

# Three-phase DC drive for regenerative and non-regenerative applications from 1-1/2-600 HP<sup>(1)</sup>



*The FlexPak 3000 digital DC drive features a unique ergonomic user interface that makes for easy application, installation, start-up, operation, maintenance and service. The use of the latest in digital, micro-integrated semiconductor and circuit technology combines simplicity, flexibility, and reliability in a compact package.*



**A 60 HP FlexPak 3000 drive with RPM III DC motor (shown with optional BMS and disconnect mounted)**

- **Simple:** All control, signal and power field wiring is readily accessible through supplied terminal boards to streamline installation. Setup and operation is coordinated with a large graphics display and keypad using plain text. Diagnostic and status information as well as help text are displayed and entered in one of five languages easily selected through the keypad. A “Quick-Start” menu combines with self tuning of the speed and current loops to ensure straightforward drive setup and startup.
  - **Reliable:** The FlexPak 3000 uses the latest in high-density power semiconductor devices, surface-mount and sub micron ASIC technology. A power interface board circuit provides noise suppression and firing circuits. It connects to the digital regulator with only a single ribbon cable.
  - **Compact:** Extensive use of molded parts allows for a high density power module without compromising the accessibility of options and circuits. The packaging is compact yet allows for easy field wiring, mounting, modification, or service. The basic chassis design can be easily converted to a NEMA 1 enclosure using available NEMA 1 conversion kits or floor mount NEMA 1 enclosures for high HP drives.
  - **Flexible:** While most applications are handled through standard drive software, many standard hardware kits and options are available, allowing the drive’s capability to be expanded with ease. The FlexPak 3000 is easily modified for input line voltages and frequencies used in many countries and can display setup, operating, status, and diagnostic information in five different languages.
- (1) 1-1/2 - 150 HP at 240 V. Higher HP ratings available by contacting regional Drive center. See page D-157 for listing of Drive center in your area.
- (2) 400-600 HP drives are not CE compliant.

## STANDARD FEATURES

### AC Supply

- 50/60 Hz AC line frequency input
- Phase-insensitive AC line input
- Semi conductor fuse protection
- AC “N” contactor (3-300 HP)
- DC “M” contactor (400-600 HP)

### Power Section

- Full-wave, full-control 6-SCR power conversion for smooth, efficient operation and high performance
- Burst firing of SCRs
- Non-regenerative or regenerative (required for reversing)
- Capable of 150% full-load current for 1-minute and 200% for 5 sec.
- 55°C ambient chassis, 40°C ambient enclosed

### User/Adjustments (all adjustable in Quick-Start menu)

- Maximum speed
- Minimum speed
- Linear acceleration

### MORE STANDARD FEATURES

- Linear deceleration
- Current limit (positive and negative on regenerative modules)
- I/R compensation (voltage regulated drives)
- Jog speed
- Jog acceleration/deceleration rate
- Reverse disable on regenerative drives

### Analog Signals (12-bit resolution)

- 0-10 VDC manual speed reference
- User-selectable  $\pm 10$  volt or 4-20 mA auto speed reference
- (2) 0-10 VDC analog outputs that are user-steerable
- Speed feedback from analog tachometer (250 VDC maximum input)

### Digital Signals

- Coast stop, auto/manual, forward/reverse, jog, run, and stop inputs
- Motor thermostat diagnostic input
- Brush wear diagnostic input or OCL enable
- Customer interlock diagnostic input
- Drive running contact output
- Drive alarm contact output
- Drive fault contact output

### Other Significant Standard Features

- Self-tuning of speed and current loops without disconnecting the fields
- Field (current) loss protection
- User-selectable stop modes
  - Coast
  - Current limit
  - Ramp

- Local controls with interactive keypad and display for drive set up, drive operation, metering and diagnostics (including fault and alarm logs)



### STANDARD OPERATOR INTERFACE FEATURES

- Complete operator controls for run, stop, forward/reverse, auto/manual, control source select and fault log
- “Quick-Start” sequence for easy, complete drive set up
- Large, easy-to-read LCD display provides the following:
  - Built-in digital metering selectable in units such as FPM (feet per minute), percent load, or other user defined units proportional to speed or current
  - Display text in any of the following languages:
    - English
    - German
    - French
    - Spanish
    - Italian
    - Alphanumeric Code

- Monitoring of multiple parameter values such as speed and load in a single display
- Adjustments and monitoring using on-screen menus and full, non-abbreviated text
- Drive status display indicators:
  - Drive fault
  - Drive alarm
  - Interlocks are o.k.
  - Drive ready
  - Drive running
  - Current/torque limit
- Extensive Diagnostics (with displayed recommended corrective action)
  - AC line voltage high/low alarm
  - Motor brush wear alarm
  - AC line synchronization fault
  - Failed SCR fault
  - Motor thermostat fault
  - Control thermostat fault
  - Drive (inverse time) overload fault
  - Drive IET (instantaneous electronic trip) fault
  - Tachometer loss fault
  - Overspeed fault
  - Field current loss fault
  - Network communication fault

### OPTIONAL FEATURES

- Incoming AC line disconnect
- Fused blower motor starter with adjustable overload
- NEMA 1 conversion kits and floor mount NEMA 1 and NEMA 12 enclosures
- Remote-mountable OIM kit for mounting in cabinet doors
- Dynamic braking kits available for customer panel-mount or NEMA 1 enclosed
- Enhanced field supply kit provides for the following:
  - Electronic field trim
  - Field economy
  - 240 VDC field on 230 VAC drives
  - 230 VAC drives can be set for field voltages 103 VDC-259 VDC
  - 460 VAC drives can be set for field voltages 207 VDC-515 VDC
- Field current regulators for above base speed operation and field economy
- Pulse encoder feedback kit provides 0.01% speed regulation via digital pulse encoder speed feedback
- AC tachometer feedback kit for use with existing motor-mounted AC tachometers
- I/O expansion card expands drive capability to do dancer follower functions, outer control loops, external MOP, preset speeds, analog or frequency output signals, HP/KW output signals, and speed or current level detector outputs
- 115 VAC control circuit interface mounts separately on chassis drives or can be mounted in the bottom of NEMA 1 enclosed drives
- AutoMax network interface option card
- DeviceNet™ communication option card
- ControlNet™ communication option card
- Profibus™ communication option card
- Interbus-S™ communication option card
- CS3000 Windows-based configuration executive for upload/download, compare, monitor and drive control capability. PC-Scope feature available on V4 and higher drives.

FlexPak 3000 Drives are included in the Modified Standard Drives Program. Please see page D-156 for more information about selecting and ordering modified standard drives.



**150 HP FlexPak 3000**



**300 HP FlexPak 3000**



**600 HP FlexPak 3000**



**FlexPak 3000 family of drives for 1-1/2 - 600 HP applications**

## DRIVE RATINGS<sup>(1)</sup>

HP Ratings	Full Load Rated RMS AC Line Current (Amperes)		Full Load Rated DC Armature Current (Amperes)		Rated Field Current (Amperes)	
	230 VAC	460 VAC	240 VDC	500 VDC	150 VDC	300 VDC
1-1/2	10	-	7	-	10	-
2	11	-	9	-	10	-
3	13	10	12	6	10	10
5	19	12	20	10	10	10
7-1/2	26	15	29	14	10	10
10	33	18	38	19	10	10
15	48	24	55	27	10	10
20	63	31	73	35	15	10
25	80	39	93	45	15	10
30	94	45	110	52	15	10
40	125	63	146	73	15	15
50	154	74	180	86	15	15
60	186	86	218	100	15	15
75	226	110	265	129	15	15
100	307	143	360	167	15	15
125	370	177	434	207	15	15
150	443	213	521	250	15	15
200	-	281	-	330	-	15
250	-	351	-	412	-	15
300	-	421	-	495	-	15
400	-	567	-	667	-	15
500	-	680	-	800	-	15
600	-	816	-	960	-	15

- (1) When applying FlexPak 3000 drives to power distribution systems with KVA capacity in excess of five times the smallest drive rating, use of an isolation transformer or line reactors of similar impedance is required.
- (2) Dependent on top speed and pulse tachometer used.  
5PY = 30:1  
RD120 = 70:1  
RL1024 = 200:1
- (3) Standard DC Tachometer interface included with drive.
- (4) Optional Pulse Encoder Feedback kit required, Model Number 907FK0101.

## Service Conditions

- Standard altitude: to 3300 feet (1000 meters)
- Standard ambient temperature
  - Cabinet units: 0-40°C (32°F to 104°F)
  - Chassis units: 0-55°C (32°F to 131°F)
- AC line voltage variation:  $\pm 10\%$
- AC line distribution system KVA capacity<sup>(1)</sup>
- Maximum 3 drives per transformer<sup>(1)</sup>
- FlexPak 3000 drives are 50/60 Hz  $\pm 2$  Hz
- Atmosphere: non-condensing relative humidity 5 to 95%

## Capacities

- Service factor: 1.0
- Maximum load: 150% for one minute, 200% for 5 seconds

## Efficiency and Power Factor

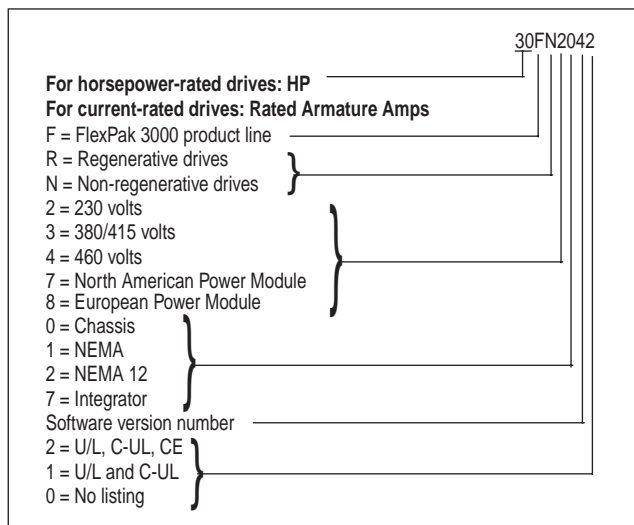
- Displacement power factor at maximum speed: 88%
- Efficiency of power module at:
  - 100% speed and 100% load: 99.3%
  - 100% speed and 25% load: 98.5%
  - 25% speed and 100% load: 96.8%
  - 25% speed and 25% load: 94.0%
- Efficiency of drive including motor is typically 87%

