



Product Description

The SPX9000 Series Adjustable Frequency Drives from Eaton's electrical sector are specifically designed for high performance applications. Equipped with high processing power, the SPX9000 can use information from an encoder or a resolver in order to provide very precise motor control. Sensorless vector and simple frequency control are also supported. Typical applications requiring high performance are: master-slave drives, positioning applications, winder tension control and synchronization.

The core of the SPX9000 is a fast microprocessor, providing high dynamic performance for applications where good motor handling and reliability are required. It can be used both in open loop applications as well as in applications requiring encoder feedback.

The SPX9000 supports fast drive-to-drive communication. It also offers an integrated data logger functionality for analysis of dynamic events without the need of additional hardware. Simultaneous fast monitoring of several drives can be done by using the 9000Xdrive tool and CAN communication. In applications where reliability and quality are essential for high-performance, the SPX9000 is the logical choice.

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The Eaton family of drives includes HVX9000, H-Max, M-Max, SVX9000, SLX9000 and SPX9000. 9000X Series drive ratings are rated for either high overload (I_H) or low overload (I_L). I_L indicates 110% overload capacity for 1 minute out of 10 minutes. I_H indicates 150% overload capacity for 1 minute out of 10 minutes.

Features and Benefits

- Speed error <0.01%, depending on the encoder
- Incremental or absolute encoder support
- Encoder voltages of 5V (RS-422), 15V or 24V, depending on the option card
- Full torque control at all speeds, including zero
- Torque accuracy <2%; <5% down to zero speed
- Starting torque >200%, depending on motor and drive sizing
- Integrated datalogger for system analysis
- Fast multiple drive monitoring with PC
- Full capability for master/slave configurations
- High-speed bus (12 Mbit/s) for fast inter-drive communication
- High-speed applications (up to 7200 Hz) possible
- Robust design—proven 500,000 hours MTBF
- Integrated 3% line reactors standard on drives from FR4 through FR9
- Line reactor is included but is separated from chassis
- EMI/RFI Filters H standard up to 200 hp I_H 480V, 100 hp I_H 230V
- Simplified operating menu allows for typical programming changes, while programming mode provides control of everything
- Quick Start Wizard built into the programming of the drive ensures a smooth start-up
- Keypad can display up to three monitored parameters simultaneously
- LOCAL/REMOTE operation from keypad
- Copy/paste function allows transfer of parameter settings from one drive to the next
- Standard NEMA Type 12/IP54 keypad on all drives
- Hand-held auxiliary 240 power supply allows programming/monitoring of control module without applying full power to the drive
- The SPX can be flexibly adapted to a variety of needs using our pre-installed “Seven in One” precision application programs consisting of:
 - Basic
 - Standard
 - Local/remote
 - Multi-step speed control
 - PID control
 - Multi-purpose control
 - Pump and fan control with auto change
- Additional I/O and communication cards provide plug and play functionality
- I/O connections with simple quick connection terminals
- Control logic can be powered from an external auxiliary control panel, internal drive functions and fieldbus if necessary
- Brake chopper standard from: 1–30 hp/380–500V 3/4–15 hp/208–230V
- NEMA Type 1/IP21 enclosures available Frame Sizes FR4–FR11, NEMA Type 12/IP54 enclosures available Frame Sizes FR4–FR10 (FR10 and FR11 freestanding drives)
- Open chassis FR10 and greater
- Standard option board configuration includes an A9 I/O board and an A2 relay output board installed in slots A and B

Standards and Certifications

Product

- IEC 61800-2

Safety

- UL 508C

EMC (at default settings)

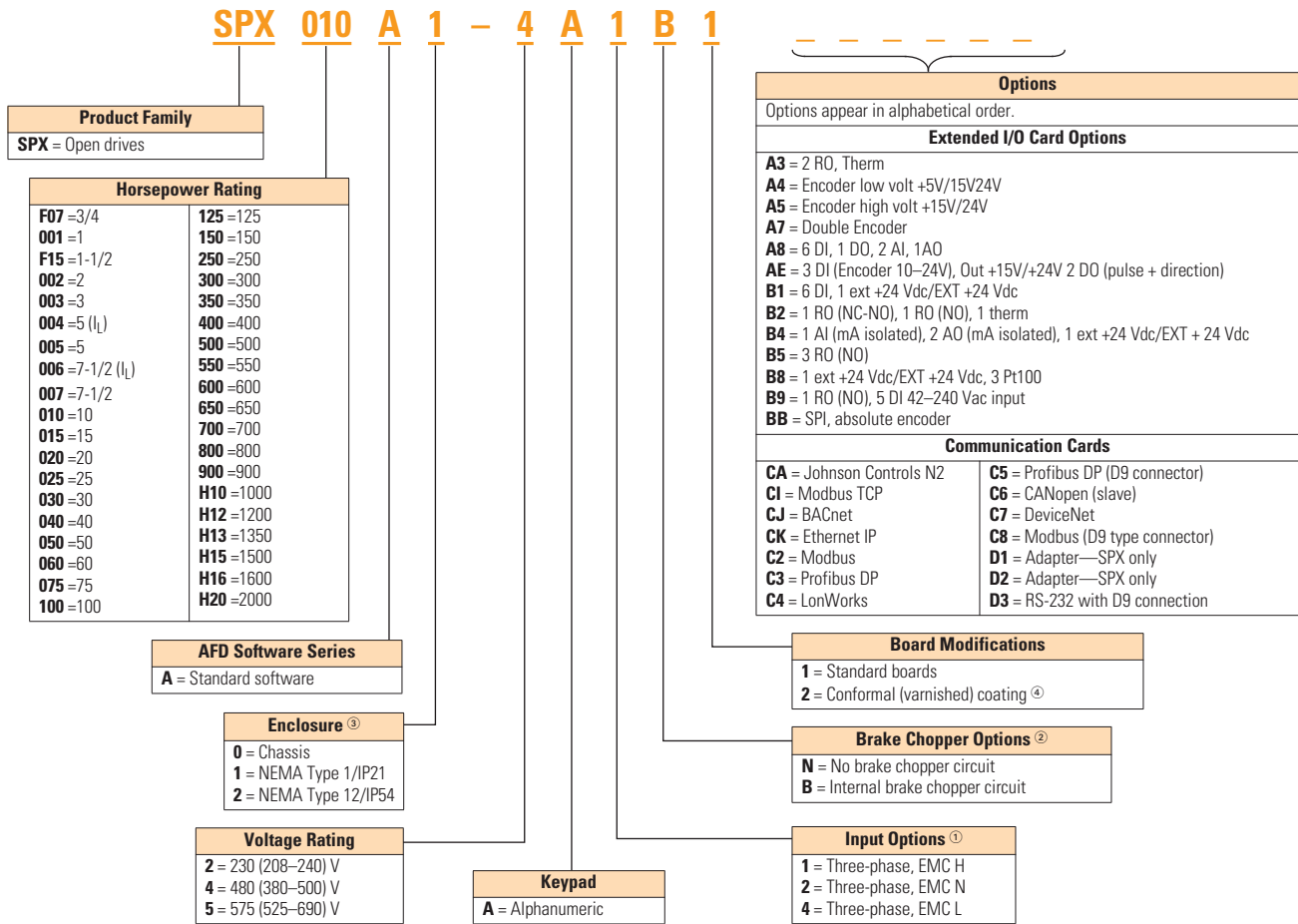
- Immunity: Fulfills all EMC immunity requirements; Emissions: EN 61800-3, LEVEL H

- UL Listed

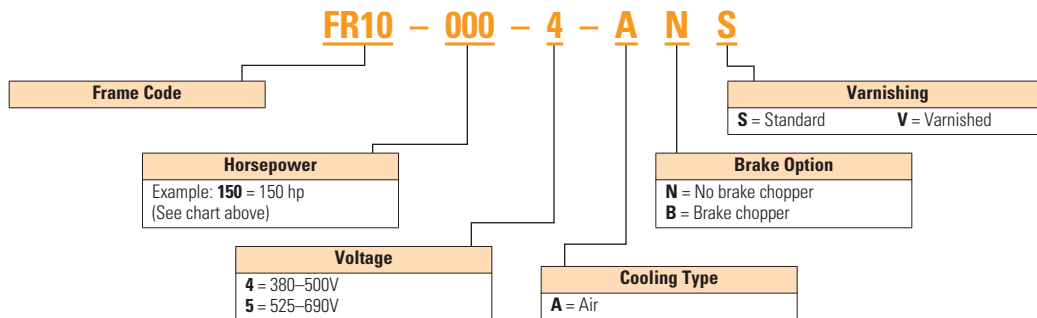


Catalog Number Selection

SPX9000 Adjustable Frequency Drives



Power Module



Notes

- All 230V drives and 480V drives up to 200 hp (I_L) are only available with input option 1 (EMC level H). 480V drives 250 hp (I_L) or larger are available with input option 2 (EMC level N). 575V drives 200 hp (I_L) or larger are available with input option 2. 575V drives up to 150 hp (I_L) are available with input option 4 (EMC level L). 480V and 690V freestanding drives are available with input option 4 (EMC level L).
- 480V drives up to 30 hp (I_L) are only available with brake chopper option B. 480V drives 40 hp (I_L) or larger come standard with brake chopper option N. 230V drives up to 15 hp (I_L) are only available with brake chopper option B. 230V drives 20 hp and larger come standard with brake chopper option N. All 575V drives come standard without brake chopper option (N). N = No brake chopper.
- 480V drives 250–350 hp (I_L) and 690V drives 200–300 hp (I_L) are available with enclosure style 0 (chassis). 480V and 690V FR10 freestanding drives are available with 1 (NEMA Type 1/IP21) or 2 (NEMA Type 12/IP54). FR11 freestanding drives are only available with enclosure style 1 (NEMA Type 1/IP21).
- Factory promise delivery. Consult sales office for availability.

Product Selection

230V Drives

SPX9000 Open Drives



208–240V, NEMA Type 1/IP21 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR4	FP	3/4	3.7	1	4.8	SPXF07A1-2A1B1
		1	4.8	1-1/2	6.6	SPX001A1-2A1B1
		1-1/2	6.6	2	7.8	SPXF15A1-2A1B1
		2	7.8	3	11	SPX002A1-2A1B1
		3	11	—	12.5	SPX003A1-2A1B1
FR5	FP	—	12.5	5	17.5	SPX004A1-2A1B1
		5	17.5	7-1/2	25	SPX005A1-2A1B1
		7-1/2	25	10	31	SPX007A1-2A1B1
FR6	FP	10	31	15	48	SPX010A1-2A1B1
		15	48	20	61	SPX015A1-2A1B1
FR7	FP	20	61	25	75	SPX020A1-2A1N1
		25	75	30	88	SPX025A1-2A1N1
		30	88	40	114	SPX030A1-2A1N1
FR8	FP	40	114	50	140	SPX040A1-2A1N1
		50	140	60	170	SPX050A1-2A1N1
		60	170	75	205	SPX060A1-2A1N1
FR9	FP	75	205	100	261	SPX075A1-2A1N1
		100	261	—	—	SPX100A1-2A1N1

208–240V, NEMA Type 12/IP54 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR4	FP	3/4	3.7	1	4.8	SPXF07A2-2A1B1
		1	4.8	1-1/2	6.6	SPX001A2-2A1B1
		1-1/2	6.6	2	7.8	SPXF15A2-2A1B1
		2	7.8	3	11	SPX002A2-2A1B1
		3	11	—	12.5	SPX003A2-2A1B1
FR5	FP	—	12.5	5	17.5	SPX004A2-2A1B1
		5	17.5	7-1/2	25	SPX005A2-2A1B1
		7-1/2	25	10	31	SPX007A2-2A1B1
FR6	FP	10	31	15	48	SPX010A2-2A1B1
		15	48	20	61	SPX015A2-2A1B1
FR7	FP	20	61	25	75	SPX020A2-2A1N1
		25	75	30	88	SPX025A2-2A1N1
		30	88	40	114	SPX030A2-2A1N1
FR8	FP	40	114	50	140	SPX040A2-2A1N1
		50	140	60	170	SPX050A2-2A1N1
		60	170	75	205	SPX060A2-2A1N1
FR9	FP	75	205	100	261	SPX075A2-2A1N1
		100	261	—	—	SPX100A2-2A1N1

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Adjustable Frequency Drives

SPX9000 Drives

480V Drives

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SPX9000 Open Drives



380–500V, NEMA Type 1/IP21 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR4	W	1	2.2	1-1/2	3.3	SPX001A1-4A1B1
	FP	1-1/2	3.3	2	4.3	SPXF15A1-4A1B1
	FP	2	4.3	3	5.6	SPX002A1-4A1B1
	W	3	5.6	5	7.6	SPX003A1-4A1B1
	W	5	7.6	—	9	SPX005A1-4A1B1
	FP	—	9	7-1/2	12	SPX006A1-4A1B1
FR5	W	7-1/2	12	10	16	SPX007A1-4A1B1
		10	16	15	23	SPX010A1-4A1B1
		15	23	20	31	SPX015A1-4A1B1
FR6	W	20	31	25	38	SPX020A1-4A1B1
		25	38	30	46	SPX025A1-4A1B1
		30	46	40	61	SPX030A1-4A1B1
FR7	FP	40	61	50	72	SPX040A1-4A1N1
	W	50	72	60	87	SPX050A1-4A1N1
	W	60	87	75	105	SPX060A1-4A1N1
FR8	FP	75	105	100	140	SPX075A1-4A1N1
	W	100	140	125	170	SPX100A1-4A1N1
	W	125	170	150	205	SPX125A1-4A1N1
FR9	W	150	205	200	261	SPX150A1-4A1N1
		200	245	250	300	SPX200A1-4A1N1

380–500V, NEMA Type 1/IP21 Freestanding Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	W	250	330	300	385	SPX250A1-4A4N1
	FP	300	385	350	460	SPX300A1-4A4N1
	W	350	460	400	520	SPX350A1-4A4N1
FR11	FP	400	520	500	590	SPX400A1-4A4N1
	FP	500	590	550	650	SPX500A1-4A4N1
	FP	550	650	600	730	SPX550A1-4A4N1

Note

Integrated fuses as standard. Limited option selection available; 115V transformer (KB), light kit (L1), HOA (K4), speed potentiometer w/HOA (K2), Disconnect switch (P2). See Freestanding Option selection on **Page V6-T36-111**.

SPX9000 Open Drives



380–500V, NEMA Type 12/IP54 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR4	W	1	2.2	1-1/2	3.3	SPX001A2-4A1B1
	FP	1-1/2	3.3	2	4.3	SPXF15A2-4A1B1
	FP	2	4.3	3	5.6	SPX002A2-4A1B1
	W	3	5.6	5	7.6	SPX003A2-4A1B1
	W	5	7.6	—	9	SPX005A2-4A1B1
	FP	—	9	7-1/2	12	SPX006A2-4A1B1
FR5	W	7-1/2	12	10	16	SPX007A2-4A1B1
		10	16	15	23	SPX010A2-4A1B1
		15	23	20	31	SPX015A2-4A1B1
FR6	W	20	31	25	38	SPX020A2-4A1B1
		25	38	30	46	SPX025A2-4A1B1
		30	46	40	61	SPX030A2-4A1B1
FR7	FP	40	61	50	72	SPX040A2-4A1N1
		50	72	60	87	SPX050A2-4A1N1
		60	87	75	105	SPX060A2-4A1N1
FR8	FP	75	105	100	140	SPX075A2-4A2N1
		100	140	125	170	SPX100A2-4A1N1
		125	170	150	205	SPX125A2-4A1N1
FR9	FP	150	205	200	261	SPX150A2-4A1N1
		200	245	250	300	SPX200A2-4A1N1

380–500V, NEMA Type 12/IP54 Freestanding Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	FP	250	330	300	385	SPX250A2-4A4N1
	FP	300	385	350	460	SPX300A2-4A4N1
	FP	350	460	400	520	SPX350A2-4A4N1

380–500V, Open Chassis Drives

Frame Size ^①	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	W	250	330	300	385	SPX250A0-4A2N1
		300	385	—	460	SPX300A0-4A2N1
		350	460	400	520	SPX350A0-4A2N1
FR11	FP	400	520	500	590	SPX400A0-4A2N1
		500	590	—	650	SPX500A0-4A2N1
		—	650	600	730	SPX550A0-4A2N1
FR12	FP	600	730	—	820	SPX600A0-4A2N1
		—	820	700	920	SPX650A0-4A2N1
		700	920	800	1030	SPX700A0-4A2N1
FR13	FP	800	1030	900	1150	SPX800A0-4A2N1
		900	1150	1000	1300	SPX900A0-4A2N1
		1000	1300	1200	1450	SPXH10A0-4A2N1
FR14	FP	1200	1600	1500	1770	SPXH12A0-4A2N1
		1600	1940	1800	2150	SPXH16A0-4A2N1

Notes

Integrated fuses as standard. Limited option selection available; 115V transformer (KB), light kit (L1), HOA (K4), speed potentiometer w/HOA (K2), disconnect switch (P2). See Freestanding Option selection on [Page V6-T36-111](#).

