

E510

**TECO**   **Westinghouse**

# *E510*

## *Compact Drive*



IP 20/ NEMA 1  
0.5-40 HP (230V)  
1-75 HP (460V)



# Control Mode Application & Selection Guide

The E510 compact AC Drive is an easily configurable product that controls many motor driven applications. Compact size is convenient for retrofitting or replacing an older generation VFD. From simple fixed speed set ups through applications with permanent magnet motors, the E510 can meet your process and machine requirements. Typical market and application solutions are listed below:

- **Conveyors**
- **Mixing equipment**
- **Fans and blowers**
- **Pumps**
- **Lathes**
- **AC contactor replacement**

## FEATURES & HIGHLIGHTS

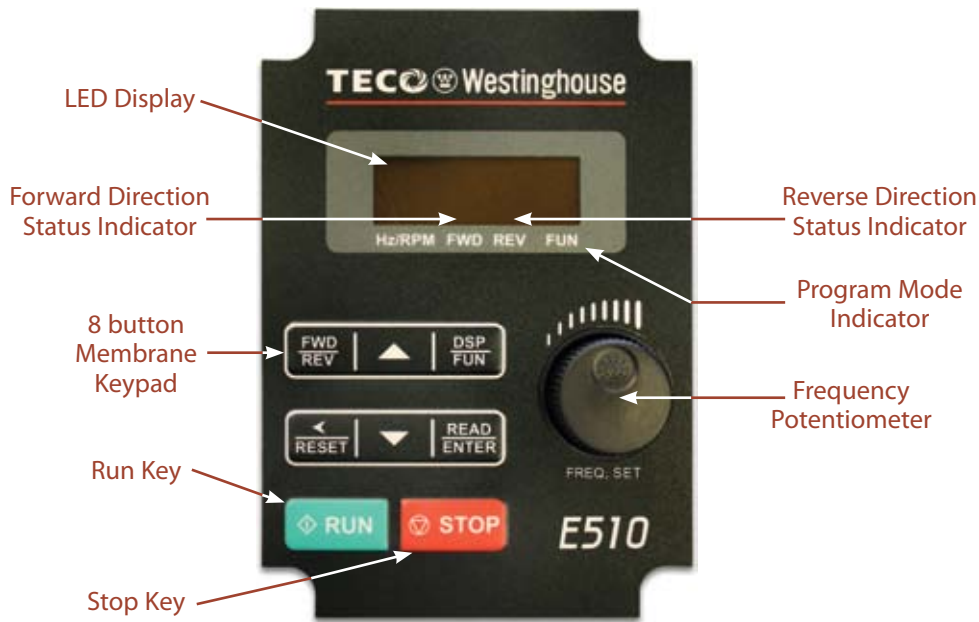
- Power Range:
  - 230V, 1Ø/ 3Ø (0.5 to 3 HP)
  - 230V, 3Ø (5 to 40 HP)
  - 460V, 3Ø (1 to 75 HP)
- Parameters grouped by function
- Built-in PLC functionality
- PID process control loop
  - Sleep mode
  - 0-10VDC or 4-20mA feedback
  - Loss of feedback or tracking detection
- Built-in Modbus Protocol (RJ45 Interface)
- 5 Digit operator's keypad with speed pot
  - Scalable display
  - Programming parameters
  - Diagnostics monitoring
- Digital and analog inputs and outputs have extremely fast (~4 msec) update time
- Auto run mode (cyclic operation)
- Power loss ride through
- Automatic Voltage Regulation (AVR)
  - Stabilizes output voltage against fluctuating input voltage



