TECO

# F510

Fan & Pump Drive

**IP 20 /IP 21** / NEMA 1
**IP 55** / NEMA 12




TAIWAN
EXCELLENCE
2013

# F510

## Mechanical Features

F510 realizes modular design, not only for applications of high protection level, but also for maintaining equipment inclusive of Hot plug display, communication card, removable fan, and etc...

# IP55

## Water and Dust Protection Design

Teco launches the all new drives for fan and pump control which meet protection level-IP55 to provide various options for harsh environment.

## Enclosure




IP20 / NEMA1




IP55 / NEMA12




# Hand/Auto/Off

Hand/Auto selection is a very convenient function when system failure , test and inspection. F510 provides friendly user interface of Hand/Auto selection. To get this function by using optional HOA digital operator.



# Pump Cascade Control

1 to 8 pump card is available for a larger water supply and constant pressure applications. It is sophisticated in water supply industry by built-in PID controller and simple PLC of the advantages of drive. F510 series provides variable frequency power to realize the continuously variable speed of pump, and keep the pressure stable by built-in PID controller. 1 to 8 pump option card can control with up to 8 pumps.

- Possess constant pressure control technology.
- Provide quick parameter setting, favorable for most of water supply applications.
- Pump Cascade Control via optional pump card.




## F510

**Energy Efficient Pump Control**



# Excellent Pump Control

Built-in multi-pump control mode. According to the load of water supply system,use intelligent control to coordinate pumps. It distributes running hours evenly across master and slave pumps to increase system efficiency and extend the life of drive.



## Blockage Inspection

F510 can detect clog of pump and give alarm to prevent overload pressure to damage pipes.

## Sleep Mode

Sleep mode saves energy by detecting when flow is low or zero. It can stop system to extend the life of drive.

## Dry Pump Protection

F510 can evaluate the system pressure and detect pump running dry. It will shut off pump immediately to protect it from heat and friction damage.

# F510

## High Efficient Fan Control

With hardware safe torque off function and fire override mode for emergency.

## Fire Override Mode

This feature is crucial for ensuring smoke extraction from building by air conditioner or fume extractor. In Fire mode, the drive will be used in full load operation as either forward or reverse direction and ignore all software protection until trigger hardware protection or drive damaged, to achieve the requirements of smoke extraction and reduce smoke damage to human as possible.

## Skip Frequency

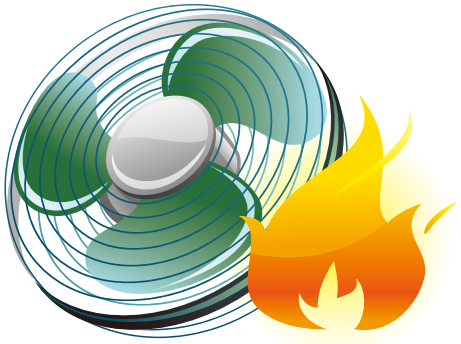
F510 can avoid resonance by quick parameter setting. Preventing mechanical damage to system and fans.

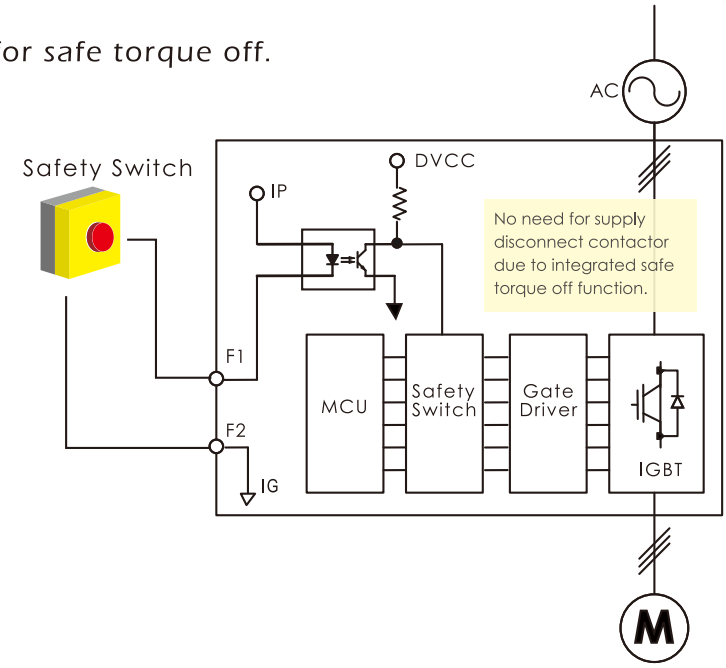


# Hardware Safe Torque Off Function

Built-in high reliable hardware circuit for safe torque off.

The operator can use the safety switch to protect staff or system in emergency timely.







# F510

## Communication Network Protocol

Advanced network functions for building automation inclusive of BACnet , Metasys N2 and Modbus. F510 can reduce the cost of installing automatic central air conditioning system.