① FR10–FR14 includes 3% line reactor, but it is not integral to chassis.

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Adjustable Frequency Drives

SPX9000 Drives

575V Drives

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SPX9000 Open Drives



525–690V, NEMA Type 1/IP21 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR6	W	2	3.3	3	4.5	SPX002A1-5A4N1
		3	4.5	—	5.5	SPX003A1-5A4N1
		—	5.5	5	7.5	SPX004A1-5A4N1
		5	7.5	7-1/2	10	SPX005A1-5A4N1
		7-1/2	10	10	13.5	SPX007A1-5A4N1
		10	13.5	15	18	SPX010A1-5A4N1
		15	18	20	22	SPX015A1-5A4N1
		20	22	25	27	SPX020A1-5A4N1
		25	27	30	34	SPX025A1-5A4N1
FR7	W	30	34	40	41	SPX030A1-5A4N1
		40	41	50	52	SPX040A1-5A4N1
FR8	W	50	52	60	62	SPX050A1-5A4N1
		60	62	75	80	SPX060A1-5A4N1
		75	80	100	100	SPX075A1-5A4N1
FR9	W	100	100	125	125	SPX100A1-5A4N1
		125	125	150	144	SPX125A1-5A4N1
		150	144	—	170	SPX150A1-5A4N1
		—	170	200	208	SPX175A1-5A4N1

525–690V, NEMA Type 1/IP21 Freestanding Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	FP	200	208	250	261	SPX200A1-5A4N1
		250	261	300	325	SPX250A1-5A4N1
		300	325	400	385	SPX300A1-5A4N1
FR11	FP	400	385	450	460	SPX400A1-5A4N1
		450	460	500	502	SPX450A1-5A4N1
		500	502	550	590	SPX500A1-5A4N1

Note

Integrated fuses as standard. Limited option selection available; 115V transformer (KB), light kit (L1), HOA (K4), speed potentiometer w/HOA (K2), disconnect switch (P2). See Freestanding Option selection on **Page V6-T36-111**.

SPX9000 Open Drives



525–690V, NEMA Type 12/IP54 Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR6	F1	2	3.3	3	4.5	SPX002A2-5A4N1
		3	4.5	—	5.5	SPX003A2-5A4N1
		—	5.5	5	7.5	SPX004A2-5A4N1
		5	7.5	7-1/2	10	SPX005A2-5A4N1
		7-1/2	10	10	13.5	SPX007A2-5A4N1
		10	13.5	15	18	SPX010A2-5A4N1
		15	18	20	22	SPX015A2-5A4N1
		20	22	25	27	SPX020A2-5A4N1
		25	27	30	34	SPX025A2-5A4N1
FR7	FP	30	34	40	41	SPX030A2-5A4N1
		40	41	50	52	SPX040A2-5A4N1
FR8	FP	50	52	60	62	SPX050A2-5A4N1
		60	62	75	80	SPX060A2-5A4N1
		75	80	100	100	SPX075A2-5A4N1
FR9	FP	100	100	125	125	SPX100A2-5A4N1
		125	125	150	144	SPX125A2-5A4N1
		150	144	—	170	SPX150A2-5A4N1
		—	170	200	208	SPX175A2-5A4N1

525–690V, NEMA Type 12/IP54 Freestanding Drives

Frame Size	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	FP	200	208	250	261	SPX200A2-5A4N1
		250	261	300	325	SPX250A2-5A4N1
		300	325	400	385	SPX300A2-5A4N1

525–690V, Open Chassis Drives

Frame Size ^①	Delivery Code	hp (I _H)	Current (I _H)	hp (I _L)	Current (I _L)	Catalog Number
FR10	FP	200	208	250	261	SPX200A0-5A2N1
		250	261	300	325	SPX250A0-5A2N1
		300	325	400	385	SPX300A0-5A2N1
FR11	FP	400	385	450	460	SPX400A0-5A2N1
		450	460	500	502	SPX450A0-5A2N1
		500	502	—	590	SPX500A0-5A2N1
FR12	FP	—	590	600	650	SPX550A0-5A2N1
		600	650	700	750	SPX600A0-5A2N1
		700	750	800	820	SPX700A0-5A2N1
FR13	FP	800	820	900	920	SPX800A0-5A2N1
		900	920	1000	1030	SPX900A0-5A2N1
		1000	1030	1250	1180	SPXH10A0-5A2N1
FR14	FP	1350	1300	1500	1500	SPXH13A0-5A2N1
		1500	1500	2000	1900	SPXH15A0-5A2N1
		2000	1900	2300	2250	SPXH20A0-5A2N1

Notes

Integrated fuses as standard. Limited option selection available; 115V transformer (KB), light kit (L1), HOA (K4), speed potentiometer w/HOA (K2), disconnect switch (P2). See Freestanding Option selection on [Page V6-T36-111](#).

① FR10–FR14 includes 3% line reactor, but it is not integral to chassis.

Accessories

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Demo Drive and Power Supply

Demo Drive and Power Supply

Description	Catalog Number
9000X demo drive	9000XDEMO
Hand-held 24V auxiliary power supply—Used to supply power to the control module in order to perform keypad programming before the drive is connected to line voltage	9000XAUX24V

NEMA Type 12/IP54 Conversion Kit

The NEMA Type 12/IP54 kit option is used to convert a NEMA Type 1/IP21 to a NEMA Type 12/IP54 drive. The NEMA Type 12/IP54 kit consists of a metal drive shroud, fan kit for some frames, adaptor plate and plugs.

NEMA Type 12/IP54 Conversion Kit

Frame Size	Delivery Code	Approximate Dimensions in Inches (mm)			Approximate Weight Lb (kg)	Catalog Number
		Length	Width	Height		
FR4	W	13 (330)	7 (178)	4 (102)	4 (1.8)	OPTN12FR4
FR5		16 (406)	8 (203)	7 (178)	5 (2.3)	OPTN12FR5
FR6		21 (533)	10 (254)	5 (127)	7 (3.2)	OPTN12FR6

Flange Kits

Flange Kit NEMA Type 12/IP54

The flange kit is utilized when the power section is mounted through the back panel of an enclosure. Includes flange mount brackets and NEMA Type 12/IP54 fan components. Metal shroud not included.

Flange kits for NEMA Type 12/IP54 enclosure drive rating are determined by rating of drive.

Flange Kit NEMA Type 12/IP54—Frames 4, 5 and 6 ①

Frame Size	Delivery Code	Catalog Number
FR4	W	OPTTHRFR4
FR5		OPTTHRFR5
FR6		OPTTHRFR6

Flange Kit NEMA Type 12/IP54—Frames 4–9 ①

Frame Size	Delivery Code	Catalog Number
FR4	FP	OPTTHR4
FR5		OPTTHR5
FR6		OPTTHR6
FR7		OPTTHR7
FR8		OPTTHR8
FR9		OPTTHR9

Flange Kit NEMA Type 1/IP21

Flange kits for NEMA Type 1/IP21 enclosure drive rating are determined by rating of drive.

Flange Kit NEMA Type 1/IP21—Frames 4–9 ①

Frame Size	Delivery Code	Catalog Number
FR4	FP	OPTTHR4
FR5		OPTTHR5
FR6		OPTTHR6
FR7		OPTTHR7
FR8		OPTTHR8
FR9		OPTTHR9

Note

① For installation of an SPX9000 NEMA Type 1/IP21 drive into a NEMA Type 12/IP54 oversized enclosure.

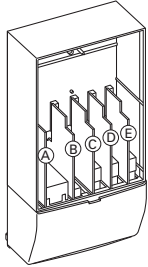
Options

9000X Series Option Board Kits

The 9000X Series drives can accommodate a wide selection of expander and adapter option boards to customize the drive for your application needs. The drive's control unit is designed to accept a total of five option boards.

The 9000X Series factory installed standard board configuration includes an A9 I/O board and an A2 relay output board, which are installed in slots A and B.

Option Boards



Option Board Kits

Option Kit Description ^①	Allowed Slot Locations ^②	Field Installed Catalog Number	Factory Installed Option Designator	SVX Ready Programs						
				Basic	Local/Remote	Standard	MSS	PID	Multi-P.	PFC
Standard I/O Cards										
2 RO (NC-NO)	B	OPTA2	—	■	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1AO, 1 +10 Vdc ref, 2 ext +24 Vdc/EXT +24 Vdc	A	OPTA9	—	■	■	■	■	■	■	■
Extended I/O Cards										
2 RO, therm	B	OPTA3	A3	—	■	■	■	■	■	■
Encoder low volt +5V/15V/24V	C	OPTA4	A4	—	■	■	■	■	■	■
Encoder high volt +15V/24V	C	OPTA5	A5	—	■	■	■	■	■	■
Double encoder—SPX only	C	OPTA7	A7	■	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1 AO	A	OPTA8	A8	—	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1AO, 1 +10 Vdc ref, 2 ext +24 Vdc/EXT +24 Vdc	A	OPTA1	—	■	■	■	■	■	■	■
3 DI (encoder 10–24V), out +15V/+24V, 2 DO (pulse+direction)—SPX only	C	OPTAE	AE	■	■	■	■	■	■	■
6 DI, 1 DO, 2 AI, 1AO, 1 +10 Vdc ref, 2 ext +24 Vdc/EXT +24 Vdc	A	OPTAFA1	—	■	■	■	■	■	■	■
6 DI, 1 ext +24 Vdc/EXT +24 Vdc	B, C, D , E	OPTB1	B1	—	—	—	—	—	■	■
1 RO (NC-NO), 1 RO (NO), 1 therm	B, C, D , E	OPTB2	B2	—	—	—	—	—	■	■
1 AI (mA isolated), 2 AO (mA isolated), 1 ext +24 Vdc/EXT +24 Vdc	B, C, D , E	OPTB4	B4	—	■	■	■	■	■	■
3 RO (NO)	B, C, D , E	OPTB5	B5	—	—	—	—	—	■	■
1 ext +24 Vdc/EXT +24 Vdc, 3 Pt100	B, C, D , E	OPTB8	B8	—	—	—	—	—	—	—
1 RO (NO), 5 DI 42–240 Vac input	B, C, D , E	OPTB9	B9	—	—	—	—	—	■	■
SPI, absolute encoder	C	OPTBB	BB	—	—	—	—	—	—	—

Notes

① AI = Analog Input; AO = Analog Output, DI = Digital Input, DO = Digital Output, RO = Relay Output

② Option card must be installed in one of the slots listed for that card. Slot indicated in bold is the preferred location.

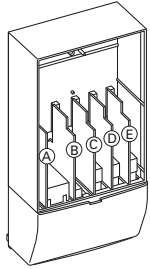
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Adjustable Frequency Drives

SPX9000 Drives

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Option Boards



Option Board Kits, continued

Option Kit Description ^①	Allowed Slot Locations ^②	Field Installed Catalog Number	Factory Installed Option Designator	SVX Ready Programs						
				Basic	Local/Remote	Standard	MSS	PID	Multi-P.	PFC
Communication Cards ^③										
Modbus	D, E	OPTC2	C2	■	■	■	■	■	■	■
Johnson Controls N2	D, E	OPTC2	CA	—	—	—	—	—	—	—
Modbus TCP	D, E	OPTCI	CI	■	■	■	■	■	■	■
BACnet	D, E	OPTCJ	CJ	■	■	■	■	■	■	■
Ethernet IP	D, E	OPTCK	CK	■	■	■	■	■	■	■
Profibus DP	D, E	OPTC3	C3	■	■	■	■	■	■	■
LonWorks	D, E	OPTC4	C4	■	■	■	■	■	■	■
Profibus DP (D9 connector)	D, E	OPTC5	C5	■	■	■	■	■	■	■
CanOpen (slave)	D, E	OPTC6	C6	■	■	■	■	■	■	■
DeviceNet	D, E	OPTC7	C7	■	■	■	■	■	■	■
Modbus (D9 type connector)	D, E	OPTC8	C8	■	■	■	■	■	■	■
Adapter—SPX only	D, E	OPTD1	D1	■	■	■	■	■	■	■
Adapter—SPX only	D, E	OPTD2	D2	■	■	■	■	■	■	■
RS-232 with D9 connection	D, E	OPTD3	D3	■	■	■	■	■	■	■
Keypad										
9000X Series local/remote keypad (replacement keypad)	—	KEYPAD-LOC/REM	—	—	—	—	—	—	—	■
9000X Series remote mount keypad unit (keypad not included, includes 10 ft cable, keypad holder, mounting hardware)	—	OPTRMT-KIT-9000X	—	—	—	—	—	—	—	—
9000X Series RS-232 cable, 13 ft	—	PP00104	—	—	—	—	—	—	—	—

Notes

- ① AI = Analog Input; AO = Analog Output, DI = Digital Input, DO = Digital Output, RO = Relay Output
- ② Option card must be installed in one of the slots listed for that card. Slot indicated in bold is the preferred location.
- ③ OPTC2 is a multi-protocol option card.

Modbus RTU Network Communications

The Modbus Network Card OPTC2 is used for connecting the 9000X Drive as a slave on a Modbus network. The interface is connected by a 9-pin DSUB connector (female) and the baud rate ranges from 300 to 19200 baud. Other communication parameters include an address range from 1 to 247; a parity of None, Odd or Even; and the stop bit is 1.

PROFIBUS Network Communications

The PROFIBUS Network Card OPTC3 is used for connecting the 9000X Drive as a slave on a PROFIBUS-DP network. The interface is connected by a 9-pin DSUB connector (female). The baud rates range from 9.6K baud to 12M baud, and the addresses range from 1 to 127.

LonWorks Network Communications

The LonWorks Network Card OPTC4 is used for connecting the 9000X Drive on a LonWorks network. This interface uses Standard Network Variable Types (SNVT) as data types. The channel connection is achieved using a FTT-10A Free Topology transceiver via a single twisted transfer cable. The communication speed with LonWorks is 78 kBits/s.

CANopen (Slave) Communications

The CANopen (Slave) Network Card OPTC6 is used for connecting the 9000X Drive to a host system. According to ISO11898 standard cables to be chosen for CAN bus should have a nominal impedance of 120 ohms, and specific line delay of nominal 5 nS/m. 120 ohms line termination resistors required for installation.

DeviceNet Network Communications

The DeviceNet Network Card OPTC7 is used for connecting the 9000X Drive on a DeviceNet Network. It includes a 5.08 mm pluggable connector. Transfer method is via CAN using a two-wire twisted shielded cable with two-wire bus power cable and drain. The baud rates used for communication include 125K baud, 250K baud and 500K baud.

