Reliance Electric FlexPak 3000 Digital DC Variable Speed Drives Product Summary

A three-phase digital DC drive for regenerative and non-regenerative applications





The Reliance[®] Family Of Variable Speed AC and DC Drives



The Reliance* FlexPak 3000 is pare of the Reliance Electric family of variable speec AC and DC crives. The FlexPak 3000 digital DC crive features a unique ergonomic user interface for easy instellation stan-up, application, and meintenance. Its unique design tass the latest digital, encreasementation of simpledy. Her billy, and reliability in a compact package.

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FlexPak 3000: Simple. Compact. Flexible. Reliable.



ElexPak 3000 DC drives provide high break away tarque, precise centrol, and the ragged reliability required by rubber and plastic extrusion equipment.



With a single keyst oke, the display kingingle of FlexPak 3000 DC drives can be changed to Finglish, German, French, Spanish, or Italian.



Simple.

- · Readily accessible control, signal, and field wiring for streamlined installation
- User-friendly, graphical displays and a remote keypad using plain text instructions provide fast and easy set-up
- Five languages, accessible with a single keystroke, for displaying diagnostics, status information, and "help" text

Compact.

- Extensive use of molded parts enable feature-rich power density with a small footprint
- Space-saving package facilitates field wiring, mounting, modification, and maintenance
- Standard chassis design converts easily to NEMA 1 erclosure using NEMA 1 conversion kits or, for high HP controllers, floor-mount NEMA 1 enclosures

Flexible.

- Standard crive software accommodates a wide range of application requirements
- · Expanded capabilities available through drive modification kits and options
- Easily modified to a full range of international input-line voltages and frequencies

Reliable.

- Advanced high-density power semiconductor devices, surface mount, and sub-micron ASIC technology for esceptional dependability
- Sophisticated design uses fewer parts for extended performance and reduced maintenance requirements

ISO Certified.

Reliance FlexPak 3000 digital DC drives are manufactured in the U.S.A. in compliance with ISO 9001 certification procedures for consistent, predictable performance. Our program of continuous quality improvement ensures that every PlexPak 3000 drive meets world-class standards of excetlence with the ultimate goal of customer satisfaction.

Standard Features and Benefits

Dependable AC Supply For Optimum Reliability

- · 50/60 Hz AC line frequency input
- · Phase insensitive AC line input
- Semiconductor fuse protection
- AC "N" contactor (DC "M" above 300 HP).

Versatile Power Capabilities For Diverse Application Requirements

- Full-wave, full control 6-Pulse power conversion for smooth efficient operation and high performance
- Burst firing of SCRs
- Non-regenerative or regenerative (required for reversing) controller
- · Capable of 150% full-load current for one minute
- · DC inverting fault protection on regenerative controllers

User-Friendly Quick Start Menu For Easy Set-Up and Application

Adjustable parameters include:

- Maximum speed
- Minimum speed
- Linear acceleration
- 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

12-Bit Resolution Analog Signals For Exceptional Accuracy

- 10 VDC manual speed reference
- Laser selectable +/- 10 Volt or 4-20 mA auto speed reference
- 0-10 VDC analog output proportional to speed
- 0-10 VDC analog output proportional to armature current
- Speed feedback from analog actiometer (250 VDC maximum input)

Expanded Offering of Digital Signals For Optimum Flexibility

- Coost, stop, auto/manual, forward/reverse, jog, run, and stop inputs
- Motor thermostat diagnostic input
- Brush wear diagnostic input
- Customer interlock diagnostic input
- Drive mening contact output
- Drive alarm contact output
- Drive fault conract output

Feature-Rich "Standard" Package For Exceptional Functionality

- Self-runing of speed and current loops without disconnecting the fields
- Field (current) loss protection.
- L ser selectable stop modes.
- Crast
 - Current limit
 - Ramp
- · Local controls with interactive keypad and display for:
 - Drive set-up
 - Drive operation
 - Metering and diagnosties (including fault and alarm logs)

