Automation for a Changing World

Delta Integrated Elevator Drive
IED Series

www.delta.com.tw/ia

DELTA

Delta Integrated Elevator Drives IED Series

Elevator control methods often use a host controller to collect peripheral component status and transmit data that propels the tractor and pulls the elevator car. Many components must be assembled and integrated with complex wiring. Error detection becomes more difficult, which results in a greater need for technical support and follow-up services.

Delta, a leading brand in industrial automation, introduces integrated elevator devices with newly developed technology. Delta's IED series meets international safety standards (UL/CE) and integrates host controller and drive to vastly improve the operation performance and reliability of the elevator. The single MCU design of the IED series is space saving and suitable for various applications in different markets for passenger and freight elevators. It is designed with provisions for full technical and maintenance support and offers one-stop shopping for all you need in an elevator drive. The planning, assembly, technology and additional services are all included with the Delta IED series. Delta as your most reliable partner presents this specialized solution for ultimate performance.

IED

I = Integration
Independent
Indispensable

E = Easy to use
Economical
Environment friendly

D = Design
Drive
Deliver

Integration that meets the highest standard of elevator industry

I   E   D

I = Integrated
- Integrates host controller and drive functions
- A single MCU provides for all operation needs

I = Independent
- Flexible applications with various types of auto-tuning for synchronous and asynchronous motor, also applicable to various encoders
- Unlimited applications, from low speed to high speed elevators, freight elevators and passenger elevators

I = Indispensable
- Provides all you need from key components to total system solutions
- Thorough global sales locations providing you with rapid service

E = Easy to Use
- Simple parameter settings
- Intelligent on-site auto-tuning

E = Economical
- On-site tuning with load
- Accurate direct-stop and automatically generates curves

E = Environment Friendly
- With selective power generation unit to create a more eco-friendly solution
- Great adaptability with UL and CE certification guaranteed

D = Design
- Innovative design for hardware protection, ensuring safe elevator operation
- Modular design for easy installation and maintenance

D = Drive
- Professional motor and drive control technology
- Smooth elevator motion, perfect stop and start

D = Deliver
- Provides true integration, flexible and indispensable elevator solutions
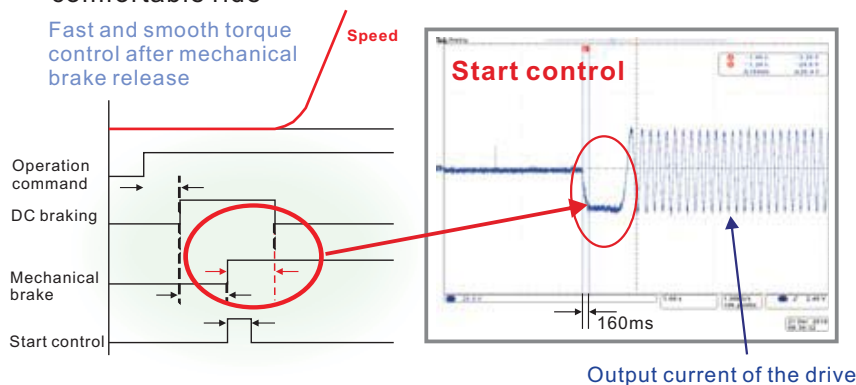- Delta's IED delivers for you

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IED Features

Auto-tuning with load

- Ability to perform auto-tuning with loads when elevator structure is completed. (Saves you the hassle of re-assembling the elevator structure)
- Supports all types of encoder when elevator is with loads
- Precisely measures the motor parameters with loads present
- Precisely measures the PG offset angle with loads present
- Simple and easy tuning for construction site applications. No need to add loads for balancing
- Safe, reliable, and labor-saving

EA-CT01

Smooth start and stop without load compensation

- Easy adjustment with simple testing process
- Applicable to any elevator structure, provides precise control, consistent efficiency and not affected at all by external conditions
- Auto-adjustment of starting torque to provide a smooth and comfortable ride

