



# E510s

IP20/NEMA 1 & IP66/NEMA 4X  
General Vector Control Drive

# E510s

General Vector Control Drive

## Product Description

E510s, succeeding to the innovation, superiority and high performance of 510 series drive, is designed to comply with worldwide standards and power ratings to deliver a cost-effective solution for various application requirements. E510s can support PM Motor Control, Safety Torque Off, Built-in PLC, Internal Communication Module, IP66 Enclosure, which makes it even more suitable for standalone machine level control applications or simple system integration.



### High end vector control technology

Support induction motor and permanent magnet motor, E510s control the motors to achieve the best performance

### Multiple auto-tuning modes

Advanced rotational, static and stator resistance measurement auto-tuning modes for ease of use

### Complies with global standards

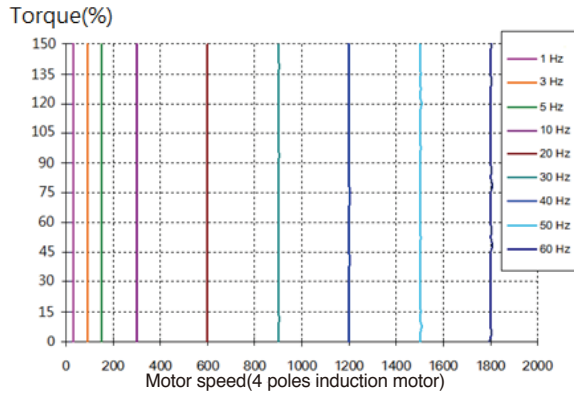
RoHS, CE, UL, and TUV certified safety torque off function

### Meet various application requirements

Support many applications such as fan & pump, conveyor, woodworking, packaging, textile and machine tools

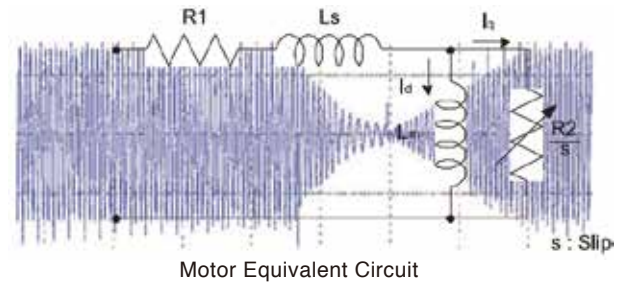
## 150%/1Hz Starting Torque

Sensorless vector (SLV) control mode achieves incredible 150% torque performance at extremely low speed (1Hz), and provides stable and reliable motor control for wide range of applications.



## Advanced Auto-Tuning

Mode	Situation
Rotational	When the load can be uncoupled
Static	When the load can not be uncoupled
Stator resistance measurement	When the motor cable is too long



## PM Motor Control

Simple parameters setting for permanent magnet motors control.



Surface Permanent Magnet Motor (SPM)



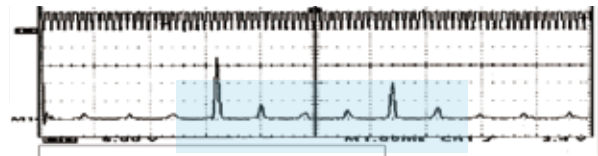
Interior Permanent Magnet Motor (IPM)

Group 22 PM Motor Parameters			
Code	Parameters	Setting Range	Default Unit
22-00	PM Motor Rated Power	0.00~600.00	KVA kW
22-02	PM Motor Rated Current	25%~200% Inverter rated current	KVA A
22-03	PM Motor's Pole Number	2~96	8 Poles
22-04	PM Motor's Rotation Speed	0~60000	1500 RPM
22-05	PM Motor's Maximum Rotation Speed	0~60000	1500 RPM
22-06	PM Motor Rated Frequency	4.8~599.0	75.0 Hz
22-10	PM SLV Start Current	20% ~ 200% Motor Rated Current	50 %
22-11	V/F Mode Start Frequency Switching Point	1.0 ~ 20.0	10.0 %
22-14	Armature Resistance of PM Motor	0.001 ~ 30.000	1.000 $\Omega$
22-15	D-axis Inductance of PM Motor	0.01 ~ 300.00	10.00 mH
22-16	Q-axis Inductance of PM Motor	0.01 ~ 300.00	10.00 mH
22-18	Flux-Weakening Limit	0~100	0 %
22-21	PM Motor Tuning	0 : PM Motor Tuning is not Active. 1 : Parameter Auto-tune	0 -

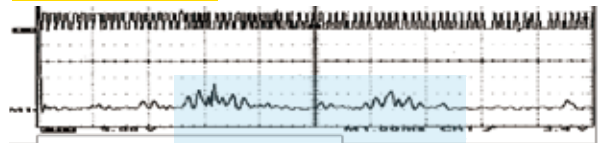
## Motor Noise Reduction Technology

Exclusive Soft PWM control technology reduces the radio frequency interference and motor noise.

Traditional PWM output

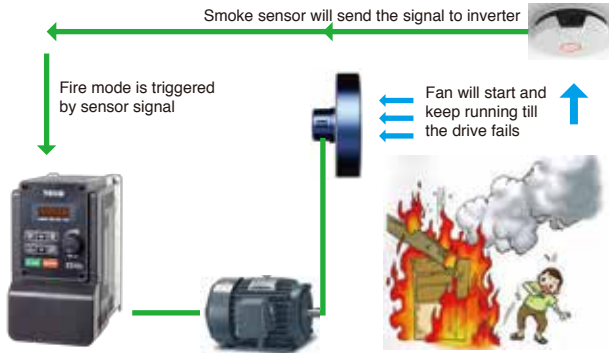


Soft PWM output



## Fire Mode

The drive will run at full speed either in forward or reverse direction and ignore all software protections until any one of the hardware protection is triggered or the drive is damaged to achieve the requirement of smoke extraction and reduce the hazard to humans.



