PowerFlex® Digital DC Drive Firmware v3.001

These release notes correspond to major revision (3), minor revision (1) of firmware for the PowerFlex® Digital DC drive.

Introduction

The following information is included in this document:

Determining Firmware Revision Level

To determine the firmware version for a PowerFlex DC, view parameter 331 [Software Version].

The firmware build number is not associated with a parameter number.

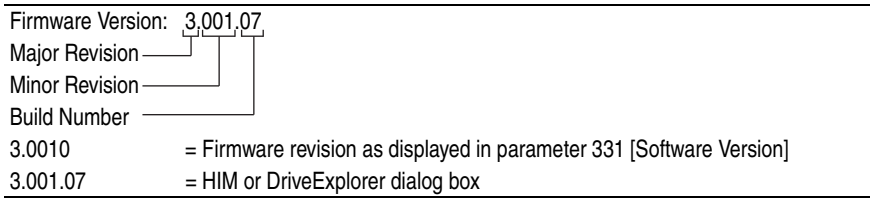
To determine the firmware build number using the HIM:

- From the Main menu, select Diagnostics > Device Version.
  View the build number under “Main Control Bd Application Code”.

To determine the firmware build number using DriveExplorer™:

- Select Explore > Device Properties.
  In the Device Properties dialog box, click on the Details tab and view the build number under Main Control Bd Application Code > Revision.

Example:



Firmware Upgrades

Important: Once a flash update has been started, do not remove power from the drive until after the download has completed and the Drive has reset. If power is removed during Boot Flash, the drive may be permanently damaged. A drive that has been damaged in this way cannot be repaired. If power is removed during Application Flash, the drive will remain in Boot and can be re-flashed.

Note: When you upgrade to a major firmware revision (**2**.xxx to **3**.xxx), after the drive has been programmed and rebooted an "EEPROM Error" fault (F100) will occur. This is due to the additional memory storage requirements for the new parameters in the firmware. You can clear the fault and continue.

HyperTerminal Update Instructions:

Firmware 1.006.05 or later:

Use HyperTerminal to load the following file:

1. PFDC_MC_3_001_07_AppES.bin

Note: The above file contains English and Spanish only. The following files are available at: http://www.ab.com/support/abdrives/webupdate/powerflexdc.html#

- PFDC_MC_3_001_07_AppFR.bin (English / French)
- PFDC_MC_3_001_07_AppDE.bin (English / German)
- PFDC_MC_3_001_07_AppIT.bin (English / Italian)
- PFDC_MC_3_001_07_AppPT.bin (English / Portuguese)

ControlFLASH Update Instructions:

ControlFLASH updates are only possible using the following:

- AnaCANda, v3.004.01 or later
- DeviceNet, v1.006.02 or later
- ControlNet, v1.001.01 or later
- EtherNet, v1.001.01 or later

Firmware 1.006.05 or later:

1. Install ControlFLASH file ControlFLASH_PFDC_v3001b07ES.msi

2. Run ControlFLASH

Note: The above file contains English and Spanish only. The following files are available at: http://www.ab.com/support/abdrives/webupdate/powerflexdc.html#

- ControlFLASH_PFDC_v3001b07FR.msi (English / French)
- ControlFLASH_PFDC_v3001b07DE.msi (English / German)
- ControlFLASH_PFDC_v3001b07IT.msi (English / Italian)
- ControlFLASH_PFDC_v3001b07PT.msi (English / Portuguese)

Enhancements

This section describes the enhancements contained in this revision:

Alpha Test Mode

The Alpha Test is a diagnostic function that allows you to activate the Armature or Field power module in an open loop mode. By commanding a SCR firing angle a voltage is produced at the output of the selected power module. A load greater than 500 mA is required for proper SCR operation - typically, an incandescent bulb or inductive load (never a motor) is used.

The following new parameters were added to the Motor Control file, Test Generator group to support this function:

- 166 [Alpha Test]
- 167 [Arm Test Angle]
- 168 [Fld Test Angle]

Refer to the “Alpha Test Mode” section in Appendix C - Application Notes, in the v3.001 PowerFlex Digital DC Drive User Manual, publication 20P-UM001, for details.

Drive Overload Function

The Drive Overload function (150% drive rating for 60 sec. or 200% for 3 sec.) protects the drive regardless of the motor overload configuration (see Motor Overload Configuration (I^2t) below). The existing fault "Drive Overload" (F64) indicates that a drive overload has occurred.

Drive Reference and Feedback Scaling

With firmware version 3.001, external reference and feedback speed values are now normalized to 25,000 counts (for firmware version 2.005 and lower, external reference and feedback speed values are scaled to “rpm x 4” counts). This enhancement includes updates to the internal values of parameters 45 [Max Ref Speed] and 162 [Max Feedback Spd].

- The value of parameter 45 [Max Ref Speed] (rpm) determines the correlation (scaling) between DPI speed reference counts and rpms as well as the analog input reference values (10V = Par 45 rpm). All speed reference values are based on the value of parameter 45 [Max Ref Speed]. In addition, the maximum value for this parameter was changed from “16383” to “6000” (rpm).

- The value of parameter 162 [Max Feedback Spd] (rpm) determines the correlation (scaling) between DPI speed feedback counts and rpms as well as the DC tachometer values. All speed feedback values are based on the value of Par 162 [Max Feedback Spd]. In addition, the maximum value for this parameter was changed from “16383” to “6000” (rpm).

Refer to the “Drive Reference and Feedback Scaling” section in Appendix C - Application Notes, in the v3.001 PowerFlex Digital DC Drive User Manual, publication 20P-UM001, for details.

Encoder Position Feedback

New parameter 1022 [Encoder Counts] displays the accumulated pulse count (32-bit integer) from the connected encoder. Each edge is counted, so a 1024 PPR device would produce 4096 counts per revolution.

