



Automation for a Changing World

Delta Elevator Drive ED Series



www.deltaww.com

 **DELTA**
Smarter. Greener. Together.



Elevator Drive - ED Series

Delta introduces its new elevator control solution: the Elevator Drive ED Series. Developed with years of elevator control experience from Delta's elevator drive VFD-VL series, the ED series is an extended version designed with more advanced features and higher performance.

The ED series is UL/CE certified ensuring the best operation reliability. Designed to high safety standards and for high durability, the ED series is an excellent solution for elevator operation in critical environments. It provides versatile and flexible control functions, and an especially smooth start and stop. Smooth operation is critical for providing passengers a safe and comfortable ride. Delta's ED series delivers the optimal operation efficiency for both passenger and cargo elevators.

Delta has a global service network always available to provide instant technical support and professional service. The Elevator Drive ED series is your most reliable choice for high performance elevator control.



ED

E

- = Elevator
- Economical
- Environmentally friendly
- Excellent

D

- = Drive
- Design
- Deployment
- Distinguished

Features

- Supports both asynchronous and synchronous motors
- Auto-tuning with the load attached
- Auto-adjust starting torque, load compensation, manual control
- Precise time sequence for elevator motion (start/stop)
- Compact size for easy installation in the elevator control cabinet with more space available
- Dual-output protection for reliable rides
- Supports 1-phase 230/460 V_{AC} Uninterrupted Power System (UPS)
- Built-in LED keypad and an optional removable LCD keypad available upon purchase



Features

Simple Instructions

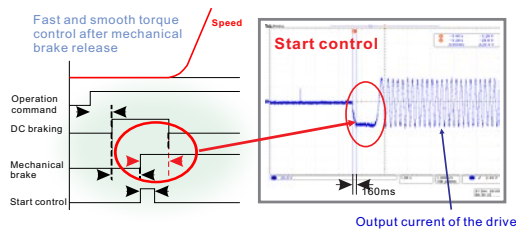
- ▶ **Auto-tuning with the load attached**
 - Ability to perform auto-tuning with load when elevator structure is complete
 - Supports multiple types of encoders
 - Precisely measures the motor parameters and PG offset angle
 - Load balance without adding additional loads, safe and convenient
- ▶ **Auto-homing mode reduces maintenance costs**
- ▶ **Built-in LED digital keypad. Removable LCD keypad is available upon purchase**
- ▶ **Compact control box design strengthens the drive structure**



■ Compact design

Comfortable Ride

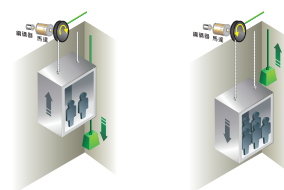
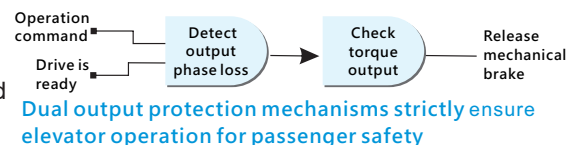
- ▶ **Efficient scheduling of operation provides precise control to achieve smooth start and stop**



- ▶ **DC braking leveling and slip compensation functions enhance the leveling accuracy and provide a comfortable ride**