## BACnet Communication

Support the most popular communication requirement for building automation.

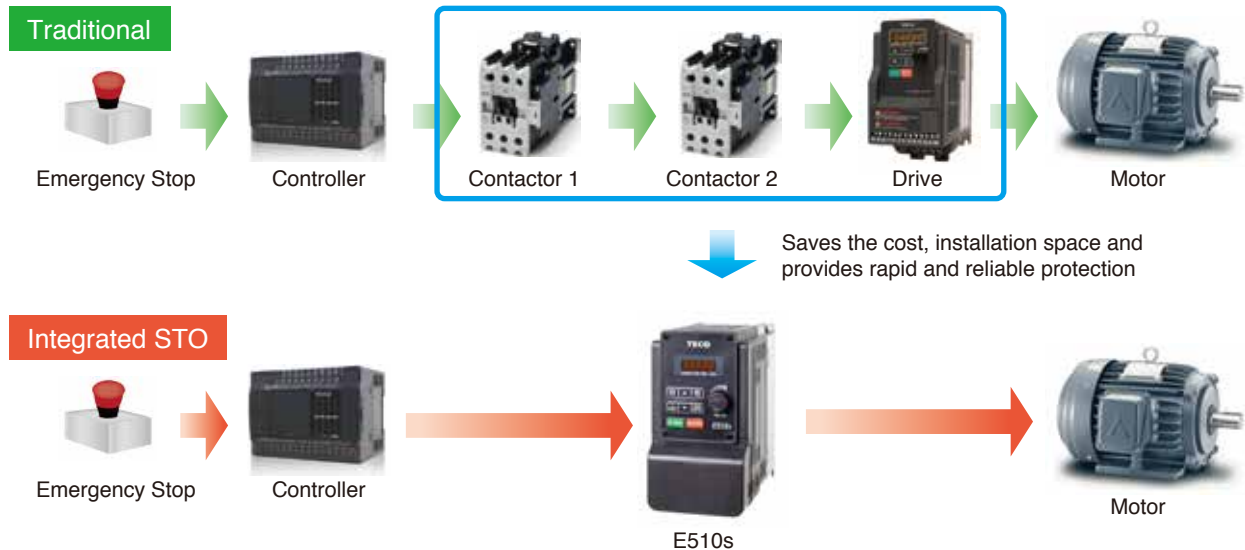
- Information exchange
- Alarm management
- Scheduling
- Parameter trending
- Equipment and Network management



## Safety Function

Integrated Safety Torque Off (STO), complies with:

- ◆ EN ISO 13849-1 Cat/PLd
- ◆ EN61508 SIL2
- ◆ EN 60204-1 Category 0
- ◆ EN62061 SIL CL2



## APPLICATIONS

### General multi-function model IP20/NEMA 1

- Textiles
- Woodworking
- Small Handling Machine
- Simple Metal Processing
- Machine Tools
- Packaging & Labeling
- Food Processing
- Fan & Pumps
- HVAC



### Tough enclosure model IP66/NEMA 4X

- Food processing : against washdown environment
- Textiles : against high heat and humid environment, like dyeing process
- Petrochemical industry : against corrosive environment
- Livestock industry : against washdown environment
- Woodworking manufacturing : against dusty environment



**Sealed Design  
High level of waterproof  
and dustproof**

## Power Rating

Rating			Normal Duty (N.D) overload capability : 120%/60s Heavy Duty (H.D) overload capability : 150%/60s									
			Single/Three phase 200V				Braking Transistor	Frame Size	Single/Three phase 400V			Braking Transistor
HP	kW		Catalog No.	Output Rating		Catalog No.			Output Rating			
	H.D	N.D		H.D	N.D		H.D	N.D				
0.5	0.4	-	E510-2P5-SH	3.1A	-	Built-in	1	-	-	-	-	-
1	0.75	-	E510-201-SH	4.5A	-	Built-in	1	E510-401-SH3	2.5A	-	Built-in	1
2	1.5	-	E510-202-SH	7.5A	-	Built-in	2	E510-402-SH3	3.8A	-	Built-in	1
3	2.2	-	E510-203-SH	10.5A	-	Built-in	2	E510-403-SH3	5.3A	-	Built-in	2
5	4	-	E510-205-SH3	17.5A	-	Built-in	2	E510-405-SH3	9.2A	-	Built-in	2
7.5	5.5	-	E510-208-SH3	26A	-	Built-in	3	E510-408-SH3	13A	-	Built-in	3
10	7.5	-	E510-210-SH3	35A	-	Built-in	3	E510-410-SH3	17.5A	-	Built-in	3
15	11	-	E510-215-SH3	48A	-	Built-in	4	E510-415-SH3	24A	-	Built-in	3
20	15	-	E510-220-SH3	64A	-	Built-in	4	E510-420-SH3	32A	-	Built-in	4
25	18.5	22	E510-225-SH3	73A	80A	Built-in	5	E510-425-SH3	40A	-	Built-in	4
30	22	30	E510-230-SH3	85A	110A	Optional Add-ON	6	E510-430-SH3	45A	58A	Built-in	5
40	30	37	E510-240-SH3	115A	138A	Optional Add-ON	6	E510-440-SH3	60A	73A	Optional Add-ON	6
50	37	45	-	-	-	-	-	E510-450-SH3	75A	88A	Optional Add-ON	6
60	45	55	-	-	-	-	-	E510-460-SH3	91A	103A	Optional Add-ON	6
75	55	75	-	-	-	-	-	E510-475-SH3	118A	145A	Optional Add-ON	6

