



# PowerFlex 70 Drive with Enhanced Control Option Firmware 4.001

This release note describes major revision 4, minor revision 1 of firmware for the PowerFlex 70 drive with Enhanced Control option only. Refer to publication 20A-RN002 for a complete description of the changes implemented in previous firmware revisions.

## Introduction

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## Enhancements

### Always Upload Parameters

A requirement for ADR is that a configuration download set all writable/recallable parameters to restore ANY replacement drive with ANY existing parameter set to what they were in the original drive. To satisfy this requirement some parameters must always be uploaded: i.e. All the parameters that are “preserved” through a reset to defaults as well as all parameters with “dynamic” defaults (parameter default depends on what another parameter is set to).

Parameter No.	Parameter Name
41	Motor NP Volts
42	Motor NP FLA
43	Motor NP Hertz
44	Motor NP RPM
45	Motor NP Power
46	Mtr NP Pwr Units
47	Motor OL Hertz
54	Maximum Voltage
55	Maximum Freq
62	IR Voltage Drop
63	Flux Current Ref
69	Start/Acc Boost
70	Run Boost
71	Break Voltage
72	Break Frequency
82	Maximum Speed
91	Speed Ref A Hi

Parameter No.	Parameter Name
94	Speed Ref B Hi
97	TB Man Ref Hi
107	Preset Speed 7
119	Trim Hi
121	Slip RPM @ FLA
148	Current Lmt Val
158	DC Brake Level
196	Param Access Lvl
201	Language
202	Voltage Class
322	Analog In 1 Hi
323	Analog In 1 Lo
325	Analog In 2 Hi
326	Analog In 2 Lo
343	Analog Out1 Hi
344	Analog Out1 Lo
542	EncdLss Vlt Comp

## Configuration Object (Copycat) Changes

In v3: The DPI Configuration Object (used by HIM copycat and Drive Explorer Upload/Download) would upload parameter information for ALL writable/recallable parameters. A v3.003 configuration upload (all parameters) requires 21 x 66 byte blocks.

For Logix ADR (Automatic Device Replacement) we want to upload a reset to defaults command followed by only the parameters that are not at their default values. The intention is to reduce the Logix memory and the upload/download time required by ADR.

In v4: A configuration upload requires 7 x 66 byte blocks if all parameters and process displays are at defaults. One block will hold a minimum of 8 parameters and can hold up to 19 parameters (for consecutive parameter numbers).

Note: Any parameter that is currently a datalink sink (P300 [Data In A1] through P307 [Data In D2]) is excluded from a configuration upload.

Added newly defined “This Device fully complies with v2.02 specification” bit to the DPI Configuration Object “Class Descriptor” (DPI 30.0.3)

## NVS Checksum Changes

The “NVS Checksum” (DPI 1.0.11) is a CRC16 check spanning:

- All parameters that are both writable and recallable
- All (2) “Process Display Objects” (DPI 6)
- The “User Definable Text” (DPI 1.0.5)

### It now excludes:

- All parameters that are data link sinks  
i.e. Parameters selected by P300 [Data In A1] through P307 [Data In D2]

It is presumed that if a parameter is specified as a data link sink it is controlled over a network via a communications adapter.

P203 [Drive Checksum] now displays the same value as the “NVS Checksum”.

The “NVS Parameter Value Checksum” (DPI 3.0.3) is now a CRC16 calculation. It is the result of the parameter portion of the “NVS Checksum” calculation.

## Change P549 [Flux Braking %] Default

In v3: The P549 [Flux Braking %] 175% default allows output voltage the results in output current that exceeds current limit. The current limiter function presumes that excess current can be corrected by reducing output frequency thus reducing slip frequency thus reducing current. But in this case the excess current is due to excessive voltage rather than slip frequency. The frequency is abruptly reduced yet current remains high.

The P549 [Flux Braking %] default has been reduced from 175% to 125%.

<b>UTILITY</b>	<b>Diag-Motor Cntl</b>	549	<b>EC v4</b>	<b>[Flux Braking %]</b>	Default: 125	166
		Gain adjustment for Flux Braking mode. (Percentage of normal output voltage.)  This parameter is only viewable when P196 [Param Access Lvl] = 2 "Reserved."			Min/Max: 100/250 Units: %	

## New Fault - F10 "Heatsink LowTemp"

In v3: F8 "Heatsink OvrTemp" is annunciated for both too high a temperature and too low a temperature (or a broken connection to the NTC). This has been a problem for customers in low temperature environments.

A new, maskable fault F10 "Heatsink LowTemp" is now used to annunciate the too low temperature case.

<b>UTILITY (File E)</b>	<b>Faults</b>	238	<b>[Fault Config 1]</b>	
		Enables/disables annunciation of the listed faults.		
<p>Bit #</p> <p>Factory Default Bit Values</p> <p>(1) Enhanced firmware 1.001 &amp; later.  (2) Enhanced firmware 2.001 &amp; later.  (3) Enhanced firmware 4.001 &amp; later.</p> <p>(4) Bit 11 enables the shear pin fault to be ignored during acceleration and deceleration. Using Bit 11 with Bit 4 set to "0" will have no effect.</p>				

### **New Fault - F112 “Power Down Csum”**

In v3: On power up, data to load the structure sNVSPowerDownData is read from the control board eeprom and checksummed. If OK, sNVSPowerDownData is loaded otherwise all values are set to default without any indication that the eeprom data was corrupt.