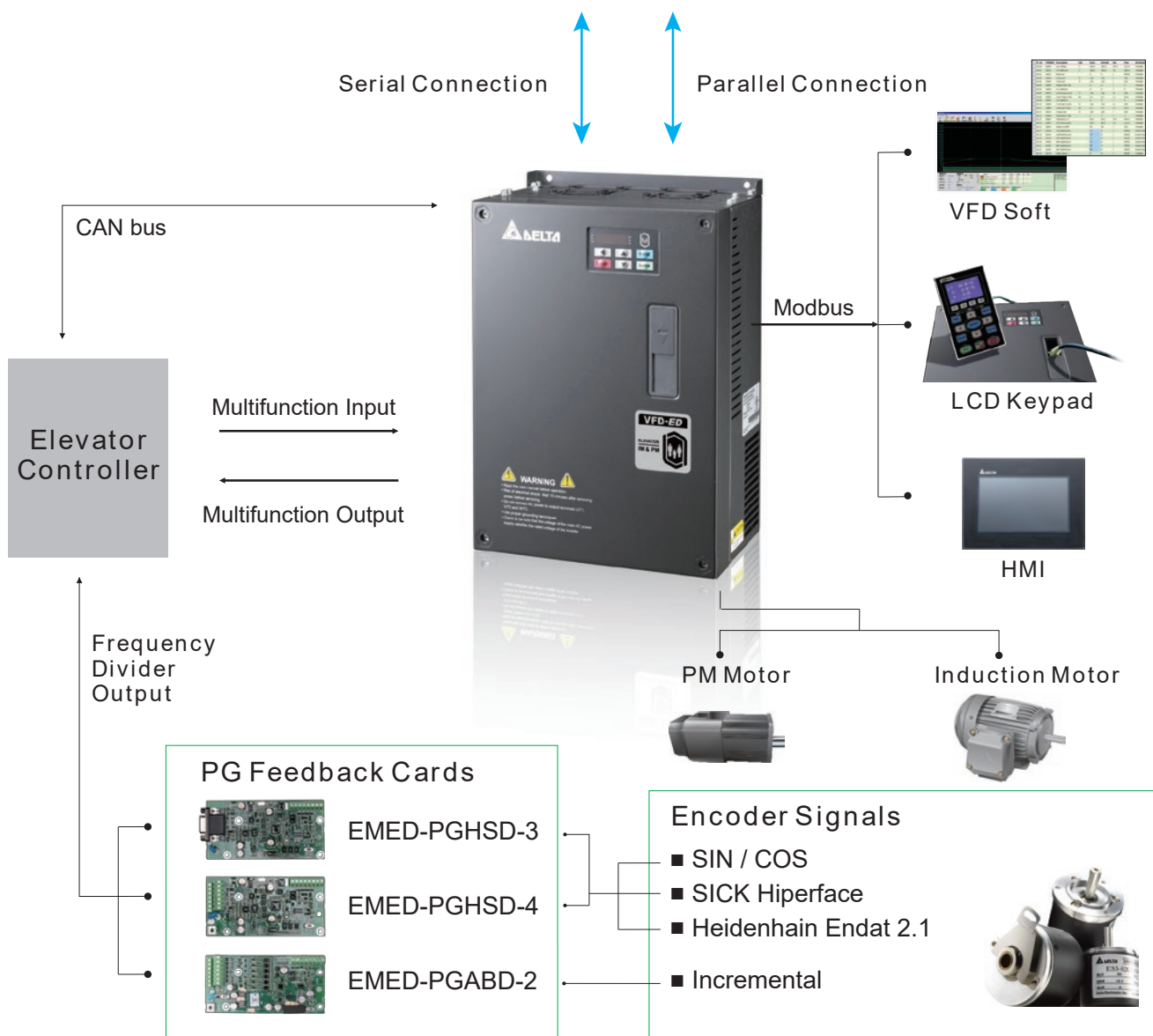
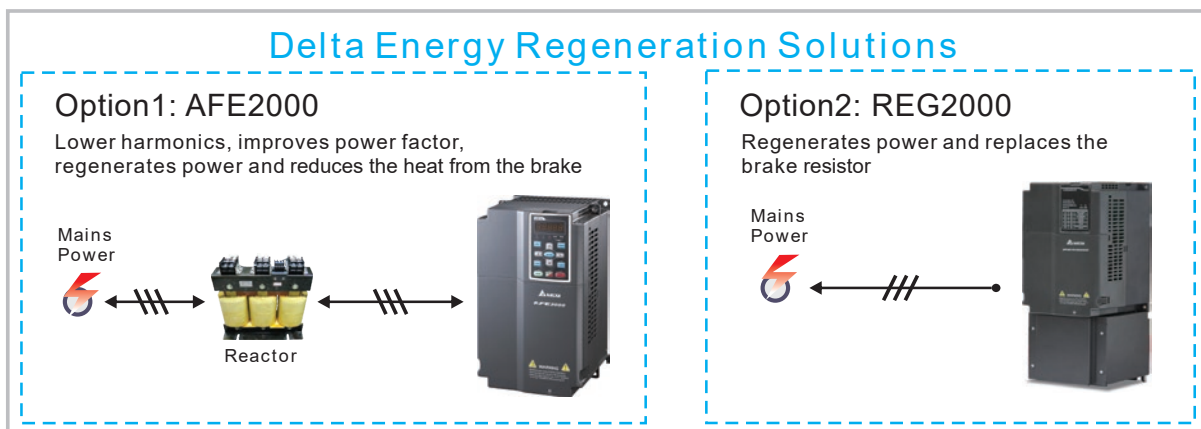
Safety Ensured

- ▶ **Dual output protection for a reliable ride**
 - Auto-detect output phase loss to ensure proper motor operation
 - Auto-check torque output before the mechanical brake is released
- ▶ **Emergency operation**
 - Supports single-phase 230/460 V_{AC} Uninterrupted Power System (UPS). Light-load direction search function is triggered automatically when power failure occurs
- ▶ **Built-in STO (Safe Torque Off) function**
 - Compliant with EN61800-5-2 (STO) and EN61508 (SIL2) standards for high safety protection and reliability
 - Less output contactors are required compared to traditional installation methods. Saves on installation cost