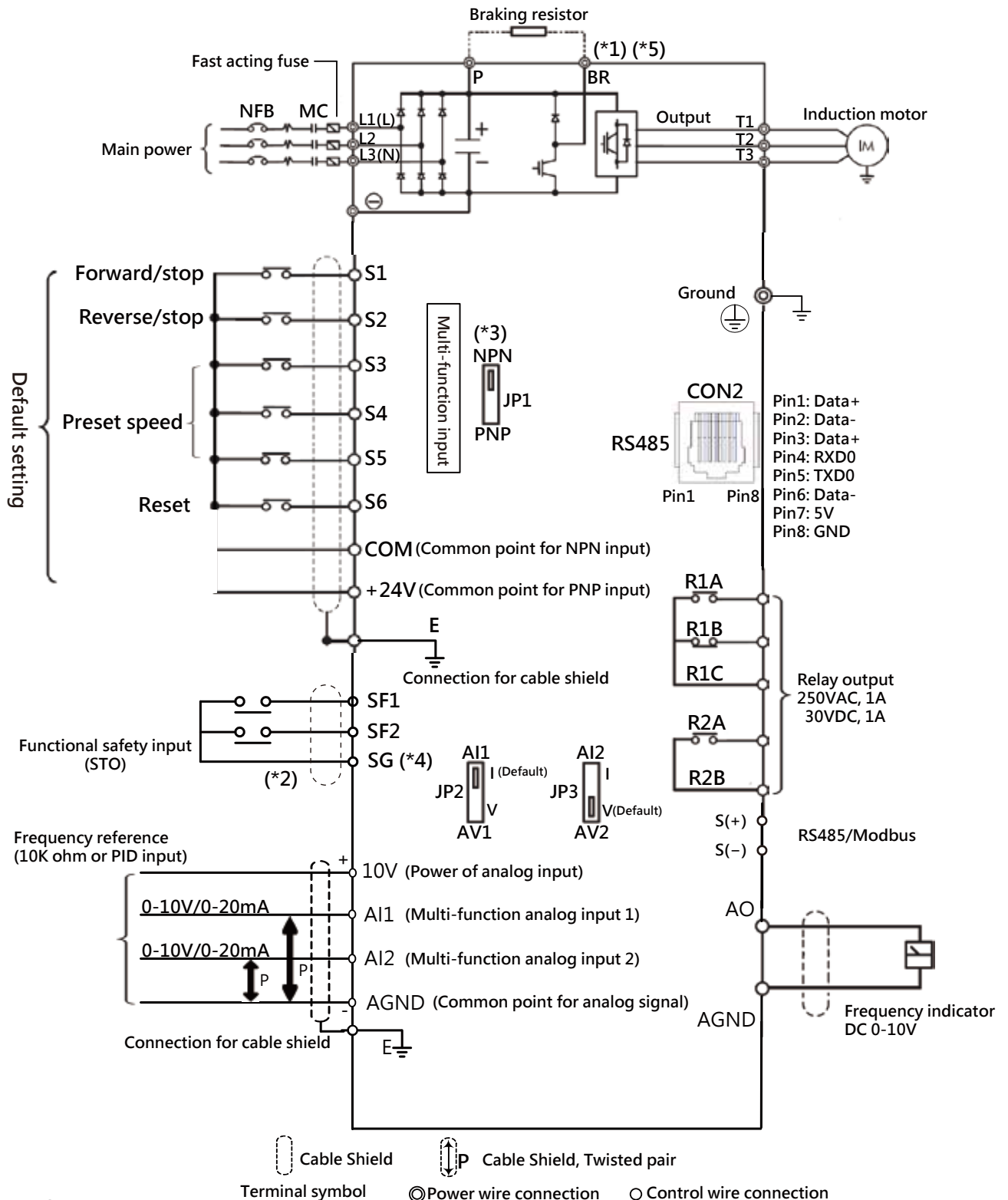
## General Specifications

Item	Description	
Input Power	Rated Voltage	Single/Three Phase: 200~240Vac Three Phase: 200~240Vac Three Phase: 380~480Vac
	Rated Frequency	50/60Hz
	Allowable Voltage Fluctuation	-15% ~ +10%
	Allowable Frequency Fluctuation	±5%
Output Rating	Output Voltage (V)	200V Class: Three Phase 0~240Vac 400V Class: Three Phase 0~480Vac
	Output Frequency (Hz)	0.01~599Hz
Control mode		V/F, SLV, PMSLV
Frequency	Output Frequency	0.01~599.00Hz
	Starting Torque	V/F: 150% / 3Hz SLV: 150% / 1Hz
	Frequency resolution	Digital input : 0.01Hz Analog input : 0.06Hz/60Hz
	Frequency setting	Keypad : set directly with ▲▼keys or the VR on the keypad Analog input : AI1/AI2 (0/2-10V, 0/4-20mA) Digital input : UP/DOWN control RS485 communication
Skip Frequency		3 skip frequency ranges configurable