Name	Description	Model Number	I/M Number
115 VAC Control Interface	VAC Converts of stomer-supplied 115 VAC signals to 24 VDC. trol Interface Mounts separate from the drive.		D2-3335
460 VAC to 230 VAC Luse Conversion Kit	60 VAC to Allows conversion of the 460 VAC to 230 VAC at 1/2 the 460 VAC 30 VAC Uase horsepower rating.		D2-3329
AC Line Disconnect Kit	Mounts on the FlexPak 3000 and allows the three-phase line to be disconnected at the drive.	901FK series	D2-3292 ur D2-3315
AC Tachonieter Feed web, Kit	Allows the drive to accept leedback signals from AC tachometers to a maximum RMS of 275 VAC.	9071FK0301	D2-3297
AutoMax Network Allows the drive to communicate on the Reliance Communication Distributed Control System (DCS). Board		915I-K0101	D2-3315
Blower Motor Provides a fused AC statier with adjustable overload and interlocking for control of the three-phase blower motor used to cool the DC motor.		902FK series	D2-3295
DeviceNet Commonivation Board	iceNet Allows the drive to communicate over the open munication protocol DeviceNet network. (see page 14) rd		IIE4P3
Drive Control Configuration Software	ive Courol Windows ⁽¹⁾ based software that connects any personal computer using Microsoft Windows V 3.1 or higher to a PlexPak 3000 trive.		D2-3349
Dyuanice Provides the bandware, including braking grids, to provide Braking Kil dynamic braking ou step.		908/9/ 12/1311K series	02-3313
Unbauced Field Sapply Kit	Provides electronic field min, field economy, and the ability to sapply 240 Vol.s field voltage from a 230 VAC line.	9031-K series	D2-3295
InventingThis kit is recommended when applying regener, live drivesUtil: Circuitto high inertia loads or when drive is frequently in lowBreakerpower regener, live mode		9061/K. seties	D2-3300 OR D2-3330
NEMA 1 Conversion K:1	Converts standard chassis to NEMA 1 enclosure.	904PK series	D2-3299 OR D2-3331
OIM Remote Mounting Kit	Enables mounting of OIM up to live meters from the drive.	9051-K0101	D2-3294
Palse Echometer Feedwork Kit	Allows digital pulse tachometer or digital encoder speed feedback.	9071-K0101	D2-3302

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Name	Description	Model Nomher	I/M Number
Field Current Regulator Kit	Provides field economy, as well as pre-weakening of the field using a fixed reference or field weakening for above base speed operation.	9111 ⁴ K. series	D2-3336
1/O Expansion Board	Mounts on the HexPak 3000 chassis to provide additional analog, frequency, and digital I/O capabilities.	914PK0101	D2-3301



^{1/0} Expansion Board Interconnections

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i/O Expansion Board Block Diagram

Reliance Electric



Floid Current Regulator Block Diagram

Features and Benefits



Operator Interface Module (OIM)

Unique Reliance OIM technology makes the HexPak 3000 digital DC drive exceptionally easy to set-up, start-up, operate, and trouble-shoot. The OIM allows you to startup, adjust, monitor, and operate the drive through one simple interface. An ergonomic keypad layout and extensive full-text information presented on a large liquid crystal display make the OIM easy to understand and use.

Similar functions are grouped together on the keypad:

- Control keys (start, stop, run, jog, and forward/reverse) on the lower right
- Set-up keys (help, enter, and cancel) grouped together on the left

To promote ready identification of specific functions, the OIM uses symbols as well as text descriptions and keys that vary in size and shape.

The Quick Start routine makes set-up fast and easy through self-prompting of the drive. The drive can be sourced in minutes, using the drive and motor nameplate information. To promote international use, all information is displayed in easy to understand units such as RPM, anops, volts, eu., and in your choice of five languages: English, French, German, Italian, or Spanish. "Help" in the language of your choice, is always only a keystroke away.