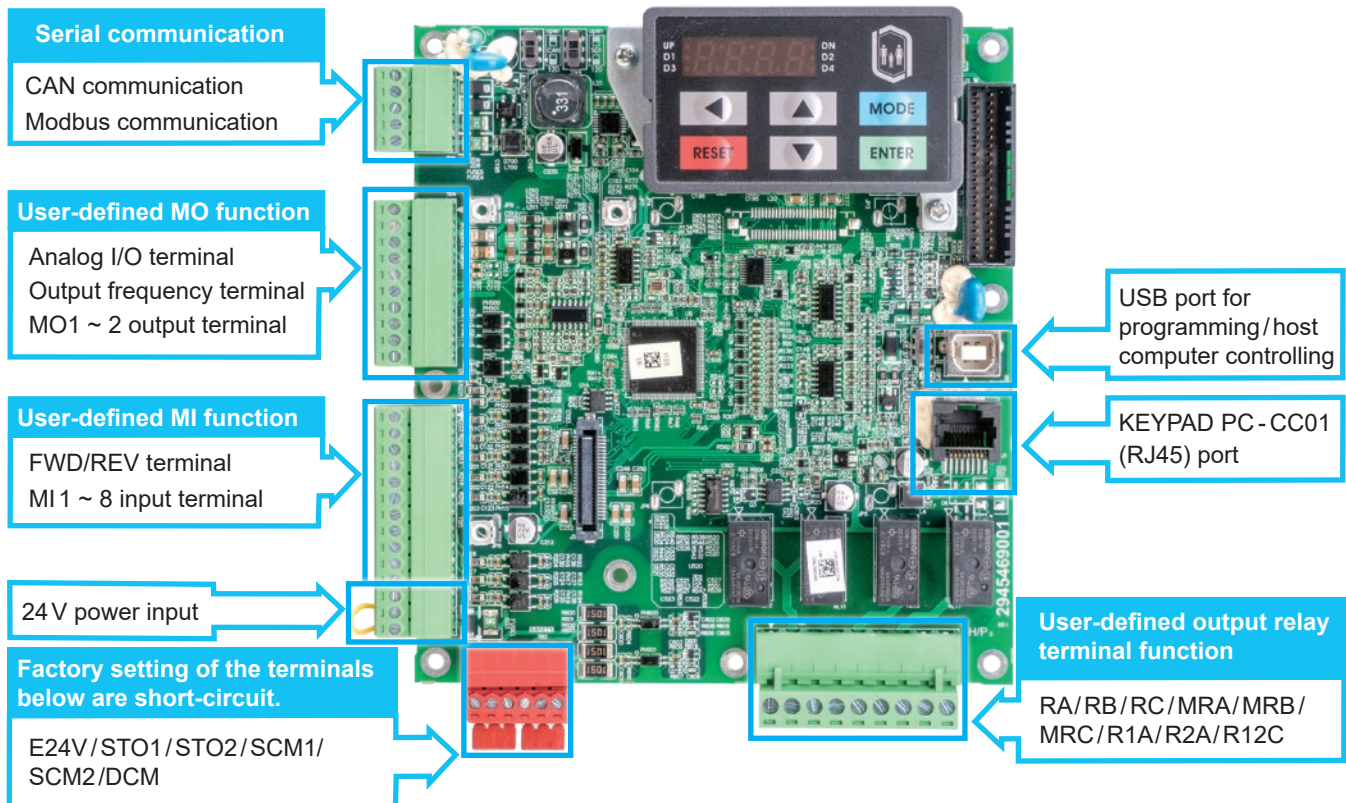


Light load direction search function is activated when power failure occurs. It brings the elevator to the nearest floor safely.

