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QUICK START MANUAL | EN

EM16

QL0318/ REV.1

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0. PREFACE

0.1 Preface

To extend the performance of the product and ensure personnel safety, please read this manual thoroughly before using the inverter. Should there be any problem in using the product that cannot be solved with the information provided in the manual, contact Our's technical or sales representative who will be willing to help you.

Precautions

The inverter is an electrical product. For your safety, there are symbols such as "Danger", "Caution" in this manual as a reminder to pay attention to safety instructions on handling, installing, operating, and checking the inverter. Be sure to follow the instructions for highest safety.



DANGER!

Indicates a potential hazard that could cause death or serious personal injury if misused.



CAUTION!

Indicates that the inverter or the mechanical system might be damaged if misused.



DANGER!

- Risk of electric shock. The DC link capacitors remain charged for five minutes after power has been removed. It is not permissible to open the equipment until 5 minutes after the power has been removed.
- Do not make any connections when the inverter is powered on. Do not check parts and signals on circuit boards during the inverter operation.
- Do not disassemble the inverter or modify any internal wires, circuits, or parts.
- Ensure that the Inveter Ground terminal is connected correctly.



CAUTION!

- Do not perform a voltage test on parts inside the inverter. High voltage can destroy the semiconductor components.
- Do not connect T1, T2, and T3 terminals of the inverter to any AC input power supply.
- CMOS ICs on the inverter's main board are susceptible to static electricity. Do not touch the main circuit board.

1. SAFETY PRECAUTIONS

1.1 Before Power Up



DANGER!

- Make sure the main circuit connections are correct Single phase L1(L),L3(N), Three phase L1(L),L2,L3(N) are power-input terminals and must not be mistaken for T1,T2 and T3. Otherwise, inverter damage can result.



CAUTION!

- The line voltage applied must comply with the inverter's specified input voltage. (See the nameplate).
- To avoid the front cover from disengaging, or other damage do not carry the inverter by its covers. Support the drive by the heat sink when transporting. Improper handling can damage the inverter or injure personnel and should be avoided.
- To avoid the risk of fire, do not install the inverter on a flammable object. Install on nonflammable objects such as metal.
- This product provides the 24V for internal use only, do not use as the power supply sources for other external components, such as sensors, electronic components ... etc., otherwise it will cause adverse situation.
- When disconnecting the remote keypad, turn the power off first to avoid any damage to the keypad or the inverter.



CAUTION!

- This product is sold subject to EN 61800-3 and EN 61800-5-1. In a domestic environment this product may cause radio interference in which case the user may be required to apply corrective measures.
- Motor over temperature protection is not provided.



CAUTION!

- Work on the device/system by unqualified personnel or failure to comply with warnings can result in severe personal injury or serious damage to material. Only suitably qualified personnel trained in the setup, installation, commissioning and operation of the product should carry out work on the device/system.
- Only permanently-wired input power connections are allowed.

1.2 During Power Up



DANGER!

- When the momentary power loss is longer than 2 seconds, the inverter will not have sufficient stored power for its control circuit. Therefore, when the power is re-applied, the run operation of the inverter will be based on the setup of following parameters:
- Run parameters. 00-02 or 00-03.
- Direct run on power up. Parameter. 07-04 and the status of external run switch.

Note: the start operation will be regardless of the settings for parameters 07-00/07-01/07-02.



DANGER! DIRECT RUN ON POWER UP.

If direct run on power up is enabled and inverter is set to external run with the run FWD/REV switch closed then the inverter will restart.



DANGER!

Prior to use, ensure that all risks and safety implications are considered.

- When the momentary power loss ride through is selected and the power loss is short, the inverter will have sufficient stored power for its control circuits to function, therefore, when the power is resumed the inverter will automatically restart depending on the setup of parameters 07-00 & 7-01.

1.3 Before Operation



CAUTION!

- Make sure the inverter model and rating are the same as that set in parameter 13-00.

Note: On power up the supply voltage set in parameter 01-01 will flash on the display for 2 seconds.

1.4 During Operation



DANGER!

- Do not connect or disconnect the motor during operation. Otherwise, It may cause the inverter to trip or damage the unit.
- To avoid electric shock, do not take the front cover off while power is on.
- The motor will restart automatically after stop when auto-restart function is enabled. In this case, care must be taken while working around the drive and associated equipment .
- The operation of the stop switch is different than that of the emergency stop switch. The stop switch has to be activated to be effective. Emergency stop has to be de-activated to become effective.



CAUTION!

- Do not touch heat radiating components such as heat sinks and brake resistors.
- The inverter can drive the motor from low speed to high speed. Verify the allowable speed ranges of the motor and the associated machinery.
- Risk of electric shock. The DC link capacitors remain charged for five minutes after power has been removed. It is not permissible to open the equipment until 5 minutes after the power has been removed.



CAUTION!

- The Inverter should be used in environments with temperature range from (14-104°F) or (-10 to 50°C)* and relative humidity of 95%.
* IP20 : -10 ~ 50 °C without stick on type dust cover.
NEMA1 : -10 ~ 40 °C with stick on type dust cover.



DANGER!

- Make sure that the power is switched off before disassembling or checking any components.