## General Specifications

Item		Description
Run	Operation command	Keypad RUN/STOP button Digital input : Multi-operation mode 2/3 wires selection JOG operation RS485 communication
Main Control Features	V / F curve setting	15 fixed curves and 1 customized curve
	Carrier frequency	1k~16k Hz (factory setting is 5 kHz)
	Multifunction input	6 Digital input points
	Multifunction output	2 Digital output points (1a x1, 1c x1)
	Multifunction analog input	2 Analog input points (0-10V / 0-20mA)
	Multifunction analog output	1 Analog output point (0-10V)
	Main features	Overload detection, 16 preset speeds, Auto-run, Acc/Dec curves setting, Main/Alternative run command select, Main/Alternative frequency command select, PID control, Torque boost, Auto restart, Speed search start, Fire mode, Constant-Pressure Pump control
Display	LED display	Parameter, Parameter value, Frequency, Line speed, DC voltage, Output voltage, Output current, PID feedback, Input and output terminal status, Heat sink temperature, Firmware version, Fault list
	LED status indicator	Run / Stop, Forward / Reverse, Frequency screen, Parameter screen
Protective Functions	Overload protection for motor (OL1)	Electrical overload protection curves selectable
	Overload protection for drive (OL2)	H.D mode : 150% for 60s, 200% for 2s N.D mode : 120% for 60s
	Over voltage	200V Class : DC bus voltage higher than 410Vdc 400V Class : DC bus voltage higher than 820Vdc
	Under Voltage	200V Class : DC bus voltage lower than 190V 400V Class : DC bus voltage lower than 380V
	Momentary Power Loss Restart	Inverter can be set to restart automatically
	Stall Prevention	Stall prevention for acceleration/deceleration operation
	Short-circuit Fault	Electronic circuit protection
	Ground Fault	Electronic circuit protection
	Others	Heat sink over temperature, Reverse prohibit, Parameter lock up, Safety Torque Off (STO,SIL2), motor PTC feedback, phase loss detection, communication error detection
Communication		Built-in RS485 / BACnet communication
		Optional add-on communication module: Profibus / DeviceNet / CANopen / Ethernet
Environment	Operating temperature	IP20/NEMA1 type : -10~50°C(without sticker or upper dust cover) -10~40°C(with sticker or upper dust cover) IP66 / NEMA4 tape : -10~40°C
	Storage temperature	-20~60°C
	Humidity	<95% R.H. (no condensation) Complies with IEC60068-2-78
	Vibration	1G. (9.8m/s <sup>2</sup> ) for < 20Hz. 0.6G (5.88m/s <sup>2</sup> ) 20Hz~50Hz (Follow IEC60068-2-6 standard)
	Enclosure	IP20/NEMA 1 IP66/NEMA 4X
PLC Function		Built-in (80 lines ladders can be programmed, 4 elements per line)
EMI Protection		The built-in noise filter complies with EN61800-3
EMS Protection		Complies with EN61800-3
Certifications	CE	Complies EN61800-3 (CE/RE) Complies EN61800-5-1 (LVD)
	UL	Complies UL508C
Options		Copy Unit, LCD Display, Internal Communication Card

## Wiring Diagram



### Remark :

- (\*1) Terminal BR only exists for IP20 200V 0.5-25HP and 400V 1-30HP  
The braking resistor can be connected directly between P and BR.
- (\*2) Safety input (SF/SG) is default shorted. When the safety input is used, please be sure to remove the short-pin between SF/SG
- (\*3) The multi-function digital input terminals S<sub>1</sub>-S<sub>6</sub> can be set to Sink(NPN) or Source(PNP) by JP1.
- (\*4) SG:+24v for SF1/SF2 only.
- (\*5) Only the model 200V 25~40HP and 400V 30~75HP provide P1 and P2 terminal, for external DC reactor connected between P1 and P2. P1 and P2 are short-circuited before shipping out from the factory.



## Dimensions

Figure A (IP20 Frame 1)

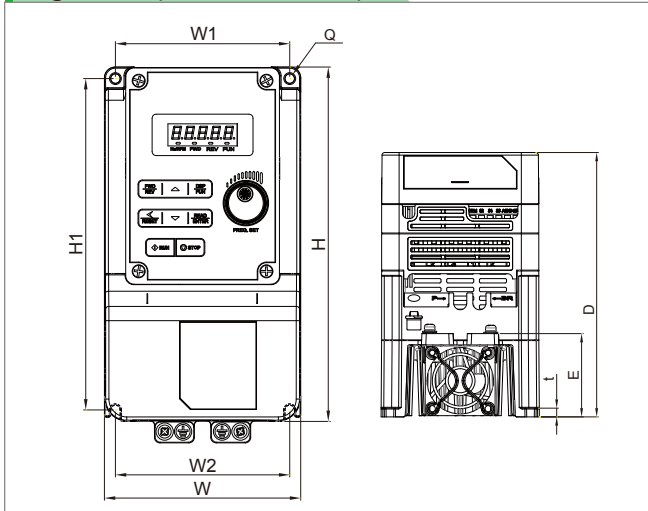


Figure B (IP20 Frame 2)