## Speed Range<sup>(2)</sup>

- Operator's speed adjustment: 0 to rated speed
- Specification speed range: 200:1 based on top speed and tachometer

## Speed Regulation

Regulation Arrangement	Speed Change with 95% Load Change	Speed Change from All Other Variables
Armature Voltage w/ IR Compensation	2-3%	15%
Closed Loop		
w/ 5PY tachometer <sup>(3)</sup>	1%	2%
w/ RD120-1 encoder <sup>(4)</sup>	0.01%	0.01%
w/ RD120-2 encoder <sup>(4)</sup>	0.01%	0.01%
w/ RL1024 encoder <sup>(4)</sup>	0.01%	0.01%



**FLEXPAK 3000 PRODUCT PUBLICATIONS**

Data Sheet.....	D-2882	Instruction Manuals con't	
Product Summary.....	D-509	Fuse Kit (460 VAC to 230 VAC).....	D2-3329
DeviceNet AC and DC Drives Data Sheet .....	D-2902	Control and Configuration Software.....	D2-3348
CE Compliance Summary .....	D-2928	115 VAC Control .....	D2-3338
AutoMax Network Interface Data Sheet.....	D-2907	DCM .....	D2-3328
Instruction Manuals		OIM.....	D2-3344
FlexPak 3000 Hardware		V4 Upgrade Kit .....	D2-3419
(1-1/2 - 600 HP).....	D2-3404	Drive Lifting Instructions .....	D2-3414
FlexPak 3000 Software .....	D2-3405	D/B Assembly Lifting Instructions .....	D2-3429
FlexPak 3000 European Power Module.....	D2-3475		
Enhanced Field Supply .....	D2-3298		
Field Current Regulator.....	D2-3336		
Blower Motor Starter .....	D2-3295		
Remote Operator Interface (OIM) .....	D2-3294		
Line Disconnect Kit			
(3-60 HP) .....	D2-3292		
(75-150 HP) .....	D2-3315		
(200-300 HP) .....	D2-3365		
(400-600 HP) .....	D2-3422		
Line Filter Kit.....	D2-3424		
Encoder (Pulse Tachometer)			
Feedback Kit.....	D2-3302		
AC Tachometer Feedback Kit .....	D2-3297		
NEMA 1 Conversion Kit			
(3-60 HP) .....	D2-3299		
(75-150 HP) .....	D2-3331		
Dynamic Braking Kit			
(3-60 HP NEMA 1) .....	D2-3313		
(3-300 HP Parts Only).....	D2-3374		
Inverting Fault Circuit Breaker Kit			
(3-60 HP) .....	D2-3300		
(3-300 HP) .....	D2-3330		
(400-600 HP) .....	D2-3421		
I/O Expansion Board.....	D2-3301		
AutoMax Network Communication Module .....	D2-3318		
DeviceNet Module.....	MAN0086-04		
ControlNet .....	D2-3425		
Profibus .....	49'1348E		
Interbus-S .....	49'1339E		

AC Drives

Analog DC Drives

Digital DC Drives

Options & Accessories

Product Demonstrators and Training

Modified Standard V/S

## PRICING Chassis Drive

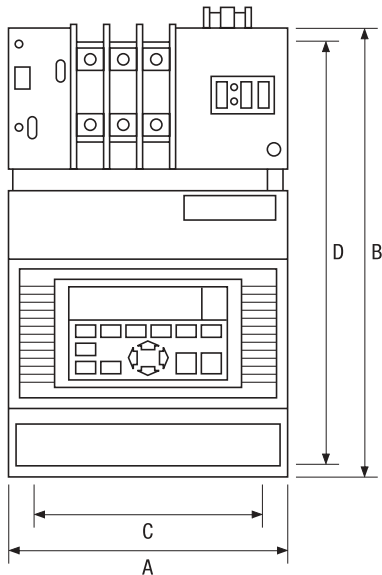
**230 VAC, 50/60 Hz, Non-Regenerative; 1-1/2 HP-30 HP**  
**240 VDC Armature; 150 VDC Field**



HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
1-1/2	10	7	10	1FN2042 →	\$3,795
2	11	9	10	2FN2042 →	3,795
3	13	12	10	3FN2042 →	3,795
5	19	20	10	5FN2042 →	3,810
7-1/2	26	29	10	7FN2042 →	3,960
10	33	38	10	10FN2042 →	3,990
15	48	55	10	15FN2042 →	4,300
20	63	73	15	20FN2042 →	4,720
25	80	93	15	25FN2042 →	4,925
30	94	110	15	30FN2042 →	4,990

**230 VAC, 50/60 Hz, Regenerative; 1-1/2 HP-30 HP**  
**240 VDC Armature; 150 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
1-1/2	10	7	10	1FR2042 →	\$4,295
2	11	9	10	2FR2042 →	4,295
3	13	12	10	3FR2042 →	4,295
5	19	20	10	5FR2042 →	4,310
7-1/2	26	29	10	7FR2042 →	4,460
10	33	38	10	10FR2042 →	4,490
15	48	55	10	15FR2042 →	4,800
20	63	73	15	20FR2042 →	5,320
25	80	93	15	25FR2042 →	5,525
30	94	110	15	30FR2042 →	5,590



Model Number	A	B	C	D	Depth	Weight
1FN2042						
2FN2042						
3FN2042						
5FN2042						
7FN2042	270.5	477.3	224.9	463.0	310.6	26.4 kg
10FN2042	(10.65)	(18.79)	(8.86)	(18.23)	(12.23)	(58 lb)
15FN2042						
20FN2042						
25FN2042						
30FN2042						
1FR2042						
2FR2042						
3FR2042						
5FR2042						
7FR2042	270.5	477.3	224.9	463.0	310.6	26.4 kg
10FR2042	(10.65)	(18.79)	(8.86)	(18.23)	(12.23)	(58 lb)
15FR2042						
20FR2042						
25FR2042						
30FR2042						

mm (inches)

→ Note that a 460 VAC model can be converted to 230 VAC (at 1/2 the rated HP) by adding a fuse kit. See page D-126 for more information. Allow 10 working days for factory conversion.

DISCOUNT VS-50D

## PRICING

**230 VAC, 50/60 Hz, Non-Regenerative; 40 HP-75 HP  
240 VDC Armature; 150 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
40	125	146	15	40FN2042 →	<b>\$6,000</b>
50	154	180	15	50FN2042 →	<b>6,700</b>
60	186	218	15	60FN2042 →	<b>7,000</b>
75	226	265	15	75FN2042 →	<b>7,600</b>

**230 VAC, 50/60 Hz, Regenerative; 40 HP-75 HP  
240 VDC Armature; 150 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
40	125	146	15	40FR2042 →	<b>\$6,800</b>
50	154	180	15	50FR2042 →	<b>7,500</b>
60	186	218	15	60FR2042 →	<b>7,800</b>
75	226	265	15	75FR2042 →	<b>8,400</b>



AC Drives

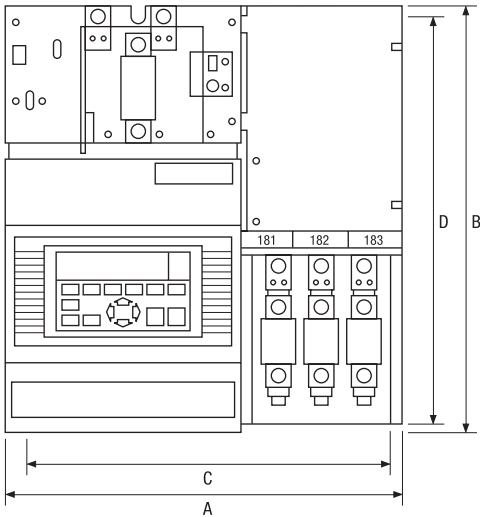
Analog DC Drives

Digital DC Drives

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Product Demonstrators and Training

Modified Standard V's



Model Number	A	B	C	D	Depth	Weight
40FN2042						
50FN2042	460.0	490.0	375.0	464.6	341.9	55 kg
60FN2042	(18.11)	(19.29)	(14.76)	(18.29)	(13.46)	(122 lb)
75FN2042						
40FR2042						
50FR2042	460.0	490.0	375.0	414.6	341.9	55 kg
60FR2042	(18.11)	(19.29)	(14.76)	(18.29)	(13.46)	(122 lb)
75FR2042						

mm (inches)

→ Note that a 460 VAC model can be converted to 230 VAC (at 1/2 the rated HP) by adding a fuse kit. See page D-126 for more information. Allow 10 working days for factory conversion.

DISCOUNT VS-50D

## PRICING Chassis Drive

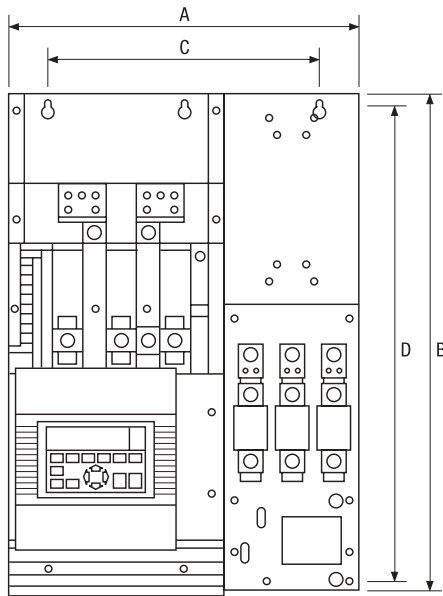
**230 VAC, 50/60 Hz, Non-Regenerative; 100 HP-150 HP  
240 VDC Armature; 150 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
100	307	360	15	100FN2042 →	\$11,800
125	370	434	15	125FN2042 →	12,300
150	443	521	15	150FN2042 →	12,300



**230 VAC, 50/60 Hz, Regenerative; 100 HP-150 HP  
240 VDC Armature; 150 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
100	307	360	15	100FB2042 →	\$18,725
125	370	434	15	125FB2042 →	18,980
150	443	521	15	150FB2042 →	19,900



Model Number	A	B	C	D	Depth	Weight
100FN2042	599.0	850.0	470.0	822.8	424.7	100.0 kg
125FN2042	(23.6)	(33.5)	(18.5)	(32.4)	(16.7)	(220.5 lb)
150FN2042						
100FB2042	599.0	850.0	470.0	822.8	424.7	100.0 kg
125FB2042	(23.6)	(33.5)	(18.5)	(32.4)	(16.7)	(220.5 lb)
150FB2042						

mm (inches)

Option kits may add mounting depth. Please allow adequate clearance when option kits are mounted on the drive package.