1.5 Inverter Disposal

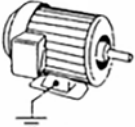


CAUTION!

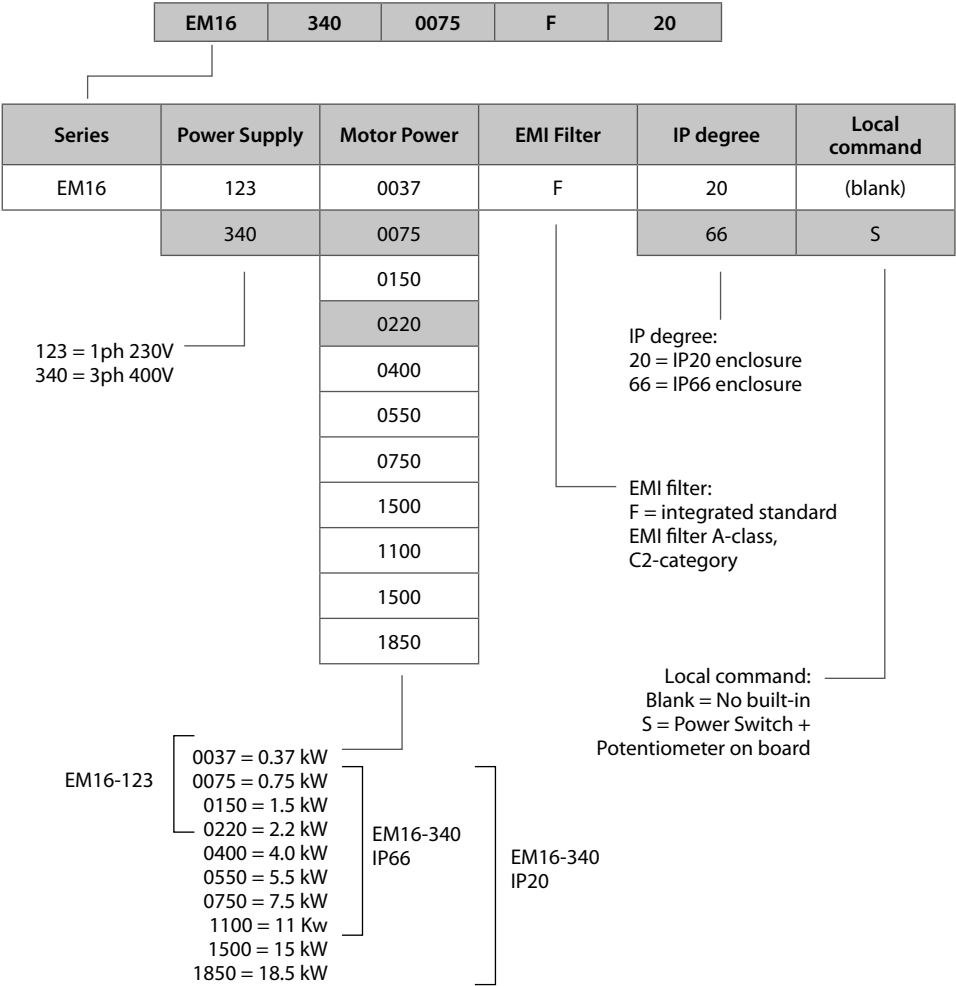
Please dispose of this unit with care as an industrial waste and according to your required local regulations.

- The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burnt.
- The plastic enclosure and parts of the inverter such as the cover board will release harmful gases if burnt.

2. ENVIRONMENT & INSTALLATION
2.1 Considerations for peripheral equipment

	Power	Ensure that the supply voltage is correct. A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter.
	Circuit Breaker & RCD	Use a molded-case circuit breaker that conforms to the rated voltage and current of the inverter. Do not use the circuit breaker as the run/stop switch for the inverter. Residual Current Circuit Breaker (RCD). Current setting should be 200mA or above and the operating time at 0.1 second or longer to prevent malfunctions.
	Magnetic contactor	Normally a magnetic contactor is not needed. A contactor can be used to perform functions such as external control and auto restart after power failure. Do not use the magnetic contactor as the run/stop switch of the inverter.
	AC reactor for power quality improvement	When a 200V/400V inverter with rating below 15KW is connected to a high capacity power source (600KVA or above) then an AC reactor can be connected for power factor improvement and reducing harmonics.
	Input noise filter	EM16 has a built-in filter (Class A/First Environment Category C2, except for Frame 4). To satisfy the required EMC regulations for your specific application you may require an additional EMC filter.
	Inverter	Connect the single phase power to Terminals, L1(L) & L3(N). Warning! Connecting the input terminals T1, T2, and T3 to AC input power will damage the inverter. Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. To reverse the motor rotation direction just swap any two wires at terminals T1, T2, and T3. Ground the Inverter and motor correctly. Ground Resistance for 200V power<100 Ohms. Ground Resistance for 400V power<10 Ohms
 Grounding	Motor	Three-phase induction motor. Voltage drop on motor due to long cable can be calculated. Volts drop should be < 10%. Phase-to-phase voltage drop $(V) = \sqrt{3} \times \text{resistance of wire } (\Omega/\text{km}) \times \text{length of line (m)} \times \text{current} \times 10^{-3}$

