



SERIES

# F510

Fan & Pump Drive

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



TAIWAN  
EXCELLENCE  
2013

# TECO

distributed by



## MOTOVARIO®

HEART OF MOTION

a TECO Group company

# 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.

LED / LCD Keypad, LCD is for multi-language

HAND / AUTO / OFF

Easy assembly and hot plug digital keypad

Easy assembly terminal cover, saving the time of installation

Quick install fan for maintaining

F510  
TECO

**WARNING**  
Risk of electrical shock, shut off main power and wait for 5 minutes before servicing.  
**CAUTION**  
Hot surface. Risk of burn.  
See manual before operation.



## Pump Cascade Control

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

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.



*PUMP Card  
1 to 8*



# 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.

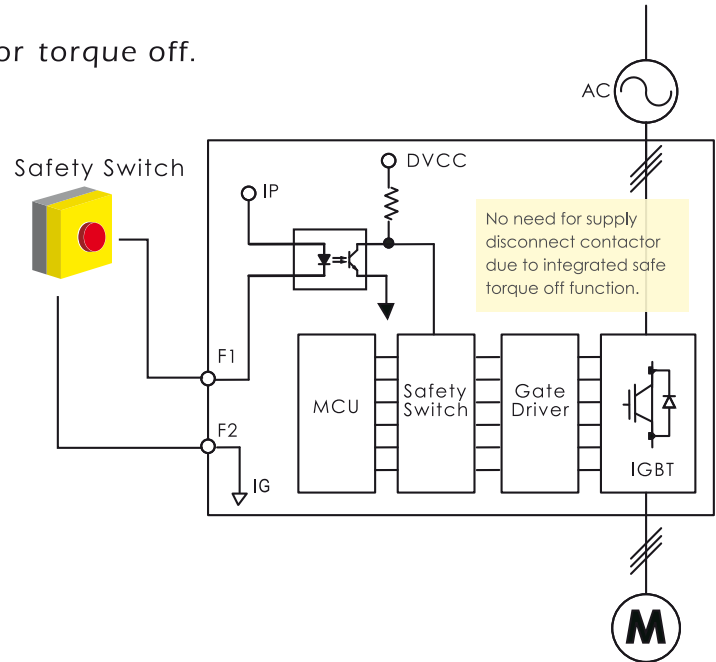
## Skip Frequency

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

# Hardware Torque Off Function

Built-in high reliable hardware circuit for 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.





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



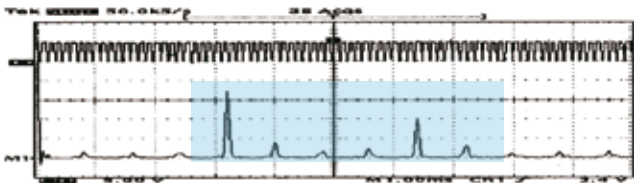
is a communications protocol for building automation and control networks. It is an ASHRAE, ANSI, and ISO standard protocol. BACnet was designed to allow communication of building automation and control systems for applications such as heating, ventilating, and air-conditioning control, lighting control, 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

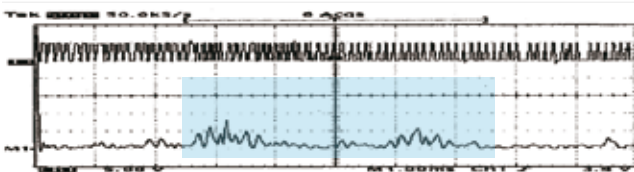
Soft PWM technology reduces common-mode voltage to restrain EMI and make motor noise down significantly.

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.



# 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 function is 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.



## 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	3.7	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 models is only for 400V 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 for frame 1 to frame 5,if necessary,please contact with our sales.