A side affect of setting sNVSPowerDownData to defaults is that it causes P61 [Autotune] to be reset to 3 “Calculate”; changing P62 [IR Voltage Drop], P63 [Flux Current Ref] and possibly P64 [IXo Voltage Drop]. This has led to many cases where a drive that was working OK suddenly can't accelerate from zero speed and it is not obvious why.

If a checksum error restoring sNVSPowerDownData from eeprom is detected (F112), do not force P61 [Autotune] to “Calculate” or force the drive into “Assisted Start Up.” But do force those things in response to a DPI Manufacturing Object “Reset to Factory” command. Note: Forcing Autotune = Calculate would overwrite “tuned” parameters, sometimes resulting in insufficient torque to start the load.

In v4: A checksum error reading sNVSPowerDownData results in a F112 “Power Down Csum” fault.

### **Autotune Calculate**

In v3: The online and offline default values for P62 [IR Voltage Drop], P63 [Flux Current Ref], and P542 [EncdIss Vlt Comp], are based on IrVolts and FluxAmps values read from the power board eeprom.

If P61 [Autotune] is 3 “Calculate” (default), values for P62 [IR Voltage Drop], P63 [Flux Current Ref], P64 [IXo Voltage Drop], and P542 [EncdIss Vlt Comp] are calculated based on the Motor NP parameters and P53 [Motor Cntl Sel].

Thus a reset to defaults command writes the default values but they are immediately overwritten by Autotune Calculate and a “compare to defaults” flags them.

In v4: The offline and online values are set to what Autotune Calculate would calculate given default Motor NP values.

The primary advantage of this change is that DriveExecutive database files (and “offline” files based on those database files) will have “better” defaults for P62 [IR Voltage Drop] and P63 [Flux Current Ref].

A secondary advantage is that if a drive is “reset to defaults” and then “compared to defaults,” no differences are found.

## Improve DPI Feedback

The filtered value of speed feedback used for "DPI Feedback" is now updated every 30mS instead of every 120mS. The filter function is the same; the average of the last twenty 6 mS samples.

## Motor NP Voltage Maximum

The original request was to increase the P41 [Motor NP Volts] online maximum so that 415V could be entered into a "400V" drive. (With v3 software, P41 [Motor NP Volts] is limited to P27 [Rated Volts].)

With v4: The P041 [Motor NP Volts] online maximum is now the drives high voltage rating:

- 208/240 => 240.0V
- 400/480 => 480.0V
- 600/600 => 600.0V

Now you can enter 415V and 50Hz into a 400V drive and get the correct V/Hz ratio.

Note: The P54 [Maximum Voltage] online maximum is still rated volts and "VoltageLimit()" software limits commanded voltage to that value or to what it calculates is the maximum possible for a given bus voltage (and P523 [Bus Utilization]).

Note: The online limit for P71 [Break Voltage] and P64 [IXo Voltage Drop] is the same as P41 [Motor NP Volts], for P62 [IR Voltage Drop] and P542 [Encdls Vlt Comp] it's ½ that and for P69 [Start/Acc Boost] and P70 [Run Boost] it's ¼ that. These limits also increase in the low voltage case.

## Thermal Manager

The drive thermal manager has been improved to reduce nuisance F9 IGBT over temperature faults. The thermal manager improvements better control the peak IGBT junction temperatures during a shock load or at non-default PWM frequencies to help extend the life of the drive.

## Process PI Reference and Feedback

The Process PI function is enhanced to support “Automotive Chain Conveyor” applications. A “follower” drive uses its process pi block to compare its torque load to the torque load on a neighboring “master” drive and to trim its speed command to achieve load sharing. In FVC control P24 [Commanded Torque] is the usual measure of load torque. In other control modes P15 [Torque Estimate] or P4 [Torque Current] may be used.

Selections 31 “CommandedTrq”, 32 “Torque Est”, and 33 “Torque Amps” have been added to P128 [PI Feedback Select] to support “Automotive Chain Conveyor.”

The selected torque load signal from the master drive may be transmitted through an analog output and received by an analog input at the follower drive. Or it may be datalink'ed from the master drive via a PLC or via the “peer to peer” function supported by 20-COMM adapters.

Selections 25 “Scale Block1” and 26 “Scale Block2” have been added to P126 [PI Reference Select] specifically to support a datalink to the master drive torque.