Johnson Controls Metasys N2 Network Communications

The OPTC2 fieldbus board provides communication between the 9000X Drive and a Johnson Controls Metasys™ N2 network. With this connection, the drive can be controlled, monitored and programmed from the Metasys system. The N2 fieldbus is available as a factory installed option and as a field installable kit.

Modbus/TCP Network Communications

The Modbus/TCP Network Card OPTCI is used for connecting the 9000X Drive to Ethernet networks utilizing Modbus protocol. It includes an RJ-45 pluggable connector. This interface provides a selection of standard and custom register values to communicate drive parameters. The board supports 10 Mbps and 100 Mbps communication speeds. The IP address of the board is configurable over Ethernet using a supplied software tool.

BACnet Network Communications

The BACnet Network Card OPTCJ is used for connecting the 9000X Drive to BACnet networks. It includes a 5.08 mm pluggable connector. Data transfer is Master-Slave/Token Passing (MS/TP) RS-485. This interface uses a collection of 30 Binary Value Objects (BVOs) and 35 Analog Value Objects (AVOs) to communicate drive parameters. The card supports 9.6, 19.2 and 38.4 Kbaud communication speeds and supports network addresses 1–127.

Ethernet/IP Network Communications

The Ethernet/IP Network Card OPTCK is used for connecting the 9000X Drive to Ethernet/Industrial Protocol networks. It includes an RJ-45 pluggable connector. The interface uses CIP objects to communicate drive parameters (CIP is "Common Industrial Protocol", the same protocol used by DeviceNet). The board supports 10 Mbps and 100 Mbps communication speeds. The IP address of the board is configurable by Static, BOOTP and DHCP methods.

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Adjustable Frequency Drives

SPX9000 Drives

Control Panel Options

Factory Options

Description	Factory Installed Option Code	Field Installed NEMA Type 1/IP21 Catalog Number
Local/Remote Keypad SVX9000 Control Panel —This option is standard on all drives and consists of an RS-232 connection, backlit alphanumeric LCD display with nine indicators for the RUN status and two indicators for the control source. The nine pushbuttons on the panel are used for panel programming and monitoring of all SVX9000 parameters. The panel is detachable and isolated from the input line potential. Include LOC/REM key to choose control location.	A	KEYPAD-LOC/REM
Keypad Remote Mounting Kit —This option is used to remote mount the SVX9000 keypad. The footprint is compatible to the SV9000 remote mount kit. Includes 10 ft cable, keypad holder and mounting hardware.	—	OPTRMT-KIT-9000X
Keypad Blank —9000X Series select keypad for use with special and custom applications.	—	KEYPAD-BLANK

Miscellaneous Options

Description	Catalog Number
9000XDrive —A PC-based tool for controlling and monitoring of the SVX9000. Features include: loading parameters that can be saved to a file or printed, setting references, starting and stopping the motor, monitoring signals in graphical or text form, and real-time display. To avoid damage to the drive or computer, SVDrivecable must be used.	9000XDRIVE
SVDrivecable —6 ft (1.8m) RS-232 cable (22 gauge) with a 7-pin connector on each end. Should be used in conjunction with the 9000XDrive option to avoid damage to the SVX9000 or computer. The same cable can be used for downloading specialized applications to the drive.	SVDRIVECABLE
External Dynamic Braking Resistors —Used with the dynamic braking chopper circuit to absorb motor regenerative energy for stopping the load and to dissipate the energy flowing back into the drive. Resistors are separated into standard duty and heavy-duty. Standard duty is defined as 20% duty or less with 100% braking torque, while heavy-duty is defined as 50% duty or less with 150% braking torque.	①

SPX9000 Drive Options

Brake Chopper Options

The brake chopper circuit option is used for applications that require dynamic braking. Dynamic braking resistors are not included with drive

purchase. Consult the factory for dynamic braking resistors which are supplied separately. Resistors are not UL Listed.

For brake chopper circuit selection and adder—NEMA Type 1/IP21, NEMA Type 12/IP54, Chassis, consult the factory. Delivery code is FP.

Conformal (Varnished) Coating ②

Chassis Frame	Delivery Code
FR4	FP
FR5	FP
FR6	FP
FR7	FP
FR8	FP
FR9	FP
FR10	FP
FR11	FP
FR12	FP
FR13	FP
FR14	FP

Conformal Coated Board Kits ③

Field Installed Catalog Number	Factory Installed Option Designator
OPT_V ④	⑤

Notes

- ① Consult factory.
- ② See Product Selection on **Pages V6-T36-101 to V6-T36-105**, 208–240V, 380–500V, 525–690V. Consult the factory for adder
- ③ See option catalog numbers on **Page V6-T36-107**.
- ④ Replace “_” with the correct catalog number from **Page V6-T36-107**. Example: OPTC2V.
- ⑤ Construct catalog numbers for factory installed per Catalog Number Selection on **Page V6-T36-100**.

Control/Communication Options**Available Control/Communications Options**

Option	Description	Option Type
K2	Door-Mounted Speed Potentiometer with HOA Selector Switch —Provides the SPX9000 with the ability to start/stop and adjust the speed reference from door-mounted control devices or remotely from customer supplied inputs. In HAND position, the drive will start and the speed is controlled by the door-mounted speed potentiometer. The drive will be disabled in the OFF position. When AUTO is selected, the drive run and speed control commands are via user-supplied dry contact and 4–20 mA signal.	Control
K4	HAND/OFF/AUTO Switch for Non-Bypass Configurations —Provides a three-position selector switch that allows the user to select either a HAND or AUTO mode of operation. HAND mode is defaulted to keypad operation, and AUTO mode is defaulted to control from an external terminal source. These modes of operation can be configured via programming to allow for alternate combinations of start and speed sources. Start and speed sources include keypad, I/O and fieldbus.	Control
KB	115V Control Transformer, 550 VA —Provides a fused control power transformer with additional 550 VA at 115V for customer use.	Control
L1	Power On and Fault Pilot Lights —Provide a white power on light that indicates power to the enclosed cabinet and a red fault light that indicates a drive fault has occurred.	Light
P2	Disconnect Switch —Disconnect switch option is applicable only with NEMA Type 1/IP21 and NEMA Type 12/IP54 Freestanding drives. Allows a convenient means of disconnecting the SPX9000 from the line, and the operating mechanism can be padlocked in the OFF position. This is factory-mounted in the enclosure.	Input

SPX Freestanding Options**480V and 690V Control Options, 200–550 hp** ①

Description	Catalog Number Suffix
Door-mounted speed potentiometer with HOA selector switch	K2
HAND/OFF/AUTO switch (22 mm)	K4
115 volt control transformer 550 VA	KB

480V and 690V Light Options, 200–550 hp ①

Description	Catalog Number Suffix
Power on/fault pilot lights	L1

Input Options, 200–550 hp ①

Description	Catalog Number Suffix
Disconnect switch	P2 ②

Notes

① Consult factory for adder information.

② Applicable with FR10 and FR11 freestanding designs only.

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Adjustable Frequency Drives

SPX9000 Drives

Replacement Parts

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SPX9000 Drives Spare Units

208–690V, Frames 4–12

Description	Catalog Number
Control unit—Includes the control board, blue base housing, installed SVX9000 software program and blue flip cover. Does not include any OPT boards or keypad. See Page V6-T36-107 for standard and option boards and keypad.	CSBS0000000000

SPX9000 Drives Replacement Parts

208–240V, Frames FR4–FR8

Frame	4		5		6		7		8		Delivery Code	Catalog Number							
hp (I _H):	3/4	1	1-1/2	2	3	5 [Ⓢ]	5	7-1/2	10	15			20	25	30	40	50	60	
Control Board																			
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	W	VB00561
Power Boards																			
	1																	FB	VB00308-0004-2
		1																FB	VB00308-0007-2
			1															FB	VB00308-0008-2
				1														FB	VB00310-0011-2
					1													FB	VB00310-0012-2
						1												FB	VB00313-0017-2
							1											FB	VB00313-0025-2
								1										FB	VB00313-0031-2
									1									FB	VB00316-0048-2
										1								FB	VB00316-0061-2
											1							FB	VB00319-0075-2
												1						FB	VB00319-0088-2
													1					FB	VB00319-0114-2
														1				FB	VB00322-0140-2
															1			FB	VB00322-0170-2
																1		FB	VB00322-0205-2
Electrolytic Capacitors																			
	2	2	2															W	PP01000
				2	2													W	PP01001
						2	2											W	PP01002
								2										W	PP01003
									2	2								W	PP01004
											2	2	2	4	4			W	PP01005
																4		W	PP01099

Note

Ⓢ I_L only; has no corresponding I_H rated hp rating.

208–240V, Frames FR4–FR8, continued

Frame	4		5		6		7		8			Delivery Code	Catalog Number					
hp (H):	3/4	1	1-1/2	2	3	5 ^①	5	7-1/2	10	15	20			25	30	40	50	60
Cooling Fans																		
	1	1	1	1	1												W	PP01060
						1	1	1									W	PP01061
									1	1							W	PP01062
											1	1	1				W	PP01063
														1	1	1	FC	PP01123 ^②
	1	1	1	1	1												W	PP01086
						1	1	1	1	1							FC	PP01088
											1	1	1				W	PP01049
														1	2	2	FC	CP01180
														1	1	1	FC	PP08037
IGBT Modules																		
	1	1															W	CP01304
			1														W	CP01305
				1	1	1											W	CP01306
							1										W	CP01307
								1									W	CP01308
									1								W	PP01022
										1							W	PP01023
											1						W	PP01024
												1					W	PP01025
													1				W	PP01029
														1			W	PP01026
															1	1	W	PP01027
Choppers/Rectifiers																		
									1								W	CP01367
										1							W	CP01368
Diode/Thyristor Modules																		
											3	3	3				W	PP01035
														3	3	3	W	CP01268
Rectifying Boards																		
											1	1	1				W	VB00242
														1	1	1	W	VB00227

Note

② PP00061 capacitor not included in main fan; please order separately.

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Adjustable Frequency Drives

SPX9000 Drives

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380–500V, Frames FR4–FR9

Frame	4			5			6			7			8			9			Delivery Code	Catalog Number			
hp (I _H):	1	1-1/2	2	3	5	7-1/2 ^①	7-1/2	10	15	20	25	30	40	50	60	75	100	125	150	200			
Control Board																							
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	W	VB00252
Power Boards																							
	1																					FB	VB00208-0003-5
		1																				FB	VB00208-0004-5
			1																			FB	VB00208-0005-5
				1																		FB	VB00208-0007-5
					1																	FB	VB00208-0009-5
						1																FB	VB00210-0012-5
							1															FB	VB00213-0016-5
								1														FB	VB00213-0022-5
									1													FB	VB00213-0031-5
										1												FB	VB00216-0038-5
											1											FB	VB00216-0045-5
												1										FB	VB00216-0061-5
													1									FB	VB00219-0072-5
														1								FB	VB00219-0087-5
															1							FB	VB00219-0105-5
																1						FB	VB00236-0140-5
																	1					FB	VB00236-0168-5
																		1				FB	VB00236-0205-5
Electrolytic Capacitors																							
	2	2	2	2																		W	PP01000
					2	2																W	PP01001
							2	2														W	PP01002
									2													W	PP01003
										2	2	2										W	PP01004
													2	2	2	4	4	4	8	8		W	PP01005
Cooling Fans																							
	1	1	1	1	1	1																W	PP01060
							1	1	1													W	PP01061
										1	1	1										W	PP01062
													1	1	1							W	PP01063
																1	1	1				FC	PP01123 ^②
																			1	1		FC	PP01080 ^③
	1	1	1	1	1	1																W	PP01086
							1	1	1													FC	PP01088
										1	1	1	1	1	1							W	PP01049
																1	1	1				FC	CP01180
																				1 ^④	2	W	PP01068
																				1	1	FC	PP09051

Notes

- ① I_L only; has no corresponding I_H rated hp rating.
- ② PP00061 capacitor not included in main fan; please order separately.
- ③ PP00011 capacitor not included in main fan; please order separately.
- ④ For FR9 NEMA Type 12/IP54 you need two PP01068 internal fans.

380–500V, Frames FR4–FR9, continued

Frame	4			5			6			7			8			9			Delivery Code	Catalog Number		
hp (I _H):	1	1-1/2	2	3	5	7-1/2 ^①	7-1/2	10	15	20	25	30	40	50	60	75	100	125	150	200		
IGBT Modules																						
	1	1	1																		W	CP01304
				1	1																W	CP01305
						1	1														W	CP01306
								1													W	CP01307
									1												W	CP01308
										1	1										W	PP01022
												1									W	PP01023
													1								W	PP01024
														1							W	PP01025
															1						W	PP01029
																1					W	PP01026
																	1	1			W	PP01027
Chopper/Rectifiers																						
										1	1										W	CP01367
												1									W	CP01368
Diode/Thyristor Modules																						
												3	3	3							W	PP01035
															3	3	3				W	CP01268
																		3	3		W	PP01037
Rectifying Boards																						
												1	1	1							W	VB00242
															1	1	1				W	VB00227
																		1	1		W	VB00459
Rectifying Module Sub-assembly																						
																			1	1	W	FR09810
Power Module Sub-assemblies																						
																			1		W	FR09-150-4-ANS ^②
																				1	W	FR09-200-4-ANS ^②

Notes

- ① I_L only; has no corresponding I_H rated hp rating.
 ② See Page V6-T36-100 for details.

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Adjustable Frequency Drives

SPX9000 Drives

380–500V, Frames FR10–FR12

Frame hp (hp):	10 250	300	350	11 400	500	550	12 600	650	700	Delivery Code	Catalog Number
Control Board											
	1	1	1	1	1	1	1	1	1	W	VB00561
Shunt Boards											
	6									FC	VB00537
		6								FC	VB00497
			6				12	12	12	FC	VB00498
				9						FC	VB00538
					9					FC	VB00513
						9				FC	VB00514
Driver Boards											
				3	3	3				FC	VB00489
	1	1	1				2	2	2	FC	VB00487
Driver Adapter Board											
	1	1	1				2	2	2	FC	VB00330
ASIC Board											
	1	1	1	1	1	1	2	2	2	FC	VB00451
Feedback Interface Board											
							2	2	2	FC	VB00448
Star Coupler Board											
							1	1	1	FC	VB00336
Power Modules											
	1	1	1	2	2	2	2	2	2	FC	FR10820 ^①
	2	2	2							FC	FR10828
	1									FC	FR10-250-4-ANS ^②
		1								FC	FR10-300-4-ANS ^②
			1				2	2	2	FC	FR10-350-4-ANS ^②
				3						FC	FR11-400-4-ANS ^②
					3					FC	FR11-500-4-ANS ^②
						3				FC	FR11-550-4-ANS ^②
Electrolytic Capacitors											
	2	2	2	3	3	3	4	4	4	FC	PP00060
	12	12	12	18	18	18	24	24	24	FC	PP01005
Fuses											
	1	1	1	1	1	1	2	2	2	FC	PP01094
	2	2	2	2	2	2	4	4	4	FC	PP01095
Cooling Fans and Isolation Transformers											
	2	2	2	3	3	3	4	4	4	FC	VB00299
	2	2	2	3	3	3	4	4	4	FC	PP01080 ^③
	2	2	2				4	4	4	FC	PP01068
	1	1	1	1	1	1	2	2	2	FC	PP01096
	1	1	1				2	2	2	FC	FR10844
	1	1	1	3	3	3	2	2	2	FC	FR10845
	1	1	1				2	2	2	FC	FR10846
	1	1	1	3	3	3	2	2	2	FC	FR10847
Rectifying Board											
	1	1	1	2	2	2	2	2	2	FC	VB00459

Notes

- ① Rectifying board not included.
- ② See Page V6-T36-100 for details.
- ③ PP00060 capacitor not included in main fan; please order separately.