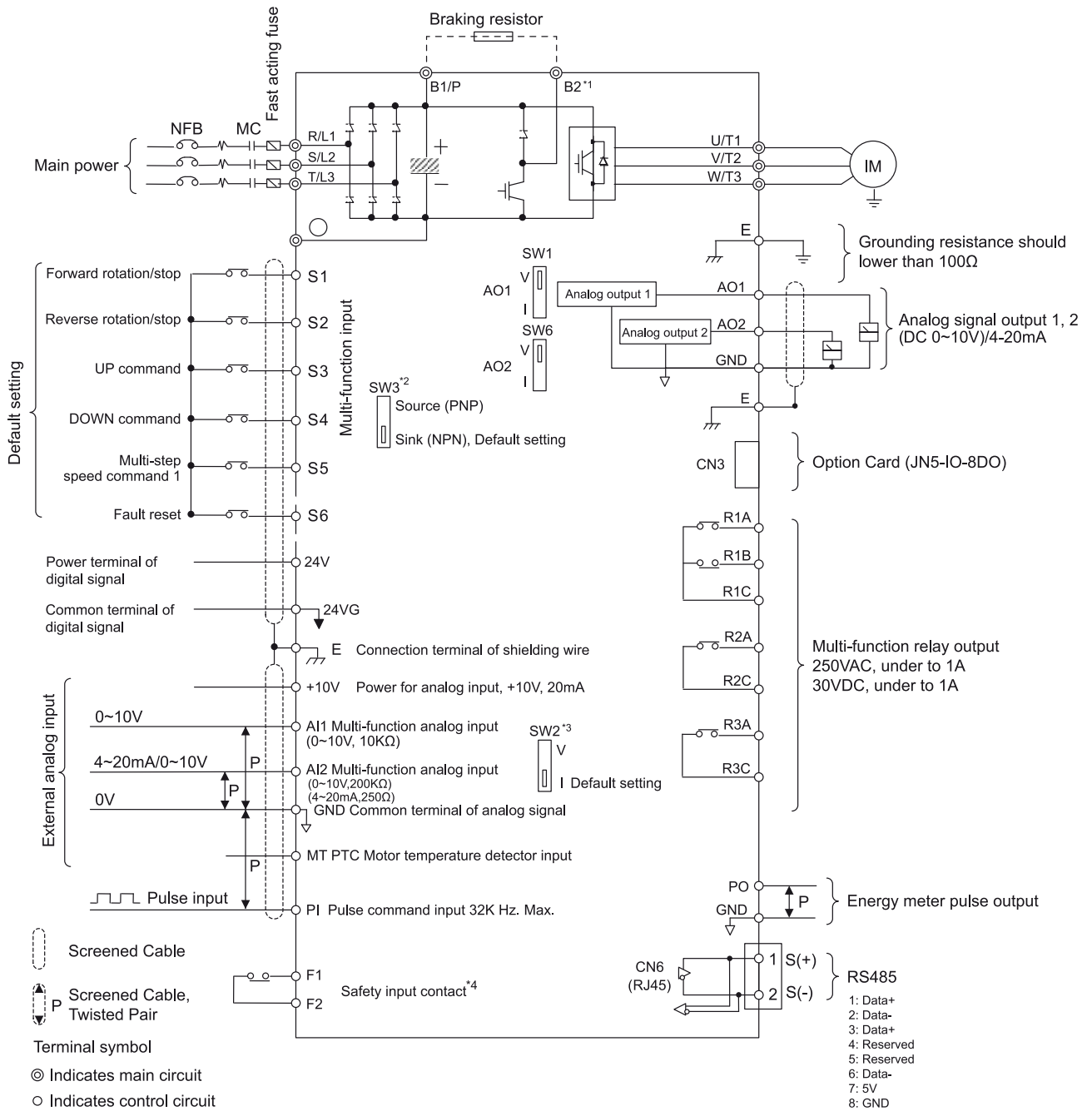
## General Specifications

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	0.01Hz ~ 400.00Hz
	Frequency Accuracy	Digital references : $\pm 0.01\%$ (-10 ~ +40°C), Analog references : $\pm 0.1\%$ (25°C $\pm 10^\circ\text{C}$ )
	Speed Control Accuracy	$\pm 0.5\%$ (Sensorless Vector Control Mode) <sup>1</sup>
	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 $2 \sim 4\text{KHZ}^2$
	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 $\geq 50\text{V}$ , 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°C (IP20/NEMA1 and IP55/NEMA12), -10 ~ +50°C (IP00), with de-rating, its maximum operation temperature is 60°C
	Storage Temperature	-20 ~ +70°C
	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
Pollution Degree	Meet IEC 60721-3-3 Class 3C2	
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	

### Notes :

- Speed control accuracy will be influenced when the motor and installation condition are different.
- The default setting of carrier frequency is different from models.