More complex set-up and adjustment information is also easily accessible through logically organized, full-text menus that significantly reduce operator training since there's no need to memorize cryptic names or parameter numbers.

If a fault should occur, the OIM allows chick access to the fault and alarm logs. In addition to logging the time and description of each fault, possible causes are identified. For example, a motor thermostat trip fault might suggest checking for an overloaded motor, inconcet blower rotation, elogged filters, etc. The end result of this sophisticated diagnostic process is reduced downtime.



OIM Integer Value Entry Screen

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Operator Interface Module (OIM)

Extensive Operator Control For Quick and Easy Use

Control keys include:

- Forward/Reverse

- Run
- Stop
 - Auro/Manual
- Control Source Select
- · Quick Start sequence for fast and easy drive set-up
- Large, easy-to-read I CD provides:
 - Built-in digital merering, selectable in units proportional to speed or current such as feet/minute (FPM) or percent load
 - Single keystroke seleers display text language:
 - English Spanish
 - German Italian
 - Brench code
- Multiple parameter values, such as speed and load, can be monitored in a single display
- On-screen menus with non-abbreviated text for adjustments and monitoring
- · Drive starus display indicators include:
- Drive fault Drive running
- Drive alarm Current/torque limit
- Interlocks (OK) Drive ready

Helpful Diagnostics For Reduced Downtime

Diagnostic displays recommending corrective action include:

- AC line voltage high/low alarm
- Motor hrush wear alarm
- Loss of AC line synchronization fault
- · Failed SCR fault
- Motor thermostat fault
- Drive thermostat fault.
- · Drive (inverse time) overlead fault
- Drive IET (instantaneous electronic trip) fault
- Tachomerer loss fault
- · Overspeed fault
- · Field current loss fault
- Network communication fault

The Quick Start function from the Main Menu will be used to start-up and tune the drive. CONTROL SOURCE SELECT must be set to KEYPAD for complete OIM control during the Quick Start procedure.

Quick Start Parameter Modification Sequence

This modification sequence is not intended to provide set-up instructions. Refer to the HexPak Instruction Manual for critical set-up information.

Step Number	Parameter Name	Description
1	TOP SPIED	This is the highest more all running speed of the motor.
2	MOTOR RATED ARM AMUS	This parameter MUST match the rated armature current from the motor nameplata.
3	MOTOR RATED ARM VOLTS	This is the rated annature voltage from the motor numeplate.
4	REVERSE DISABLE	When on, REVERSE DISABLE prevents the drive from operating in reverse.
5	FEEDBACK SILLCI	This selects the type of feedback signal used for the speed/voltage loop.
6	ANLG TACH VOLTS/1000	This is the analog tachometer scaling from the tachemeter nonneplate in volts per 1000 RPM.
7	PULSE TACH PPR	This parameter sets the pulse toeborneter pulses per revolution (PPR) from the pulse achometer nameplate.
8	PULSE TACH	This parameter anables or disables a QUADRATURE tachonicter.
9	ACCELERATION TIME	This is the time it takes to accelerate to TOP SPEED.
10	DECELERATION TIME	This is the time it takes to decelerate from TOP SPEED to zero.
Ú.	MINIMUM SPEED	This parameter selects the drive's minimum operational speed.
12	MAXIMUM SPEED	This parameter is the maximum speed of the drive that can be supported by the application or process.

Step Number	Parameter Name	Description
13	JOG ACCEL/DECEL TIME	This is the time it takes the jog reference to reach TOP SPEED from zero.
14	JOG SPEED	This is the operating speed when the drive is jogging.
15	POSITIVE CURRENT LIM	This selects the maximum percent of motor rated armature current for the forward bridge.
16	NEGATIVE CURRENT LIM	This parameter selects the maximum percent of motor rated annautre current for the reverse bridge.
17	IR COMPENSATION	This parameter selects the armature voltage loss compensation value used when the drive is configured as a voltage regulator.
18	MOTOR HOF FLD AMPS	This parameter sets the mover rated by. Eek amps from the motor in mephate.
19	JUMPER INFORMATION DISPLAY	Displays correct regulator jumper positions.
20	SELFTUNE? NO YES	Allows user to self-true the speed and/or current loops.

