

A low cost, user-friendly PWM drive in compact NEMA 1 and 4X/12 enclosures



Reliance® Electric's SP500 controller is a compact, low-cost AC PWM inverter that is designed and built in North America. Utilizing state-of-the-art digital microprocessing concepts and IGBT (insulated gate bi-polar) transistors, SP500 offers "trip-free" adjustable-speed performance for AC induction and synchronous motors.

The SP500 offers the advanced technology to provide high performance and flexibility without the high-cost and complex programming common to many other drive controllers. Because it is available in a water-tight, dust-tight, corrosive resistant enclosure, the SP500 is ideal for the harsh environments found in many processing applications.

Standard Features

- Quiet motor operation with selectable 4, 6 or 8 kHz carrier frequency
- "Trip-free" operation
- 208-230 VAC, 380-460 VAC and 575 VAC three-phase input ($\pm 10\%$); 115 VAC and 208-230 VAC single-phase input
- 0.5 to 240 Hz three-phase voltage output
- Standard on-board keypad and display:
 - Start/Stop-Reset
 - Program mode
 - Forward/Reverse (plus reverse lock-out)
 - Increment and decrement
 - Selectable display of motor RPM, % load, and output voltage
- LED indication of: Run, Forward, Reverse, Remote Control, Program Mode, Motor RPM, % Load, Output Voltage
- 3 preset speeds
- Password lockout
- Power-up start
- Frequency avoidance
- Auto restart after fault
- Remote start/stop with local or remote speed control
- Reverse disable
- Available low energy snubber braking kit
- 150% load for one minute
- 500 millisecond power dip ride-through
- Capable of starting into a rotating motor (either direction) without tripping.
- Internal terminal board for:
 - Remote Start/Stop IET reset operation
 - Remote Forward/Reverse selection
 - External speed control via customer supplied:
 - 5K ohm speed potentiometer
 - 0-10 VDC reference
 - 0-20 milliamp reference
 - 0-10 VDC output proportional to either:
 - Output frequency, Output amps or Output voltage
 - IET or controller running form "C" contact
 - Function loss
- Controller fault display for:
 - Over current, short circuit or ground fault
 - Over voltage
 - Under voltage
 - Controller high temperature
 - External function loss
 - Electronic thermal overload
- Coast-to-rest or ramp-to-rest selection
- Meets CE96 with the addition of an optional Mains Filter
- UL/CSA electronic motor overload which meets NEC/CEC requirements

Software Parameters

0	Local or Remote Control (4 choices) (default = local)
1	Acceleration Time (.5 - 90 seconds)
2	Deceleration Time (.5 - 90 seconds)
3	Minimum Speed (.5 - 30 Hz)
4	Maximum Speed (30 - 240 Hz)
5	Current Limit (10 - 150%)
6	Manual Torque Boost (2 - 10%)
7	V/Hz (voltage tops out at 30 - 240 Hz)
8	RPM Monitor Base Selection (10 - 9999)
9	Configurable Output Relay Selectable Carrier Frequency (4, 6, 8 kHz (default = 4 KHz)
10	Remote Reference Gain (60 - 100%)
12	Remote Reference Offset (0 - 40%)
13	Percent Selected Speed Reference Display Enable
14	Electronic Thermal Overload (20 - 100%)
15	Electronic Thermal Overload Enable (default = enable)
16	Coast Stop Enable (default = coast)
17	Reverse Disable (default = off)
18	RPM Setpoint Enable (default = off)
19	Power-up Start Enable (default = off)
20	Password Lockout Enable (default = off)
21	Avoidance Frequency (min. to max. speed)
22	Avoidance Bandwidth (0 - 30 Hz)
23, 24 & 25	3 Preset Speeds (range = min. to max. speed)
26	Auto-Restart After Fault (0 - 10 attempts)
27	Auto-Restart Retry Wait Time (1 - 30 seconds)
28	Controller Voltage/Select (set at factory)
29	Analog Output Reference Selection
49	Software Version Number (x.xx)

Service Conditions

- Elevation to 3300 ft (1000 meters)
- Ambient Temperature Range:
 - Cabinet: 0°C to 40°C (32°F to 104°F)
 - Chassis: 0°C to 55°C (32°F to 131°F)
- Atmosphere: Non-Condensing Relative Humidity 5 to 95%
- AC Line Voltage Variation plus or minus 10%
- AC Line Frequency: 48 Hz to 62 Hz
- Speed Range: 20:1