# Wiring Diagram



\*1: Only the main circuit of IP20 200V 1~30HP, 400V 1~40HP (included) and IP55 400V 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

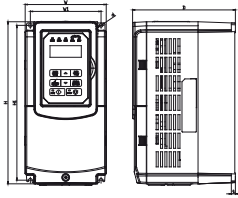


Figure A

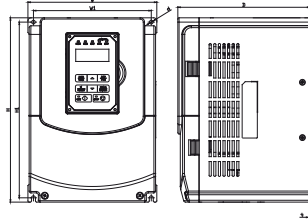


Figure B

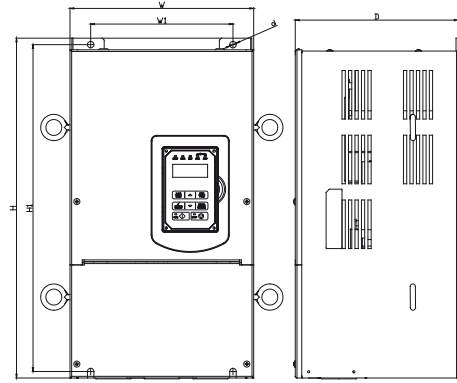


Figure C

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)							Net Weight (kg)
				W	H	D	W1	H1	t	d	
A	IP20	Frame1	F510-2001-H	130	215	150	118	203	5	M5	2.2
			F510-2002-H								
			F510-2003-H								
			F510-4001-H3								
			F510-4002-H3								
		F510-4003-H3									
		Frame2	F510-2005-H3	140	279	177	122	267	7	M6	3.8
			F510-2008-H3								
			F510-4005-H3								
			F510-4008-H3								
F510-4010-H3											
B	IP20	Frame 3	F510-2010-H3	210	300	215	192	286	1.6	M6	6.2
			F510-2015-H3								
			F510-4015-H3								
			F510-4020-H3								
		Frame 4	F510-2020-H3	265	360	225	245	340	1.6	M8	10
			F510-2025-H3								
			F510-2030-H3								
C	IP20	Frame 5	F510-4025-H3	286.5	525	252	220	505	3.3	M8	24
			F510-4030-H3								
			F510-4040-H3								
			F510-2040-H3								
			F510-2050-H3								
F510-4050-H3											
F510-4060-H3											
F510-4075-H3											

