Legacy
Reliance Drives

CA701
Effective Date:
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BALDOR®

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For applications from 0.25 to 5 HP, the MD60 is a simple AC Microdrive that can be panel mounted as well as wall or machine mounted.

Reliance Electric's MD60 AC Drive is ready to operate out-of-the-box! The drive includes a built-in LED display and operator controls, including a single turn potentiometer for speed reference. Built-in dynamic braking circuitry only requires the addition of a braking resistor to meet higher performance application needs to handle fast accel & decel rates.

PRICE, PRACTICALITY & PERFORMANCE

This is the criteria that drove the development of the MD60 AC Drive. This product offering is targeted at the fastest changing and growing segment of the variable speed drive market - the market from fractional to five horsepower.

CONFIGURATION & DISPLAYS

The parameters of the MD60 are segregated into groups, P-Parameters which reflect the basic values required for operation, and A-Parameters which are associated with more advanced use. This simplifies setup and minimizes customer exposure to unwanted parameters during startup.

During use, the operator can monitor as many as 22 D-Parameters to display values such as Output Frequency, Output Current, Output Voltage, as well as the status of specific I/O points and the firmware version level.

Fault conditions are identified by alpha-numeric codes such as F2. Each MD60 AC Drive has a label adhered to its left side providing a description of the Fault Codes, as well as the most common Display and Basic Configuration Parameters to help in setup and during use.

APPLICATION CONSIDERATIONS

The MD60 is a Volts per Hertz controller which is suitable for general purpose use in a multitude of applications. Listed below are some of the Advanced Parameter functions which are useful when configuring the MD60.

VARIABLE TORQUE USE

Centrifugal fans and pumps are well suited for the MD60 which will provide good speed control beyond the 10:1 speed range normally required by these applications (i.e. 180 to 1800 RPM). Some the advanced parameter functions that can be considered during setup and operation include:

- Output Carrier Frequency selection which is adjustable from 2 to 16 kHz, to achieve low acoustic motor operation.
- Reverse Disable since fans and pumps are uni-directional and can become damaged if inadvertently operated in reverse.
- Auto-Restart with up to 9 attempts, along with a settable delay time between attempts, since many variable torque applications operate unmanned in remote areas.

Also, with 2 Analog Inputs standard, an isolated 0-10 VDC and a 4-20 mA input, the MD60 can be easily used in any automated process control system.

CONSTANT TORQUE USE

For simple conveyors, mixers, agitators, and machine applications, the MD60 provides a cost effective solution. These applications will benefit from the 200% Over Current (for 3 seconds) capacity of the MD60 Microdrive. Some additional advanced parameter features include:

- V/Hz Operation, Speed Regulation +/- 2% of motor base speed 40:1 Operating Speed Range
- Start Boost (Voltage Boost) improves breakaway torque at the low end of the drive's frequency output.
- S-Curve Acceleration may enhance performance and control of high inertia loads by tapering changes in speed rates during initial starts, as well as when approaching desired speed settings.
- Dynamic Braking provides the ability to dissipate excessive DC Bus Voltage and thereby avoid High Bus Fault conditions normally experienced during extremely fast acceleration rates as well as in fast deceleration rates where the inertia of the load attempts to overhaul the electric motor.

GLOBAL DESIGN

MD60 is a true Global Design which meets the standards for North and South America, Europe, Australia and Asia. One product for the World Market.

Drive Ratings

Drive Ratings					
Input Voltage	kW	HP	Output Current	Model Number	Frame Size
230V, 50/60 Hz 1-Phase With Integral EMC Filter	0.2	0.25	1.5A	**6MDAN-1P5111**	A
	0.37	0.5	2.3A	**6MDAN-2P3111**	A
	1.5	2	8.0A	**6MDAN-8P0111**	B
230V, 50/60 Hz 1-Phase No Filter	2.2	3	12.0A	**6MDAN-012111**	C
	0.2	0.25	1.5A	**6MDAN-1P5101**	A
	0.37	0.5	2.3A	**6MDAN-2P3101**	A
230V, 50/60 Hz 3-Phase	2.2	3	12.0A	**6MDAN-012101**	C
	0.2	0.25	1.5A	**6MDBN-1P5101**	A

Drive Parameters: Basic Group(1)

No.	Parameter Name	Default Value
P031	Motor NP Volts	Varies
P032	Motor NP Hertz	60 Hz
P033	Motor OL Current	Varies
P034	Minimum Frequency	0 Hz
P035	Maximum Frequency	60 Hz
P036	Start Source	0 = Keypad
P037	Stop Mode	1 = Coast, Clear Fault
P038	Speed Reference	0 = Drive Potentiometer
P039	Accel Time 1	5.0 sec.
P040	Decel Time 1	5.0 sec.
P041	Reset to Defaults	0 = Idle State
P043	Motor OL Ret	0 = Disabled

(1) The 12 parameters in this group represent the minimum requirement for basic operation.

Drive Parameters: Advanced Group(2)

No.	Parameter Name	Default Value
A051	Digital In1 Select	4 = Preset Frequencies
A052	Digital In2 Select	4 = Preset Frequencies
A055	Relay Output Select	0 = Ready (Not Faulted)
A056	Relay Output Level	0
A067	Accel Time 2	10.0 sec.
A068	Decel Time 2	10.0 sec.
A069	Internal Frequency	0.0 Hz
A070	Preset Frequency 0	0.0 Hz
A071	Preset Frequency 1	0.0 Hz
A072	Preset Frequency 2	0.0 Hz
A073	Preset Frequency 3	0.0 Hz
A078	Jog Frequency	10.0 Hz
A079	Jog Accel/Decel	10.0 sec.
A080	DC Brake Time	0.0 sec.
A081	DC Brake Level	Amps x 0.5
A082	DB Resistor Select	0 = Disabled
A083	S Curve%	0% (Disabled)
A084	Start Boost	8 = 5.0
A088	Maximum Voltage	Rated Volts
A089	Current Limit	Amps x 1.8
A090	Motor OL Select	0 = No Derate
A091	PWM Frequency	4.0 kHz
A092	Auto Restart Tries	0
A093	Auto Restart Delay	1.0 sec.
A094	Start At Power Up	0 = Disabled
A095	Reverse Disable	0 = Reverse Enabled
A096	Flying Start Enable	0 = Disabled
A097	Compensation	1 = Electrical
A098	SW Current Trip	0.0 (Disabled)
A099	Process Factor (Display Scaling)	30
A100	Fault Clear	0 = Ready
A101	Program Lock	0 = Unlocked
A102	Testpoint Select	0
A103	Comm Data Rate	4 = 19.2 K
A104	Comm Node Address	1
A105	Comm Loss Action	0 = Fault
A106	Comm Loss Time	5
A107	Comm Format	0 = RTU 8-N-1
A110	0-10 V Analog Input Low	0.00%
A111	0-10 V Analog Input High	100.00%
A112	4-20 mA Analog Input Low	0.00%
A113	4-20 mA Analog Input High	100.00%
A114	Slip Compensation	2.0 Hz
A115	Process Time Lo	0
A116	Process Time Hi	0

(2) Parameters within this group are accessed without any password required. The parameters are presented this way for identification purposes only, to help simplify setup.

Display Parameters

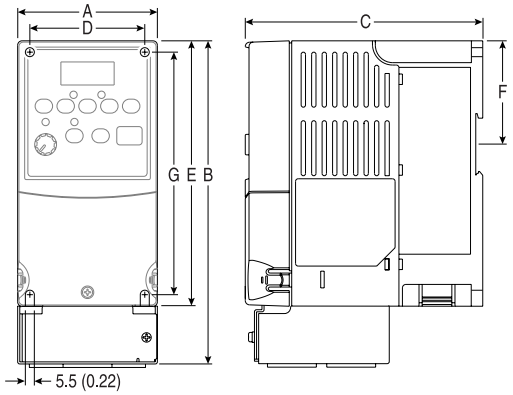
d001	Output Frequency
d002	Command Frequency
d003	Output Current
d004	Output Voltage
d005	DC Bus Voltage
d006	Drive Status
d007	Fault 1 Code
d008	Fault 2 Code
d009	Fault 3 Code
d010	Process Display

d012	Control Source
d013	Control Input Status
d014	Digital Input Status
d015	Comm Status
d016	Control SW Version
d017	Drive Type
d018	Elapsed Run Time
d019	Testpoint Data
d020	0-10 V Analog Input
d021	4-20 mA Analog Input
d024	Drive Temp.

Mounting Dimensions

Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds). Front View

Front View



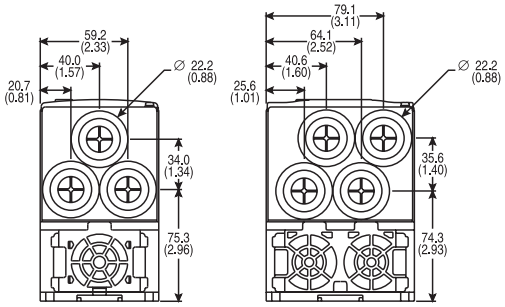
Front Side

Frame	A	B(1)	C	D	E(2)	F	G	Weight
A	80	185	136	67	152	59.3	140	1.4
	(3.15)	(7.28)	(5.35)	(2.64)	(5.98)	(2.33)	(5.51)	(3.1)
B	100	213	136	87	180	87.4	168	2.2
	(3.94)	(8.39)	(5.35)	(3.43)	(7.09)	(3.44)	(6.61)	(4.9)

(1) Height dimension includes NEMA 1/IP30 kit

(2) Height dimension for standard IP20 unit, without NEMA 1/IP30 kit

Bottom View with NEMA 1/IP30 Kit



Frame A Frame B

6MD V N -1P5 1 1 1

6MD = MD Drive

A = 1-Phase, 240 VAC
V = 1-Phase, 115 VAC
B = 3-Phase, 230 VAC
D = 3-Phase, 460 VAC

N = IP20 (Open)

@115V/230 VAC
1P5 = 1.5 A, 0.25 HP
2P3 = 2.3 A, 0.5 HP
4P5 = 4.5 A, 1 HP
6P0 = 6.0 A, 1.5 HP
8P0 = 8 A, 2 HP
012 = 12 A, 3 HP
017 = 17.5 A, 5 HP

@460 VAC
1P4 = 1.4 A, 0.5 HP
2P3 = 2.3 A, 1 HP
4P0 = 4 A, 2 HP
6P0 = 6 A, 3 HP
8P7 = 8.7 A, 5 HP

Reserved

0 = Not Filtered
1 = Internal Filter

1 = MD60

Instruction Manuals

MD60 User Manual:	D2-3499
MD60 Data Sheet	RAPS-1520

Service Conditions

Altitude	1,000 m (3,300 ft.) Maximum
Ambient Temperature:	IP20: -10°C (14°F) to 50°C (122°F)
	NEMA 1/IP30: -10°C (14°F) to 40°C (104°F)
Storage Temperature:	-40°C (-40°F) to 85°C (185°F)
Relative Humidity:	0% to 95%, non-condensing
Speed Regulation:	± 2% of base speed across a 40:1 speed range
Intermittent Overload:	150% overload capacity for up to 1 minute
	200% overload capacity for up to 3 seconds

MD60 Kit Instruction Manuals

NEMA 1 Kit	D2-3503
Input EMI Filters Installation Instructions	D2-3504
MDCOMM-232 Serial Converter Module	D2-3502
V*S Utilities Software	D2-3488
OIM User Guide	D2-3534
OIM Quick Reference	D2-3508
Remote Large OIM Installation Instructions	D2-3509
Remote Small OIM Installation Instructions	D2-3526
Door Mount NEMA 1 OIM Bezel Kit	D2-3517
Cable Accessory Kits	RA-IN003A-EN-P
DB Resistor Kits	RA-IN004A-EN-P

PRICING

Single-phase 115 VAC and 208 - 230 VAC, Three-phase 208 - 230 VAC, 380 - 460 VAC Product Features

- IP20 enclosure as standard, modifiable to NEMA 1 (IP30).
- Integral keypad and display including single turn speed potentiometer.
- Power ratings up to 5 HP with both single-phase and three-phase input ratings.
- Built-in braking transistor allows connection to remote braking resistor for enhanced performance needs.

200 - 240 V, 50/60 Hz, 1-Phase Input (230 V, 3-Phase Output), With Integral EMC Filter

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDAN-1P5111	A	0.25	1.5A	25	**$345**
6MDAN-2P3111	A	0.5	2.3A	30	**373**
6MDAN-8P0111	B	2	8.0A	80	**593**
6MDAN-012111	C	3	12.0A	110	**707**

200 - 240 V, 50/60 Hz, 1-Phase Input (230 V, 3-Phase Output)

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDAN-1P5101	A	0.25	1.5A	25	**$311**
6MDAN-2P3101	A	0.5	2.3A	30	**339**
6MDAN-012101	C	3	12.0A	110	**667**

200 - 240 V, 50/60 Hz, 3-Phase (230 V, 3-Phase Output)

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDBN-1P5101	A	0.25	1.5A	25	**$311**

DISCOUNT VS-1AC

MD60 ACCESSORIES

NEMA 1/IP30 Kit

The MD60 AC drive has an enclosure rating of IP20, but includes provisions to mount a NEMA 1/IP30 kit. This kit provides a metal conduit plate for attaching user conduit, as well as a plastic top cover for the drive.

MD60 NEMA 1/IP30 Kits		
Description	**Model Number**	**List**
MD60 IP30/NEMA 1 Kit, Frame B	**6MD-NM1B**	**$15**

EMC Compliance Filters

The MD60 drive has been designed to conform to global industry standards for EMC compliance, including Europe and Australia. To meet the conducted and radiated emission standards of EN 61800-3, the filters listed below must be used, depending on the motor cable length. Reference the MD60 User Manual (D2-3499) for details on the filters and their installation. Also be sure to follow recommended wiring practices for drives and motors as identified in the MD60 User Manual.

MD60 EMC Filters		
Description	**Model Number**	**List**
External EMC Filter for Short Cable Distances		
MD60 EMC filter (5 meter), 1/2-2 HP, 230 V, 3 ph	**6MDF-9P5AS**	**$57**
External EMC Filter for Long Cable Distances		
MD60 EMC filter (100 meter), 1/4-2 HP 230 V, 3 ph	**6MDF-9P5AL**	**$90**
MD60 EMC filter (100 meter) 3-5 HP 230 V, 3 ph	**6MDF-021BL**	**113**
MD60 EMC filter (100 meter) 1/2-2 HP 460 V, 3 ph	**6MDF-5P7AL**	**85**

NOTE: The 230 V, single-phase input drives are available with a factory installed filter option, and may not need to have the external filters listed above installed to meet the required emission standards. Contact Reliance or reference the User Manual (D2-3499) for details.

MD60/MD65 NEMA 1 Bezel Kit

The NEMA 1 Bezel Kit provides a convenient means for panel or door mounting of MD1CC CopyCat Keypad. The kit includes a one meter RJ45 to RJ45 cable.

Model Number: MDBZL-N1 .....$68

DB Resistor Kits

The MD60 drives include power terminals for connecting low power dynamic braking resistors. These resistors are not enclosed and must be separately mounted.

For enclosed braking resistor options, reference the GV3000SE section, page D-66. Select resistors from the chart on this page based on the power rating of the MD60. Also, refer to the MD60 User Manual for connections and parameter setup when using braking resistors.

Drive Rating (HP)	Nominal Value (Ohm)	Resistor Rating (W)	Model Number (1)	List Price
230 V DB Resistor				
1	91	500	**AK-R2-091P500**	**$203**
2	91	500		
3	47	500	**AK-R2-047P500**	**203**
5	47	500		

(1) Resistors listed in this table are rated for a 5% duty cycle

V*S Utilities Configuration Software

The MD60 drive can be configured using the V*S Utilities software. The V*S Utilities software kit includes the standard Reliance PC software. All necessary cables and the serial converter are included in the MD60 Serial Converter Kit. Reference the D2-3502 Serial Converter Module Instruction Manual for details.

V*S Utilities Software and Cables		
Description	**Model Number**	**List**
VS* Utilities software CD	**RECOMM-VSUTIL**	**$154**
RJ45 to RJ45 2 meter male to male cable (MD60/ MD65 to converter)	**MDCBL-RJ45**	**15**
Serial converter to computer cable	**RECBL-SFC**	**57**

MD60/MD65 Cable Accessories

The MD60 drive provides an RJ45 port to allow the connection of a single peripheral device. The RJ45 Splitter Cable can be used to connect a second MDI peripheral device to the drive.

MD60/MD65 Cable Accessories		
Description	**Model Number**	**List**
RJ45 to RJ5 2 meter male to male Cable (MD60, MD65 converter)	**MDCBL-RJ45**	**$15**
OIM Cable (2.9 meter OIM to RJ45)	**MDCBL-CC3**	**34**
MDI Splitter Cable	**AK-U0-RJ45-SC1**	**17**

DISCOUNT VS-1AC

For applications from 0.5 to 15 HP, the MD65 is a simple Sensorless Vector AC Microdrive that can be panel mounted as well as wall or machine mounted.

Following on the success of the MD60, the MD65 continues to establish the reliability and ease of use expected on the Reliance Electric brand drives.

PERFORMANCE FEATURES

- Adjustable Current Limit
  -10% to 150%
- Operator Interface Module
  -Integral Drive Mounted
- Display Lines
  -4-Character LED Display
- Programmable Preset Speeds
  -Eight
- Analog Outputs
  - One (0-10 VDC or 4 - 20mA)
- Auto Restart
  -Yes
- Frequency Avoidance
  -One Band
- Fault Memory
  -Three Deep
- Digital Inputs
  -Four Logic (Configurable)

DRIVE SPECIFICATIONS

- Analog Inputs: Two Total
  - 0-10 VDC: One
  - 4-20 mA: One
- Digital Outputs
  -Two Opto-coupled (Configurable)
- Relay Outputs
  - One Form C (Configurable)
- Meter Outputs
  - 0-10 VDC: One Analog Usable for Meter (Configurable)
- Maximum Load:
  - 15 HP @ 600 VAC
- Overload Capacity
  - Drive Output 150% for One Minute, 200% for Three Seconds
- Frequency Accuracy
  - Digital Keypad: 0.5% of Set Output
  - Digital Keypad: ±0.5% of Maximum Output Frequency
- Input Voltage Tolerance
  - Typically ±10%
- Rated Input Frequency
  - 50/60 Hz (47-63 Hz Range)
- Carrier Frequency:
  - 2-16 kHz (4 kHz default)
- Operating Temperature:
  - –10° to 50°C (IP20)
- Snubber (Dynamic Braking):
  -Built-in Transistor
- Dynamic Braking External:
  -Resistor Terminals or DC Bus for Snubber Kit
- DC Braking:
  -Included
- Volts/Hz
  -Custom V/Hz Curve
  - Speed Regulation: ±2% of motor base speed
  -40:1 Operating Speed Range
- Sensorless Vector:
  -With Autotune
  - Speed Regulation: ±1% of motor base speed
  -60:1 Operating Speed Range
- Frequency Control Range:
  - 0-400 Hz
- Accel/Decel:
  -Independently Adjustable: Two
- Time Range:
  - 0.1 to 600 Seconds
- S Curve Acceleration
  -Yes
- Din Rail Mount
  -Yes on B Frame
- Integral Speed Pot
  -Yes
- Sink/Source Inputs
  - Selectable, 24 VDC Logic
- Electronic Overload Trip
  -Electronic Motor Overload Class 10 Protection
- Communication Option Card
  - DeviceNet
  - EtherNet
  - Profibus
- Serial Communications
  - RS-485 Included for Optional PC Interface Program
- PID Control
  -Included

PROTECTIVE FEATURES

- Power Loss Rid Through
  - 500 Milliseconds
- Under Voltage
  -Level Depends on Voltage Class (240, 480, or 575)
- Ground Fault
  -Phase-to-Ground on Drive Output
- Output Short Circuit
  -Phase-to-Phase on Drive Output
- Over Temperature -Heatsink Monitor
- Output Voltage
  -DC Bus
- Drive Overload
  - Exceed Drive rating of 150% for One Minute
- Over Current
  - Hardware Overcurrent Circuit, Software Overcurrent Fault

AGENCY CERTIFICATIONS

- Listings
  - UL, cUL, CE, C-Tick

DRIVE RATINGS

Drive Ratings						
Input Voltage	**kW**	**HP**	**Output Current**		**Model Number**	**Frame**
Size120V, 50/60 Hz 1-Phase	0.4	0.5	2.3A	*	**6MDVN-2P3102**	B
240V, 50/60 Hz 1-Phase With Integral EMC Filter	0.4	0.5	2.3A	*	**6MDAN-2P3112**	B
240V, 50/60 Hz 1-Phase No Filter	0.4	0.5	2.3A	*	**6MDAN-2P3102**	B
	0.75	1	5.0A	*	**6MDAN-5P0102**	B
240V, 50/60 Hz 3-Phase No Filter	0.4	0.5	2.3A	*	**6MDBN-2P3102**	B
	1.5	2	8.0A	*	**6MDBN-8P0102**	B
	3.7	5	17.5A	*	**6MDBN-017102**	B
	5.5	7.5	24.0A	*	**6MDBN-024102**	C
480V, 50/60 Hz 3-Phase No Filter	0.75	1	2.3A	*	**6MDDN-2P3102**	B
	1.5	2	4.0A	*	**6MDDN-4P0102**	B
	5.5	7.5	12.0A	*	**6MDDN-012102**	C
600V, 50/60 Hz 3-Phase No Filter	2.2	3	4.2A	*	**6MDEN-4P2102**	B
	7.5	10	12.2A	*	**6MDEN-012102**	C
	11.2	15	19.0A	*	**6MDEN-019102**	C

Instruction Manual

MD65 User Manual:	D2-3519
MD65 Data Sheet:	RAPS-960
MD65 Brochure:	RAPS-959

Service Conditions

Altitude: 1,000 m (3,300 ft.) Maximum

Ambient Temperature: IP20: -10°C (14°F) to 50°C (122°F) NEMA 1/
IP30: -10°C (14°F) to 40°C (104°F)

Storage Temperature: -40°C (-40°F) to 85°C (185°F)

Relative Humidity: 0% to 95%, non-condensing

Speed Regulation:
V/Hz ± 2% of base speed across a 40:1 speed range
SE ± 1% of base speed across a 60:1 speed range

Intermittent Overload: 150% overload capacity for up to 1 minute
200% overload capacity for up to 3 seconds

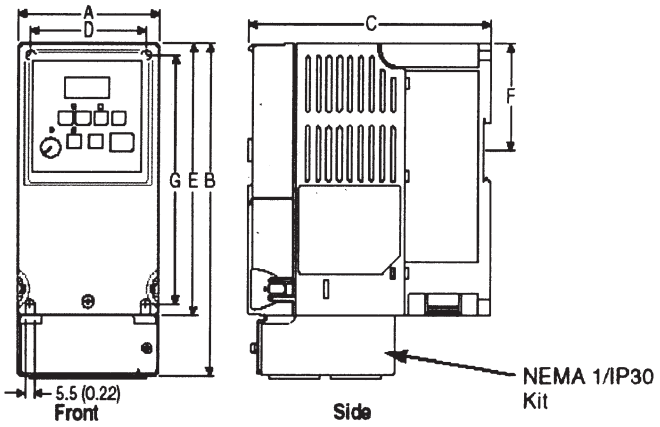
MD65 Kit Instruction Manuals

Nema 1 Kit	D2-3503
Input EMI Filters Installation Instructions	D2-3504
MDCOMM-232 Serial Converter Module	D2-3502
V*S Utilities Software	D2-3488
OIM User Guide	D2-3534
OIM Quick Reference	D2-3508
Remote Large OIM Installation Instructions	D2-3509
Remote Small OIM Installation Instructions	D2-3526
Door Mount NEMA 1 OIM Bezel Kit	D2-3517
Cable Accessory Kits	RA-IN003A-EN-P
DB Resistor Kits	RA-IN004A-EN-P
Communication Cover Kit	D2-3523
NEMA 1 Kit w/Comm Card	D2-3527
DeviceNet Comm Card	D2-3520
EtherNet Comm Card	D2-3529
Profibus Comm Card	D2-3530

MOUNTING DIMENSIONS

Dimensions are in millimeters and (inches). Weights are in kilograms and (pounds).

