


Delta presents you with an ideal drive for door applications

Automation for a Changing World

# Delta Door Control Drive & Motor VFD-DD Series

www.deltaww.com

DELTA
Smarter. Greener. Together.

# Door Drive Functions and Features

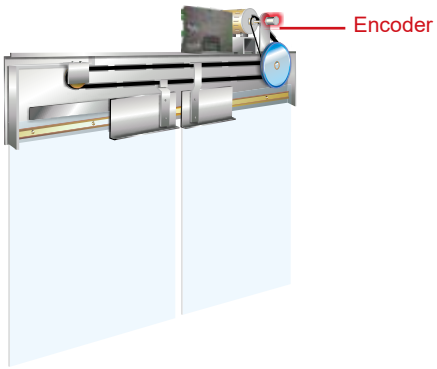
## User Friendly Design




## Door Control Solutions

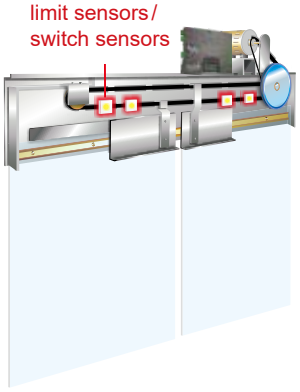
### ▪Distance Control Mode

For encoder applications this mode precisely controls the door's opening and closing position via encoder feedback signal.



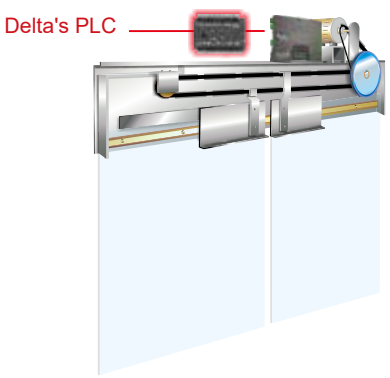

### ▪Speed Control Mode

For induction motor applications this mode executes door opening and closing via 2~4 limit sensors or switch sensors.




### ▪Multi-step Speed Control Mode

For PLC applications this mode uses Delta's PLC as a host controller to control door opening and closing in multi-step speeds.



## Built-in Door Control Functions

### ▪Door Width Auto-tuning

Door width is automatically measured and saved as the door opens and closes. It will open and close twice to confirm the door width accuracy. Once confirmed, the measurement is recorded into the drive parameters.

### ▪Smooth Door Curve

The door will reopen in a reverse direction when door blockage is detected. The reopen is performed with a smooth curve to minimize the impact of vibration.

### ▪Demo Mode

Demo mode demonstrates the door open, close and reverse motions to ensure the performance and quality of the drive system and the door structure.

### ▪Asynchronous (IM) and Synchronous (PM) Motors Applications

Compatible with Delta ECMD series door control servo motor and other induction motors (signal type encoder that accepts open collector and differential signal with 5, 12 or 24 $V_{DC}$).

### ▪Door Protection System

Passengers enter and exit the elevator with greater safety. When the light curtain and safety panel fail to function, the drive will command the door to re-open as it detects a rise of current caused by the blocked door.

### ▪Blockage Detection

4 steps: 1. precise torque detection at blockage;
2. door remains at current position for a few seconds;
3. door “OPEN/CLOSE” time-out;
4. forced open.

### ▪Built-in EMI Filters

(except for Basic Models)