I/O FEATURES	
<b>Digital Inputs</b>	<ul style="list-style-type: none"> <li>• Qty 6 configurable</li> <li>• Over 39 available selections</li> <li>• Assign each as normally open or normally closed</li> <li>• 24V power supply</li> <li>• Pulse input</li> </ul>
<b>Digital Outputs</b>	<ul style="list-style-type: none"> <li>• Qty 2 relay outputs</li> <li>• Over 20 available selections</li> <li>• Assign each as normally open or normally closed</li> </ul>
<b>Analog Inputs</b>	<ul style="list-style-type: none"> <li>• Qty 2 analog input channels: Select either @0-10VDC or 4-20mA</li> <li>• Adjustable gain and bias on each channel</li> <li>• Speed reference or PID feedback</li> </ul>
<b>Analog Output</b>	<ul style="list-style-type: none"> <li>• 0-10VDC</li> <li>• 5 available configurations                             <ul style="list-style-type: none"> <li>- Output Frequency</li> <li>- Set Frequency</li> <li>- Output Current</li> <li>- Output Voltage</li> <li>- DC Bus Voltage</li> </ul> </li> <li>• Adjustable gain and bias</li> </ul>
<b>Safety Input</b>	Dedicated safety input (factory jumpered)
<b>RS485</b>	Select Modbus RTU or BACNet