Dimensions (in/mm)

Style (lb/kg)	Height	Width	Depth	Weight
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	18/8.2
D	18.3/465	11.4/290	9.4/239	25/11.3

Drive Ratings

Contr. HP	Input Volt.	NEMA Encl.	Model Number	Max. Cont. Output Amps	Dim. Style
1/4-1	115	1	* 1SU11001	6.8	A
1/4-1	208-230	1	* 1SU21001	5	A
2	208-230	1	* 1SU21002	7.5 ⁽¹⁾	A
3	208-230	1	* 1SU21003	10.6	C
5	208-230	1	* 1SU21005	14.2	C
1/4-1	208-230	4x/12	* 1SU24001	4.5(1)	A
2	208-230	4x/12	* 1SU24002	7.5	C
3	208-230	4x/12	* 1SU24003	10.6	C
5	208-230	4x/12	* 1SU24005	14.2	C
1/4-1	380-460	1	* 1SU41001	2.1	B
2	380-460	1	* 1SU41002	3.4	B
3	380-460	1	* 1SU41003	5.3	B
5	380-460	1	* 1SU41005	8.2	B
7-1/2	380-460	1	* 1SU41007	11.1	C
10	380-460	1	* 1SU41010	14.2	C
15	380-460	1	* 1SU41015	21	D
20	380-460	1	* 1SU41020	27	D
1/4-1	380-460	4x/12	* 1SU44001	2.1	B
2	380-460	4x/12	* 1SU44002	3.4	B
3	380-460	4x/12	* 1SU44003	5.3	B
5	380-460	4x/12	* 1SU44005	8.2	B
7-1/2	380-460	4x/12	* 1SU44007	11.1	C
10	380-460	4x/12	* 1SU44010	14.2	C
15	380-460	12	* 1SU42015	21	D
20	380-460	12	* 1SU42020	27	D
1/4-1	575	1	* 1SU51001	1.6	B
2	575	1	* 1SU51002	2.7	B
3	575	1	* 1SU51003	4.3	B
5	575	1	* 1SU51005	6.2	B
7-1/2	575	1	* 1SU51007	9	C
10	575	1	* 1SU51010	12	C
1/4-1	575	4x/12	* 1SU54001	1.6	B
2	575	4x/12	* 1SU54002	2.7	B
3	575	4x/12	* 1SU54003	4.3	B
5	575	4x/12	* 1SU54005	6.2	B
7-1/2	575	4x/12	* 1SU54007	9	C
10	575	4x/12	* 1SU54010	12	C
DEMO	120	4x/12	* D1SP5101	2	A

Instruction Manual

- Installation and Operation Manual D2-3356

(1) Amp and KVA data is based on a controller programmed for a carrier frequency of 4 kHz. For carrier frequency settings of 6 or 8 kHz, refer to the instruction manual or Reliance Electric for Amp and KVA data.

* Normally carried in stock

Single-phase 115 VAC ⁽¹⁾ and 208-230 VAC Three-phase 208-230 VAC ⁽²⁾, 380-460 VAC and 575 VAC input SP500's



Product Features

- Removable top cover for easy conversion to chassis style
- Local operator station digital keypad
- Terminal strip for remote control operation
- NEMA 1 or NEMA 4X/12 Enclosed SP500s

All references to HP are for single motor NEMA Design B induction motors only. Contact your Reliance Electric sales office for application assistance when other types of motors or multiple motors are to be used.

NEMA 1/Chassis SP500 Drives ⁽³⁾

Application HP ⁽⁴⁾	115 VAC ⁽¹⁾ Model Number	List	208-230 VAC ⁽²⁾ Model Number	List	380-460 VAC Model Number	List	575 VAC Model Number	List
1/4-1	* 1SU1100 ⁽¹⁾	\$661	* 1SU21001	\$610	* 1SU41001	\$870	* 1SU51001	\$958
2	-	-	* 1SU21002	751	* 1SU41002	1,012	* 1SU51002	1,112
3	-	-	* 1SU21003	1,096	* 1SU41003	1,159	* 1SU51003	1,276
5	-	-	* 1SU21005	1,252	* 1SU41005	1,464	* 1SU51005	1,612
7-1/2	-	-	-	-	* 1SU41007	1,780	* 1SU51007	1,959
10	-	-	-	-	* 1SU41010	2,212	* 1SU51010	2,435
15	-	-	-	-	* 1SU41015	3,116	-	-
20	-	-	-	-	* 1SU41020	3,714	-	-