SPEED COMMAND (File C)	Process PI	126	<b>[PI Reference Sel]</b>	Default: 0	“PI Setpoint”	124 thru 138	
			Selects the source of the PI reference.	Options:	See Table		
			(1) Enhanced Control Drives Only.				
			<b>Options</b>	<b>P462 [PI Feedback Hi]</b>	<b>P463 [PI Feedback Lo]</b>		
		0	“Setpoint”	+100	-100		
		1	“Analog In 1”	P322 [Analog In1 Hi]	P323 [Analog In1 Lo]		
		2	“Analog In 2”	P325 [Analog In2 Hi]	P326 [Analog In2 Lo]		
		3-7	“Reserved”				
		8	“Encoder”	+P55 [Maximum Freq]	-P55 [Maximum Freq]		
		9	“MOP Level”	+P55 [Maximum Freq]	-P55 [Maximum Freq]		
		10	“Master Ref”	+P55 [Maximum Freq]	-P55 [Maximum Freq]		
		11-17	“Preset Spd1-7”	+P55 [Maximum Freq]	-P55 [Maximum Freq]		
		18-20	“DPI Port 1-3”	+32767	-32676		
		21	“Reserved”				
		22	“DPI Port 5”	+32767	-32676		
23-24	“Reserved”						
25	“Scale Block1”	P477 [Scale1 In Hi]	P478 [Scale1 In Lo]				
26	“Scale Block2”	P483 [Scale2 In Hi]	P484 [Scale2 In Lo]				
27-29	“Reserved”						
30	“HighRes Ref” (1)	+32767 x 2 <sup>16</sup>	-32767 x 2 <sup>16</sup>				
31	“CommandedTrq” (2)	P436 [Pos Torque Limit]	P437 [Neg Torque Limit]				
32	“Torque Est” (2)	P436 [Pos Torque Limit]	P437 [Neg Torque Limit]				
33	“Torque Amps” (2)	+P28 [Rated Amps]	-P28 [Rated Amps]				

SPEED COMMAND (File C)	Process PI	128	<b>[PI Feedback Sel]</b>	Default: 2	“Analog In 2”	124 thru 138
			Selects the source of the PI reference.	Options:	See P126 [PI Reference Sel]	
			(1) Enhanced Control Drives Only.			

## Added Scaled Blocks Parameters

To support “Automotive Chain Conveyor” applications we need to “datalink” the master torque reference to the follower drive. We need a parameter in the follower drive that is WRITABLE and selectable by P126 [PI Reference Sel].

To provide flexible limiting, scaling, and offset, part of the “scaled blocks” function of the PF700VC is adapted to the PF70EC.

Note: The VC supports “parameter linking” but the EC doesn’t. The “ScaleX Out” parameters in the VC are only useful with parameter linking.

Note: All VC parameters are 32 bits. Most EC parameters are 16 bits and we want these new parameters to be 16 bit signed in the EC.

Note: When using datalinks, values that are outside the min and max of the sink parameter are ignored. For Example: If P127 [PI Setpoint] was datalink’ed to the master drive torque and the torque suddenly stepped from 0.00% to 100.01%, [PI Setpoint] would stay at 0.00%. Using [ScaleX In Value] (accepts any 16 bit value) avoids that problem.

UTILITY (File E)	Scaled Blocks	476	EC v4	[Scale1 In Value]	Default: 0.0	90
		482	EC v4	[Scale2 In Value]	Min/Max: -3276.8/+3276.7	93
				Displays the value of the signal being sent to [ScaleX In Value] using a datalink.	Units: 0.1	117
						126
						127
						427
		477	EC v4	[Scale1 In Hi]	Default: 0.0	91
		483	EC v4	[Scale2 In Hi]	Min/Max: -3276.8/+3276.7	94
				Scales the upper value of [ScaleX In Value].	Units: 0.1	119
						428
				460		
				462		
478	EC v4	[Scale1 In Lo]	Default: 0.0	92		
484	EC v4	[Scale2 In Lo]	Min/Max: -3276.8/+3276.7	95		
		Scales the lower value of [ScaleX In Value].	Units: 0.1	120		
				429		
				461		
				463		

## Other Scaled Blocks Uses

The necessary selections to use scaled block functionality have also been added to:

- P90 [Speed Ref A Sel] 25 “Scale Block1” and 26 “Scale Block2”
- P93 [Speed Ref B Sel] 25 “Scale Block1” and 26 “Scale Block2”
- P213 [Speed Ref Source] 26 “Scale Block1” and 27 “Scale Block2”
- P427 [Torque Ref A Sel] 25 “Scale Block1” and 26 “Scale Block2”

Tip: With parameters defaulted; set P447 [Scale1 In Hi] = 1800.0 and P90 [Speed Ref A Sel] = 25 “Scale Block1”. Then a speed command can be entered in P476 [Scale1 In Value] in 0.1 RPM units.

Tip: We expect that using a scaled block and speed trim together will be an optimal solution to many application problems.

### Add “Speed Fdbk” to [Digital OutX Sel]

Added 61 “Speed Fdbk” to P380 [Digital Out1 Sel] and P384 [Digital Out2 Sel]. The value of P25 [Speed Feedback] is compared against P381 [Dig Out1 Level] or P385 [Dig Out3 Level] to set the relay state.