525–690V, Frames FR6–FR9

Frame	6		7					8		9					Delivery Code	Catalog Number				
hp (I _H):	2	3	5 ^①	5	7-1/2	10	15	20	25	30	40	50	60	75	100	125	150	200 ^①		
Control Board																				
	1	1	1	1	1	1	1	1	1	1	1				1	1	1	W	VB00561	
Driver Boards																				
	1																		FB	VB00404-0004-6
		1																	FB	VB00404-0005-6
			1																FB	VB00404-0007-6
				1															FB	VB00404-0010-6
					1														FB	VB00404-0013-6
						1													FB	VB00404-0018-6
							1												FB	VB00404-0022-6
								1											FB	VB00404-0027-6
									1										FB	VB00404-0034-6
Power Boards																				
	1	1	1	1	1	1	1	1	1										FB	VB00414
										1									FB	VB00419-0041-6
											1								FB	VB00419-0052-6
												1							FB	VB00422-0062-6
													1						FB	VB00422-0080-6
														1					FB	VB00422-0100-6
Power Modules																				
														1					FC	FR09-100-5-ANS ^②
															1				FC	FR09-125-5-ANS ^②
																1			FC	FR09-150-5-ANS ^②
																	1		FC	FR09-175-5-ANS ^②
Electrolytic Capacitors																				
	2	2	2	2	2	2	2	2	2										FC	PP01093
										2	2	4	4		8	8	8	8	FC	PP01041
													4						FC	PP01040
Fuses																				
											1	1	1	1	1	1	1	1	W	PP01094
											2	2	2	2	2	2	2	2	W	PP01095

Notes

- ① I_L only; has no corresponding I_H rated hp rating.
 ② See Page V6-T36-100 for details.

36.4

Adjustable Frequency Drives

SPX9000 Drives

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525–690V, Frames FR6–FR9, continued

Frame	6						7				8		9				Delivery Code	Catalog Number		
hp (I _H):	2	3	5 ^①	5	7-1/2	10	15	20	25	30	40	50	60	75	100	125	150	200 ^①		
Cooling Fans																				
	1	1	1	1	1														W	PP01061
						1	1	1	1										W	PP01062
										1	1								W	PP01063
												1	1	1					FC	PP01123
	1	1	1	1	1	1	1	1	1	1	1								W	PP01049
												1	1	1					FC	CP01180
															1	1	1	1 ^②	W	PP01068
															1	1	1	1	FC	PP01080
Fan Power Supply																				
																1	1	1	FC	VB00299
IGBT Modules																				
	3	3	3	3	3	3	3	3	3										FC	PP01091
										1	1								FC	PP01089
												1	1	1					FC	PP01127
IGBT/Diode (Brake)																				
	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	FC	PP01040
Diode Module																				
	1	1	1	1	1	1	1	1	1										FC	PP01092
Diode/Thyristor Modules																				
										3	3								FC	PP01071
															3	3	3	3	FC	PP01072
Rectifying Boards																				
										1	1								FC	VB00442
															1	1	1	1	FC	VB00460
Rectifying Module Sub-Assemblies																				
																1	1	1	W	FR09810
																1	1	1	FC	FR09811

Notes

- ① I_L only; has no corresponding I_H rated hp rating.
- ② For NEMA Type 12/IP54, two PP01068 internal fans are needed.

525–690V, Frames FR10–FR12

Frame hp (I _H):	10 250	300	350	11 400	500	550	12 600	650	700	Delivery Code	Catalog Number
Component Boards											
1	1		1	1	1	1	1	1	1	W	VB00561
1	1		1	1	1	1	2	2	2	FC	VB00451
6										FC	VB00545
	6									FC	VB00510
			6				12	12	12	FC	VB00511
1	1		1				2	2	2	FC	VB00330
1	1		1				2	2	2	FC	VB00487
				3	3	3				FC	VB00489
				9						FC	VB00546
					9					FC	VB00547
						9				FC	VB00512
							2	2	2	FC	VB00448
							1	1	1	FC	VB00336
Power Modules											
1	1		2	2	2	2	2	2	2	FC	FR10821 ^①
2	2		2							FC	FR10829
1										FC	FR10-200-5-ANS ^②
	1									FC	FR10-250-5-ANS ^②
			1				2	2	2	FC	FR10-300-5-ANS ^②
				3						FC	FR11-400-5-ANS ^②
					3					FC	FR11-450-5-ANS ^②
						3				FC	FR11-500-5-ANS ^②
Electrolytic Capacitors											
2	2		2	3	3	3	4	4	4	FC	PP00060
12	12		12	18	18	18	24	24	24	FC	PP01099
Fuses											
1	1		1	1	1	1	2	2	2	FC	PP01094
2	2		2	2	2	2	4	4	4	FC	PP01095
Cooling Fans and Isolation Transformers											
2	2		2	3	3	3	4	4	4	FC	VB00299
2	2		2	3	3	3	4	4	4	FC	PP01080 ^③
2	2		2				4	4	4	FC	PP01068
1	1		1	1	1	1	2	2	2	FC	PP01096
1	1		1				2	2	2	FC	FR10844
1	1		1	3	3	3	2	2	2	FC	FR10845
1	1		1				2	2	2	FC	FR10846
1	1		1	3	3	3	2	2	2	FC	FR10847
Fan Power Supply											
							1	1	1	FC	VB00299
Rectifying Boards											
1	1		1	2	2	2	2	2	2	FC	VB00460

Notes

- ① Rectifying board not included.
 ② See **Page V6-T36-100** for details.
 ③ PP00060 capacitor not included in main fan; please order separately.

Technical Data and Specifications

SPX9000 Drives

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Description	Specification
Input Ratings	
Input voltage (V_{in})	+10%/–15%
Input frequency (f_{in})	50/60 Hz (variation up to 45–66 Hz)
Connection to power	Once per minute or less (typical operation)
High withstand rating	100 kAIC
Output Ratings	
Output voltage	0 to V_{in}
Continuous output current	I_H rated 100% at 122°F (50°C), FR9 and below I_L rated 100% at 104°F (40°C), FR9 and below I_H/I_L 100% at 104°F (40°C), FR10 and above
Overload current (I_H/I_L)	150% I_H , 110% I_L for 1 min.
Output frequency	0 to 320 Hz
Frequency resolution	0.01 Hz
Initial output current (I_H)	250% for 2 seconds
Control Characteristics	
Control method	Frequency control (V/f) Open loop: sensorless vector control Closed loop: frequency control Closed loop: vector control
Switching frequency	Adjustable with parameter 2.6.9
Frame 4–6	1 to 16 kHz; default 10 kHz
Frame 7–12	1 to 10 kHz; default 3.6 kHz
Frequency reference	Analog input: Resolution 0.1% (10-bit), accuracy $\pm 1\%$ V/Hz Panel reference: Resolution 0.01 Hz
Field weakening point	30 to 320 Hz
Acceleration time	0 to 3000 sec.
Deceleration time	0 to 3000 sec.
Braking torque	DC brake: 30% $\times T_n$ (without brake option)
Ambient Conditions	
Ambient operating temperature	14°F (–10°C), no frost to 122°F (50°C) I_H (FR4–FR9) 14°F (–10°C), no frost to 104°F (40°C) I_L (FR10 and up) 14°F (–10°C), no frost to 104°F (40°C) I_L (all frames)
Storage temperature	–40° to 158°F (–40° to 70°C)
Relative humidity	0 to 95% RH, noncondensing, non-corrosive, no dripping water
Air quality	Chemical vapors: IEC 721-3-3, unit in operation, class 3C2; Mechanical particles: IEC 721-3-3, unit in operation, class 3S2
Altitude	100% load capacity (no derating) up to 3280 ft (1000m); 1% derating for each 328 ft (100m) above 3280 ft (1000m); max. 9842 ft (3000m)
Vibration	EN 50178, EN 60068-2-6; 5 to 50 Hz, displacement amplitude 1 mm (peak) at 3 to 15.8 Hz, max. acceleration amplitude 1G at 15.8 to 150 Hz
Shock	EN 50178, EN 60068-2-27 UPS Drop test (for applicable UPS weights) Storage and shipping: max. 15G, 11 ms (in package)
Enclosure class	NEMA 1/IP21 or NEMA 12/IP54, open chassis/IP20

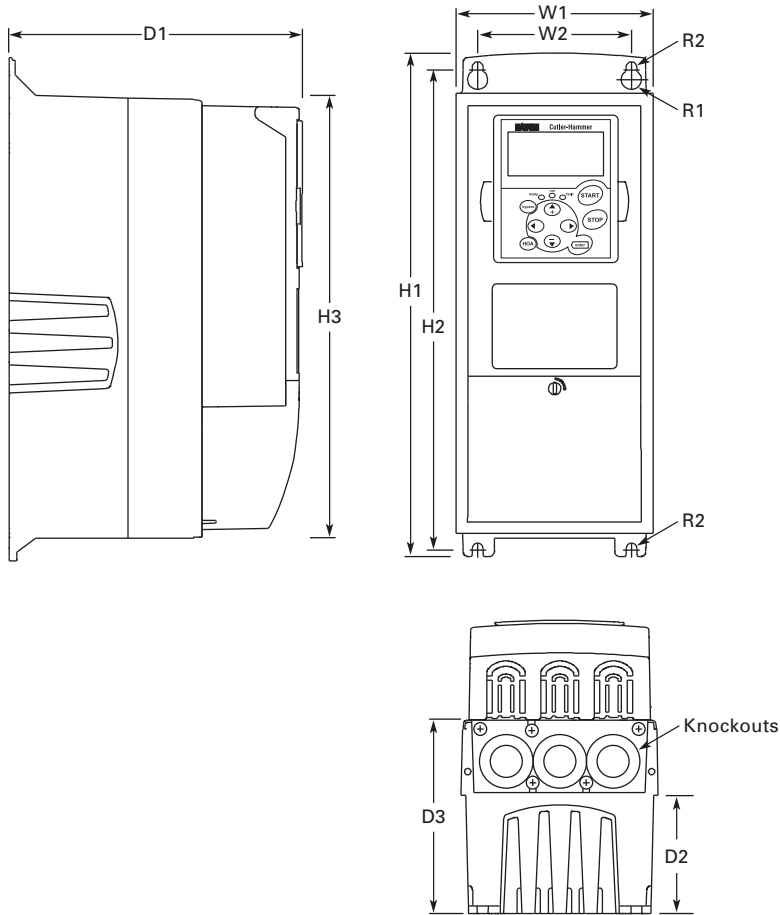
Description	Specification
Control Connections	
Analog input voltage	0 to 10V, R = 200 kohms (–10 to 10V joystick control) resolution 0.1%; accuracy $\pm 1\%$
Analog input current	0(4) to 20 mA; R_i —250 ohms differential
Digital inputs (6)	Positive or negative logic; 18 to 30 Vdc
Auxiliary voltage	+24V $\pm 15\%$, max. 250 mA
Output reference voltage	+10V +3%, max. load 10 mA
Analog output	0(4) to 20 mA; R_L max. 500 ohms; resolution 10 bit; Accuracy $\pm 2\%$
Digital outputs	Open collector output, 50 mA/48V
Relay outputs	2 programmable Form C relay outputs switching capacity: 24 Vdc/8A, 250 Vac/8A, 125 Vdc/0.4A
Protections	
Overcurrent protection	Trip limit 4.0 $\times I_H$ instantaneously
Overvoltage protection	Yes
Undervoltage protection	Yes
Earth fault protection	In case of earth fault in motor or motor cable, only the frequency converter is protected
Input phase supervision	Trips if any of the input phases are missing
Motor phase supervision	Trips if any of the output phases are missing
Overtemperature protection	Yes
Motor overload protection	Yes
Motor stall protection	Yes
Motor underload protection	Yes
Short circuit protection	Yes (+24V and +10V reference voltages)
High Performance Features	
Speed error	<0.01%, depending on the encoder
Encoder support	Incremental or absolute
Encoder voltages	5V (RS-422), 15V or 24V, depending on the option card
Torque control	Full torque control at all speeds, including zero
Torque accuracy	<2%; <5% down to zero speed
Starting torque	>200%, depending on motor and drive sizing
Master/slave configurations	Full capability
System analysis	Integrated data logger
PC communication	Fast multiple drive monitoring with PC
Inter-drive communication	High-speed bus (12 Mbits/s)
High-speed applications	Up to 7200 Hz

Dimensions

Approximate Dimensions in Inches (mm)

9000X Drives

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR4, FR5 and FR6



Voltage	hp (I _H)	H1	H2	H3	D1	D2	D3	W1	W2	R1 Dia.	R2 Dia.	Weight Lbs (kg)	Knockouts at Inches (mm)
FR4													
230V	3/4–3	12.9	12.3	11.5	7.5	3.0	5.0	5.04	3.9	0.5	0.3	11.0 (5)	3 at 10.1 (28)
480V	1–5	(327)	(313)	(292)	(190)	(77)	(126)	(128)	(100)	(13)	(7)		
FR5													
230V	5–7-1/2	16.5	16.0	15.3	8.4	3.9	5.8	5.7	3.9	0.5	0.3	17.9 (8)	2 at 1.5 (37)
480V	7-1/2–15	(419)	(406)	(389)	(214)	(100)	(148)	(144)	(100)	(13)	(7)		1 at 10.1 (28)
FR6													
230V	10–15	22.0	21.3	20.4	9.3	4.2	6.5	7.7	5.8	0.6	0.4	40.8 (19)	3 at 1.5 (37)
480V	20–30	(558)	(541)	(519)	(237)	(105)	(165)	(195)	(148)	(15.5)	(9)		
575V	2–25												

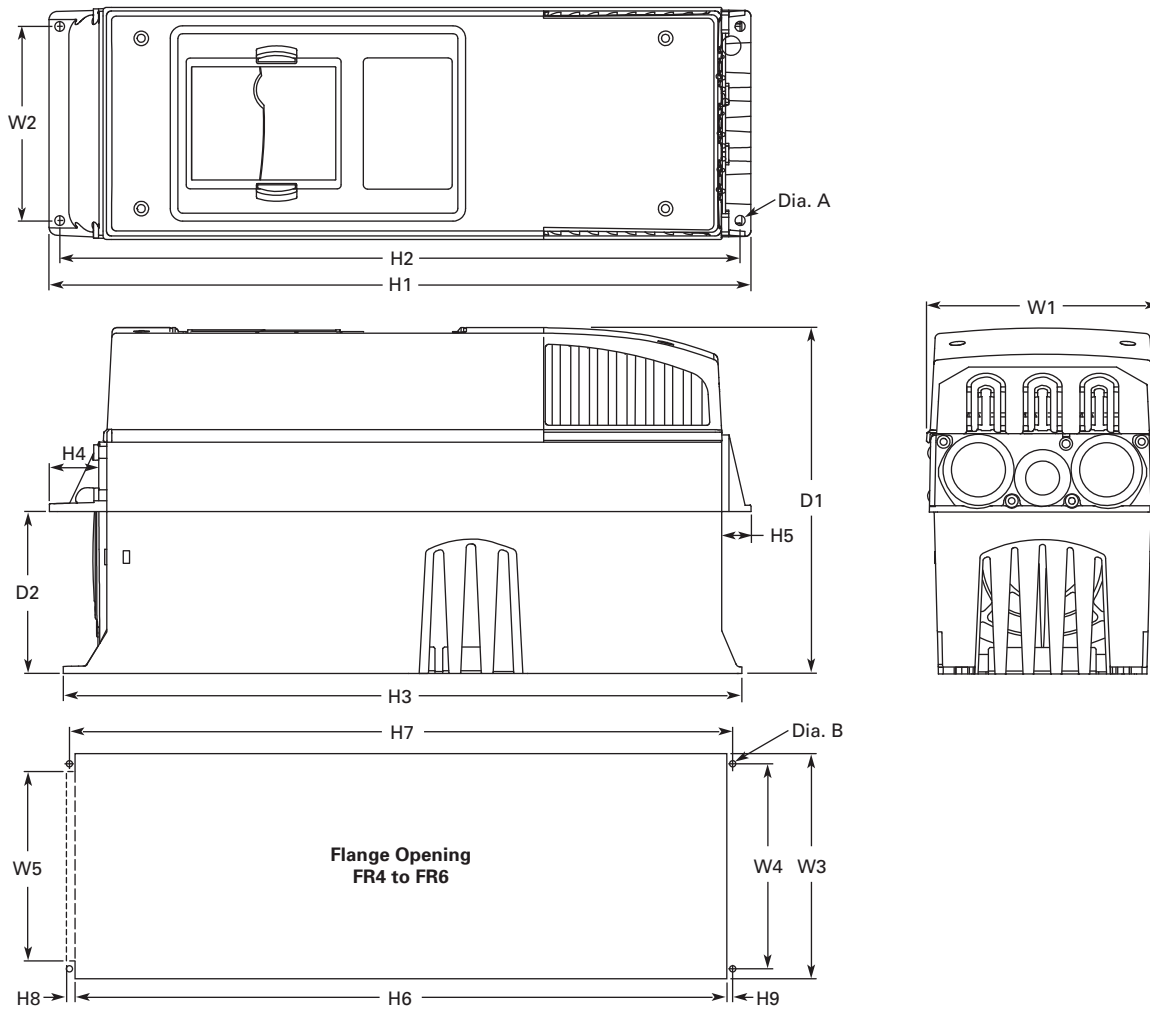
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54 with Flange Kit, FR4, FR5 and FR6