# Integral Intelligent LED Keypad

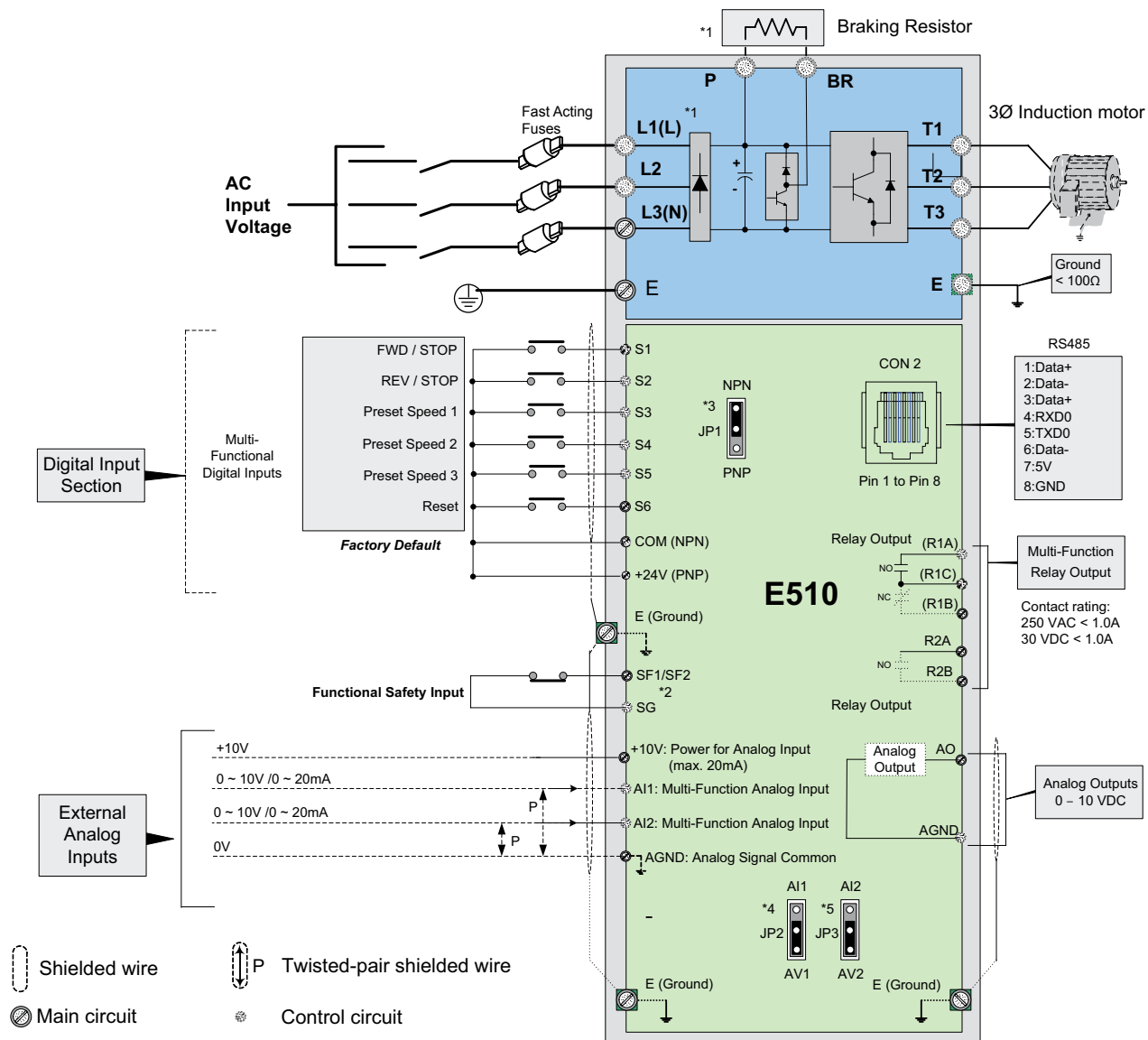


SPECIFICATIONS	
<b>Control Mode</b>	V/Hz, Sensorless Vector (SLV), Permanent Magnet Sensorless Vector (PMSLV)
<b>Frequency Range</b>	0-599Hz
<b>Frequency Accuracy</b>	Digital Input: .01Hz Analog input: 0.1%
<b>Speed Control</b>	50:1
<b>Starting Torque</b>	150%/1Hz (SLV) 150%/3Hz (V/Hz)
<b>Overload Tolerance (Rated Output Current)</b>	150%/1 minute 120%/1 minute Frames 5/6
<b>Frequency Settings</b>	<ul style="list-style-type: none"> <li>• Frequency setting with <math>\wedge</math>, <math>\vee</math> keys</li> <li>• Potentiometer on keypad</li> <li>• External input terminals                             <ul style="list-style-type: none"> <li>- 0-10VDC or</li> <li>- 4-20mA</li> </ul> </li> <li>• Multi-function Input (Up/Down)</li> <li>• Pulse input</li> </ul>
<b>Acceleration Settings</b>	<ul style="list-style-type: none"> <li>• Two sets of acceleration and deceleration times (0-3600 sec)</li> <li>• Jog acceleration and deceleration settings</li> </ul>
<b>Voltage/Frequency Characteristics</b>	<ul style="list-style-type: none"> <li>• Qty 18 preset V/Hz patterns plus user settable V/F pattern</li> <li>• Adjustable voltage (torque) boost</li> </ul>
<b>Control Features</b>	<ul style="list-style-type: none"> <li>• 1-16kHz Carrier frequency (adjustable)</li> <li>• Start into rotating load</li> <li>• Acceleration/Deceleration ramps with S curves</li> <li>• Sensorless Vector mode with auto tuning</li> <li>• PM control mode</li> <li>• DC injection braking</li> <li>• PID loop control</li> </ul>
<b>Input Voltage Range</b>	200-240VAC +10%, -15% 380-480VAC +10%, -15%

PROTECTION FEATURES	
<b>Overload Stall Prevention</b>	Up to 150%, 1 minute on acceleration, deceleration and constant speed
<b>Overcurrent</b>	Instantaneous above 200%
<b>DC BUS Overvoltage</b>	230V input: >410VDC 460V input: >810VDC
<b>DC BUS Undervoltage</b>	230V input: <190 VDC 460V input: <380 VDC
<b>Other protection</b>	Ground Fault, Phase Loss, Overtemperature, Loss of PID Feedback External Fault Setting, Fire Mode

ENVIRONMENTAL FEATURES	
<b>Operating Temperature</b>	-10~+50°C
<b>Storage Temperature</b>	-20~+70°C
<b>Humidity</b>	95% RH or less (non-condensing)
<b>Vibration/ Shock</b>	<ul style="list-style-type: none"> <li>• 20 HP or less; 1g (32.2 ft/sec<sup>2</sup>)</li> <li>• 20-25 HP; 0.6g (19.3 ft/sec<sup>2</sup>)</li> </ul>
<b>Certification</b>	Complies with IEC 60018-2-78, UL, cUL, CE, & RoHS