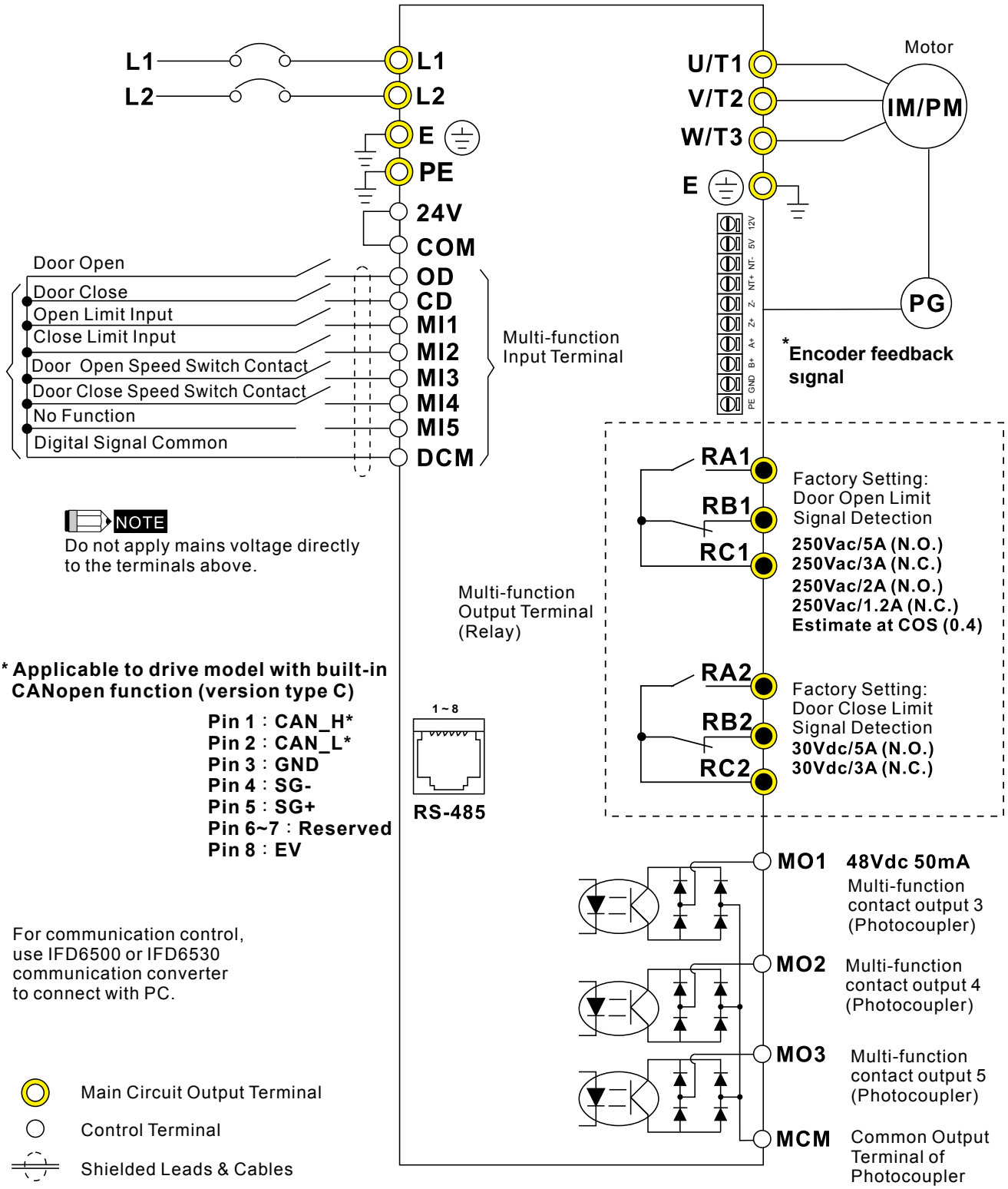
# Specifications

| 230V 1-phase: 200W and 400W models | | | | |
|---|---|---|---|---|
| **Model Number VFD-_ _ _DD** | | 001 | 002 | 004 |
| **Max. Applicable Motor Output (W)** | | 100 | 200 | 400 |
| Output Rating | **Rated Output Capacity (KVA)** | 0.3 | 0.6 | 1.0 |
| | **Rated Output Current for Constant Torque (A)** | 0.8 | 1.5 | 2.5 |
| | **Maximum Output Voltage (V)** | Proportional Double Input Voltage | Proportional Input Voltage | |
| | **Output Frequency (Hz)** | 0.00 ~ 120.00 Hz | | |
| | **Carrier Frequency (kHz)** | 10 kHz | | |
| | **Rated Input Current (A)** | 3 A | 4.9 A | 6.5 A |
| Environment | **Voltage Tolerance** | Single Phase 100 ~ 120 V (-15 ~ +10 %) (85 ~ 132 V) | Single Phase 200 ~ 240 V (-15 ~ +10 %) (170 ~ 264 V) | |
| | **Frequency Tolerance** | 50 / 60 Hz ±5 % (47 ~ 63 Hz) | | |
| **Cooling Method** | | Natural Cooling | | |
| **Frame** | | W 170 * L 215 * H 55 mm | | |

# General Specifications

| | | | |
|---|---|---|---|
| Control Characteristics | **Starting Torque** | | At 0.5 Hz, starting torque reaches above 150 % at 0.5 Hz; under FOC+PG mode, starting torque reaches above 150% at 0Hz. |
| | **Speed Control Range** | | 1:100 (external PG installation can achieve 1:1000) |
| | **Speed Control Accuracy** | | ±0.5 % (external PG installation can achieve 0.02 %) |
| | **Speed Response Ability** | | 5 Hz (vector control can attain 30 Hz) |
| | **Max. Output Frequency (Hz)** | | 0.00 to 120.00 Hz |
| | **Output Frequency Accuracy** | | Digital command ±0.005 % |
| | **Frequency Setting Resolution** | | Digital command ±0.01 Hz |
| | **Torque Limit** | | 200 % torque current as maximum |
| | **Accel/Decel Time** | | 0.00 ~ 600.00 sec |
| | **V/F Curve Pattern** | | Adjustable V / F curve of 4 independent points |
| Operating Characteristics | **Frequency Setting Signal** | **Keypad** | By parameter setting |
| | | **External Signal** | Multi-function input selection 1 ~ 5 (15 step speeds; JOG), parameter setting on serial communication port (RS-485) |
| | **Operation Setting Signal** | **Keypad** | Set by RUN, STOP key |
| | | **External Signal** | 2 wires (FWD, REV, RUN), JOG operation, RS-485 serial interface, demo mode |
| | **Multi-Function Input Signal** | | Multi-step speed selection MI1 ~ MI15, Jog, first to second accel/decel switches, demo mode, force stop, emergency stop, operation command source, parameter lock, driver reset, open/close limit signal, door open prohibited signal, force open signal, reposition, 2nd step open/close curve selection |
| | **Multi-Function Output Signal** | | (RC1, RA1, RB1), (RC2, RA2, RB2), (MO1, MO2, MO3 and MCM) AC drive operating, frequency attained, fault indication, over torque, over voltage, operation mode, alarm indication, demo mode indication, overheat alarm, drive is ready, emergency stop, braking signal, zero speed indication, PG indication error, position detection, limit signal, re-open/close indication, position finished |
| **Communication Interface** | | | Built-in Modbus, customize CAN Bus |
| **Alarm Output Contact** | | | Contact "ON" when malfunctions occurs (relay with a "C" or "A" contact, or 2 open collector outputs) |
| **Operation Function** | | | AVR, 4 set fault records, reverse inhibition, DC brake, auto torque/slip compensation, auto tuning, adjustable carrier frequency, output frequency upper and lower limits, parameter reset, vector control, MODBUS communication, abnormal reset, abnormal re-start, PG feedback control, fan control, demo mode, door width auto-tuning |
| **Protection Function** | | | Over voltage, over current, under current, external fault, overload, ground fault, overload, overheating, electronic thermal, PG feedback error, external limit signal error, re-open/re-close |
| **Digital Keypad** | | | 7 function keys, 4-digit 7-segment LED, 4 status LEDs, master frequency, output frequency, output current, custom units, parameter values for setup, review and faults, RUN, STOP, RESET, FWD / REV |
| **Built-in EMI filter** | | | Certified to EN55011 CLASS A |
| Protection Characteristics | **Motor Protection** | | Electronic thermal relay protection |
| | **Over Current Protection** | | The current forces 180 % of the over-current protection and 240 % of the rated current |
| | **Overload Capacity** | | 150 % for 120 seconds; 180 % for 10 seconds |
| | **Voltage Protection** | | Over-voltage level: $V_{DC} > 400$; low-voltage level: $V_{DC} < 200$ |
| | **Over-voltage Protection for Input Power** | | Varistor (MOV) |
| | **Overheat Protection** | | Built-in temperature sensor |
| Environment | **Enclosure Rating** | | IP20 |
| | **Operation Temperature** | | -10 °C ~ 40 °C |
| | **Ambient Temperature** | | -20 °C ~ 60 °C |
| | **Ambient Humidity** | | Below 90 % RH (non-condensing) |
| | **Vibration** | | 1.0 G less than 20 Hz, 0.6 G at 20 ~ 60 Hz |
| | **Installation Location** | | Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust |
| **Certificate** | | | CE UL |