METASYS is a communication protocol developed by Johnson Controls Inc. It is according to the actual needs of user and manager in building. Metasys N2 is easy to install, use, and adjust. System maintenance becomes very convenient. Metasys N2 may also collect, record, preserve and manage important message and data of the system, to achieve the best automatic management and energy saving effect.





Modbus has become a defacto standard communication protocol, and it is now amongst the most commonly available means of connecting industrial electronic devices.

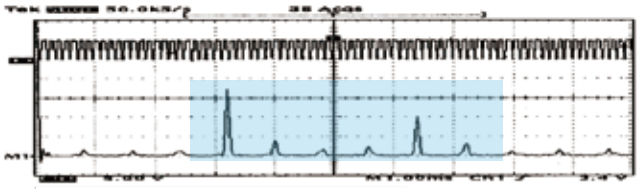
ASHRAE BACnet™ is a communications protocol for building automation and control networks. It is an ASHRAE, ANSI, and ISO standard protocol. BACnet was designed to allow communication of building automation and control systems for applications such as heating, ventilating, and air-conditioning control, lighting control, access control, and fire detection systems and their associated equipment. The BACnet protocol provides mechanisms for computerized building automation devices to exchange information, regardless of the particular building service they perform.



## Ultra Low Motor Noise

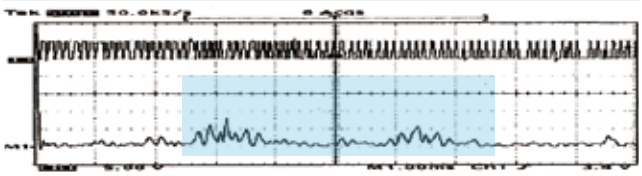
Soft PWM technology reduces common-mode voltage to restrain EMI and make motor noise down significantly.

Traditional PWM modulation method



Unique Soft PWM modulation technology lowers the audible motor noise for quieter industrial environment.

Soft PWM modulation method



## Permanent-Magnet Motor Control Technology

Permanent-magnet motor control technology avoids energy wasting. PM motor with high efficiency rises importance for present trend of energy saving and emission reduction.

## Conformity To Global Standards

Conformity to RoHS directive and international recognized certification.

**RoHS**

UL/cUL approval and CE certification.

CE cULus

# F510

## Saving Energy

The issue of saving energy and emission reduction become popular in recent years. The importance of relative technologies grows as time. F510 provides various technologies of saving energy.

## RTC Function / Simple PLC

Automatic control has been mainstream. It is not only saving human resource cost ,but also handling system load more efficiently. To adjust load to avoid unnecessary expense by built-in simple PLC with Real Time Clock Function. It can modulate load easily to achieve the purpose of daylight saving.

※ The RTC fuction only for LCD keypad.

## Automatic Energy Saving Function

F510 can adjust to the optimum output voltage, and lower the output current of the drive according to the load automatically. The output power changes by the load proportion. In light duty, the AES has highest efficiency.




※ The Value of saving 25% consumption is tested at 20% Load and used 30HP VFD to drive the motor as the same level.

# BASIC SPECIFICATIONS

## 200V Class

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inverter Capacity (HP) | | | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 125 | 150 | 175 |
| Output Rated | Rated Output Capacity (KVA) | | 1.9 | 2.9 | 4.0 | 5.5 | 8 | 11.4 | 15.2 | 21.3 | 26.2 | 30 | 41.9 | 52.5 | 64.3 | 76.2 | 95.2 | 119 | 152 | 171 |
| | Rated Output Current (A) | | 5.0 | 7.5 | 10.6 | 14.5 | 22 | 30 | 42 | 56 | 69 | 80 | 110 | 138 | 169 | 200 | 250 | 312 | 400 | 450 |
| | Maximum Applicable Motor | (HP) | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 125 | 150 | 175 |
| | | (KW) | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 130 |
| | Maximum Output Voltage (V) | | Three Phase, 200V~240V | | | | | | | | | | | | | | | | | |
| | Maximum Output Frequency (Hz) | | Based on parameter setting 0.1~400.0 Hz | | | | | | | | | | | | | | | | | |
| Input Power | Rated Voltage, Frequency | | 1-Phase/3-Phase | | | Three Phase, 200V ~ 240V, 50/60Hz | | | | | | | | | | | | | | |
| | Allowable Voltage Fluctuation | | -15% ~ +10% | | | | | | | | | | | | | | | | | |
| | Allowable Frequency Fluctuation | | ±5% | | | | | | | | | | | | | | | | | |