→ Note that a 460 VAC model can be converted to 230 VAC at 1/2 the rated HP. See page D-126 for more information. Allow 10 working days for factory conversion.

DISCOUNT VS-50D

## PRICING

### Chassis Drive

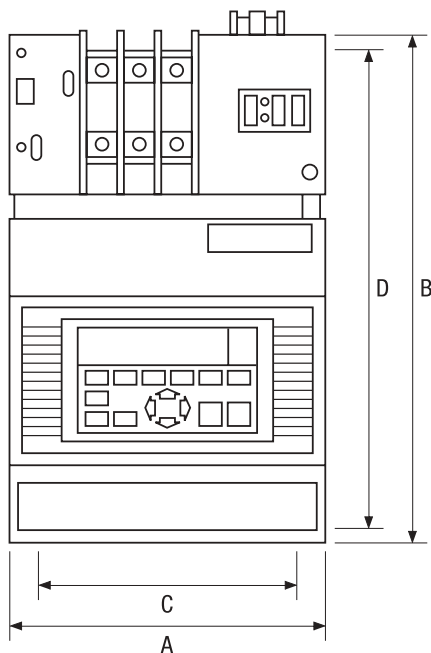
**460 VAC, 50/60 Hz, Non-Regenerative; 3 HP-60 HP**  
**500 VDC Armature; 300 VDC Field**



HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
3	10	6	10	3FN4042 ◊	\$3,795
5	12	10	10	5FN4042 ◊	3,795
7-1/2	15	14	10	7FN4042 ◊	3,795
10	18	19	10	10FN4042 ◊	3,810
15	24	27	10	15FN4042 ◊	3,960
20	31	35	10	20FN4042 ◊	3,990
25	39	45	10	25FN4042 ◊	4,250
30	45	52	10	30FN4042 ◊	4,300
40	63	73	15	40FN4042 ◊	4,720
50	74	86	15	50FN4042 ◊	4,925
60	86	100	15	60FN4042 ◊	4,990

**460 VAC, 50/60 Hz, Regenerative; 3 HP-60 HP**  
**500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
3	10	6	10	3FR4042 ◊	\$4,295
5	12	10	10	5FR4042 ◊	4,295
7-1/2	15	14	10	7FR4042 ◊	4,295
10	18	19	10	10FR4042 ◊	4,310
15	24	27	10	15FR4042 ◊	4,460
20	31	35	10	20FR4042 ◊	4,490
25	39	45	10	25FR4042 ◊	4,750
30	45	52	10	30FR4042 ◊	4,800
40	63	73	15	40FR4042 ◊	5,320
50	74	86	15	50FR4042 ◊	5,525
60	86	100	15	60FR4042 ◊	5,590



Model Number	A	B	C	D	Depth	Weight
3FN4042						
5FN4042						
7FN4042						
10FN4042						
15FN4042	270.5	477.3	224.9	463.0	310.6	26.4 kg
20FN4042	(10.65)	(18.79)	(8.86)	(18.23)	(12.23)	(58 lb)
25FN4042						
30FN4042						
40FN4042						
50FN4042						
60FN4042						
3FR4042						
5FR4042						
7FR4042						
10FR4042						
15FR4042	270.5	477.3	224.9	463.0	310.6	26.4 kg
20FR4042	(10.65)	(18.79)	(8.86)	(18.23)	(12.23)	(58 lb)
25FR4042						
30FR4042						
40FR4042						
50FR4042						
60FR4042						

mm (inches)

◊ Normally carried in stock

**DISCOUNT VS-50D**

# FlexPak 3000 Drive DC Drives

## PRICING Chassis Drive

**460 VAC, 50/60 Hz, Non-regenerative; 75 HP-150 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
75	110	129	15	75FN4042 ◇	\$6,000
100	143	167	15	100FN4042 ◇	6,700
125	177	207	15	125FN4042 ◇	7,000
150	213	250	15	150FN4042 ◇	7,600

**460 VAC, 50/60 Hz, Regenerative; 75 HP-150 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
75	110	129	15	75FR4042 ◇	\$6,800
100	143	167	15	100FR4042 ◇	7,500
125	177	207	15	125FR4042 ◇	7,800
150	213	250	15	150FR4042 ◇	8,400



AC Drives

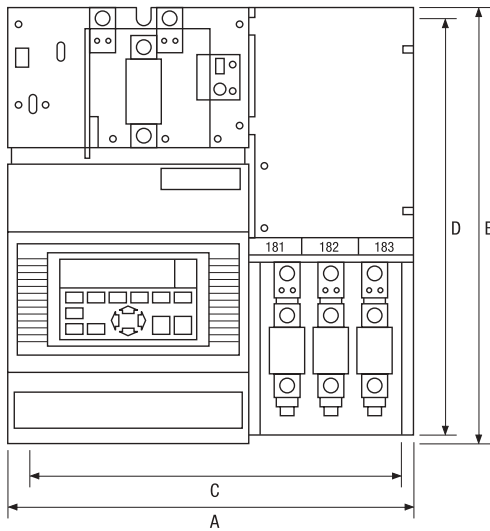
Analog DC Drives

Digital DC Drives

Options & Accessories

Product Demonstrators and Training

Modified Standard V'S



Model Number	A	B	C	D	Depth	Weight
75FN4042						
100FN4042	460.0	490.0	375.0	464.6	341.9	55 kg
125FN4042	(18.11)	(19.29)	(14.76)	(18.29)	(13.46)	(122 lb)
150FN4042						
75FR4042						
100FR4042	460.0	490.0	375.0	414.6	341.9	55 kg
125FR4042	(18.11)	(19.29)	(14.76)	(18.29)	(13.46)	(122 lb)
150FR4042						

mm (inches)

◇ Normally carried in stock

DISCOUNT VS-50D

## PRICING

### Chassis Drive

**460 VAC, 50/60 Hz, Non-Regenerative; 200 HP-300 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
200	281	330	15	200FN4042 ◇	<b>\$11,800</b>
250	351	412	15	250FN4042 ◇	<b>12,300</b>
300	421	495	15	300FN4042 ◇	<b>12,300</b>

**460 VAC, 50/60 Hz, Regenerative; 200 HP-300 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
200	281	330	15	200FB4042 ◇	<b>\$18,725</b>
250	351	412	15	250FB4042 ◇	<b>18,980</b>
300	421	495	15	300FB4042 ◇	<b>19,900</b>



AC Drives

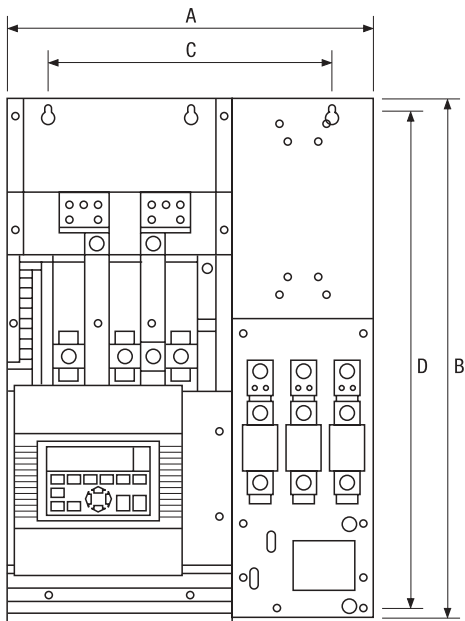
Analog DC Drives

Digital DC Drives

Options & Accessories

Product Demonstrators and Training

Modified Standard V/S



Model Number	A	B	C	D	Depth	Weight
200FN4042	599.0	850.0	470.0	822.0	424.7	100 kg
250FN4042	(23.6)	(33.5)	(18.5)	(32.4)	(16.7)	(220.5 lb)
300FN4042						
200FB4042	599.0	850.0	470.0	822.8	424.7	100 kg
250FB4042	(23.6)	(33.5)	(18.5)	(32.4)	(16.7)	(220.5 lb)
300FB4042						

mm (inches)

Option kits may add additional mounting depth. Please allow adequate clearance when option kits are mounted on the drive package.

◇ Normally carried in stock

DISCOUNT VS-50D

## PRICING Chassis Drive

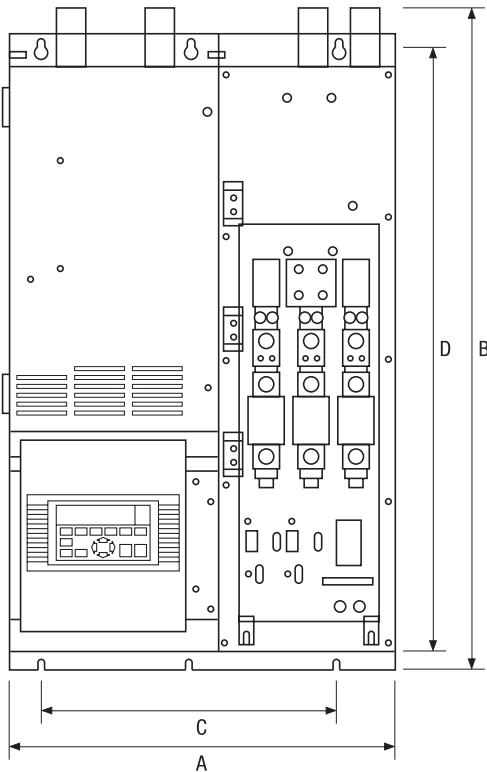
**460 VAC, 50/60 Hz, Non-Regenerative; 400 HP-600 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number	List
400	567	667	15	400FN4041 ◇	\$17,740
500	680	800	15	500FN4041 ◇	18,000
600	816	960	15	600FN4041 ◇	18,550



**460 VAC, 50/60 Hz, Regenerative; 400 HP-600 HP  
500 VDC Armature; 300 VDC Field**

HP Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Drive Model Number <sup>(1)</sup>	List
400	567	640	15	400FR4041 ◇	\$29,500
500	680	800	15	500FR4041 ◇	30,000
600	816	960	15	600FR4041 ◇	30,500



Model Number	A	B	C	D	Depth	Weight
400FN4041	677.7	1149.2	520.7	1104.0	478.1	204.5 kg
500FN4041	(26.68)	(45.25)	(20.5)	(43.47)	(18.82)	(450 lb)
600FN4041						
400FR4041	677.7	1149.2	520.7	1104.0	478.1	204.5 kg
500FR4041	(26.68)	(45.25)	(20.5)	(43.47)	(18.82)	(450 lb)
600FR4041						

mm (inches)

Option kits may add additional mounting depth. Please allow adequate clearance when option kits are mounted on the drive package.