Fast and smooth torque control after mechanical brake release

Speed

Start control

Operation command

DC braking

Mechanical brake

Start control

160ms

Output current of the drive

EA-CP16

Compact design of control cabinet to strengthen the structure

- Thin body design, with a minimum thickness of 146mm

146mm

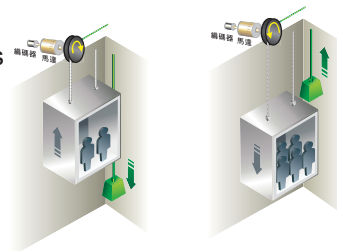**EA-FM02MV**

IED

EA-FM02MH

EA-FM02MV
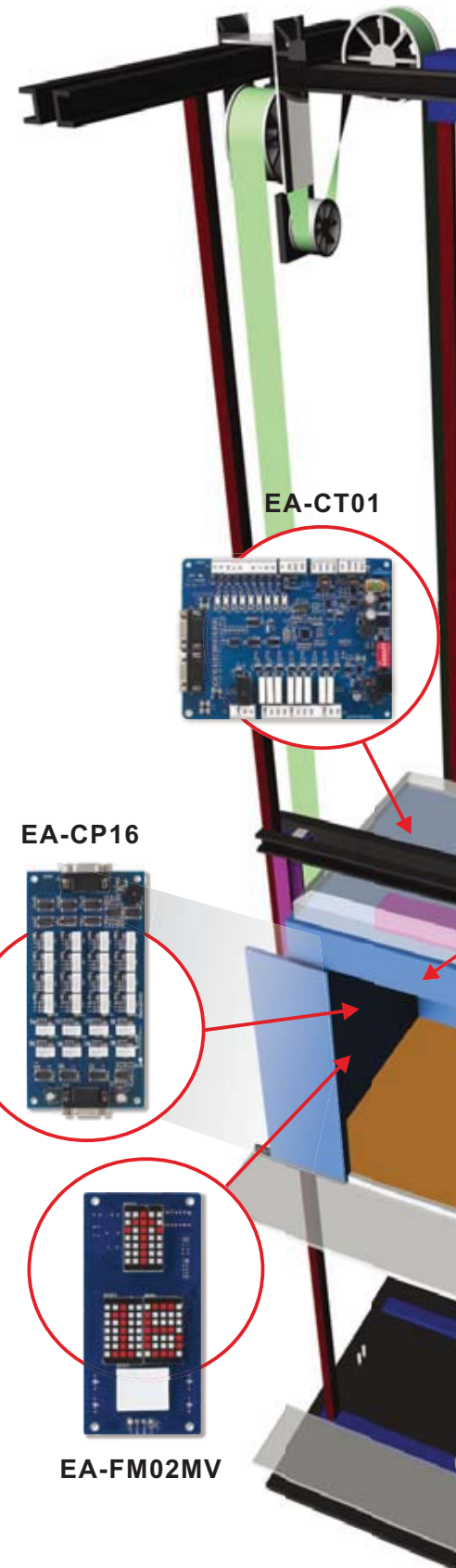
Reliable ride with comfort and safety ensured

- Auto-detection on output phase loss to ensure proper operation of motor
- Automatic confirmation on torque output before releasing the mechanical brake

Operation command ── Detection of output phase failure → Confirmation of torque output → Release of mechanical brake
Drive ready ──

Dual protection, elevator safety guaranteed

- Supports single-phase 230 VAC UPS and executes a light-load direction search automatically when power failure occurs.

編碼器 馬達   編碼器 馬達

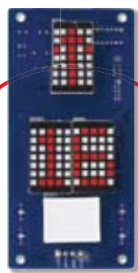**In case of power failure the light-load direction search function is triggered to bring the elevator car to the nearest floor instantly.**

Built-in digital keypad with easy-to-use features

- Optional LCD (KPC-CC01), a pull-out type digital keypad supporting multi-languages is available upon purchase.

USB port convenient for program upload/download and facilitating the tuning process

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ΔNELTA
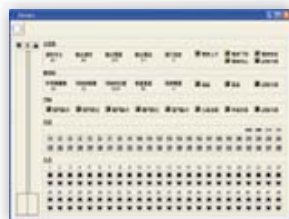
Application Fields and Speed:

- Low speed, mid speed and high speed elevators
- Passenger elevators, medical elevators, elevators for disabled, elevators for housing, elevators for commercial buildings
- Elevator speed: 4m/sec

A fully integrated drive technology in one MCU

One MCU for all configurations, no communication problems or configuration delays.

Direct stop

A single operational MCU lowers the malfunction rate

One MCU design has no need to transmit data to others and no interference problem