Communications and Control Capabilities

DeviceNet

When used in conjunction with the DeviceNet Communication Board, the capabilities of the FlexPak 3000 are extended to include high speed communications over the network that has become the industry standard for open communication. The DeviceNet Communication Board enables drive configuration, control, monitoring, and diagnostics to be accessed from a remote location for optimum versatility.

The DeviceNet protocol is supported by a wide array of industrial equipment manufacturers. Typically, a host logic controller is used as the benual manufacturing or process coaucol center, with nodes or drops used for all devices on the network. Each device is individually addressed and connected to the network by a single cable to reduce the amount of wiring required. Since all devices communicate through this single network, complex operations such as interlocking and sequencing can be easily configured with software from a single tocation.

AutoMax DCS-Net

HexPak 3000 drives are also available with an interface card that allows on AutoMax real-time distributed controller to control their operations. When connected to this network, the drive can receive reference, control, and tuning information and send monitoring and diagnostic information such as speed feedback and drive status through a high-speed network link. All data is pre-defined on the DCS-Ner through fixed memory mapping to minimize programming.

HexPak 3000 DC drives are ideal for use in connected production or processing applications where high-speed communications are required for exacting motor torque and/or speed control.



CS3000 Control and Configuration Software

CS3000 is a Windows based software program that can be used to configure and operate FlexPak 3000 drives from a personal computer (PC). It can:

- Create, store, upload, download, and print drive configurations
- · Control drive (start, stop, forward, reverse, etc.)
- Monitor drive status (faults, alarms, ready, etc.).
- · Drive metering (output speed, output current, etc.)
- Monitor and change drive parameters in English rather than codes
- · Compare drive and PC configurations
- · Read and reset the drive fault/alarm log-



File Management

Opened files can be downloaded to the drive, and all configurations can be saved as files, so it's easy to duplicate configurations for drives on repeat applications.

Drive Configuration

Configurations can be easily downloaded from a PC office environment to a crive on the factory floor.



Drive Control

PC drive control facilitates start-ups, minimizes troubleshooting time, and makes it easy to monitor drive status with a wide selection of controls and an extensive display of drive output conditions.

Drive Status

A pop up drive status window can be viewed whenever a drive connect is performed for convenient monitoring that includes fault/alam status.

Hardware Requirements

- JBM 286/386/486 Penuium or IBM-compatible PC
- · Windows 3.1 or higher
- Hard drive with at least 8 Mbytes of available space
- Minimum of 640 Kbytes of conventional RAM plus
 256 Kbytes of extended RAM
- 1.3.5" floppy disk drive
- Monochrome or color EGA, CGA, or VGA monitor
- RS-232 serial COM port

	Ariue Status	
Nn I	Faults	
Nu	llarins	_
Sto	uped	_
Och.	yn noady	
Ma	nual mude	
Far	ward	_
\$pc	ed Reg.	_
Con	nected	



Proven DC Technology For Reliable, Predictable Performance

The FlexPak 3000 is a full-wave, 6-pulse power converter that includes a digital current minor loop and a digital major loop for armature voltage or speed regulation by tachometer. There is also a third control loop for applications requiring an Outer Control Loop (OCL), e.g., a position regulator.