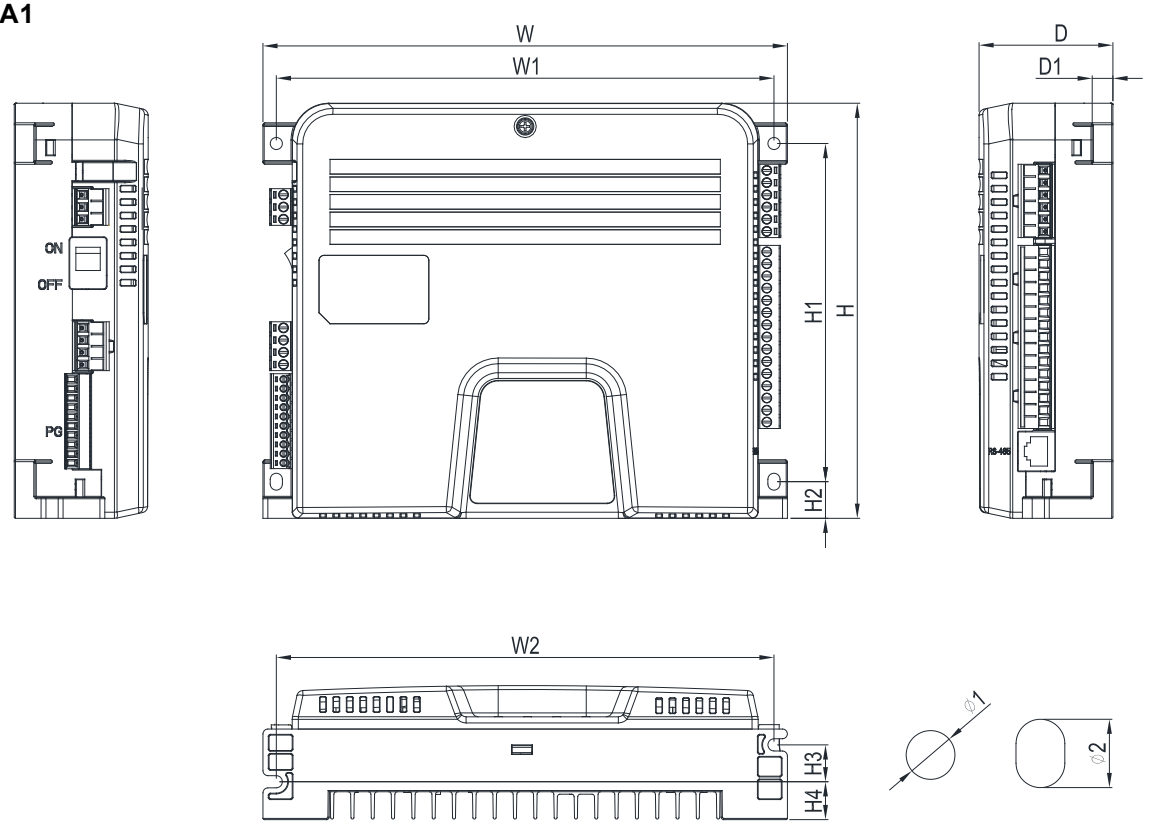
# Wiring




*Please refer to VFD-DD series user manual for terminal definition of E type encoder.

# Dimensions

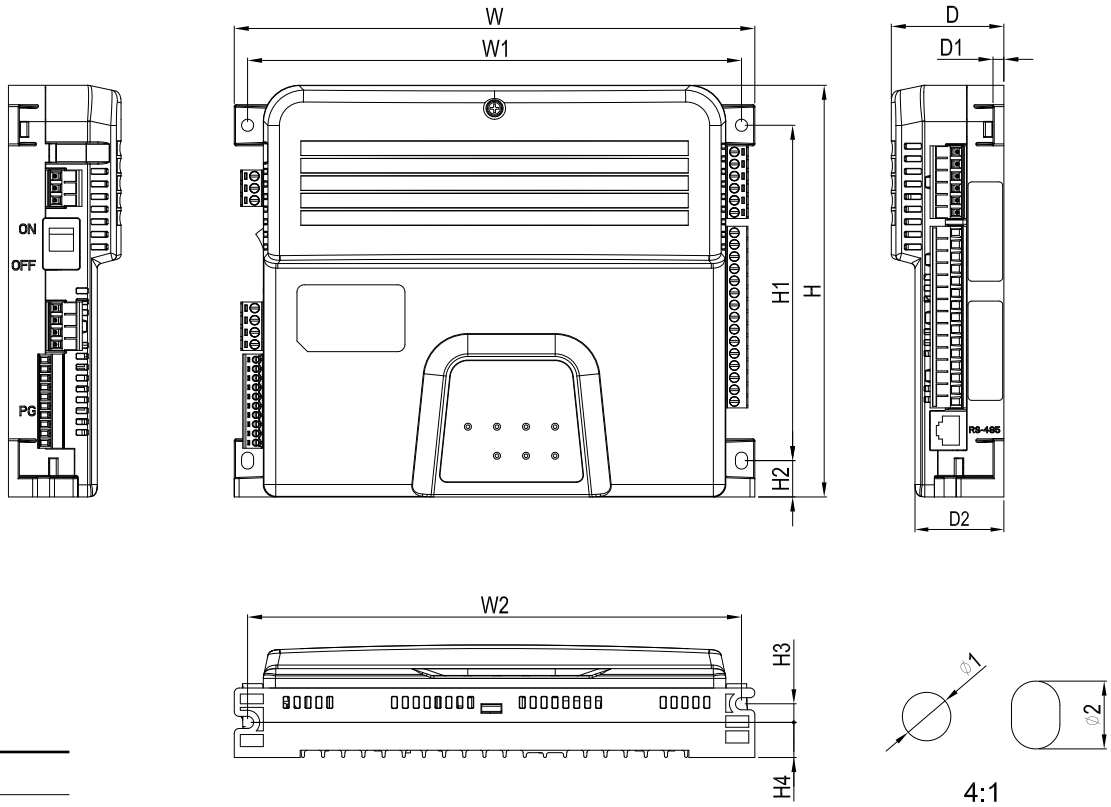
**FRAME_A1**




| MODEL |
|---|
| VFD001DD11S |
| VFD002DD21S |
| VFD002DD21T |
| VFD004DD21S |
| VFD004DD21T |
| VFD002DD21V |
| VFD004DD21V |

| FRAME | | W | H | D | W1 | W2 | H1 | H2 | H3 | H4 | D1 | Ø1 | Ø2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | mm | 215.0 | 170.0 | 55.0 | 204.0 | 204.0 | 138.5 | 15.0 | 15.1 | 15.5 | 8.5 | 5.0 | 7.0 |
| | inch | 8.46 | 6.69 | 2.17 | 8.03 | 8.03 | 5.45 | 0.59 | 0.59 | 0.61 | 0.34 | 0.20 | 0.28 |

**FRAME_A2**




| MODEL |
|---|
| VFD002DD21F |

| FRAME | | W | H | D | W1 | W2 | H1 | H2 | H3 | H4 | D1 | Ø1 | Ø2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A2 | mm | 215.0 | 170.0 | 46.5 | 204.0 | 204.0 | 138.5 | 15.0 | 7.7 | 14.5 | 4.5 | 5.0 | 7.0 |
| | inch | 8.46 | 6.69 | 1.83 | 8.03 | 8.03 | 5.45 | 0.59 | 0.3 | 0.57 | 0.17 | 0.20 | 0.28 |