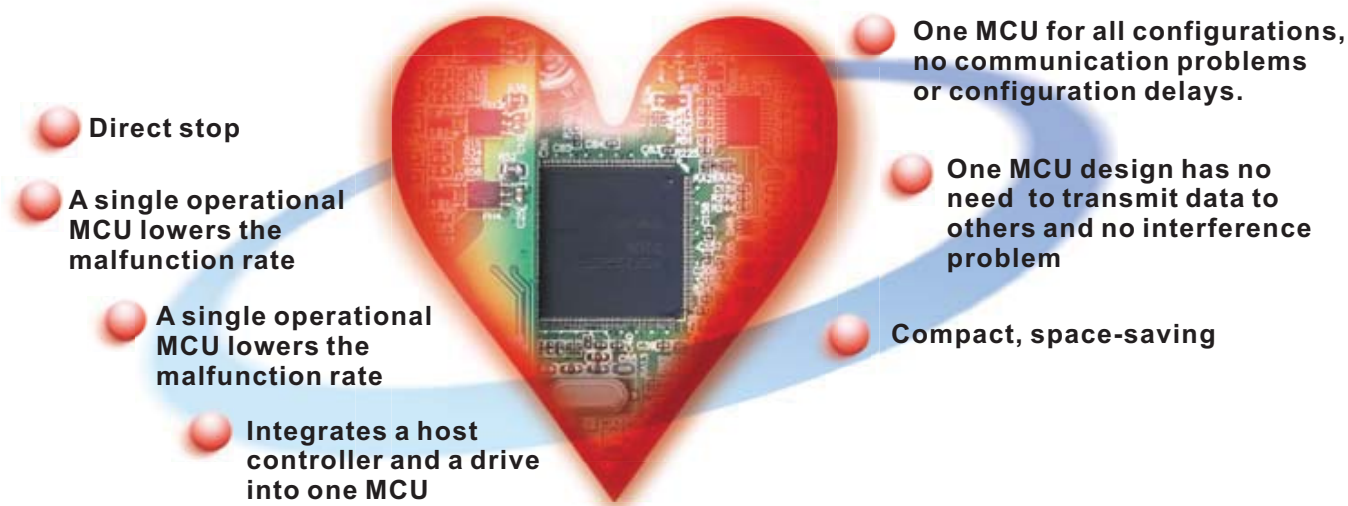**A single operational MCU lowers the malfunction rate**

Compact, space-saving

Integrates a host controller and a drive into one MCU

One MCU	Two MCUs
Fast calculation for Direct Stop	Slow calculation for Direct Stop
Faster speed, all digital signals are processed simultaneously	Slower speeds, digital signals are processed separately.
A single operational MCU lowers the malfunction rate	Two MCUs processing simultaneously increase the malfunction rate.
One MCU does all configurations, no communication, no configuration delays	Two MCUs compute separately and interact through mutual communication causing delays in computing time.
One MCU does all configurations, no communication or interference problems	Two MCUs compute separately and transfer data to each other, causing errors due to interference.
Compact, space-saving	Two MCUs are space consuming.
Integrates host controller and drive into one MCU	One MCU for host controller and one MCU for drive.

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IED Features

Operator inspection mode:
When the elevator is in for maintenance or inspection, this mode allows an operator to conduct a low speed run via the maintenance switches located on the top of the car, inside the car or on the control board.

Direct stop:
With floor distances and parameters settings provided to the system, this feature calculates and configures the optimal speed curve automatically for the elevator to operate from start to stop.

Real-time speed curve configuration:
The elevator's speed curve is configured in real-time to operate between floors with different travel distances.

Default door opening:
The elevator door prepares for opening as it detects the floor arrival sensor when traveling. This function shortens the waiting time for door to open.

Automatic re-leveling when door opens:
Floor leveling may fluctuate when weight changes or when false operation occurs. This mode automatically re-levels the elevator at low speed as the door opens.

Rescue operation to the nearest floor:
When power failure occurs suddenly, the elevator automatically travels to the nearest floor for landing to ensure passenger safety.

Auto-tuning with load:
This feature enables auto-tuning for a dynamic or static motor that is equipped with a load. The elevator rope does not need to be removed.

Fire operation:
When fire alarm is ON, the elevator automatically returns to the rescue floor and will not respond to any calls from the hall to ensure passenger safety.

Encoder offset auto-tuning with load:
This feature supports various encoder types and encoder offset tuning of permanent magnet motors. Also enables auto-tuning for a dynamic or static motor that is equipped with load. The elevator rope does not need to be removed.

Attendant operation:
When the attendant switch is pressed inside the elevator car, the attendant operation mode is ON and an operator inside the elevator can
(1) answer calls from the elevator hall and decide whether to accept or decline the call,
(2) control the elevator door's open and close,
(3) control elevator travel up and down.

Energy saving lights and fans control:
The lighting and fans are automatically turned off for energy-saving purposes when there are no instructions from inside the elevator or calls from the hall during the set time.

Automatic detection of floor heights:
Floor heights are automatically measured and saved into the MCU as the elevator travels from the top floor to the bottom floor. This feature automatically calculates the leveling position for landing and the optimal operation speed for traveling between each floor.

Automatic adjustment of car position:

The car position is constantly monitored and analyzed by the system, when it fails to match with the system analysis due to malfunctions or human errors, the elevator will automatically return to the nearest position correction zone for adjustment. Once the car position is identified, the elevator restore to normal operation status.