FlexPak 3000 Drive Control Block Diagram

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FlexPak 3000 Digital Drive Wiring Diagram



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Stand-Alone FlexPak 3000 Configuration



Recommended Applications	Benefits	
 Plastic or food extunders. 	High break-away tonque	
 Misces or agirators 	 Wide speed range 	
 Line shafts 	 Excellent speed regu- 	
 Lead section for multiple 	lation when used with	
drive MG set replacement	digital tachometer	

Master/Follower FlexPak 3000 Configuration



Dancer Position Regulator FlexPak 3000 Configuration



Service Conditions

Caused and Alabarda	to 2200 to at (1000) as security
Stancard Annuale	TO SHIP BET (TOOL INCLUS)
Above 3300 feet	Dente 3% for every
	1000 ft above 3300 ft
	up to 10,000 ft
Standard Ambiert Temperan	nc:
Cabiner Units	0-40° C (32-104° F)
Chassis Units	0-551 C (32-131° F)
AC Line Volrage Variation	+/-10%
AC Line Frequercy	
AC Line Distribution System	i KVA Capacity ^{a:} (1)
Maximum Three Drives/Trai	isformer ⁽¹⁾ (1)
Atmosphere (nor-condensing	g relative humidity)5-95%
Ervironment	. The drive should be located
	in an area that is free of dust,
	dirt, acidie or caustie vapors,
	vibration and shock,
	temperature extremes, and
	electrical or electromagnetic
	noise interference

Efficiency and Power Factor

Displacement Power Factor	
At Maximum Speed	88.0%
Power Module Efficiency:	
100% Speed, 100% load	99.3%
100% Speed, 35% lead	98.5%
25% Speed, 100% load	96.8%
25% Speed, 25% Load	94.0%
Drive Efficiency With Motor (typically).	87.0%

Capacities

Service Factor	1.0
Maximum Load	. 150% for one minute

Conformity to Standards

Ul-fisted	
C-UL Lisred	
IEC Classified	
CE Approved ^{v:}	EN 50081-1
	EN 50082-3
	EN 60204
	EN 1050
	EN 292
	EN 1037

Speed Range

Operating	. 1% to rated speed®
Typical Quoted Regulation	
Continuous (for force-ventilated moto	rs) 100% rated
	torque down to
	5% has spord

Speed Regulation

With Digital Encoder	0.01%
With Aualog Tachometer	1.0%
With Armature Voltage Feechack	2.0%

(1) A only by Flox Pair 3000 digits, 130 drives to power distribution systems, with KVA explority in excess of two times the same last or we rearly resplaces the use of an evolution transformer, or flow reactors of samely impedance.

⁽²⁾ Dependent on top space and dig tollowed insect:
 * SPY = 50:1
 * (D120 = 20:1)
 * (L1094 = 200:1)

(3) Contact Reliance for installation requirements.

FlexPak 3000 Chassis And Conversion Kit Dimensions



FlexPak 3000 Chassis and Conversion Kit Dimensions





Reliance Electric

FlexPak 3000 Minimum Mounting Clearance Distances



FlexPak 3000 Controller Ratings

IIP Hatings	Full Load Hated HMS AC Line Carrent (Amperes)		Full Load Rated RMS DC Armature Current (Amperes)		Rated Held Current (Amperes)			Full Load Hate# HMS AG Line Current (Amperes)		Full Load Rated HMS DC Armature Current (Amperes)		Hated Held Current (Amperes)	
	ZBU VAC	46U VAČ	240 YAC	500 VAG	140 906	300 VDC	Harlings	230 VAC	4KE YAC	240 YAG	DBO VAC	140 000	and MOC
1.5	10	- .	7	ર્ક પ્ર વ શ	10	2.7.5	4G	125	63	146	73	15	15
2	11	1	y.	-	111		SC	154	74	180	86	15	15
3	13	10	12	6	10	10	6C	186	86	215	100	15	15
5	19	12	20	10	-18	10	75	226	118	265	129	20	15
7.5	26	15	29	14	10	111	100	367	143	360	* 87	20	15
10	33	·s	36	19	10	10	*25	370	177	434	207	20	15
15	48	24	55	27	10	10	150	443	213	521	250	20	20
20	83	31	78	35	15	-111	200	592	281	685	339	20	20
25	80	39	93	45	15	10	250	733	351	856	412	20	20
ac	94	45	110	52	15	10	300	859	421	* 000	495	20	20
							400	-	SSC	÷	640	149 A	20
							500	-	689	-	800	-	20
							600	0.50	833	S	980	ે પ્ર વ ્ય	20