System Structure

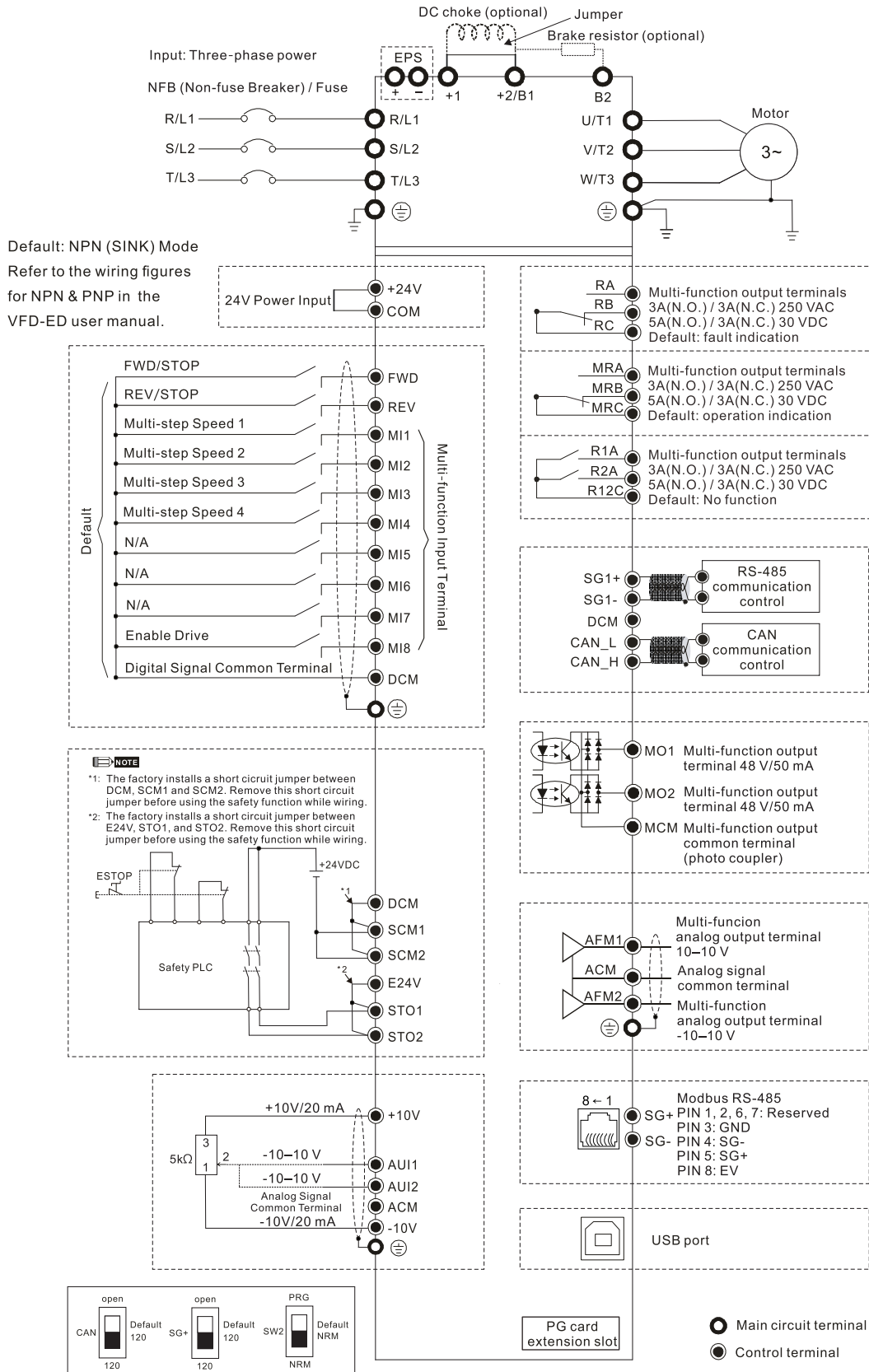


Control Terminals



Name	Quantity	Terminal
Digital input terminal (MI)	FWD x 1 REV x 1 MI x 8	<ol style="list-style-type: none"> 1. FWD: Forward Run/Stop 2. REV: Reverse Run/Stop 3. MI1 ~ MI8 user-defined functions 4. ON: Activation current $6.5\text{mA} \geq 11\text{V}_{\text{DC}}$ 5. OFF: Allowable leakage current $10\mu\text{A} \leq 11\text{V}_{\text{DC}}$
Analog input terminal (AUI)	2 units	<ol style="list-style-type: none"> 1. User-defined functions 2. Input range: $-10 \sim +10\text{V}$ 3. Input impedance = $20\text{k}\Omega$
Relay output terminal	4 units (Normally Open/ Normally Close)	<ol style="list-style-type: none"> 1. User-defined functions 2. $3\text{A(N.O.)}/3\text{A(N.C.) } 250\text{V}_{\text{AC}}$ $5\text{A(N.O.)}/3\text{A(N.C.) } 30\text{V}_{\text{DC}}$ (min. $5\text{V}_{\text{DC}}, 10\text{mA}$)
Digital Output terminal (MO)	2 units	<ol style="list-style-type: none"> 1. User-defined functions 2. Max. $48\text{V}_{\text{DC}} 50\text{mA}$
Analog output terminal (AFM)	2 units	<ol style="list-style-type: none"> 1. User-defined functions 2. Max. load: $5\text{k}\Omega$ 3. Output current: Max. 2mA 4. Resolution : $0 \sim 10\text{V}$ corresponds to the max. operation frequency 5. Range: $0 \sim 10\text{V} \rightarrow -10 \sim +10\text{V}$
Safety Torque Off (STO) terminal	2 units	<ol style="list-style-type: none"> 1. Power removal safety function for EN954-1 and IEC/EN61508 2. Factory setting of E24V/STO1/STO2 is short-circuit 3. Factory setting of SCM1/SCM2/DCM is short-circuit 4. When STO1 ~ SCM1; STO2 ~ SCM2 is activated, the activation current is $3.3\text{mA} \geq 11\text{V}_{\text{DC}}$
Serial communication ports	2 units	<ol style="list-style-type: none"> 1. CAN communication 2. Modbus communication
USB port	1 unit	Programming/host computer controlling

Wiring



Specifications

- Model Name

Series Name
(Variable Frequency Drive)

Maximum Applicable Motor Capacity (kW)

ED Series



Version Type
Input Voltage and Phase

21 : 230V single-phase
23 : 230V 3-phase
43 : 460V 3-phase

Frame Size		230V											
		B			C			D			E		
Model VFD-__ED23/21S		022*	037*	40	55	75	110	150	185	220	300	370	
Applicable Motor Output (KW)		2.2	3.7	4	5.5	7.5	11	15	18.5	22	30	37	
Applicable Motor Output (HP)		3	5	5	7.5	10	15	20	25	30	40	50	
Output Rating	Rated Output Capacity (KVA)	4.8	6.8	7.9	9.5	12.5	19	25	29	34	46	55	
	Rated Output Current (A)	12	17	20	24	30	45	58	77	87	132	161	
	Maximum Output Voltage (V)	Proportional to input voltage											
	Output Frequency (Hz)	0.00 ~ 400											
	Carrier Frequency (kHz)	2 ~ 15									2 ~ 9		
Rated Output Maximum Carrier Frequency (kHz)		8			10			8			6		
Input Rating	Input Current (A)	24	34	20	23	30	47	56	73	90	132	161	
	Rated Voltage (V)	Single-phase			3-phase								
	200 ~ 240												
	Rated Frequency (Hz)	50/60											
	Voltage Tolerance (V)	±10% (180 ~ 264)											
Frequency Tolerance (Hz)	±5% (47 ~ 63)												
Cooling Method		Fan cooling											
Weight (kg)		6	6	6	8	10	10	13	13	13	36	36	

*VFD022ED21S & VFD037ED21S are single phase model.

Frame Size		460V											
		B	C			D			E				
Model VFD-__ED43S		40	55	75	110	150	185	220	300	370	450	550	750
Applicable Motor Power (KW)		4	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Applicable Motor Power (HP)		5	7.5	10	15	20	25	30	40	50	60	75	100
Output Rating	Rated Output Capacity (KVA)	9.2	10.4	13.5	18.3	24	30.3	36	46.2	63.7	80	96.4	116.3
	Rated Output Current (A)	11.5	13	17	23	30	38	45	58	80	100	128	165
	Maximum Output Voltage (V)	Proportional to input voltage											
	Output Frequency (Hz)	0.00 ~ 400											
	Carrier Frequency (kHz)	2 ~ 15						2 ~ 9			2 ~ 6		
Rated Output Maximum Carrier Frequency (kHz)		8	10			8			6				
Input Rating	Rated Input Current (A)	11.5	14	17	24	30	37	47	58	80	100	128	165
	Rated Voltage (V)	3-phase 380 ~ 480											
	Rated Frequency (Hz)	50/60											
	Voltage Tolerance (V)	±10% (342 ~ 528)											
	Frequency Tolerance (Hz)	±5% (47 ~ 63)											
Cooling Method		Fan cooling											
Weight (kg)		6	8	10	10	10	10	13	14.5	36	36	50	50

The measure of input and output current is influenced by the power supply, input reactor, wiring cables and the power supply impedance applied to the AC motor drive.