Front View



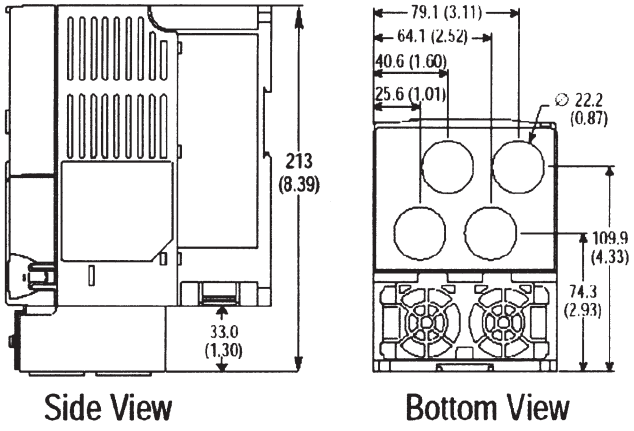
Frame	A	B (1)	C	D	E (2)	F	G	Weight
B	100 (3.94)	213 (8.39)	136 (5.35)	87 (3.43)	180 (7.09)	87.4 (3.44)	168 (6.61)	2.2 (4.9)
C	130 (5.1)	320 (12.6)	180 (7.1)	116 (4.57)	260 (10.2)	(3)	246 (9.7)	4.3 (9.5)

(1) Height Dimension includes NEMA 1/IP30 kit

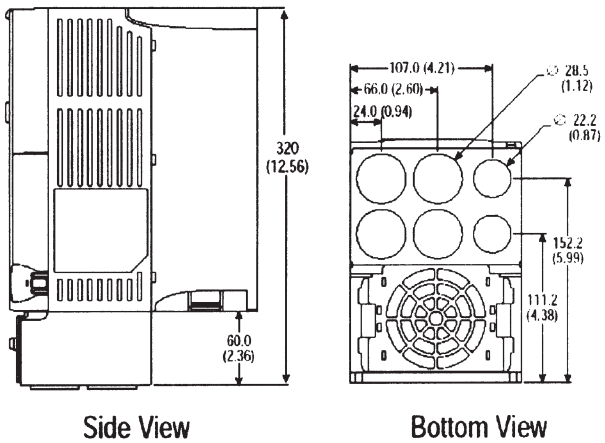
(2) Height Dimension for standard IP20 unit, without NEMA 1/IP30 kit

(3) C-Frame Enclosure does not support a din rail mounting and the "F" dimension does not apply

IP30NEMA 1/UL Type 1 Option Kit



FRAME B



FRAME C

6MD V N - 2P3 1 1 2

6MD = MD Drive

A = 1-Phase, 240 VAC
V = 1-Phase, 115 VAC
B = 3-Phase, 230 VAC
D = 3-Phase, 460 VAC
E = 3-Phase, 575 VAC

N = IP20 (Open)

1 = MD60
2 = MD65

0 = No Filter
1 = Internal Filter

Reserved

@115V/230 VAC
2P3 = 2.3A, 0.5 HP
5P0 = 5.0A, 1 HP
6P0 = 6.0 A, 1.5 HP
8P0 = 8 A, 2 HP
012 = 12 A, 3 HP
017 = 17.5 A, 5 HP
024 = 24 A, 7.5 HP
033 - 33 A, 10 HP

@460 VAC
1P4 = 1.4 A, 0.5 HP
2P3 = 2.3 A, 1 HP
4P0 = 4 A, 2 HP
6P0 = 6 A, 3 HP
010 = 10A, 5 HP
012 = 12 A, 7.5 HP
017 = 17 A, 10 HP
024 = 24 A, 15 HP

@575 VAC
1P7 = 1.7 A, 1 HP
3P0 = 3.0 A, 2 HP
4P2 = 4.2 A, 3 HP
6P6 = 6.6 A, 5 HP
9P9 = 9.9 A, 7.5 HP
012 = 12 A, 10 HP
019 = 19 A, 15 HP

PRICING

Single-phase 115 VAC and 208 - 230 VAC, Three-phase 208 - 230 VAC, 380 - 460 VAC and 600 VAC

Product Features

- IP20 enclosure as standard, modifiable to NEMA 1 (IP30)
- Integral keypad and display including single turn speed potentiometer.Power ratings up to 15 HP with both single-phase and three-phase input ratings
- Built-in braking transistor allows connection to remote braking resistor for enhanced performance needs

100 - 115 V, 50/60 Hz, 1 Phase Input (230 V, 3-Phase Output)

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDVN-2P3102	B	0.5	2.3A	30	**$530**

200 - 240 V, 50/60 Hz, 1-Phase Input (230 V, 3-Phase Output), With Integral EMC Filter

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDAN-2P3112	B	0.5	2.3A	30	**$435**

200 - 230 V, 50/60 Hz, 1-Phase Input (230 V, 3-Phase Output)

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDAN-2P3102	B	0.5	2.3A	30	**$417**
6MDAN-5P0102	B	1	4.5A	55	**491**

200 - 230 V, 50/60 Hz, 3-Phase

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDBN-2P3102	B	0.5	2.3A	30	**$543**
6MDBN-8P0102	B	2	8.0A	80	**774**
6MDBN-017102	B	5	17.5A	165	**1,056**
6MDBN-024102	C	7.5	24.0A	226	**1,554**

380 - 460 V, 50/60 Hz, 3-Phase

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDDN-2P3102	B	1	2.3A	40	**$700**
6MDDN-4P0102	B	2	4.0A	60	**809**
6MDDN-012102	C	7.5	12.0A	160	**1,554**

600 V, 50/60 Hz, 3-Phase

Model Number	Frame Size	HP	Output Current	Watt Loss	List
6MDEN-4P2102	B	3	4.2A	90	**$1,052**
6MDEN-012102	C	10	12.2A	200	**1,837**
6MDEN-019102	C	15	19.0A	285	**2,261**

DISCOUNT VS-1AC

MD65 ACCESSORIES

NEMA 1/IP30 Kit

The MD65 AC drive has an enclosure rating of IP20, but includes provisions to mount a NEMA 1/IP30 kit. This kit provides a metal conduit plate for attaching user conduit, as well as a plastic top cover for the drive.

MD65 NEMA 1/IP30 Kits		
Description	**Model Number**	**List**
MD65 IP30/NEMA 1 Kit, Frame B	**6MD-NM1B**	**$15**
MD65 IP30/NEMA 1 Kit, Frame B (1)	**6MD-NM1COMB**	**28**
MD65 IP30/NEMA 1 Kit, Frame C (1)	**6MD-NM1COMC**	**28**

(1) These NEMA 1 Kits are for use when the 6MD-COMMCVRB or 6MD-COMMCVRC Communication Cover Kits are installed on the MD65 drive.

EMC Compliance Filters

The MD65 drive has been designed to conform to global industry standards for EMC compliance, including Europe and Australia. To meet the conducted and radiated emission standards of EN 61800-3, the filters listed below must be used, depending on the motor cable length. Reference the MD65 User Manual (D2-3519) for details on the filters and their installation. Also be sure to follow recommended wiring practices for drives and motors as identified in the MD65 User Manual.

MD65 EMC Filters		
Description	**Model Number**	**List**
External EMC Filter for Short Cable Distances		
MD65 EMC filter (5 meter), 7.5-10 HP, 230 V, 3 ph	**6MDF-034CS**	**$113**
MD65 EMC filter (5 meter), 7.5-10 HP, 460 V, 3 ph	**6MDF-018CS**	**102**
External EMC Filter for Long Cable Distances		
MD65 EMC filter (100 meter), 3 HP 230 V, 1 ph	**6MDF-025CL**	**$113**
MD65 EMC filter (100 meter), 1/2-5 HP 230 V, 3 ph	**6MDF-021BL**	**113**
MD65 EMC filter (100 meter) 7.5-10 HP 230 V, 3 ph	**6MDF-034CL**	**147**

Note: The 230 V, single-phase input drives are available with a factory installed filter option and may not need to have the external filters listed above installed to meet the required emission standards. Contact Reliance or reference the User Manual (D2-3519) for details.

V*S Utilities Configuration Software

The MD65 drive can be configured using the V*S Utilities software. The V*S Utilities software kit includes the standard Reliance PC software. All necessary cables and the serial converter are included in the MD65 Serial Converter Kit. Reference the D2-3502 Serial Converter Module Instruction Manual for details.

V*S Utilities Software and Cables		
Description	**Model Number**	**List**
VS* Utilities software CD	**RECOMM-VSUTIL**	**$154**
RJ45 to RJ45 2 meter male to male cable (MD60/ MD65 to converter)	**MDCBL-RJ45**	**15**
Serial converter to computer cable	**RECBL-SFC**	**57**

DB Resistor Kits

The MD65 drives include power terminals for connecting low power dynamic braking resistors. These resistors are not enclosed and must be separately mounted.

For enclosed braking resistor options, reference the GV3000SE section, page D-66. Select resistors from the chart on this page based on the power rating of the MD65. Also, refer to the MD65 User Manual for connections and parameter setup when using braking resistors.

Drive Rating (HP)	Nominal Value (Ohm)	Resistor Rating (W)	Model Number (1)	List Price
230 V DB Resistor				
1	91	500	**AK-R2-091P500**	**$203**
2	91	500		
3	47	500	**AK-R2-047P500**	**203**
5	47	500		
7.5	30	1200	**AK-R2-030P1K2**	**271**
10	30	1200		

(1) Resistors listed in this table are rated for a 5% duty cycle

(2) Requires two AK-R2-120P1K2 Resistors wired in parallel

MD60/MD65 Cable Accessories

The MD65 drive provides an RJ45 port to allow the connection of a single peripheral device. The RJ45 Splitter Cable can be used to connect a second MDI peripheral device to the drive.

MD60/MD65 Cable Accessories		
Description	**Model Number**	**List**
RJ45 to RJ5 2 meter male to male Cable (MD60, MD65 converter)	**MDCBL-RJ45**	**$15**
OIM Cable (2.9 meter OIM to RJ45)	**MDCBL-CC3**	**34**
MDI Splitter Cable	**AK-U0-RJ45-SC1**	**17**

MD60/MD65 NEMA 1 Bezel Kit

The NEMA 1 Bezel Kit provides a convenient means for panel or door mounting of MD1CC CopyCat Keypad. The kit includes a one meter RJ45 to RJ45 cable.

Model Number: MDBZL-N1.....$68

DISCOUNT VS-1AC

Communication Cards

DeviceNet, EtherNet and Profibus Cards

The Network communication cards mount internal to the MD65 drive and receives power from the drive and network. Switches or parameters allow node and data rate configuration. Explicit UCMM, Polled Cyclic and Change of State messages are supported. Specify cover kit according to the drive frame size.

MD65 Communication Cards & Cover Kits

Description	Model Number	List
MD65 DeviceNet Communication Card	**MDCOMM-DNET**	**$317**
MD65 Profibus Communication Card	**MDCOMM-PBUS**	**424**
B Frame Communication Cover Kit (1)	**6MD-COMMCVRB**	**23**
C Frame Communication Cover Kit (1)	**6MD-COMMCVRC**	**23**

(1) The 6MD-COMMCVRB and 6MD-COMMCVRC Communication Cover Kits are required for installation of the Communication Cards in the MD65 drive.

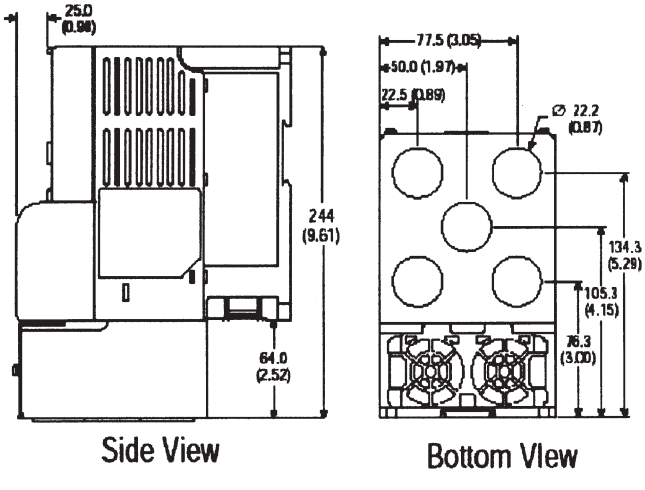
Communication Card Mounting Dimensions
Drive Dimensions - NEMA 1/IP30 Kit with Communication Option.
Dimensions shown in mm (in).

Multi-Drop Network Capabillity

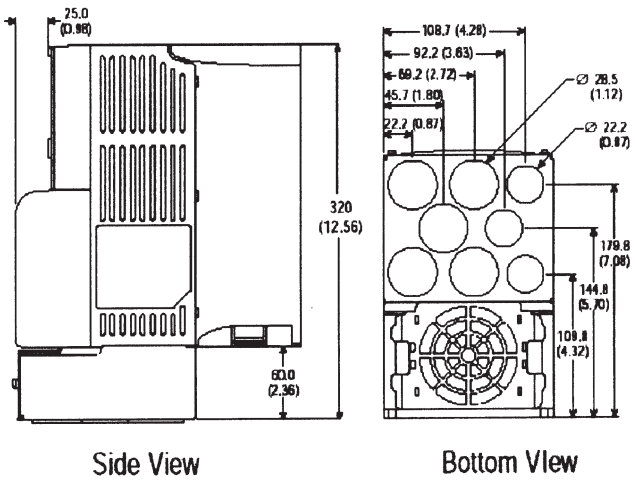
Connect up to five (5) MD65 or MD60 drives with one Network DeviceNet or EtherNet Card. Provides the lowest cost Industry Solution for DeviceNet or EtherNet Networks.

Requires one MD65 and DeviceNet or EtherNet Card set for Multi-Drop Configuration. MD60 or MD65 Drives are linked to Multi-Drop MD65 Drive using standard RS485 Serial Modbus Commuication Port built into the drive.

Typical Network Connection Diagram



Frame B



Frame C

DISCOUNT VS-1AC

MD60 & 65 Dynamic Brake Resistor Specifications

The following dynamic brake resistors for use with the MD60 & MD65 product lines are designed for 100% braking torque at a 5% duty cycle with a maximum on-time of 10 seconds.Resistors come standard with flying leads for ease of wiring while maintaining IP20 (electrical finger-safe) requirements.

Connection points are provided for user supplied thermostat over temperature protection.

Application Cross Reference

Drive and Motor Size kW (HP)	Minimum Resistance (See Note 4)		Part Number	Resistance Ohms +/-5%	Continuous Power kW	Max Energy kJ	Max Braking Torque % of Motor	Application Type 1 Braking Torque % of Motor	Duty Cycle %	Application Type 2 Braking Torque % of Motor	Duty Cycle %
	MD60	MD65									
100-120 Volt AC Input Drives											
0.75 (1)	60	48	**AK-R2-091P500**	91	0.00	17	218%	100%	23%	150%	31%
1.1 (1.5)	60	48	**AK-R2-091P500**	91	0.00	17	164%	100%	16%	148%	11%
200-240 Volt AC Input Drives											
0.37 (0.5)	60	48	**AK-R2-091P500**	91	0.00	17	293%	100%	46%	150%	31%
0.75 (1)	60	48	**AK-R2-091P500**	91	0.00	17	218%	100%	23%	150%	15%
1.5 (2)	60	48	**AK-R2-091P500**	91	0.00	17	109%	100%	11%	109%	11%
2.2 (3)	48	32	**AK-R2-047P500**	47	0.16	33	144%	100%	15%	144%	11%
4 (5)	32	19	**AK-R2-047P500**	47	0.16	33	79%	79%	11%	N/A	N/A
5.5 (7.5)		13	**AK-R2-030P1K2**	30	0.26	52	90%	90%	10%	N/A	N/A
7.5 (10)		10	**AK-R2-030P1K2**	30	0.26	52	66%	66%	10%	N/A	N/A

Note 1: Always check resistor ohms against minimum resistance for drive being used.

Note 2: Duty cycle listed is based on full speed to zero speed deceleration.

For constant regen at full speed, duty cycle capability is half of what is listed.

Application Type 1 represents maximum capability up to 100% braking torque where possible.

Application Type 2 represents more than 100% braking torque where possible, up to a maximum of 150%.

Note 3: For 11 and 15 kW (15 and 20 HP) normal duty external resistor applications, use two 7.5 kW (10 HP) size resistors wired in parallel.

Note 4: The minimum resistance specification is applicable to a customer supplied external braking resistors.

A full-featured industrial AC drive suitable for panel, machine, flange and washdown mounted installations

SP600 Drives from 0.5 to 50 HP (6SP Series)
SP600 Drives from 20 to 200 HP (6SB Series)

The benchmark for value in AC Drives, the SP600 provides the benefits of more expensive full-featured drives in a compact, versatile, and cost effective design. Multiple enclosure/packaging options with drive mounted LCD keypad and embedded braking circuitry make this drive very versatile. The wide range of network options available for this product will allow you to maximize data acquisition, control and application flexibility.

STANDARD FEATURES

The SP600 AC drive offers versatility and simple intelligence, setting the standard by which drives in this class are measured.

For customers who rely on the simplicity of the SP500, the SP600 provides the "user friendliness" expected by our customers with the advanced features and functionality of a leading edge drive.

The default configuration of the SP600 limits the customer's exposure to a Basic access level of parameters.

But for those who require broader application flexibility, the full access level of parameters gives the user complete access to all of the drive parameters.

Every SP600 is software selectable for either:

- **Volts/Hertz**
- **Sensorless Vector Control (SVC)**

Each method is capable of operating single or multiple motors from one AC Drive(1).

- **Input Voltages/Power Ratings:**
  - 200, 208, 240 (0.5 to 25 HP)
  - 380, 400, 415, 480 (0.5 to 200 HP)
  - 600 (0.5 to 150 HP)
- **Enclosures/Mounting:**
  - Wall or Machine Mount NEMA 1 (IP20)
  - Wall or Machine Mount NEMA 4X/12 (IP66)
  - Flange Mount NEMA 1 (IP20)
  - Zero clearance stacking, side by side cabinet mounting with 50°C rating (IP20)
- **Switching Frequency:**
  4 - 10 kHz carrier frequency
  Increase up to 10 kHz for quiet motor operation. See manual for de-rating.
- **Detachable Operator Interface:**
  Multi-line, 6-language LCD OIM for local or remote operation. Allows drive configuration, control, monitoring and diagnostics.
- **Terminal Strip Control:**
  - 24 V Digital Inputs (qty. 6), configurable
    - 8 programmable pre-set speed selections possible
  - Analog Inputs, 10 bit resolution(2)
    - Input #1 (0 to +10 VDC(2) or 4-20 mA)
    - Input #2 (-10 to 10 VDC, or 4-20 mA)
  - Analog Outputs, 10 bit resolution(2)
    - 0 - 10 VDC 6SP models
    - 0 - ±10 VDC or 4 - 20 mA 6SB models
  - Relay Outputs (qty 2), Form C
- **Braking Transistor Built-in**
  - Optional Drive-mounted or externally mounted braking resistor required
  - Braking Modes: Extended ramp, DC injection, DB
- **Typical OIM Operator Functions**:
  - Start/Stop
  - Forward/Reverse
  - Jog
  - Auto/Manual
  - Clear Fault

Other Features

- Configuration and monitoring of single or multiple drives when using optional V*S Utilities PC Software.
- Intelligent Thermal Management (ITM™) system can reduce carrier frequency or shut the drive off in case of an over-temperature condition.
- UL and NEC approved electronic motor overload protection.
- Adjustable Auto Restart.
- Frequency avoidance bands to lock out mechanical resonance points.
- "S" curve acceleration and deceleration for smooth speed transitions.
- Line-to-Line and Line-to-Ground output short circuit protection.
- Fault memory logs that display time stamped drive faults.
- Built-in PI process control functionality.

(1) SVC mode is limited to identical motors coupled mechanically.
(2) 11 Bit resolutin and 0 - ±10 VDC on 6SB models.

