

## Tech Tip

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**Topic:** Auto Tuning to a motor without using the Assisted Start up

**Drive Product:** PowerFlex® 700S

**Introduction** A Tech Tip provides details on a specific feature of a drive product and provides configuration and tuning information on the parameters associated with that specific feature. This document serves as a supplement to the PowerFlex 700S Users Manual (20D-UM001) providing guidelines for Auto tuning of the motor – drive combination without using the Assisted Start. This procedure is useful when changing motors on the drive without changing the functions of the drive. Please refer to the Users Manual for details on the PF700S control and feedback parameters. Before running autotune verify that drive parameters 1 through 7 are set to the correct motor data.

**User Information** Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://www.ab.com/documents/gi>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this document are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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**Related Publications** The following publications should be referenced and followed when operating, configuring, or commissioning this drive product. These publications may be found on the automation book store at [www.theautomationbookstore.com](http://www.theautomationbookstore.com) ;

Publication Title	Pub Number
PowerFlex 700S User Manual	20D-UM001B-EN-P
PowerFlex 700S Reference Manual	PFlex-RM002A-EN-E
PowerFlex 700S Firmware Release Notes	20D-RN004A-EN-P
PowerFlex 700S Quick Start	20D-QS001A-EN-P

# Tech Tip

## Precautions

### Class 1 LED Product

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**ATTENTION:** Hazard of permanent eye damage exists when using optical transmission equipment. This product emits intense light and invisible radiation. Do not look into module ports or fiber optic cable connectors.

### General Precautions

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**ATTENTION:** This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference Allen Bradley publication 8000-4.5.2, "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.



**ATTENTION:** An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors such as under sizing the motor, incorrect or inadequate AC supply, or excessive surrounding air temperatures may result in malfunction of the system.



**ATTENTION:** Only qualified personnel familiar with the PowerFlex 700S AC Drive and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.



**ATTENTION:** To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before performing any work on the drive. Measure the DC bus voltage at the +DC & -DC terminals of the Power Terminal Block (refer to Chapter 1 in the PowerFlex 700S User Manual for location). The voltage must be zero.



**ATTENTION:** Risk of injury or equipment damage exists. DPI or SCANport host products must not be directly connected together via 1202 cables. Unpredictable behavior can result if two or more devices are connected in this manner.



**ATTENTION:** Risk of injury or equipment damage exists. Parameters 365 [Encdr0 Loss Cnfg] - 394 [VoltFdbkLossCnfg] let you determine the action of the drive in response to operating anomalies. Precautions should be taken to ensure that the settings of these parameters do not create hazards of injury or equipment damage.



**ATTENTION:** Risk of injury or equipment damage exists. Parameters 383 [SL CommLoss Data] - 392 [NetLoss DPI Cnfg] let you determine the action of the drive if communications are disrupted. You can set these parameters so the drive continues to run. Precautions should be taken to ensure the settings of these parameters do not create hazards of injury or equipment damage.

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## Tech Tip

### Step by Step Directed Auto Tuning Procedure

1. Performing the PowerFlex® 700S power circuit diagnostics test.
  - a) Verify motor is correctly connected to the drive
  - b) For the Phase I drive, Set bit 5 = 1 in Parameter 151 [Logic Command]. For the Phase II drive, set bit 27 = 1 Parameter 153 [Control Options].
  - c) Start the drive. The H.I.M module will display "Test Done" in the Status line. If a problem exists, the drive will display the fault code.
  - d) Stop the drive. This will reset the Power Circuit Diagnostics bit back to zero.
  
2. Performing the PowerFlex® 700S Direction and Feedback direction tests.
  - a) Record parameter 485 [Motor Ctrl Mode] setting. (P432 [Test Freq Ref] & P433 [Test Freq Rate] should be at default settings)
  - b) Set parameter 485 [Motor Ctrl Mode] to Test (4).
  - c) Start the drive. If the motor direction is incorrect, stop the drive. Change the value of bit 10 of Parameter 153 [Control Options]. If bit 10 = 1 set = 0, If bit 10 = 0 set = 1. Restart the drive and verify direction. Then stop the drive. (Optional: change motor phasing without changing direction setting; i.e. swap motor U and V phases.)
  - d) Start the drive. Monitor the speed feedback parameter for the feedback device you are using. Parameter 231 [Encdr0 Spd Fdbk], 241 [Encdr1 Spd Fdbk], 251 [FB Opt0 Spd Fdbk], 277 [FB Opt1 Spd Fdbk]. If the feedback is negative, stop the drive. Change the value of the bit for the correct feedback selected. Parameter 233 [Encdr0 Config] bit 6, 243 [Encdr1 Config] bit 6, 259 [Hi Res0 Config] bit 5, 266 [Reslvr0 Config] bit 5. Start the drive and re-verify speed feedback is positive. Stop the drive. (Optional for encoders, change encoder wiring; i.e. swap wires A and A-Not.)
  - e) Set parameter 485 [Motor Ctrl Mode] back to the recorded value.
  
3. Performing the PowerFlex® 700S Motor Control Auto Tune test.
  - a) Set bit 4 = 1 in Parameter 151 [Logic Command] for the Phase I drive, set bit 25 = 1 Parameter 153 [Control Options] for the Phase II drive.
  - b) Start the drive. The H.I.M module will display "Test Done" in the Status Line after completing the test. (The test will take a few minutes. Depending on setting for rotation tune the motor may spin. **If you can not rotate the motor, set bit 9 = 1 in Parameter 515 [FOC Tune Config]**)
  - c) Stop the drive. This will reset the MC Atune En bit back to zero.
  
4. Performing the PowerFlex® 700S System Inertia Tests.
  - a) Couple the motor to the load.
  - b) For the Phase I drive, set bit 9 = 1 in Parameter 151 [Logic Command]. For the Phase II drive, set 30 = 1 in Parameter 153 [Control Options].
  - c) Start the drive. The drive will rotate slowly forward to take up any gear lash. Then it will accelerate to the Auto Tune Speed reference at the Auto Tune Torque reference. When the test is complete the H.I.M will display "Test Done" in the Status Line.
  - d) Stop the drive. This will reset the System Inertia test bit.

This completes the Auto Tuning without using the Assisted Start on the H.I.M.

# AB Parts