## Dimensions

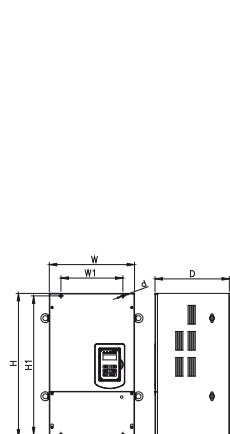


Figure D

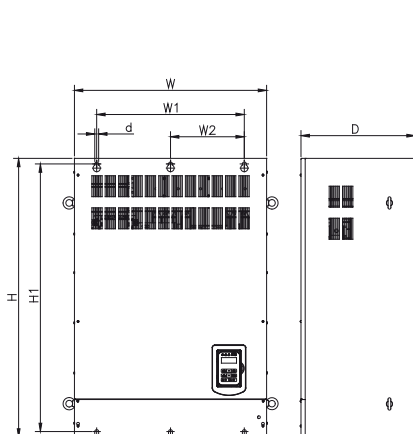


Figure E

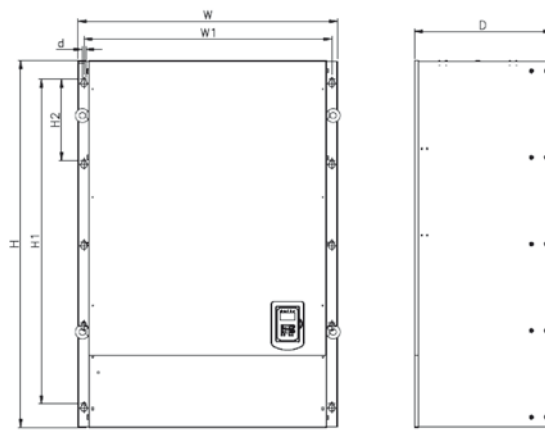


Figure F

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)								Net Weight (kg)	
				W	H	D	W1	W2	H1	H2	t		d
D	IP00	Frame 6	F510-2060-H3	344	580	300	250	N/A	560	N/A	1.6	M8	40
			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													
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	958	1356	507	916	N/A	1200	300	6.2	M12	335
			F510-4670-H3										
			F510-4800-H3										

## Dimensions

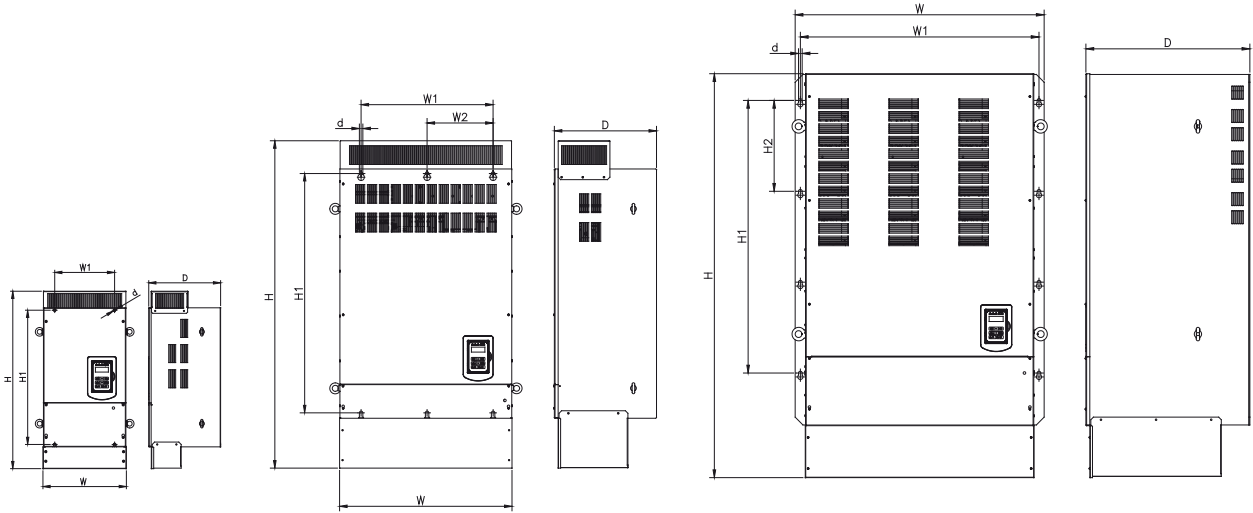


Figure G

Figure H

Figure I

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)								Net Weight (kg)	
				W	H	D	W1	W2	H1	H2	t		d
G	IP20	Frame 6	F510-2060-H3	348.5	740	300	250	N/A	560	N/A	1.6	M8	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										
H	IP20	Frame 8	F510-4175-H3	692	1313	410	530	265	960	N/A	1.6	M12	194
			F510-4215-H3										
			F510-4250-H3										
			F510-2150-H3										
			F510-2175-H3										
I	IP20	Frame 9	F510-4300-H3	958	1756	507	916	N/A	1200	300	6.2	M12	350
			F510-4375-H3										
			F510-4425-H3										
			F510-4535-H3										
			F510-4670-H3										
			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