(1) An inverting fault circuit breaker Model Number 906FK3101 must be specified with 400-600 HP regenerative drives and is included in Drive price. Refer to page D-130 for description.

◇ Normally carried in stock

DISCOUNT VS-50D

# FlexPak 3000 DC Drives

## FlexPak 3000 SPECIAL AC LINE VOLTAGE DRIVES<sup>(2)</sup>

For 380 VAC or 415 VAC input, select the required armature amps from the attached chart to price the drive. HP and kW ratings are estimated and should only be used as an approximation.



Special 380/415 VAC Non-Regenerative FlexPak 3000 <sup>(2)</sup>										
380 VAC 400 VDC Armature 250 VDC Field <sup>(1)</sup>		415 VAC 460 VDC Armature 270 VDC Field <sup>(1)</sup>		460 VAC 500 VDC Armature 300 VDC Field <sup>(1)</sup>		AC Amps	DC Armature Amps	DC Field Amps	Model Number	List
HP	KW	HP	KW	HP	KW					
2.4	1.8	2.8	2.1	3	2.2	10	7	10	7FN3042	\$4,295
12	9.0	13.8	10.3	15	11.2	26	29	10	29FN3042	4,460
24	17.9	27.6	20.6	30	22.4	48	55	10	55FN3042	4,800
48	35.8	55.2	41.2	60	44.7	94	110	15	110FN3042	5,490
120	89.5	138.0	102.9	150	111.9	226	265	15	265FN3042	8,000

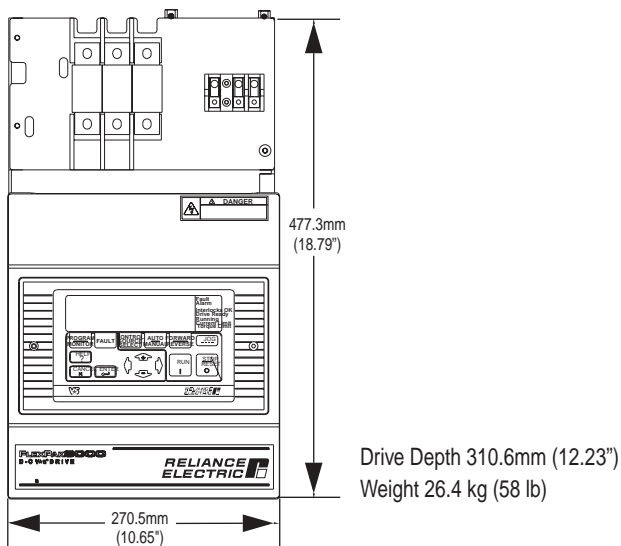
Special 380/415 VAC Regenerative FlexPak 3000 <sup>(2)</sup>										
380 VAC 400 VDC Armature 250 VDC Field <sup>(1)</sup>		415 VAC 460 VDC Armature 270 VDC Field <sup>(1)</sup>		460 VAC 500 VDC Armature 300 VDC Field <sup>(1)</sup>		AC Amps	DC Armature Amps	DC Field Amps	Model Number	List
HP	KW	HP	KW	HP	KW					
2.4	1.8	2.8	2.1	3	2.2	10	7	10	7FR3042	\$4,795
12	9.0	13.8	10.3	15	11.2	26	29	10	29FR3042	4,960
24	17.9	27.6	20.6	30	22.4	48	55	10	55FR3042	5,300
48	35.8	55.2	41.2	60	44.7	94	110	15	110FR3042	6,090
120	89.5	138.0	102.9	150	111.9	226	265	15	265FR3042	8,900

(1) HP and KW ratings are estimated.

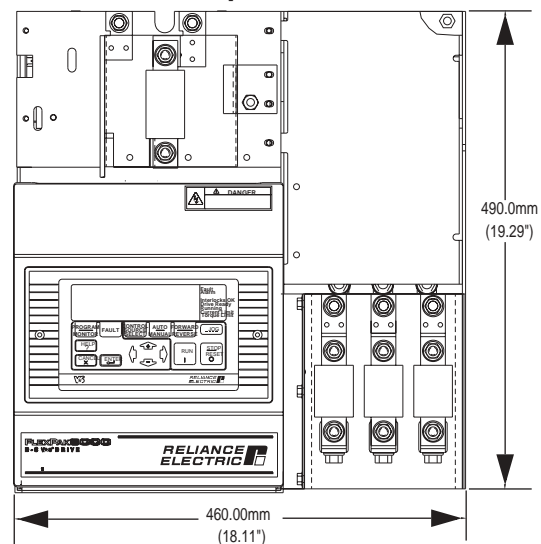
(2) Requires use of nonstandard voltage DC motors. Contact Reliance sales office for motor pricing assistance.

### Dimensions of FlexPak 3000 Chassis

#### 7 to 110 A Rated Output



#### 265 A Rated Output



Drive Depth 341.9mm (13.46")  
Weight 55 kg (122 lb)

DISCOUNT VS-50D

NOTES

AC Drives

Analog DC Drives

Digital DC Drives

Options & Accessories

Product Demonstrators  
and Training

Modified Standard V'S

# Three-phase DC Power Module drive for regenerative and non-regenerative applications from 5 to 400 HP



*The FlexPak 3000 Power Module digital DC drive is ideal for configured drive applications in which maximum wiring and panel flexibility is required. The Power Module design is also ideal for offshore destinations where the systems integrator or OEM requires country-specific fusing and magnetics.*



**200 HP (375 Amps)  
FlexPak 3000 Power Module  
with Optional OIM**

**Simple:** All control, signal and power field wiring is readily accessible through supplied terminal boards to streamline installation. Setup configuration and operation can be accomplished using the optional OIM (Operator Interface Module) or CS3000 configuration software.

**Optional:** In order to give the user the most flexible and lowest cost solution, the OIM (Operator Interface Module) is an option for the FlexPak 3000 Power Module drive. This interface, with its large graphics display and keypad allows for easy setup and troubleshooting using plain text. Diagnostic and status information as well as help text are displayed and entered in one of five languages easily selected through the keypad. A “Quick-Start” menu combines with self-tuning of the speed and current loops to ensure quick, straightforward drive setup and startup.

**Compact:** Extensive use of molded parts allows for a high density power module without compromising the accessibility of options and circuits. This European-style Power Module

drive package (IP00) does **not include a contactor, control transformer, or fusing**, allowing it to be customized and configured into a much smaller panel space. This FlexPak 3000 Power Module packaging also makes it ideal for retrofitting older analog drives such as the MaxPak Plus. Retrofits are an ideal application because most older analog drives had all of the mechanical hardware mounted separately on the panel. With the FlexPak 3000 Power Module, existing hardware, such as contactors, control transformers, and fusing can be reused, providing significant cost savings.

**Flexible:** The FlexPak 3000 Power Module drive is ideal for offshore destinations where the systems integrator or OEM can select the magnetics and fuses common to the country of destination. The FlexPak 3000 Power Module drive is not burdened with the cost of supporting multiple fuse ratings or control transformer ratings in order to be a global drive. Similar to the standard FlexPak 3000 drive, the FlexPak 3000 Power Module drive can also be modified with standard

kits to satisfy a wide array of applications without burdening the customer with unnecessary features. The FlexPak 3000 Power Module model uses most of the same kits as the standard FlexPak 3000 drive model.

## STANDARD FEATURES

### AC Supply

- 50/60 Hz AC line frequency input
- Phase-insensitive AC line input
- Interface control for either an AC or DC contactor

### Power Section

- Full-wave, full-control 6-SCR power conversion for smooth, efficient operation and high performance
- IP00 power module construction
- Non-regenerative or regenerative (required for reversing) configurations available
- Capable of 150% full-load current for 1 minute

## STANDARD FEATURES CON'T

### Analog Signals (12-bit resolution)

- 0-10 VDC manual speed reference
- User selectable +10 volt or 4-20 mA speed reference
- Two 0-10 VDC analog outputs that are user-configurable
- Speed feedback from analog DC tachometer (250 VDC maximum input)

### Digital Signals

- Coast stop, auto/manual, forward/reverse, jog, run and stop inputs
- Motor thermostat diagnostic input
- Brush wear diagnostic input or OCL (Outer Control Loop) enable
- Customer interlock diagnostic input
- Drive running contact output
- Drive alarm contact output
- Drive fault contact output

### Other Significant Standard Features

- Field Current Regulator based on unit-type Amp rating providing field economy
  - 4 A (25-60 A Ratings)
  - 10 A (150-450 A Ratings)
  - 12 A (800 A Rating)
- Self-tuning of speed and current loops without disconnecting the field
- Field (current) loss protection
- User selectable stop modes

## SERVICE CONDITIONS

- Standard altitude: to 3300 feet (1000 meters)
- Standard ambient temperature
  - Operating temperature @ nominal current: 0-40°C
  - Maximum operating temperature: 55°C (derate at 1.5% per °C above 40°C)
- Nominal AC line voltage: 200 to 460 VAC +/- 10%

- Nominal AC line frequency: 50/60 Hz +/- 2Hz
- Atmosphere: non-condensing relative humidity 50% at 40°C

## EFFICIENCY AND POWER FACTOR

- Typical displacement power factor at rated speed and load: 88%
- Typical efficiency of power module at rated load and speed: 98.6%
- Efficiency of drive including motor is typically 85%

## OVERLOAD CAPACITIES

- Continuous unit type current rating
- Maximum load: 150% of nominal rating for one minute

## SPEED RANGE/REGULATION

- Operator's speed adjustment: 0 to rated speed
- Specification speed range: 100:1 based on top speed and tachometer

## OPTIONAL OPERATOR INTERFACE MODULE FEATURES

- Complete operator controls for run, stop, forward/reverse, auto/manual, control source select and fault log
- "Quick Start" sequence for easy, complete drive set up
- Large, easy-to-read LCD display provides the following:
  - Built-in digital metering selectable in units proportional to speed or current such as FPM (feet per minute), percent load, or other user defined units
- Monitor of multiple parameter values in a single display such as speed and load
- Display available in multiple languages
- Drive status display indicators:
  - Drive fault and alarm
  - Interlocks are o.k.
  - Drive ready and drive running
  - Current/torque limit
- Extensive Diagnostics displays (recommended corrective action)

## Speed Regulation

Regulation Arrangement	Speed Change with 95% Load Change	Speed Change from All Other Variables
Armature Voltage w/ IR Compensation	2-3%	15%
Closed Loop		
w/ 5PY tachometer <sup>(1)</sup>	1%	2%
w/ RD120-1 encoder <sup>(2)</sup>	0.01%	0.01%
w/ RD120-2 encoder <sup>(2)</sup>	0.01%	0.01%
w/ RL1024 encoder <sup>(2)</sup>	0.01%	0.01%

<sup>(1)</sup> Standard DC tachometer interface included with drive; no pulse encoder feedback kit required.

