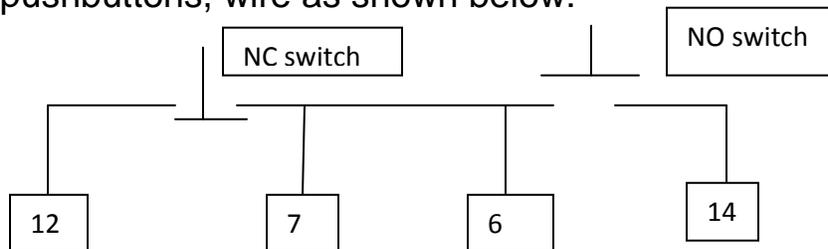
**3. Motor Output Wiring:** Terminals are marked T1, T2, T3, in addition to the European markings U2, V2, W2.

**4. Bus Braking Unit for 4 quadrant applications:** The drive has a built-in braking unit (less resistor) in all units standard up through the PX-100. If the braking unit is still functional in the original Genesis application, then it can be kept and used for the Flexmax. Where the old bus loader is not usable, a new type braking unit is available from Powertec as an option in various current ratings, depending on the braking power needed in the application. They are not sized to the drive, but sized to the braking effort required. In ALL cases, resistors have to be added in order for braking action to occur. Ohmic value of braking resistors and wattage can be found in the manual on page 74, or call Powertec and get the information. We can help. The resistor is connected to terminals BR1 and C on drives up through PX-100. On larger drives, the braking unit is wired according to the instructions in the braking unit package. When using the old braking unit, the resistors remain connected as normal, and the L1 and L2 terminals still need to be connected to an AC input phase. The K1 contact needs to be connected in series with the enable input to the Flexmax. See further I/O connections below.

**5. Resolver Feedback:** The motor resolver for the Flexmax is the same resolver used for Millennium with no modifications. It fits in the same place. Flexmax uses a 15 pin D-sub connector at the drive end to connect the resolver. We furnish the drive with the connector, but the wiring must be wired to the connector. Powertec can also provide (at optional cost) the connector with as much wire as necessary to make the field connection to the motor conduit box. In retrofit situations where the existing resolver wire is in place, it is best to bring the resolver wires to a terminal strip near the drive and wire from the D-sub connector on the drive to the terminal strip with Belden 9504 4 pair twisted pair cable. This is much smaller wire and easier to work with than the larger conductor wire

typically used to the motor. Powertec can provide the D-sub wired to a few feet of this cable for this interface if desired. The connections from the Powertec Motor terminal strip in the conduit box to the pins on the D-sub connector are shown in table 4.3.3.1 on page 53 (chapter 4) of the manual. Shielded connections are needed to insure the feedback noise does not cause the drive to operate erratically.