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FR4, FR5 and FR6 with Flange Kit

W1	W2	H1	H2	H3	H4	H5	D1	D2	Dia. A
FR4									
5.0 (128)	4.5 (113)	13.3 (337)	12.8 (325)	12.9 (327)	1.2 (30)	0.9 (22)	7.5 (190)	3.0 (77)	0.3 (7)
FR5									
5.6 (143)	4.7 (120)	17.0 (434)	16.5 (420)	16.5 (419)	1.4 (36)	0.7 (18)	8.4 (214)	3.9 (100)	0.3 (7)
FR6									
7.7 (195)	6.7 (170)	22.0 (560)	21.6 (549)	22.0 (558)	1.2 (30)	0.8 (20)	9.3 (237)	4.2 (106)	0.3 (7)

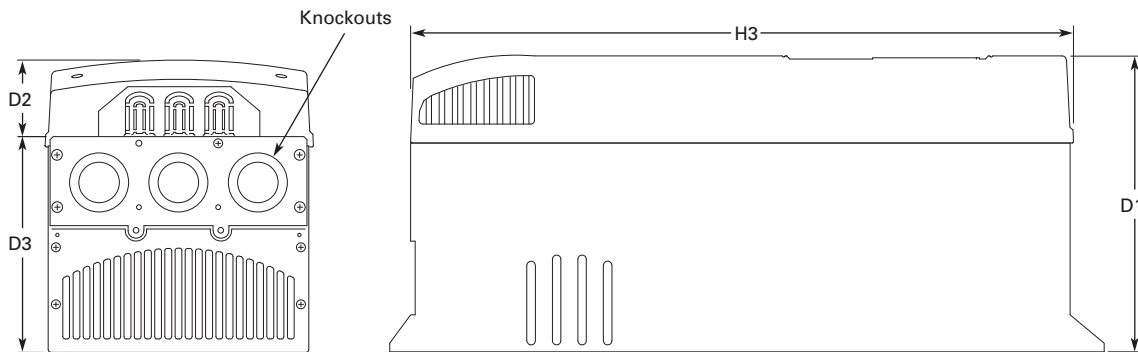
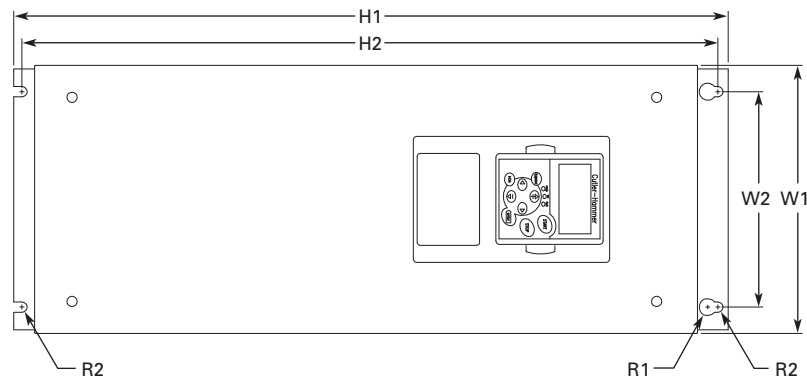
Flange Opening, FR4 to FR6

W3	W4	W5	H6	H7	H8	H9	Dia. B
FR4							
4.8 (123)	4.5 (113)	—	12.4 (315)	12.8 (325)	—	0.2 (5)	0.3 (7)
FR5							
5.3 (135)	4.7 (120)	—	16.2 (410)	16.5 (420)	—	0.2 (5)	0.3 (7)
FR6							
7.3 (185)	6.7 (170)	6.2 (157)	21.2 (539)	21.6 (549)	0.3 (7)	0.2 (5)	0.3 (7)

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR7

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Voltage	hp (I _H)	H1	H2	H3	D1	D2	D3	W1	W2	R1 Dia.	R2 Dia.	Weight Lbs (kg)	Knockouts at Inches (mm) N1 (O.D.)
230V	20–30	24.8 (630)	24.2 (614)	23.2 (590)	10.1 (257)	3.0 (77)	7.3 (184)	9.3 (237)	7.5 (190)	0.7 (18)	0.4 (9)	77.2 (35)	3 at 1.5 (37)
480V	40–60												
575V	30–40												

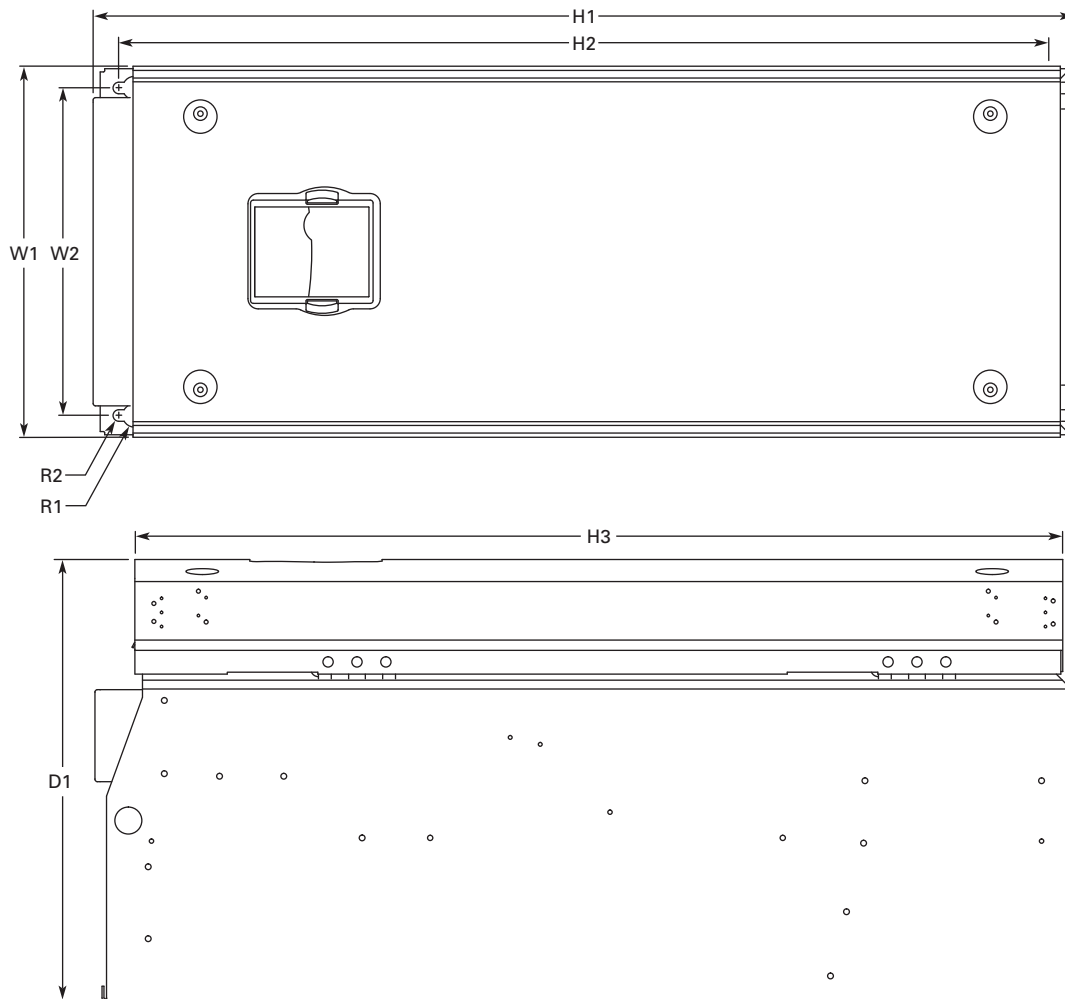
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR8

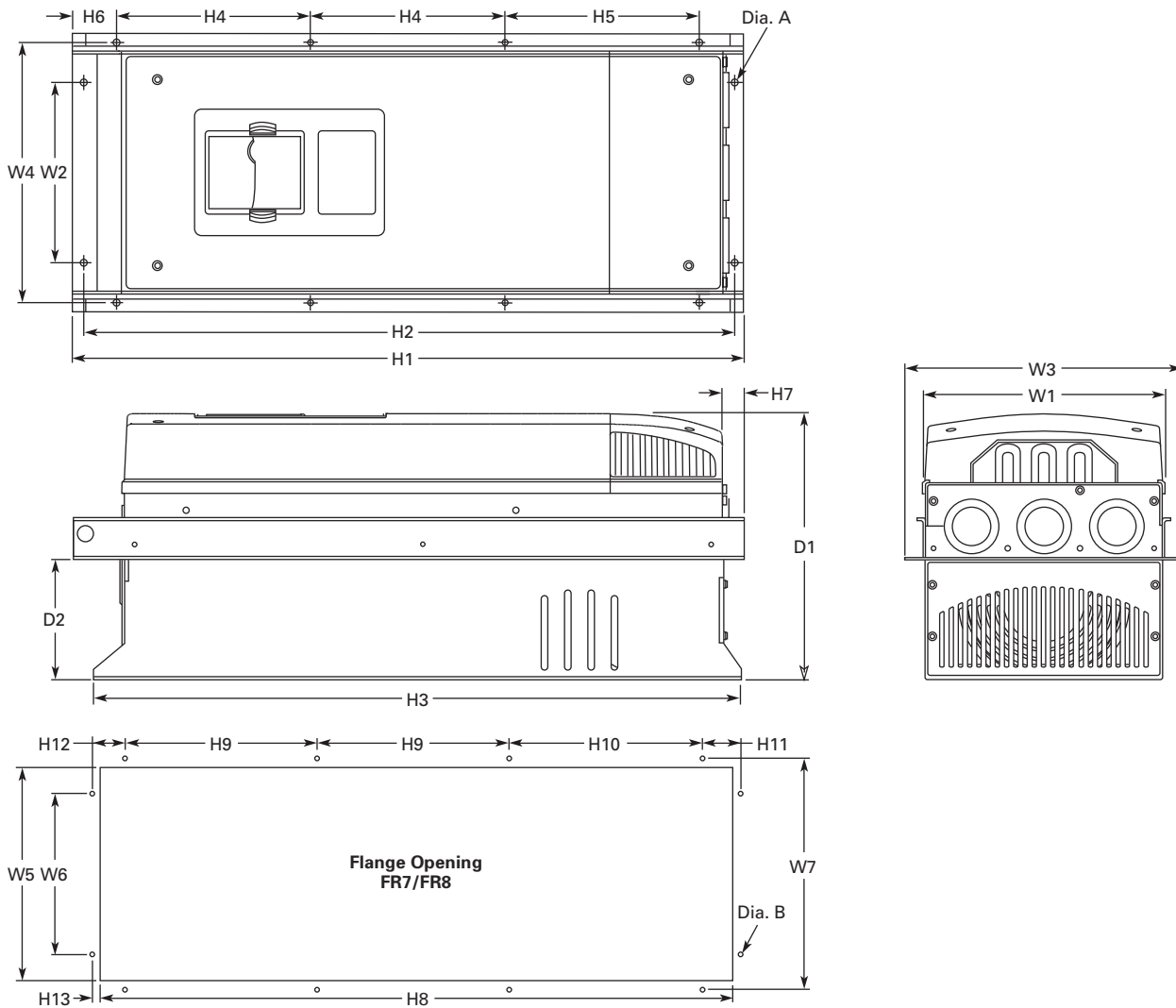
36



Voltage	hp (I _H)	D1	H1	H2	H3	W1	W2	R1 Dia.	R2 Dia.	Weight Lbs (kg)
230V	40–60	13.5 (344)	300.1 (764)	28.8 (732)	28.4 (721)	11.5 (291)	10 (255)	0.7 (18)	0.4 (9)	127 (58)
480V	75–125									
575V	50–75									

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, with Flange Kit, FR7 and FR8



W1	W2	W3	W4	H1	H2	H3	H4	H5	H6	H7	D1	D2	Dia. A
FR7													
9.3 (237)	6.8 (175)	10.6 (270)	10.0 (253)	25.6 (652)	24.9 (632)	24.8 (630)	7.4 (189)	7.4 (189)	0.9 (23)	0.8 (20)	10.1 (257)	4.6 (117)	0.3 (6)
FR8													
11.2 (285)	—	14.0 (355)	13.0 (330)	32.8 (832)	—	29.3 (745)	10.2 (258)	10.4 (265)	1.7 (43)	2.2 (57)	13.5 (344)	4.3 (110)	0.4 (9)

Flange Opening, FR7 and FR8

W5	W6	W7	H8	H9	H10	H11	H12	H13	Dia. B
FR7									
9.2 (233)	6.9 (175)	10.0 (253)	24.4 (619)	7.4 (189)	7.4 (189)	1.4 (35)	1.3 (32)	1.0 (25)	0.3 (6)
FR8									
11.9 (301)	—	13.0 (330)	31.9 (810)	10.2 (258)	10.4 (265)	—	—	1.3 (33)	0.4 (9)

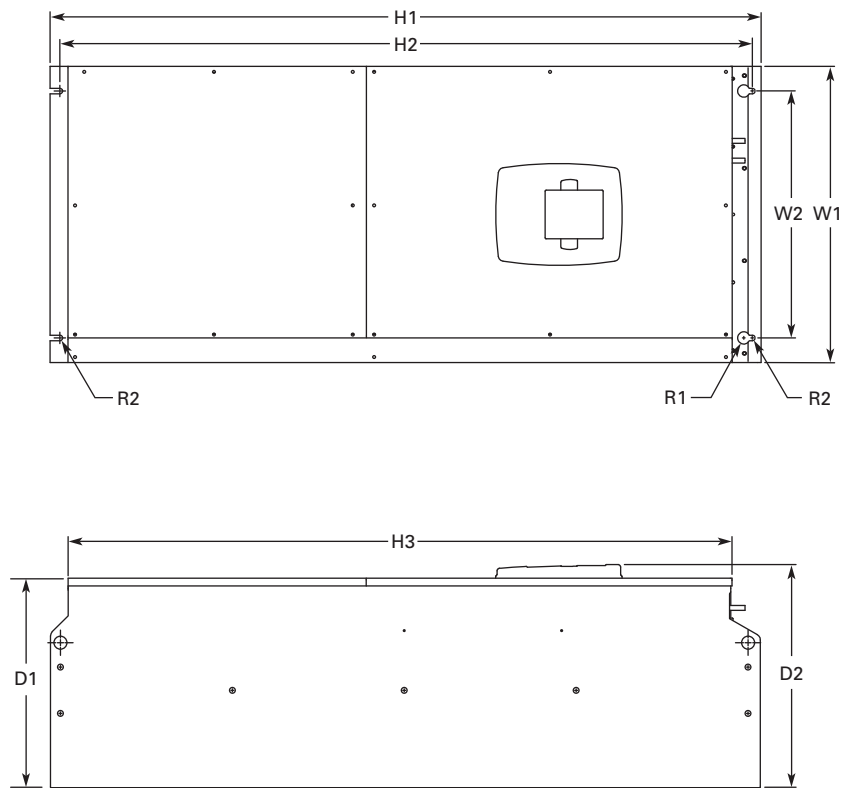
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR9