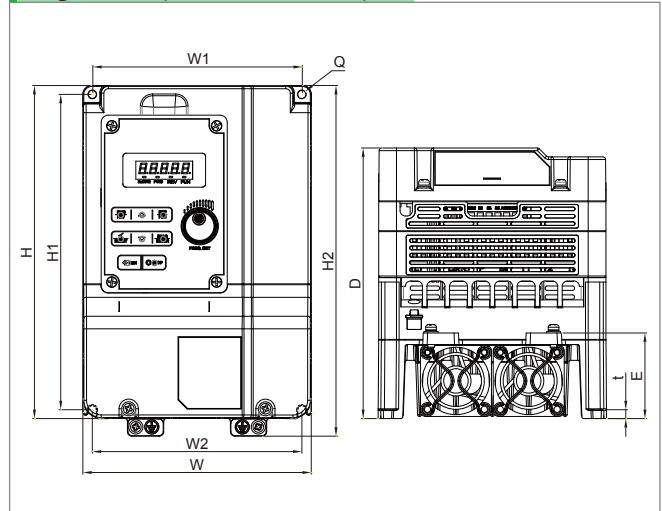


Figure	Catalog No.	Dimension: mm (inch)									Net Weight: kg (lb)
		W	W1	W2	H	H1	D	E	t	Q	
A	E510-2P5-SH	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.5 (3.3)
	E510-201-SH										
	E510-2P5-SH1F										
	E510-201-SH1F										
	E510-202-SH3										
	E510-401-SH3										
	E510-402-SH3										
	E510-401-SH3F										
	E510-402-SH3F	1.58 (3.48)									

Figure	Catalog No.	Dimension: mm (inch)										Net Weight: kg (lb)	
		W	W1	W2	H	H1	H2	D	D1	E	t		Q
B	E510-202-SH	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.0 (4.41)
	E510-203-SH												
	E510-202-SH1F												
	E510-203-SH1F												
	E510-205-SH3												
	E510-403-SH3												
	E510-405-SH3												
	E510-403-SH3F												
	E510-405-SH3F	2.2 (4.81)											

## Dimensions

Figure C (IP20 Frame 3)

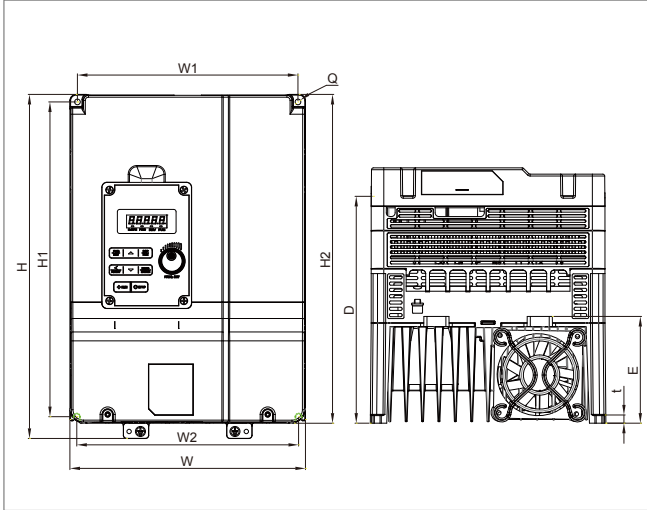


Figure D (IP20 Frame 4)

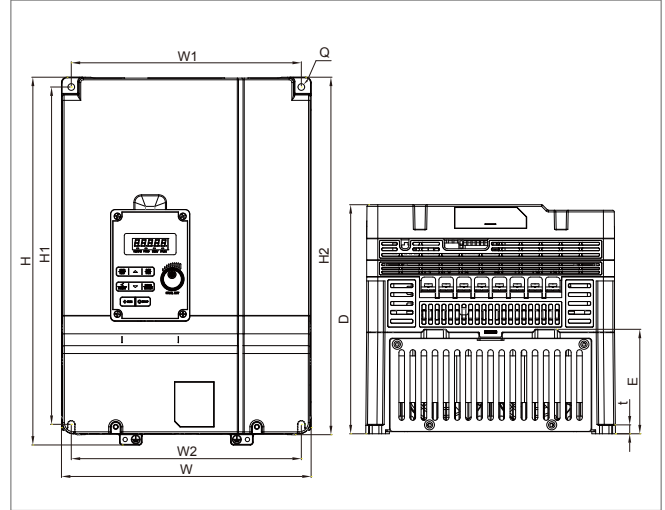


Figure	Catalog No.	Dimension: mm (inch)											Net Weight: kg (lb)
		W	W1	W2	H	H1	H2	D	D1	E	t	Q	
C	E510-208-SH3	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.0 (13.23)
	E510-210-SH3												
	E510-408-SH3												
	E510-410-SH3												6.5 (14.33)
	E510-415-SH3												
	E510-408-SH3F												
	E510-410-SH3F												
E510-415-SH3F	10.0 (22.05)												

Figure	Catalog No.	Dimension: mm (inch)											Net Weight: kg (lb)
		W	W1	W2	H	H1	H2	D	D1	E	t	Q	
D	E510-215-SH3	224.6 (8.84)	207 (8.15)	207 (8.15)	321.6 (12.66)	303.5 (11.95)	330.9 (13.03)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	8 (0.31)	M5	10.0 (22.05)
	E510-220-SH3												
	E510-420-SH3												
	E510-425-SH3												

## Dimensions

Figure E (IP20 Frame 5)