Low Rated Motor Speeds Now Supported

The internal interaction of Parameters 162 [Max Feedback Spd], 169 [Encoder PPR] and 175 [Rated Motor Volt] have been modified so that motors with low rated speed values can now be used.

Maximum Output Voltage Level Limit Increased

The of parameter 921 [Out Volt Level] has been increased from 100% to 110%. Only the parameter maximum limit value has changed. Internally, its value is still clamped to 100% so that detection of a "Feedback Loss" (was “Encoder Loss”) (F91) is not affected. This change allows operation above motor base speed but with constant flux (less fluctuation) because the voltage regulator is permitted to go above (10% max.) rated voltage (speed).

Motor Overload Configuration (I^2t)

New parameter 479 [MtrOvrld Flt Cfg] allows the motor overload calculation to be configured as a Fault, Alarm, or Ignored. Also, the new "Motor Overload" (F7) fault has been added to indicate when a motor overload condition exists and the new bit 13 "Mtr Overload" has been added to parameter 1380 [Drive Alarm 1] to indicate when the new motor overload alarm is active.

New parameter 1290 [MtrOvrld Status] displays the present motor overload status as a percentage of motor overload (0% - 100%). This parameter is active regardless of the configuration of the motor overload configuration (Fault, Alarm, or Ignore).

New parameter 376 [MtrOvrld Type] allows the selection of the type of motor overload calculation, “StandardDuty” or “HeavyDuty”. Standard Duty is 150% for 1 minute or 200% for 3 seconds indicate a motor overload. Heavy Duty is 200% for 1 minute indicates a motor overload. Heavy Duty requires that the drive is oversized relative to the motor so it could provide 200% of rated current for 1 minute without faulting.

Multi-Language Support Added

Parameter 302 [Language] has been added to allow you to select the operating language of the drive. The default firmware shipped with the drive supports "English" and “Spanish" only. Separate firmware files will each support "English" and one other language selection (French, German, Italian and Portuguese). Once the firmware file containing the desired second language has been installed in the drive, the appropriate value (2, 4, 5 or 7) for selecting the second language will be displayed and can be selected in parameter 302 [Language]. The firmware files containing the additional languages can be downloaded at: http://www.ab.com/support/abdrives/webupdate/index.html

New Motor Overspeed Configuration

Parameter 585 [Overspeed Val] has been added and is used to specify a speed value (rpm) at which the new “Overspeed” fault (F25) will occur.

New Speed / Torque Modes

The drive can now be programmed to operate as a speed regulator, a torque regulator, or a combination of the two. There are six modes of operation: 0 “Zero Torque Ref”, 1 “Speed Reg”, 2 “Torque Reg”, 3 “SLAT Min”, 4 “SLAT Max”, and 5 “Sum”.

Refer to the “Speed / Torque Mode Selection” section in Appendix C - Application Notes, in the v3.001 PowerFlex Digital DC Drive User Manual, publication 20P-UM001, for details.

The following parameters have been added to support the new Speed/ Torque Mode functions:

- 14 [Selected TorqRef] displays the selected torque reference based on the value of parameter 241 [Spd Trq Mode Sel].
- 15 [SLAT Err Stpt] configures the condition for transfer between Speed and Torque operation during “SLAT Min” or “SLAT Max” mode.
- 16 [SLAT Dwell Time] configures the amount of time that the speed error must be greater than the value of Par 15 [SLAT Err Stpt] in order to return to “SLAT Min” or “SLAT Max” mode.
- 17 [Motor Trq Ref] displays the total motor torque reference.
- 241 [Spd Trq Mode Sel] is used to choose the operating mode for the drive. For this firmware version, parameter 241 [Spd Trq Mode Sel] replaces parameter 242 [].

New Type 2 Field Configuration Conflict Alarm

The new Type 2 "Field Configuration Conflict" (FldCfg Cflct) alarm has been added and indicates when there is a conflict in the settings of field configuration related parameters.

Miscellaneous Parameter Additions

The following new parameters have been added with this firmware revision:

- 95 [Spd Reg Pos Lim] - positive speed regulator output limit. When this limit is active the positive integrator portion of the PI regulator is held to prevent windup.
- 96 [Spd Reg Neg Lim] - negative speed regulator output limit. When this limit is active the negative integrator portion of the PI regulator is held to prevent windup.
- 238 [SpdOut Filt Gain] - is a first order lead/lag filter gain on the speed regulator output signal.
- 239 [SpdOut FiltBW] - is a first order lead/lag filter bandwidth on the speed regulator output signal.
- 461 [Spd Fdbk Invert] - enables/disables speed feedback negation.
- 462 [Flux Divide] - can now be used to select division by flux for Inertia Compensation or Torque Reference.
- 463 [Flux Filter BW] - can be used as an adjustable low pass filter on the value of Par 500 [Flux Ref Pct]. The filtered result is used by the Torque Reference divide by flux function.
- 500 [Field Ref Pct] was renamed to [Flux Ref Pct].
- 563 [Anlg Tach Zero] was renamed to [Feedback Offset].
- 914 [Spd FB filt Gain] - is a first order lead/lag filter gain on the speed feedback signal.
- 915 [Spd FB Filt BW] - is a first order lead/lag filter bandwidth on the speed feedback signal.
- 926 [Filt Torq Cur] was renamed to [Torq Cur Filter].

Corrected Anomalies

This section describes the anomaly corrected in this revision:

Corrected Erroneous Main Contactor Faults

This revision of firmware corrects erroneous Main Contactor (F10) faults when the drive was repeatedly “Started” or “Jogged”.

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using our products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a "MySupport" feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this document. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3434 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of our products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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