QUIET MOTOR OPERATION UP TO 600 FT

- The SP600 controller uses IGBT transistors switched at frequencies up to 10 kHz to reduce PWM induced motor audible noise. This technology limits the increase of audible motor to not more than 3dba when compared to sine wave operation.
- Unique transistor control circuits also allow drive to operate at motor distances of up to 600 feet, with proper cable type, before output filtering considerations must be applied.
- Tested to ensure that the waveform at the motor conduit box will not exceed the limits specified in NEMA MG1 31.40.4.2. at lead lengths of 200 ft.

SERVICE CONDITIONS

- Elevation to 3300 ft (1000 meters)
  - De-rate 3% for every 1000 ft. above 3300 ft.
- Operating temperature ranges:
  - NEMA 1 Enclosures:
    0°C to 40°C
  - IP20 Enclosures:
    0°C to 50°C
  - NEMA 4X/12 Enclosures:
    0°C to 40°C
- Atmosphere:
  - Non-condensing relative humidity:
    5% to 95%
- AC line voltage variation: rated input voltage ±10%
- AC line frequency variation (50/60 Hz): 48 - 62 Hz.
- Storage temperature: -40°C to 65°C (-40°F to 149°F)

RATINGS(1)

- 110% OL: 110% of rated horsepower for 1 minute, 150% of rated horsepower for 3 seconds
- 150% OL: 150% of rated horsepower for 1 minute, 200% of rated horsepower for 3 seconds

NOTE: Single-phase operation requires 50% de-rating of drive output current.

(1) See horsepower rating chart

APPLICATION DATA

- Pulse width modulation (PWM): sensorless vector control or volts per hertz control
- Displacement power factor: 0.96
- Frequency stability long term: 0.01% of base speed with digital keypad 0.5% of base speed with analog speed reference
- Linearity (speed reference to output frequency): ± 1.0%

SP600 BRAKE RESISTOR SPECIFICATIONS

The SP600 has various combinations of internal braking transistors and either internal or external braking resistors. The minimum resistance that may be used that prohibits damaging this internal transistor as well as the recommended resistance by motor voltage and horsepower is specified on page D-41.

The average power dissipation of the braking mode must be estimated and the power rating of the Dynamic Brake Resistor chosen to be greater than the average regenerative power dissipation of the drive.

SP600 SPECIFICATIONS

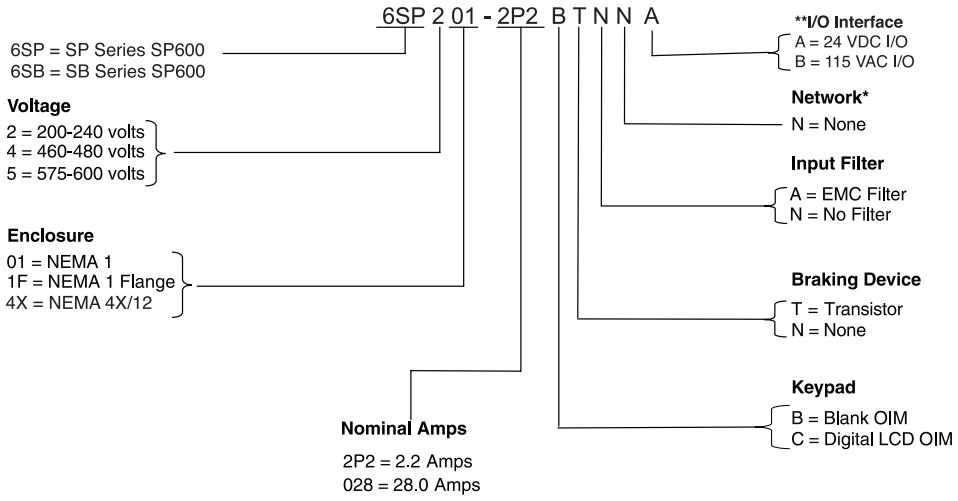
The specifications below are applicable over a constant torque range.

Specification	Fan/Pump and Custom V/Hz	SVC
Speed regulation/accuracy (with slip compensation)	0.5% (40:1 speed range)	0.5% (80:1 speed range)
Operating speed range (with slip compensation)	40:1	80:1
Dynamic speed accuracy (speed response to a 95% step load change)	0.5% base speed	0.5% base speed
Velocity bandwidth (with slip compensation)	10 rad/s	20 rad/s
Minimum settability of velocity bandwidth/slip compensation	0.1 rad/s	0.1 rad/s

DIMENSIONS

Frame	Overall Height	Mount C-C Height (1)	Overall Width	Mount C-C Width (1)	Depth	Weight
A	8.89 (225.8)	8.33 (211.6)	4.82 (122.4)	3.71 (94.2)	7.08 (179.8)	5.97 (2.71)
B	9.24 (234.6)	8.67 (220.2)	6.76 (171.7)	4.83 (122.7)	7.08 (179.8)	7.93 (3.60)
B4	9.44 (240.0)	8.67 (220.2)	6.76 (171.7)	4.83 (122.7)	8.0 (203.0)	7.95 (3.61)
C	11.81 (300.0)	11.25 (285.6)	7.28 (185.0)	5.42 (137.6)	7.08 (179.8)	15.18 (6.89)
D	13.78 (350.0)	13.21 (335.6)	8.66 (219.9)	6.65 (169.0)	7.08 (179.8)	20.4 (9.25)
D4	13.78 (350.0)	13.21 (335.6)	8.66 (219.9)	6.65 (169.0)	8.3 (211.0)	20.12 (9.13)
E	21.88 (555.8)	19.33 (491.0)	11.04 (280.3)	7.87 (200.0)	8.15 (207.1)	41.0 (18.6)
E4	21.88 (555.8)	19.33 (491.0)	11.04 (280.3)	7.87 (200.0)	8.65 (219.8)	41.0 (18.6)
2	13.48 (342.0)	12.6 (320.0)	8.74 (222.0)	7.56 (192.0)	7.87 (200.0)	27.6 (12.5)
3	20.37 (517.0)	19.7 (500.0)	8.74 (222.0)	7.56 (192.0)	7.87 (200.0)	40.9 (18.55)
4	29.9 (759.0)	29.1 (738.2)	8.74 (222.0)	7.56 (192.0)	7.94 (201.7)	54.0 (24.5)
5	25.4 (644.0)	24.6 (625.0)	12.2 (309.0)	8.86 (225.0)	10.9 (275.0)	82.0 (37.2)
6 (125 to 150 HP)	38.43 (976.0)	32.48 (825.0)	15.90 (404.0)	11.81 (300.0)	10.85 (276.0)	157.5 (71.4)
6 (200 HP)	38.43 (976.0)	32.48 (825.0)	15.90 (404.0)	11.81 (300.0)	10.85 (276.0)	165.5 (75.1)

(1) C-C - center hole to center hold
inches (mm)
lbs (kg)

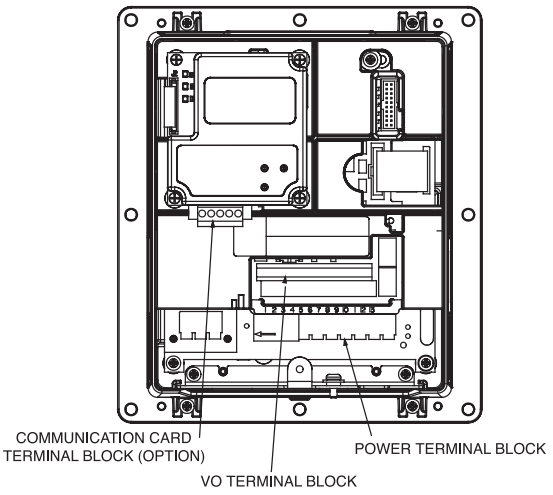


* Communication options are supplied as kits. See Options section.
** 20 HP and above have 115 VAC I/O option available. (This character not used in 6SP series model number)

Instruction Manuals

D2-3485	6SP Series (ratings from 0.5 HP to 50 HP)
D2-3501	6SB Series (ratings from 20 HP to 200 HP)
D2-3487	Operator Interface (Local)
D2-3516	Door Mount OIM Bezel Kit
D2-3490	Operator Interface (NEMA 4 - Large)
D2-3525	Operator Interface (NEMA 4 - Small)
D2-3493	Dynamic Braking Kit
D2-3489	Dynamic Braking Selection Guide
D2-3500	RF filter Kit
D2-3488	V*S Utilities
D2-3485-1ES	Spanish Manual/User
D2-3477	Serial Converter
D2-3478	DeviceNet
D2-3479	ProfiBus
D2-3480	Interbus-S
D2-3497	ControlNet
D2-3510	EtherNet/IP

6SP MODEL – TERMINAL ASSIGNMENTS



Control Terminals

Terminal	Signal Name	Default Functions
1	Digital In 1	Stop/Clear Fault
2	Digital In 2	Start
3	Digital In 3	Function Loss
4	Digital In 4	Jog
5	Digital In 5	Auto/Manual
6	Digital In 6	Speed Select 1
7	24 V Int. Com	Power Supply Common
8	Digital In Ext.Com	Logic Common
9	+24 VDC Int.	Internal 24 V logic supply
10	+10 VDC Ref. Out	Internal 10 V reference supply
11	Digital Out1 - NO	Fault
12	Digital Out1 - C	
13	Digital Out1 - NC	
	Analog Input 1	Default = 4-20 mA
14	Analog Volts In1 (-)	See Param. 320
15	Analog Volts In1 (+)	Non-isolated
16	Analog Current In1 (-)	
17	Analog Current In1 (+)	
	Analog Input 2	Default = 0 to 10 VDC
18	Analog Volts In2 (-)	See Param. 320
19	Analog Volts In2 (+)	Isolated
20	Analog Current In2 (-)	
21	Analog Current In2 (+)	
22	Analog Out (-) & Reference Common	
23	Analog Volts Out (+)	Drive Output Frequency
24	Digital Out2 - NO	Running
25	Digital Out2 - C	
26	Digital Out2 - NC	

Power Terminals

Terminal	Signal Name	Function
R	R/L1	AC line input
S	S/L2	AC line input
T	T/L3	AC line input
+DC/BR1	DC Brake (+)	DB (+) resistor connection
+BRK/BR2	DC Brake (-)	DB (-) resistor connection
U	U/T1	Motor output
V	V/T2	Motor output
W	W/T3	Motor output
PE	PE Ground	Protective Earth
PE	PE Ground	Protective Earth

Output Ratings:
200 - 240 VAC Three-phase Ratings

Model Number		Output Amps						Nominal Power Ratings			
		240 VAC Input			208 VAC Input			110% OL Duty		150% OL Duty	
		Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP
6SP2xx	-2P2	2.2	2.4	3.3	2.5	2.7	3.7	0.37	0.5	0.25	0.33
	-4P2	4.2	4.8	6.4	4.8	5.5	7.4	0.75	1	0.55	0.75
	-6P8	6.8	9	12	7.8	10.3	13.8	1.5	2	1.1	1.5
	-9P6	9.6	10.6	14.4	11	12.1	16.5	2.2	3	1.5	2
	-015	15.3	17.4	23.2	17.5	19.2	26.2	4	5	3	3
	-022	22	24.2	33	25.3	27.8	37.9	5.5	7.5	4	5
	-028	28	33	44	32.2	37.9	50.6	7.5	10	5.5	7.5
	-042	42	46.2	63	43	55.5	74	11	15	7.5	10
	-054	54	63	84	62.1	72.4	96.6	15	20	11	15
	-070	70	81	108	78.2	93.1	124	18.5	25	15	20

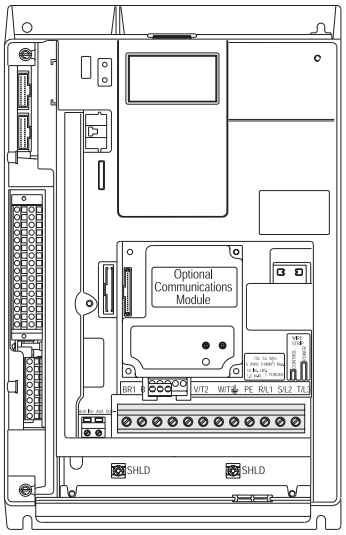
380 - 480 VAC Three-phase Ratings

Model Number		Output Amps						Nominal Power Ratings			
		480 VAC Input			400 VAC Input			110% OL Duty		150% OL Duty	
		Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP
6SP4xx	-1P1	1.1	1.2	1.6	1.3	1.4	1.9	0.37	0.5	0.25	0.33
	-2P1	2	2.4	3.2	2.1	2.4	3.2	0.75	1	0.55	0.75
	-3P4	3.4	4.5	6	3.5	4.5	6	1.5	2	1.1	1.5
	-005	5	5.5	7.5	5	5.5	7.5	2.2	3	1.5	2
	-008	8	8.8	12	8.7	9.9	13.2	4	5	3	3
	-011	11	12.1	16.5	11.5	13	17.4	5.5	7.5	4	5
	-014	14	16.5	22	15.4	17.2	23.1	7.5	10	5.5	7.5
	-022	22	24.2	33	22	24.2	33	11	15	7.5	10
	-027	27	33	44	30	33	45	15	20	11	15
	-034	34	40.5	54	37	40.5	54	18.5	25	15	20
	-040	40	51	68	43	51	68	22	30	18.5	25
	-052	52	60	80	60	66	90	30	40	22	30
	-065	65	78	104	72	90	120	37	50	30	40

600 VAC Three-phase Ratings

Model Number		Output Amps			Nominal Power Ratings			
		575 - 600 VAC Input			110% OL Duty		150% OL Duty	
		Cont.	1 Min.	3 Sec.	kW	HP	kW	HP
6SP5xx	-0P9	0.9	1	1.4	0.37	0.5	0.25	0.33
	-1P7	1.7	2	2.6	0.75	1	0.5	0.75
	-2P7	2.7	3.6	4.8	1.5	2	1	1.5
	-3P9	3.9	4.3	5.8	2.2	3	1.5	2
	-6P1	6.1	6.7	9.1	4	5	2	3
	-9P0	9	9.9	13.5	5.5	7.5	3.75	5
	-011	11	13.5	18	7.5	10	5.5	7.5
	-017	17	18.8	25.5	11	15	7.5	10
	-022	22	25.5	34	15	20	11	15
	-027	27	33	44	18.5	25	15	20
	-032	32	40.5	54	22	30	18.5	25
	-041	41	48	64	30	40	22	30
	-052	52	61.5	82	37	50	30	40

6SB Model 24 V I/O Terminal Assignments



Control Terminals(1)

Terminal	Signal Name	Default Function
	Analog Input 1	Default = 4-20 mA
1	Analog Volts In1 (-)	See Param. 320
2	Analog Volts In1 (+)	Term. 17 & 18
	Analog Input 2	Default = volts
3	Analog Volts In2 (-)	See Param. 320
4	Analog Volts In2 (+)	Term. 19 & 20
5	Reference Common	
	Analog Output 1	Default = volts
6	Analog Volts Out1 (-)	Drive Output Frequency
7	Analog Volts Out1 (+)	See Param. 342
8	Analog Current Out1 (-)	
9	Analog Current Out1 (+)	
10	Reserved	
11	Digital Out1 - NO	Fault
12	Digital Out1 - C	
13	Digital Out1 - NC	
14	Digital Out2 - NO	Running
15	Digital Out2 - C	
16	Digital Out2 - NC	
17	Analog Current In1 (-)	See Param. 320
18	Analog Current In1 (+)	
19	Analog Current In2 (-)	
20	Analog Current In2 (+)	
21	-10 VDC Ref. Out	
22	+10 VDC Ref. Out	
23	Reserved	
24	+24 VDC Int.	Internal 24 V logic supply
25	Digital In Ext.Com	Logic Common
26	24V Int. Com	Power Supply Common
27	Digital In 1	Stop/Clear Fault
28	Digital In 2	Start
29	Digital In 3	Function Loss
30	Digital In 4	Jog
31	Digital In 5	Auto/Manual
32	Digital In 6	Speed Select 1

Typical Power Terminals

Terminal	Description	
BR1	DC Brake (+)	DB (-) resistor connection
BR2	DC Brake (-)	DB (-) resistor connection
DC+	DC Bus (+)	
DC-	DC Bus (-)	
	Motor Ground	Frame 2 only
PE	PE Ground	Frame 2 only
U	U/T1	Motor output
V	V/T2	Motor output
W	W/T3	Motor output
R	R/L1	AC line input
S	S/L2	AC line input
T	T/L3	AC line input

(1)Terminal chart defines the 24 V interface I/O configuration.

Note: 115 VAC I/O card defined separately.

400-480 VAC Three-phase Ratings

Model Number		Output Amps						Nominal Power Ratings			
		480 VAC Input			400 VAC Input			110% OL Duty		150% OL Duty	
		Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP
6SB401	-027	27	33	44	30	33	45	15	20	11	15
	-034	34	40.5	54	37	45	60	18.5	25	15	20
	-040	40	51	68	43	56	74	22	30	18.5	25
	-052	52	60	80	56	64	86	30	40	22	30
	-065	65	78	104	72	84	112	37	50	30	40
	-077	77	97	130	85	128	170	45	60	37	50
	-096	95	106	144	105	115	158	55	75	45	60
	-125	125	138	163	125	138	163	55	100	45	75
	-156	156	172	234	170	187	255	93	125	75	100
	-180	180	198	270	205	220	300	110	150	100	125
	-248	248	273	372	260	286	390	132	200	110	150

575-600 VAC Three-phase Ratings

Model Number		Output Amps			Nominal Power Ratings			
		600 VAC Input			110% OL Duty		150% OL Duty	
		Cont.	1 Min.	3 Sec.	kW	HP	kW	HP
6SB501	-022	22	25.5	34	15	20	11	15
	-027	27	33	44	18.5	25	15	20
	-032	32	40.5	54	22	30	18.5	25
	-041	41	48	64	30	40	22	30
	-052	52	61.5	82	37	50	30	40
	-062	62	78	104	45	60	37	50
	-077	77	85	116	55	75	45	60
	-099	99	109	126	75	100	55	75
	-125	125	138	188	90	125	75	100
	-144	144	158	216	110	150	90	125

WALL MOUNT DRIVES (SP MODELS)

- Motor Power Rating: 0.5 to 25 HP (0.33 to 18.5 kW)
- Input Voltage: 200-208, 240 VAC, 50/60 Hz
- Enclosure: NEMA 1 Ventilated/IP20
- Mounting: Wall/Machine – Panel Mount as IP20
- Models available with LCD OIM keypad
- Models available with internal EMC filter
- Zero clearance side by side mounting

SP600 Shown with LCD OIM

200 - 240 VAC, 50/60 Hz Input: Ratings 0.5 to 25 HP

NEMA 1/IP20 Model Number		Frame Size	With OIM	With Filter	Horsepower Rating 110% OL VT Applications	Horsepower Rating 150% OL (1) CT Applications	Drive Amps @ 240 V (3) Continuous (2)	1 Min.	3 Sec.	List
6SP201	-4P2BTNN	A			1	0.75	4.2	4.8	6.4	$796
	-9P6CTNN	B	•		3	2	9.6	10.6	14.4	1,179
	-022BTAN	D		•	7.5	5	22	24.2	33	1,550
	-028BTAN	D		•	10	7.5	28	33	44	1,940
	-042CTAN	D	•	•	15	10	42	46.2	63	2,673
	-054BTAN	E		•	20	15	54	63	84	3,115
	-070CTAN	E	•	•	25	20	70	81	108	4,108

(1) Overload of 150% of rated current for 1 minute dependant on actual motor full load amps versus drive continuous amp rating.

(2) Rated for 240 VAC input and 4 kHz switching frequency.

(3) See amp rating chart for currents @ 208 VAC.

Model Numbers 6SP201- xxxBxxx are without OIM. OIM option available. See page D-40 for information.

Model Numbers 6SP201- xxxCxxx are with OIM.

Model Numbers 6SP201- xxxCxAx are with OIM and internal EMC filter.

All models are 24VDC Inputs. See option AK-M9-115VAC-1 on page D-39 for 115VAC Inputs.

WALL MOUNT Drives (SP MODELS)

- Motor Power Rating: 0.5 to 50 HP (0.33 to 37 kW)
- Input Voltage: 380-415, 460-480 VAC, 50/60 Hz
- Enclosure: NEMA 1 Ventilated/IP20
- Mounting: Wall/Machine – Panel Mount as IP20
- Models available with LCD OIM keypad
- Models available with internal EMC filter
- Zero clearance side by side mounting

380 - 480 VAC, 50/60 Hz Input: Ratings 0.5 to 50 HP

NEMA 1/IP20 Model Number		Frame Size	With OIM	With Filter	Horsepower Rating 110% OL VT Applications	Horsepower Rating 150% OL (1) CT Applications	Drive Amps @ 480 V (3) Continnu-ous (2)	1 Min.	3 Sec.	List
6SP401	-1P1CTNN	A	•		0.5	0.33	1.1	1.2	1.6	$1,108
	-3P4BTNN	A	•	•	2	1.5	3.4	4.5	6	1,035
	-005BTNN	B			3	2	5	5.5	7.5	1,139
	-011CTAN	C	•	•	7.5	5	11	12.1	16.5	1,896
	-027BTAN	D		•	20	15	27	33	44	2,917
	-052CTAN	E	•	•	40	30	52	60	80	5,720
	-065CTAN	E	•	•	50	40	65	78	104	7,176

(1) Overload of 150% of rated current for 1 minute dependant on actual motor full load amps versus drive continuous amp rating.

(2) Rated for 240 VAC input and 4 kHz switching frequency.

(3) See amp rating chart for currents @ 208 VAC.

Model Numbers 6SP201- xxxBxxx are without OIM.

Model Numbers 6SP201- xxxCxxx are with OIM.

Model Numbers 6SP201- xxxCxAx are with OIM and internal EMC filter.