## 400V Class

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inverter Capacity (HP) | | | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 125 | 150 | 175 | 215 | 250 | 300 | 375 | 425 | 535 | 670 | 800 |
| Output Rated | Rated Output Capacity (KVA) | | 2.6 | 3.1 | 4.1 | 7 | 8.4 | 13 | 18 | 24 | 28.9 | 34 | 41 | 55 | 67 | 78 | 110 | 125 | 158 | 190 | 225 | 250 | 331 | 392 | 445 | 525 | 640 | 731 |
| | Rated Output Current (A) | | 3.4 | 4.1 | 5.4 | 9.2 | 12.1 | 17.5 | 23 | 31 | 38 | 44 | 58 | 73 | 88 | 103 | 145 | 168 | 208 | 250 | 296 | 328 | 435 | 515 | 585 | 700 | 875 | 960 |
| | Maximum Applicable Motor | (HP) | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 125 | 150 | 175 | 215 | 250 | 300 | 375 | 425 | 535 | 670 | 800 |
| | | (KW) | 0.75 | 1.5 | 2.2 | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 280 | 315 | 400 | 500 | 600 |
| | Maximum Output Voltage (V) | | Three Phase, 380V~480V | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Maximum Output Frequency (Hz) | | Based on parameter setting 0.1~400.0Hz | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Power | Rated Voltage, Frequency | | Three Phase, 380V ~ 480V, 50/60Hz | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Allowable Voltage Fluctuation | | -15% ~ +10% | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Allowable Frequency Fluctuation | | ±5% | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes :

1. Based on the standard 4-pole induction motor. Selecting inverter must have a higher output current rating than motor.
2. IP55 mondels is only for 440V class with LCD display,the capacity is from 1 to 100HP.
3. The maximum output frequency of each control mode is different, please refer to user manual for more details.
4. IP21 models are available,if necessary,please contact with our sales.