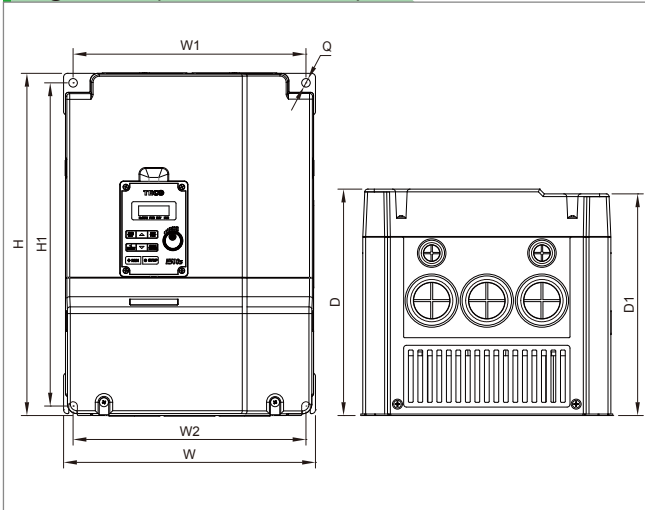


Figure F (IP20 Frame 6)

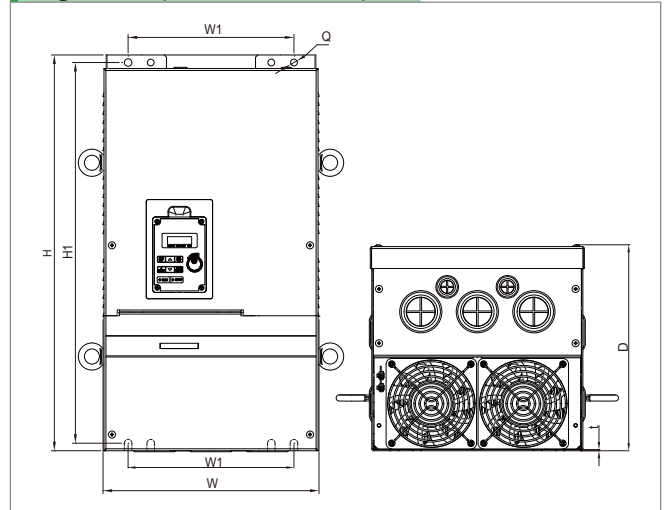


Figure	Catalog No.	Dimension: mm (inch)									Net Weight: kg (lb)
		W	W1	W2	H	H1	D	D1	t	Q	
E	E510-225-SH3	265	245	245	360	340	238.2	233.2	1.6	M8	10.0 (22.05)
	E510-430-SH3	(10.43)	(9.65)	(9.65)	(14.17)	(13.39)	(9.38)	(9.18)	(0.06)		

Figure	Catalog No.	Dimension: mm (inch)								Net Weight: kg (lb)
		W	W1	W2	H	H1	D	t	Q	
F	E510-230-SH3	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	23.2 (51.15)
	E510-240-SH3									
	E510-440-SH3									
	E510-450-SH3									
	E510-460-SH3									
	E510-475-SH3									

## Dimensions

Figure G (IP20 Frame 5, with filter)

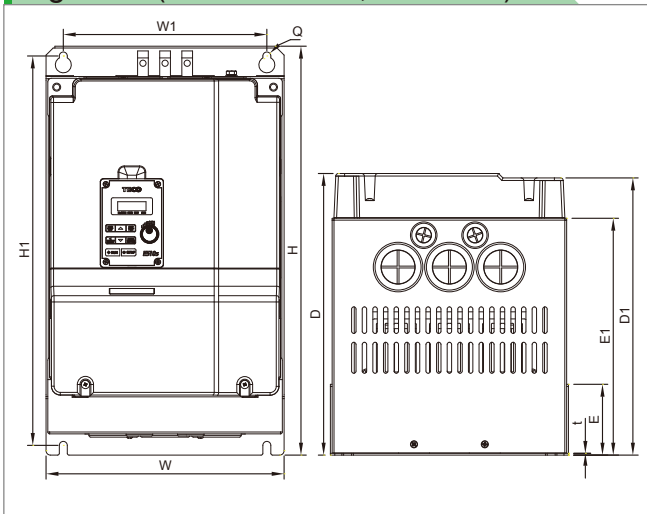


Figure H (IP20 Frame 6, with filter)

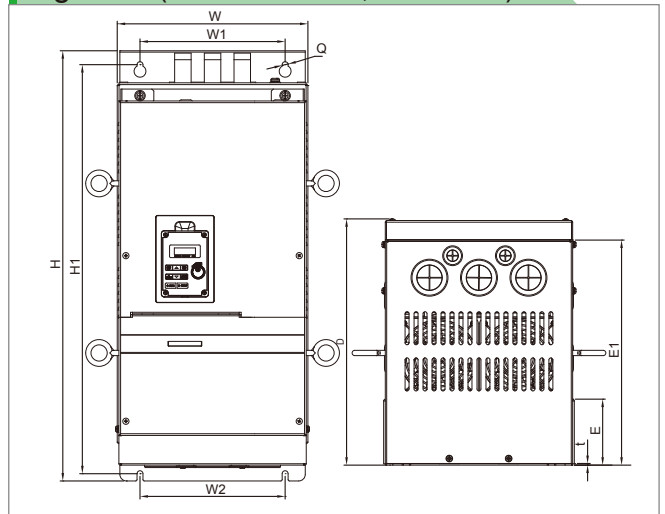


Figure	Catalog No.	Dimension: mm (inch)										Net Weight: kg (lb)
		W	W1	H	H1	D	D1	E	E1	t	Q	
G	E510-420-SH3F	235.6	180	400	381.5	267.1	262.1	62	237	4	M6	18.9 (41.67)
	E510-425-SH3F	(9.28)	(7.09)	(15.75)	(15.02)	(10.52)	(10.32)	(2.44)	(9.33)	(0.16)		
	E510-430-SH3F	269	230	462	440	318.2	313.2	80	267.6	4	M8	22.8 (50.27)
		(10.59)	(9.05)	(18.19)	(17.32)	(12.53)	(12.33)	(3.15)	(10.54)	(0.16)		