General Specifications

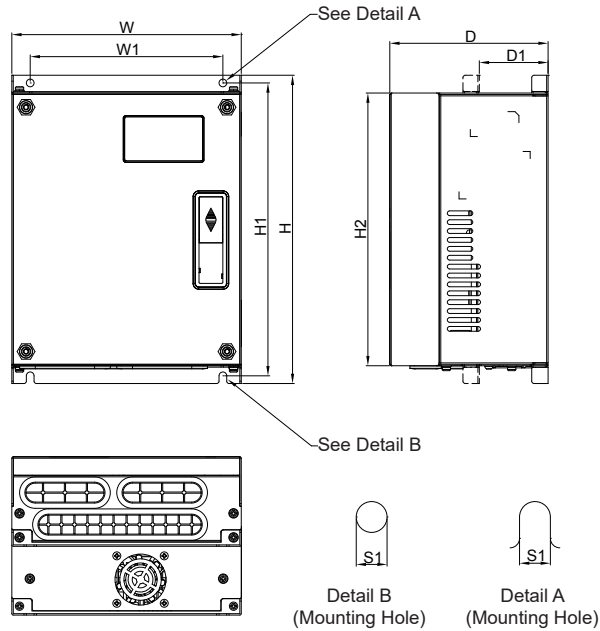
Control Characteristics	Control Method	V/F, VF+PG, SVC, FOC+PG, FOC+PM
	Starting Torque	Up to 150% at 0.5Hz Under FOC+PG or FOC+PM mode, starting torque can reach 150% at 0Hz
	Speed Control Range	1:100 (up to 1:1000 when using PG card)
	Speed Control Resolution	±0.5% (up to ±0.02% when using PG card)
	Speed Response Ability	5Hz (up to 30Hz for vector control)
	Max. Output Frequency	0.00 to 400Hz
	Output Frequency Accuracy	Digital Command 0.005%, Analog Command 0.5%
	Frequency Setting Resolution	Digital Command 0.01Hz, Analog Command: 1/4096 (12 bit) of the max. output frequency
	Torque Limit	Max. is 200% torque current
	Accel/Decel Time	0.00 ~ 600.00 seconds
	V/F Curve	Adjustable V/F curve using 4 independent points
	Frequency Setting Signal	±10V
	Protection Characteristics	Motor Protection
Over-current Protection		Over-current protection for 250% rated current Current clamp for 190% rated current
Ground Leakage Current Protection		Higher than 50% rated current
Overload Ability		150% for 60 seconds, 180% for 10 seconds
Over-voltage Protection		Over-voltage level: [230V model] $V_{DC} > 400V$ [460V model] $V_{DC} > 800V$ Low-voltage level: [230V model] $V_{DC} < 200V$ [460V model] $V_{DC} < 400V$
Over-voltage Protection for the Input Power		Varistor (MOV)
Over-temperature Protection		Built-in temperature sensor
Environment	Protection Level	NEMA 1/IP20
	Operation Temperature	-10°C ~ 40°C, up to 50°C under derating operation
	Storage Temperature	-20°C ~ 60°C
	Ambient Humidity	Below 90% RH (non-condensing)
	Vibration	1.0 G, while frequency is less than 20 Hz; 0.6G, while frequency is between 20 ~ 60 Hz
	Installation Location	Altitude 1,000m or lower, keep from corrosive gasses, liquid and dust
	Power System	TN System ^{*1*}
Certifications		CE, UL, TUV, EAC, RCM, RoHS, EN81-1+A3, EN81-20:2014, KC Mark (460V, Frame C / D / E)

*1 TN System: The neutral point of the power system is connected to the ground directly. The metal components that are exposed to air are connected to the ground via the protective earth conductor.

*2 Single-phase models have a three wire single-phase system design.

Dimensions

■ Frame B



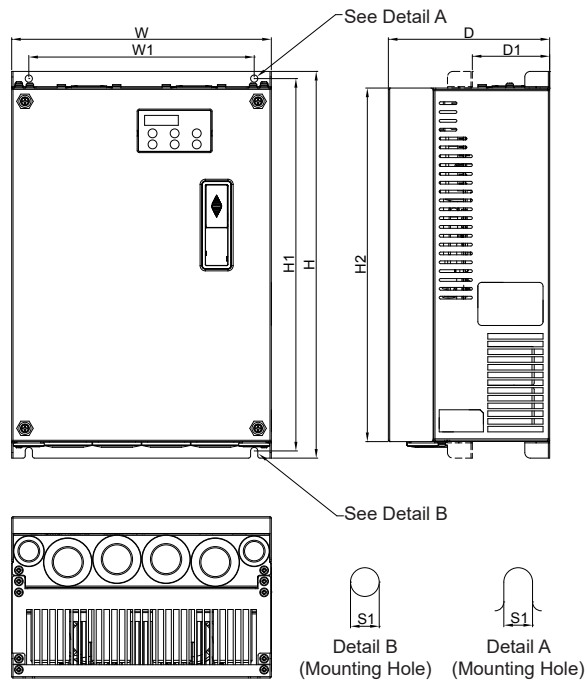
MODEL

VFD022ED21S VFD040ED43S
 VFD037ED21S
 VFD040ED23S

Frame		W	W1	H	H1	H2	D	D1*	S1
B	mm	193.5	162.5	260	247	230	133.5	58	6.5
	inch	7.6	6.39	10.22	9.71	9.04	5.25	2.28	0.26

*D1: This dimension is for flange mounting application reference.