# GENERAL SPECIFICATIONS

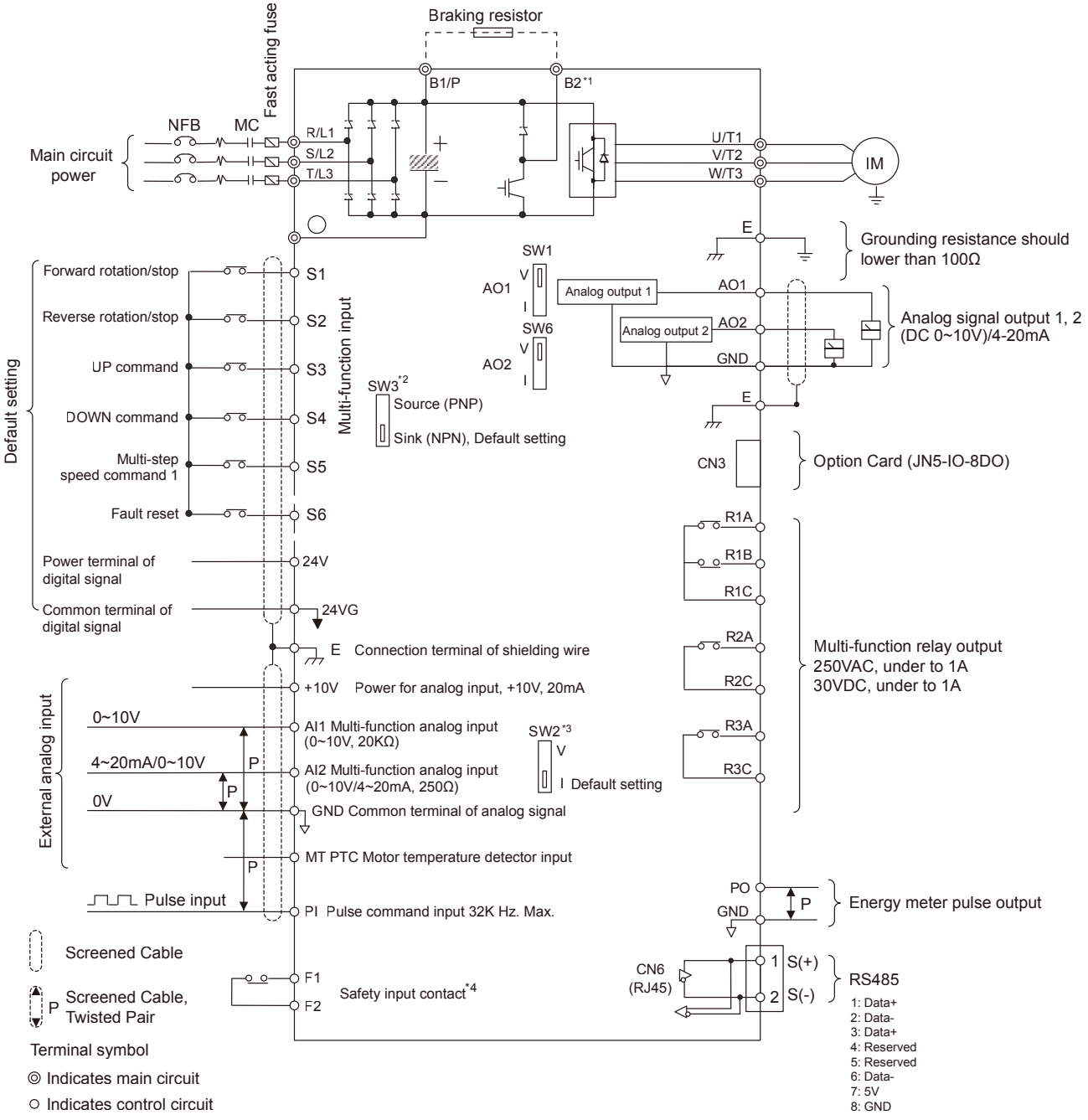
| | | |
|---|---|---|
| Control Characteristics | Display | LED keypad with 5-digits seven-segment display or LCD keypad (HOA LCD keypad option)all LCD keypad with parameter copy function |
| | Control Modes | V/F, SLV, PMSLV with Space Vector PWM Mode |
| | Output Frequency | 0.1Hz ~ 400.0Hz |
| | Frequency Accuracy | Digital references : ±0.01%(-10 ~ +40℃), Analog references : ±0.1% (25℃ ±10℃) |
| | Speed Control Accuracy | ±0.5% (Sensorless Vector Control Mode)*1 |
| | Frequency Setting Resolution | Digital references : 0.01Hz, Analog references : 0.06Hz/60Hz |
| | Output Frequency Resolution | 0.01Hz |
| | Overload Tolerance | 120% /1 min |
| | Frequency Setting Signal | DC 0 ~ +10V / 0~+10V or 4 ~ 20mA |
| | Acceleration / Deceleration Time | 0.0 ~ 6000.0 second (separately set acceleration and deceleration time ) |
| | Voltage / Frequency Characteristics | Can arbitrarily set V / F curve based on parameters |
| | Braking Torque | About 20% |
| | Main Control Functions | Auto Tuning, Soft-PWM, Over-Voltage Protection, Dynamic Braking, Speed Search, Momentary Power Loss Restart, 2 Sets of PID Control, Slide Difference Compensation, RS-485 Communication Standard, Simple PLC Function, 2 Sets of Analog Output, Safety Switch |
| | Other Functions | Records of Power On and Operation Time, 4 Fault History Records and Latest Fault Record State, Energy-Saving Function, Phase Loss protection, Smart Braking, DC Braking, Dwell, S Curve Acceleration and Deceleration, Up / Down Operation, Modbus, BACNet MS/TP, and Metasys N2 Communication Protocol, Display of Multi- Engineering Unit, Local / Remote Switch, SINK / SOURCE Input Selection, User Parameter Settings |
| Protection Functions | Stall Protection | Current level can be set (in acceleration or constant speed, it can be set separately. In deceleration, it can be set with or without protection) |
| | Over Current (OC) and Output Short-circuit (SC) Protection | It stops when the current exceeds 160% of the inverter rated current |
| | Inverter Overload Protection (OL2) | Inverter will be stopped when the output higher than 120% rated current for 1 min, Carrier frequency is 2~4KHZ*2 |
| | Motor Overload Protection (OL1) | Electrical overload protection curve |
| | Over Voltage Protection (OV) | If the main circuit DC voltage is over 410V (200V class) / 820V (400V class), the motor stops running |
| | Under Voltage Protection (UV) | If the main circuit DC voltage is under 190V (200V class) / 380V (400V class), the motor stops running |
| | Momentary Power Loss Restart | Power loss exceeds 15ms. You can set the function of momentary power loss restart up to 2sec |
| | Overheat Protection(OH) | Thermistor sensor on heatsink |
| | Ground Fault Protection(GF) | Protection by current detection circuit |
| | Charge Indicator | When main circuit DC voltage ≧50V, the CHARGE LED is on |
| | Output Phase Loss Protection (OPL) | If the OPL function acts, the motor stops rotation automatically |
| Environment Specification | Location | Indoor (protected from corrosive gases and dust) |
| | Ambient Temperature | -10 ~ +40℃ (IP20/NEMA1 and IP55/NEMA12), -10 ~ +50℃ (IP00), with de-rating, its maximum operation temperature is 60℃ |
| | Storage Temperature | -20 ~ +70℃ |
| | Humidity | 95%RH or less ( no condensation ) |
| | Altitude and Vibration | Altitude of 1000 meters or lower, 1.0G, in compliance with IEC 60068-2-6 |
| Communication Function | | Built-in RS-485 as standard (Modbus protocol with RJ45 / BACnet / Metasys N2) |
| PLC Function | | Built-in |
| Electromagnetic Interference (EMI) | | Meet EN61800-3 Standard, IP20 400V 75HP or below and IP55 400V 60HP can be built in |
| Electromagnetic Susceptibility (EMS) | | Meet EN61800-3 Standard |
| Certification | CE | Meet EN61800-3(CE & RE) and EN61800-5-1(LVD) |
| | UL | UL508C |
| Option Card | | 1 to 8 Pump card, HOA LCD keypad, Profibus card |

Notes :

1.Speed control accuracy will be influenced when the motor and installation condition are different.