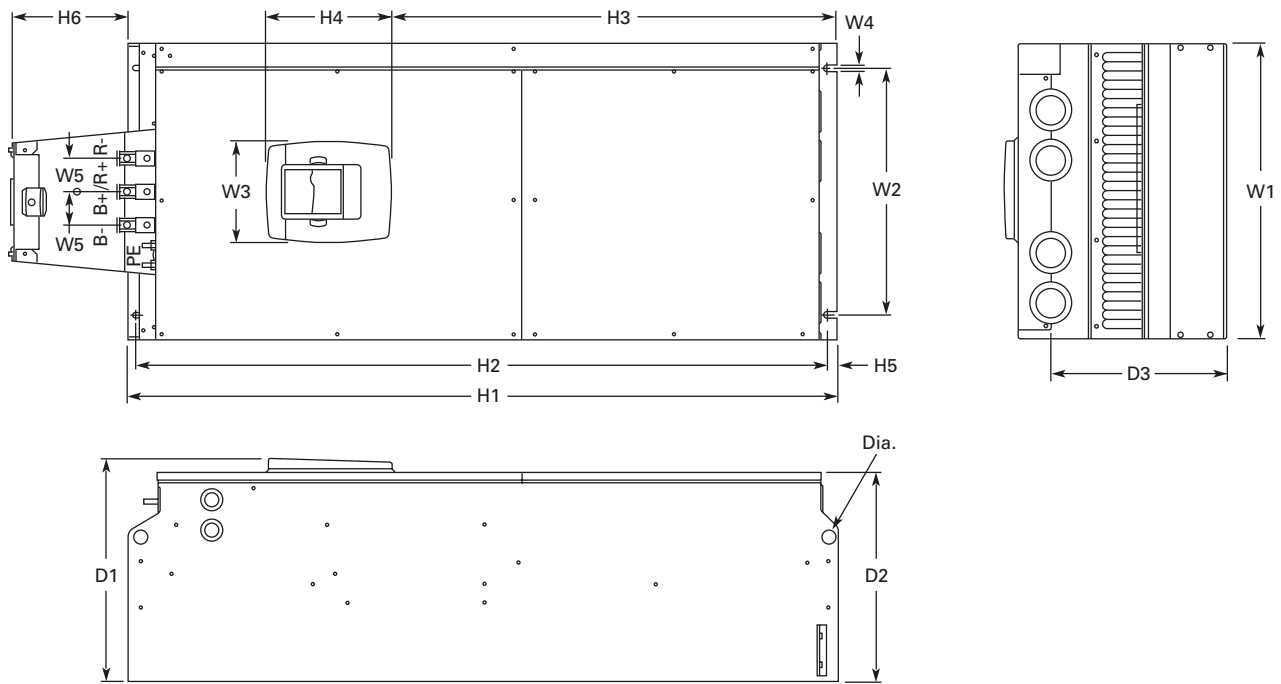
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Voltage	hp (I _H)	H1	H2	H3	D1	D2	W1	W2	R1 Dia.	R2 Dia.	Weight Lbs (kg)
230V	75–100	45.3 (1150)	44.1 (1120)	42.4 (1076)	13.4 (340)	14.3 (362)	18.9 (480)	15.7 (400)	0.8 (20)	0.4 (9)	322 (146)
480V	150–200										
575V	100–175										

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR9, continued



W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	H6 ①	D1	D2	D3	Dia.
18.9 (480)	15.7 (400)	6.5 (165)	0.4 (9)	2.1 (54)	45.3 (1150)	44.1 (1120)	28.3 (721)	8.0 (205)	0.6 (16)	7.4 (188)	14.2 (361.5)	13.4 (340)	11.2 (285)	0.8 (21)

Note

① Brake resistor terminal box (H6) included when brake chopper ordered.

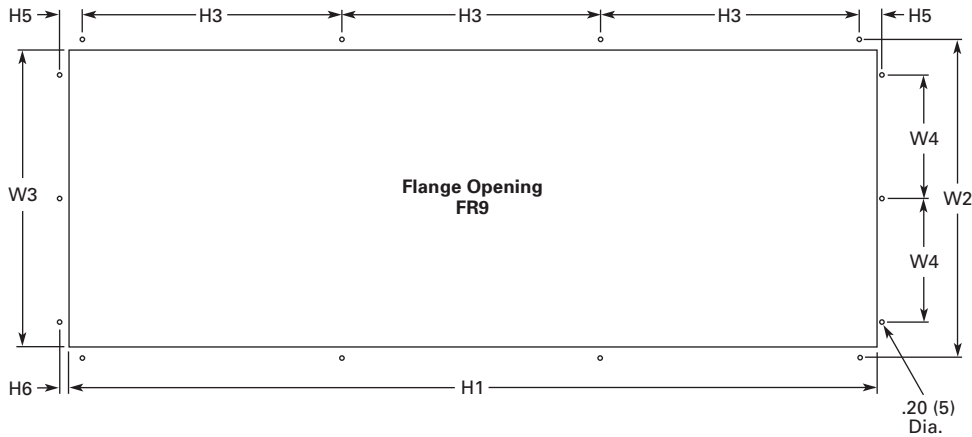
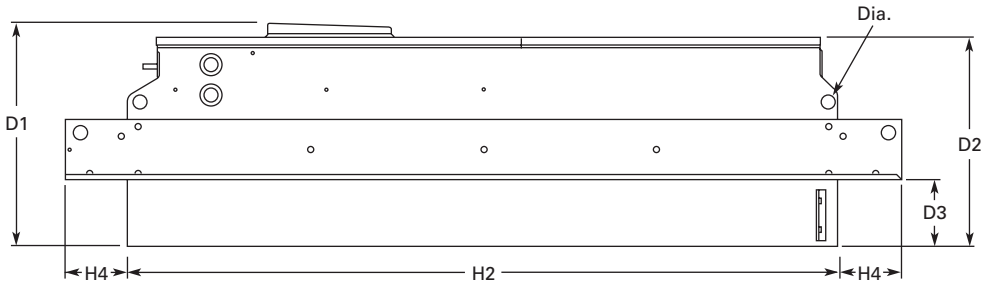
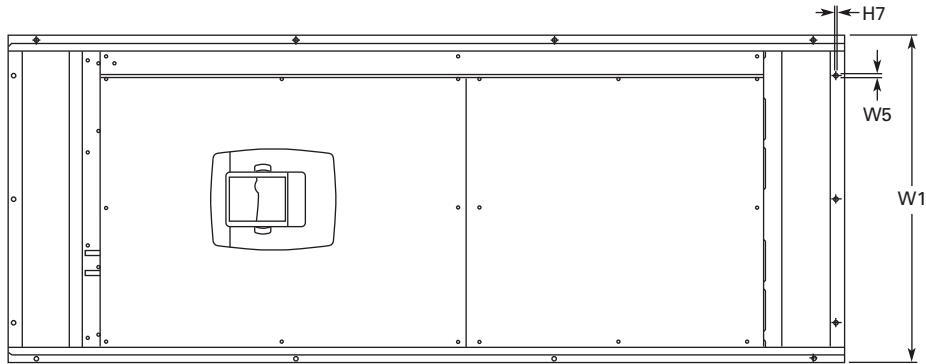
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR9 with Flange Kit

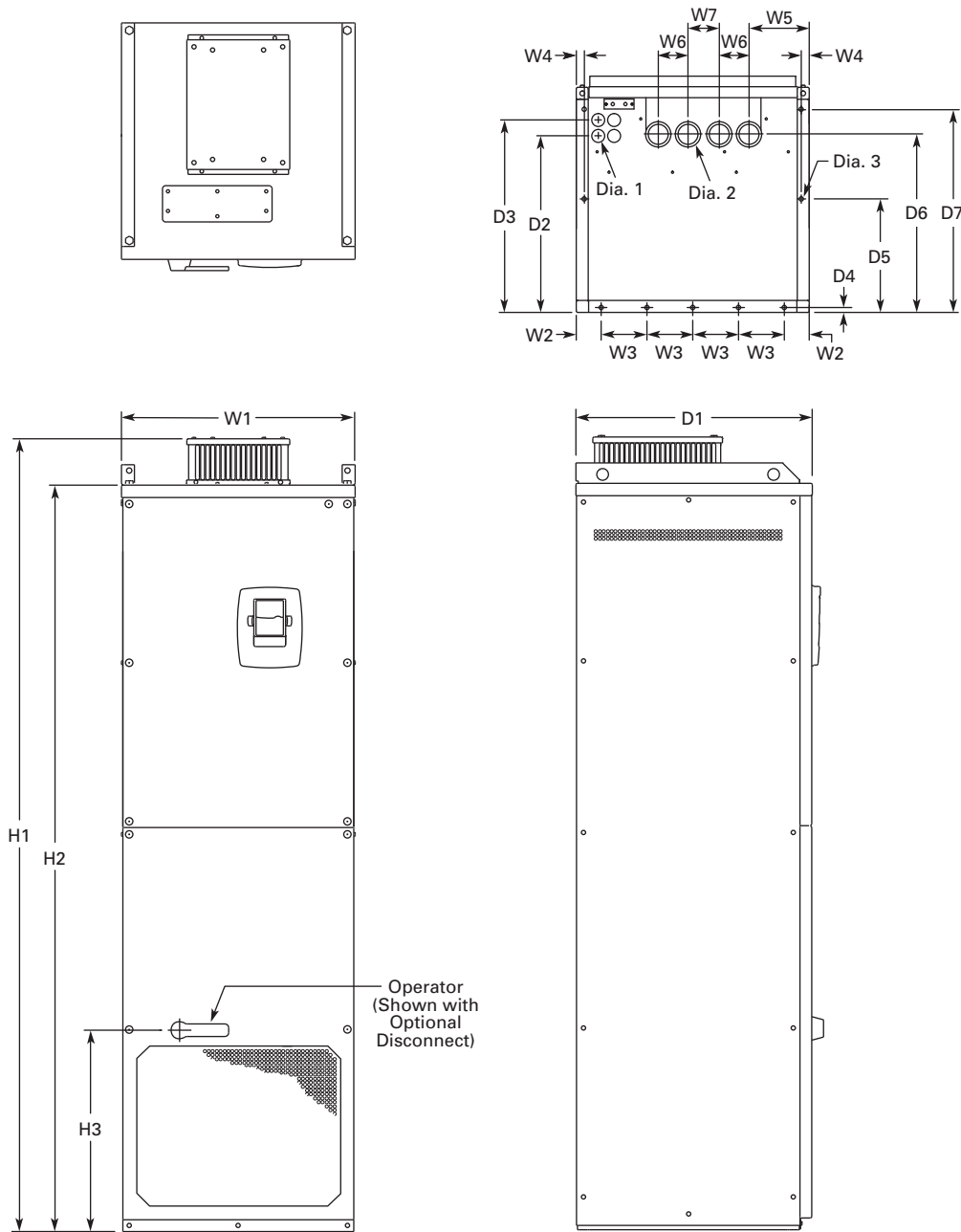
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W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	H6	H7	D1	D2	D3	Dia.
20.9 (530)	20.0 (510)	19.1 (485)	7.9 (200)	0.2 (5.5)	51.7 (1312)	45.3 (1150)	16.5 (420)	3.9 (100)	1.4 (35)	0.4 (9)	0.1 (2)	24.9 (362)	13.4 (340)	4.3 (109)	0.8 (21)

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21 and NEMA Type 12/IP54, FR10 Freestanding



Volts	hp (I _H)	W1	W2	W3	W4	W5	W6	W7	H1	H2	H3	D1	D2	D3	D4	D5	D6	D7	Dia. 1	Dia. 2	Dia. 3	Weight Lbs (kg)
480V	250-350	23.43	2.46	4.53	0.79	5.95	2.95	30.11	79.45	74.80	20.18	23.70	17.44	19.02	0.47	11.22	17.60	20.08	0.83	1.89	0.43	875 (389)
690V	200-300	(595)	(62.5)	(115)	(20)	(151)	(75)	(79)	(2018)	(1900)	(512.5)	(602)	(443)	(483)	(12)	(285)	(447)	(510)	(21)	(48)	(11)	

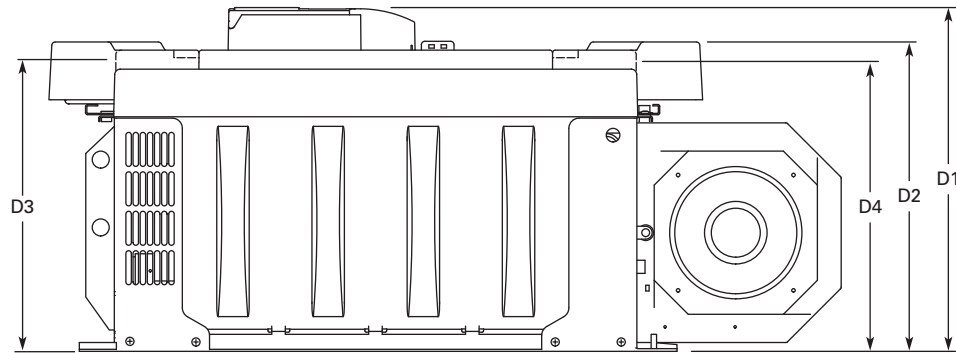
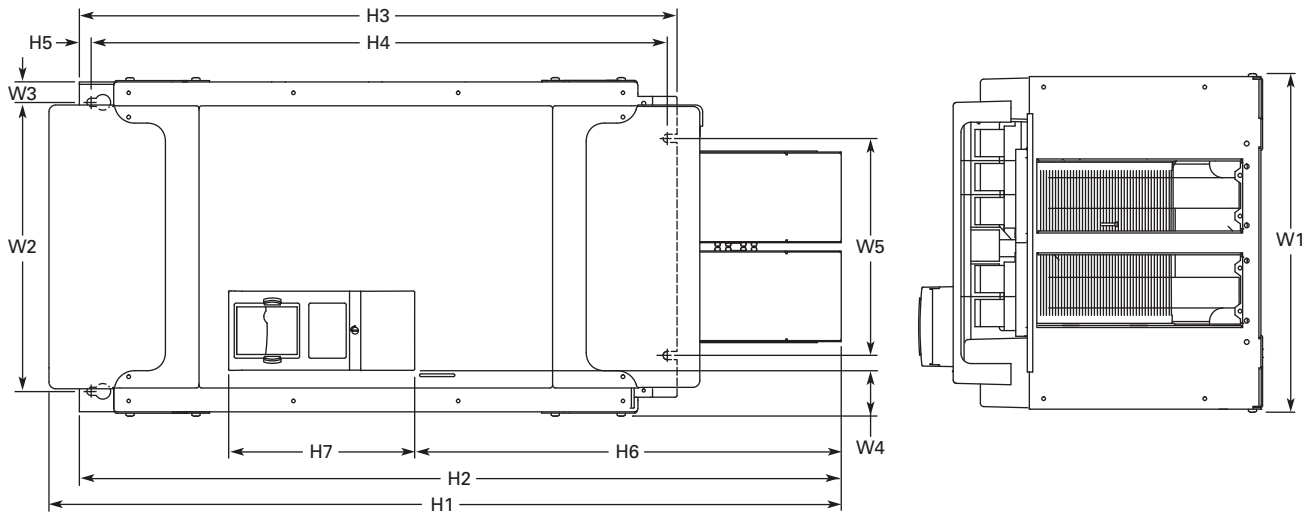
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