■ Frame C



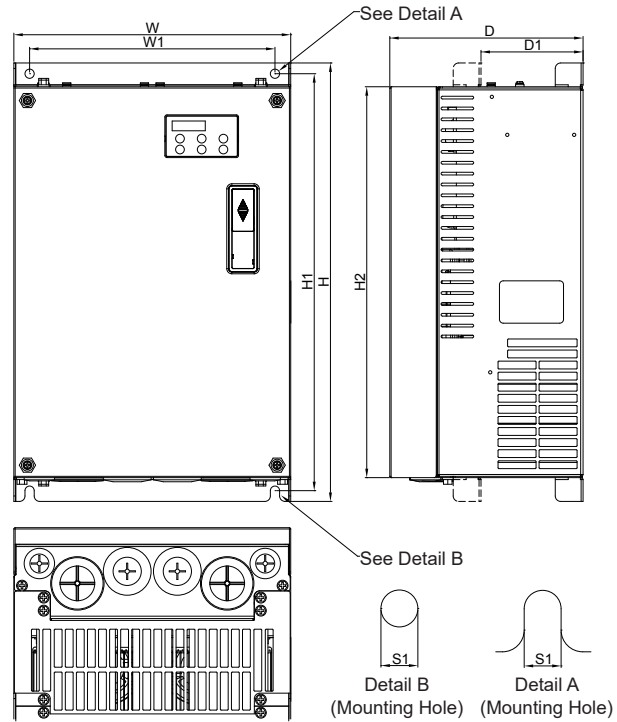
MODEL

VFD055ED23S VFD055ED43S
 VFD075ED23S VFD075ED43S
 VFD110ED23S VFD110ED43S
 VFD150ED43S
 VFD185ED43S

Frame		W	W1	H	H1	H2	D	D1*	S1
C	mm	235	204	350	337	320	146	70	6.5
	inch	9.25	8.03	13.78	13.27	15.6	5.75	2.76	0.26

*D1: This dimension is for flange mounting application reference.

■ Frame D



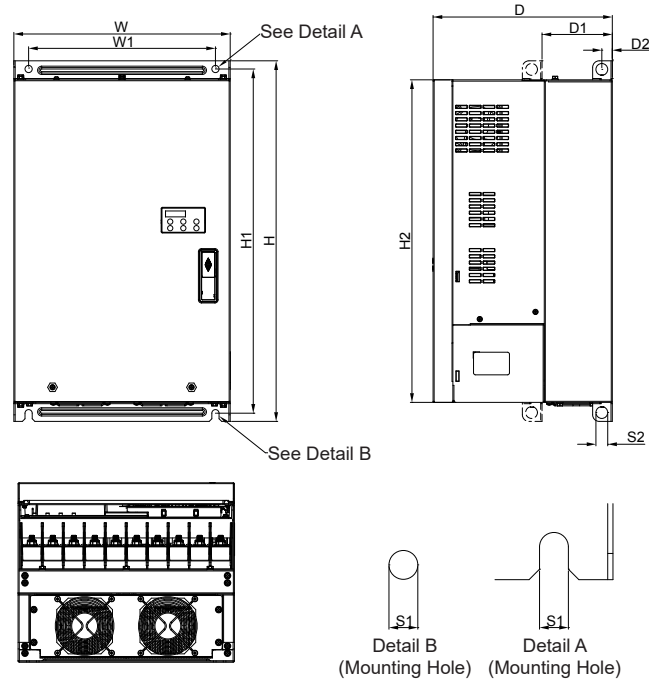
MODEL

VFD150ED23S VFD220ED43S
 VFD185ED23S VFD300ED43S
 VFD220ED23S

Frame		W	W1	H	H1	H2	D	D1*	S1
D	mm	255	226	403.8	384	360	178	94	8.5
	inch	10.4	8.9	15.9	15.12	14.17	7.01	3.7	0.33

*D1: This dimension is for flange mounting application reference.

■ Frame E



MODEL

VFD300ED23S VFD370ED43S
 VFD370ED23S VFD450ED43S
 VFD550ED43S
 VFD750ED43S

Frame		W	W1	H	H1	H2	D	D1*	D2	S1	S2
E	mm	330	285	550	525	492	273.4	107.2	16	11	18
	inch	12.99	11.22	21.65	20.67	19.37	10.76	4.22	0.63	0.43	0.71

*D1: This dimension is for flange mounting application reference.