# Model Name of Door Drive

**VFD 002 DD 2 1 S**

**【Product Name 】**
AC Motor Drive

**【Power Range 】**
001 : 0.1 kW 0.125 HP
002 : 0.2 kW 0.25 HP
004 : 0.4 kW 0.5 HP

**【Product Series】**
DD: Door Drive

**【Version】**
S: Standard
T: Built-in CANopen
V: Basic
F: Slim

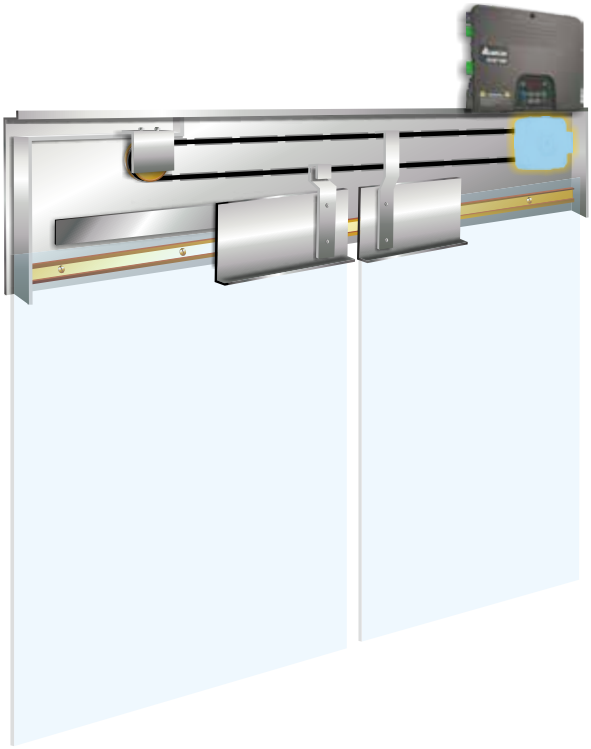
**【Voltage】**
1: Single phase

**【Mains Input Voltage】**
1 : 115 V
2 : 230 V

# Servo Motors ECMD Series

- **55 mm thin design**
- **Instant torque up to 5 N-m**
- **Maximizes installation flexibility**
  Both sides of motor can be installed
- **Motor temperature detection and overheating protection**