False car call cancellation:

This function allows user to cancel the wrong floor selection pressed on the control board.

Cancellation of reverse direction instructions:

When the elevator responds to calls in the same direction or when the traveling direction is reversed, the reverse direction calls are erased and will not be registered.

Load by-pass:

When the elevator detects a full load greater than 80% of the car's rated capacity, it will only respond to the floor selected inside the elevator. All calls from the hall are registered but will delay response until the car's weight is reduced to lower than 80% of the rated capacity.

Time-based service:

The elevator can be set to respond to only certain floor instructions or to travel between certain floors during a set time.

Rush hour operation:

During rush hours, the elevators will only respond to the car instructions after departing from the base floor and will return to the base floor automatically (ignoring calls from the hall) after the last call from the car is finished.

Anti-nuisance function:

If the system detects and determines any nuisance during operation, the elevator lands at the nearest floor registered on the control board and automatically clears the rest of the calls to minimize wasted energy.

Overload protection:

When the elevator car weight exceeds 110% of the car's rated capacity, the buzzer sounds and stops the door from closing.

Control Terminals

Name	Quantity	Terminal
Multi-function digital input	24 sets, up to a maximum 40 sets via I/O extension slots	1. Functions defined by user 2. Photo coupler 3. Input impedance: approximately 3.75kΩ 4. Input voltage: 0~30VDC

Multi-function relay output	2 sets (N.O./N.C.)
	6 sets (N.O.)
		1. Functions defined by user
		2. Resistive load
		    5A(N.O.)/3A(N.C.) 250VAC
		    5A(N.O.)/3A(N.C.) 30VDC
		3. Inductive load (COS 0.4)
		    2.0A(N.O.)/1.2A(N.C.) 250VAC
		    2.0A(N.O.)/1.2A(N.C.) 30VDC

MODBUS communication	3 sets	1. Chinese LCD keypad is available upon purchase 2. Communicate with panel at hall 3. Communicate with host controller for monitoring purpose 4. Communication for group control
CANBUS communication	1 set	1. Communicate with the car top instruction board
USB port	1 set	1. Computer monitoring, programming
Analog input	1 set	1. Input voltage: +10 V~-10V 2. Input impedance 20k 3. Resolution 12bit

Wiring

Provides three-phase power input

No-fuse breaker

R/L1 —NFB—
S/L2 —
T/L3 —

*1 EPS + -   Brake resistor (optional)

+1   +2/B1   B2

R/L1
S/L2
T/L3

U/T1
V/T2
W/T3

Motor
IM 3~

Sink
SW1
The factory setting is Source

Internal Power
J7
The factory setting is External Power

Factory setting

24V power input
Maintenance/ inspection signal
Upward inspection signal
Downward inspection signal
Leveling signal (Up)
Leveling signal (Down)
Door-zone signal
Feedback for operation output
Feedback for door-lock loop
Brake feedback
Safety circuit feedback
Upward limit signal
Upward deceleration 1
Upward deceleration 2
Upward deceleration 3
Downward limit signal
Downward deceleration 1
Downward deceleration 2
No function
No function
No function
No function
No function
No function
No function
Digital signal common

U24V
DCM
MI1
MI2
MI3
MI4
MI5
MI6
MI7
MI8
MI9
MI10
MI11
MI12
MI13
MI14
MI15
MI16
MI17
MI18
MI19
MI20
MI21
MI22
MI23
MI24
DCM

RA
RB
RC

Factory setting for operation: mechanic contactor output

MRA
MRB
MRC

Brake output

R1A
R2A
R12C

Forced brake output

R3A
R4A
R34C

R5A
R6A
R56C

Modbus RS-485
Pin 1, 2, 6, 7 reserved
Pin 3GND
Pin 4:SG-
Pin 5:SG+
Pin 8:EV

8 ←1

USB port

○ Main Circuit terminals
● Control terminals
⏚ Shielded leads & cables

External
Car top

SG1+
SG1-
CAN_L
CAN_H
DCM
SG2+
SG2-
DCM
AI
ACM

I/O extension slot

PG extension slot

* 1. Terminals for supplying emergency power to control board or providing backup power supply. (Applicable to frame C and D models.)