MODEL IDENTIFICATION



2.2 Specifications

2.2.1 Product Specifications

230V CLASS: SINGLE PHASE + INTERNAL EMI FILTER

Type:

ENCLOSURE IP20

Model: EM16-123-.....-F-20				
	0037	0075	0150	0220
Recommended motor power (KW)	0.4	0.75	1.5	2.2
Rated output current (A)	3.1	4.5	7.5	10.5
Rated power capacity (KVA)	1.2	1.7	2.90	4.00
Input voltage range(V)	Single Phase:200~240V,50/60HZ			
Allowable voltage fluctuation	+10%-15%			
Output voltage range(V)	Three phase: 0~240V			
Input current (A)*	8.5	12	16	23.9
Inverter net weight (Kg)	1.65	1.65	2.5	2.5
Allowable momentary power loss time (s)	2.0	2.0	2.0	2.0
Enclosure	IP20			

The input current is calculated value at full rated output current.

F: Built - in EMI filter

20: Protect ion class IP20

Type:

ENCLOSURE IP66 / POWER-SWITCH ON BOARD / POTENTIOMETER ON BOARD

Model: EM16-123- -F-66-S				
	0037	0075	0150	0220
Recommended motor power (KW)	0.4	0.75	1.5	2.2
Rated output current (A)	3.1	4.5	7.5	10.5
Rated power capacity (KVA)	1.2	1.7	2.90	4.00
Input voltage range(V)	Single Phase:200~240V,50/60HZ			
Allowable voltage fluctuation	+10%-15%			
Output voltage range(V)	Three phase: 0~240V			
Input current (A)*	8.5	12	16	23.9
Inverter net weight (Kg)	1.65	1.65	2.5	2.5
Allowable momentary power loss time (s)	2.0	2.0	2.0	2.0
Enclosure	IP66			

The input current is calculated value at full rated output current.

F: Built - in EMI filter

66: Protection class IP66

S: Built - in Power Switches and Potentiometer

400VCLASS: THREE PHASE + INTEGRAL EMI FILTER

Type:
ENCLOSURE IP20

				
Model: EM16-340- -F-20	0075	0150	0220	0400
Recommended motor power (KW)	0.75	1.5	2.2	3.7
Rated output current (A)	2.3	3.8	5.2	8.8
Rated power capacity (KVA)	1.7	2.9	4.0	6.7
Input voltage range(V)	Three phase: 380~480V,50/60HZ			
Allowable voltage fluctuation	+10%-15%			
Output voltage range(V)	Three phase: 0~480V			
Input current (A)*	4.2	5.6	7.3	11.6
Inverter net weight (Kg)	1.7	1.7	2.5	2.5
Allowable momentary power loss time (s)	2.0	2.0	2.0	2.0
Enclosure	IP20			

The input current is calculated value at full rated output current.

					
Model: EM16-340- -F-20	0550	0750	1100	1500	1850
Recommended motor power (KW)	5.5	7.5	11	15	18.5
Rated output current (A)	13.0	17.5	24	32	40
Rated power capacity (KVA)	9.9	13.3	19.1	24	30.5
Input voltage range(V)	Three phase: 380~480V,50/60HZ				
Allowable voltage fluctuation	+10%-15%				
Output voltage range(V)	Three phase: 0~480V				
Input current (A)*	17	23	31	38	48
Inverter net weight (Kg)	6.7	6.7	6.7	13.7	13.7
Allowable momentary power loss time (s)	2.0	2.0	2.0	2.0	15
Enclosure	IP20				

The input current is calculated value at full rated output current.

F: Built - in EMI filter

20: Protect ion class IP20

400VCLASS:THREE PHASE + INTEGRAL EMI FILTER**Type:****ENCLOSURE IP66 / POWER-SWITCH ON BOARD / POTENTIOMETER ON BOARD**

				
Model: EM16-340- -F-66-S	0075	0150	0220	0400
Recommended motor power (KW)	0.75	1.5	2.2	3.7
Rated output current (A)	2.3	3.8	5.2	8.8
Rated power capacity (KVA)	1.7	2.9	4.0	6.7
Input voltage range(V)	Three phase: 380~480V,50/60HZ			
Allowable voltage fluctuation	+10%-15%			
Output voltage range(V)	Three phase: 0~480V			
Input current (A)*	4.2	5.6	7.3	11.6
Inverter net weight (Kg)	1.7	1.7	2.5	2.5
Allowable momentary power loss time (s)	2.0	2.0	2.0	2.0
Enclosure	IP66			

			
Model: EM16-340- -F-66-S	0550	0750	1100
Recommended motor power (KW)	5.5	7.5	11
Rated output current (A)	13.0	17.5	24
Rated power capacity (KVA)	9.9	13.3	19.1
Input voltage range(V)	Three phase: 380~480V,50/60HZ		
Allowable voltage fluctuation	+10%-15%		
Output voltage range(V)	Three phase: 0~480V		
Input current (A)*	17	23	31
Inverter net weight (Kg)	6.7	6.7	6.7
Allowable momentary power loss time (s)	2.0	2.0	2.0
Enclosure	IP66		

The input current is calculated value at full rated output current.