INPUTS & OUTPUTS (File J) Digital Outputs	380	[Digital Out1 Sel]	Default: 1	“Fault”	381
	384	[Digital Out2 Sel]	4	“Run”	385
		Selects the drive status that will energize a (CRx) output relay.	Options: 1	“Fault” <sup>(1)</sup>	382
			2	“Alarm” <sup>(1)</sup>	383
			3	“Ready”	
			4	“Run”	
			5	“Forward Run”	
			6	“Reverse Run”	
			7	“Auto Restart”	
			8	“Powerup Run”	002
			9	“At Speed”	001
			10	“At Freq” <sup>(2)</sup>	003
			11	“At Current” <sup>(2)</sup>	004
			12	“At Torque” <sup>(2)</sup>	218
			13	“At Temp” <sup>(2)</sup>	012
			14	“At Bus Volts” <sup>(2)</sup>	137
			15	“At PI Error” <sup>(2)</sup>	157
			16	“DC Braking”	147
			17	“Curr Limit”	053
			18	“Economize”	048
			19	“Motor Overld”	184
			20	“Power Loss”	
			21	“Input 1 Link”	
			22	“Input 2 Link”	
			23	“Input 3 Link”	
			24	“Input 4 Link”	
			25	“Input 5 Link”	
			26	“Input 6 Link”	
			27	“PI Enabled” <sup>(3)</sup>	
			28	“PI Hold” <sup>(3)</sup>	
			29	“Drive Overld” <sup>(3)</sup>	
		30	“Param Cnt” <sup>(3)</sup>		
		31-57	“Reserved”		
		58	“Manual Mode” <sup>(4)</sup>		
		59	“Fast Braking” <sup>(4)</sup>		
		60	“Reserved”		
		61	“Speed Fdbk” <sup>(2)(5)</sup>		

## New Power Loss Mode

If P184 [Power Loss Mode] = 5 “Decel 2 Stop”:

- If P12 [DC Bus Voltage] drops to = (P13 [DC Bus Memory] - 120), set P211 [Drive Alarm 1] Bit 2 “Power Loss” = 1 and P215 [Last Stop Source] = 0 “Pwr Removed.”
- The logic sequencing treats this similar to a “ramp to stop” except it forces the ramp to use P143 [Decel Time 2] with no s-curve to set the ramp and any P159 [DC Brake Time] is ignored.
- P143 [Decel Time 2] must be set short enough to keep the drive regenerating power from the load for the duration of the stop.
- If P12 [DC Bus Voltage] drops to = (P13 [DC Bus Memory] - 180), the drive switches to a coast stop and the precharge relay opens.
- If P161/162 [Bus Reg Mode X] is 1 “Adjust Freq,” the actual decel time may be increased to limit P12 [DC Bus Voltage].
- If P238 [Fault Config 1] Bit 0 “Power Loss” is set (NOT the default), the drive will fault after P185 [Power Loss Time].
- P211 [Drive Alarm 1] Bit 2 “Power Loss” is cleared once BOTH the drive is stopped AND
- P12 [DC Bus Voltage] = (P13 [DC Bus Memory] - 60). The drive can then accept a re-start command.
- If Power Loss Level is active, it sets the P12 [DC Bus Voltage] setpoints.

For P184 [Power Loss Mode] 0..4, if power is restored before low of control board power and run is maintained, the response to restored power is to do a flying start and return to the commanded speed.

This new P184 [Power Loss Mode] is intended for cases where a power loss causes a process disruption and the desired drive response is to stop as quickly as possible and not to restart until commanded (and power is restored).

P143 [Decel Time 2] is automatically selected to allow for cases where the “normal operation” decel is not fast enough to keep the drive regenerating power all the way to zero speed. If P143 [Decel Time 2] is not short enough to keep the bus up, the drive switches to a coast stop.

Note: This is essentially a ramp to stop, while active it over-rides P155 [Stop/Brk Mode A].

Note: If P184 [Power Loss Mode] is set to 3 “Reserved” it changes to 0 “Coast” and if set to 4 “Reserved” it changes to 1 “Decel.”

<b>DYNAMIC CONTROL (File D)</b>	<b>Power Loss</b>	184	<b>[Power Loss Mode]</b>	Default: 0 "Coast"	013
			Sets the reaction to a loss of input power. Power loss is recognized when: <ul style="list-style-type: none"> <li>DC bus voltage is <math>\leq 73\%</math> of [DC Bus Memory] and [Power Loss Mode] is set to "Coast".</li> <li>DC bus voltage is <math>\leq 82\%</math> of [DC Bus Memory] and [Power Loss Mode] is set to "Decel".</li> </ul> <p>"Coast" = Disable drive and allow the motor to coast.  "Decel" = Decelerate the motor at a rate which will regulate the DC Bus until the load's Kinetic Energy can no longer power the drive.  "Continue" = Allow the drive to power the motor down to 50% of the nominal DC Bus voltage.</p> <p>Refer to the PowerFlex 70EC/700VC Reference Manual, publication PFLEX-RM004 for additional information.</p> <div style="border: 1px solid black; padding: 5px;">  <p><b>ATTENTION:</b> To guard against drive damage; in "Continue" mode a minimum line impedance must be provided to limit inrush current when the power line recovers. The input impedance should be equal or greater than the equivalent of a 5% transformer with a VA rating 6 times the drive's input VA rating.</p> </div>	Options: 0 "Coast" 1 "Decel" 2 "Continue" <b>EC</b> 3 "Reserved" 4 "Reserved" 5 "Decel 2 Stop" <b>EC v4</b>	185

## Corrected Anomalies

### No Flying Start with Diagnostics Disabled

In v3: The Drive will not execute a Flying Start for P56 [Compensation] Bit 3 "Xsistor Diag" = 0 "Disabled" (i.e. Power Stage Diagnostics disabled). This has been corrected in v4.