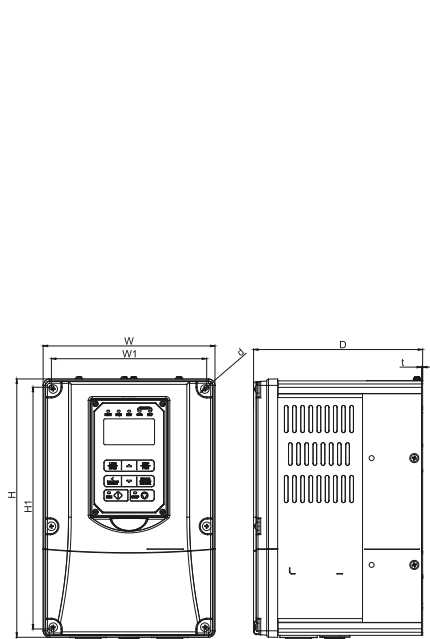


Figure J

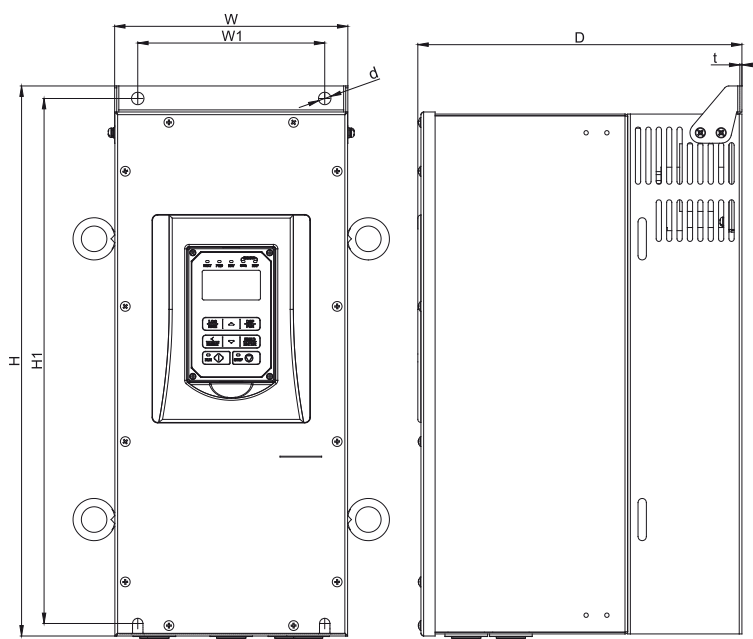


Figure K

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)						Net Weight (kg)		
				W	H	D	W1	H1	t		d	
J	IP55(NEMA12)	Frame 1	F510-4001-C3FN4	189	284	186	171	266	1.2	M5	5.1	
			F510-4002-C3FN4									
			F510-4003-C3FN4									
			F510-4005-C3FN4									
			F510-4008-C3FN4									
		Frame 2	F510-4010-C3FN4	230	320	210	210	305	2	M5	8.6	
F510-4015-C3FN4												
Frame 3		F510-4020-C3FN4	265	396	227	249	380	2	M5	17		
		F510-4025-C3FN4										
K		IP55(NEMA12)	Frame 4	F510-4030-C3FN4	224	527	311	180	505	2	M10	32.5
				F510-4040-C3FN4								
			Frame 5	F510-4050-C3FN4	326	695	343	276	671	2.3	M10	55
	F510-4060-C3FN4											
	F510-4075-C3N4											
F510-4100-C3N4												

Note: Models for 4075&4100 without built-in filter type.