<sup>(2)</sup> Optional pulse encoder feedback interface kit required; model number 907FK0101

## PRICING

FlexPak 3000 Power Module drives can support 200-460 VAC line input voltages. **The customer must select and provide the appropriate fusing, control transformer, and contactor for the desired line input voltage.**



**200 HP (375 AMP) HP FlexPak 3000 Power Module with optional OIM**

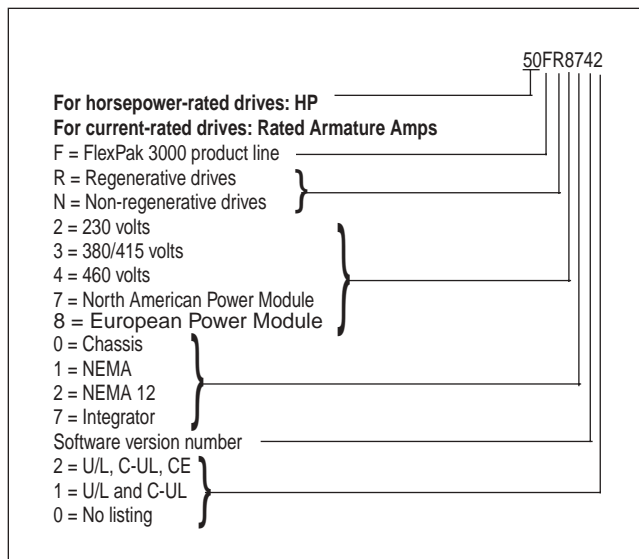
Non-Regenerative Power Module					
HP at 460 VAC <sup>(1)</sup>	Nom. Current Rating <sup>(2,4)</sup>	Unit Type Current Rating <sup>(3,4)</sup>	North American Model Number	European Stock No.	List
10	20	25	20FN8742	848.00.73	<b>\$3,390</b>
29	50	60	50FN8742	848.02.73	<b>3,440</b>
75	125	150	125FN8742	848.04.73	<b>3,840</b>
125	208	250	200FN8742	848.06.73	<b>4,600</b>
200	375	450	375FN8742	848.08.73	<b>7,000</b>
400	667	800	650FN8742	848.10.73	<b>9,100</b>

Regenerative Power Module					
HP at 460 VAC <sup>(1)</sup>	Nom. Current Rating <sup>(2,4)</sup>	Unit Type Current Rating <sup>(3,4)</sup>	North American Model Number	European Stock No.	List
10	20	25	20FR8742 ◊	848.01.73	<b>\$3,850</b>
29	50	60	50FR8742 ◊	848.03.73	<b>4,000</b>
75	125	150	125FR8742 ◊	848.05.73	<b>4,655</b>
125	208	250	200FR8742 ◊	848.07.73	<b>5,710</b>
200	375	450	375FR8742 ◊	848.09.73	<b>8,100</b>
400	667	800	650FR8742	848.11.73	<b>11,300</b>

Options			
Description	North American Model Number	European Stock No.	List
KeyPad Operator Interface Module (OIM)	317C160D ◊	922.95.00	<b>\$600</b>
Configuration Software (CS3000)	2CS3000 ◊		<b>350</b>

- (1) HP based on 40°C ambient & 460 VAC line input voltage at nominal rating. Derate at 1.5% per °C above 40°C
- (2) Nominal current rating is 100% continuous operation with 50% overload capability.
- (3) Unit-type current rating based on maximum continuous operation without overload.
- (4) Field current regulator rating: 4 A (25-60 A Ratings), 10 A (150-450 A Ratings), 12 A (800 A Rating). Rating is based on unit-type amp rating.

Note: All ratings are based on 40°C Ambient



◊ Normally carried in stock

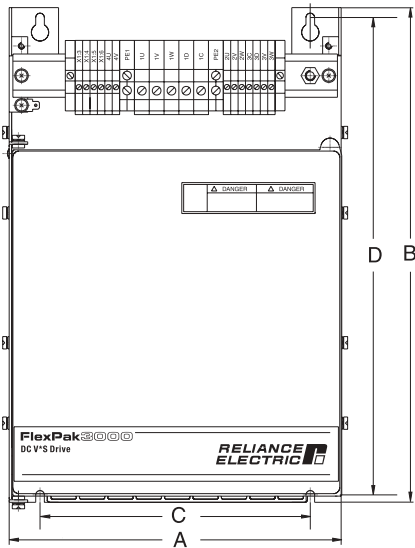
**DISCOUNT VS-50D**

# FlexPak 3000 Power Module

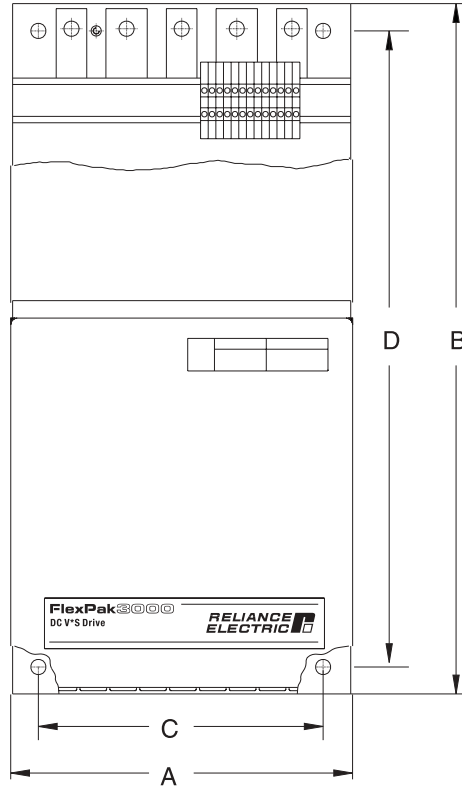
## FlexPak 3000 Power Module Dimensions

Power Module Dimensions								
HP at 460 VAC <sup>(1)</sup>	Nom. Current Rating <sup>(2)</sup>	Unit Type Current Rating <sup>(3)</sup>	A	B	C	D	Depth	Weight
10	20	25	269 mm (10.6")	400 mm (15.8")	219 mm (8.62")	386 mm (15.2")	287mm (11.3")	10 kg (22 lb)
29	50	60	269 mm (10.6")	400 mm (15.8")	219 mm (8.62")	386 mm (15.2")	287mm (11.3")	10 kg (22 lb)
75	125	150	269 mm (10.6")	428 mm (16.9")	219 mm (8.62")	386 mm (15.2")	287mm (11.3")	14 kg (31 lb)
125	208	250	270 mm (10.6")	550 mm (21.7")	220 mm (8.66")	500 mm (19.68")	337mm (13.3")	40 kg (88 lb)
200	375	450	270 mm (10.6")	550 mm (21.7")	220 mm (8.66")	500 mm (19.68")	337mm (13.3")	40 kg (88 lb)
400	667	800	306 mm (12.1")	660 mm (26.0")	266 mm (10.47")	636 mm (25.0")	436 mm (17.2")	83 kg (183 lb)

- (1) HP based on 40°C Ambient & 460 VAC line input voltage at Nominal Rating  
Derate at 1.5% per °C above 40°C
- (2) Nominal Current Rating is 100% continuous operation with 50% overload capability.
- (3) Unit Type Current Rating based on maximum continuous operation without overload.



**Typical 20, 50, and 125 Amp power module dimension outline. See instruction manual for details.**



**Typical 208, 375, and 667 Amp power module dimension outline. See instruction manual for details.**

## PRODUCT PUBLICATIONS

Instruction Manual: D2-3475

DISCOUNT VS-50D

# FlexPak 3000 and WebPak 3000 Drive Options

## AC LINE DISCONNECTS FOR CHASSIS OR NEMA 1 ENCLOSED DRIVES

Select and price disconnect per the table below. This kit cannot be mounted on FlexPak 3000 Power Module drives.

### AC Line Disconnects Selection

Incoming Line Voltage		Disconnect for Chassis Drives			Disconnect for NEMA 1 Conversion Kit Mounting <sup>(1)</sup>		
230 VAC	460 VAC	Model Number	List		Model Number	List	
			Kit	Installed		Kit	Installed
1-1/2 - 25	3-50	901FK0101 ◇	\$555	\$630	901FK0101 ◇	\$555	\$630
30	60	901FK0201 ◇	660	735	901FK0201 ◇	660	735
40-60	75-125	901FK1102 ◇	1,350	1,425	901FK1112 ◇	1,425	1,500
75	150	901FK1202 ◇	2,100	2,175	901FK1212 ◇	2,175	2,250
100	200	901FK2101 ◇	2,500	2,575	-	-	-
125-150	250-300	901FK2201 ◇	4,075	4,150	-	-	-
-	400	901FK2401 ◇	5,070	5,170	-	-	-
-	500	901FK2401 ◇	5,070	5,170	-	-	-
-	600	901FK2501 ◇	7,625	7,725	-	-	-

(1) Enclosure not included in price. See page D-131 for enclosure pricing.

### Blower Motor Starter

This option provides a fused AC starter with adjustable overload and interlocking for control of the three-phase blower motor used to cool the DC motor. This kit cannot be mounted on FlexPak 3000 Power Module drives.