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	Non-Regen	erative	Regenerative			
Horsepower	230 VAC	460 VAC	230 VAC	460 VAC		
1.5	1EN2032	-	1FR2032	1 (- 9)		
2	2F N2032	100	2FR2032	1.20		
3	3FN2032	3FN4032	3FR2032	3FR4032		
5	SF N2032	5FN4032	5FR2032	5E14032		
7.5	7EN2032	7HN4032	7FR2032	7EH4032		
10	10FN2032	1CEN4C32	10FI12632	10F 34032		
15	15FN2032	15EN4032	15EE2032	15F 34032		
20	20FN2032	20FN4032	20FH2032	20F-34062		
25	25FN 2032	25FN4C32	25FFI2C32	25F 74032		
30	30FN2332	3GEN4032	30FH2C32	30F 34032		
40	40EN2032	4CEN4032	40FH2032**	40FH4032		
50 50EN2032		SCFN4032	50FFI203213	50FF14032		
50	60EN2032	6CEN4032	60FH2032**	50FF14032		
75	75EN2032/	75EN40623	75FH20327	75FR403211		
100	100FN2031	100FN4032**	* 00F 3203*	100FH4032**		
125	125EN2031	125FN40321	* 25F *203*	125EH4032**		
150	150EN2031	150EN40320	150F-52031	150EH4032**		
200	200FN2031 ⁰¹	200FN4031	200FR2031/1	200FB403*		
230	250EN2031 ^a	250EN4031	250FB2031	25CFB403*		
300	300EN2031%	300EN4081	SDDF B2031/2	300FB403*		
400	575	400FN4031?*	-	400FR4031		
500	-	500EN403121	-	500F14031		
600	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	500EN40312	343	500FH4031		

FlexPak 3000 Controller Selection

· "Contact Hollance for Availability.

Special AC Line Voltage Controllers (380/415 VAC)

Unit Type	inpit Voltage VAC	Full Load Hated HMS AC Line Current (Amperes)	Fell Load Rated DG Armature Current (Amperes)	Hated Field Current (Amperes)	Power Supply Capaeity*1	Min. Saurae KVA	Helerense HP & 480 VAC Input	Nadel Nømber (Non-Hegen)	Mođel Kumber (Kegen)
7A	380/415	10	7	10	5000	4:5	3	7EN3031	7EH3031
28A	350/415	26	29	10	5000	15/18	15	29FN3631	29FR3031
55A	380/415	48	55	10	5000	33/36	30	SSEN3031	55EB3031
110A	380/415	.94	110	15	10000	82/68	60	110EN3031	10FR3031
285A	380/415	226	285	20	25000	145/157	150	265FN3031	265FD3081

¹¹ Mileo appying FlorBok 3056 drives to a power distribution sparem with Kirk sepecity in excess of fee times the administration the estimation of the association transformer of the estimation of the estimated of the estim

²¹ Maximum permissible evallable grounel/ical PMS (aut cover)

Worldwide Training, Service, And Support



Rockwell Automation Global Technical Services provides comprehensivetraining for PlexPak 3000 and all Reliance products. For information on class availability and pricing, call 1-800-RELIANCE (1-800-735-4262).

Performance Driven

To find out how Reliance can help you meet the productivity and performance demands of your application, call or EAX today.

> Toll Free 1-800-245-4501 FAX 1-216-266-7120



To obtain the latest information about Reliance products, services, career opportunities, and contacts worldwide, visit us on fire at

http://www.reliance.com

IMPORTANT NOTICE

This binchure is nor intended to provide operating instructions. Appropriate Recoverlin terrational Corporation distriction manuals and precations attached to append us should be read corefully prior to installation, operation, and/or maintenance of equipment.

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