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Product Specifications

■ 230V Series

230V	Frame	[1]B		C			D			[1]E	
	Model IED___ A23A	022[2]	040	055	075	110	150	185	220	300	370
	Applicable Motor Output (kW)	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37
	Applicable Motor Output (HP)	3	5	7.7	10	15	20	25	30	40	50
Output	Rated output capacity (kVA)	4.8	7.9	9.6	12	17.9	23.1	30.7	34.7	52.6	64.1
	General application of the rated output (A)	12.0	20.0	24.0	30.0	45.0	58.0	77.0	87.0	132.0	161.0
	Rated output for elevators	13.7	22.8	27.4	34.3	51.4	66.3	88.0	99.4	151.0	184.0
	Maximum output voltage (V)	Three-phase corresponding input voltage									
	Range of output frequency (Hz)	0.00~400Hz									
	Carrier Frequency (kHz)	2~15kHz								2~9kHz	
Enter	Input Current (A)	26	25	30	38	56	723	95	107	163	200
	Input voltage range	Single-phase 200~240V 50/60Hz	Three-phase power supply 200~240V 50/60 Hz								
	Power voltage alteration allowed	10% (180~260V)									
	Power frequency alteration allowed	5% (47~63Hz)									
	Cooling method	Forced cold wind									

■ 460V Series

460V	Frame	[1]B	C			D				[1]E			
	Model IED___ A43A	040	055	075	110	150	185	220	300	370	450	550	750
	Applicable Motor Output (kW)	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
	Applicable Motor Output (HP)	5	7.5	10	15	20	25	30	40	50	60	75	100
Output	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
	General application of the rated output (A)	11.5	13	17	23	30	38	45	58	80	100	121	146
	Rated output for elevators	13.1	14.9	19.4	26.3	34.3	43.4	51.4	66.3	92	114	138	167
	Maximum output voltage (V)	Three-phase power of 380~480V 50/60Hz											
	Range of output frequency (Hz)	0.00~400Hz											
	Carrier Frequency (kHz)	2~15kHz							2~9kHz		2~6kHz		
Enter	Input Current (A)	17	18	22	28	37	47	56	72	99	123	150	180
	Input voltage range	Three-phase corresponding input voltage											
	Power voltage alteration allowed	10% (342~528V)											
	Power frequency alteration allowed	5% (47~63Hz)											
	Cooling method	Forced cold wind											

* 1. 230 V, 2.2 kW, and IED are single-phase models, version IED022A21A

General Specifications

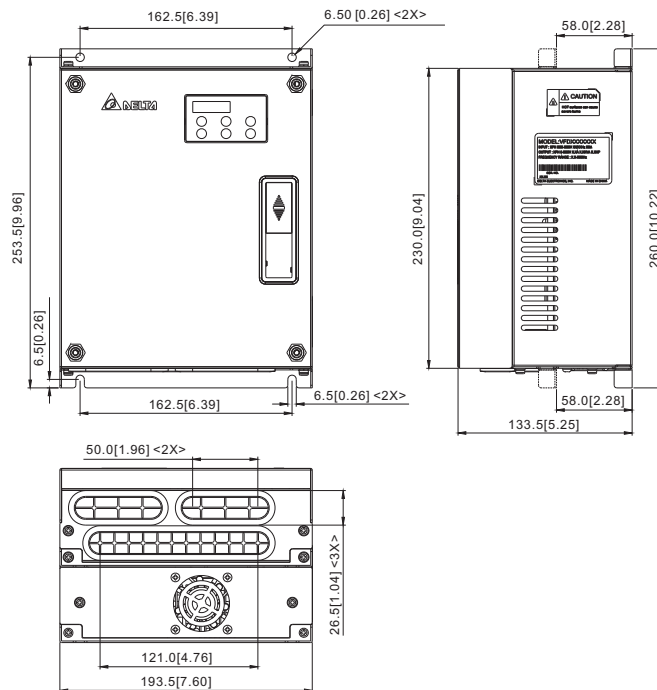|		
Control characteristics	Control method	1: V/F, 2:VF+PG, 3:SVC, 4: FOC+PG, 5: TQC+PG, 6:FOC+PM
	Starting torque	The starting torque can reach up to 150% or more at the frequency of 0.5 Hz. The control mode for FOC + PGC and FOC + PM is 0 Hz.
	Speed control range	1:100 (external PG up to 1:1000)
	Speed control precision	+/-0.5% (up to +/-0.02% with external PG card)
	Speed response bandwidth	5Hz (vector control up to 40 Hz)
	Maximum output frequency (Hz)	0.00 to 400 Hz
	Frequency output accuracy	Digital command 0.005%, analog command 0.5%
	Frequency setting resolution	Digital command 0.01 Hz, Analog command: 1/4096 (12 bit) of maximum output frequency
	Torque limit	Max. 200% of torque current
	Torque accuracy	±5%
	Acceleration/deceleration time	0.00~600.00 Sec
	Analog input signal	+/-10V
Protection features	Motor protection	Electronic thermal relay protection
	Over-current protection	200% of current clamp for rated current, 250% of over-current protection for rated current
	Ground current protection	Ground current protectin level is 50% of rated current of the AC motor drive
	Overload capacity	150% of rated output current for 60 seconds, 200% for 3 seconds
	Over-voltage protection	Over-voltage level: Vdc > 410/820V
	Over-voltage protection for input power	Metal Oxide Varistor (MOV)
	Over-temperature protection	Built-in temperature sensor
Environment	Protection level	NEMA 1/IP20
	Operation Temperature	-10°C~40°C, Derating up to 50°C
	Storage temperature	-20° C~60°C
	Humidity	Below 90% RH (no condensation)
	Vibration	1.0G below 20Hz, 0.6 G when 20~60Hz
	Cooling System	Fan cooling (When IED is ON the fan turns ON; when IED is OFF the fan turns OFF)
	Installation height	Below the altitude of 1,000 m (non-corrosive gases and liquids, dust-free)
	International Certification	CE / CE Mark Safety Approved UL/cUL Safety Approved