## Dimensions

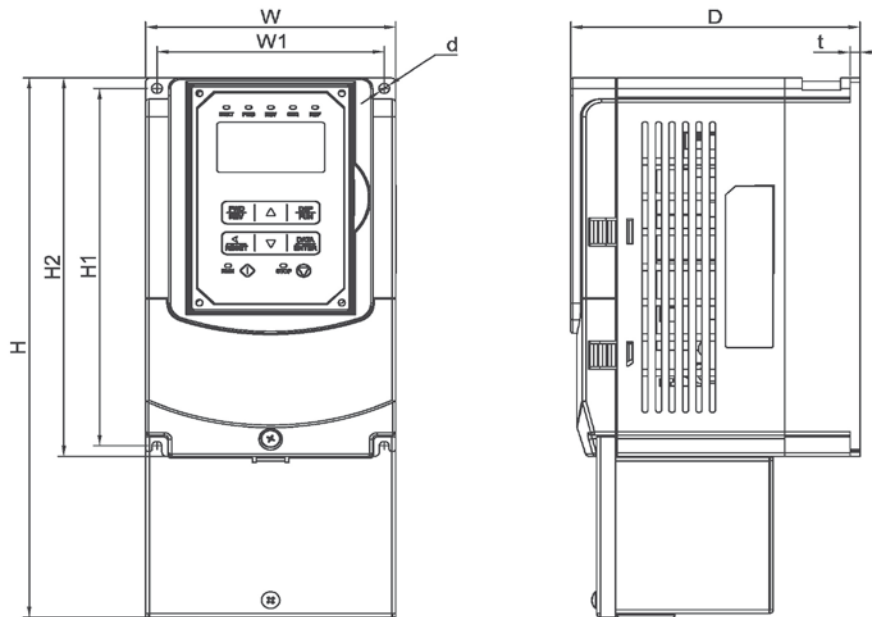


Figure L

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)								Net Weight (kg)
				W	H	D	W1	H1	H2	t	d	
L	IP20	Frame 1	F510-4001-H3F	130	306	150	118	203	215	5	M5	3.5
			F510-4002-H3F									
			F510-4003-H3F									
		Frame 2	F510-4005-H3F	140	400	177	122	267	279	7	M6	5.5
			F510-4008-H3F									
			F510-4010-H3F									