# Connection Diagram



## Notes:

- \*1: The 230V, 0.5-25 HP and 460V, 1-40 HP have a built-in braking transistor. The braking resistor can be connected between P and BR.
- \*2: Run Permissive input SF and SG is a normally closed input. This input must be closed to enable the inverter output. A jumper is factory installed. Remove the jumper when installing user-defined interlocks and permissives.
- \*3: Use jumper JP1 to select between Sink (NPN, with 24VG common) or Source (PNP, with +24V common) for multi-function digital input terminals S1~S6.
- \*4: Use jumper JP2 to switch between voltage and current input for Multi-function analog input 1 (AI1).
- \*5: Use jumper JP3 to switch between voltage and current input for Multi-function analog input 1 (AI2).

# Control Circuit Terminal Description

TYPE	TERMINAL	TERMINAL FUNCTION		SIGNAL LEVEL
<b>Digital Input Signals</b>	S1	Please see "Digital Input Section" on "Connection Diagram" page (left) for default settings and setting range.		24 VDC, 8 mA photocoupler isolation. (The max. input voltage is 30 Vdc, input resistance is 4.3kΩ) High Logic: 13V Low Logic: 10V
	S2			
	S3			
	S4			
	S5			
	S6			
<b>Relay Outputs</b>	R1A	NO (Normally Open)	Please see "Digital Input Section" on "Connection Diagram" page (left) for default settings and setting range.	250VAC/1A (30VDC/1A)
	R1B	NC (Normally Closed)		
	R1C	Common Point		
	R2A	NO (Normally Open)		
	R2B			
<b>24Vdc Supply</b>	COM	Common point of PNP input (JP1 switch to PNP)		±15%, Max output current 60mA
	24V	Common point of NPN input (JP1 switch to NPN)		
<b>Analog Input Signals</b>	10V	Built-in power for external potentiometer		10V (Max current: 20mA)
	AI1/AV1	Multi-analog input 1 (0-10V/0-20mA) (Please use JP2 to select voltage or current input)		Resistance for voltage input is 153KΩ; for current input is 500Ω
	AI2/AV2	Multi-analog input 2 (0-10V/0-20mA) (Please use JP3 to select voltage or current input)		
	AGND	Analog input common point		—
<b>Ground</b>		Ground terminal		—
<b>Analog Output Signal</b>	AO	Analog output terminal		0~10VDC, (Max current: 2mA)
	AGND	Analog input common point		—
<b>Safety Switch</b>	SF1	Safety switch, the output voltage of inverter will be cut off when the terminal switches on.		—
	SG			

## Control Circuit Terminal

R2A	R2B	R1A	R1B	R1C	*	S1	S3	S5	24V	AI1	AI2
S(+)	S(-)	SF1	SG	*	COM	S2	S4	S6	AGND	10V	AO

\*Terminals used for European standard drive.

**Terminal sizes are standard; no special micro tools are needed for making connections.**



# Models & Ratings

All Models Have Remote Mountable Keypad with a Potentiometer.

## 230V 1/3-Phase Input/ 3-Phase Output

MODEL NO.	HP		OUTPUT AMPS		DIMENSIONS (Inches)			APPROX. WT. (lbs.)
	CONSTANT TORQUE	VARIABLE TORQUE	CONSTANT TORQUE	VARIABLE TORQUE	HEIGHT	WIDTH	DEPTH	
E510-2P5-H-U	0.5	0.5	3.1	3.1	7.43	3.57	5.96	3.5
E510-201-H-U	1	1	4.5	4.5	7.43	3.57	5.96	3.5
E510-202-H-U	2	2	7.5	7.5	8.29	5.07	6.00	5.5
E510-203-H-U	3	3	10.5	10.5	8.29	5.07	6.00	5.5