2-150 HP @ 230 VAC and 5-600 HP @ 460 VAC	
Blower 3-Phase Current Amps	Single Starter Model Number
.4-.63	902FK0101 ◇
.63-1.0	902FK0201 ◇
1.0-1.4	902FK0301 ◇
1.4-1.8	902FK0401 ◇
1.7-2.4	902FK0501 ◇
2.2-3.1	902FK0601 ◇
2.8-4.0	902FK0701 ◇
3.5-5.0	902FK0801 ◇
4.5-6.5	902FK0901 ◇
6.0-8.5	902FK0111 ◇
7.5-11.0	902FK0121 ◇

Kit..... \$400 List

Factory Installed..... \$500 List

◇ Normally carried in stock

DISCOUNT VS-50D

## 115 V Control Interface

This option consists of a printed circuit board which converts customer-supplied 115 VAC signals to 24 VDC for operating a FlexPak 3000. This card mounts separately on the chassis drives or can be mounted in drives with optional NEMA 1 conversion kits.

### INPUTS AND OUTPUTS

- Run
- Stop
- Jog
- Fwd/Rev
- Auto/Man
- Coast/Stop
- Customer interlock
- Fault reset
- Brush wear
- Motor thermostat

Kit Model Number 917FK0101 ◊ ..... \$500 List

## Conversion Kit 460 VAC to 230 VAC

This kit contains control transformer fuses that allows the user to convert a 460 VAC FlexPak 3000 or WebPak 3000 to a 230 VAC drive at one-half the 460 VAC horsepower rating. This kit can be obtained at no-charge if requested on the same purchase order as the 460 VAC FlexPak 3000 drive. This kit cannot be used with FlexPak 3000 Power Module drives.

A fuse kit is not required to convert 200-600 HP 460 VAC FlexPak 3000 drives to 230 VAC. See the instruction manual for conversion instructions or factory order as a 230 VAC drive.

Model Number 916FK0100 ◊ ..... This fuse kit will convert FlexPak 3000, 3-60 HP @ 460 VAC to 1-1/2 - 30 HP @ 230 VAC.

Model Number 916FK0200 ◊ ..... This fuse kit will convert FlexPak 3000, 75-150 HP @ 460 VAC to 40-75 HP at 230 VAC.

Model Number 916FK0100 and 916FK0200 Ordered w/ Drive N/C Ordered separately ..... \$50

For 380 VAC/415 VAC operation, see page D-119 for special voltage drives.

## Dynamic Braking (DB)

Dynamic braking reduces the stopping time of the motor when the STOP button is depressed. Under normal operation, the motor will coast-to-rest. If Dynamic Braking has been installed, when the STOP button is pressed, the motor operates as a generator. The rotating mechanical energy is turned into electrical energy, which is dissipated as heat in the dynamic braking resistor. **Note:** Dynamic braking is **not** a holding brake, and will **not** keep a motor from turning.

◊ Normally carried in stock

HP Rating	240 VDC Dynamic Braking <sup>(3)</sup>	
	Loose Parts Kit <sup>(3)</sup>	
	Model Number	Kit List <sup>(1)</sup>
1-1/2	912FK0010	\$675
2	912FK0020	675
3	912FK0030	675
5	912FK0050	675
7-1/2	912FK0070 ◊	675
10	912FK0100 ◊	695
15	912FK0150 ◊	695
20	912FK0200 ◊	1,100
25	912FK0250 ◊	1,100
30	912FK0300 ◊	1,100
40	912FK0400	1,500
50	912FK0500	1,800
60	912FK0500	1,800
75	912FK0750	2,050

HP Rating	500 VDC Dynamic Braking <sup>(3)</sup>	
	Loose Parts Kit <sup>(3)</sup>	
	Model Number	Kit List <sup>(1)</sup>
3	913FK0030	\$880
5	913FK0050 ◊	880
7-1/2	913FK0070 ◊	880
10	913FK0100 ◊	880
15	913FK0150 ◊	880
20	913FK0200 ◊	1,210
25	913FK0200 ◊	1,210
30	913FK0300 ◊	1,240
40	913FK0400 ◊	1,240
50	913FK0500 ◊	1,325
60	913FK0500 ◊	1,325
75	913FK0750 ◊	1,850
100	913FK1000 ◊	2,000
125	913FK1000 ◊	2,000
150	913FK1500 ◊	2,200
200	913FK2000 ◊	2,640
250	913FK2500 ◊	4,900
300	913FK3000 ◊	5,000
400	913FK4000	2,800 <sup>(2)</sup>
500	913FK5000	3,000 <sup>(2)</sup>
600	913FK6000	3,200 <sup>(2)</sup>

(1) Includes D/B contactor and D/B resistors. Customer must supply fuses and 115 VAC power for contactor or price 115 VAC control transformer from option pages.

(2) Kit consists of resistors and enclosure only. Drive has DB pole on contactor as standard.

(3) This kit cannot be used with FlexPak 3000 Power Module drives. Contact factory for assistance.

DISCOUNT VS-50D

## Enhanced Field Supply

This FlexPak 3000 Field Supply modification provides the following additional features:

- Electronic field trim
- Field economy
- The ability to have a 240 VDC field supply instead of a 150 VDC field supply on 230 VAC input drives.

AC Line Input	Field Voltage (DC) Output
230 VAC	103 to 207 DC 207 to 259 DC
460 VAC	207 to 414 DC 414 to 575 DC

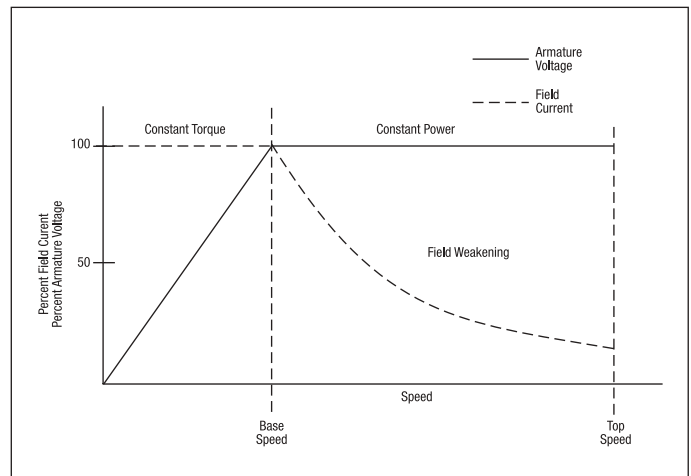
This modification replaces the standard field supply or field current regulator. Motor field weakening is not possible with this kit.

230 VAC HP	460 VAC HP	DC Amps	Model Number <sup>(1)</sup>	Kit List	Factory Installed List
1-1/2 - 15	3 - 30	10	923FK0101 ◇	\$500	\$500
20-300	40 - 600	20	923FK0201 ◇	650	650

(1) The enhanced field supply kit cannot be used when using a field current regulator kit.

## Field Current Regulator

The Field Current Regulator kit replaces the standard field voltage supply with a current regulated supply. It provides field economy and constant horsepower (above base speed) operation. It can be used in drives that have software Version 3.0 or later. (Note: the second to last digit of the drive model number specifies the drive version number.) With this kit installed, the field control loop contained in the drive software is enabled, allowing the user to set field amps and adjust field regulator functions, either locally or over a network connection.



Three Field Current Regulator kits are available for use in FlexPak 3000 drives. Kit selection is based on motor hot field current. Use the kit that will provide the necessary motor field current required for your application. Field control resolution is optimized by using the smallest field regulator kit that meets necessary motor field current requirements. The motor being used must have extended speed range capability and speed feedback via analog tachometer or pulse encoder in order to operate above base speed.

The FlexPak 3000 Power Module Drive: The field current regulator is supplied as standard with the FlexPak 3000 Power Module drive.

Approx. HP <sup>(2)</sup>		Motor Hot Field Amps	Field Current Regulator Model Number <sup>(3)(4)</sup>	Kit List <sup>(3)</sup>	Factory Installed List <sup>(3)</sup>
230 VAC HP	460 VAC HP				
1-1/2 - 10	3-20	4	911FK0041 ◇	\$280	\$280
1-1/2 - 15	3-30	10	911FK0101 ◇	300	300
20-60	40-125	15	911FK0151 ◇	320	320
75-300	150-600	15	-	Std.	Std.

- (2) For estimating only. Field current regulator should be sized according to motor hot field amps.
- (3) Requires V3.0 or later FlexPak 3000. (Second to last digit of drive M/N must be a "3" or larger.) This kit is standard on all FlexPak 3000 drives 75 HP @ 230 VAC/150 HP @ 460 VAC and larger and on FlexPak 3000 Power Module drives.
- (4) A field current regulator kit cannot be used when using an Enhanced Field Supply kit.

◇ Normally carried in stock

DISCOUNT VS-50D

## I/O EXPANSION CARD

The I/O expansion card mounts in the FlexPak 3000 chassis and gives the FlexPak 3000 additional analog, frequency and digital I/O capability. Some additional features with this card are:

- Dancer follower functions
- Outer Control Loop (OCL) applications
- External motor operated pot (MOP) function
- (3) preset speeds
- (2) user configurable analog outputs
- (1) user configurable frequency output
- (1) user configurable frequency input
- (2) timed threshold level detectors

## AVAILABLE I/O

### 5 Digital Inputs (24 VDC, isolated)

- (2) inputs for preset speed selection
- (2) inputs for MOP increment and decrement
- (1) input for OCL enable

### 2 Level Detectors (30 VDC or 250 VAC)

- Selectable normally open or normally closed
- Detected when signals exceed an adjustable threshold
- Timed delay output from 0 to 300 seconds

### 2 Analog Inputs (Isolated)

- Input 1:  $\pm 10$  V, 4-20 mA, 10-50 mA
- Input 2:  $\pm 10$  V ONLY
- Voltage scalable from 4.4 V to 10.0 V
- Steerable to OCL reference and feedback, speed reference trim, positive current limit (negative also if regenerative) and inertia compensation

### 2 Analog Outputs (unfiltered)

- Output 1:  $\pm 10$  V, 4-20 mA
- Output 2:  $\pm 10$  V ONLY
- User configurable

### 1 Frequency Input

- Differential 5 to 15 V square wave (single direction)
- Scalable from 2 to 250 kHz
- User configurable

### 1 Frequency Output

- Differential 5 to 15 V square wave (single direction)
- Scalable from 2 to 250 kHz
- User configurable

### Output Control Loop (OCL)

- Dancer follower (Type I position loop)
- Dancer position regulator (Type II position loop)

See I/M D2-3301 for more detailed information of the I/O expansion card.