Figure	Catalog No.	Dimension: mm (inch)										Net Weight: kg (lb)
		W	W1	W2	H	H1	D	E	E1	t	Q	
H	E510-440-SH3F	288.9 (11.37)	220 (8.66)	220 (8.66)	652 (25.67)	620 (24.41)	369.8 (14.56)	90 (3.54)	331.1 (13.04)	4 (0.16)	M8	47.2 (104.07)
	E510-450-SH3F											
	E510-460-SH3F											
	E510-475-SH3F											

## Dimensions

Figure I (IP66 Frame 1)

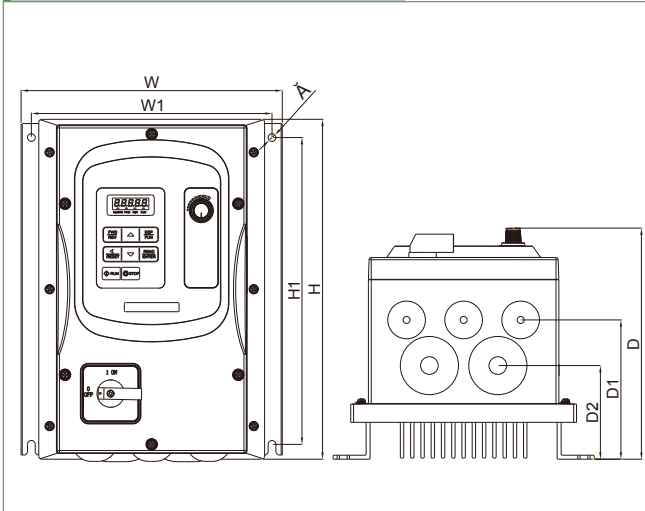


Figure J (IP66 Frame 2)

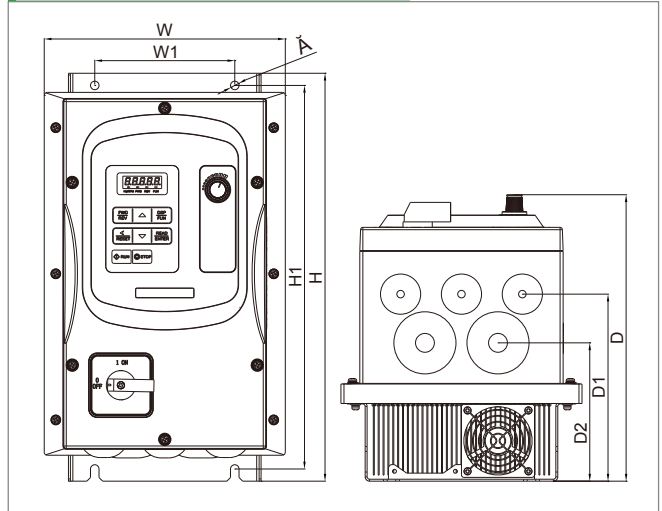


Figure	Catalog No.	Dimension: mm (inch)								Net Weight: kg (lb)
		W	W1	H	H1	D	D1	D2	Φ	
I	E510-2P5-SH1FN4S	229 (9.01)	211 (8.30)	298 (11.73)	269 (10.59)	202.6 (7.97)	122.1 (4.80)	82.1 (3.23)	M6	3.0 (6.6)
	E510-201-SH1FN4S									
	E510-2P5-SH1FN4									
	E510-201-SH1FN4									
	E510-2P5-SHN4									
	E510-201-SHN4									
	E510-401-SH3FN4S									
	E510-402-SH3FN4S									
	E510-401-SH3FN4									
	E510-402-SH3FN4									
	E510-401-SH3N4									
	E510-402-SH3N4									

Figure	Catalog No.	Dimension: mm (inch)								Net Weight: kg (lb)
		W	W1	H	H1	D	D1	D2	Φ	
J	E510-202-SH1FN4S	198 (9.63)	115 (5.59)	335 (16.30)	315 (15.33)	235.3 (11.45)	153.6 (7.47)	113.6 (5.53)	M6	5.9 (13.0)
	E510-203-SH1FN4S									
	E510-202-SH1FN4									
	E510-203-SH1FN4									
	E510-202-SHN4									
	E510-203-SHN4									
	E510-205-SH3N4									
	E510-403-SH3FN4S									
	E510-405-SH3FN4S									
	E510-403-SH3FN4									
	E510-405-SH3FN4									
	E510-403-SH3N4									
E510-405-SH3N4										

## Dimensions

Figure K (IP66 Frame 3)