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Dimensions

■ Frame:B

Models
IED022A21A
IED040A23A
IED040A43A

162.5[6.39]   6.50 [0.26] <2X>   58.0[2.28]

253.5[9.96]

230.0[9.04]

260.0[10.22]

6.5[0.26]

162.5[6.39]   6.5[0.26] <2X>   58.0[2.28]

133.5[5.25]

50.0[1.96] <2X>

26.5[1.04] <3X>

121.0[4.76]

193.5[7.60]

Unit:mm[inch]

■ Frame:C

Models
IED055A23A 、IED055A43A
IED075A23A 、IED075A43A
IED110A23A 、IED110A43A

235.0[9.25]   146.0[5.75]

204.0[8.03]

337.0[13.27]
350.0[13.78]

6.5[0.26]   6.5[0.26]

Unit:mm[inch]

13
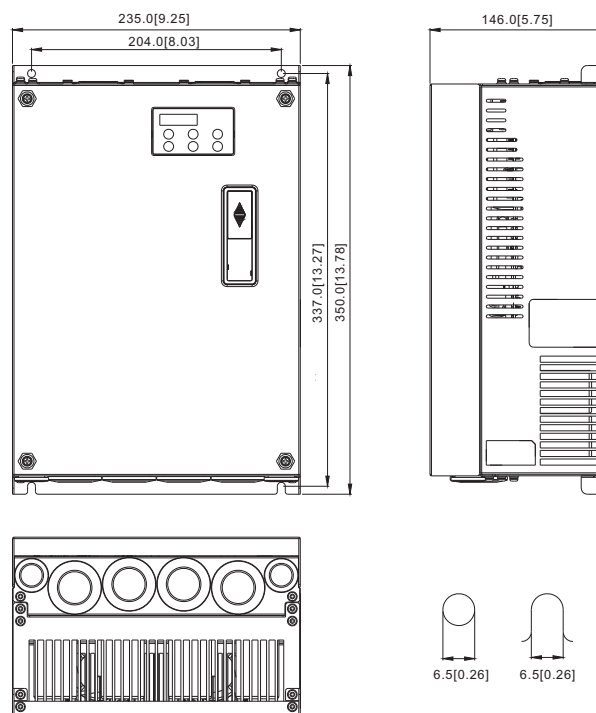
■ **Frame:D**

Models

IED150A23A 、 IED150A43A
IED185A23A 、 IED185A43A
IED220A23A 、 IED220A43A
IED300A43A

255.0[10.04]
226.0[8.90]
178.0[7.01]
384.0[15.12]
403.8[15.90]

8.5[0.33]   8.5[0.33]
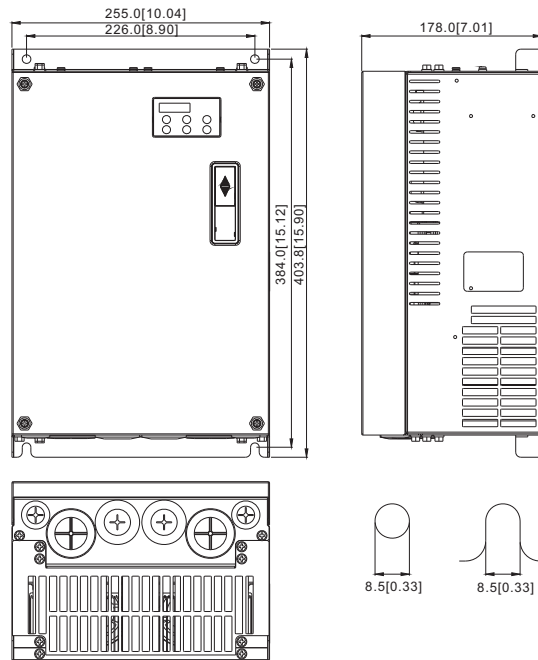
Unit:mm[inch]