**Kit Model Number 914FK0101**  $\diamond$  ..... **\$660 List** <sup>(1)</sup>

**Factory Installed**..... **\$780 List** <sup>(1)</sup>

<sup>(1)</sup> Requires V3.0 or later FlexPak 3000. (Second last digit of controller M/N must be "3" or higher.)

$\diamond$  Normally carried in stock

DISCOUNT VS-50D

**NETWORK COMMUNICATIONS**

**AutoMax Network Communication Card**

The AutoMax Network Communication card mounts in a FlexPak 3000 drive allowing it to communicate with an AutoMax network. The drive can be controlled, tuned, and monitored by way of the high speed (875 Kbaud) AutoMax network link. Up to 55 FlexPak 3000 drives can be connected to a single network using the basic configuration or up to 13 using the full configuration.

Kit Model Number 915FK0101 ◊ .....\$441 List <sup>(1)</sup>  
 Factory Installed.....\$561 List

**ACCESSORIES FOR AUTOMAX NETWORK**

Passive Tap Model Number 57C0380 ◊ ..... (4)  
 75 Ohm Terminator Model Number 45C71 ◊ ..... (4)  
 Drop Cable Model Number 57C381 ◊ ..... (4)

**ControlNet™ Communication Card**

The ControlNet Communication card mounts in a FlexPak 3000 drive, allowing it to communicate over the open network ControlNet. ControlNet is a highly deterministic and repeatable control layer network. It provides real-time high speed transport of time critical I/O data and messaging data, all on one link. ControlNet is ideal for complex control systems that require synchronized and coordinated real-time performance.

ControlNet provides high speed (5 msec) updates to all scheduled reference and control data. It also provides access to all drive parameters through unscheduled traffic.

Kit Model Number 915FK2101 ◊ .....\$735 List <sup>(1)(2)</sup>  
 Factory Installed.....\$855 List

**DeviceNet™ Communication Card**

The DeviceNet Communication card mounts in a FlexPak 3000 drive, allowing it to communicate over the open network DeviceNet. The card provides the ability to modify parameters plus operate and monitor the FlexPak 3000. Horner Electric Co. manufactures this card. More information is obtainable from I/M HE-FP3.

Kit Model Number 915FK1100 ◊ .....\$560 List <sup>(1)(3)</sup>  
 Factory Installed.....\$680 List

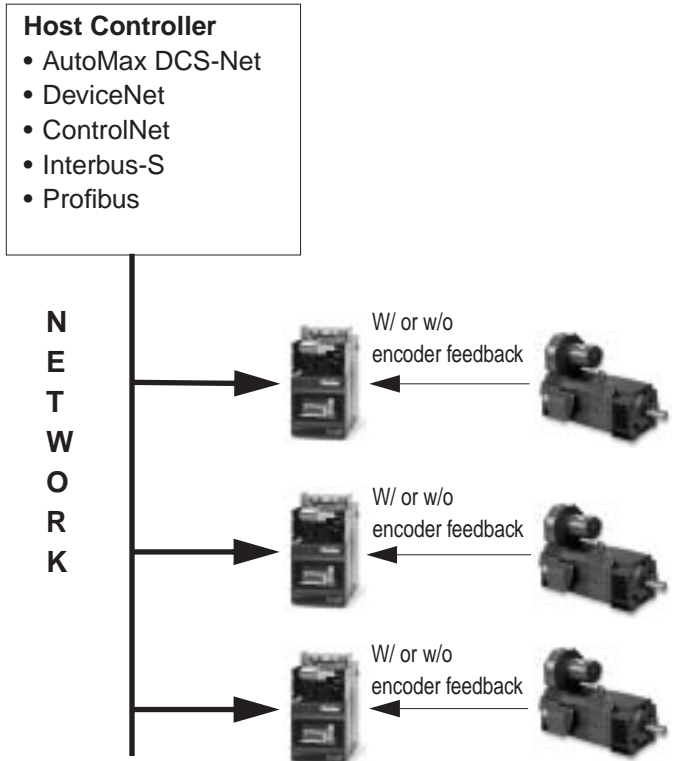
◊ Normally carried in stock

**Interbus-S™ Communication Card**

The Interbus-S Communication card mounts in the FlexPak 3000 drive, allowing it to communicate with an Interbus-S network. The card allows the FlexPak 3000 drive to be controlled and monitored over the network.

Kit Model Number 915FK3101.....\$735 List <sup>(1)</sup>  
 Factory Installed.....\$855 List

Note that this card also requires a remote to local bus connector, such as the Phoenix Model IBS24BK/LC



- (1) Only one network card can be installed in the drive at one time
- (2) Must use V4.2 or higher firmware
- (3) Must use V3.12 or higher firmware
- (4) Contact Reliance Electric for price and availability

**Profibus™ Communication Card**

The Profibus Communication card allows the FlexPak 3000 to communicate over the Profibus network. This card allows the FlexPak 3000 to be controlled and monitored over the network.

Kit Model Number 915FK4101.....\$735 List  
 Factory Installed.....\$855 List

## INVERTING FAULT CIRCUIT BREAKER

This modification replaces the standard inverting fault fuse. The inverting fault circuit breaker is recommended when applying regenerative FlexPak 3000 drives to high inertia loads (where the reflected load ( $WR^2$ ) to the motor is equal to or greater than the motor's). It also is used on applications where the drive is frequently in a low power regenerative mode, such as on un-winders and pay-offs. The inverting fault breaker must be mounted separately from the drive, unless the drive is mounted in a cabinet.

240 VDC HP	500 VDC HP	Kit Model Number	Kit List
1-1/2 - 2	3-5	906FK0101 ◇	\$775
3-5	7.5-10	906FK0201 ◇	775
7-1/2 - 10	15-20	906FK0301 ◇	775
15-20	25-40	906FK0401 ◇	900
25-30	50-60	906FK0501 ◇	950
40-60	75-125	906FK1101 ◇	1,600
75	150	906FK1201 ◇	2,350
100-150	200-300	906FK2101 <sup>(1)</sup>	<sup>(1)</sup>
-	400-600	906FK3101 <sup>(2)</sup>	<sup>(2)</sup>

- (1) Standard on all **FB** models. Example 300FB4042.
- (2) Included in drive price and must be specified with regenerative 400-600 HP drives.

## V4.2 REGULATOR UPGRADE<sup>(1)(3)</sup>

This kit includes a V4.2 regulator board, grounding harness, CS3000 software and V4.2 software manual. This kit can be used to upgrade V3.0<sup>(2)</sup> or higher FlexPak 3000 drives.

**Kit Model Number 920FK0042 ◇ .....\$600 List**

## OPERATOR INTERFACE MODULE (OIM) DRIVE-MOUNTED KIT<sup>(3)</sup>

This kit includes an OIM and all necessary connection hardware. This option is available for FlexPak 3000 **Power Module** drives (standard on FlexPak 3000 drives).

**Kit Model Number 317C160D ◇ .....\$600 List**

- (1) Contact Reliance for upgrading V2 or lower drives.
- (2) Second last digit of controller M/N must be "3" or higher.
- (3) Upgrading from a Version 2 FlexPak3000 Drive to Version 4 requires that both the regulator board and OIM kit be upgraded.

## LINE FILTER KIT

The Line Filter kit is used on 400-600 HP FlexPak 3000 drives when the primary of the drive's source transformer is greater than 2300 VRMS. The kit helps attenuate high voltage spikes that capacitively couple from the transformer primary to secondary.

400 HP VAC	Kit Model Number	Kit List
400-600	918FK0601 ◇	\$750

## OPERATOR INTERFACE MODULE (OIM) REMOTE MOUNTING KIT

The kit includes a cable bezel and blank OIM replacement panel for mounting to the drive chassis in applications where it is desirable to locate the OIM away from the drive or in a cabinet door. The OIM can be then mounted up to 5 meters from the drive.

**Kit Model Number 905FK0101 ◇ ..... \$150 List**

◇ Normally carried in stock

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## FlexPak 3000 and WebPak 3000 DC Drives Options

### NEMA 1 CONVERSION KIT

This modification allows conversion of standard chassis to a NEMA 1 enclosure. This kit cannot be used with FlexPak 3000 Power Module drives.

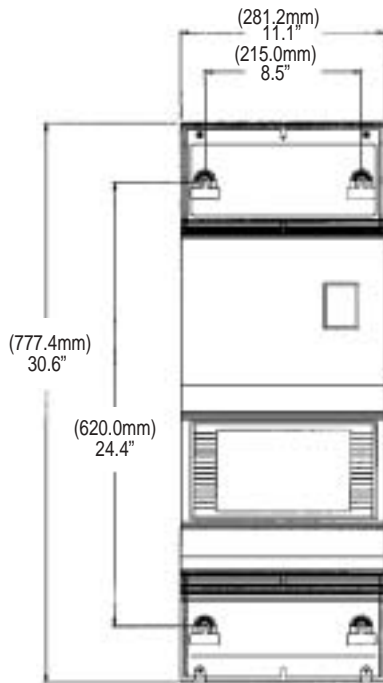
230 VAC HP	460 VAC HP	Kit Model Number	Kit List	Factory Installed
1-1/2 - 30	3-60	904FK0101 ◊	\$795	\$895
40-75	75-150	904FK0201 ◊	1,100	1,200
100-150	200-300	N/A	N/A	N/A
-	400-600	N/A	N/A	N/A



*FlexPak 3000 drive shown with the optional NEMA 1 enclosure*

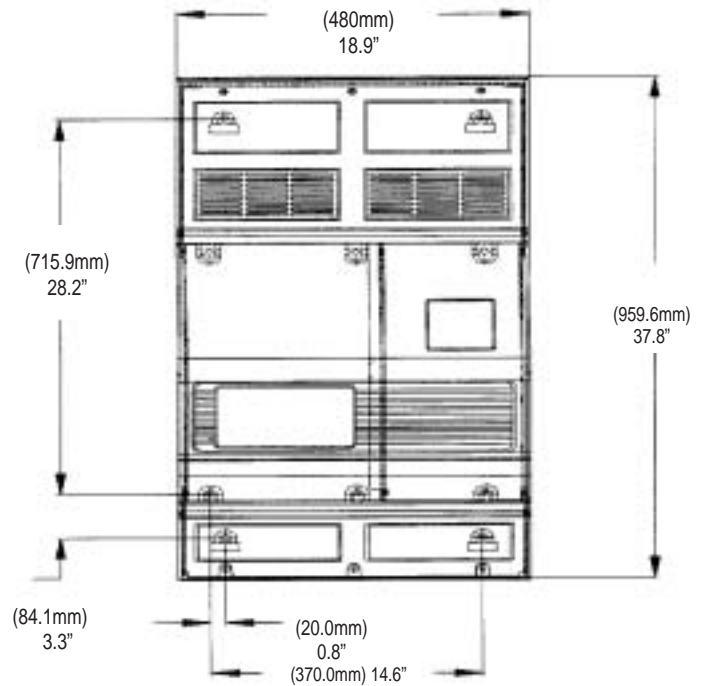
### DIMENSIONS WITH NEMA 1 CONVERSION KIT INSTALLED

**1 1/2-30 HP @ 230 VAC, 3-60 HP @ 460 VAC**  
**Model Number 904FK0101**



Attached Depth: (308.57mm) 12.15"

**40-75 HP @ 230 VAC, 75-150 HP @ 460 VAC**  
**Model Number 904FK0201**



Attached Depth: (332.8mm) 13.1"

◊ Normally carried in stock

**DISCOUNT VS-50D**

SOFTWARE PROGRAMMING & RS-232 CABLES

**CS3000 Software, Control & Configuration**

This is a Windows® based software package which allows drive Control & Configuration. The user is allowed to create, store, upload, download, monitor, control and/or compare parameter values in a user-friendly environment.