NEMA 4X/12 SP500 Drives ⁽³⁾

Application HP ⁽⁴⁾	115 VAC ⁽¹⁾ Model Number	List	208-230 VAC ⁽²⁾ Model Number	List	380-460 VAC Model Number	List	575 VAC Model Number	List
1/4-1	-	-	* 1SU24001	\$722	* 1SU44001	\$1,031	* 1SU54001	\$1,135
2	-	-	* 1SU24002	1,016	* 1SU44002	1,198	* 1SU54002	1,318
3	-	-	* 1SU24003	1,261	* 1SU44003	1,373	* 1SU54003	1,510
5	-	-	* 1SU24005	1,377	* 1SU44005	1,735	* 1SU54005	1,908
7-1/2	-	-	-	-	* 1SU44007	2,108	* 1SU54007	2,320
10	-	-	-	-	* 1SU44010	2,258	* 1SU54010	2,883
15	-	-	-	-	* 1SU42015 ⁽⁴⁾	3,621	-	-
20	-	-	-	-	* 1SU42020 ⁽⁴⁾	4,313	-	-

(1) 115 VAC SP500 is rated for 1 phase 50/60 Hz, 115 V input and 115 V 3-phase output. A 115 VAC 3-phase motor must be used.

(2) 1SU21001 and 1SU24001 can be used on single-phase power but must be derated by 1/2. 1SU21002 can be used on single-phase power without being derated.

(3) NEMA B induction motor rating only. Application load and speed requirements must be considered to properly size the motor and SP500. Contact your local Reliance Electric sales office for assistance.

(4) 15 and 20 HP (460 V) SP500 are NEMA 12 only - not NEMA 4X/12

* Normally carried in stock

DISCOUNT VS-1AC

SP500 Options

Compliance to CE Directives

SP500 AC Drives meet the European Community standards:

- EN50081-1: Electromagnetic compatibility - generic emissions standard, Part 1: residential, commercial, and light industry; and
- EN50082-2: Electromagnetic compatibility - generic immunity, Part 2: industrial environment

Compliance Requirements

Compliance is maintained by fitting the SP500 with a Reliance Mains Filter (as detailed under Mains Filter) and following the installation guidelines below. Refer also to the drive instruction manual.

- The motor leads must not exceed 250 feet (75 meters) from the SP500 to the motor.
- The motor leads must be 3 conductor with ground, screened or armored cable, or the motor leads can be run in rigid conductive conduit. The cable screen or armor or conductive conduit must be electrically connected to the SP500 housing and the motor.
- Remote operator controls and signal wires may be run in either a screened or armored conduit or the control leads must be in a rigid conductive conduit. The cable screen or armor, or the conductive conduit must be electrically connected at the SP500 housing and the operator station enclosure.
- The remote operator control station enclosure shall be of an electrically conductive material (aluminum, stainless steel, or steel). Note: Standard industrial pushbuttons, selector switches and pushbutton potentiometers are acceptable.
- 15 HP and 20 HP SP500's also require a special NEMA 1 cover kit.*

* Normally carried in stock



5 HP SP500 mounted on a Mains Filter

MAINS FILTER is housed in a compact NEMA 1 (IP21) enclosure designed for mounting between the wall or backpanel 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	Mains Filter Dimensions (in/mm)				List
			H	W	D		
1	1SU21001	* 2DF2282	16/407	5.7/146	2.5/63	\$965	
2	1SU21002	* 2DF2282	16/407	5.7/146	2.5/63	965	
3	1SU21003	* 2DF4283	15.2/387	8.5/217	2/53	680	
5	1SU21005	* 2DF4283	15.2/387	8.5/217	2/53	680	
7-1/2	1SU41007	* 2DF4284	17.3/440	10.7/272	2/53	765	
10	1SU41010	* 2DF4284	17.3/440	10.7/272	2/53	765	
15 ⁽¹⁾	1SU41015	* 2DF4285	22.6/575	10.7/272	3.6/93	1,110	
20 ⁽¹⁾	1SU41015	* 2DF4285	22.6/575	10.7/272	3.6/93	1,110	

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

SP500 AC Drives

LINE REACTORS are used to provide additional impedance in the AC line. They are an alternative to using isolation transformers for adding impedance provided that line voltage corresponds to the drive's rating. Line reactors are supplied in NEMA 1 enclosures for separate mounting. See pages M-193 through M-194 for information, sizing, pricing and dimensions.