S 400V series only up to 15HP.**F: Built - in EMI filter****66: Protect ion class IP66****S: Built - in Power Switches and Potentiometer**

2.2.2 General Specifications

Item		EM16
Control Mode		V/F Control, Vector Control
Frequency	Output Frequency	0.01~599.00 Hz
	Starting Torque	150%/1Hz (Vector)
	Speed Control Range	1:50
	Setting resolution	Digital input: 0.01Hz
		Analog input: 0.06Hz/60Hz
	Setting	Keypad: Set directly with ▲▼ keys or the VR on the keypad
		External Input Terminas: AI1 (0/2~10V), AI2 (0/4~20mA) input Multifunction input up/down function (Group3)
		Setting frequency by communication method.
Run	Operation set	Frequency limit
		Lower and upper frequency limits 3 skip frequency settings.
		Keypad run, stop button
Main Control Features	Operation set	External terminals: Multi- operation-mode 2 / 3 wire selection Jog operation
		Run signal by communication method.
	V / F curve setting	18 fixed curves and one customized curve
	Carrier frequency	1~16KHz
	Acceleration and deceleration control	2 off Acc / dec time parameters. 4 off S curve parameters.
	Multifunction input	29 functions (refer to description on group3)
Display	Multifunction output	21 functions (refer to description on group3)
	Multifunction analog output	5 functions (refer to description on group4)
	Main features	Overload Detection, 16 preset speeds, Auto-run, Acc/Dec Switch (2 Stages), Main/Alt run Command select, Main/Alt Frequency Command select, PID control, torque boost, V/F start Frequency, Fault reset, Firemode.
LED	LED	Display: parameter / parameter value / frequency / line speed / DC voltage / output voltage / output current / PID feedback / input and output terminal status / Heat sink temperature / Program Version / Fault Log
	LED Status Indicator	Run / Stop / Forward / Reverse, and etc.

Item		EM16
Control Mode		V/F Control, Vector Control
Protective Functions	Overload Protection	The relays to protect the motor and the inverter (150%/1min)
	Over voltage	220V: >410V, 380V: >820V
	Under Voltage	220V: <190V, 380V: <380V
	Momentary Power Loss Restart	Inverter auto-restart after a momentary power loss.
	Stall Prevention	Stall prevention for Acceleration/ Deceleration/ Operation.
	Short-circuit output terminal	Electronic Circuit Protection
	Grounding Fault	Electronic Circuit Protection
	Other protection features	Protection for overheating of heat sink, The carrier frequency decreasing with the temperature function, fault output, reverse prohibit, prohibit for direct start after power up and error recovery, parameter lock up
	All frames include brake transistor	
Communication control		Standard built-in RS485 communication (Modbus), One to one or One to many control.
Environment	Operating temperature	-10~50 °C (Note1)
	Storage temperature	-20~60 °C
	Humidity	95% RH or less (no condensation) (Compliance with IEC 60068 - 2-78)
	Shock	20Hz or less 1G (9.8m/s ²) 20~50Hz 0.6G (5.88m/s ²) (Compliance with IEC 60068 - 2-6)
	Protection class	IP20/NEMA1/IP66/NEMA4X (Depending on models)

Note1:

IP20 type:

-10 ~ 50 °C (without stick on type dust cover.)

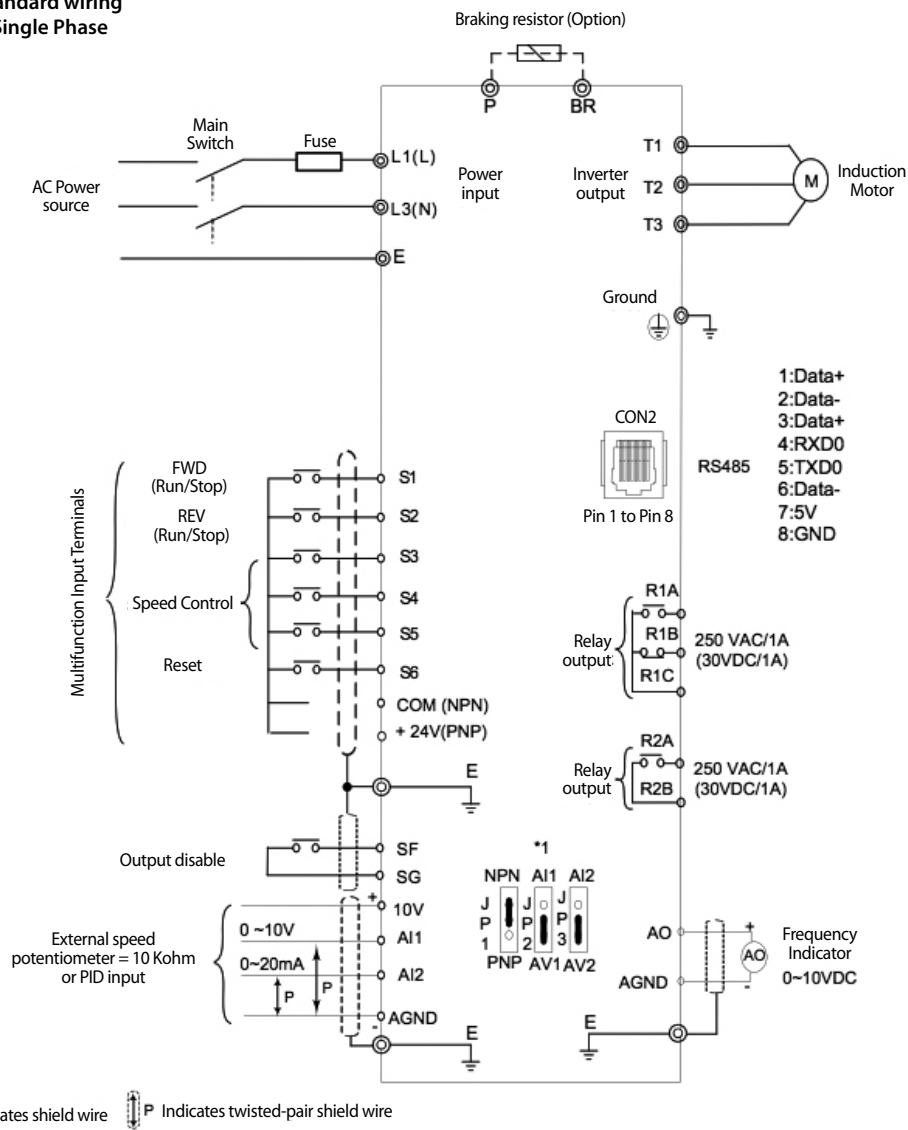
-10 ~40 °C (with stick on type dust cover.)