Accessories

EMED-PGHSD-3/EMED-PGHSD-4 PG Cards

Terminals		Descriptions
Vin		Port for voltage input (for adjusting the value of voltage amplitude from push-pull pulse output) Maximum input voltage: 24 V _{DC}
A/O, B/O		Push-pull pulse output signal Maximum output frequency: 50 kHz
GND		Power source common for encoder
AO, \overline{AO} , BO, \overline{BO}		Line driver pulse output signal Maximum output frequency: 100 kHz
PGHSD-1	PGHSD-2	Support encoder signal - Incremental - SinCos, for example: ERN1387 - Endat 2.1, for example: ECN413/ECN1313 - SICK HYPERFACE, for example: SRS50/60
D-SUB Connector (J3)	Terminal Block Connector (TB2)	
SW1		Internal/External power switch for frequency divided output
SW2		Switch between encoder power 5V/8V

EMED-PGHSD-3 EMED-PGHSD-4

EMED-PGABD-2 PG Card

Terminals	Descriptions
Vin	Port for voltage input, to adjust the amplitude of output voltage at terminal A/O and terminal B/O
A/O, B/O	Output signal of the push-pull frequency divider Factory setting: Output amplitude is about +24 V. Use SW2 to cut off the internal default power Input required power (i.e. output voltage's amplitude) Max. output frequency: 100kHz Frequency dividing range: 1~31 Hz
GND	Common ground terminal connecting to the host controller and the motor drive
AO, \overline{AO} , BO, \overline{BO}	Line driver pulse output signal Maximum output frequency: 150 kHz Frequency dividing range: 1~31 Hz
VP	Power output of encoder Note: Use SW1 to set up output voltage Voltage: +5V ± 0.5V or +12V ± 1V Current: Max. 200 mA
0V	Common power terminal of encoder
A · \overline{A} · B · \overline{B} · Z · \overline{Z}	Incremental encoder signal input (line driver, voltage, push-pull, open collector) Note: Different input signal needs different wiring method. See user manual for wiring diagrams Maximum input frequency: 150 kHz
U · \overline{U} · V · \overline{V} · W · \overline{W}	Absolute encoder signal input (line driver, voltage, push-pull, open collector) Note: Different input signal needs different wiring method. See user manual for wiring diagrams Maximum input frequency: 150 kHz
SW1	Switch between encoder power 5V/12V
SW2	Switch between OPEN-C/LINE-D
SW3	Internal/External power switch for frequency divided output



Accessories



KPC-CC01

- High illuminated LCD display
- Modbus RS-485
- Languages:
 - English
 - Traditional Chinese
 - Simplified Chinese

Ordering Information

Frame		Applicable Models		
			230 V	460 V
Frame B		230 V: 2.2 kW ~ 4 kW 460 V: 4 kW	VFD022ED21S VFD037ED21S VFD040ED23S	VFD040ED43S
Frame C		230 V: 5.5 kW ~ 11 kW 460 V: 5.5 kW ~ 18.5 kW	VFD055ED23S VFD075ED23S VFD110ED23S	VFD055ED43S VFD075ED43S VFD110ED43S VFD150ED43S VFD185ED43S
Frame D		230 V: 15 kW ~ 22 kW 460 V: 22 kW ~ 30 kW	VFD150ED23S VFD185ED23S VFD220ED23S	VFD220ED43S VFD300ED43S
Frame E		230 V: 30 kW ~ 37 kW 460 V: 37 kW ~ 75 kW	VFD300ED23S VFD370ED23S	VFD370ED43S VFD450ED43S VFD550ED43S VFD750ED43S

Global Operations

ASIA (Taiwan)



Taoyuan Technology Center (Green Building)



Taoyuan Plant 1



Tainan Plant (Diamond-rated Green Building)

ASIA (China)