2.The default setting of carrier frequency is different from models.

# WIRING DIAGRAM




Notes :

*1: Only the main circuit of IP20 220V 1~30HP, 440V 1~40HP (included) and IP55 440V 1~25HP with built-in braking transistor provide terminal B2. The braking resistor can be connected directly between B1 and B2.

*2: The multi-function digital input terminals S1~S6 can be set to source (PNP) or sink (NPN) mode by SW3.

*3: The multi-function analog input 2 (AI2) can be set to the voltage command input (0~10v) or the current command input (4~20mA) through the SW2.

*4: When integrated safety function is NOT used, connect a link across terminals F1 & F2 for the inverter output to function. External safety circuits can be interfaced with inverter using terminals F1 and F2.

*5: IP20 frame 6 to frame8 and all IP55 models are built-in DC reactor.

*6: IP20 1~3HP don't support option card.

## DIMENSIONS

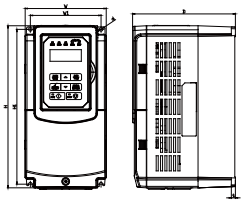


Figure A

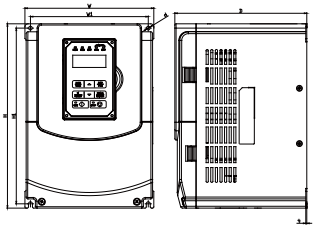


Figure B

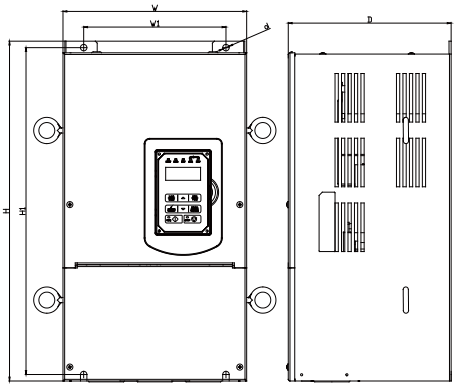


Figure C

| Figure | Enclosure | Frame | Models | Dimensions(mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W | H | D | W1 | H1 | t | d | Weight (kg) |
| A | IP20 | Frame1 | F510-2001-H<br>F510-2002-H<br>F510-2003-H<br>F510-4001-H3<br>F510-4002-H3<br>F510-4003-H3 | 130<br>W | 215<br>H | 150<br>D | 118<br>W1 | 203<br>H1 | 5<br>t | M5<br>d | 2.2 |
| A | IP20 | Frame2 | F510-2005-H3<br>F510-2008-H3<br>F510-4005-H3<br>F510-4008-H3<br>F510-4010-H3 | 140 | 279 | 177 | 122 | 267 | 7 | M6 | 3.8 |
| B | IP20 | Frame 3 | F510-2010-H3<br>F510-2015-H3<br>F510-4015-H3<br>F510-4020-H3 | 210 | 300 | 215 | 192 | 286 | 1.6 | M6 | 6.2 |
| | | Frame 4 | F510-2020-H3<br>F510-2025-H3<br>F510-2030-H3<br>F510-4025-H3<br>F510-4030-H3<br>F510-4040-H3 | 265 | 360 | 225 | 245 | 340 | 1.6 | M8 | 10 |
| C | IP20 | Frame 5 | F510-2040-H3<br>F510-2050-H3<br>F510-4050-H3<br>F510-4060-H3<br>F510-4075-H3 | 284 | 525 | 252 | 220 | 505 | 1.6 | M8 | 30 |

*The dimension of frame 1~frame 5 with built-in filter, please refer to the manual.