DISCOUNT VS-1AC

WALL MOUNT Drives (SB MODELS)

- Motor Power Rating: 20 to 200 HP (15 to 132 kW)
- Input Voltage: 380-415, 480 VAC, 50/60 Hz
- Enclosure NEMA 1 Ventilated/IP20
- Mounting: Panel mount zero clearance stackable
- Models available with LCD OIM keypad
- Models available with 24 VDC or 120 VAC I/O

380 - 480 VAC, 50/60 Hz Input: Rating 20 to 200 HP

NEMA 1/IP20 Model Number		Frame Size	With OIM	With Brake	With Filter	Horsepower Rating 110% OL VT Applications	Horsepower Rating 150% OL (1) CT Applications	Drive Amps @ 480 V (3) Continuous (2)	1 Min.	3 Sec.	List
6SB401	-065CTANA	3	•	•	•	50	40	65	78	104	$7,628
	-077CNANA	4	•		•	60	50	77	97.5	130	8,388
	-156CNANA	6	•		•	125	100	156	172	234	12,641
	-156CTANA		•	•	•						13,468
	-180CNANA	6	•		•	150	125	180	198	270	13,692
	-248CNANA	6	•		•	200	150	248	273	372	19,068

(1) Overload of 150% of rated current for 1 minute dependant on actual motor full load amps versus drive continuous amp rating.

(2) Rated for 480 VAC input and 4 kHz switching frequency (248 Amp Model @ 2KHz Switching Frequency)

(3) See amp rating chart for currents @ 400 VAC.

Model Numbers 6SB401- xxxBTANA are 24VDC Inputs without OIM. OIM option available. See page D-40 for information.

Model Numbers 6SB401- xxxCTANA are 24VDC Inputs with OIM.

Model Numbers for 115 VAC Inputs are non-stock. Consult factory.

WALL MOUNT Drives (SP MODELS)

- Motor Power Rating: 0.5 to 50 HP (0.33 to 37 kW)
- Input Voltage: 575, 600 VAC, 50/60 Hz
- Enclosure: NEMA 1 Ventilated/IP20
- Mounting: Wall/Machine – Panel Mount as IP20
- Models available with LCD OIM keypad
- Zero clearance side by side mounting

SP600 Shown with LCD OIM

600 VAC, 50/60 Hz Input: Rating 0.5 to 50 HP

NEMA 1/IP20 Model Number		Frame Size	With OIM	With Filter	Horsepower Rating 110% OL VT Applications	Horsepower Rating CT Applications	Drive Amps @ 575 V Continuous (2)	1 Min.	3 Sec.	List
6SP501	-9P0BTNN	C	•		7.5	5	9	9.9	13.5	$1,903

(1) Overload of 150% of rated current for 1 minute dependant on actual motor full load amps versus drive continuous amp rating.

(2) Rated for 600 VAC input and 4 kHz switching frequency.

Model Numbers 6SP501- xxxBTNN are without OIM.

Model Numbers 6SP501- xxxCTNN are with OIM.

DISCOUNT VS-1AC

WASHDOWN DRIVES

- Power Rating: 0.5 to 25 HP (0.33 to 18.5 kW)
- Voltage: 200, 208 & 240 VAC, 50/60 Hz
- Enclosure: NEMA 4X/12 Washdown/Dustproof/IP66
- Mounting: Wall/Machine
- OIM/Keypad: LCD OIM factory installed

200 - 240 VAC, 50/60 Hz Input: Ratings 0.5 to 25 HP

NEMA 4X/12/IP66 Model Number		Frame Size	Horsepower Rating		Drive Amps @ 240 V (3)			List
			110% OL	150% OL(1)	Continuous (2)	1 Min.	3 Sec.	
			VT Applications	CT Applications				
6SP24X	-4P2CTAN	B4	1	0.75	4.2	4.8	6.4	$1,253
	-6P8CTNN	B4	2	1.5	6.8	9	12	1,270
	-9P6CTNN	B4	3	2	9.6	10.6	14.4	1,395
	-070CTAN	E4	25	20	70	81	108	5,273

(1) Overload of 150% or more for 1 minute. Dependant upon actual motor full load amp rating versus the drive continuous amp rating.

(2) Rated for 240 VAC input and 4 kHz switching frequency.

(3) See amp rating chart for currents @ 208 VAC.

All models are 24VDC Inputs. .

WASHDOWN DRIVES

- Power Rating: 0.5 to 50 HP (0.33 to 37 kW)
- Voltage: 380, 400, 415 & 480 VAC, 50/60 Hz
- Enclosure: NEMA 4X/12 Washdown/Dustproof/IP66
- Mounting: Wall/Machine - Panel Mount as IP20
- OIM/Keypad: LCD OIM factory installed

380 - 480 VAC, 50/60 Hz Input: Ratings 0.5 to 50 HP

NEMA 4X/12/IP66 Model Number		Frame Size	Horsepower Rating		Drive Amps @ 480 V (3)			List
			110% OL	150% OL (1)	Continuous (2)	1 Min.	3 Sec.	
			VT Applications	CT Applications				
6SP44X	-1P1CTAN	B4	0.5	0.33	1.1	1.2	1.6	$1,503
	-2P1CTAN	B4	1	0.75	2.1	2.4	3.2	1,568
	-3P4CTNN	B4	2	1.5	3.4	4.5	6	1,665
	-005CTNN	B4	3	2	5	5.5	7.5	1,945
	-005CTAN	B4	3	2	5	5.5	7.5	2,033
	-011CTAN	D4	7.5	5	11	12.1	16.5	2,735
	-014CTAN	D4	10	7.5	14	16.5	22	2,955
	-027CTAN	D4	20	15	27	33	44	4,545
	-052CTAN	E4	40	30	52	60	80	8,668

(1) Overload of 150% or more for 1 minute. Dependant upon actual motor full load amp rating versus the drive continuous amp rating.

(2) Rated for 480 VAC input and 4 kHz switching frequency.

(3) See amp rating chart for currents @ 400 VAC.

DISCOUNT VS-1AC

WASHDOWN DRIVES

- **Power Rating: 0.5 to 50 HP (0.33 to 37 kW)**
- **Voltage: 575, 600 VAC, 50/60 Hz**
- **Enclosure: NEMA 4X/12 Washdown/Dustproof/IP66**
- **Mounting: Wall/Machine - Panel Mount as IP20**
- **OIM/Keypad: LCD OIM factory installed**

600 VAC, 50/60 Hz Input: Ratings 0.5 to 50 HP

NEMA 4X/12/IP66 Model Number		Frame Size	Horsepower Rating		Drive Amps @ 600V			List
			110% OL	150% OL (1)	Continuous (2)	1 Min.	3 Sec.	
			VT Applications	CT Applications				
6SP54X	-0P9CTNN	B4	0.5	0.33	0.9	1	1.4	**$1,645**
	-3P9CTNN	B4	3	2	3.9	4.3	5.8	**2,235**
	-9P0CTNN	D4	7.5	5	9	9.9	13.5	**2,755**
	-011CTNN	D4	10	7.5	11	13.5	18	**3,255**
	-017CTNN	D4	15	10	17	18.8	25.5	**4,035**
	-022CTNN	D4	20	15	22	25.5	34	**4,815**

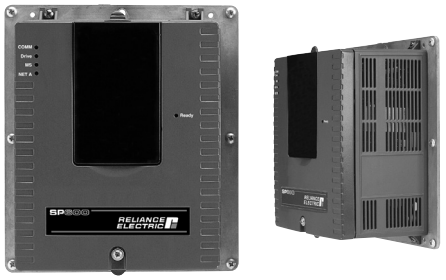
(1) Overload of 150% or more for 1 minute. Dependant upon actual motor full load amp rating versus the drive continuous amp rating.

(2) Rated for 600 VAC input and 4 kHz switching frequency.

All models are 24VDC Inputs. See option AK-M9-115VAC-1 on page D-39 for 115VAC Inputs.

FLANGE MOUNT DRIVES

- **Power Rating: 0.5 to 50 HP (0.33 to 37 kW)**
- **Voltage: 380, 400, 415, 480 VAC, 50/60 Hz**
- **Mounting: Flange Mount as IP20/NEMA1**
- **Models without LCD OIM keypad; use remote keypad or order separately**



SP6000 Flange Mount

380 - 480 VAC, 50/60 Hz Input: Ratings 0.5 to 50 HP

Flanged IP20 Model Number		Frame Size	With OIM	With Filter	Horsepower Rating		Drive Amps @ 480 V (3)			List
					110% OL		Continuous (2)	1 Min.	3 Sec.	
					CT Applications	VT Applications				
6SP41F	**-011BTAN**	C		•	7.5	5	11	12.1	16.5	**$1,830**

(1) Overload of 150% or more for 1 minute. Dependant upon actual motor full load amp rating versus the drive continuous amp rating.

(2) Rated for 480 VAC input and 4 kHz switching frequency.

(3) See amp rating chart for currents @ 400 VAC.

Model Numbers 6SP41F-xxxBxxx are without OIM.

Model Numbers 6SP41F- xxxBxAx are with internal EMC filter.

DISCOUNT VS-1AC

SP600 Options

The SP600 Product Family is easily modified with a full line of optional kits and accessories including communications, resistors, filters, OIMs, and cables.

Communication Module

Braking Resistor Kit

Braking Resistor Kits - Low Energy

SP600 drives in frames A, B, C, D, B4, D4 and 2 include mounting provisions for low-energy braking resistors. Dependant upon the drive power rating, these resistors will provide momentary braking capacities of about 6 - 10%, enough to handle most simple deceleration needs as well as speed overshoot correction. Consider other braking options from the GV3000/SE section of this catalog should more braking capacity be required. Minimum braking resistances apply (see page D-41). Wattage depends on application.

200-240 VAC Braking Resistors			
Model Number	**Frame**	**Brake Resistance**	**List**
6SP2-DB1-A	A	62	**$156**
6SP2-DB1-C	C	62	**156**

380-480 VAC Braking Resistors			
Model Number	**Frame**	**Brake Resistance**	**List**
6SP4-DB1-C	C	115	**$156**
6SP4-DB1-D	D, D4	62	**156**
6SB4-DBI-2	2		**156**

Communication Modules - Network Options

Network connectivity can be achieved by adding one of the options listed below:

Model Number	Description	List
RECOMM-CNET	ControlNet	**$468**
RECOMM-PBUS	Profibus	**494**
RECOMM-IBUS	Interbus-S	**676**
RECOMM-485	RS485 DF1	**307**
RECOMM-H485	P1, N2, or Modbus-RTU	**540**

CE & C-Tick External Mount EMC Compliance Filter Kits

SP600 drives are designed to meet Global Industry Standards, including those of Europe (CE) and Australia (C-Tick). EMC compliance for both conducted and radiated noise emissions can be met by following the table below and adding the recommended filter as designated.

Also be sure to follow recommended wiring practices for drives and motors as identified in our product manuals as well as those of each region.

CE EMC Filters		
Model Number	**Description**	**List**
6SP-MF1A	1 Phase, 240 VAC, 8A	**$146**
6SP-MF3A	3 Phase, 200-460 VAC, 5 A	**156**

SP600 Frame	Filter
A	**External only (see above)**
B	**Optional (internal by model number)**
C	**Standard (internal)**
D	**Standard (internal)**
2	**Standard (internal)**
3	**Standard (internal)**
4	**Standard (internal)**
5	**Standard (internal)**
6	**Standard (internal)**

DISCOUNT VS-1AC

V*S Utilities Configuration Software

This windows-based software package allows online configuration and monitoring of the SP600 AC drives. This software utility allows the user to upload, download, monitor and compare parameter values in a user-friendly environment. VS Utilities runs under Windows 98/NT/ME/2000/XP.

V*S Utilities Features:

- Custom views for monitoring selected parameters
- Compare drive parameter settings to:
  - Defaults
  - Saved files
- Point-to-point or multi-drop capabilities (serial network or EtherNet)
- Built-in online help

  NOTE: Software requires the RECOMM-232 serial converter. The RECOMM-232 serial converter comes standard with a one meter cable.

The cable length can be extended by:

- Replacing the RECBL-M10 with a longer cable (see table).
- Extending the cable with extension option.

DPI cables, drive side of converter box, cannot exceed 10 meters (DPI = Drive Peripheral Interface).

Software/Serial Converter Model No. RECOMM-VSU232 .....$437
Software ONLY Model Number: RECOMM-VSUTIL.....154

SP600 NEMA 4X Remote Mount OIM

(Operator Interface Module)

Remote mountable LCD OIM for door mounting. This will allow users to operate the SP600 drive from a door mounted operator interface. The remote interface is supplied with a 3 meter DPI male-to-male cable (RECBL-M30) that can be extended by using the RECBL-F30/F90 cables. A DPI screw terminal adapter kit can also be used to extend with customer fabricated cables.

SP600 Accessories

Model Number	Description	Length	List
RECBL-M03	DPI cable (male to male; locking mini DIN) (converter to drive cable)	0.33 m	**$42**
RECBL-M10		1.0 m	**47**
RECBL-M30		3.0 m	**57**
RECBL-M90		9.0 m	**83**
RECBL-F03	DPI cable (male to female; locking mini DIN) (drive cable extension)	0.33 m	**42**
RECBL-F10		1.0 m	**47**
RECBL-F30		3.0 m	**57**
RECBL-F90		9.0 m	**83**
1202-TB-KIT-SET	DPI Screw Terminal Adapter Kit for extending remote OIM connections up to 100 meters (Includes two screw terminal adapters)	n/a	**120**
2-CBL-KIT-100M	DPI Screw Terminal Adapter Kit w/Cable for extending remote OIM connections up to 100 meters (Includes two screw terminal adapters, tools, and 100M shielded cable)	n/a	**364**
RECBL-SSP	1 to 2-port DPI splitter cable	n/a	**67**
RECBL-LCD	OIM LCD external-mount harness (Hirose to DIN)	n/a	**52**
RECBL-SFC	Serial flash cable (converter to 9DSUB)	n/a	**57**
RECOMM-VSU232	VS Utilities and RECOMM-232	n/a	**437**

m=meters

Note: Drive DPI is a female mini-din connector. In order to connect to this port you need a male mini-din connector.
RE1LCD OIMs have a Hirose connector (only one type of Hirose connector is used).

Note: DPI Screw Terminal Kits are to be utilized when a remote OIM is to be located more than 10 meters from the drive.
DPI Screw Terminal Kits can be used with RE4ALCD or REZL-N1 OIM kits (not usable with RE4LCD-PNL)

DISCOUNT VS-1AC

SP600 BRAKE RESISTOR SPECIFICATIONS

The specifications below are applicable to external braking resistors.

The average power dissipation of the braking mode must be estimated and the power rating of the Dynamic Brake Resistor chosen to be greater than the average regenerative power dissipation of the drive.

Reference manual D2-3489 “SP600 AC Drive Dynamic Braking Selection Guide” for more detailed information.

Output Power		Minimum Resistance SP600	Suggested Resistor		
Drive Rating (Normal Duty)	Motor kW		Resistance 10% Tolerance	Peak Power (kW) During On Time	Resulting Braking Torque (expressed in % of rated motor torque)
240V, 0.5HP	0.37	34	131	1.08	293%
240V, 1HP	0.75	34	66	2.15	287%
240V, 2HP	1.5	34	61	2.33	155%
240V, 3HP	2.2	34	49	2.89	132%
240V, 5HP	4	31	33	4.3	107%
240V, 7.5HP	5.5	23	24	5.91	107%
240V, 10HP	7.5	23	24	5.91	79%
480V, 0.5HP	0.37	68	502	1.13	305%
480V, 1HP	0.75	68	306	1.85	247%
480V, 2HP	1.5	68	163	3.48	232%
480V, 3HP	2.2	68	131	4.33	197%
480V, 5HP	4	68	97	5.85	146%
480V, 7.5HP	5.5	74	70	8.11	147%
480V, 10HP	7.5	74	73	7.77	104%
480V, 15HP	11	44	45	12.61	115%
480V, 20HP	15	31/44*	45	12.61	84%
480V, 25HP	18.5	32	32	17.73	96%
480V, 30HP	22	27	27	21.01	96%
480V, 40HP	30	20	20	28.37	95%
480V, 50HP	37	21	21	27.02	73%
480V, 60HP	45	17	17	33.37	74%
480V, 75HP	55	11	11	51.58	94%
480V, 100HP	75	11	11	51.58	69%
480V, 125HP	90	9	9	63.04	70%
480V, 150HP	110	7	7	81.05	74%
480V, 200HP	132	3.3	4	141.84	107%
600V, 0.5HP	0.37	117	874	1.01	274%
600V, 1HP	0.75	117	471	1.88	251%
600V, 2HP	1.5	117	255	3.48	232%
600V, 3HP	2.2	117	209	4.24	193%
600V, 5HP	4	81	120	7.39	185%
600V, 7.5HP	5.5	81	82	10.81	197%
600V, 10HP	7.5	81	82	10.81	144%
600V, 15HP	11	48	48	18.47	168%
600V, 20HP	15	48	48	18.47	123%

* 31 ohms for 6SP models and 44 ohms for 6SB models.

Modified Standard NEMA 4X/12 Wall Mount Drives with Disconnect (1)

- Motor Power Rating: 0.5 to 20 HP (0.33 to 15 kW)
- Input Voltage: 230, 480 VAC, 50/60 Hz
- Operator Functions include: Start/Stop, Jog, Preset Speeds, Accel/Decel Rate 1 or 2 selection, Forward/Reverse, etc.
- Braking resistors mount to the rear on the extended heatsink
- Door Mounted Graphical LCD OIM for drive configuration and operation
- Added Safety of a fused input with rotary through the door disconnect handle includes lock-out/tag out capability

240, 50/60 Hz Input: Ratings 0.5 to 10 HP

	Modified Standard Model Number (1)	Frame Size	Horsepower Rating	Maximum Drive Currents (Amps)				
				110% OL	150% OL	Continuous1 Min.	2 sec.	List
6SP2DS	-2P2CTNN	A	0.5	0.33	2.2	2.4	3.3	$3,530
	-4P2CTNN	A	1	0.75	4.2	4.8	6.4	3,530
	-6P8CTNN	B	2	1.5	6.8	9	12	3,705
	-015CTAN	C	5	3	15.3	17.4	23.2	4,130
	-022CTAN	D	7.5	5	22	24.2	33	4,940
	-028CTAN	D	10	7.5	28	33	44	5,220

460, 50/60 Hz Input: Ratings 0.5 to 20 HP

	Modified Standard Model Number (1)	Frame Size	Horsepower Rating	Maximum Drive Currents (Amps)				
				110% OL	150% OL (2)	Continuous1 Min.	2 sec.	List
6SP4DS	-1P1CTNN	A	0.5	0.33	1.1	1.2	1.6	$3,565
	-2P1CTNN	A	1	0.75	2.1	2.4	3.2	3,565
	-3P4CTNN	A	2	1.5	3.4	4.5	6	3,595
	-005CTNN	B	3	2	5	5.5	7.5	3,705
	-008CTNN	B	5	3	8	8.8	12	3,750
	-011CTAN	C	7.5	5	11	12.1	16.5	4,270
	-022CTAN	D	15	10	22	24.2	33	5,275
	-027CTAN	D	20	15	27	33	44	5,420

(1) These units cannot be modified with any additional modifications without consulting factory.
(2) Overload of 150% or more for 1 minute. Dependent upon actual motor full load amp rating versus the drive continuous amp rating.

Dimensions

Frame Size	Enclosure Size H x W x D mm (inches)	Approximate Weight Kg (lbs)
A & B	400 (15.75) X 300 (11.81) X 254 (10)	11.8 (26)
C & D	600 (23.62) X 300 (11.81) X 254 (10)	19.1 (42)

DISCOUNT MS-1AC

The Multi-Purpose High-Performance Industrial AC Drive that solves virtually all stand-alone or coordinated system drive applications with a common platform

The Reliance Electric GV6000, utilizing the latest in vector control technology, is a multi-purpose drive incorporating V/Hz, Sensorless Vector and Flux Vector control in one product. Whether your applications are simple fans or pumps, or more complex applications such as web processing systems where the ultimate in performance is required, the Reliance Electric GV6000 drive will meet your application needs while providing you a common platform that is expandable and the easiest to use in its class.

The Reliance Electric GV6000 package provides simplicity and broad application flexibility with the performance you need in an ultra-compact, zero-stackable, bookshelf design. Ideal for stand-alone, retro-fit, or for integration into new system designs where high power density is required.

STANDARD FEATURES

A zero-stacking bookshelf design with 3 methods of control as standard:

- General Purpose (Scalar V/Hz)
- Sensorless Vector Control (SVC)
- Flux Vector Control (FVC)

Each method provides a cost effective means to address the wide range of applications required by today's demanding drives customers. All methods are standard without the need for expensive or complicated option boards. Encoder feedback is included at no additional cost on each drive.

A simple, yet powerful keypad is supplied with every Reliance Electric GV6000 drive. The semi-graphic backlit LCD display provides an interface to the drive that is user-friendly yet fully functional and includes our CopyCat function for transferring parameter sets between drives.

Diagnostics is a very important attribute of the Reliance Electric GV6000 product line. A dedicated fault/alarm key directs you to the fault and alarm queues, which indicate a descriptive name, a fault or alarm number (for easy navigation in the extensive troubleshooting section of the manual) and a time stamp that indicates the elapsed time since the event.

Dynamic braking is provided with an integral snubber (7th) transistor (standard on frame 0 – 4 drives). Other optional features include a wide assortment of communications modules, software utilities, remote keypads and full-numeric keypads.