Note: Diagnostics are enabled by default. A sine wave filter may require disabling diagnostics.

### Hardware Fault with Process PI and DC or Fast Brake

In v3: The drive can overcurrent or overvoltage trip when initiating DC Brake or Fast Brake using SVC or V/Hz control with Process PI enabled. Process PI code that adjusts frequency at a transition to a stop was causing a frequency step when transitioning to flux down. This has been corrected in v4.

Note: There is a simple work around for earlier code, set P124 [PI Configuration] Bit 6 "Stop Mode" = 1 "Enabled".

### Error Reading P1 [Output Freq] via SCANport

In v3: There is an error in the Formula Data sent for P1 [Output Freq] when read through SCANport (but not DPI). This caused Drive Executive and RSNetwork DeviceNet to display a grossly incorrect value for Output Freq when connected to the drive via a SCANport adapter. This has been corrected in v4.

SCANport write "parameter data value" commands were NOT triggering an sActiveSet save to non-volatile storage. This has been fixed. Note: This only affects systems using SCANport HIMs and/or communications adapters (almost none), systems using DPI HIMs and adapters are not affected.

## Fault Queue Data Not Saved

A small but important error was introduced in v3.002: “Fault Queue” data is not being stored in nvs. The queue itself works correctly but on power up it is loaded with what ever happened to be in eeprom. This has been corrected in v4.

Note: This problem only affected the “Fault Queue”. The fault parameters P243 [Fault 1 Code] through P250 [Fault 4 Time] were/are saved and restored correctly.

## Maximum PWM Frequency

Frame E drives should limit P151 [PWM Frequency] to 8kHz instead of 12kHz. (The maximum is programmed into the power board eeprom.) Online tools (HIM, Drive Explorer) limit P151 [PWM Frequency] to the programmed maximum.

Offline tools (Drive Executive, RSNetworkx) SHOULD allow setting P151 [PWM Frequency] to 12kHz (the offline maximum) BUT the drive should internally limit the active pwm frequency to the online maximum. This has been fixed.

NOTE: The diagnostic parameter P4 [Active PWM Freq] shows the internally limited value.

## Re-Calculate Flux Up Time

A change to P45 [Motor NP Power] or P63 [Flux Current Ref] now re-calculates P58 [Flux Up Time] if P57 [Flux Up Mode] = 1 “Automatic.”

Note: A customer programmed automatic flux up time, autotuned the drive, and saved the parameters. After a power cycle the customer noted that Flux Up Time had changed. This was traced to not re-calculating time after autotune changed flux current.

## Fast Brake Overvoltage Trip

The drive could trip on F5 OverVoltage if executing a Fast Brake stop with P161 [Bus Reg Mode A] = 0 “Disabled.” This has been fixed.

## Synchronous Motor Operation

Problems using the EC with synchronous motors have been fixed:

Problem 1: Program the drive for a ramp stop with dc braking (or ramp to hold) and zero speed command. As the drive is started and stopped, a PM synchronous motor will “jump” 90° (electrical).

Brake current was always applied in the D axis, correct for induction motors but not for synchronous motors. Now, for P40 [Motor Type] = 1 “Synchr Reluc” or 2 “Synchr PM”, brake current is applied in the +Q axis.

Problem 2: Command 0.1 Hz, start the drive, then reverse the direction. At each reverse, the shaft of a PM synchronous motor “jumps” by 180° (electrical).

Previously all voltage was applied in the +Q axis for frequency = 0, and in the -Q axis for frequency < 0. Now, for P40 [Motor Type] = 1 “Synchr Reluc” or 2 “Synchr PM”, all voltage is applied in the +Q axis.

Note: This would result in the polarities of both P4 [Torque Current] and P5 [Flux Current] to be the opposite what you'd get with an induction motor in reverse rotation. The polarities of displayed have been “corrected” to match the “expected” polarity.

## RSNetWorx DeviceNet EDS File Generator

For v3: The RSNetWorx for DeviceNet EDS Wizard “Create and EDS File” function fails. At place in the File Group Param structure where the PF700VC locates the group “Scaled Blocks,” the PF70EC has a group labeled “Reserved” with zero parameters. Apparently RSNetWorx can not deal with a group that has zero parameters.

Adding the new scaled blocks parameters to that block fixes the problem.

## Appendix

### New Parameters

File	Group	Parameter
Utility	Scaled Blocks	P476 [Scale1 In Value]
Utility	Scaled Blocks	P477 [Scale1 In Hi]
Utility	Scaled Blocks	P478 [Scale1 In Lo]
Utility	Scaled Blocks	P482 [Scale2 In Value]
Utility	Scaled Blocks	P483 [Scale2 In Hi]
Utility	Scaled Blocks	P484 [Scale2 In Lo]

### New Bits

File	Group	Parameter	Bit
Utility	Faults	P238 [Fault Config 1]	2 "HS Low Temp"