## DIMENSIONS

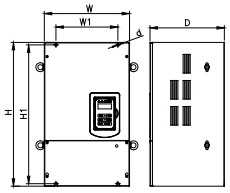



Figure D

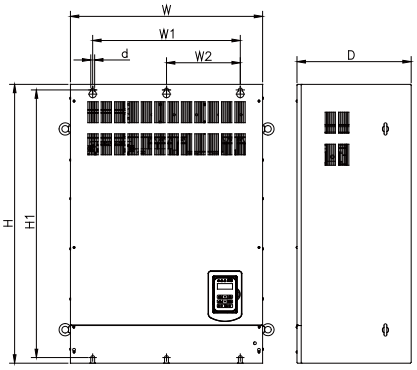



Figure E

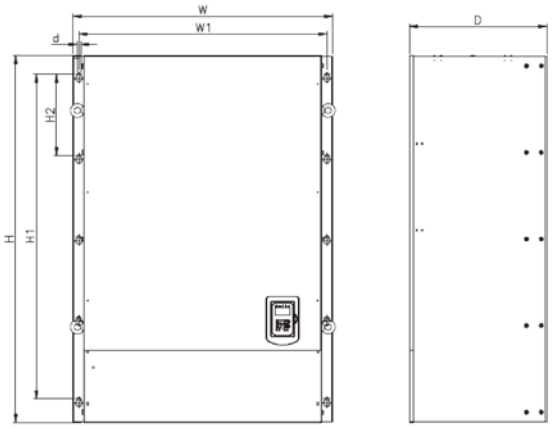



Figure F

| Figure | Enclosure | Frame | Models | Dimensions(mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W | H | D | W1 | W2 | H1 | H2 | t | d | Weight (kg) |
| D | IP00 | Frame 6 | F510-2060-H3 | 344 | 580 | 300 | 250 | N/A | 560 | N/A | 1.6 | M10 | 40.5 |
| | | | F510-2075-H3 | | | | | | | | | | |
| | | | F510-4100-H3 | | | | | | | | | | |
| | | | F510-4125-H3 | | | | | | | | | | |
| | | Frame 7 | F510-2100-H3 | 459 | 790 | 324.5 | 320 | N/A | 760 | N/A | 1.6 | M10 | 74 |
| | | | F510-2125-H3 | | | | | | | | | | |
| | | | F510-4150-H3 | | | | | | | | | | |
| | | | F510-4175-H3 | | | | | | | | | | |
| | | | F510-4215-H3 | | | | | | | | | | |
| | | | F510-4250-H3 | | | | | | | | | | |
| E | IP00 | Frame 8 | F510-2150-H3 | 690 | 1000 | 410 | 530 | 265 | 960 | N/A | 1.6 | M12 | 184 |
| | | | F510-2175-H3 | | | | | | | | | | |
| | | | F510-4300-H3 | | | | | | | | | | |
| | | | F510-4375-H3 | | | | | | | | | | |
| | | | F510-4425-H3 | | | | | | | | | | |
| F | IP00 | Frame 9 | F510-4535-H3 | 960 | 1356 | 507 | 916 | N/A | 1200 | 300 | 3 | M12 | 340 |
| | | | F510-4670-H3 | | | | | | | | | | |
| | | | F510-4800-H3 | | | | | | | | | | |

## DIMENSIONS

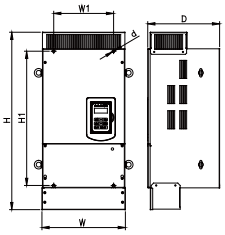



Figure G

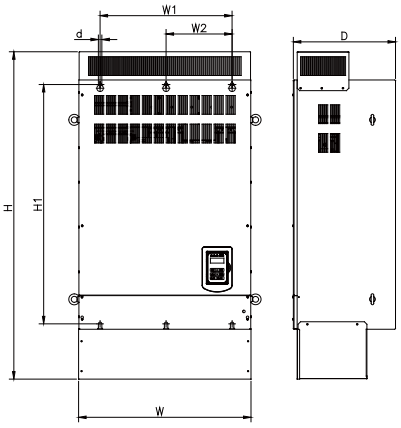



Figure H

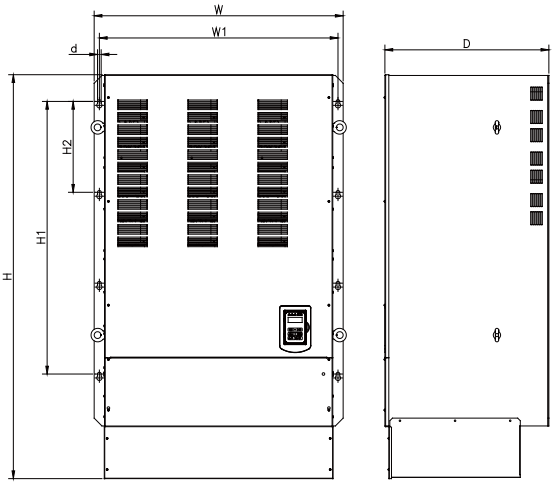



Figure I

| Figure | Enclosure | Frame | Models | Dimensions(mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W | H | D | W1 | W2 | H1 | H2 | t | d | Weight (kg) |
| G | IP20 | Frame 6 | F510-2060-H3 | 348.5 | 740 | 300 | 250 | N/A | 560 | N/A | 1.6 | M10 | 44 |
| | | | F510-2075-H3 | | | | | | | | | | |
| | | | F510-4100-H3 | | | | | | | | | | |
| | | | F510-4125-H3 | | | | | | | | | | |
| | | Frame 7 | F510-2100-H3 | 463.5 | 1105 | 324.5 | 320 | N/A | 760 | N/A | 1.6 | M10 | 81 |
| | | | F510-2125-H3 | | | | | | | | | | |
| | | | F510-4150-H3 | | | | | | | | | | |
| | | | F510-4175-H3 | | | | | | | | | | |
| | | | F510-4215-H3 | | | | | | | | | | |
| | | | F510-4250-H3 | | | | | | | | | | |
| H | IP20 | Frame 8 | F510-2150-H3 | 690 | 1313 | 410 | 530 | 265 | 960 | N/A | 1.6 | M12 | 194 |
| | | | F510-2175-H3 | | | | | | | | | | |
| | | | F510-4300-H3 | | | | | | | | | | |
| | | | F510-4375-H3 | | | | | | | | | | |
| | | | F510-4425-H3 | | | | | | | | | | |
| I | IP20 | Frame 9 | F510-4535-H3 | 960 | 1556 | 507 | 916 | N/A | 1200 | 300 | 3 | M12 | 330 |
| | | | F510-4670-H3 | | | | | | | | | | 340 |
| | | | F510-4800-H3 | | | | | | | | | | |