IP66 type:

-10 ~ 50 °C

2.3 Standard wiring

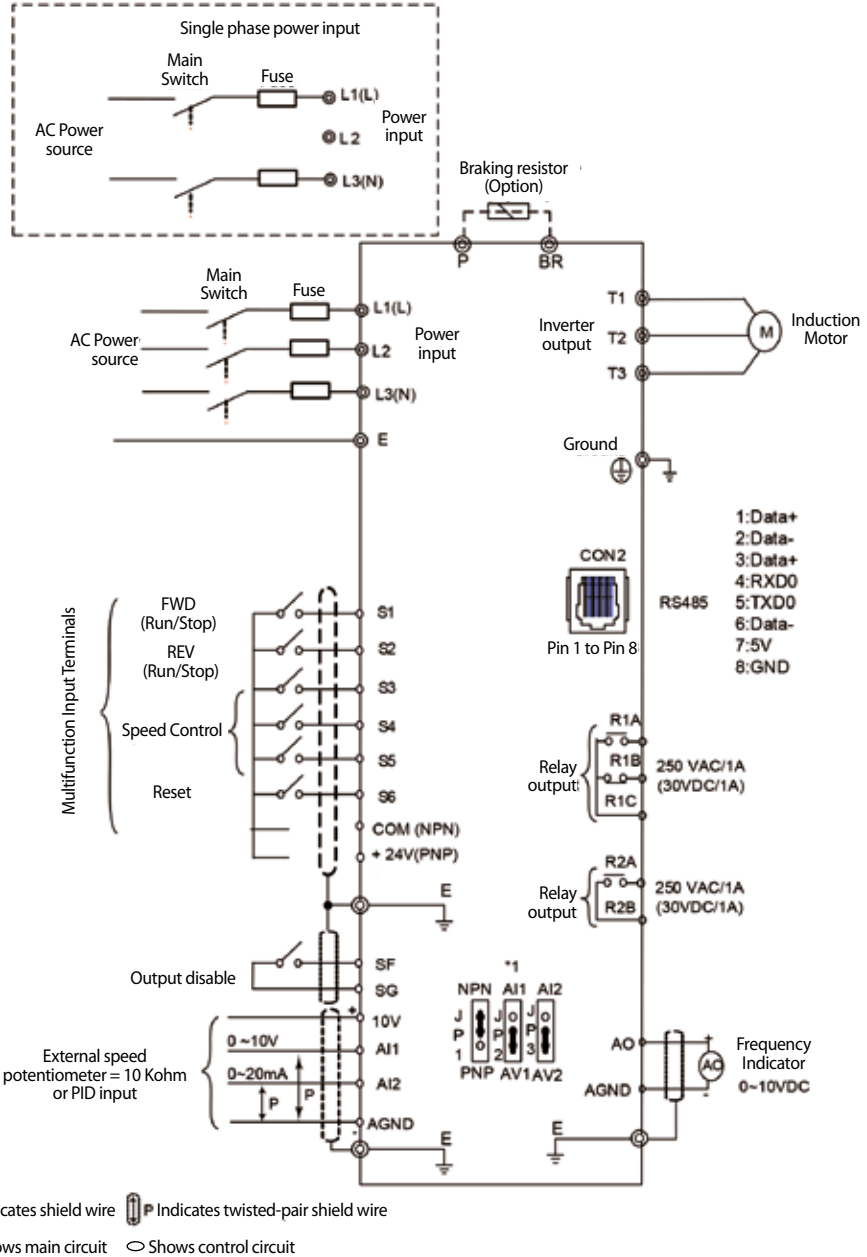
2.3.1 Single Phase



*1: JP1:NPN/PNP selection, JP2:AI1 0~10V/0~20mA selection, JP3:AI2 0~10V/0~20mA selection

Models	
EM16-123-0037-F-...	EM16-123-0150-F-...
EM16-123-0075-F-...	EM16-123-0220-F-...