### New Enums

File	Group	Parameter	Bit	
Speed Command	Speed References	P90 [Speed Ref A Sel]	25 "Scale Block1"	
			26 "Scale Block2"	
		P93 [Speed Ref B Sel]	25 "Scale Block1"	
			26 "Scale Block2"	
	Speed Trim	P117 [Trim In Sel]	25 "Scale Block1"	
			26 "Scale Block2"	
	Process PI	P126 [PI Reference Sel]		25 "Scale Block1"
				26 "Scale Block2"
			31 "CommandedTrq"	
			32 "Torque Est"	
		33 "Torque Amps"		
	P128 [PI Feedback Sel]	25 "Scale Block1"		
		26 "Scale Block2"		
		31 "CommandedTrq"		
		32 "Torque Est"		
		33 "Torque Amps"		
Dynamic Control	Power Loss	P184 [Power Loss Mode]	5 "Decel 2 Stop"	
Utility	Diagnostics	P213 [Speed Ref Source]	26 "Scale Block1"	
			27 "Scale Block2"	
Inputs & Outputs	Digital Outputs	P380 [Digital Out1 Sel]	61 "Speed Fdbk"	
		P384 [Digital Out2 Sel]	61 "Speed Fdbk"	
Motor Control	Torq Attributes	P427 [Torque Ref A Sel]	25 "Scale Block1"	
			26 "Scale Block2"	

### New Faults

No.	Name
10	Heatsink LowTemp
112	Power Down Csum

## Determining Firmware Revision

This section describes procedures to determine the firmware revision of your PowerFlex 70 drive with Enhanced Control option.

### Using the LCD HIM (20-HIM-\*\*)

Step	Key(s)	Example Screens
1. In the main menu, press the Up Arrow or Down Arrow to scroll to <b>Device Select</b> .	▲ OR ▼	
2. Press Enter to enter your selection.	↵	
3. Press the Up Arrow or Down Arrow to scroll to the PowerFlex 70 EC drive.	▲ OR ▼	
4. Press Enter to select the drive. The main menu for the drive will appear.	↵	
5. Press the Up Arrow or Down Arrow to scroll to <b>Diagnostics</b> .	▲ OR ▼	
6. Press Enter to enter your selection.	↵	
7. Press the Up Arrow or Down Arrow to scroll to <b>Device Version</b> .	▲ OR ▼	
8. Press Enter to display the Product Data screen.	↵	
9. Press Enter again to display the adapter's firmware version.	↵	

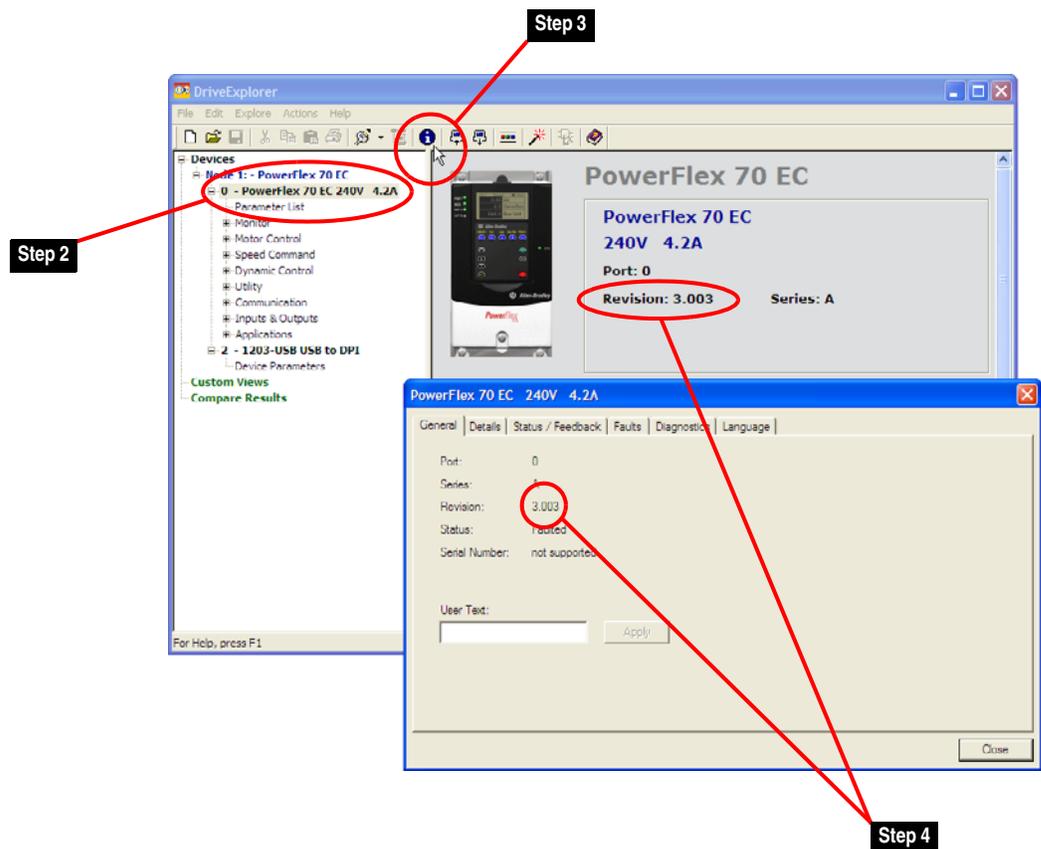
## Using DriveExplorer Lite/Full

1. Launch DriveExplorer and go online (via 1203-USB or 1203-SSS converter) with the connected drive.
2. In the DriveExplorer treeview, click on the PowerFlex 70 EC drive as shown in [Figure 1](#).
3. Click the information icon to display the drive's Properties screen.
4. The "Revision:" field shows the present revision (for example, 3.003) of the drive firmware.