*The enclosure type of IP00 model is standard for frame 6 to frame 9.It is required to purchase the installation accessories if user selects the enclosure type of IP20 model.

| | |
|---|---|
| Frame 6 | JN5-NK-A06 |
| Frame 7 | JN5-NK-A07 |
| Frame 8 | JN5-NK-A08 |
| Frame 9 | JN5-NK-A09 |

## DIMENSIONS

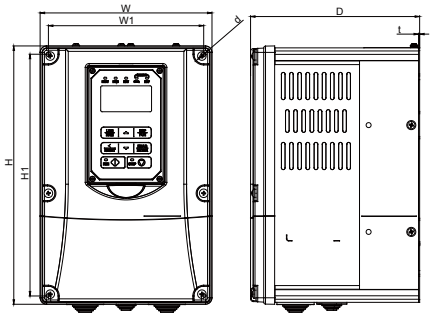



Figure J

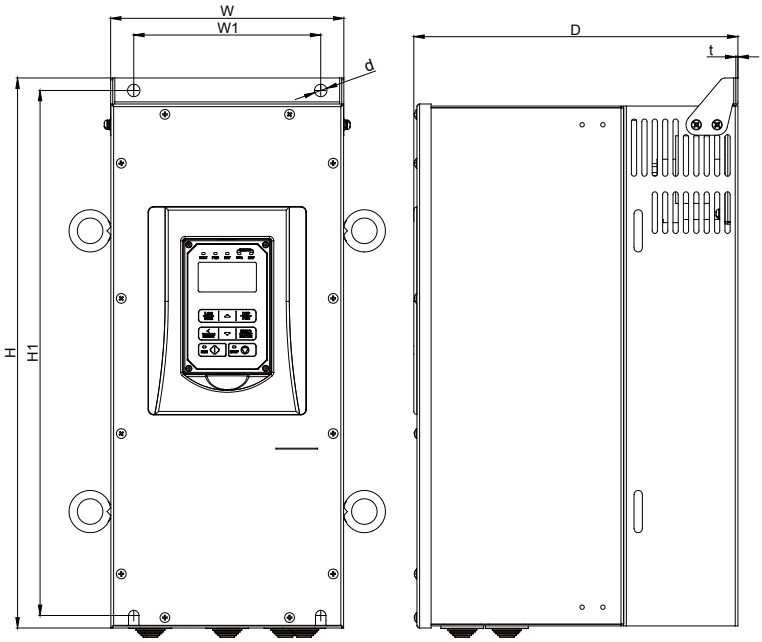
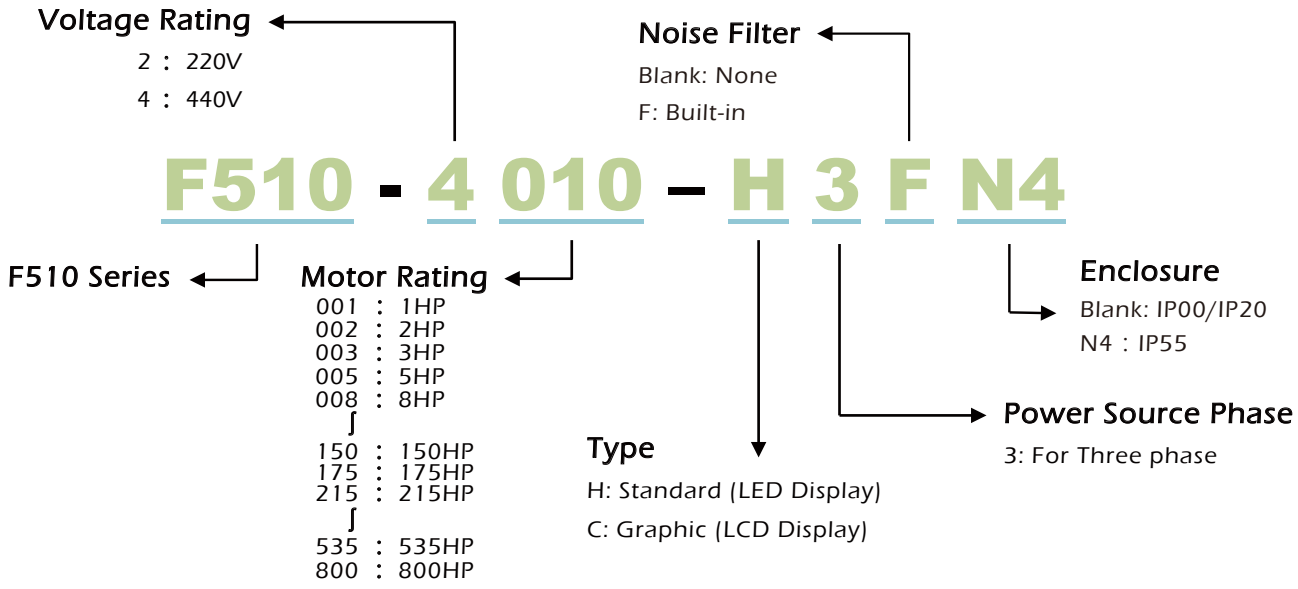