Input Voltages/Power Ratings:

- 200, 208, 240 (0.5 to 100 HP)
- 380, 400, 415, 480 (0.5 to 200 HP)
- 600 (1 to 150 HP)

Enclosures/Mounting:

- Wall or Machine Mount NEMA 1 (convertible to IP20)
- Zero clearance stacking, side by side cabinet mounting with 50°C rating

Detachable Operator Interface:

- Every GV6000 comes standard with our easy to use Operator Interface Module (OIM) to provide metering, programming and operator control. The GV6000 follows the same TAB programming style as the popular general purpose Reliance Electric MD65 V*S Drive. This logically organized, easy to use method makes the GV6000 family member the easiest drive in it's class to set-up and operate.
- Text can be displayed in multiple languages, and with a single keystroke of the display key you can toggle among four different metering screens.
- Tactile feedback on keys
- Similar version is available for remote cabinet door mounting in NEMA 4X/12/IP66 rating
- Full Numeric version of OIM available for mounting locally on the drive or remotely in a NEMA 1 Bezel Kit
- All versions support CopyCat programming
- Each OIM includes opeartor control keys for Start, Stop/Reset, Increase/Decrease Speed, Forward/Reverse, Jog and Auto/Manual

Specifications – I/O

- 6 programmable digital inputs available in 24VDC or 115VAC (Digital input 6 can be selected as a hardware enable not interpreted by software)
- 2 analog inputs ±10V/4-20mA (11 bit + sign)
- +24VDC supply for digital inputs (not present on 115VAC input models)
- ±10V reference voltage outputs for potentiometer supplies
- 3 programmable digital outputs (dry contacts: 1 form-C, 1 form-A, and 1 form-B)
- 2 analog outputs ±10V/4-20mA (11 bit + sign)
- Encoder input (3 channel, differential inputs) also usable as a frequency reference
- 12V DC/5 V DC encoder power supply

Braking Transistor Built-in

- Standard on frames 0 - 4, optional on frames 5 - 6
- Optional braking resistor can be drive mounted on frames 0 - 2 for low energy braking applications or mounted external for heavy duty braking applications
- Braking Modes: Extended deceleration ramp by frequency adjustment, DC injection, or Internal/External DB Resistor

OTHER FEATURES

- Configuration and monitoring of single or multiple drives when using optional V*S Utilities PC Software
- Intelligent Thermal Management (ITM™) system can reduce carrier frequency, reduce current limit or shut the drive off in case of an over-temperature condition
- UL and NEC approved electronic motor overload protection with motor OL memory upon removal of power from the drive (2005 NEC compliant)
- Auto Restart with adjustable restart time and selectable number of restart attempts
- Frequency avoidance bands to lock out mechanical resonance points
- "S" curve acceleration and deceleration for smooth speed transitions
- Line-to-Line and Line-to-Ground output short circuit protection
- Fault memory logs the 16 most recent events with descriptive name, fault number, and timestamp
- Built-in PID process control for automatically adjusting motor speed to precisely regulate external process variables
- Torque proving including flux up with brake proving, float capability, and micro positioning for lifting applications
- Sleep/Wake mode provides the ability to start and stop the drive based on the level of an analog input rather than discrete start/stop digital inputs
- Flying start to quickly synchronize drive output to a rotating load
- Slip compensation and droop control
- Quick start feature to easily configure and tune the drive using text based prompting eliminating the need for parameter familiarity
- Pull-apart control and encoder terminal blocks and removable conduit plate to allow easy wiring and maintenance
- Patented reflected wave reduction algorithm and integral common mode cores for noise reduction

QUIET MOTOR OPERATION UP TO 600 FT

The GV6000 controller uses IGBT transistors switched at frequencies up to 10 kHz to reduce PWM induced motor audible noise. This technology limits the increase of audible motor to not more than 3dba when compared to sine wave operation.

Unique transistor control circuits also allow drive to operate at motor distances of up to 600 feet, with proper cable type, before output filtering considerations must be applied.

Tested to ensure that the waveform at the motor conduit box will not exceed the limits specified in NEMA MG1 31.40.4.2. at lead lengths of 200 ft.

Specifications – General

- 0° to 40°C, 1000m altitude without derating in NEMA 1 Configuration (0° to 50°C for IP20 Configuration)
- 5 to 95% humidity, non-condensing
- Input voltage operating range exceeds ±10% of nominal and 47 to 63Hz frequency
- Operational on single-phase power for 50% of the nominal current rating
- 97.5% efficiency, nominal line voltage and rated amps
- Displacement power factor: 0.98 across entire speed range
- Sine-coded PWM with adjustable carrier frequency; volts per hertz, sensorless vector and vector control
- Speed regulation 0.001% across a 120:1 speed range; 1000:1 operating range; 250 rad/sec bandwidth (Flux Vector Control)
- Frequency stability long term: 0.01% of base speed with digital input, 0.4% of base speed with analog speed reference

Ratings

- 110% OL: 110% of rated horsepower for 1 minute, 150% of rated horsepower for 3 seconds
- 150% OL: 150% of rated horsepower for 1 minute, 200% of rated horsepower for 3 seconds

NOTE: Single-phase operation requires 50% de-rating of drive output current.

See horsepower rating chart

GV6000 Brake Resistor Specifications

The GV6000 has various combinations of internal braking transistors and either internal or external braking resistors. The minimum resistance that may be used that prohibits damaging this internal transistor as well as the recommended resistance by motor voltage and horsepower is specified in publication D2-3489.

The average power dissipation of the braking mode must be estimated and the power rating of the Dynamic Brake Resistor chosen to be greater than the average regenerative power dissipation of the drive.

GV6000 Specifications

The specifications below are applicable over a constant torque range.

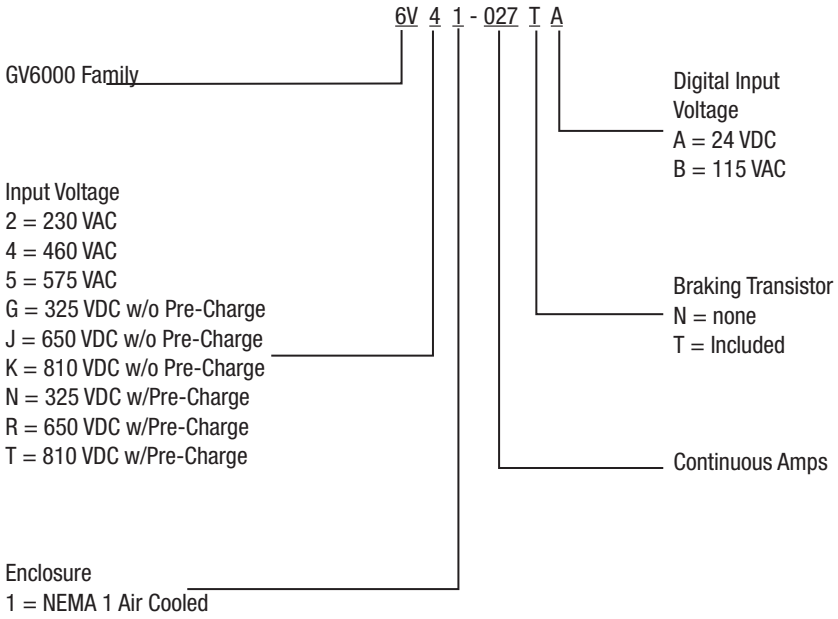
Specification	Volts per Hertz	Sensorless Vector	Sensorless Vector (w/feedback)	Vector (w/o feedback)	Vector (w/feedback)
Speed regulation/accuracy	0.5%	0.5%	0.1%	0.1%	.001%
Specified speed range	40:1	80:1	80:1	120:1	120:1
Operating speed range	40:1	80:1	80:1	120:1	1000:1
Velocity bandwidth (with slip compensation)	10 rad/s	20 rad/s	20 rad/s	50 rad/sec	250 rad/sec
Minimum settability of velocity bandwidth/slip compensation	0.1 rad/s	0.1 rad/s	0.1 rad/s	0.1 rad/sec	0.1 rad/sec

Torque Regulation:
w/o feedback +/- 5%, 600 rad/sec bandwidth
w/ feedback +/- 2%, 2500 rad/sec bandwidth

Dimensions

Frame	Overall Height	Overall Width	Overall Depth
0	13.23 (336.0)	4.33 (110.0)	7.87 (200.0)
1	13.23 (336.0)	5.31 (135.0)	7.87 (200.0)
2	13.48 (342.5)	8.74 (222.0)	7.87 (200.0)
3	20.37 (517.5)	8.74 (222.0)	7.87 (200.0)
4	29.87 (758.8)	8.66 (220.0)	7.94 (201.7)
5	25.37 (644.5)	12.16 (308.9)	10.84 (275.4)
6	38.43 (976.3)	15.9 (403.9)	10.85 (275.5)

inches (mm)



Instruction Manuals

D2-3540	GV6000 User Manual
D2-3548	GV6000 Remote NEMA 4X/12/IP66 OIM Installation Manual
D2-3516	Remote NEMA 1 OIM Bezel Kit Installation Manual
D2-3488	V*S Utilities
D2-3477	Serial Converter

Terminal Assignments

Control Terminals

Terminal	Signal Name	Factory Default
1	Analog In1 Volts/mA (-)	These inputs/outputs are dependent on a number of parameter settings
2	Analog In1 Volts/mA (+)	
3	Analog In2 Volts/mA (-)	
4	Analog In2 Volts/mA (+)	
5	Pot Common	-
6	Analog Out 1 Volts/mA(-)	These inputs/outputs are dependent on a number of parameter settings
7	Analog Out 1 Volts/mA(+)	
8	Analog Out 2 Volts/mA(-)	
9	Analog Out 2 Volts/mA(+)	
10	HW PTC Input 1	Motor Temperature
11	Digital Out 1 - N.C.	Fault
12	Digital Out 1 - Common	
13	Digital Out 1 - N.O.	NOT Fault
14	Digital Out 2 - N.C.	NOT Run
15	Digital Out 2/3 - Common	
16	Digital Out 3 - N.O.	Run
17	Analog In 1	
18	Current Input Jumper	
19	Analog In 2	
20	Current Input Jumper	
21	-10V Pot Reference	-
22	+10V Pot Reference	-
23	HW PTC Input 2	Motor Temperature
24	+24V DC (Not available on 115 VAC Versions)	-
25	Digital In Common	-
26	24V Common (Not available on 115 VAC Versions)	-
27	Digital In 1	Stop - CF
28	Digital In 2	Start
29	Digital In 3	Function Loss
30	Digital In 4	Jog
31	Digital In 5	Auto/Man
32	Digital In 6 (Can be set for hardware enable)	Speed Sel 1

Encoder Terminals

Terminal	Signal Name	Function
1	Encoder A	Channel A Input
2	Encoder A (NOT)	Channel A Differential Input
3	Encoder B	Channel B Input
4	Encoder B (NOT)	Channel B Differential Input
5	Encoder Z	Channel Z Input (Marker Pulse)
6	Encoder Z (NOT)	Channel Z Differential Input (Marker Pulse)
7	+12 VDC/5 VDC Common	250mA Power Supply for encoder
8	+12 VDC/5 VDC Output	

Power Terminals

Terminal	Signal Name	Function
BR1	DC Brake (+)	DB Resistor Connection
BR2	DC Brake (-)	DB Resistor Connection
DC+	DC Bus (+)	DC Bus Connection
DC-	DC Bus (-)	DC Bus Connection
PE	PE Ground	Protective Earth
	Motor Ground	Motor Ground
R (L1)	R/L1	AC Line Power
S (L2)	S/L2	Three-Phase = R, S & T
T (L3)	T/L3	Single-Phase = R & S Only
U (T1)	U/T1	To Motor
V (T2)	V/T2	To Motor
W (T3)	W/T3	To Motor
PS+	AUX (+) (Frames 5 & 6 Only)	Auxiliary Control Voltage
PS-	AUX (-) (Frames 5 & 6 Only)	Auxiliary Control Voltage

Output Ratings

240 VAC

Model Number		Frame	Output Amps @ 110% OL Duty			Nominal Power Ratings				Application Data		
			240 VAC			110% OL Duty (Variable Torque Applications)		150% OL Duty (Constant Torque Applications)		Input KVA @240 VAC	Input Amps @240 VAC	Watts Loss @ 4 kHz @240 VAC
			Cont	1 Min	3 Sec	kW	HP	kW	HP			
6V21	-2P2xx	0	2.2	2.4	3.3	0.37	0.5	0.25	0.33	0.7	1.7	46
	-4P2xx	0	4.2	4.8	6.4	0.75	1	0.55	0.75	1.4	3.3	61
	-6P8xx	1	6.8	9	12	1.5	2	1.1	1.5	2.4	5.9	77
	-9P6xx	1	9.6	10.6	14.4	2.2	3	1.5	2	3.4	8.3	98
	-015xx	1	15.3	16.8	23	4	5	2.2	3	5.7	13.7	179
	-022xx	1	22	24.2	33	5.5	7.5	4	5	8.3	19.9	208
	-028xx	2	28	33	44	7.5	10	5.5	7.5	10.7	25.7	269
	-042xx	3	42	46.2	63	11	15	7.5	10	16	38.5	368
	-052xx	3	52	63	80	15	20	11	15	19.8	47.7	436
	-070xx	4	70	78	105	18.5	25	15	20	26.7	64.2	698
	-080xx	4	80	105	140	22	30	18.5	25	30.5	73.2	876
	-104xx	5	104	115	175	30	40	22	30	40.6	98	967
	-130xx	5	130	143	175	37	50	30	40	50.7	122	1270
	-154xx	6	154	169	231	45	60	37	50	60.1	145	1496
	-192xx	6	192	211	288	55	75	45	60	74.9	180	1993
	-260xx	6	260	286	390	66	100	55	75	96.6	233	2255

480 VAC

Model Number		Frame	Output Amps @ 110% OL Duty			Nominal Power Ratings				Application Data		
			480 VAC			110% OL Duty (Variable Torque Applications)		150% OL Duty (Constant Torque Applications)		Input KVA @480 VAC	Input Amps @480 VAC	Watts Loss @ 4 kHz @480 VAC
			Cont	1 Min	3 Sec	kW	HP	kW	HP			
6V41	-1P1xx	0	1.1	1.2	1.6	0.37	0.5	0.25	0.33	0.7	0.9	53
	-2P1xx	0	2.1	2.4	3.2	0.75	1	0.55	0.75	1.4	1.6	63
	-3P4xx	0	3.4	4.5	6	1.5	2	1.1	1.5	2.2	2.6	76
	-5P0xx	0	5	5.5	7.5	2.2	3	1.5	2	3.2	3.9	93
	-8P0xx	0	8	8.8	12	4	5	2.2	3	5.7	6.9	164
	-011xx	0	11	12.1	16.5	5.5	7.5	4	5	7.9	9.5	194
	-014xx	1	14	16.5	22	7.5	10	5.5	7.5	10.4	12.5	218
	-022xx	1	22	24.2	33	11	15	7.5	10	16.6	19.9	326
	-027xx	2	27	33	44	15	20	11	15	20.6	24.8	394
	-034xx	2	34	40.5	54	18.5	25	15	20	25.9	31.2	441
	-040xx	3	40	51	68	22	30	18.5	25	30.5	36.7	459
	-052xx	3	52	60	80	30	40	22	30	39.7	47.7	610
	-065xx	3	65	78	104	37	50	30	40	49.6	59.6	717
	-077xx	4	77	85	116	45	60	37	50	60.1	72.3	930
	-096xx	5	96	106	144	55	75	45	60	74.9	90.1	1107
	-125xx	5	125	138	163	55	100	45	75	97.6	117	1479
	-156xx	6	156	172	234	93	125	75	100	122	147	1845
	-180xx	6	180	198	270	110	150	100	125	141	169	2204
	-248xx	6	248	273	372	132	200	110	150	194	233	2512

WALL/MACHINE/PANEL MOUNT DRIVES

- Motor Power Rating: 0.5 to 100 HP (0.33 to 75 kW)
- Input Voltage: 200-208, 240 VAC, 50/60 Hz
- Enclosure: NEMA 1 Ventilated/IP20
- Mounting: Wall/Machine – Panel Mount as IP20

200 - 240 VAC, 50/60 Hz Input: Ratings 0.5 to 100 HP

NEMA 1/IP20 Model Number	Frame Size	24 V Inputs	115 V Inputs	Brk Trans	Horsepower Rating		Drive Amps @ 240 V (3)			List
					110% OL	150% OL(1)	Continuous (2)	1 Min.	3 Sec.	
					VT Applications	CT Applications				
6V21-080TA	4	x		inc.	30	25	80	105	140	**$ 5,751**
6V21-260NA	6	x			100	75	260	286	390	**18,673**

(1) Overload of 150% of rated current for 1 minute dependent on actual motor full load amps versus drive continuous amp rating.
(2) Rated for 240 VAC input and 4 kHz switching frequency (260 Amp Unit @ 2kHz)
(3) See amp rating chart for currents @ 208 VAC.

- Motor Power Rating: 0.5 to 200 HP (0.33 to 150 kW)
- Input Voltage: 380, 400, 415 & 480 VAC, 50/60 Hz
- Enclosure: NEMA 1 Ventilated/IP20
- Mounting: Wall/Machine – Panel Mount as IP20
- Standard LCD OIM Keypad Included
- Encoder Feedback Included
- Zero clearance side by side mounting

380 - 480 VAC, 50/60 Hz Input: Ratings 0.5 to 200 HP 200 HP

NEMA 1/IP20 Model Number	Frame Size	24v	115v	Brk Trans	Horsepower Rating		Drive Amps @ 480 V(3)			List
					110% OL	150% OL(1)	Continuous(2)	1 Min.	3 Sec.	
					VT Applications	CT Applications				
6V41-1P1TA	0	x		inc.	0.5	0.33	1.1	1.2	1.6	**$1,711**
6V41-5P0TA	0	x		inc.	3	2	5	5.5	7.5	**1,711**
6V41-011TA	0	x		inc.	7.5	5	11	12.1	16.5	**2,205**
6V41-027TA	2	x		inc.	20	15	27	33	44	**3,536**
6V41-065TA	3	x		inc.	50	40	65	78	104	**7,753**
6V41-096NA	5	x		TA	75	60	96	106	144	**9,511**
6V41-156NA	6	x			125	100	156	172	234	**12,766**
6V41-248TA	6	x		x	200	150	248	273	372	**20,020**

(1) Overload of 150% of rated current for 1 minute dependent on actual motor full load amps versus drive continuous amp rating.
(2) Rated for 480VAC input and 4 kHz switching frequency (248 Amp Unit @ 2kHz)
(3) See amp rating chart for currents @ 400 VAC.

DISCOUNT VS-1AC

GV6000 Options

The GV6000 Product Family is easily modified with a full line of optional kits and accessories including communications, resistors, filters, OIMs and cables.

Braking Resistor Kits - Low Energy

Frames 0, 1, and 2 GV6000 drives include mounting provisions for low-energy braking resistors. Dependent upon the drive power rating, these resistors will provide momentary braking capacities of about 6 - 10% duty cycle, enough to handle most simple deceleration needs as well as speed overshoot correction. Consider other braking options from the GV3000/SE section of this catalog should more braking capacity be required.

208-240 VAC Braking Resistors			
Model Number	**Frame**	**Brake Resistance**	**List**
6XX2-DB1-1	1 (2-5 Hp)	62 Ohms	**$156**
6XX2-DB2-1	1 (7.5 Hp)	22 Ohms	**156**

380-480 VAC Braking Resistors			
Model Number	**Frame**	**Brake Resistance**	**List**
6XX4-DB1-0	0	115 Ohms	**$156**

Communication Modules - Network Options

Network connectivity can be achieved by adding one of the options listed below:

Model Number	Description	List
RECOMM-CNET	ControlNet	**$468**
RECOMM-PBUS	Profibus	**494**
RECOMM-IBUS	Interbus-S	**676**
RECOMM-485	RS485 DF1	**307**

CE & C-Tick External Mount EMC Compliance Filter Kits

GV6000 drives are designed to meet Global Industry Standards, including those of Europe (CE) and Australia (C-Tick). EMC compliance for both conducted and radiated noise emissions can be met with internally mounted EMC filters included in each drive per the below table.

Also be sure to follow recommended wiring practices for drives and motors as identified in our product manuals as well as those of each region.

Drive Input Voltage	Frame	CE Filter
208-230V AC	0-3	Yes
208-230V AC	4-6	Yes
380-460V AC	0-6	Yes
600V AC	0-6	Yes

Note: CE Certification testing has not been performed on 600V class drives.

V*S Utilities Monitoring and Configuration Software

This windows-based software package allows online configuration and monitoring of the GV6000 AC drives. This software utility allows the user to upload, download, monitor and compare parameter values in a user-friendly environment. VS Utilities runs under Windows 98/NT/ME/2000/XP.

V*S Utilities Features:

- Custom views for monitoring selected parameters
- Compare drive parameter settings to:
  Defaults
  Saved files
- Point-to-point or multi-drop capabilities (serial network or EtherNet)
- Built-in online help

Note: Software requires the RECOMM-232 serial converter.

The RECOMM-232 serial converter comes standard with a one meter cable. The cable length can be extended by:

- Replacing the RECBL-M10 with a longer cable (see table).
- Extending the cable with extension option.

DPI cables, drive side of converter box, cannot exceed 10 meters

(DPI = Drive Peripheral Interface).

Software/Serial Converter Model No. **RECOMM-VSU232.** **$437**
Software ONLY Model Number: **RECOMM-VSUTIL**. **154**

DISCOUNT VS-1AC

GV6000 Accessories

Model Number	Description	Length	List
RECBL-M03	DPI cable (male to male; locking mini DIN) (converter to drive cable)	0.33 m	**$42**
RECBL-M10		1.0 m	**47**
RECBL-M30		3.0 m	**57**
RECBL-M90		9.0 m	**83**
RECBL-F03	DPI cable (male to female; locking mini DIN) (drive cable extension)	0.33 m	**42**
RECBL-F10		1.0 m	**47**
RECBL-F30		3.0 m	**57**
RECBL-F90		9.0 m	**83**
1202-TB-KIT-SET	DPI Screw Terminal Adapter Kit for extending remote OIM connections up to 100 meters (Includes two screw terminal adapters)	n/a	**120**
1202-CBL-KIT-100M	DPI Screw Terminal Adapter Kit w/Cable for extending remote OIM connections up to 100 meters (Includes two screw terminal adapters, tools, and 100M shielded cable)	n/a	**364**
RECBL-SSP	1 to 2-port DPI splitter cable	n/a	**67**
RECBL-LCD	OIM LCD external-mount harness (Hirose to DIN)	n/a	**52**
RECOMM-VSU232	VS Utilities and RECOMM-232	n/a	**437**

m=meters

Note: Drive DPI is a female mini-din connector. In order to connect to this port you need a male mini-din connector.
OIMs have a Hirose connector (only one type of Hirose connector is used).