FR10 Open Chassis ①

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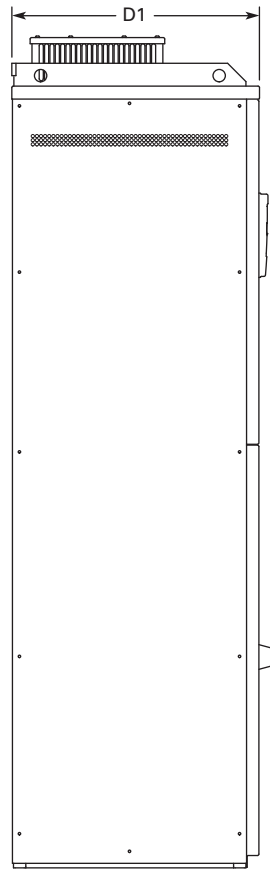
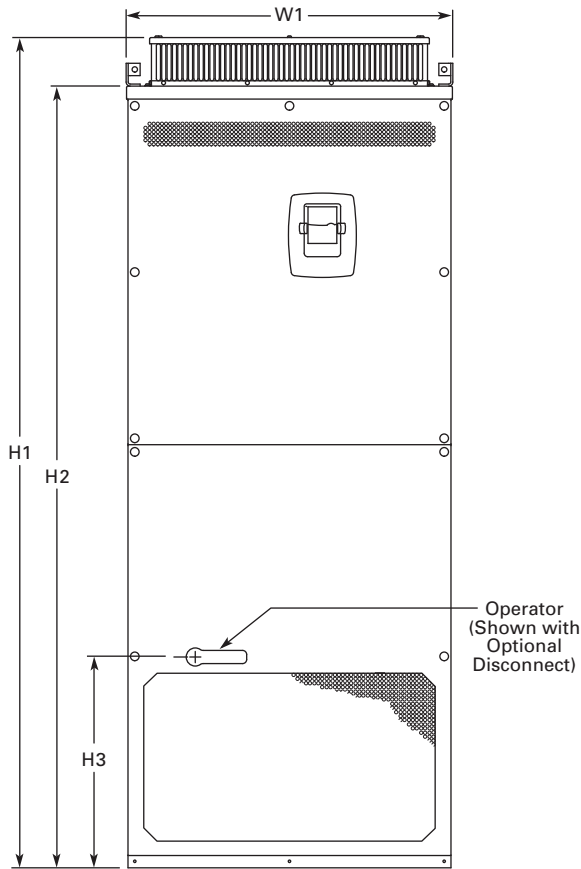
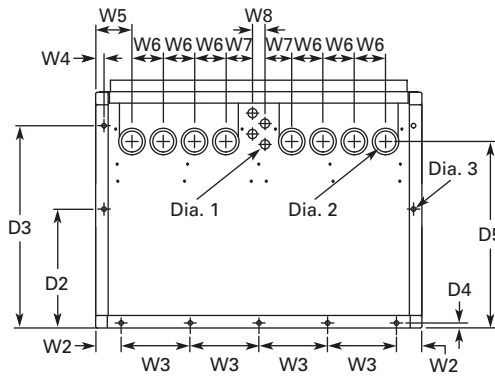
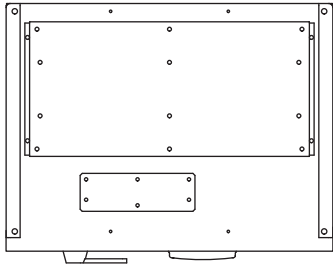
Voltage	hp (I _H)	W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	H6	H7	D1	D2	D3	D4	Weight Lbs (kg)
480V	250-350	19.7 (500)	16.7 (425)	1.2 (30)	2.6 (67)	12.8 (325)	45.9 (1165)	44.1 (1121)	34.6 (879)	33.5 (850)	0.7 (17)	24.7 (627)	10.8 (275)	19.9 (506)	17.9 (455)	16.7 (423)	16.6 (421)	518 (235)
575V	200-300																	

Note

① SPX9000X FR12 is built of two FR10 modules. Please refer to SPX9000 installation manual for mounting instructions.

Approximate Dimensions in Inches (mm)

NEMA Type 1/IP21, FR11 Freestanding Drive



Voltage	hp (I _H)	W1	W2	W3	W4	W5	W6	W7	W8	H1	H2	H3	D1	D2	D3	D4	D5	Dia. 1	Dia. 2	Dia. 3	Weight Lbs (kg)
480V	400-550	31.26 (794)	2.40 (61)	6.50 (165)	0.79 (20)	3.43 (87)	2.95 (75)	2.52 (64)	1.18 (30)	79.45 (2018)	74.80 (1900)	20.18 (512.5)	23.70 (602)	11.22 (285)	19.09 (485)	0.47 (12)	17.60 (447)	0.83 (21)	1.89 (48)	0.35 x 0.43 (9 x 11)	526 (239)
690V	400-500																				

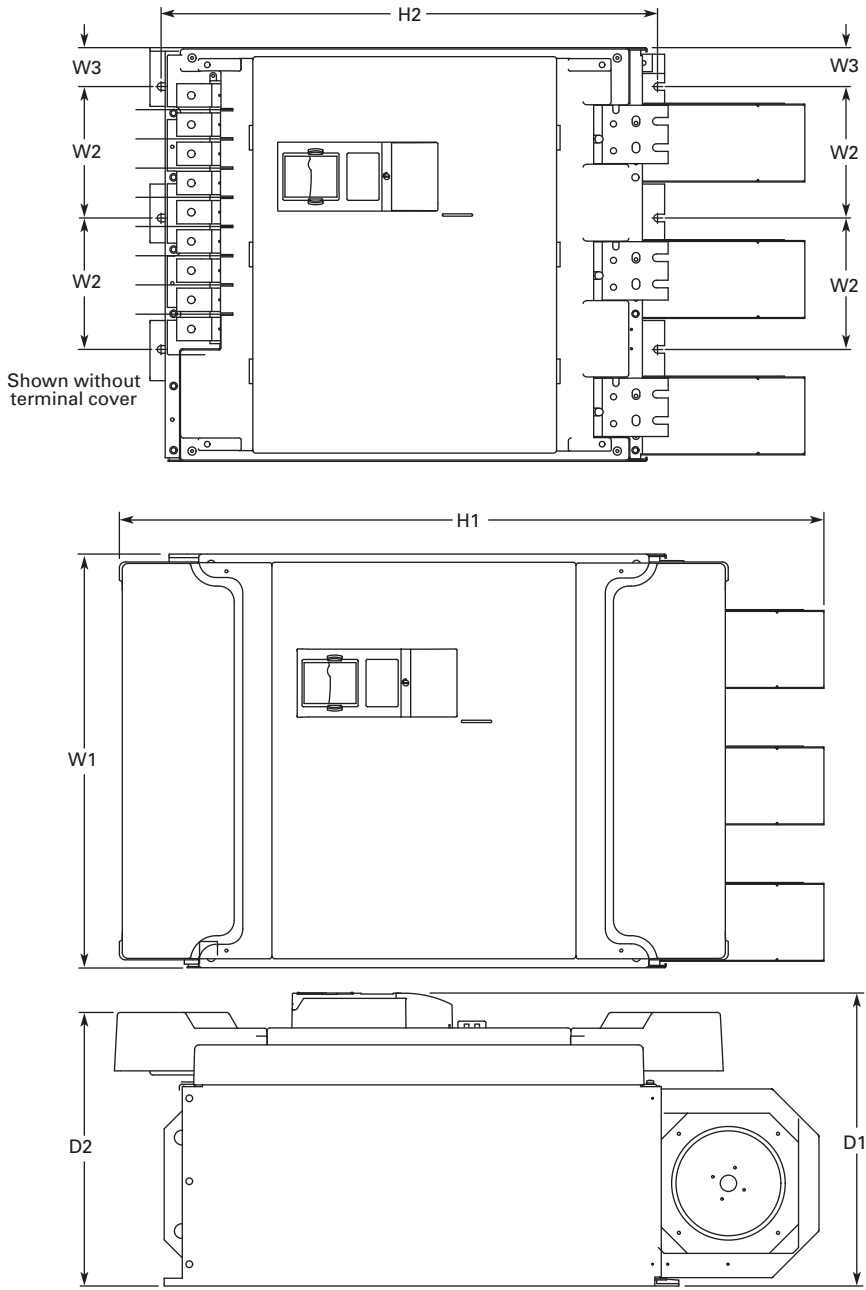
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

FR11 Open Chassis

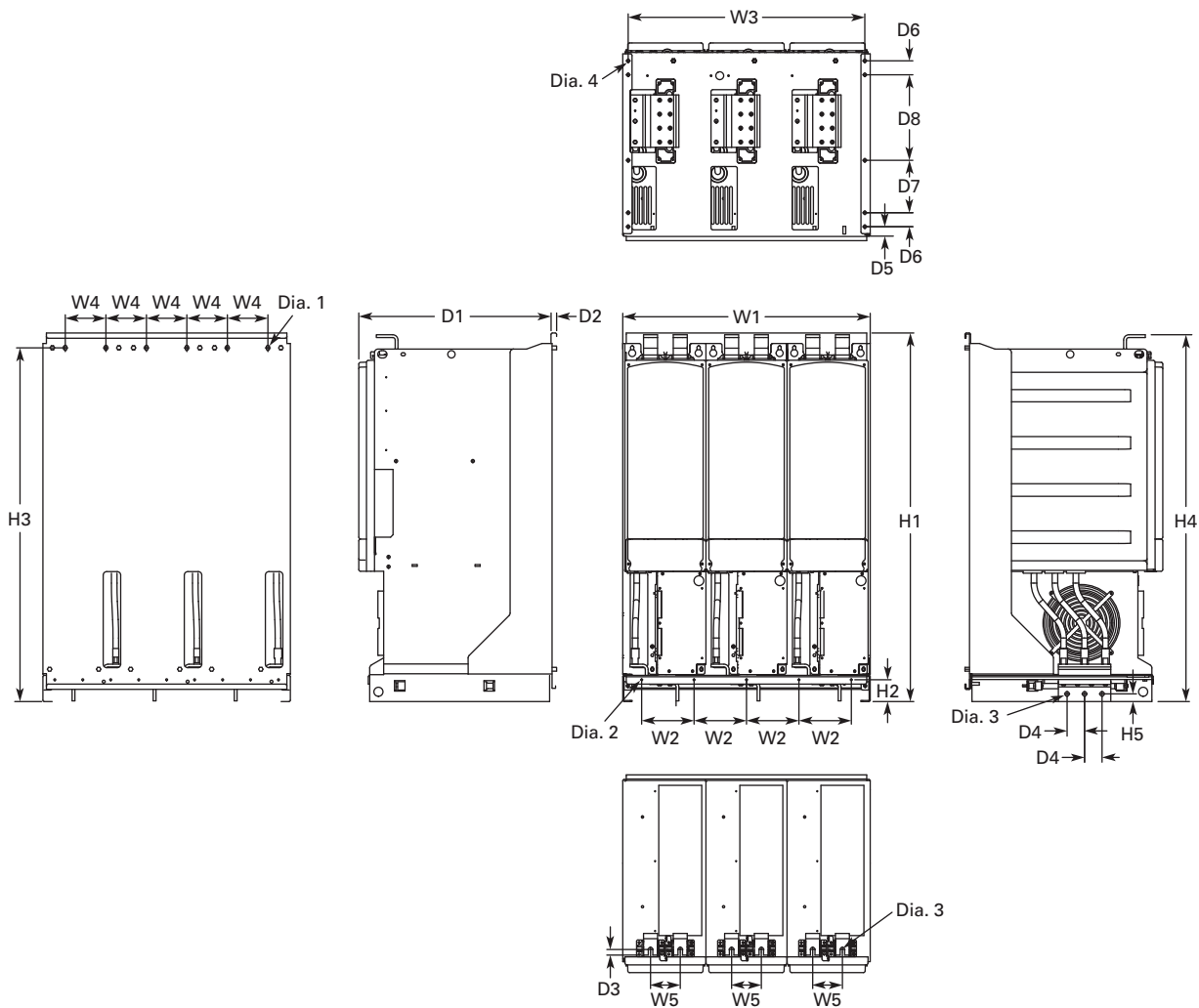
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Voltage	hp (I _H)	W1	W2	W3	H1	H2	D1	D2	Weight Lbs (kg)
480V	400-550	27.9 (709)	8.6 (225)	2.6 (67)	45.5 (1155)	33.5 (850)	19.8 (503)	18.4 (468)	833 (378)
575V	400-500								

Approximate Dimensions in Inches (mm)

FR13, Open Chassis Inverter



W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	D1	D2	D3	D4	D5	D6	D7	D8	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Weight Lbs (kg)
27.87 (708)	5.91 (150)	26.65 (677)	4.57 (116)	3.35 (85)	41.54 (1055)	2.46 (62.5)	39.86 (1012.5)	41.34 (1050)	0.79 (20)	21.77 (553)	0.51 (13)	0.63 (16)	1.97 (50)	1.06 (27)	1.57 (40)	5.91 (150)	9.64 (244.8)	0.35x0.59 (9x15)	0.18 (4.6)	0.51 (13)	0.37 (9.5)	683 (310)

Notes

9000X FR14 is built of two FR13 modules. Please refer to SPX9000 installation manual for mounting instructions.

FR13 is built from an inverter module and a converter module. Please refer to SPX9000 installation manual for mounting instructions.