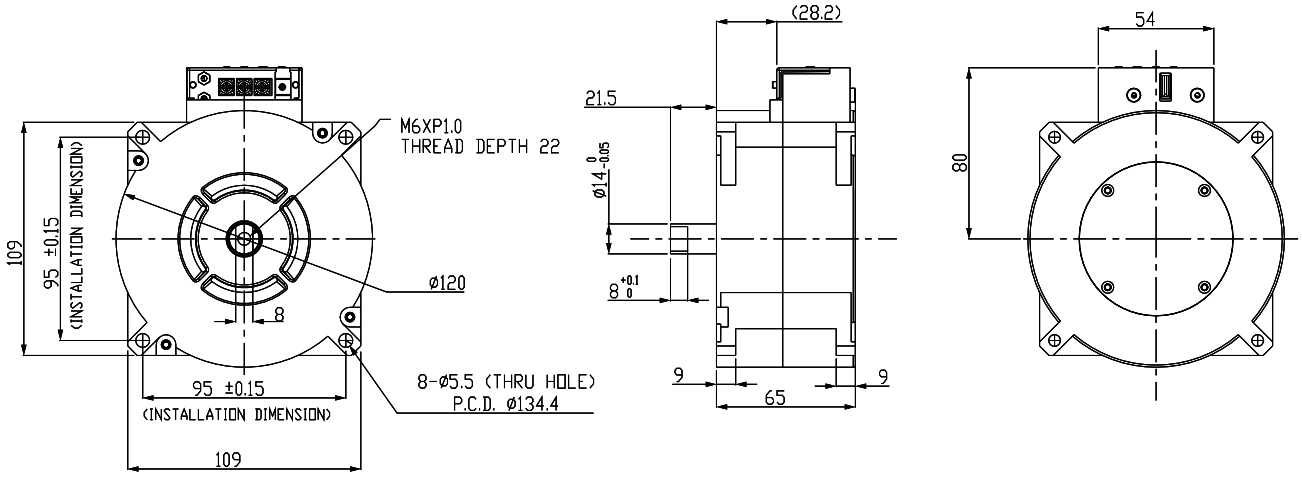


# Specifications

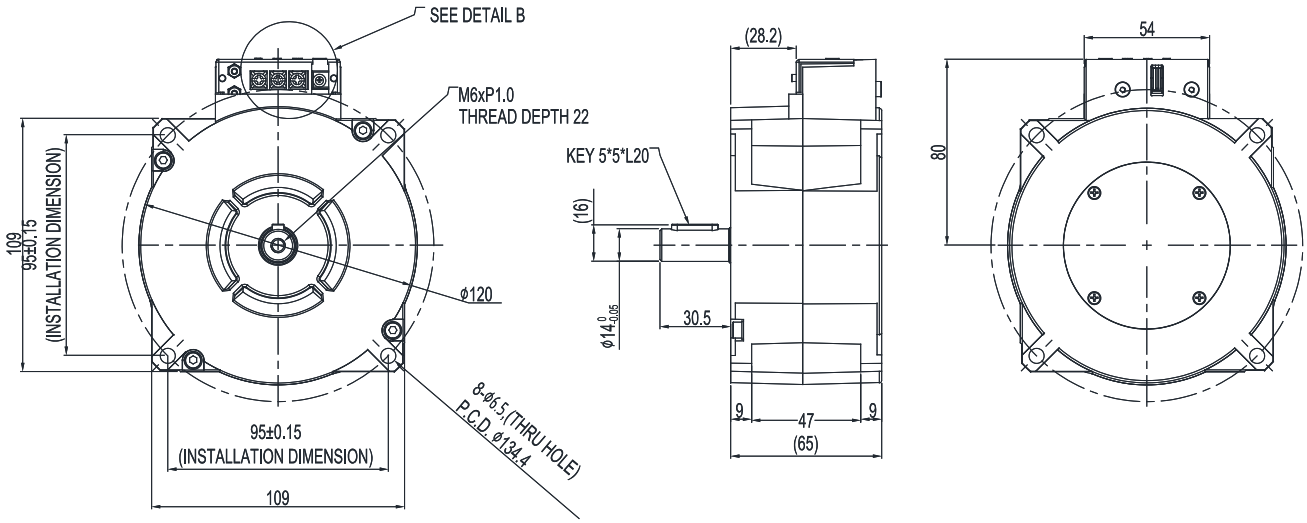
| | Model Name | ECMD-B91207M_ | ECMD-B91608M_ | ECMD-B81610M_ |
|---|---|---|---|---|
| Rated Speciation | Rated Power (W) | 70 | 80 | 100 |
| | Rated Voltage (V) | 220 | 220 | 220 |
| | Rated Torque (N-m) | 2.0 | 3.0 | 3.5 |
| | Rated Speed (rpm) | 350 | 250 | 280 |
| | Rated Current (A) | 0.7 | 1.0 | 0.95 |
| Rated Speciation | Pole Numbers | 10 | 16 | 16 |
| | Encoder Resolution | 10 bit (256ppr) | 10 bit (256ppr) | 12 bit (1024ppr) |
| | Continuous Stall Torque (N-m) | 2.0 | 3.0 | 3.5 |
| | Max. Instant Torque (N-m) | 5.0 | 5.0 | 5.5 |
| | Max. Speed (rpm) | 750 | 600 | 500 |
| | Max. Instant Current (A) | 2.5 | 2.5 | 2.5 |
| | Rotor Moment of Inertia (Kg.m$^2$) | $3.0 \times 10^{-4}$ | $4.9 \times 10^{-4}$ | $4.9 \times 10^{-4}$ |
| | Armature Resistance (Ohm) | 18.7 | 15.8 | 24.3 |
| | Armature Inductance (mH) | 195 | 177 | 273 |
| | Mechanical Time Constant (ms) | 1.96 | 2.42 | 2.13 |
| | Electrical Time Constant (ms) | 10.4 | 11.2 | 11.2 |
| | Insulation Class | B | | |
| | Insulation Resistance | 10 MΩ DC 500 V | | |
| | Insulation Strength | 1.5 k $V_{AC}$, 1 min. | | |
| | Max. Radial Shaft Load (N) | 98 | | |
| | Max. Thrust Shaft Load (N) | 49 | | |
| | Weight (kg) | 2.5 | 3.0 | 3.0 |
| Environment | Maximum Winding Temperature | 130 °C | | |
| | Operating Temperature | 5 ~ 45 °C | | |
| | Storage Temperature | -10 ~ 50 °C | | |
| | Operating Humidity (%RH) | 20 ~ 95 %RH (Non-condensing) | | |
| | Storage Humidity (%RH) | 20 ~ 95 %RH (Non-condensing) | | |
| | IP Rating | IP20 (Standard) | | |

# Dimensions

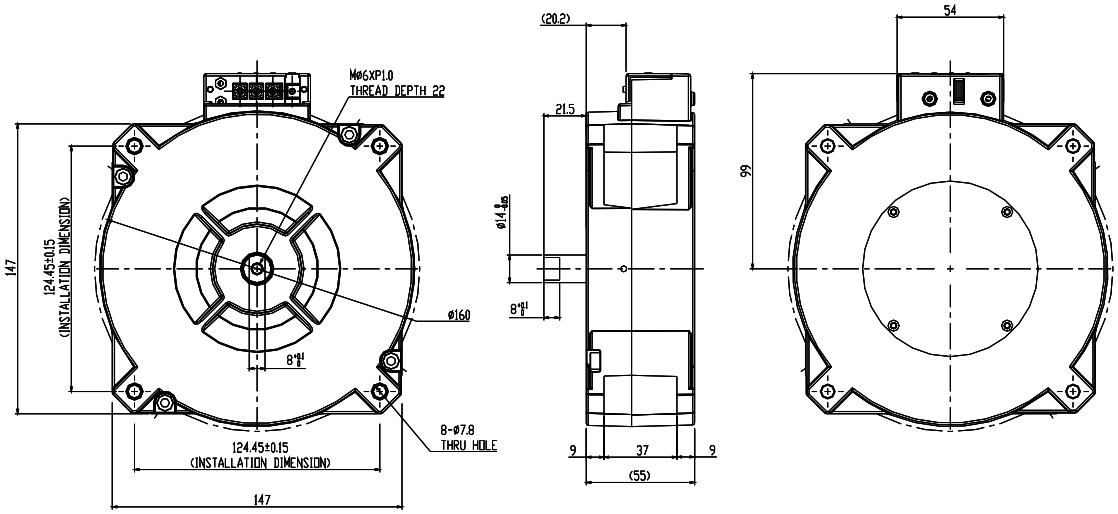
## ■ ECMD-B91207MS




## ■ ECMD-B91207MN

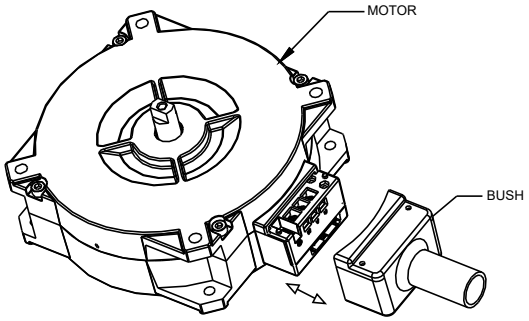


## ECMD-B91608MS/ECMD-B81610MS

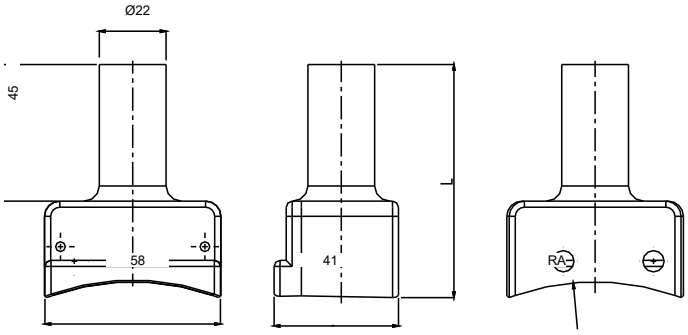



# ECMD Motor Dust Cap

### ECMD Motor Dust Cap Installation



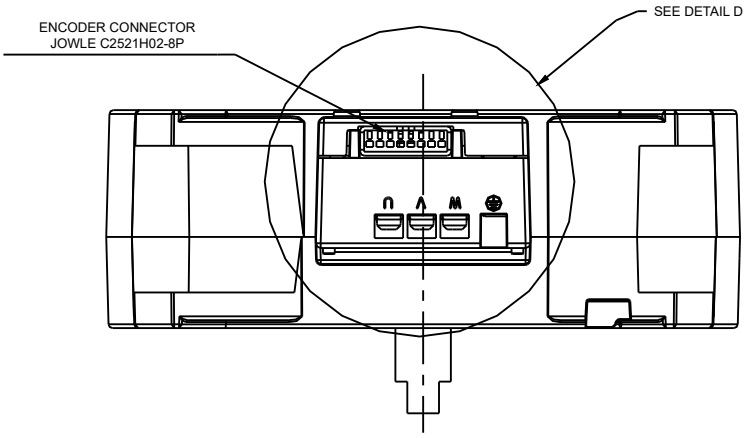

### ECMD Motor Dust Cap Specification

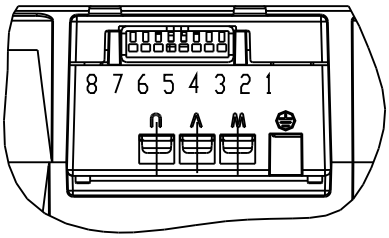



| MODEL NAME | L (mm) | RA (mm) | USED ON |
|---|---|---|---|
| DPB-N7860 | 77.4 | 60 | ECMD-B91207M_ |
| DPB-N7779 | 76.8 | 79 | ECMD-B81610M_<br>ECMD-B91608M_ |