Note: DPI Screw Terminal Kits are to be utilized when a remote OIM is to be located more than 10 meters from the drive.
DPI Screw Terminal Kits can be used with RE4ALCD or REZL-N1 OIM kits (not usable with RE4LCD-PNL)

Model Number	Description	List
6VKYPD-STD	Standard OIM	**$182**
6VKYPD-N4	Remote NEMA 4 OIM	**302**
REBLNKOIM	Blank Insert	**11**

OIMs

Five OIM kits are available:

- 6VKYPD-STD, which is the standard keypad shipped with the drive (14-button)
- 6VKYPD-FN, which is the full numeric keypad (23-button)
- 6VKYPD-N4, which is the remote NEMA 4 door mountable keypad (16-button)
- REBLNKOIM, which is the blank insert that can be utilized in the drive cover when the OIM is not present
- REBZL-N1, which is the door mountable bezel kit to remotely mount either the drive mounted keypad or the full-numeric keypad

SP500 General Purpose AC Drive

1 Hp	**115 VAC**	**1 Phase - 50/60 Hz**
1 thru 5 Hp	**208-230 VAC**	**3 Phase - 50/60 Hz**
1 thru 20 Hp	**380-460 VAC**	**3 Phase - 50/60 Hz**
1 thru 10 Hp	**575 VAC**	**3 Phase - 50/60 Hz**

Applications: Variable torque, constant torque or constant horsepower applications. New installations, replacements and original equipment manufactures (OEM).

Features: Volts per Hertz Control with peak overload capacity of 150% for one minute. Flexible mounting options NEMA 1 or NEMA 4X/12. Integral keypad, operator interface and local speed control. Basic set of less than 30 programming parameters. Power ratings from 1 Hp to 5 Hp 230Vac, 20 Hp 460 Vac and 10 Hp 575 Vac.

Performance Features	Control Modes	V/Hz Control
	Operator Interface Module	Integral Drive Mounted
	Display Lines	4-Character LED display
	Programmable Preset Speeds	Three
	Analog Output	One (0-10 VDC)
	Auto Restart	Yes - Up to 10 attempts
	Frequency Avoidance	One Band
	Fault History	Last Three Faults
	Digital Inputs	Dedicated control terminals for start/stop, forward/reverse and fault/reset
Drive Specifications	Analog Input	One: 0-10VDC or 4-20 mA
	Digital Output	One Form C Relay
	Maximum Load	20 Hp @ 460 VAC
	Overload Capacity	Drive Output 150% for One Minute
	Input Voltage Ranges	115VAC, 208-230VAC, 380-460VAC and 575VAC
	Input Voltage Tolerance	10% / -10%
	Rated Input Frequency	50-60 Hz (±5%)
	Carrier Frequency	4, 6 or 8 kHZ
	Operating Temperature	-10° to 40°C
	Volts/Hz	Linear or Custom V/Hz
	Frequency Control Range	0 to 240 Hz
	Accel/Decel Range	0.5 to 90 Seconds
	Keypad Speed Control	Yes
Protective Features	Function Loss	Function loss input open
	High Bus Voltage	DC bus voltage above trip level
	Low Bus Voltage	DC bus voltage below trip level
	Over Current, short circuit or ground fault	Drive output exceeds 200% rating
	Thermostat/Drive Overload	Excess drive temperature
	Electronic Thermal Overload	Exceed Drive rating of 150% for One Minute
Agency Certifications		UL, cUL, CE
Service Conditions	Altitude	1,000 m (3,300 ft.) Maximum
	Ambient Temperature	0°C (32°F) to 40°C (104°F)
	Storage Temperature	-40°C +65°C (-40° to +149°F)
	Relative Humidity	5% to 95%, non-condensing
	Intermittent Overload	150% overload capacity for up to 1 minute; 200% instantaneous overload

SP500 General Purpose AC Drive

Catalog Number	Frame	Hp	Output Current	List Price	Mult. Sym.	V*S Alternate (a)
208-230V, 50/60 Hz, 3-Phase Input (230 V, 3-Phase Output) – NEMA 1 (Green Enclosure)						
1SU21005	C	5	14.2	1,353	VS1AC	VS1MD25+ VS1MD-NM1C
380-480V, 50/60 Hz, 3-Phase Input (460 V, 3-Phase Output) – NEMA 1 (Green Enclosure)						
1SU41020	D	20	27	4,012	VS1AC	VS1PF420-9+VS1PFNM1C
575V, 50/60 Hz, 3-Phase Input (575 V, 3-Phase Output) – NEMA 1 (Green Enclosure)						
1SU51007	C	7-1/2	9	2,116	VS1AC	VS1SP57-1B

Dimensions

Frame	Height Inches (mm)	Width Inches (mm)	Depth Inches (mm)	Weight lb (kg)
A	12 (305)	5.7 (146)	4.8 (122)	7 (3.2)
B	11.1 (282)	8.8 (224)	6.25 (159)	12 (5.4)
C	13.3 (338)	11 (280)	6.25 (159)	18 (98.20)
D	18.3 (465)	11.4 (290)	9.4 (239)	25 (11.3)

Mains Filter

Mains Filter (AC line filter for CE requirements) is housed in a compact NEMA 1 (IP21) enclosure designed for mounting between the wall or back panel and the SP500. Pre-drilled and tapped holes are provided on the filter enclosure for mounting the SP500. Incoming AC power must be routed into the top of the filter. Outgoing AC power is then routed from the bottom of the filter to the bottom of the SP500. Mounting hardware and flying leads from the Mains Filter are provided.

Mains Filter 2DF2282 is rated for 1-phase or 3-phase, 50/60 Hz, 250 VAC max. Mains filters 2DF4283, 2DF4284 and 2DF4285 are rated for 3-phase, 50/60 Hz, 500 VAC max.

Hp	SP500 Model Number	Mains Filter Model Number	List Price	Mult. Sym.
3	**1SU21003**	**2DF4283**	735	VS1AC
5	**1SU21005**	**2DF4283**	735	VS1AC
7-1/2	**1SU41007**	**2DF4284**	827	VS1AC
10	**1SU41010**	**2DF4284**	827	VS1AC
15 (1)	**1SU41015**	**2DF4285**	2,160	VS1AC
20 (1)	**1SU41020**	**2DF4285**	2,160	VS1AC

(1) For 15 Hp and 20 Hp SP500, a cover kit and a filter kit are both required to conform to CE requirements.

Low Energy Snubber Braking Kit

Low Energy Snubber Braking Kit provides rapid deceleration of the drive motor by providing 150% intermittent braking of the motor. The kit dissipates the power regenerated by the motor during deceleration through resistors.

The braking resistors are sized to provide a maximum of three stops per minute, taking 4 seconds for a complete stop when the motor is connected to a load that has six times the NEMA motor inertia. The kits are provided in a separate enclosure for field wiring.

SP500 Voltage	SP500 Hp Rating	Kit Model Number	Resistor Wattage	Style	List Price	Mult Symb.
460	15-20	**2DB4020**	1600	C	1,808	VS1AC

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Hp	SP500 Model Number	Mains Filter Model Number	List Price	Mult. Sym.
3	**1SU21003**	**2DF4283**	**735**	VS1AC
5	**1SU21005**	**2DF4283**	**735**	VS1AC
7-1/2	**1SU41007**	**2DF4284**	**827**	VS1AC
10	**1SU41010**	**2DF4284**	**827**	VS1AC
15 (1)	**1SU41015**	**2DF4285**	**2,160**	VS1AC
20 (1)	**1SU41020**	**2DF4285**	**2,160**	VS1AC

(1) For 15 Hp and 20 Hp SP500, a cover kit and a filter kit are both required to conform to CE requirements.

Low Energy Snubber Braking Kit

Low Energy Snubber Braking Kit provides rapid deceleration of the drive motor by providing 150% intermittent braking of the motor. The kit dissipates the power regenerated by the motor during deceleration through resistors.

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SP500 Voltage	SP500 Hp Rating	Kit Model Number	Resistor Wattage	Style	List Price	Mult Symb.
460	15-20	**2DB4020**	1600	C	**1,808**	VS1AC

GV3000 Vector Drive

1 thru 100 Hp **230 VAC** **3 Phase - 50/60 Hz**
1 thru 400 Hp **460 VAC** **3 Phase - 50/60 Hz**

Applications: Constant torque or constant horsepower applications. New installations, replacements and original equipment manufacturers (OEM).

Features: NEMA 1, NEMA 4, NEMA 12, IP20, and IP00 enclosures. Output frequency 0 to 200 Hz with peak overload capacity of 150%. Digital speed or torque control. Built-in PID process control loop. Automatic tuning to motor and full rated torque down to zero speed.

Input Ratings	Voltage	230	460
	Voltage Range	180-264	340-528
	Phase	3 Phase	
	Frequency	50/60 Hz +5%	
	Impedance	Line reactor needed for supplies with greater than 30,000 amp symmetrical fault capacity	
Output Ratings	Horsepower	1-100 Hp @ 230VAC, 3PH; 1-400 Hp @ 460VAC, 3 PH;	
	Overload Capacity	Heavy Duty (Constant Torque) = 150% for 60 seconds, 200% for 3 seconds	
		Normal Duty (Variable Torque) = 110% for 60 seconds and 150% overload for 3 seconds.	
	Frequency	0-200 Hz	
	Voltage	0 to maximum input voltage (RMS)	
Protective Features	Trip	Microprocessor checksum, over current, over voltage, under voltage, over temperature (motor or control), output shorted or grounded, motor overload, encoder loss.	
	External Output	LED trip condition indicators codes, fault relay output	
	Short Circuit	Phase to phase, phase to ground	
	Electronic Motor Overload	Meets UL508C (I^2T)	
Environmental Conditions	Temperature	0° to 40°C, NEMA 1;0° to 50°C, Power Module IP00	
	Cooling	Forced air	
	Enclosure	NEMA 1, NEMA 4X, NEMA 12, IP20 and IP00	
	Altitude	Sea level to 3300 Feet (1000 Meters)	
	Humidity	NEMA1: 5% to 95% RH Non-Condensing; NEMA 4X To 100% RH Condensing	
	Storage Temperature	-40 to +65°C	
Keypad Display	Display	4 digit bright 7-segment LED readout; 14 discrete LED indicators	
	Keys	9 key membrane with tactile feedback	
	Functions	Output status monitoring, Digital speed control, Parameter setting and display, Diagnostic and Fault log display, Motor run and jog, Auto/Manual toggle	
	LED Indicators	Forward run command, Reverse run command, Jog active, Auto/Manual Indication, Monitor display indication	
	Remote Mount	Optional remote mountable LCD keypad, full text display, multi-language support, quick start menu, NEMA 12 rating, 5 meter distance capable with included cable	
	Trip	Last 10 trips retained in memory with elapsed time stamp	
Control Specifications	Control Method	Microprocessor controlled PWM output, selectable encoderless vector, sensorless vector or V/Hz inverter	
	PWM Frequency	Selectable 2KHz, 4KHz (Standard), or 8KHz	
	Frequency Setting	±10 VDC, 0-10 VDC, 4-20 mA or 0-20 mA; digital (keypad); Serial Communications (via option); RS-232 via CS3000 Software	
	Accel/Decel	0-999.9 seconds	
	Motor Matching	Automatic tuning to motor with manual override	
	PC Setup Software	CS3000 Software available using the RS-232 port for commissioning, parameter viewer, scope capture and cloning	
	Maximum Output Frequency	200 Hz	
Motor Feedback	Feedback Type	Incremental encoder coupled to motor shaft	
	Pulses/Rev	512 PPR, 1024 PPR (Standard), 2048 PPR, 4096 PPR, SE (No encoder - sensorless vector operation)	
	Input Type	2 channel in quadrature, 15 VDC, differential	
	Power Supply for Encoder	15 VDC, 250 mA maximum	
	Max. Frequency	125 KHz	
Analog Inputs	One Differential	±10VDC, 0-10VDC, 4-20 mA or 0-20 mA, 10-bit + sign	
	Input Impedance	50 kOhms (Volt mode); 250 Ohms (Current mode)	
Analog Outputs	Analog Outputs	1 Assignable	
	Full Scale Range	0-10V or 4-20mA	
	Source Current	1 mA maximum (volt mode), 20mA (using external supply or +15V encoder supply)	
	Resolution	9 bits	
Digital Inputs	Quantity	3 Assignable, 5 dedicated inputs (Function Loss, Run/Jog, Reset, Stop, Start)	
	Rated Voltage	24VDC Nominal Utilizing Internal 24VDC Isolated Power Supply	
	Update Rate	75mSec ~ 126mSec (depending on input and whether V/Hz or Vector mode)	
Relay Outputs	Rated Voltage	250VAC/30VDC maximum	
	Maximum Current	5A maximum resistive / 2 amps maximum inductive	
	Output Conditions	7 Programmable Conditions	

GV3000 Closed Loop Vector NEMA 1 Enclosure

Catalog Number	Heavy Duty				Normal Duty				List Price	Mult. Sym.	V*S Alternate (a)
	Hp	kW	Cont. Amps	Peak Amps	Hp	kW	Cont. Amps	Peak Amps			
230 Volts - Three Phase Input											
2V2160	2	1.5	8.5	12.8	2	1.5	8.5	9.4	1,615	VS1AC	VS1GV22-1B
15V2160	15	11	53.3	80	15	11	53.3	58.6	3,721	VS1AC	VS1GV215-1B
460 Volts - Three Phase Input											
3V4160	3	2.2	5.3	8	3	2.2	5.3	5.8	1,718	VS1AC	VS1GV43-1B
10V4160	10	7.5	14.2	21.3	10	7.5	14.2	15.6	3,097	VS1AC	VS1GV410-1B
20V4160	20	15	27	40.5	20	15	27	29.7	4,677	VS1AC	VS1GV420-1B
25G4160	20	15	27	40.5	25	18.7	30.4	33.4	5,078	VS1AC	VS1GV425-1B
50R4160	40	30	56	84	60	45	72	79.2	15,513	VS1AC	VS1GV450-1B
75R4160	60	45	71	106.5	75	56	93	102.3	15,513	VS1AC	VS1GV460-1B
75T4160 (b)	60	45	71	106.5	75	56	93	102.3	19,004	VS1AC	VS1GV4100-1B
125R4160	100	75	122	183	125	93	168	184.8	29,021	VS1AC	VS1GV4150-1T
200V4160	200	150	240	360	200	150	240	264	30,186	VS1AC	VS1GV4200-1T
250V4160	250	187	302	453	250	187	302	332.2	33,372	VS1AC	VS1GV4250-1T
300V4160	300	224	361	541.5	300	224	361	397.1	39,602	VS1AC	VS1GV4300-1T
350V4160	350	261	414	621	350	261	414	455.4	41,646	VS1AC	VS1GV4350-1T
400V4160	400	298	477	525	400	298	477	525	45,418	VS1AC	VS1GV4400-1T
460 Volts - Three Phase Input with Disconnect Switch											
200V4160DS	200	150	240	360	200	150	240	264	32,940	VS1AC	
250V4160DS	250	187	302	453	250	187	302	332.2	35,910	VS1AC	
300V4160DS	300	224	361	541.5	300	224	361	397.1	42,653	VS1AC	
350V4160DS	350	261	414	621	350	261	414	455.4	44,697	VS1AC	
400V4160DS	400	298	477	525	400	298	477	525	48,469	VS1AC	

(a) Review dimension and application/IO functionality for complete compatibility. Contact your local district office for assistance.
(b) Model 75T4160 includes a built-in RFI filter to meet CE component standards.

GV3000 Closed Loop Vector NEMA 4 Enclosure

Catalog Number	Heavy Duty				Normal Duty				List Price	Mult. Sym.	V*S Alternate (a)
	Hp	kW	Cont. Amps	Peak Amps	Hp	kW	Cont. Amps	Peak Amps			
230 Volts - Three Phase Input											
2V2460	2	1.5	8.5	12.8	2	1.5	8.5	9.4	1,646	VS1AC	VS1GV22-4B
3V2460	3	2.2	12.3	18.5	3	2.2	12.3	13.5	1,713	VS1AC	VS1GV23-4B

GV3000 Closed Loop Vector NEMA 12 Enclosure

Catalog Number	Heavy Duty				Normal Duty				List Price	Mult. Sym.	V*S Alternate (a)
	Hp	kW	Cont. Amps	Peak Amps	Hp	kW	Cont. Amps	Peak Amps			
230 Volts - Three Phase Input											
7V2260	7.5	5.6	26.9	40.4	7.5	5.6	26.9	29.6	**2,231**	VS1AC	VS1GV27-4B
15V2260	15	11	53.3	80	15	11	53.3	58.6	**3,738**	VS1AC	VS1GV215-4B
20V2260	20	15	69.6	104.4	20	15	69.6	76.6	**4,611**	VS1AC	VS1GV220-1B
460 Volts - Three Phase Input											
15V4260	15	11.2	21	31.5	15	11.2	21	23.1	**3,977**	VS1AC	VS1GV415-4B
20V4260	20	15	27	40.5	20	15	27	29.7	**4,727**	VS1AC	VS1GV420-4B
60G4260	50	37.3	67	100.5	60	45	78	85.8	**12,372**	VS1AC	—

GV3000 Closed Loop Vector Power Module (Open) Enclosure

Catalog Number	Heavy Duty				Normal Duty				List Price	Mult. Sym.	V*S Alternate (a)
	Hp	kW	Cont. Amps	Peak Amps	Hp	kW	Cont. Amps	Peak Amps			
230 Volts - Three Phase Input											
30V2060	30	22.4	105	157.5	30	22.4	105	115.5	**9,153**	VS1AC	VS1GV230-1B
40V2060	40	30	135	202.5	40	30	135	148.5	**9,669**	VS1AC	VS1GV240-1B
50V2060	50	37.3	150	225	50	37.3	150	165	**10,834**	VS1AC	VS1GV250-1B
60V2060	60	45	195	292.5	60	45	195	214.5	**12,904**	VS1AC	VS1GV260-1B
75V2060	75	56	245	367.5	75	56	245	269.5	**13,979**	VS1AC	—
100V2060	100	75	275	412.5	100	75	275	302.5	**16,184**	VS1AC	—
460 Volts - Three Phase Input											
30V4060	30	22.4	40	60	30	22.4	40	44	**7,074**	VS1AC	VS1GV430-1B
40V4060	40	30	54	81	40	30	54	59	**7,818**	VS1AC	VS1GV440-1B
50V4060	50	37.3	67	100	50	37.3	67	74	**8,813**	VS1AC	VS1GV450-1B
60V4060	60	45	78	117	60	45	78	86	**10,192**	VS1AC	VS1GV460-1B

GV3000 Closed Loop Vector Amp Rated IP20 Bookshelf Enclosure

Catalog Number	Heavy Duty		Normal Duty		List Price	Mult. Sym.	V*S Alternate (a)
	Cont. Amps	Peak Amps	Cont. Amps	Peak Amps			
460 Volts - Three Phase Input w/0 EMI Filter							
31ER4060	2.1	3.2	3.1	3.4	**1,804**	VS1AC	VS1GV41-1B
38ER4060	3.1	4.7	3.8	4.2	**1,827**	VS1AC	VS1GV42-1B
460 Volts - Three Phase Input w/EMI Filter							
31ET4060	2.1	3.2	3.1	3.4	**2,044**	VS1AC	—
38ET4060	3.1	4.7	3.8	4.2	**2,090**	VS1AC	—
55ET4060	3.8	5.7	5.5	6.1	**2,124**	VS1AC	—
240ET4060	16.5	24.8	24	26.4	**3,737**	VS1AC	—
300ET4060	22	33	30	33	**4,682**	VS1AC	—

(a) Review dimension and application/IO functionality for complete compatibility. Contact your local district office for assistance.

GV3000 Accessories and Kits

Catalog Number	Description	List Price	Mult. Sym.
	NEMA 1 Kits		
2CK4160	25-60Hp NEMA 1 CE Compliance Cover	**378**	VS1AC
2CK4100	NEMA1 Conversion Kit for 75-100Hp 460V IP00 GV3000 Drives	**702**	VS1AC
2CK4125	NEMA1 Conversion Kit for 125Hp 460V IP00 GV3000 Drives	**767**	VS1AC
2CK4200	NEMA1 Conversion Kit for 150-200Hp 460V IP00 GV3000 Drives	**821**	VS1AC
	Accessories and Options		
2SI3000	GV3000/SUPER RMI CARD	**621**	VS1AC
2NB3000	Interbus - S Network Board	**880**	VS1AC
2TC3025	Encoder feedback cable 10 pin MS Dynapar H20 25'	**185**	VS1AC
2TC4025	Encoder feedback cable 26 pin MS Tamagawa FA Series 25'	**195**	VS1AC
2TC4075	Encoder feedback cable 16 pin MS Tamagawa FA Series 75'	**345**	VS1AC
2TC4100	Emcpder feedbacl cab;e pm;u/ Bare emds 100'	**345**	VS1AC
2CS3000	Configuration Software Exec. For GV30000 FP3000	**350**	VS1AC
2CS3000	Configuration Software Exec. for GV30000 FP3000	**350**	VS1AC
2CA3000	9 pin to 9 pin interface cable	**120**	VS1AC
2CA3001	25 pin to 9 pin adapter cable	**120**	VS1AC

(a) Review dimensions and applicagtion/IO functionality for complete compatibility. Contact your local distric office for assistance.

BRAKING, LOOSE SNUBBER RESISTOR KITS FOR GV3000/SE BOOKSHELF

Resistor Sizing Data for GV3000/SE Bookshelf Drives with Built-in Braking Transistor
(Maximum Braking Power and Permitted Braking Resistors)

GV3000/SE Bookshelf Model Number	Maximum Drive Input Voltage	Turn-on Voltage[1]	Turn-off Voltage[1]	Maximum Braking Current	Resistor Minimum Ohms	Braking Power Continuous	Braking Power @ 25% Duty Cycle
31ER/31ET4060	460	750	720	6 Amps	125	4500 W	4500 W
38ER/38ET4060	460	750	720	6 Amps	125	4500 W	4500 W
55ER/55ET4060	460	750	720	6 Amps	125	4500 W	4500 W
85ER/85ET4060	460	750	720	6 Amps	125	4500 W	4500 W
126ER/126ET4060	460	750	720	10 Amps	75	7500 W	7500 W
150ER/150ET4060	460	750	720	10 Amps	75	7500 W	7500 W
240ER/240ET4060	460	750	720	15 Amps	50	11000 W	11000 W
300ER/300ET4060	460	750	720	20 Amps	37.5	15000 W	15000 W
430ER/430ET4060	460	750	720	30 Amps	25	22000 W	22000 W

(1)The Turn-on and Turn-off voltages will be proportional to the incoming line power to the GV3000/SE.