## 230V 3-Phase Input/ 3-Phase Output

MODEL NO.	HP		OUTPUT AMPS		DIMENSIONS (Inches)			APPROX. WT. (lbs.)
	CONSTANT TORQUE	VARIABLE TORQUE	CONSTANT TORQUE	VARIABLE TORQUE	HEIGHT	WIDTH	DEPTH	
E510-205-H3-U	5	5	17.5	17.5	8.29	5.07	6.00	5.5
E510-208-H3-U	7.5	7.5	26	26	11.46	7.36	7.98	14.3
E510-210-H3-U	10	10	35	35	11.46	7.36	7.98	14.3
E510-215-H3-U	15	15	48	48	14.14	8.84	8.11	22.3
E510-220-H3-U	20	20	64	64	14.14	8.84	8.11	22.9
E510-225-H3-U	25	25-30	73	80	14.17	10.43	9.38	22.1
E510-230-H3-U	30	40	85	110	20.67	11.28	10.62	66.1
E510-240-H3-U	40	50	115	138	20.67	11.28	10.62	66.1

## 460V 3-Phase Input/ 3-Phase Output

MODEL NO.	HP		OUTPUT AMPS		DIMENSIONS (Inches)			APPROX. WT. (lbs.)
	CONSTANT TORQUE	VARIABLE TORQUE	CONSTANT TORQUE	VARIABLE TORQUE	HEIGHT	WIDTH	DEPTH	
E510-401-H3-U	1	1	2.5	2.5	7.43	3.57	5.96	3.8
E510-402-H3-U	2	2	3.8	3.8	7.43	3.57	5.96	3.8
E510-403-H3-U	3	3	5.3	5.3	8.29	5.07	6.00	5.5
E510-405-H3-U	5	5	9.2	9.2	8.29	5.07	6.00	5.5
E510-408-H3-U	7.5	7.5	13	13	11.46	7.36	7.98	14.3
E510-410-H3-U	10	10	17.5	17.5	11.46	7.36	7.98	14.3
E510-415-H3-U	15	15	24	24	11.46	7.36	7.98	14.3
E510-420-H3-U	20	20	32	32	14.14	8.84	8.11	23.2
E510-425-H3-U	25	25	40	40	14.14	8.84	8.11	23.2
E510-430-H3-U	30	30-40	45	58	14.17	10.43	9.38	22.1
E510-440-H3-U	40	50	60	73	20.67	11.28	10.62	66.1
E510-450-H3-U	50	60	75	88	20.67	11.28	10.62	66.1
E510-460-H3-U	60	75	91	103	20.67	11.28	10.62	66.1
E510-475-H3-U	75	100	118	145	20.67	11.28	10.62	77.2

## Options & Accessories

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Expansion cables and bezel kit for remote mounting of operator's keypad

JN5-CM-01M	1m cable
JN5-CM-02M	2m cable
JN5-CM-03M	3m cable
JN5-CM-05M	5m cable
JN5-KEYBOX	Remote keypad holder

The E510 has a standard RS485 port with RTU Modbus protocol. A cable that connects this port to a USB compatible device is available.

JN5-CM-USB	USB cable to connect PC
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The E510 has a standard LED Keypad. An optional LCD keypad or copy module for upload/download are available.

JN5-OP-A02	IP20 LCD operator
JN5-CU	Copy unit

NEMA1 kit replacements are available to upgrade the protection level of inverter. It can be installed at the bottom of the inverter. (Units come with NEMA 1 conduit kits as shipped.)

JN5-NK-E01	NEMA 1 Kit for frame 1
JN5-NK-E02	NEMA 1 Kit for frame 2
JN5-NK-E03	NEMA 1 Kit for frame 3
JN5-NK-E04	NEMA 1 Kit for frame 4

Dust Stickers can upgrade the protection level to avoid the entry of foreign matter. (When an inverter is installed with a dust sticker, do not exceed the 70% rated current of the inverter.)

JN5-ECOV1*	Dust Sticker for frame 1
JN5-ECOV2*	Dust Sticker for frame 2
JN5-ECOV3*	Dust Sticker for frame 3
JN5-ECOV4*	Dust Sticker for frame 4

\*NEMA1 kits and Dust Stickers are included with the frames 1-4 VFDs. These parts are intended as replacement items.

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