2.3.2 Single /Three phase

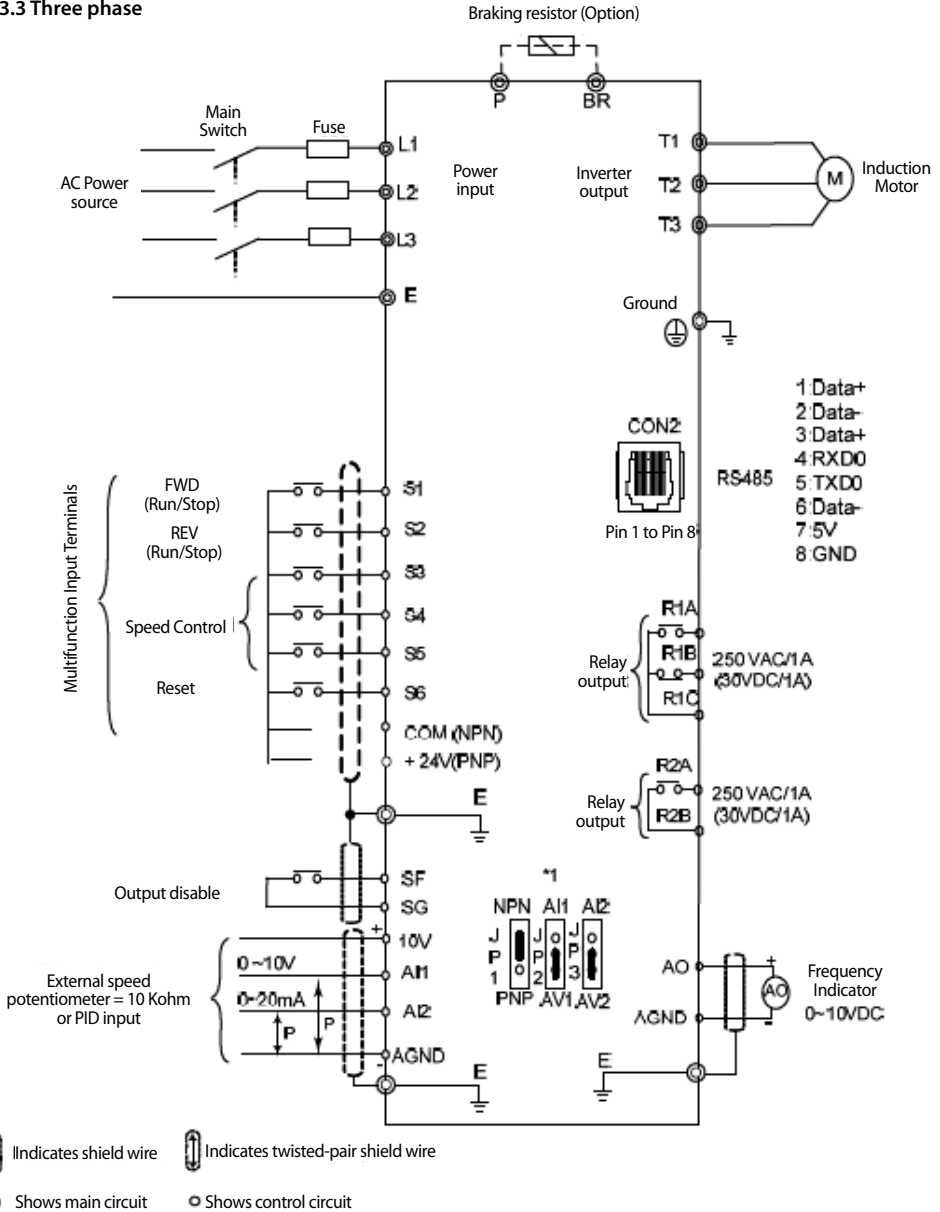


*1: JP1:NPN/PNP selection, JP2:AI1 0~10V/0~20mA selection, JP3:AI2 0~10V/0~20mA selection

Model:

200V: E510-2P5-H(N4R)/ E510-201-H(N4R)/ E510-202-H(N4R)/ E510-203-H(N4R)

2.3.3 Three phase



*1: JP1:NPN/PNP selection, JP2:AI1 0~10V/0~20mA selection, JP3:AI2 0~10V/0~20mA selection

Models		
EM16-340-0075-F...	EM16-340-0400-F...	EM16-340-1100-F...
EM16-340-0150-F...	EM16-340-0550-F...	EM16-340-1500-F...
EM16-340-0220-F...	EM16-340-0750-F...	EM16-340-1850-F...