■ **Frame:E**

models

IED300A23A¡IED370A23A
IED370A43A¡IED450A43A
IED550A43A¡IED750A43A

330.0[12.99]
285.0[11.22]
SEE DETAIL A
273.4[10.76]
107.2[4.22]
16.0[0.63]
525.0[20.67]
550.0[21.65]
492.0[19.37]
SEE DETAIL B
18.0[0.71]

11.0[0.43]   11.0[0.43]

DETAIL A   DETAIL B
(MOUNTING HOLE)   (MOUNTING HOLE)

Unit:mm[inch]

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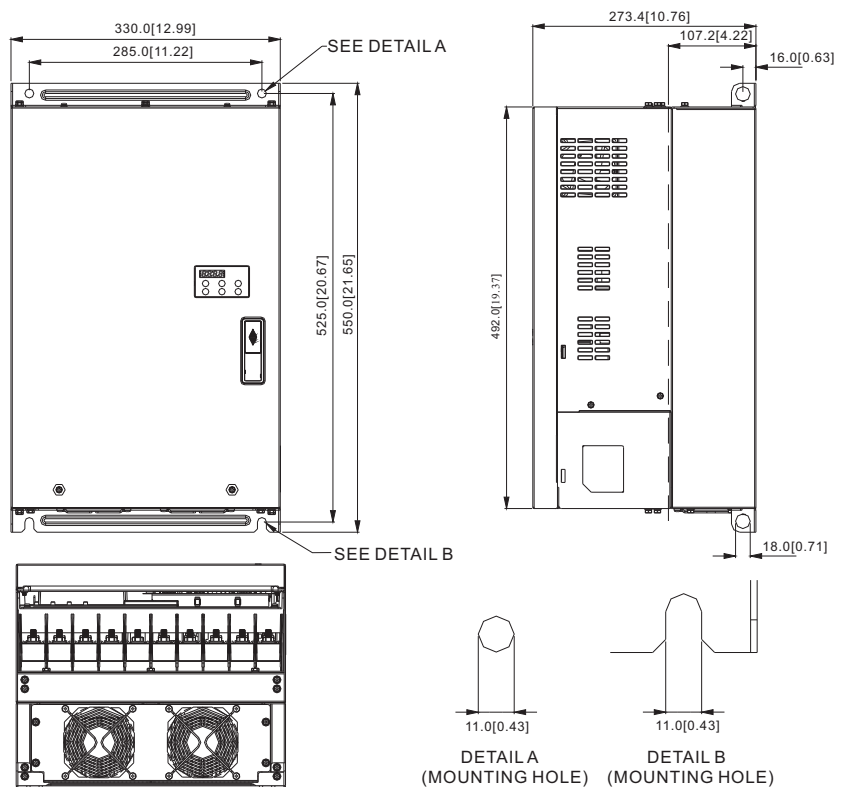
IED Accessories

Junction board for car signals (EA-CT01)

Terminals	Descriptions
I1~I9	Multi-function input terminals Signal of open-/close-door limit Open-/close-door arrival signal Full load/overload signal Light curtains ½
VI/Icom	External +24V input
SAI/SBI/GND/VS	Analog input terminals, connects to weighing signal input
CAN+ / CAN-	CAN communication
MOD+ / MOD-	Modbus communication
J4 , J5	Communication through instruction board
Ob1~Ob3-COMb Oc1~Oc3-COMc Od1~Od2-COMd NO-COMa/NC-COMa	Output for multi-function relay Open-/close-door signal Arrival signal for going up-/down-stairs Door lock Fan/lighting control for lift car

Car instruction board (EA-CP16)

Terminals	Descriptions
CN1	Connects to the junction board on top of lift car
CN2	Extension slots, more than 16 sets of plug-in for time-based group control
JP1~JP16	Plug-in for floor button inside the lift car
JP17~JP24	Output for open-door display Output for closed-door display Output for display of open-door delay Output for direct arrival display

Integrated instruction board for lift car signal (EA-CTP01)