# Pin Definitions

## ■ ECMD Motor Pin Definitions

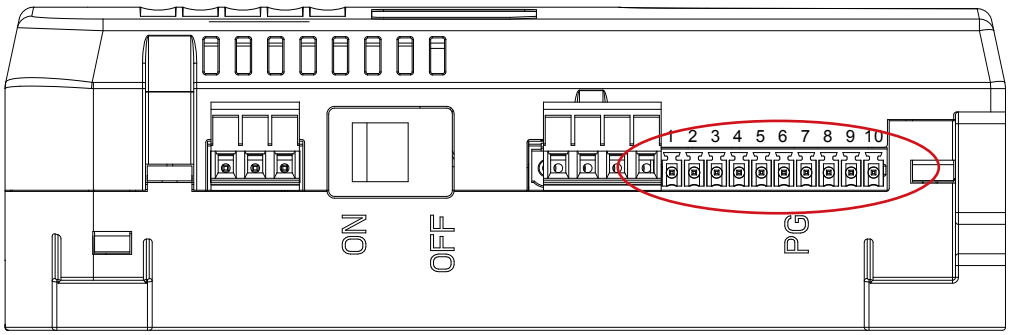



| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| FUNCTION | A+ | NTC+ | B+ | NTC- | PWM+ | PWM- | +5V | GND |

※ NTC function is under development.

## ■ VFD-DD
## Pin Definitions of Encoder Feedback Terminal



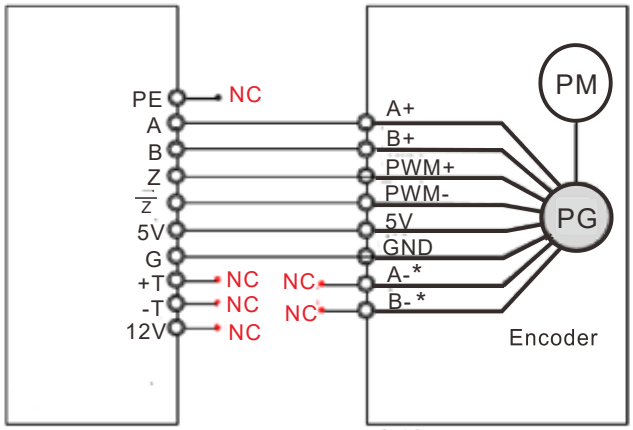

| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| FUNCTION | PE | G | B | A | Z | $\overline{Z}$ | +T* | -T* | 5V | 12V |

* +T, -T would be connected to pin NTC+, NTC- on the ECMD motor, keep it empty if the chosen motor does not support NTC function (motor overheat protection).

※ For using 24V output, please refer to the VFD-DD user manual.

## ■ VFD-DD & ECMD
## Pin definitions and connection for the encoder feedback signal of motor

| Pin Definition of DD | Pin Definition of ECMD | Color of Core Wire |
|---|---|---|
| **PE** | -- | -- |
| **G** | GND | BLU |
| **B** | B+ | WHT |
| **A** | A+ | BLK |
| **Z** | PWM+* | ORG |
| **$\overline{Z}$** | PWM-* | ORG/RED |
| **+T** | A-/NTC+** | BLK/RED |
| **-T** | B-/NTC-** | WHT/RED |
| **5V** | +5VDC | BRN |
| **12V** | -- | -- |

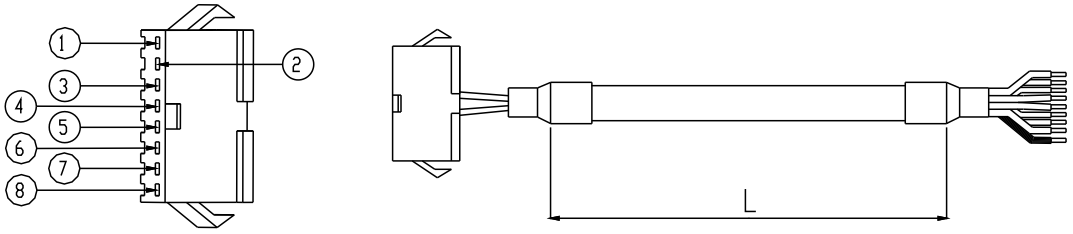



VFD-DD series

Delta motor:
ECMD-B81610M
ECMD-B91608M
ECMD-B91207M

* PWM (Pulse Width Modulation): absolute encoder signal
** NTC function is under development.
※ For using 24V output, please refer to the VFD-DD user manual.