Use the pre-packaged Snubber Resistor Braking Kits in the table below or contact a local snubber resistor supply house for alternate size loose resistors for panel mounting.

Model Number M3575RH5B
Snubber Resistor Kit

Snubber Resistor Kit Sizing for GV3000/SE Bookshelf

Snubber Resistor Kits can be connected to the GV3000/SE Bookshelf drive's built-in braking transistor for dissipation of regenerative energy as heat. By selecting the proper resistor, the user can optimize the braking performance of the drive package.
Note: Resistor maximum "on" rating is 60 seconds.

GV3000/SE Bookshelf Model Number	Braking HP	Braking Duty Cycle	Snubber Resistor Module Model Number	Cabinet Dimen. (inches) (inches) W x H x D	Peak Braking Watts	Continuous Braking Watts	Resistor Load Ohms	Amp Rating	List
31ER/31ET4060 38ER/38ET4060 55ER/55ET4060 85ER/85ET4060	1	6%	M3575RH1M	4 x 12.75 x 8.7	746	50	780	1	**$695**
	1	20%	M3575RH1MF	4 x 12.75 x 8.7	746	150	780	1	**834**
	2	6%	M3575RH2M	4 x 12.75 x 8.7	1492	100	390	2	**736**
	2	20%	M3575RH2MF	4 x 12.75 x 8.7	1492	300	390	2	**886**
	3	20%	M3575RH3MF	4 x 12.75 x 8.7	2238	450	260	3	**942**
	4	20%	M3575RH4MF	7 x 12.75 x 8.7	2984	600	195	4	**1,025**
	5	6%	M3575RH5B	4 x 17.75 x 8.7	4000	200	150	5	**865**
	5	20%	M3575RH5BF	4 x 17.75 x 8.7	4000	800	150	5	**1,056**
	6	6%	M3575RH6M	7 x 12.75 x 8.7	4476	300	130	6	**958**
	6	20%	M3575RH6MF	7 x 12.75 x 8.7	4476	900	130	6	**1,123**
126ER/126ET4060 150ER/150ET4060	8	6%	M3575RH8B	4 x 17.75 x 8.7	6000	300	90	8	**973**
	8	20%	M3575RH8BF	4 x 17.75 x 8.7	6000	1200	90	8	**1,138**
	9	6%	M3575RH9M	10 x 12.75 x 8.7	6714	450	87	9	**1,128**
	9	20%	M3575RH9MF	10 x 12.75 x 8.7	6714	1350	87	9	**1,391**
300ER/300ET4060	16	6%	M3575RH16B	7 x 17.75 x 9.2	12000	600	45	16	**1,148**
430ER/430ET4060	24	6%	M3575RH24B	10 x 17.75 x 9.7	18000	900	30	24	**1,257**

DISCOUNT VS-1AC

BRAKING, LOOSE SNUBBER TRANSISTOR KITS & SNUBBER RESISTOR KITS

Snubber Transistor Braking Kits - Transistor Only, Protected Enclosure (IP20) Type

For deceleration of high inertia loads as well as for correction of speed command overshoot, Snubber Transistor Braking Kits provide the circuitry needed to connect to the DC bus and to a matched resistor package for regulation of regenerative energy.
These snubber transistor circuits are packaged in wall mountable, protected enclosures with IP20 type connections.

Note: Maximum "on" rating is 60 seconds.

AC Line Voltage	Snubber Model Number	Amps DC RMS	Minimum Load Ohms	Cabinet Style	List
230	M3575TL15	15	25	M3	$1,338
	M3575TL30	30	12.5	M3	1,571
	M3575TL60	60	6.25	M4	1,854
460	M3575TH75	75	10	M4	1,854
	M3575TH125	125	6	B4	2,879
	M3575TH150	150	5	B4	3,682
	M3575TH200	200	3.75	B7	4,120
	M3575TH300	300	2.5	B7	4,429
	M3575TH600	600	1.25	B7	6,086

Cabinet Style	Enclosed Dimensions - Inches			
	Style	Width	Height	Depth
M3	Wall	3.00	12.75	8.70
M4	Wall	4.00	12.75	8.70
M7	Wall	7.00	12.75	8.70
M10	Wall	10.00	12.75	8.70
B4	Wall	4.00	17.75	8.00
B5	Wall	5.65	17.75	8.00
B7	Wall	7.00	17.75	8.00
B10	Wall	10.00	17.75	8.00
B10D	Wall	10.00	17.75	11.70
G1	Floor	25.00	38.00	22.00
G2	Floor	25.00	47.00	22.00
G3	Floor	25.00	56.00	22.00

Model Number M3575TH15 Snubber Transistor Kit
and Model Number M3575H5B Snubber Resistor Kit

INSTRUCTION MANUAL

D2-3439

(1) List price is for resistor module only

DISCOUNT VS-1AC

Snubber Resistor Kits - Resistor Only, Protected Enclosure (IP20) Type

Snubber Transistor Kits require a resistor for dissipation of regenerative energy as heat. By selecting the proper resistor, the user can optimize the braking performance.

Note: Maximum "On" rating is 60 seconds.

Braking HP	Duty Cycle	Snubber Resistor Module Model Number	Use with Transistor Module Model Number	Cabinet Style	Braking Watts		Load Ohms	Amp Rating	List[1]
					Peak	Cont.			
230 V Snubber Resistor Kits									
1	6%	M3575RL1M	M3575TL15	M4	746	50	190	2	**$690**
1	20%	M3575RL1MF	M3575TL15	M4	746	150	190	2	**834**
2	20%	M3575RL2MF	M3575TL15	M4	1492	300	95	4	**886**
3	6%	M3575RL3M	M3575TL15	M4	2238	150	63	6	**788**
3	6%	M3575RL3B	M3575TL15	B4	1989	100	75	5	**721**
3	20%	M3575RL3MF	M3575TL15	M4	2238	450	63	6	**987**
3	20%	M3575RL3BF	M3575TL15	B4	1989	400	75	5	**878**
4	6%	M3575RL4M	M3575TL15	M7	2984	200	48	8	**855**
4	20%	M3575RL4MF	M3575TL15	M7	2984	600	48	8	**1,025**
5	6%	M3575RL5B	M3575TL15	B4	3979	200	38	10	**783**
5	20%	M3575RL5BF	M3575TL15	B4	3979	800	38	10	**932**
6	6%	M3575RL6M	M3575TL15	M7	4476	300	32	12	**958**
6	20%	M3575RL6MF	M3575TL15	M7	4476	900	32	12	**1,128**
8	20%	M3575RL8BF	M3575TL15	B4	5968	1200	25	15	**989**
9	6%	M3575RL9M	M3575TL30	M10	6714	450	21	18	**1,123**
9	20%	M3575RL9MF	M3575TL30	M10	6714	1350	21	18	**1,396**
11	6%	M3575RL11B	M3575TL30	B7	7957	400	19	20	**922**
11	20%	M3575RL11BF	M3575TL30	B7	7957	1600	19	20	**1,159**
16	6%	M3575RL16B	M3575TL60	B7	11936	600	13	31	**1,051**
16	20%	M3575RL16BF	M3575TL60	B7	11936	2400	13	31	**1,282**
24	6%	M3575RL24B	M3575TL60	B10	17904	900	8	47	**1,262**
24	20%	M3575RL24BF	M3575TL60	B10	17094	3600	8	47	**1,571**
460V Snubber Resistor Kits									
1	6%	M3575RH1M	M3575TH15	M4	746	50	780	1	**$695**
1	20%	M3575RH1MF	M3575TH15	M4	746	150	780	1	**834**
2	6%	M3575RH2M	M3575TH15	M4	1492	100	390	2	**736**
2	20%	M3575RH2MF	M3575TH15	M4	1492	300	390	2	**886**
3	20%	M3575RH3MF	M3575TH15	M4	2238	450	260	3	**942**
4	20%	M3575RH4MF	M3575TH15	M7	2984	600	195	4	**1,025**
5	6%	M3575RH5B	M3575TH15	B4	4000	200	150	5	**865**
5	20%	M3575RH5BF	M3575TH15	B4	4000	800	150	5	**1,056**
6	6%	M3575RH6M	M3575TH15	M7	4476	300	130	6	**958**
6	20%	M3575RH6MF	M3575TH15	M7	4476	900	130	6	**1,123**
8	6%	M3575RH8B	M3575TH15	B4	6000	300	90	8	**973**
8	20%	M3575RH8BF	M3575TH15	B4	6000	1200	90	8	**1,138**
9	6%	M3575RH9M	M3575TH15	M10	6714	450	87	9	**1,128**
9	20%	M3575RH9MF	M3575TH15	M10	6714	1350	87	9	**1,391**
16	6%	M3575RH16B	M3575TH30	B7	12000	600	45	16	**1,148**
24	6%	M3575RH24B	M3575TH30	B10	18000	900	30	24	**1,257**
27	20%	M3575RH27BF	M3575TH30	B10	21800	4000	25.7	27	**1,700**
33	20%	M3575RH33BF	M3575TH75	B10D	2500	4920	22.5	32	**1,868**
50	20%	M3575RH50G1F	M3575TH75	G1	40000	8000	14	53	**5,361**
100	20%	M3575RH100G2F	M3575TH125	G2	80000	16000	7	106	**6,983**

BRAKING, PRE-PACKAGED SNUBBER TRANSISTOR/ RESISTOR KITS

Complete Snubber Transistor Resistor Brake Kits NEMA 1 Enclosed

For Deceleration of High Inertia Loads as well as for correction of speed command overshoot. Snubber Resistor Kits dissipate excess DC Bus energy into heat, thereby allowing quick step change commands in both acceleration and deceleration.

Snubber Resistor Kits include both the transistor circuitry and resistor elements in a wall mountable open ventilated enclosure.

Note: Maximum "On" rating is 60 seconds.

For sizing instructions, refer to the calculations on page D-xvi.

Snubber Resistor Module

Style	Enclosed Dimensions		
	Height	Width	Depth
B	18.2 (476)	9.5 (241)	8.5 (216)
C	18.2 (476)	11.5 (292)	10.5 (267)

Drive Rating	Snubber Model Number	Cabinet Style	Resistance Value	Cont. Watt Dissipation	Instant. Watt Dissipation	Continuous Duty Cycle	List
1 HP, 230 V	**2SR20400**	B	30	400	4,000	50%	**$2,508**
2 HP, 230 V	**2SR20400**	B	30	400	4,000	30%	**2,508**
3 HP, 230 V	**2SR20400**	B	30	400	4,000	20%	**2,508**
	2SR21200	B	10	1,200	12,000	50%	**2,925**
5 HP, 230 V	**2SR21200**	B	10	1,200	12,000	30%	**2,925**
	2SR21800	C	6	1,800	18,000	50%	**3,744**
7-1/2 HP, 230 V	**2SR21200**	B	10	1,200	12,000	30%	**2,925**
	2SR21800	C	6	1,800	18,000	50%	**3,744**
10 HP, 230 V	**2SR21200**	B	10	1,200	12,000	20%	**2,925**
	2SR21800	C	6	1,800	18,000	40%	**3,744**
1 HP, 460 V	**2SR40400**	B	120	400	4,000	50%	**2,699**
2 HP, 460 V	**2SR40400**	B	120	400	4,000	30%	**2,699**
3 HP, 460 V	**2SR40400**	B	120	400	4,000	20%	**2,699**

DISCOUNT VS-1AC

BRAKING, LOOSE SNUBBER TRANSISTOR KITS & RESISTOR INFORMATION

Snubber Transistor Braking Kits - Transistor Only, Enclosed Chassis

For deceleration of high inertia loads as well as for correction of speed command overshoot, Snubber Transistor Braking Kits provide the circuitry needed to connect the drive's DC bus to a matched resistor package for regulation of regenerative energy.

Model Number M3452H150B7 Snubber Transistor Kit

These snubber transistor circuits are designed to be utilized in engineered applications. Matching the appropriate resistor package then allows the user to optimize the braking capacity of the snubber based on peak and continuous loads. Be sure to follow the minimum resistance values provided in the table. Using resistances lower than the published data will result in excess current being allowed through the circuit and damaging the snubber transistor.

AC Line Voltage	Snubber Model Number	Max Amps DC	Min. Ohms	Max. On Time	UL Listed	Cabinet Style(1)	List
230	**2ST20019**	No longer available, see page 43 for alternate selections					
460	**2ST40009**	No longer available, see page 43 for alternate selections					
	2ST40125	Use **M3452H150B7**					
	M3452H150B7	150	5	Continuous	Yes	B7	**4,272**
	M3452H200K6	200	3.8	Continuous	Yes	K6	**4,748**
	2ST40300	Use **M3452H300K6**					
	M3452H300K6	300	2.5	Continuous	Yes	K6	**5,126**
	M3452H600K6	600	1.25	60 Seconds	Ues	K6	**6,606**

(1) See page D-64 for Cabinet Dimensions

INSTRUCTION MANUAL

D2-3291

Snubber Resistor Selection Information - For use with the Snubber Transistor Kits

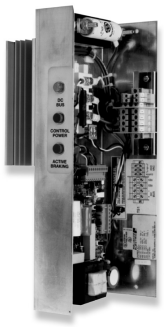
Snubber Transistor Kits require a resistor for dissipation of regenerative energy as heat. By selecting the proper resistor, the user can optimize the braking performance of the drive system. The following table provides resistor sizing information based on application horsepower and duty cycle. Resistors must be purchased from the selection on page D-65 or from a local resistor supply house.

HP	Duty	Snubber Transistor Model Number	Resistor Min. Ohms	Resistor Max. Ohms	Approx. Resistor KW
75-100	100%	**M3452H150B7**	5	7	75
125-200	20%	**M3452H150B7**	5	17	30
	60%	**M3452H150B7**	5	6	90
	100%	**M3452H200K6**	3.8	4	150
250	40%	**M3452H150B7**	5	7	75
	60%	**M3452H150B7**	5	6	112
	80%	**M3452H200K6**	3.8	4	150
	100%	**M3452H300K6**	2.5	3	187
300	40%	**M3452H150B7**	5	6.5	90
	50%	**M3452H150B7**	5	5.5	112
	60%	**M3452H200K6**	3.8	4	135
	100%	**M3452H300K6**	2.5	3	224
350	40%	**M3452H150B7**	5	5.5	104
	60%	**M3452H300K6**	2.5	4	157
	80%	**M3452H300K6**	2.5	3	208
400	20%	**M3452H150B7**	5	9	60
	75%	**M3452H300K6**	2.5	3	225

BRAKING, LOOSE SNUBBER TRANSISTOR KITS & RESISTOR INFORMATION

Snubber Transistor Braking Kits - Transistor Only, Open Frame Type

For deceleration of high inertia loads as well as for correction of speed command overshoot, Snubber Transistor Braking Kits provide the circuitry needed to connect the drive's DC bus to a matched resistor package for regulation of regenerative energy.



Model Number 2ST40027 Snubber Transistor Kit

These snubber transistor circuits are designed to be mounted into another enclosure in engineered applications. Matching the appropriate resistor package then allows the user to optimize the braking capacity of the snubber based on peak and continuous loads. Be sure to follow the minimum resistance values provided in the table. Using resistances lower than the published data will result in excess current being allowed through the circuit and damaging the snubber transistor.

AC Line Voltage	Snubber Model Number	Amps DC RMS	Min. Ohms	Max. On Time	UL Listed	List
230	**2ST20019**	19	20	120 sec	No	**$1,420**
460	**2ST40009**	9	75	Cont.	No	**1,640**
	2ST40125	125	6	120 sec.	No	**3,185**
	2ST40300	300	25	Cont	No	**4,140**

(1) See page D-64 for Cabinet Dimensions

Snubber Resistor Selection Information - For use witgh the Snubber Transistor Kits

Snubber Transistor Kits require a resistor for dissipation of regenerative energy as heat. By selecting the proper reisgtor, the use can opgtimize the brakingb performance of the drive system. The following table provides resistor sizing information based on application horsepower and duty cycle. Resisgtors ust be purchased from a local resistor supply house.

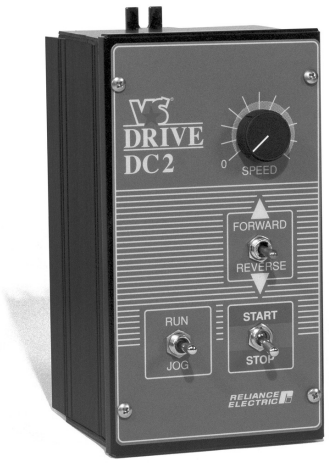
HP	Duty	Snubber Transistor Mode Number	Resistor Min. Ohms	Resisgtor Max. Ohms	Approx. Resistor KW
1 - 5	60%	**2ST20019**	30	58	3
	100%	**2ST20019**	20	35	3.75
7-1/2 - 10	60%	**2ST20019**	20	29	3.75
75 - 100	100%	**2ST40125**	6	7	75
125 - 200	20%	**2ST40125**	6	7	75
250	40%	**2ST40125**	6	7	75
	100%	**2ST40300**	2.5	3	187
300	40%	**2ST40125**	6	6.5	90
	100%	**2ST40300**	2.5	3	224
350	20%	**2ST40125**	10	11	52
	80%	**2ST40300**	2.5	3	208
400	60%	**2ST40300**	2.5	3	179

INSTRUCTION MANUAL

D2-3291

DC2 DC Drives for 1/4 thru 2 Hp PMDC and Shunt Wound Motors

1/4-2 Hp **115/230 VAC** **1 Phase 50/60 Hz.**



Applications: General purpose industrial use with Permanent Magnet or Shunt Wound DC Motors.

Features: General purpose industrial use. Available in open chassis, plate style, NEMA 12 or NEMA 4/4X. Operates from either local or remote operator controls for added mounting flexibility, (Note: reversing drives are local control only). All models have a single, surface mount design, printed circuit board. Jumper reconnection for Line voltage, Horsepower, Feedback, "S" curve, and Zero speed. Adjustments for Min and Max speed, Current Limit, IR drop Compensation, and Accel/Decel rate. 20:1 constant torque speed range, 30:1 constant torque speed range with tachometer feedback.

1/4 - 1Hp @ 115 VAC 90 VDC Armature, 50 VDC Field (a)

1/2 - 2Hp @ 230 VAC 180 VDC Armature, 100 VDC Field (a)

Regulator Type	Catalog Number	List Price	Mult. Sym.	BC Series Alternate (b)(e)
Open Chassis, DC2 Series 40				
Torque Regulator	**DC2-43U**	400	VS3DC	

NOTE: Conduit hole plugs are standard on NEMA 12K designs. Conduit hubs are standard on NEMA 4/12 designs only. Conduit hubs for either design can be ordered through Renewal Parts by referencing Reliance Part Number 608826-2A.

(a) Jumper selection for 115VAC / 90 VDC or 230 VAC / 180 VDC.
(b) Instrument Interface units also provide auxiliary control relay contact rated 0.6 Amps @ 125 VAC for customer use. Aux. relay not available on BC Series Signal Isolation Option Boards.
(c) DC2 Series 50 Drive must be mounted to a metal surface 18" by 18" to meet 1hp @115 VAC and 2HP @ 230 VAC or an optional heat sink (HS1-50) can be purchased.
(d) Switch reversing DC2 models include as standard an installed line fuse.
(e) Review dimensions and applications I/O functionality for complete compatibility. Contact your local district office for assistance.
(f) Catalog number indicates option kits factory installed for functional equivalent drive.

A transformer is mandatory for tachometer feedback operation using the Type RE-020 20.8 VDC/1000 RPM tachometer (Model Number R20E8000). The Type RE-007 (Model Number R07E1210) fully-isolated 7 VDC/1000 tachometer does not require an isolation transformer. Consult Instruction Manual D2-3231 for other recommended and mandatory use of isolation transformers.

Mounting Dimensions

Drive Style	Outside		Mounting		
	Height Inches (mm)	Width Inches (mm)	Depth Inches (mm)	Height Inches (mm)	Width Inches (mm)
Open Chassis DC2 Series 40	7.875 (200)	5.0 (128)	4.875 (125)	7.375 (188)	5.0 (128)

DC3N Non-Regenerative DC Drives

1/8 - 1Hp @ 115 VAC, 1-Ph, 50/60 Hz, 90 VDC Armature
1/4 - 2Hp @ 230 VAC, 1-Ph, 50/60 Hz, 180 VDC Armature

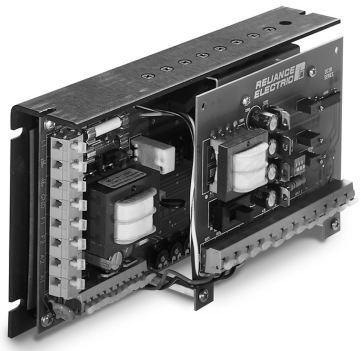
Hp Rating		Catalog Number	"Non-Isolated" Controller Selection – DC3N Enclosed Models – 115/230 VAC, 1 Phase, 50/60 Hz For the Operation of Permanent Magnet DC Motors Only							
115 VAC Input	230 VAC Input		Enclosure Type	Rated AC Line (Amps)	Input KVA	DC Armature Voltage	Rated Armature Current (Amps)	List Price	Mult. Sym.	BC Series Alternate (a)
1/8 to 1/2	—	DC3N-12D-01-010-AN	NEMA 1	4.5 to 7.8	0.5 to 0.9	90	2.7 to 5.0	250	VS3DC	BC140 + BC143 (b)
1/2 to 1.0	—		NEMA 1	7.8 to 13	0.9 to 1.5	90	5.0 to 10 **			
—	1/2 to 1.0		NEMA 1	2.6 to 7.0	0.6 to 1.6	180	1.4 to 5.0			
—	1.0 to 2.0		NEMA 1	7.0 to 12	1.6 to 2.8	180	5.0 to 9.2 **			

NOTE: ** Requires addition of Heatsink Kit Option: DC3N-HS-01 List Price: $124.00
External isolated reference source, 90 VDC Armature: 0-1.4 VDC reference and 180 VDC: 0-2.8 VDC reference
Instruction manual D2-3451
(a) Review dimensions and application I/O functionality for complete compatibility. Contact your local district office for assistance.
(b) BC143 Heatsink option required for 1 Hp @ 115 VAC or 2 Hp @ 230 VAC rating.
(c) Catalog number indicates option kits factory installed for functional equivalence.