**TIP:** When clicking on the drive using version 5.01 or higher DriveExplorer Lite/Full, the drive firmware revision is also shown in the right pane of the DriveExplorer window.

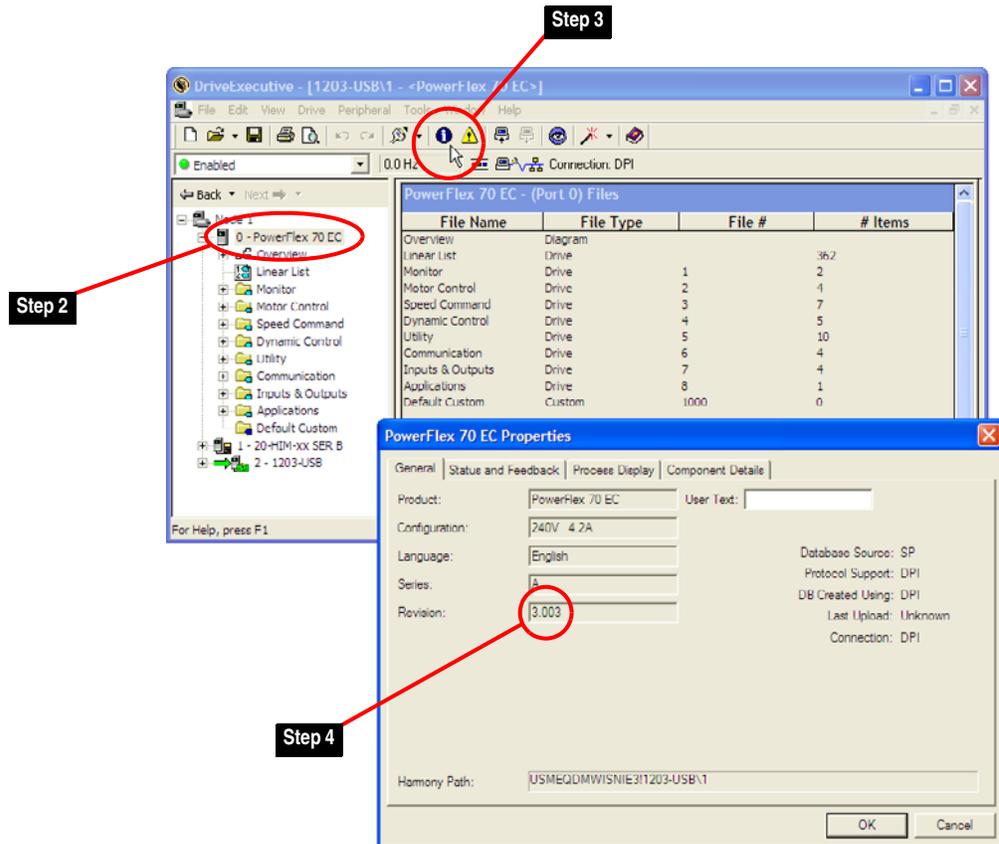
Figure 1 Information Icon in DriveExplorer Window



## Using DriveExecutive

1. Launch DriveExecutive and go online with the connected drive.
2. In the DriveExecutive treeview, click on the PowerFlex 70 EC drive as shown in [Figure 2](#).
3. Click the information icon to display the drive's Properties screen.
4. The "Revision:" field shows the present revision (for example, 3.003) of the drive firmware.

Figure 2 Information Icon in DriveExecutive Window



## Firmware Flashing

This section describes procedures to flash upgrade your drive firmware. Flash kits for drives and communications adapters are provided on the Allen-Bradley Web Updates site located at:

<http://www.ab.com/support/abdrives/webupdate>



**ATTENTION:** Risk of permanent equipment damage exists. Once a flash update has been started, do not remove power from the drive until after the download has completed and the STS status indicator on the drive becomes FLASHING GREEN. If power is removed before this occurs, the drive may be permanently damaged. A drive that has been damaged in this way cannot be repaired.

---

### Installing the Flash Kit

1. Install the flash kit utility from the Allen-Bradley Web Updates site for the PowerFlex 70 EC drive. (This also automatically installs the latest version of the ControlFLASH utility on your computer.)
2. You are now ready to use DriveExplorer, DriveExecutive, ControlFLASH or HyperTerminal to update the drive. Follow the instructions in the appropriate section below.

### Using DriveExplorer Lite/Full

1. With the Flash Kit installed (see [Installing the Flash Kit](#)), launch DriveExplorer and go online (via a 1203-USB or 1203-SSS converter) with the drive.
2. In the DriveExplorer treeview, click on the PowerFlex 70 EC drive. Then click the information icon as shown in [Figure 1](#) to display the drive's Properties screen.
3. On the PowerFlex 70 EC Properties screen, click the Details tab.

**Important:** This update may cause the drive parameters to revert to their default values. You may want to save your configuration using DriveExplorer or the HIM CopyCat feature before upgrading.

4. To start the flash update, click the **Flash Update...** button. Follow the additional steps and screen prompts until the flash update procedure completes and displays the new firmware revision (v4.001).