## ■ ECMD Motor
## Pin Definitions and Signal Cable Specifications (Without D-SUB connector)

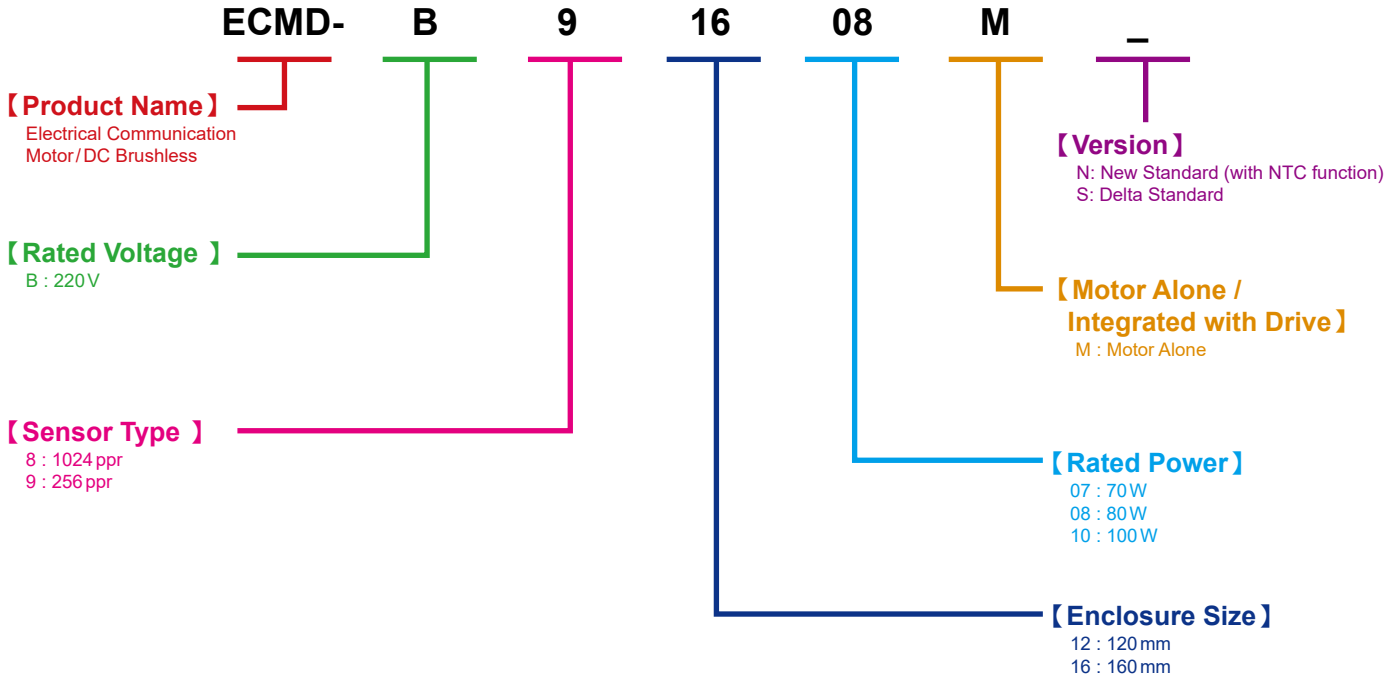



| JOWLE C2522H02-8P DETAIL | | |
|---|---|---|
| **PIN NO.** | **DESCRIPTION** | **COLOR** |
| **1** | A+ | BLK |
| **2** | A-/NTC+** | BLK/RED |
| **3** | B+ | WHT |
| **4** | B-/NTC-** | WHT/RED |
| **5** | PWM+* | ORG |
| **6** | PWM-* | ORG/RED |
| **7** | +5V | BRN |
| **8** | GND | BLUE |

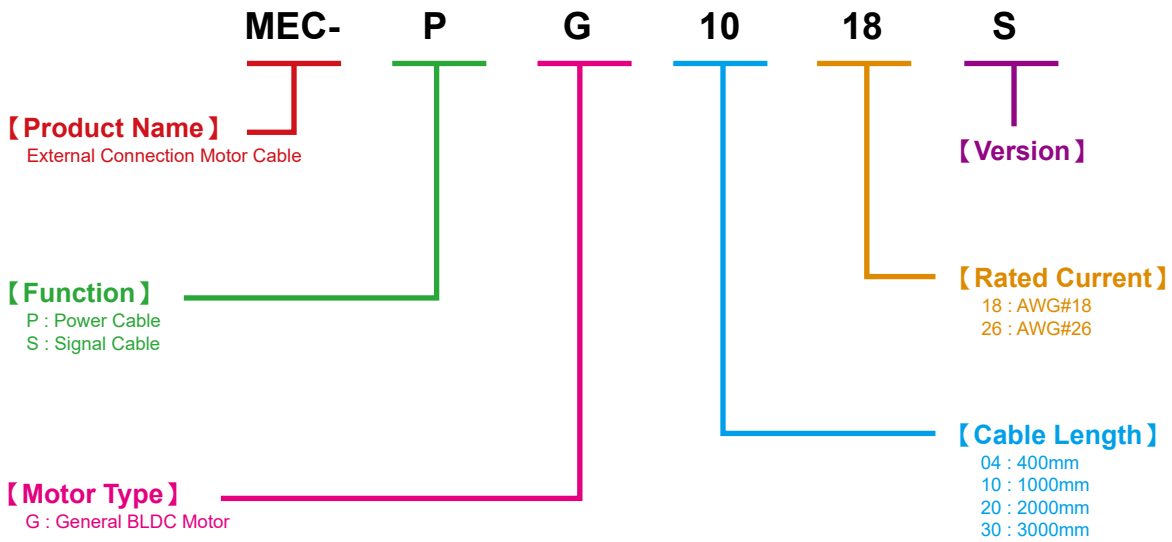
| MODEL NAME | L (mm) |
|---|---|
| **MEC-SG0426S** | 385 |
| **MEC-SG1026S** | 1000 |
| **MEC-SG2026S** | 2000 |
| **MEC-SG3026S** | 3000 |

* PWM (Pulse Width Modulation): absolute encoder signal
** NTC function is under development.

# Model Name of ECMD Motor




# Model Name of Motor Cable



# Ordering Information

| VFD-DD Series | Description |
|---|---|
| **VFD001DD11S** | 115 $V_{AC}$-1 Phase 100 W AC motor drive, supports IM & PM motors, built-in EMI filter |
| **VFD002DD21S** | 230 $V_{AC}$-1 Phase 200 W AC motor drive, supports IM & PM motors, built-in EMI filter |
| **VFD004DD21S** | 230 $V_{AC}$-1 Phase 400 W AC motor drive, supports IM & PM motors, built-in EMI filter |
| **VFD002DD21V** | 230 $V_{AC}$-1 Phase 200 W AC motor drive, supports IM & PM motors |
| **VFD004DD21V** | 230 $V_{AC}$-1 Phase 400 W AC motor drive, supports IM & PM motors |
| **VFD002DD21T** | 230 $V_{AC}$-1 Phase 200 W AC motor drive, supports IM & PM motors, built-in EMI filter / CAN* |
| **VFD004DD21T** | 230 $V_{AC}$-1 Phase 400 W AC motor drive, supports IM & PM motors, built-in EMI filter / CAN* |
| **VFD002DD21F** | 230 $V_{AC}$-1 Phase 200 W motor drive, Supports IM & PM motors, built-in EMI Filter, slim type |

*** CANopen protocol is provided upon request, please contact Industrial Automation Business Group**

| ECMD Motor | Description |
|---|---|
| **ECMD-B91207MN** | Servo motor enclosure size 120 mm, rated power 70 W, torque 2.0 N-m, speed 350 rpm (different bearing key) |
| **ECMD-B91207MS** | Servo motor enclosure size 120 mm, rated power 70 W, torque 2.0 N-m, speed 350 rpm |
| **ECMD-B91608MS** | Servo motor enclosure size 160 mm, rated power 80 W, torque 3.0 N-m, speed 250 rpm |
| **ECMD-B81610MS** | Servo motor enclosure size 160 mm, rated power 100 W, torque 3.5 N-m, speed 280 rpm |