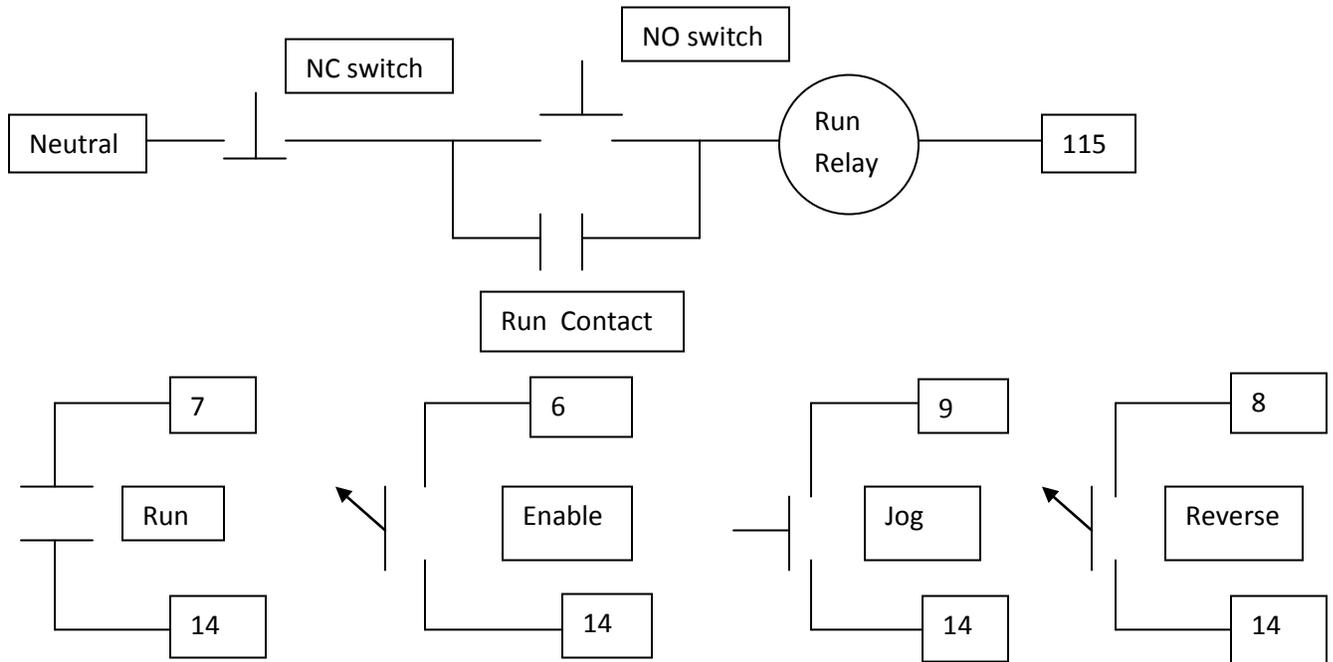
**6. Connections to the digital I/O** is shown on page 48 with the standard default functions shown for enable, run, inverse(reverse), and Jog. These can be reassigned using the keypad or E@sydrivesPX. The I/O is 24 vdc and is opto-isolated from the drive power supplies and common, therefore can be used with the internal 24 vdc, or sourced from a remote device providing it's own 24 vdc and isolated from the drive completely. The standard default set up is to run from contacts for run and enable. In most applications run and enable can be tied together and be activated at the same time. Assuming the drive is being operated using the drive 24 vdc, then a jumper is placed from 16 to 5 and the inputs are made from 14 (24 vdc) to 6, 7, 8, or 9 as shown. If you are trying to run the drive from momentary start-stop pushbuttons, wire as shown below:



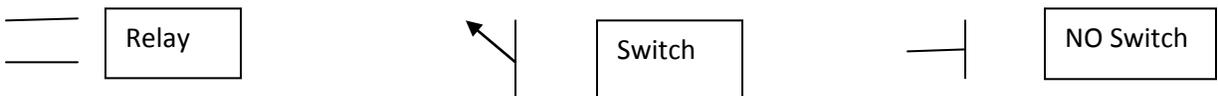
Note: Digital output 0 comes out on 12 and Digital output zero must be assigned the function "enable" using the keypad or WinPX. This acts as the seal-in function for run. When the start button is pushed the enable is made high. When enable is high, the digital output on 12 becomes high and makes run and enable high. When the start button is released, enable stays high (and run remains high) until stop is pushed again.

There are some applications where it may be desirable, however to have enable be a separately controlled input. In the case where other run **options are desired, like Jog**, for instance and the momentary start/stop pushbutton type function is desired then an external relay is required as shown below. Get a 4 pole double throw relay (simple ice

cube type) and socket and mount it to the panel and connect it as shown using 115 vac. We recommend this instead of using a 24 vdc relay and taking the power off the drive 24 vdc supply.



Below is symbol description:



Note: Enable must be on in order to run or jog. Opening enable causes the drive to coast to a stop. Reverse can be made at any speed or direction.

**7. Analog input 0** is defaulted to speed. Wire the pot as shown in the diagram on page 48. CCW side of pot to 19. CW side of pot to 20 (or 21 for reverse operation), wiper to 1. Jumper between 2 and 19.

**8. Analog outputs for speed and load** are available from 19 to 17 (Speed) and 19 to 18 (Current). See page 48. These can be scaled and offset and reversed as desired using the keypad or E@sydrivePX.

**9. Motor Thermal** The standard thermal protection for a Millennium motor is the NTC (negative thermal coefficient) . This type of device does not work with the Flexmax. We recommend a NC (normally closed) Thermal switch be used in its place. It should be mounted on the NDE (non-drive end) of the motor on the winding. This requires some disassembly of the motor to perform or Powertec can perform this task for you.

**Contact Powertec for specific instructions on other operating modes.**