### Using DriveExecutive

1. With the Flash Kit installed (see [Installing the Flash Kit](#)), launch DriveExecutive and go online with the connected drive.

2. In the DriveExecutive treeview, click on the PowerFlex 70 EC drive. Then click the information icon as shown in [Figure 2](#) to display the drive's Properties screen.
3. On the PowerFlex 70 EC Properties screen, click the Component Details tab.

**Important:** This update may cause the drive parameters to revert to their default values. You may want to save your configuration using DriveExecutive or the HIM CopyCat feature before upgrading.

4. To start the flash update, click the **Flash Update** button. Follow the additional steps and screen prompts until the flash update procedure completes and displays the new firmware revision (v4.001).

### Using ControlFLASH

1. With the Flash Kit installed (see [Installing the Flash Kit on page 17](#)), launch ControlFLASH by selecting **Start > (All) Programs > Flash Programming Tools > ControlFLASH**.
2. On the ControlFLASH Welcome screen, click **Next >**.
3. Choose the PowerFlex 70 EC from the list and click **Next >**.

**Important:** This update may cause the drive parameters to revert to their default values. You may want to save your configuration using the HIM CopyCat feature, DriveExplorer or DriveExecutive before upgrading.

4. Expand the treeview for the communication path you are using, and select the drive icon that represents the drive you are updating. Then click **OK**.
5. With the Multiple Assemblies Found window displayed, select "Port 0 - PowerFlex 70 EC" from the list and click **OK**.
6. With the Firmware Revision window displayed, select "4.001.xx" from the list of available updates and click **Next >**. Follow the remaining steps and screen prompts until the flash procedure completes and displays the new firmware revision (v4.001).

### Using HyperTerminal

1. With the Flash Kit installed (see [Installing the Flash Kit on page 17](#)), launch HyperTerminal and go online (via 1203-USB or 1203-SSS converter) with the connected drive.
2. Press the **Enter** key until the main menu ([Figure 3](#)) appears.

**Figure 3 Main Menu**

```

Main Menu - Enter Number for Selection
1> Display Setup Parameters
2> Display Event Queue
3> Flash Upgrade

```

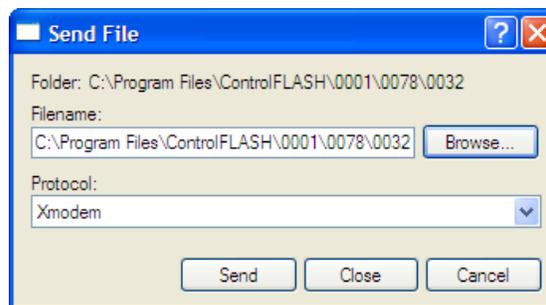
- In the main menu, press **3** to flash upgrade. Then press the number key that corresponds to the “PowerFlex 70 EC” in the list, and press **Y** (for Yes) to update the flash code. The terminal program will start displaying the letter “C”. This signals the XMODEM protocol that the download may proceed. You then have one minute to start the transfer. Press **CTRL-X** to cancel a started update.



**ATTENTION:** Risk of injury or equipment damage exists. When you perform a flash update, the drive will fault if it is receiving control I/O from the adapter. Verify that the drive has stopped safely or is receiving control I/O from an alternate source before beginning a flash update.

- Select **Transfer > Send File** to display the Send File screen ([Figure 4](#)).
- Click **Browse** and navigate to the flash file located in:

C:\Program Files\ControlFLASH\0001\0078\0032

**Figure 4 Send File Screen**

- In the Select File to Send window list, double-click on the “PF70EC\_App\_4\_001\_31.bin” file. This file name now appears in the Filename box in the Send File screen.
  - In the Protocol box, select “Xmodem.”
  - Click **Send**. A dialog box appears and reports the progress of the update. When it is complete, the message “Flash Complete” appears. HyperTerminal also checks the new firmware in the drive and resets the drive.
- Important:** Keep the device powered for 15 seconds after the operation has completed or until the drive STS status indicator starts flashing green.
- Press the **Enter** key to return to the main menu.

## Restrictions

No restrictions apply to this revision of firmware.

## Compatible Revisions

To use this revision of firmware, update your system tools as follows:

Update this:	To this version or later:
DriveExplorer Lite/Full	4.01
DriveExecutive	3.01
LCD HIM	all versions compatible
RSLinx Classic	2.43

## 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 Frequently Asked Questions (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.

Rockwell Automation also provides complimentary phone support for drives, communication adapters, and peripherals. If you experience a problem with the adapter, please review the information in its User Manual. For further help in getting your adapter operational, contact a Customer Support representative:

United States	(1) 262.512.8176 Monday – Friday, 7am – 6pm CST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

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>.

## Product Satisfaction Return

Rockwell Automation tests all 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 to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

U.S. Allen-Bradley Drives Technical Support - Tel: (1) 262.512.8176, Fax: (1) 262.512.2222, Email: [support@drives.ra.rockwell.com](mailto:support@drives.ra.rockwell.com), Online: [www.ab.com/support/abdrives](http://www.ab.com/support/abdrives)

[www.rockwellautomation.com](http://www.rockwellautomation.com)

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