2.4 Terminal Description

2.4.1 Description of main circuit terminals

Terminal symbols	TM1 Function Description
L1(L)	Main power input:single phase: L1(L)/L3(N) single/three phase:L1(L)/L2/L3(N) three phase:L1/L2/L3
L2	
L3(N)	
T1	Inverter output, connect to U/V/W terminals of motor
T2	
T3	
P	Braking resistor connection terminal: Used in applications when it is required to stop a high inertia load rapidly. (Refer to specifications of the braking resistor)
BR	
	Ground terminal

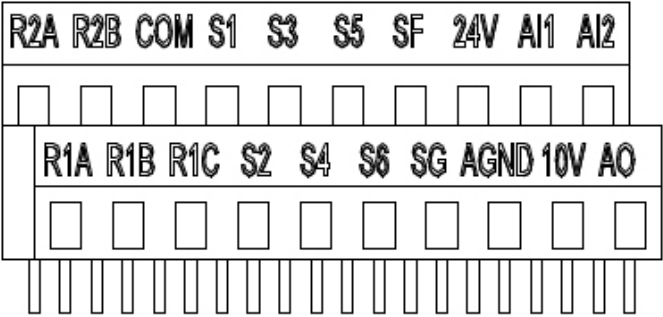
2.4.2 Control circuit terminal description

Type	Terminal	Terminal function	Signal level
Digital input signal	S1	Forward-Stop (Preset), Multi function input terminal	24 VDC, 8 mA, Optical coupling isolation (Max, voltage30 Vdc, Input impedance 3.3kΩ)
	S2	Reverse-Stop (Preset), Multi function input terminal	
	S3	Preset Speed0 (5-02), Multi function input terminal	
	S4	Preset Speed1 (5-03), Multi function input terminal	
	S5	Preset Speed2 (5-05), Multi function input terminal	
	S6	Fault reset input, Multi function input terminal	

Type	Terminal	Terminal function		Signal level	
Relay output	R1A	NO (Normally open)		Multi function output: Run, Fault, setting Frequency, Frequency Reached, Auto Restart, Momentary AC Power Loss, Rapid Stop, Base Block Stop Mode, Motor Overload Protection, Drive Overload Protection, Over-torque Threshold Level-Preset Current level Reached-Preset Brake Frequency Reached, PID Feedback Signal Loss, Final count value reached, Initial count value reached, PLC Status Indicator, PLC control...	250VAC/1A (30VDC/1A)
	R1B	NC (Normally closed)			
	R1C	COMMON			
	R2A				
	R2B				
24VPower supply	COM	Digital signal common terminal (JP1 Switching NPN position)			±15%,Max output current 60mA
	24V	Digital signal common terminal (JP1 Switching PNP position)			
The analog input signal	10V	Built in Power for an external speed potentiometer			10V (Max current: 20mA)
	AI1	Multifunctional analog input: JP2 selects voltage or current input Voltage: JP2 in AV1 position Current: JP2 in AI1 position			0 ~ 10V,(Max current: 20mA) (Input impedance: 153KΩ)
	AI2	Multifunctional analog input: JP3 selects voltage or current input Voltage: JP3 in AV2 position Current: JP3 in AI2 position			0 ~ 10V,0 ~20mA (Input impedance: 153KΩ)
	AGND	The analog common terminal			----
		Shielding wire connecting terminal (The earth)			----

Type	Terminal	Terminal function	Signal level
The analog onput signal	AO	Multifunctional analog output terminal*3	0 ~10V, (Max current:2mA)
	AGND	The analog common terminal	----
Safety switch	SF	Terminal SF is for output disable	
	SG		

Control circuit terminals:



2.5 Outline Dimensions

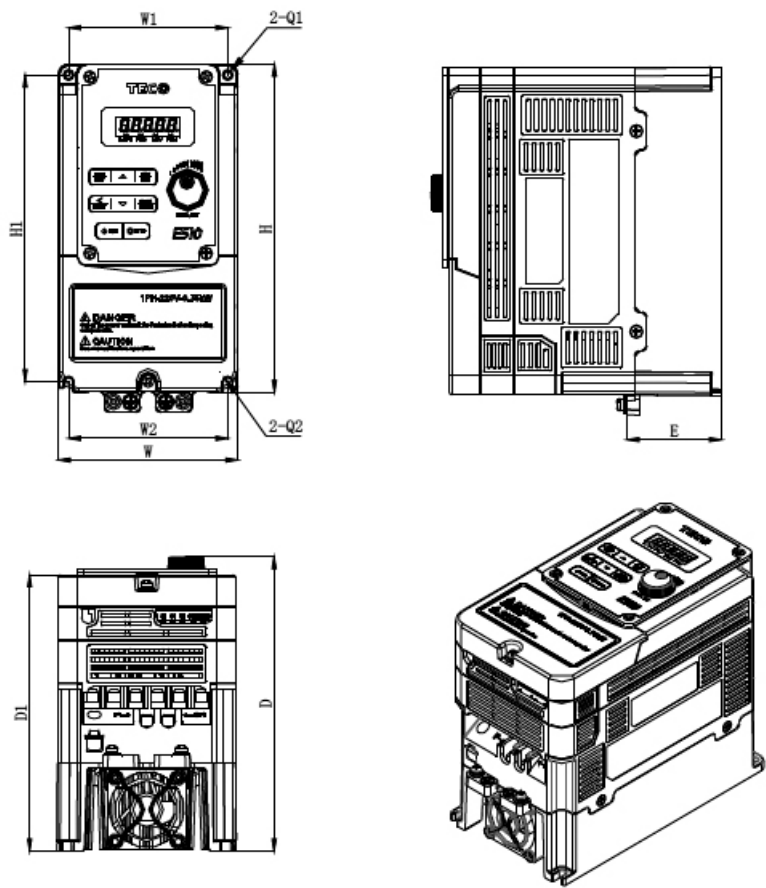
Tolerance Table (mm)				
1 ~ 10 ± 0.1	10 ~ 50 ± 0.2	50 ~ 100 ± 0.3	100 ~ 200 ± 0.5	200 ~ 400 ± 0.8