## Dimensions

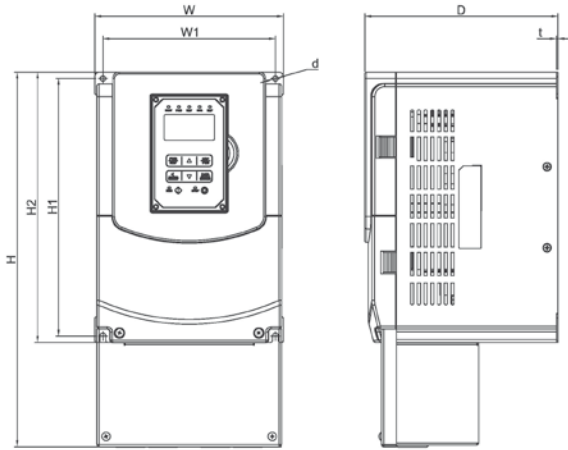


Figure M

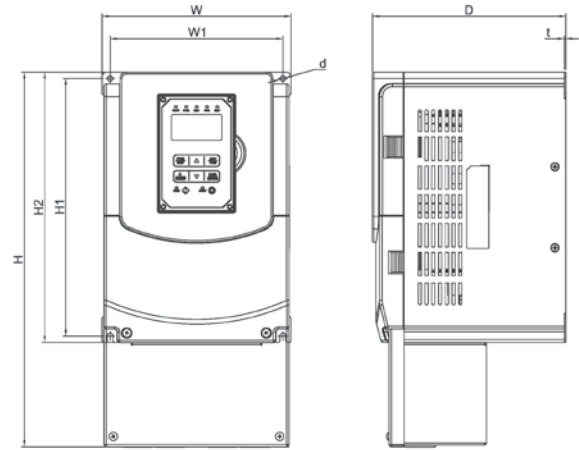
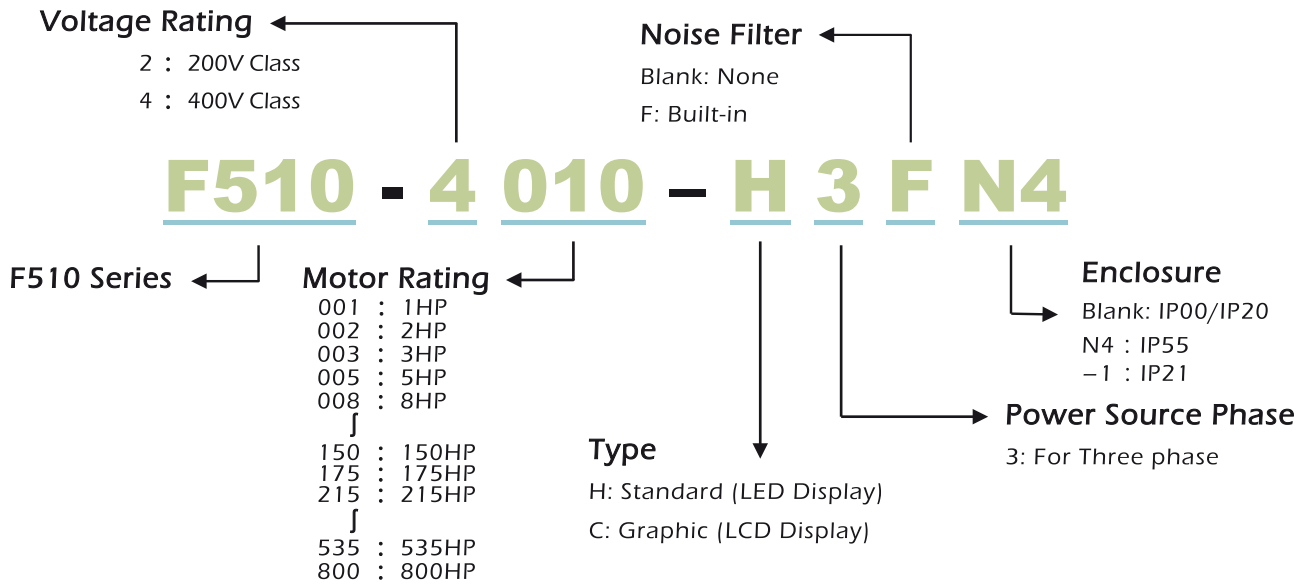


Figure N

Figure	Enclosure	Frame	Catalog No.	Dimensions(mm)								Net Weight (kg)
				W	H	D	W1	H1	H2	t	d	
M	IP20	Frame 3	F510-4015-H3F	210	416.5	215	192	286	300	1.6	M6	8.0
			F510-4020-H3F									
		Frame 4	F510-4025-H3F	265	500	225	245	340	360	1.6	M8	12.5
			F510-4030-H3F									
N	IP20	Frame 5	F510-4050-H3F	286.5	679	252	220	505	525	3.3	M8	29.5
			F510-4060-H3F									
			F510-4075-H3F									

## Catalog Number Identification



## Accessories

Accessories	Description	Catalog No.	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
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	For Frame 6
		JN5-NK-A07	For Frame 7
		JN5-NK-A08	For Frame 8
		JN5-NK-A09	For 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	For Frame 1
		JN5-CR-A02	For Frame 2
		JN5-CR-A04	For Frame 4
Others	1 to 8 Pump card	JN5-IO-8DO	
	Copy Module for 510 series	JN5-CU	





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