Configuration and operation of the drive from a PC provides the flexibility and power desired by today's sophisticated users and OEMs alike.

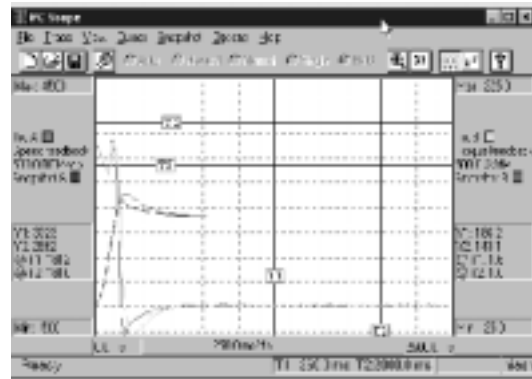
- Compare; when performed either locally or over a remote modem allows quick qualification of any changed parameters. Differences are displayed on the PC and may be printed.
- Edit; allows programing via PC.
- Download; allows one step programming of multiple parameters from drive memory.
- Upload; allows identification of existing drive parameters from drive memory.
- Drive control;
  - Monitors 6 display values;
  - Speed reference (scalable)
  - Motor speed
  - Armature volts
  - Motor current
  - Percent load
- Configurable displays are;
  - Speed reference
  - Control source
  - Auto/Manual mode
  - Fwd/Rev direction
- Operational keys displayed;
  - Run, Jog, Stop, Reset
- Fault/Alarm Log; allows fault and alarm history for diagnosis of operation.
- PC Scope feature; allows monitoring and trace of two drive parameters for diagnostics and tuning of the drive. Captured data can also be saved as an ASCII text file or can be compared to previous traces.<sup>(1)</sup>

(1) Requires V4.0 or later  
 (2) Contact Reliance for pricing.

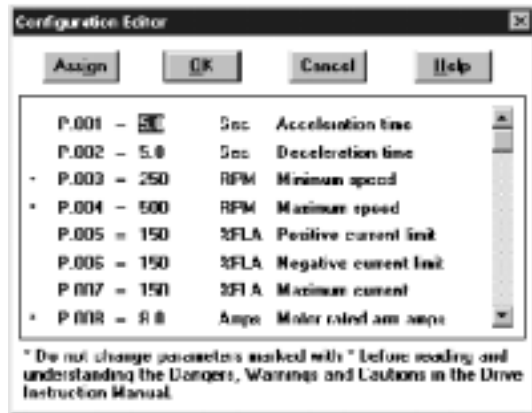
Provided on a 3.5" diskette with manual. Note that this software is also compatible with GV3000 AC drives.

Reference Manual Number: D2-3348

Model Number 2CS3000 ◇.....\$350 List



PC Scope screen from CS3000



Configuration Editor screen from CS3000

**CS3000 Computer Cable**

The 9-pin connector connects to the PC and the 25-pin connector connects to the FlexPak 3000 drive.

Model Number \* 61C127 ◇.....<sup>(2)</sup>

◇ Normally carried in stock

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## Tachometer/Encoder (Speed Feedback)

### ADVANTAGES OF CLOSED-LOOP SPEED REGULATION

Normal voltage regulation using IR drop compensation provides 1-2% speed regulation with a 95% load change. However, changes in other variables (temperature, frequency, and voltage) can cause significantly greater speed changes, sometimes as much as 15%.

For improved speed regulation, add a motor-mounted tachometer. For the best regulation, use an encoder (pulse tachometer) kit. Use the chart below to select speed feedback kits and factory mounted tachometers/encoders.

Speed Feedback	Maximum Input	Type Tachometer	Regulation	Non-Regen.	Regen.	Speed Feedback Kit Model Number	Speed Feedback Kit Less Tachometer/Encoder List	Speed Feedback Kit Factory Installed Less Tachometer/Encoder List
Voltage	-	-	2%	√	√	-	-	-
AC Tachometer	250 VAC	RE 045	1%	√		907FK0301 <sup>(2)</sup> ◇	\$300	\$385
DC Tachometer	250 VDC	5PY	1%	√	√	Std.	Std.	Std.
Encoder (Pulse)	73KHz <sup>(1)</sup>	RD-120-1 <sup>(3)(5)</sup>	.01%	√		907FK0101 ◇	300	385
Encoder (Pulse)	73KHz <sup>(1)</sup>	RD-120-2 <sup>(3)(5)</sup>	.01%		√	907FK0101 ◇	300	385
Encoder (Pulse)	73KHz <sup>(1)</sup>	H56 <sup>(3)</sup>	.01%	√	√	907FK0101 ◇	300	385
Encoder (Pulse)	73KHz <sup>(1)</sup>	RL-1024 <sup>(4)</sup>	.01%	√	√	907FK0101 ◇	300	385

(1)  $\frac{PPR \times RPM}{60,000} = KHz$

(2) Kit is intended for use with existing motors that have RE045 tachometers. For new motor and tachometer applications, select another tachometer and appropriate feedback kit. AC tachometers are not suitable for Regenerative reversing drive applications.

(3) 120 PPR

(4) 1024 PPR

(5) Not suitable for use in TENV frames DC180, DC210, or C180.

◇ Normally carried in stock

**DISCOUNT VS-50D**

## COMPLIANCE TO CE DIRECTIVES

Reliance Mains Filter and Inductor kits are designed for use with the FlexPak 3000 DC drive, when compliance with European Community requirements for electromagnetic compatibility is required. When used in conjunction with a FlexPak 3000 drive, the AC Mains Filter and AC Mains Inductor kits, along with specific wiring practices (as detailed in Instruction Manual D2-3404) and an electrical cabinet, comply with standards EN50081-1, EN50081-2, EN50082-1 and EN50082-2.

EN50081-1: Electromagnetic compatibility-Generic emissions standard, Part 1: residential, commercial, and light industry.

EN50081-2: Electromagnetic compatibility-Generic emissions standard, Part 2: industrial environment.

EN50082-1: Electromagnetic compatibility-Generic immunity standard, Part 1: residential, commercial, and light industry.

EN50082-2: Electromagnetic compatibility-Generic immunity standard, Part 2: Industrial environment.

## Compliance Requirements

For the FlexPak 3000 DC Drive to conform to the standards listed on the Declaration of Conformity (DOC), the drive must:

- Be accompanied by the DOC for that drive. A copy of the DOC can be obtained at web site [www.ab.com/](http://www.ab.com/) certification. Request the FlexPak 3000.
- Be specified by model number on the DOC.
- Have a CE mark, which is below the drive nameplate.
- Be mounted and wired on the conductive, non-coated back panel of an electrical cabinet.
- FlexPak 3000 Power Module version: Consult drive manual for compliance requirements (D2-3475).

- Include an AC Mains Filter and AC Mains Inductor (as specified under AC Mains Filter and AC Mains Inductor Selection).
- Be installed and wired according to the instructions as specified in the FlexPak 3000 Instruction Manual D2-3404.
- Be operated with the electrical cabinet doors closed.

**NOTE: Conformity of the FlexPak 3000 Drive does not guarantee that the entire installation will be in compliance.**

## Required Kits

In addition to the CE model<sup>(1)</sup> drive, you will need the following to install the drive for CE compliance:

- AC Mains Filter kit
- AC Mains Inductor kit
- Electrical cabinet with back mounting panel (See data sheet D-2928 and Drive Hardware manual D2-3404)

Rating HP		Inductor Part Number	List	Mains Filter Amp Rating	Filter Model Number	List
230 VDC	460 VAC					
1-1/2	3	608895-63H ◇	\$290	15	3DF4353 ◇	\$650
2	5	608895-63H ◇	290	15	3DF4353 ◇	650
3	7.5	(3)	300	15	3DF4353 ◇	650
5	10	(3)	300	30	3DF4354 ◇	680
7-1/2	15	(3)	330	30	3DF4354 ◇	680
10	20	(3)	345	50	3DF4355 ◇	875
-	25	(3)	345	50	3DF4355 ◇	875
15	30	608895-63R ◇	375	50	3DF4355 ◇	875
20	40	608895-63W ◇	435	100	3DF4357 ◇	1,020
25	50	608895-63W ◇	435	100	3DF4357 ◇	1,020
30	60	(3)	550	100	3DF4357 ◇	1,020
40	75	(3)	610	300	3DF4359	3,110
50	100	608895-63AC ◇	720	300	3DF4359	3,110
60	125	608895-63AE ◇	860	300	3DF4359	3,110
75	150	608895-63AG ◇	1,355	300	3DF4359	3,110
-	200	608895-63AK ◇	1,360	320	3DF4359	3,110
-	250	608895-63AN ◇	1,365	400	3DF4359	6,220 <sup>(2)</sup>
-	300	608895-63AR ◇	1,735	500	3DF4359	6,220 <sup>(2)</sup>

- (1) Model number must have a "2" in the last digit to be CE-compliant. Example 60FN4042.  
 (2) Requires quantity two. Specify two, price includes two.  
 (3) See catalog page D-147 for Inductor part number and pricing.

◇ Normally carried in stock

DISCOUNT VS-50D