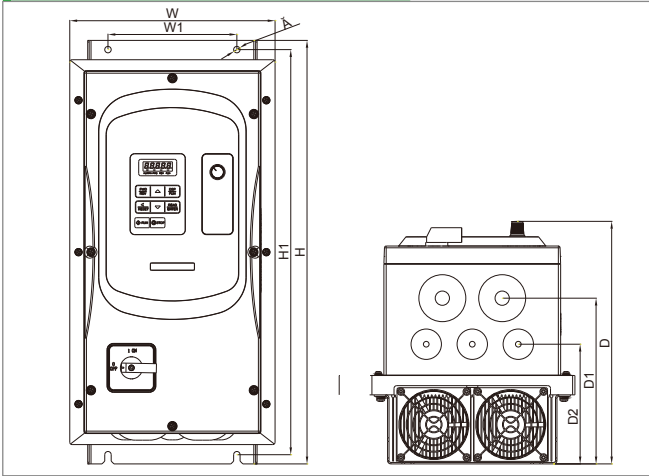
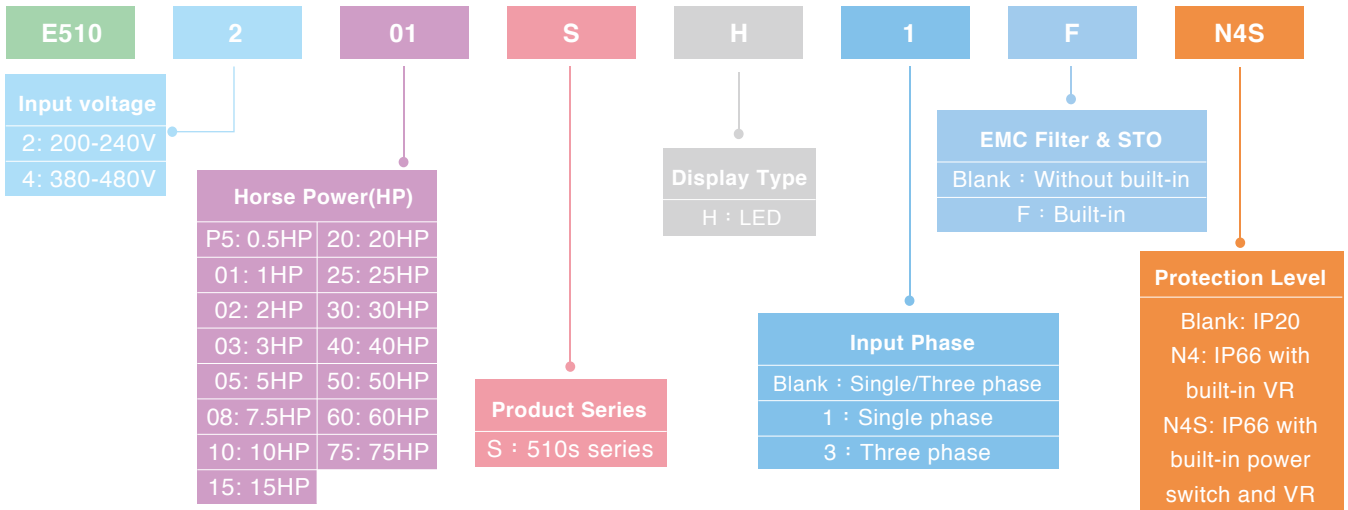


Figure	Catalog No.	Dimension: mm (inch)								Net Weight: kg (lb)
		W	W1	H	H1	D	D1	D2	Φ	
K	E510-208-SH3N4	223 (10.58)	140 (6.81)	460 (22.39)	440 (21.42)	263.5 (12.82)	180 (8.76)	130 (6.32)	M6	13.0 (28.6)
	E510-210-SH3N4									
	E510-215-SH3N4									
	E510-220-SH3N4									
	E510-408-SH3FN4S									
	E510-410-SH3FN4S									
	E510-415-SH3FN4S									
	E510-408-SH3FN4									
	E510-410-SH3FN4									
	E510-415-SH3FN4									
	E510-408-SH3N4									
	E510-410-SH3N4									
	E510-415-SH3N4									
	E510-420-SH3N4									
E510-425-SH3N4										

## Catalog Number Identification



## Accessories

Accessories	Description	Catalog No.
Connection Cable	Operator extension cable 1m	JN5-CB-01M
	Operator extension cable 2m	JN5-CB-02M
	Operator extension cable 3m	JN5-CB-03M
	Operator extension cable 5m	JN5-CB-05M
	RJ45 to USB connecting cable 1.8m	JN5-CM-USB
Integrated Communication Card	Profibus communication card	JN5-CMI-PDP
	Ethernet TCP/IP communication card	JN5-CMI-TCPIP
	DeviceNet communication card	JN5-CMI-DNET
	CANopen communication card	JN5-CMI-CAN
	EtherNet/IP Communication card	JN5-CMI-EIP
NEMA1 KIT	NEMA1 Kit for frame 1	JN5-NK-SE01
	NEMA1 Kit for frame 2	JN5-NK-SE02
	NEMA1 Kit for frame 3	JN5-NK-SE03
	NEMA1 Kit for frame 4	JN5-NK-SE04
LCD Operator Interface	IP20 LCD operator interface	JN5-OP-A02
Din-rail Kit	Din-rail for frame 1	JN5-DINF1
	Din-rail for frame 2	JN5-DINF2
Others	Copy unit	JN5-CU
	Remote keypad holder	JN5-KEYBOX



JN5-CM-USB



JN5-CU



JN5-OP-A02



JN5-KEYBOX



JN5-DINF1



JN5-CMI-PDP

JN5-CMI-CAN  
JN5-CMI-DNET

JN5-CMI-TCPIP



NEMA1 KIT



JN5-DINF2



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