Figure K

| Figure | Enclosure | Frame | Models | Dimensions(mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W | H | D | W1 | H1 | t | d | Weight (kg) |
| J | IP55(NEMA12) | Frame 1 | F510-4001-C3FN4 | 189 | 284 | 186 | 171 | 266 | 1.2 | M5 | 7 |
| | | | F510-4002-C3FN4 | | | | | | | | |
| | | | F510-4003-C3FN4 | | | | | | | | |
| | | | F510-4005-C3FN4 | | | | | | | | |
| | | | F510-4008-C3FN4 | | | | | | | | |
| | | Frame 2 | F510-4010-C3FN4 | 230 | 320 | 210 | 210 | 305 | 2 | M5 | 10.5 |
| | | | F510-4015-C3FN4 | | | | | | | | |
| | | Frame 3 | F510-4020-C3FN4 | 265 | 396 | 227 | 249 | 380 | 2 | M5 | 17 |
| | | | F510-4025-C3FN4 | | | | | | | | |
| K | | Frame 4 | F510-4030-C3FN4 | 224 | 527 | 311 | 180 | 505 | 2 | M10 | 32.5 |
| | | | F510-4040-C3FN4 | | | | | | | | |
| | | | F510-4050-C3FN4 | | | | | | | | |
| | | Frame 5 | F510-4060-C3FN4 | 326 | 695 | 343 | 276 | 671 | 2.3 | M10 | 55 |
| | | | F510-4075-C3N4 | | | | | | | | |
| | | | F510-4100-C3N4 | | | | | | | | |

Note: Models for 4075&4100 are not built-in filter.

## MODEL DESIGNATION




## ACCESSORIES

| Accessories | Description | Model | Note |
|---|---|---|---|
| Cables | IP20 Digital operator extention cable | JN5-CB-01M | 1 meter |
| | | JN5-CB-02M | 2 meter |
| | | JN5-CB-03M | 3 meter |
| | | JN5-CB-05M | 5 meter |
| | RJ45 to USB connecting cable | JN5-CM-USB | 1.8 meter |
| | | JN5-CM-USB-3 | 3 meter |
| Communication Card | Profibus option card | JN5-CM-PBUS | Under development |
| Communication Moduels (Gateways) | Profibus DP module | JN5-CM-PDP | |
| | TCP-IP module | JN5-CM-TCPIP | |
| | DeviceNet module | JN5-CM-DNET | |
| | CANopen module | JN5-CM-CAN | |
| NEMA1 Kits | Mechanical device consisting of anti-dust cover on the upper part and wiring box on the bottom to meet NEMA1 | JN5-NK-A06 | Frame 6 |
| | | JN5-NK-A07 | Frame 7 |
| | | JN5-NK-A08 | Frame 8 |
| | | JN5-NK-A09 | Frame 9 |
| Digital Operators | IP20 LED Type | JN5-OP-F01 | |
| | IP20 LCD Type | JN5-OP-F02 | |
| | IP20 LCD HOA Type | JN5-OP-F03 | With HAND/OFF/AUTO function |
| | IP20 Blank type | JN5-OP-A03 | |
| | IP55 LCD Type | JN5-OP-F04 | |
| Protective Cover | Positioned on both sides of the inverter to prevent unknown objects from invading | JN5-CR-A01 | Frame 1 |
| | | JN5-CR-A02 | Frame 2 |
| | | JN5-CR-A04 | Frame 4 |
| Others | 1 to 8 Pump card | JN5-IO-8DO | |
| | F510 remote control box | JNEP-16-F | |
| | Copy Module for 510 series | JN5-CU | |



Ideal For Fan & Pump

Distributor

TECO

TECO ELECTRIC & MACHINERY CO., LTD.

TECO GO ECO

10F, No. 3-1, Park St., Nan-Kang, Taipei 115, Taiwan
TEL : 886-2-6615-9111Ext.1339 FAX : 886-2-6615-1033
http://globalsa.teco.com.tw

GJ-68-05 2015-09-15

Specifications covered in this brochure may be subject to change without notice.