*** Without power cable and encoder cable**

| Accessories | Description |
|---|---|
| **MEC-SG0426S** | 385 mm ECMD motor encoder cable, without D-SUB connector |
| **MEC-SG1026S** | 1,000 mm ECMD motor encoder cable, without D-SUB connector |
| **MEC-SG2026S** | 2,000 mm ECMD motor encoder cable, without D-SUB connector |
| **MEC-SG3026S** | 3,000 mm ECMD motor encoder cable, without D-SUB connector |
| **MEC-PG0418S** | 370 mm ECMD motor power cable |
| **MEC-PG1018S** | 1,000 mm ECMD motor power cable |
| **MEC-PG2018S** | 2,000 mm ECMD motor power cable |
| **MEC-PG3018S** | 3,000 mm ECMD motor power cable |
| **DPB-N7860** | ECMD-B91207MS dust cap |
| **DPB-N7779** | ECMD-B91608M_ / ECMD-B81610M_ dust cap |

Smarter. Greener. Together.

## Industrial Automation Headquarters

**Delta Electronics, Inc.**
Taoyuan Technology Center
No.18, Xinglong Rd., Taoyuan District,
Taoyuan City 33068, Taiwan
TEL: 886-3-362-6301 / FAX: 886-3-371-6301

## Asia

**Delta Electronics (Shanghai) Co., Ltd.**
No.182 Minyu Rd., Pudong Shanghai, P.R.C.
Post code : 201209
TEL: 86-21-6872-3988 / FAX: 86-21-6872-3996
Customer Service: 400-820-9595

**Delta Electronics (Japan), Inc.**
Tokyo Office
Industrial Automation Sales Department
2-1-14 Shibadaimon, Minato-ku
Tokyo, Japan 105-0012
TEL: 81-3-5733-1155 / FAX: 81-3-5733-1255

**Delta Electronics (Korea), Inc.**
Seoul Office
1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,
Seoul, 08501 South Korea
TEL: 82-2-515-5305 / FAX: 82-2-515-5302

**Delta Energy Systems (Singapore) Pte Ltd.**
4 Kaki Bukit Avenue 1, #05-04, Singapore 417939
TEL: 65-6747-5155 / FAX: 65-6744-9228

**Delta Electronics (India) Pvt. Ltd.**
Plot No.43, Sector 35, HSIIDC Gurgaon,
PIN 122001, Haryana, India
TEL: 91-124-4874900 / FAX : 91-124-4874945

**Delta Electronics (Thailand) PCL.**
909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),
Pattana 1 Rd., T.Phraksa, A.Muang,
Samutprakarn 10280, Thailand
TEL: 66-2709-2800 / FAX : 662-709-2827

**Delta Energy Systems (Australia) Pty Ltd.**
Unit 20-21/45 Normanby Rd., Notting Hill Vic 3168, Australia
TEL: 61-3-9543-3720

## Americas

**Delta Electronics (Americas) Ltd.**
Raleigh Office
P.O. Box 12173, 5101 Davis Drive,
Research Triangle Park, NC 27709, U.S.A.
TEL: 1-919-767-3813 / FAX: 1-919-767-3969

**Delta Greentech (Brasil) S/A**
São Paulo Office
Rua Itapeva, 26 – 3˚ Andar - Bela Vista
CEP: 01332-000 – São Paulo – SP - Brasil
TEL: 55-11-3530-8642 / 55-11-3530-8640

**Delta Electronics International Mexico S.A. de C.V.**
Mexico Office
Vía Dr. Gustavo Baz No. 2160, Colonia La Loma,
54060 Tlalnepantla Estado de Mexico
TEL: 52-55-2628-3015 #3050/3052

## EMEA

**Headquarters: Delta Electronics (Netherlands) B.V.**
Sales: Sales.IA.EMEA@deltaww.com
Marketing: Marketing.IA.EMEA@deltaww.com
Technical Support: iatechnicalsupport@deltaww.com
Customer Support: Customer-Support@deltaww.com
Service: Service.IA.emea@deltaww.com
TEL: +31(0)40 800 3800

**BENELUX: Delta Electronics (Netherlands) B.V.**
De Witbogt 20, 5652 AG Eindhoven, The Netherlands
Mail: Sales.IA.Benelux@deltaww.com
TEL: +31(0)40 800 3800

**DACH: Delta Electronics (Netherlands) B.V.**
Coesterweg 45, D-59494 Soest, Germany
Mail: Sales.IA.DACH@deltaww.com
TEL: +49(0)2921 987 0

**France: Delta Electronics (France) S.A.**
ZI du bois Challand 2, 15 rue des Pyrénées,
Lisses, 91090 Evry Cedex, France
Mail: Sales.IA.FR@deltaww.com
TEL: +33(0)1 69 77 82 60

**Iberia: Delta Electronics Solutions (Spain) S.L.U**
Ctra. De Villaverde a Vallecas, 265 1º Dcha Ed.
Hormigueras – P.I. de Vallecas 28031 Madrid
TEL: +34(0)91 223 74 20

Carrer Llacuna 166, 08018 Barcelona, Spain
Mail: Sales.IA.Iberia@deltaww.com

**Italy: Delta Electronics (Italy) S.r.l.**
Ufficio di Milano Via Senigallia 18/2 20161 Milano (MI)
Piazza Grazioli 18 00186 Roma Italy
Mail: Sales.IA.Italy@deltaww.com
TEL: +39 02 64672538

**Russia: Delta Energy System LLC**
Vereyskaya Plaza II, office 112 Vereyskaya str.
17 121357 Moscow Russia
Mail: Sales.IA.RU@deltaww.com
TEL: +7 495 644 3240

**Turkey: Delta Greentech Elektronik San. Ltd. Sti. (Turkey)**
Şerifali Mah. Hendem Cad. Kule Sok. No:16-A
34775 Ümraniye – İstanbul
Mail: Sales.IA.Turkey@deltaww.com
TEL: + 90 216 499 9910

**GCC: Delta Energy Systems AG (Dubai BR)**
P.O. Box 185668, Gate 7, 3rd Floor, Hamarain Centre
Dubai, United Arab Emirates
Mail: Sales.IA.MEA@deltaww.com
TEL: +971(0)4 2690148

**Egypt + North Africa: Delta Electronics**
511 Cairo Business Plaza, North 90 street,
New Cairo, Cairo, Egypt
Mail: Sales.IA.MEA@deltaww.com

*We reserve the right to change the information in this catalogue without prior notice.

DELTA_IA-MDS_VFD-DD_C_EN_20190517