DC3N Non-isolated Enclosed Style Overall Dimensions

Enclosure Style	Overall		
	Height Inches (mm)	Width Inches (mm)	Depth Inches (mm)
NEMA 1	8.00 (203)	6.00 (152)	3.46 (88)
NEMA 4X/12	8.20 (208)	6.90 (175)	4.50 (114)
Heatsink	**Height Inches (mm)**	**Width Inches (mm)**	**Length Inches (mm)**
DC3N-HS-00	1.0 (25)	4.40 (112)	6.90 (175)
DC3N-HS-01	1.0 (25)	7.78 (198)	6.90 (175)

DC3R Regenerative DC Drives



1/4 - 1Hp @ 115 VAC, 1-Ph, 50/60 Hz, 90 VDC Armature
1/2 - 2Hp @ 230 VAC, 1-Ph, 50/60 Hz, 180 VDC Armature

Hp Rating		Catalog Number	"Non-Isolated" Controller selection - DC3R Chassis model - 115/230 VAC, 1 Phase, 50/60 Hz For the operation of Permanent Magnet and Shunt wound DC Motors							
115 VAC Input	230 VAC Input		Chassis Type	Rated AC Line (Amps)	DC Armature Voltage	Rated Armature Current (Amps)	Motor Field Voltage	List Price	Mult. Sym.	BC Series Alternate (a)
Hp Rating		Catalog Number	"Isolated" Controller selection - DC3R Chassis model - 115/230 VAC, 1 Phase, 50/60 Hz							
1/4 to 1/2	—	DC3R-12D-00-010-AI	Plate	4.2 to 7.5	90	2.7 to 5.0	50/100	521	VS3DC	BC204 + BC215 + BC143 (b) or order as BC204-BPSI (c) with BC215 Bi-polar Signal Isolator
1/2 to 1.0	—		Plate	7.5 to 12.1	90	5.0 to 10***	50/100			
—	1/2 to 1.0		Plate	3.8 to 6.7	180	2.5 to 5.0	100/200			
—	1.0 to 2.0		Plate	6.7 to 11.7	180	5.0 to 9.2***	100/200			

NOTE: ***Requires addition of Heatsink Kit Option DC3R-HS-00. List Price, $149.00
Drive instruction manual D2-3453
DC3R Isolation Board Option instruction manual D2-3454
(a) Review dimensions and application I/O functionality for complete compatibility. Contact your local district office for assistance.
(b) BC143 Heatsink option required for 1 Hp @ 115 VAC or 2 Hp VAC rating.
(c) Catalog number indicates option kits factory installed for functional equivalence.

DC3R "Non-isolated" and "isolated" Plate Style Overall Dimensions

Style	Height Inches (mm)	Width Inches (mm)	Length Inches (mm)
Non-isolated	1.86 (47)	4.75 (120)	8.90 (226)
Isolated	3.12 (78)	4.75 (120)	8.90 (226)
Heatsink			
DC3R-HS-00	1.0 (25)	6.9 (175)	9.78 (248)

FlexPak 3000 Digital DC Drives

Applications: Three-phase DC drive for regenerative and non-regenerative industrial applications from 1-1/2 to 600 Hp

Features: Flexible design allows for adaptability and use in many demanding applications. The Operator Interface Module has a keypad panel and easy to read graphics LCD display. Simple to set up and use with a step by step "Quick Start" program. Operating status and diagnostic information as well as help text aids in set up and operation. The drive may be operated from the OIM or from a remotely mounted control station.

230 VAC, 50/60 Hz, Non-Regenerative; 1-1/2 Hp - 30 Hp
230 VAC drives use equivalent rated 460 VAC drives listed below with required 916FK0100 460 VAC/230 VAC conversion kits
240 VDC Armature; 150 VDC Field

Hp Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Catalog Number	Mult. Sym.	List Price
1-1/2	10	7	10	**3FN4042**	VS50D	**3,870**
5	19	20	10	**10FN4042**	VS50D	**3,885**

230 VAC, 50/60 Hz, Regenerative; 1-1/2 Hp - 30 Hp
230 VAC drives use equivalent rated 460 VAC drives listed below with required 916FK0100 460 VAC/230 VAC conversion kits
240 VDC Armature; 150 VDC Field

Hp Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Catalog Number	Mult. Sym.	List Price
1-1/2	10	7	10	**3FR4042**	VS50D	**4,380**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 230 VAC, (460 VAC Converted), catalog numbers, 1-1/2 through 30 Hp	10.65 (270.5)	18.79 (477.3)	12.23 (310.6)	58 (26.4)

FlexPak 3000 Digital DC Drives

230 VAC, 50/60 Hz, Non-Regenerative; 40 Hp - 75 Hp

230 VAC drives listed below use equivalent rated 460 VAC drives with required 916FK0200 460 VAC/230 VAC conversion kits.

240 VDC Armature; 150 VDC Field

Hp Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Catalog Number	Mult. Sym.	List Price
60	186	218	15	**125FN4042**	VS50D	**7,140**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 230 VAC catalog numbers, 40 through 75 Hp	18.11 (460)	490 (19.29)	13.46 (341.9)	122 (55)

FlexPak 3000 Digital DC Drives

230 VAC, 50/60 Hz, Regenerative; 100 Hp - 150 Hp
230 VAC catalog numbers do not exist for these Hp ratings. Use a 460 VAC drive at 2X Hp rating and reconnect control power transformer for 230VAC operation at startup.
240 VDC Armature; 150 VDC Field

Hp Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Catalog Number	Mult. Sym.	List Price
100	307	360	15	**200FB4042**	VS50D	**19,100**
150	443	521	15	**300FB4042**	VS50D	**20,300**

Dimensions Shown for 460 VAC Models

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 230 VAC drives, 100 through 150 Hp, (All 460 VAC catalog numbers, 200 through 300 Hp)	23.6 (599)	33.5 (850)	16.7 (424.7)	220.5 (100.0)

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

FlexPak 3000 Digital DC Drives

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	Catalog Number	Mult. Sym.	List Price
3	10	6	10	**3FN4042**	VS50D	**3,870**
10	18	19	10	**10FN4042**	VS50D	**3,885**

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	Catalog Number	Mult. Sym.	List Price
3	10	6	10	**3FR4042**	VS50D	**4,380**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 460 VAC catalog numbers, 3 through 60 Hp	10.65 (270.5)	18.79 (477.3)	12.23 (310.6)	58 (26.4)

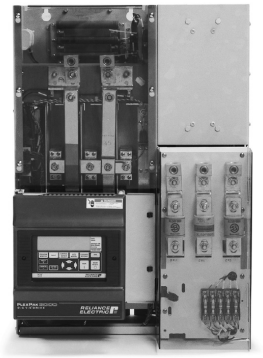
460 VAC, 50/60 Hz, Non-regenerative; 75 Hp-150 Hp
500 VDC Armature; 300 VDC Field

Hp Rating	Full Load RMS AC Line Current	Full Load Rated DC Armature Current	Rated Field Current	Catalog Number	Mult. Sym.	List Price
125	177	207	15	**125FN4042**	VS50D	**7,140**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 460 VAC catalog numbers, 75 through 150 Hp	18.11 (460)	19.29 (490)	13.46 (341.9)	122 (55)

FlexPak 3000 Digital DC Drives



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	Catalog Number	Mult. Sym.	List Price
200	281	330	15	**200FB4042**	VS50D	**19,100**
300	421	495	15	**300FB4042**	VS50D	**20,300**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 460 VAC catalog numbers, 200 through 300 Hp	23.6 (599)	33.5 (850)	16.7 (424.7)	220.5 (100)

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 Catalog Number	Mult. Sym.	List Price
400	567	667	15	**400FN4041**	VS50D	

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 Catalog Number (a)	Mult. Sym.	List Price
400	567	640	15	**400FR4041**	VS50D	**30,090**
500	680	800	15	**500FR4041**	VS50D	**30,600**
600	816	960	15	**600FR4041**	VS50D	**31,110**

Dimensions

Catalog Number	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
All 460 VAC catalog numbers, 400 through 600 Hp	26.68 (677.7)	42.25 (1149.2)	18.82 (478.1)	450 (204.5)

NOTE: (a) 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 OPTIONS section for description.

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

FlexPak 3000 Digital DC Drives

Special AC Line Voltage Drives (b)

For 380 VAC or 415 VAC input, select the required armature amps 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(b)

380 VAC 400 VDC Armature 250 VDC Field (a)		415 VAC 460 VDC Armature 270 VDC Field(a)		460 VAC 500 VDC Armature 300 VDC Field(a)		AC Amps	DC Armature Amps	DC Field Amps	Catalog Number	Mult. Sym.	List Price
Hp	kW	Hp	kW	Hp	kW						
2.4	1.8	2.8	2.1	3	2.2	10	7	10	**7FN3042**	VS50D	**4,380**
12	9	13.8	10.3	15	11.2	26	29	10	**29FN3042**	VS50D	**4,550**

(a) Hp and KW ratings are estimated.
(b) Requires use of nonstandard voltage DC motors. Contact Baldor-Reliance sales office for motor pricing assistance.

Dimensions

Catalog Number	Height Inches (mm)	Width Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
7 to 110A Rated Output	18.79 (477.3)	10.65 (270.5)	12.23 (310.6)	58 lb (26.4)

FlexPak 3000 Power Module Style Drives

Three-Phase DC Power Module Drive for Regenerative and Non-Regenerative Applications from 5 to 400 Hp

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. Keypad Operator Interface Module (OIM) must be ordered separately.

Hp at 460 VAC [a]	Nom. Current Rating [b][d]	Unit Type Current Rating [c][d]	Catalog Number	Mult. Sym.	List Price
Non-Regenerative Power Module					
29	50	60	**50FN8742**	VS50D	**3,685**
Regenerative Power Module					
29	50	60	**50FR8742**	VS50D	**4,080**
125	208	250	**200FR8742**	VS50D	**5,825**
400	667	800	**650FR8742**	VS50D	**11,525**

[a] Hp based on 40°C ambient & 460 VAC line input voltage at nominal rating. Derate at 1.5% per °C above 40°C
[b] Nominal current rating is 100% continuous operation with 50% overload capability.
[c] Unit-type current rating based on maximum continuous operation without overload.
[d] Field current regulator rating: 4A (25-60A Ratings), 10A (150-450A Ratings), 12A (800A Rating). Rating is based on unit-type amp rating.
Note: All ratings are based on 40°C Ambient

Power Module Style Drive Options

Description	Catalog Number	Mult. Sym.	List Price
Configuration Software (CS3000)	**2CS3000**	E8	**418**

Power Module Dimensions

Hp at 460 VAC Rating [a]	Nom. Current [b]	Unit Type Current Rating [c]	Width Inches (mm)	Height Inches (mm)	Depth Inches (mm)	Weight lbs (kg)
29	50	60	10.6 (269)	15.8 (400)	11.3 (287)	22 (10)
200	375	450	10.6 (270)	21.7 (550)	13.3 (337)	88 (40)
400	667	800	12.1 (306)	26.0 (660)	17.2 (436)	183 (83)

[a] Hp based on 40°C Ambient & 460 VAC line input voltage at Nominal Rating. Derate at 1.5% per °C above 40°C.
[b] Nominal Current Rating is 100% continuous operation with 50% overload capability.
[c] Unit Type Current Rating based on maximum continuous operation without overload.

FlexPak 3000 Power Module Style Drives

AC Line Disconnects for Chassis or NEMA Enclosed Drives

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

Incoming Line Voltage		Disconnect For Chassis Drives			Disconnect For Nema 1 Conversion Kit Mounting [a]		
230 VAC	460 VAC	Catalog Number	Mult. Sym.	List Price	Catalog Number	Mult. Sym.	List Price
1-1/2 - 25	3.50	**901FK0101**	VA500	**$555**	**902FK0101**	VS50D	**400**
30	60	**901FK0201**	VS50D	**660**			
40 - 60	75 - 125	**901FK1102**	VS50D	**1,350**			
75	150	**901FK1202**	VS50D	**2,100**	**901FK1212**	VS50D	**2,175**
100	200	**90FK2101**	VS50D	**2,500**	**-**	-	**-**
125 - 150	250 - 300	**901FK2201**	VS50D	**4,075**	**-**	-	**-**
-	400	**901FK2401**	VS50D	**5,070**	**-**	-	**-**
-	500	**901FK2401**	VS50D	**5,070**	**-**	-	**-**
-	600	**901FK2501**	VS50D	**7,625**	**-**	-	**-**

(a) Enclosure not included in price

Conversion Kit 460 VAC to 230 VAC

This kit contains control transformer fuses that allows the user to convert a 460 VAC FlexPak 3000 to a 230 VAC drive at on-half the 460 VAC horsepower rating. 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.

The Control Circuit Transformer must be re-connected for 230 VAC.

Contact a Baldor representative for assistance.

Catalog Number	This fuse kit will convert	Mult. Sym.	List Price Ordered with Drive	List Price Ordered Separately
916FK0200	FLEXPAK 3000, 75-150 Hp @ 460 VAC to Hp at 230 VAC	VS50D	**N/C**	**50**

FlexPak 3000 Drive Options
Dynamic Braking (DB)

Hp Rating	Catalog Number	Mult. Sym.	Kit List [a]
240 VDC Dynamic Braking Loose Parts Kit [c]			
3	**912FK0030**	VS50D	**850**
5	**912FK0050**	VS50D	**850**
7-1/2	**912FK0070**	VS50D	**885**
10	**912FK0100**	VS50D	**940**
15	**912FK0150**	VS50D	**940**
20	**912FK0200**	VS50D	**1,220**
25	**912FK0250**	VS50D	**1,220**
30	**912FK0300**	VS50D	**1,250**
40	**912FK0400**	VS50D	**1,500**
50	**912FK0500**	VS50D	**1,800**
60	**912FK0500**	VS50D	**1,800**
500 VDC Dynamic Braking Loose Parts Kit [c]			
3	**913FK0030**	VS50D	**880**
5	**913FK0050**	VS50D	**880**
7-1/2	**913FK0070**	VS50D	**880**
10	**913FK0100**	VS50D	**1,135**
15	**913FK0150**	VS50D	**1,135**
20	**913FK0200**	VS50D	**1,210**
25	**913FK0200**	VS50D	**1,210**
40	**913FK0400**	VS50D	**1,240**
75	**913FK0750**	VS50D	**1,850**
100	**913FK1000**	VS50D	**2,000**
125	**913FK1000**	VS50D	**2,200**
150	**913FK1500**	VS50D	**2,640**
200	**913FK2000**	VS50D	**4,900**
250	**913FK2500**	VS50D	**5,000**
300	**913FK3000**	VS50D	**5,000**
400	**913FK4000**	VS50D	**2,800 [b]**
500	**913FK5000**	VS50D	**3,000 [b]**
600	**913FK6000**	VS50D	**3,200 [b]**

(a) Includes D/B contactor and D/B resistors. Customer must supply fuses and 115 VAC power for contactor.
(b) Kit consists of resistors and enclosure only. Drive has DB pole on contactor as standard.
(c) This kit cannot be used with FlexPak 3000 Power Module drives. Contact your local Baldor•Reliance sales office for assistance.

FlexPak 3000 Drive Options

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 (WR2) 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.

HP Rating 240 VDC	HP Rating 500 VDC	Kit Catalog Number	Mult. Sym.	Kit List Price
1-1/2 - 2	3-5	**906FK0101**	VS50D	**775**
3-5	7.5-10	**906FK0201**	VS50D	**775**
7-1/2 - 10	15-20	**906FK0301**	VS50D	**775**
15-20	25-40	**906FK0401**	VS50D	**900**
25-30	50-60	**906FK0501**	VS50D	**950**
75	150	**906FK1201**	VS50D	**2,350**
100-150	200-300	**Standard on FB model drives.**		

(a) Included in drive price and must be specified with regenerative 400-600 Hp drives.

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.

Hp	Kit Catalog Number	Mult. Sym.	List Price
400-600	**918FK0601**	VS50D	**750**

FlexPak 3000 Drive Options

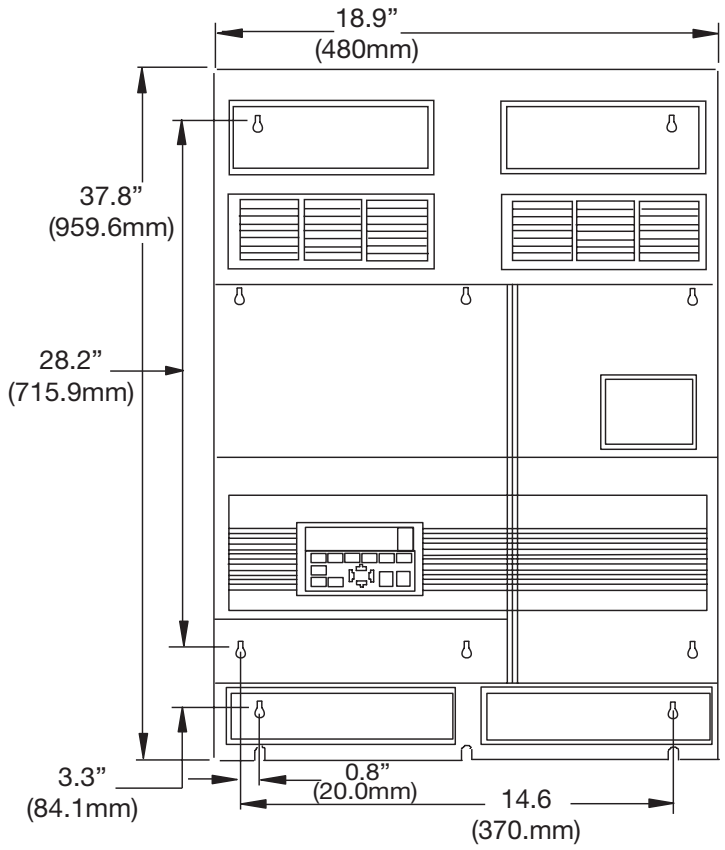
NEMA 1 Conversion Kit

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

HP Rating 230 VAC	HP Rating 460 VAC	Kit Catalog Number	Mult. Sym.	Kit List Price
40-75	75-150	**904FK0201**	VS50D	**1,100**
100-150	200-300	**N/A**	N/A	**N/A**
—	400-600	**N/A**	N/A	**N/A**

Dimensions

Hp Rating 230VAC	Hp Rating 460VAC	Width Inches (mm)	Height Inches (mm)	Attached Depth Inches (mm)
40-75	75-150	18.9 (480)	37.8 (959.6)	13.1 (332.8)



FlexPak 3000 Drive Options

Software Programming and RS-232 Cables

CS3000 Software, Control and Configuration

This is a Microsoft 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.

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 programming 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. [a]

Provided on a 3.5” diskette with manual. [b] Note that this software is also compatible with GV3000 AC drives.

Reference Manual Number: D2-3348

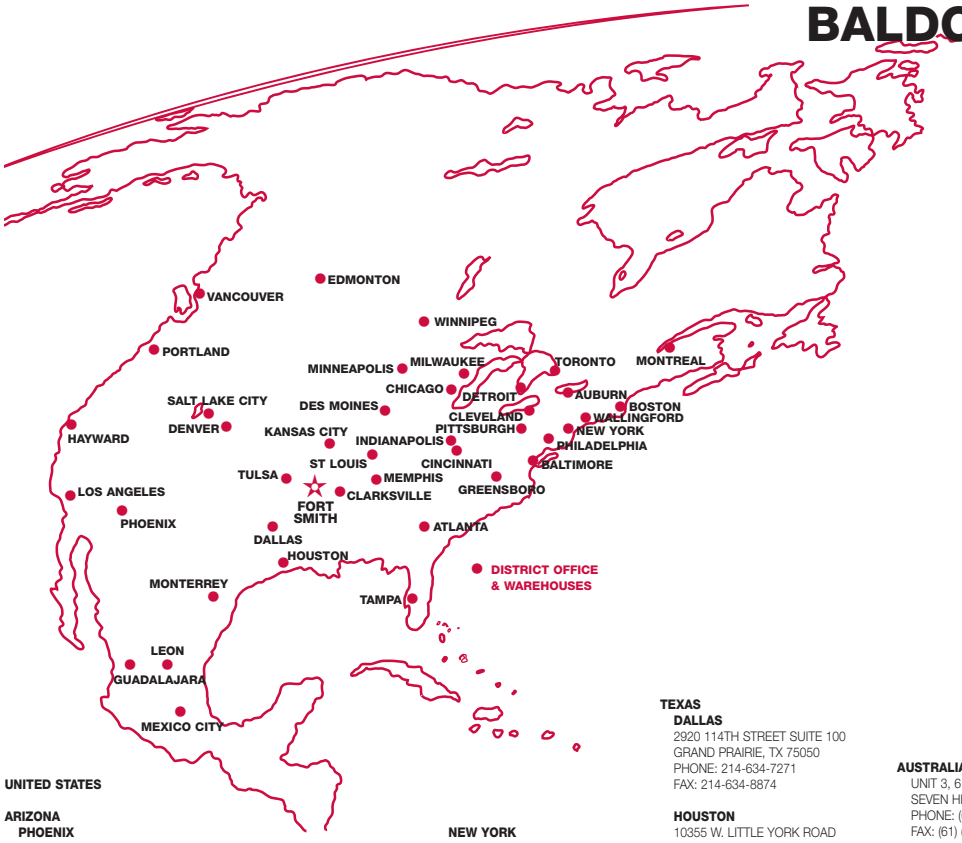
Catalog Number	Mult. Sym.	List Price
2CS3000 [c]	VS1AC	**418**

CS3000 Computer Cable

The 9-pin connector connects to the PC and the 25-pin connector connects to the FlexPak 3000 drive.
Model Number * **2CA3001**

[a] Requires V4.0 or later
[b] If a 3.5" disc drive is not available, contact your local Baldor•Reliance District Office for software package compatible with your PC storage.
[c] Requires Microsoft Windows 2000® or earlier version.

BALDOR SALES OFFICES



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