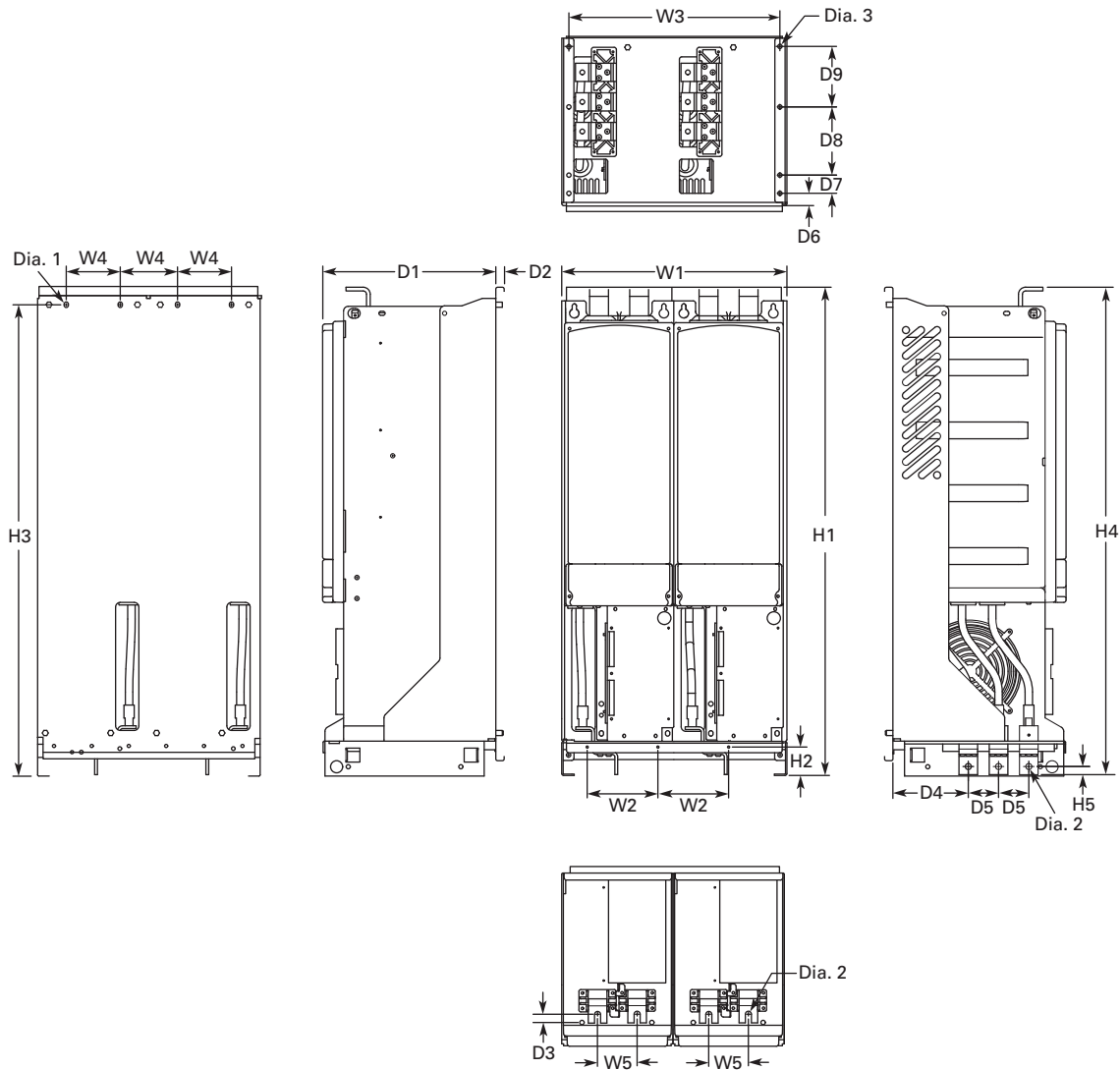
36.4 Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

FR13, Open Chassis Converter

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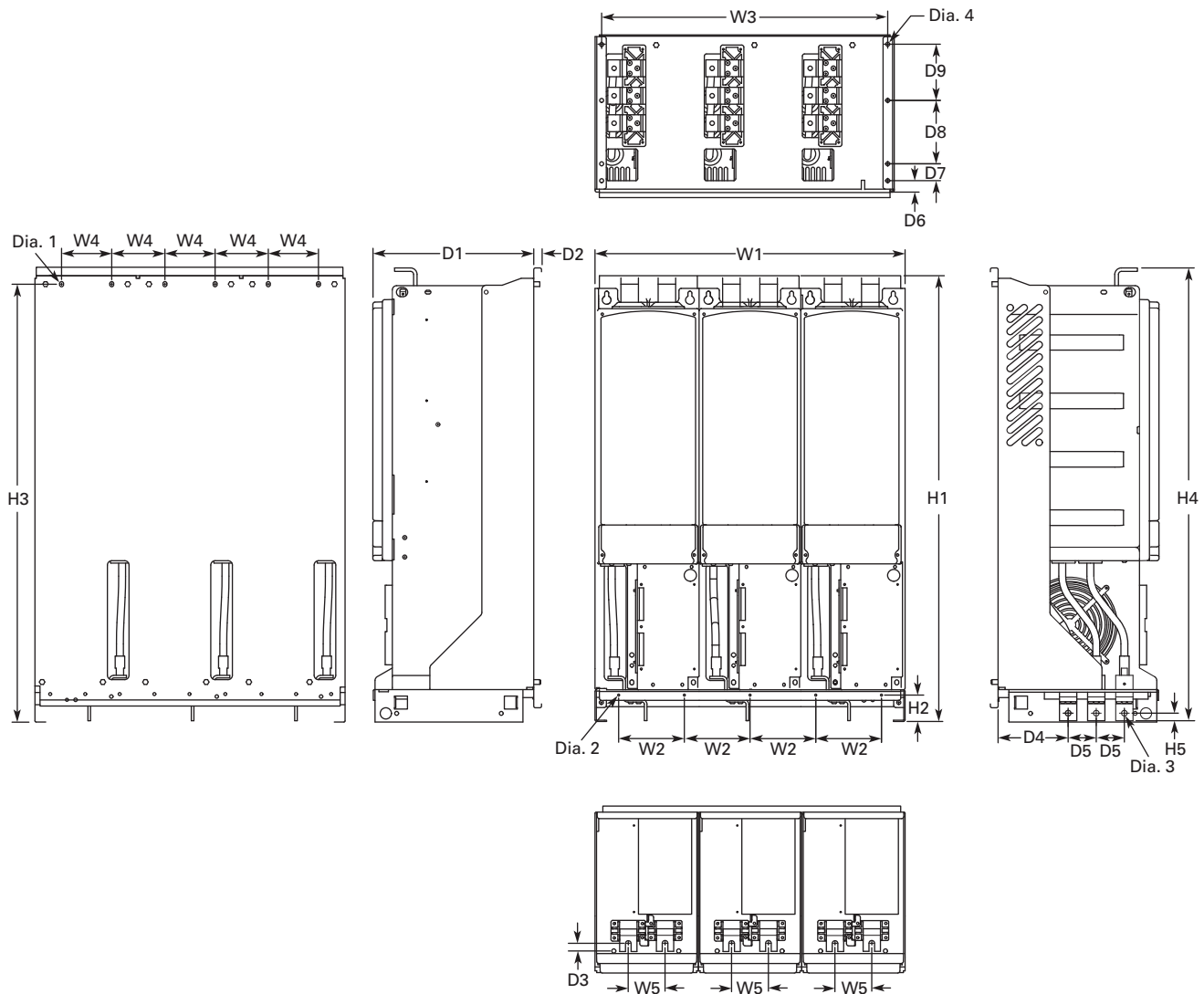
W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	D1	D2	D3	D4	D5	D6	D7	D8	D9	Dia. 1	Dia. 2	Dia. 3	Weight Lbs (kg)
18.74 (476)	5.91 (150)	17.52 (445)	4.57 (116)	3.35 (85)	41.54 (1055)	2.46 (62.5)	39.86 (1012.5)	41.34 (1050)	0.69 (17.5)	14.69 (373)	0.51 (13)	0.73 (18.5)	6.42 (163)	2.56 (65)	1.06 (27)	1.57 (40)	5.91 (150)	5.24 (133)	0.35x0.59 (9x15)	0.51 (13)	0.37 (9.5)	295 (134)

Number of Input Units

480V Catalog Number	hp	Input Modules
SPX800A0-4A2N1	800	2

690V Catalog Number	hp	Input Modules
SPX800A0-5A2N1	800	2
SPX900A0-5A2N1	900	2
SPXH10A0-5A2N1	1000	2

Approximate Dimensions in Inches (mm)

FR13, Open Chassis Converter—900/1000 hp 480V

W1	W2	W3	W4	W5	H1	H2	H3	H4	H5	D1	D2	D3	D4	D5	D6	D7	D8	D9	Dia. 1	Dia. 2	Dia. 3	Dia. 4	Weight Lbs (kg)
27.87 (708)	5.91 (150)	26.65 (677)	4.57 (116)	3.35 (85)	41.54 (1055)	2.46 (62.5)	39.86 (1012.5)	41.34 (1050)	0.69 (17.5)	14.69 (373)	0.51 (13)	0.73 (18.5)	6.42 (163)	2.56 (65)	1.06 (27)	1.57 (40)	5.91 (150)	5.24 (133)	0.35x0.59 (9x15)	0.18 (4.6)	0.51 (13)	0.37 (9.5)	443 (201)

Number of Input Units

480V Catalog Number	hp	Input Modules
SPX900A0-4A2N1	900	3
SPXH10A0-4A2N1	1000	3

36.4

Adjustable Frequency Drives

SPX9000 Drives

Approximate Dimensions in Inches (mm)

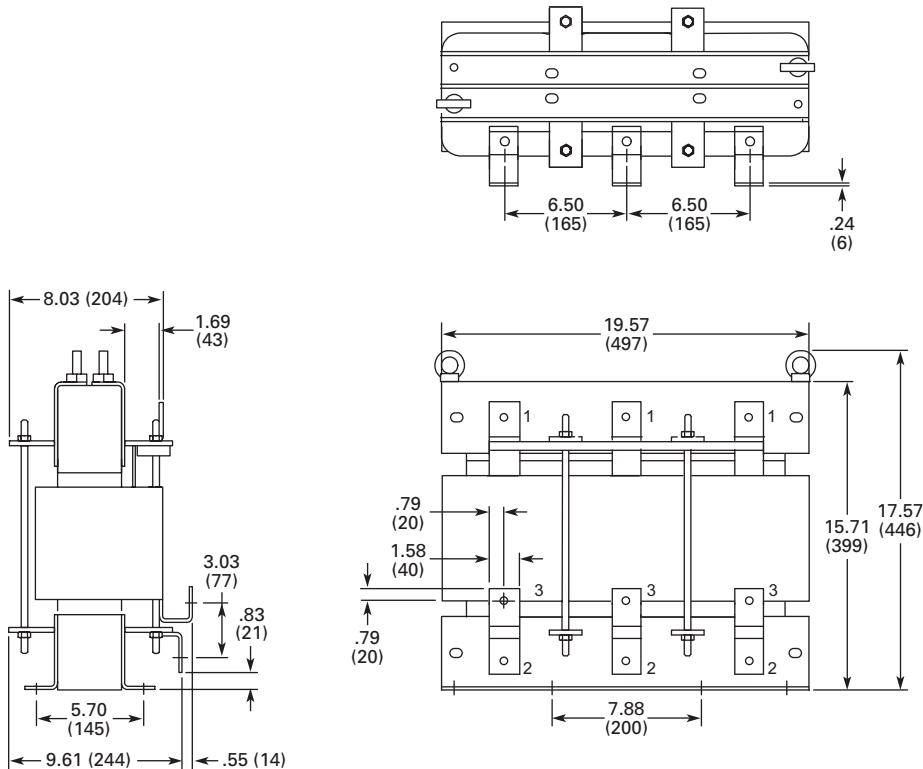
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AC Choke Dimensions

Choke Types

Catalog Number	Frame Size	Choke Type ①	Catalog Number	Frame Size	Choke Type ①
Voltage Range 380–500V			Voltage Range 525–690V		
SPX 250 4	FR10	CHK0400	SPX 200 5	FR10	CHK0261
SPX 300 4		CHK0520	SPX 250 5		CHK0400
SPX 350 4		CHK0520	SPX 300 5		CHK0400
SPX 400 4	FR11	2 x CHK0400	SPX 400 5	FR11	CHK0520
SPX 500 4		2 x CHK0400	SPX 450 5		CHK0520
SPX 550 4		2 x CHK0400	SPX 500 5		2 x CHK0400
SPX 600 4	FR12	2 x CHK0520	SPX 550 5	FR12	2 x CHK0400
SPX 650 4		2 x CHK0520	SPX 600 5		2 x CHK0400
SPX 700 4		2 x CHK0520	SPX 700 5		2 x CHK0400
SPX 800 4	FR13	2 x CHK0400	SPX 800 5	FR13	2 x CHK0400
SPX 900 4		3 x CHK0520	SPX 900 5		2 x CHK0400
SPX H10 4		3 x CHK0520	SPX H10 5		2 x CHK0400
SPX H12 4	FR14	4 x CHK0520	SPX H13 5	FR14	4 x CHK0400
SPX H16 4		6 x CHK0400	SPX H15 5		6 x CHK0400

CHK0520

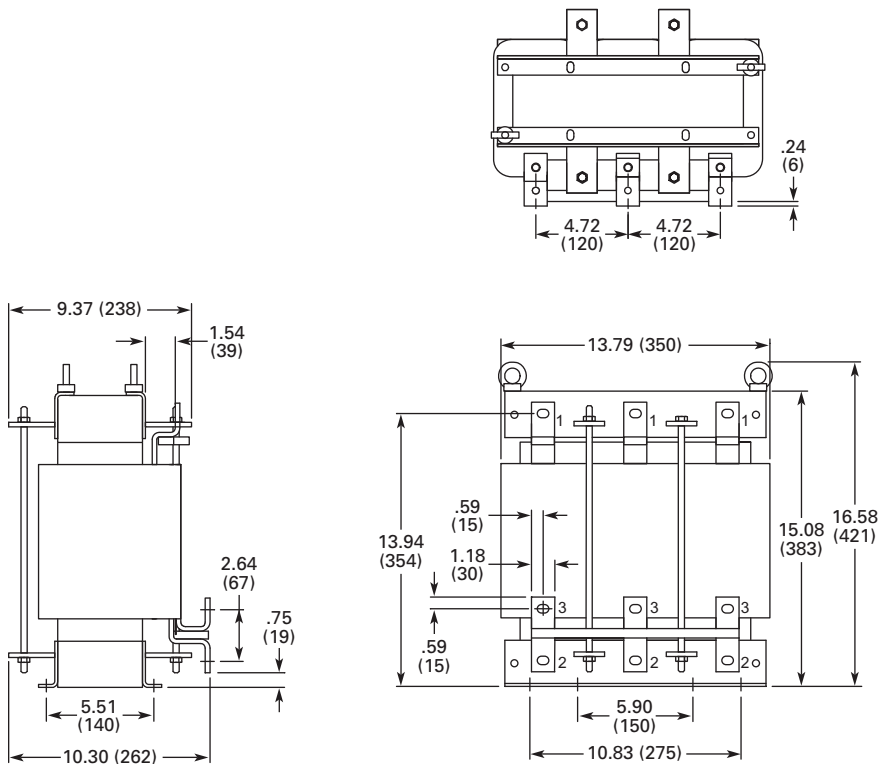


Note

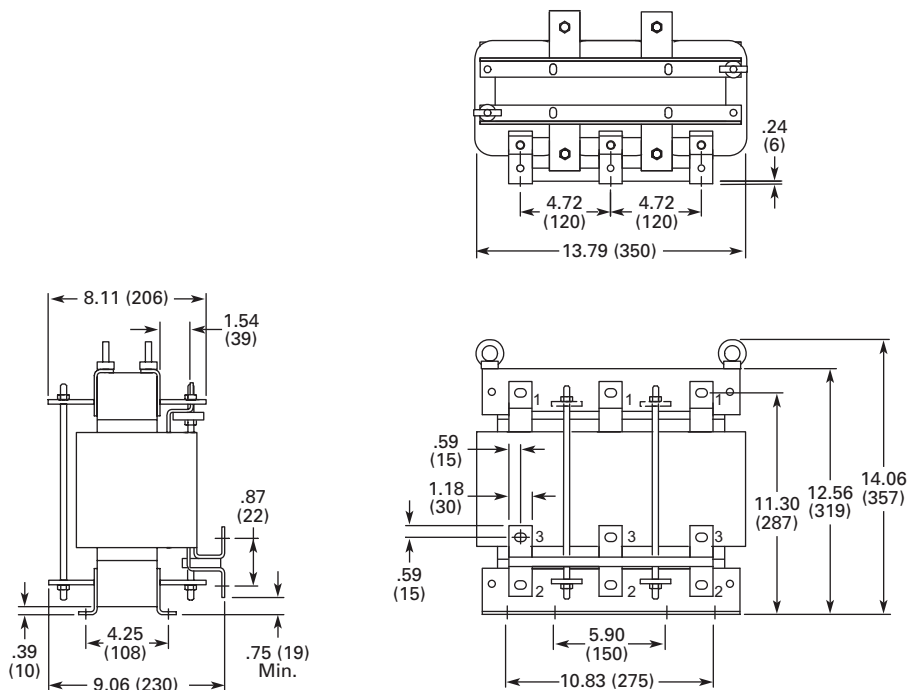
① Chokes are provided with all FR10–FR14 drives.

Approximate Dimensions in Inches (mm)

CHK0400



CHK0261



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