Terminals	Descriptions
I1~I9	Multi-function input terminals. Signal of open-/close-door limit . Open-/close-door arrival signal Full-load/overload signal. Light curtains ½
VI/Icom	External +24V input
SAI/SBI/GND/Vs	Analog input terminals, connects to weighing signal input
CAN+ / CAN-	CAN communication
MOD+ / MOD-	Modbus communication
CN1	Communication through instruction board
CN2	Extension slots, more than 16 sets of plug-in for time-based group control instruction
JP1~JP16	Plug-in for floor button inside the lift car
JP17~JP24	Output for open-door display, output for closed-door display Output for display of open-door delay, output for direct arrival display
Ob1~Ob3-COMb Oc1~Oc3-COMc Od1~Od2-COMd NO-COMa/NC-COMa	Output for multi-function relay Open-/close-door signal Arrival signal for going up-/down-stairs Door lock Fan/lighting control for lift car

Vertical and horizontal matrix display panel for floor (EA-FM02MH)

Terminals	Descriptions
JP1	Connects communication and power to instruction board
JP2, JP3	Switch for going up-/down-stairs
JP4	Door-lock and fire instructions
Jp5	Door-lock and fire switch

Straight-matrix display panel for floor (EA-FM02MV)

Terminals	Descriptions
JP1	Connects communication and power to instruction board
JP2, JP3	Switch for going up-/down-stairs
JP4	Fire Switch
JP5	Door-lock switch

Input card (EMED-D411A110V)

Terminals	Descriptions
HCM	Digital multi-function input terminals, AC power common
HI1~HI4	Input voltage: 100VAC~130VAC Input frequency: 57~63Hz

PG feedback card for open-collector, Line Driver and UVW encoder signal (EMED-PGAB)

Terminals	Descriptions
VP	Output power of encoder Output voltage: +5V/+12V (+5V/+12V determined by SW1) Maximum output current: 200mA
0V	Power source common for encoder
A, /A, B, /B, Z, /Z	Incremental encoder signal input Line driver input complies to the RS422 standard Single-phase input of +12 V open collector signal (can be set by SW2) Maximum input frequency: 100kHz
U, /U, V, /V, W, /W	Hall sensor signal input Maximum input frequency: 50kHz
⏚	Connected to the grounding of the power of the AC motor drive and used for PG shielding.

PG feedback card for Heidenhain ERN1387, EnDat2.1 and HIPERFACE (EMED-PGHSD)

Terminals	Descriptions
Vin	Port for voltage input (for adjusting the value of voltage amplitude from push-pull pulse output) Maximum input voltage: 24VDC
GND	Common ground for Vin and output siganl
A/O, B/O	Signal for push-pull pulse output Maximum output current: 30mA Maximum output frequency: 100kHz
AO, /AO, BO, /BO	Signal for differential pulse output Maximum output current: 30mA Maximum output frequency: 100kHz
D-SUB Connector (J3)	Encoder signal input Supports Heidenhain ERN1387 encoder. Heidenhain EnDat2.1 SICK HIPERFACE

Asia

Taoyuan Technology Center

Taoyuan Plant 1

Taiwan's First Green Factory

Wujiang Plant 3

China Delta Greentec

Global Operations

Canada

Montreal
Toronto

Amsterdam ■
Eindhoven ■

■ **Fremont**

USA

■ **Raleigh**

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C B
D C B
E F G Lith
UK
Belgium
H I R
France J K L B
Portugal Spain Italy Greece
Morocco Cyp

Mexico

A Mexico City
B Monterey
C Guadalajara

Jamaica
Guatemala   Honduras   Republica Dominicana
EL Salvador   Puerto Rico

Costa Rica
Panama

Colombia

Venezuela

Ecuador

Nigeria

Ghana

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B Estonia
C Sweden
D Denmark
E Netherlands
F Germany
G Poland
H Czech
I Hungary
J Slovenia
K Croatia
L Serbia

H

Peru

Brasil

Bolivia

Paraguay

Chile

A
D C B
E
F **Sao Paulo**
G

Argentina

Zambia

Brasil

A Minas Gerais
B Espírito Santo
C Rio de Janeiro
D São Paulo State
E Paraná
F Santa Catarina
G Rio Grande do Sul
H Amazonas

S

▲ Factories 2   ■ Branch office

Europe

America

Tokyo Office

India Office

Eindhoven Office

Raleigh Office

Lithuania
Belarus Russia
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Romania
Bulgaria Armenia Uzbekistan
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Cyprus Syria
Lebanon Iran
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Jordan Kuwait Pakistan Delhi
Egypt UAE
Saudi Arabia
Sudan
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31

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■ ⊙ **Shanghai**
▲ ■ ⊙ **Wujiang**
▲ ■ ⊙ **Taoyuan**
**Technology Center
& Plant I**

⊙ **Tainan**

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B Kolkata
C Mumbai
D Hyderabad
E Bangalore
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9	Taiyuan	25	Xiamen
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13	Shanghai	29	Foshan
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16	Xian	32	Nanjing

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