ISOLATION TRANSFORMERS are available for use on the input AC line to the SP500. Although SP500's are designed to operate from a normal industrial power distribution system(1) without the need of an isolation transformer, the following benefits of isolation transformers should be considered.

- 1) Local codes may require a transformer.
- 2) Transformer isolates the AC drive circuitry from plant AC line voltage adding increased safety and reliability.
- 3) The transformer will help reduce abnormal AC line voltage transients from reaching the drive circuitry.

See pages M-183 through M-191 for Specifications, Prices, Dimensions and Weights.

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.

Instruction Manual

D2-3178

Style	Enclosure Dimensions and Weights			
	Height Inch/MM	Width Inch/MM	Depth Inch/MM	Weight lb/kg
A	9.8/250	7.8/200	3.9/100	7/3
B	13/330	8.7/222	8.7/222	17/8
C	13/330	8.7/222	8.7/222	20/9

SP500 Voltage	SP500 HP Rating	Kit Model Number	Resistor Wattage	Style	List
230	1/4-5	* 2DB2005	200	A	\$672
460	1/4-10	* 2DB4010	800	B	1,143
460	15-20	* 2DB4020 ⁽²⁾	1600	C	1,674

Note: For 575V DB kits, use model number 2SR50600 and model number 2SR51200 on page D-66.

REMOTE OPERATOR STATION

Reference pages M-183 through M-191 for available remote operator station.

SP500 Rating	Max. Line KVA	Fault Current Rating
1/4-5 HP (230 VAC)	100	5,000 Sym. Amps
1/4-10 HP (460 VAC)	1000	25,000 Sym. Amps
1/4-10 HP (575 VAC)	1000	25,000 Sym. Amps

- (2) Requires a 10 V 50 mA supply. 15-20 HP 460 VAC units do not supply 10 volt to power the snubber kit. Alternate model is 2SR41800 (requires no additional power supply) see page M-66.

* Normally carried in stock

DISCOUNT VS-1AC

SP500 DRIVE TO MOTOR LEAD LENGTHS

See the GV3000/SE drive lead length section for more information about lead length issues for AC drives in general.

SP500 HP Rating	Filter Type	Maximum Lead Length in Feet with 230 VAC Motor			Maximum Lead Length in Feet with 460 VAC Motor			Maximum Lead Length in Feet with 575 VAC Motor		
		Carrier Frequency			Carrier Frequency			Carrier Frequency		
		4 kHz	6 kHz	8 kHz	4 kHz	6 kHz	8 kHz	4 kHz	6 kHz	8 kHz
1	None	500	500	500	250	250	250	150	150	150
2		500	500	500	350	350	350	250	200	200
3		1000	1000	1000	400	400	400	250	200	200
5		1000	1000	1000	500	500	500	250	200	200
7.5 to 10		N/A	N/A	N/A	500	500	500	250	250	250
15 to 20		N/A	N/A	N/A	500	500	500	N/A	N/A	N/A
1	A 5% MTE reactor/filter at the drive.	A reactor/filter is not required. Above lead lengths are maximum distances.			500	500	500	500	500	500
2					500	500	500	500	500	500
3					1000	1000	1000	1000	1000	1000
5					1000	1000	1000	1000	1000	1000
7.5 to 10		N/A	N/A	N/A	1000	1000	1000	1000	1000	1000
15 to 20		N/A	N/A	N/A	1000	1000	1000	N/A	N/A	N/A

Note: The lead lengths listed are valid with Reliance Electric inverter duty motors.

N/A indicates that the drive does not have this rating or it is not applicable.

REACTORS

SP500 HP Rating	230 Volt 5% MTE Reactor	480 Volt 5% MTE Reactor	600 Volt 5% MTE Reactor
1	RL-00402	* RL-00202	* RL-00203
2		* RL-00403	* RL-00404
3		* RL-00403	* RL-00404
5		* RL-00803	* RL-00804
7.5		* RL-01203	* RL-00803
10		* RL-01803	* RL-01203
15		* RL-02503	
20		* RL-03503	

Note: MTE standard reactors can be used on SP500 drives with carrier frequency settings up to 8 kHz.

All reactors listed are UL-recognized (UL-506 File #E53094) and CSA certified (CSA File #LR29753).

* Normally carried in stock