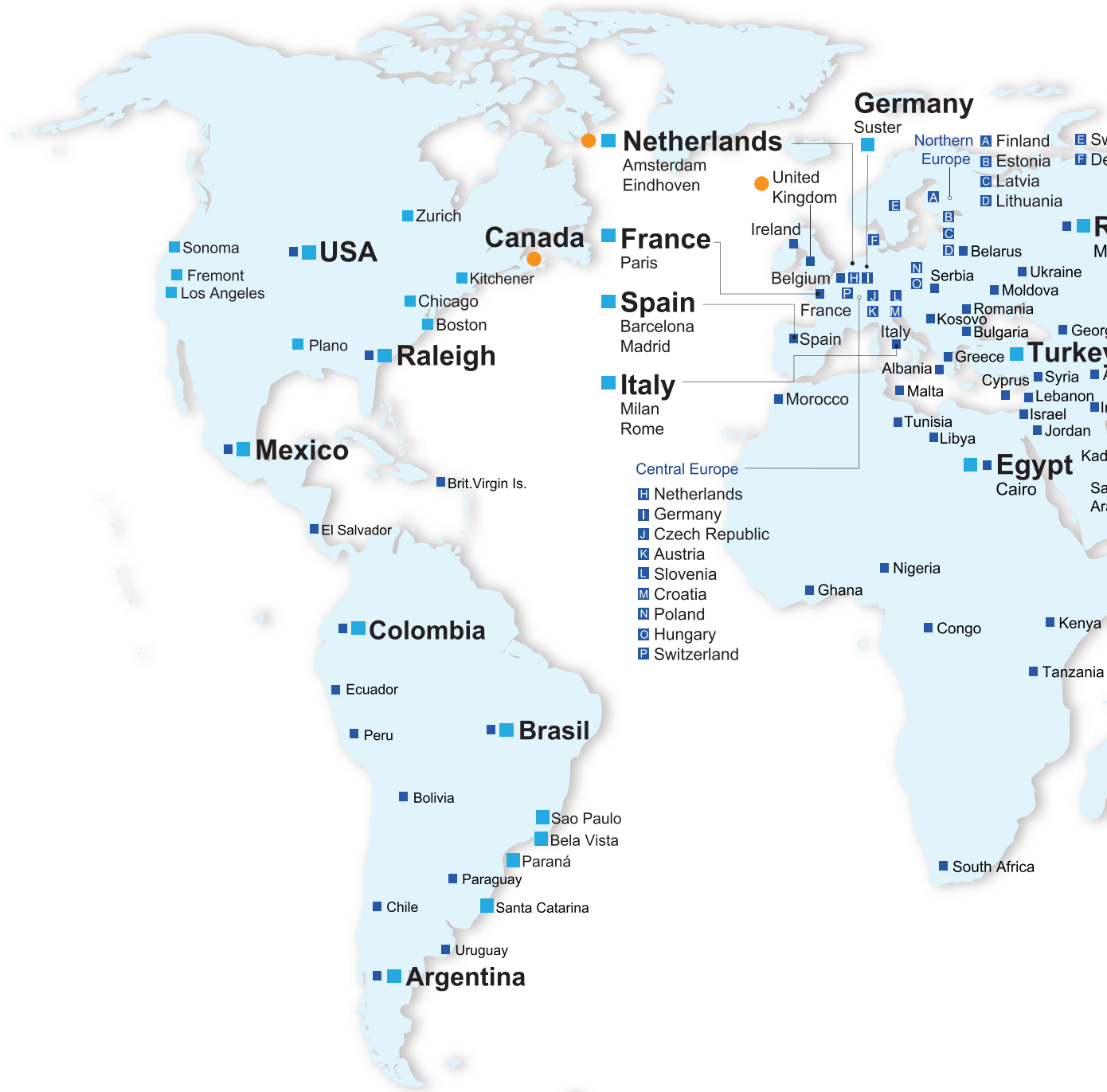


Wujiang Plant 3



Shanghai Office

▲ 9 Factories



ASIA (Japan)



Tokyo Office

ASIA (India)



Rudrapur Plant
(Green Building)

EUROPE



Amsterdam, the Netherlands

AMERICA

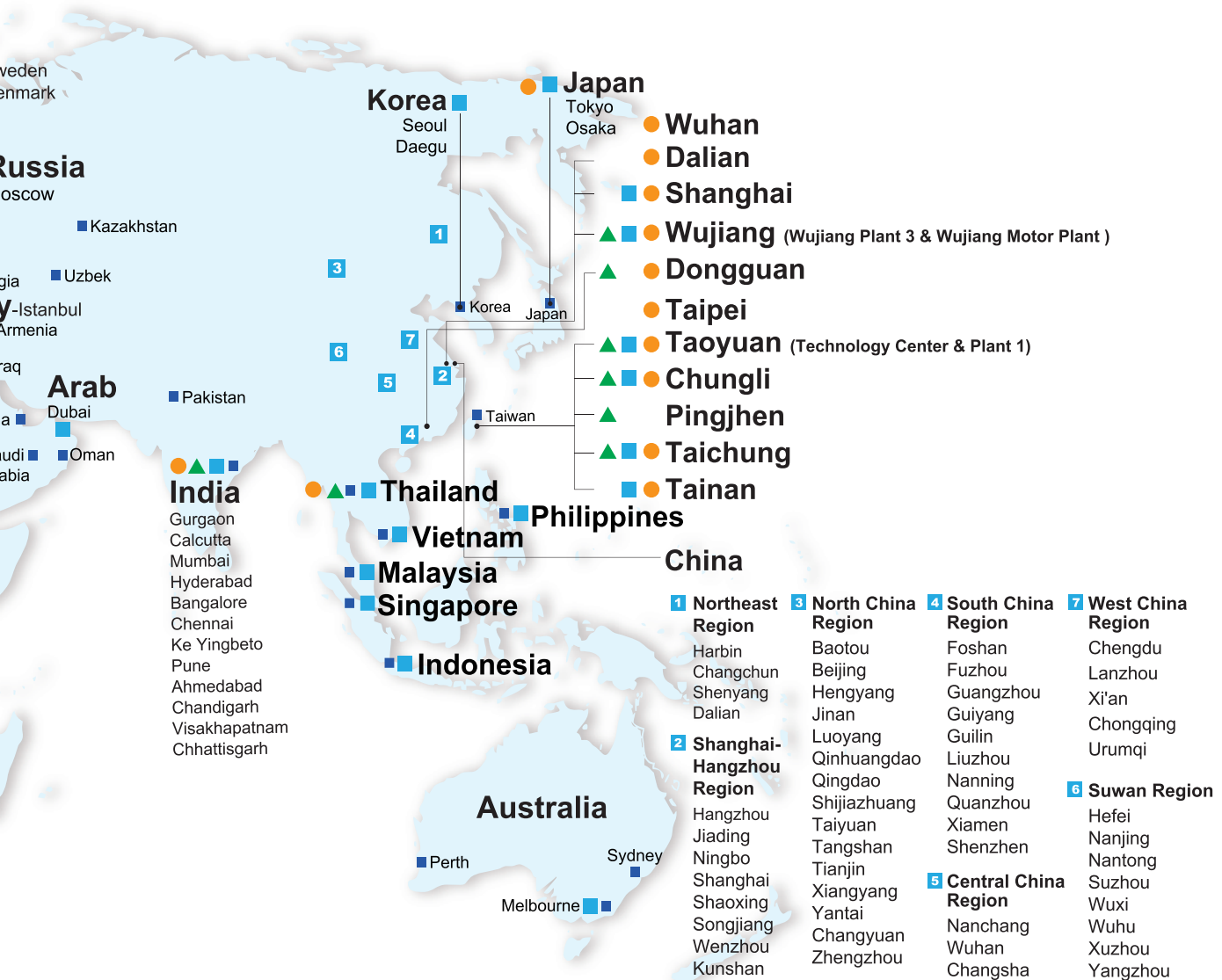


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■ 909 Distributors





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