2.5.1 IP20 dimensions

FRAME 1 (IP20)

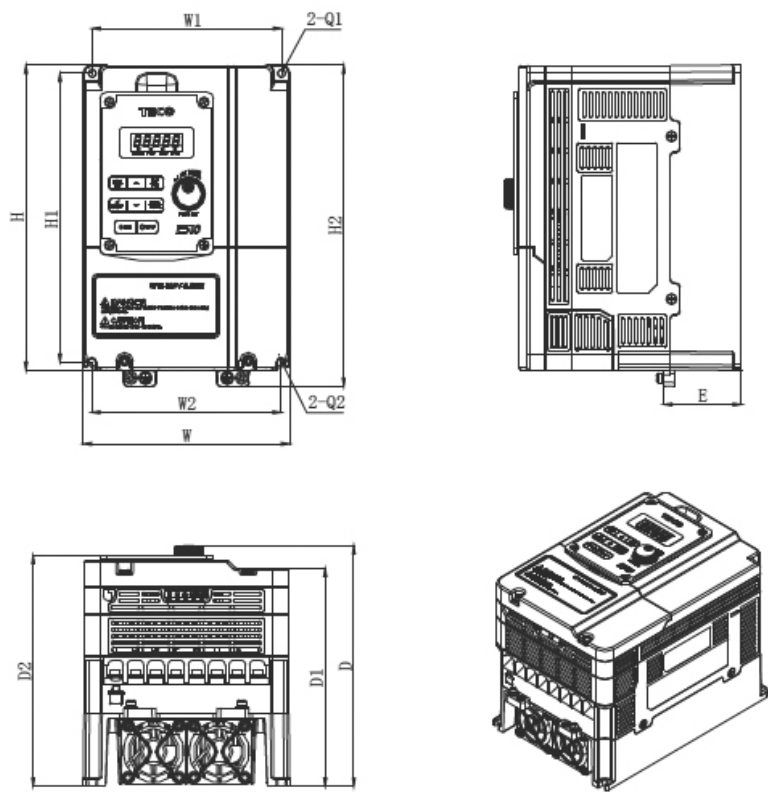
Single phase: 230V 0.37 ~ 0.75 kW

Three phase: 400V 0.75 ~ 1.5 kW



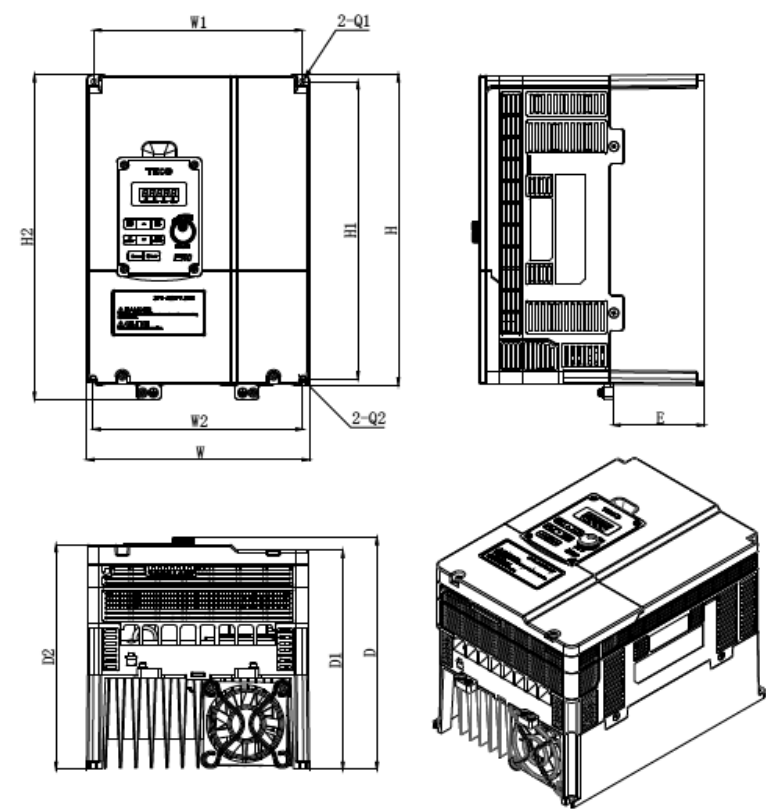
Model	Dimensions (mm)										N.W (Kg)
	W	W1	W2	H	H1	D	D1	E	Q1	Q2	
EM16-123-0037-F-20	90.6	80.5	80.5	163.6	153	149	137.8	48	4.3	4.3	1.7
EM16-123-0075-F-20											
EM16-340-0075-F-20											
EM16-340-0150-F-20											

FRAME 2 (IP20)
 Single phase: 230V 1.5~2.2 kW
 Three phase: 400V 2.2~4.0 kW



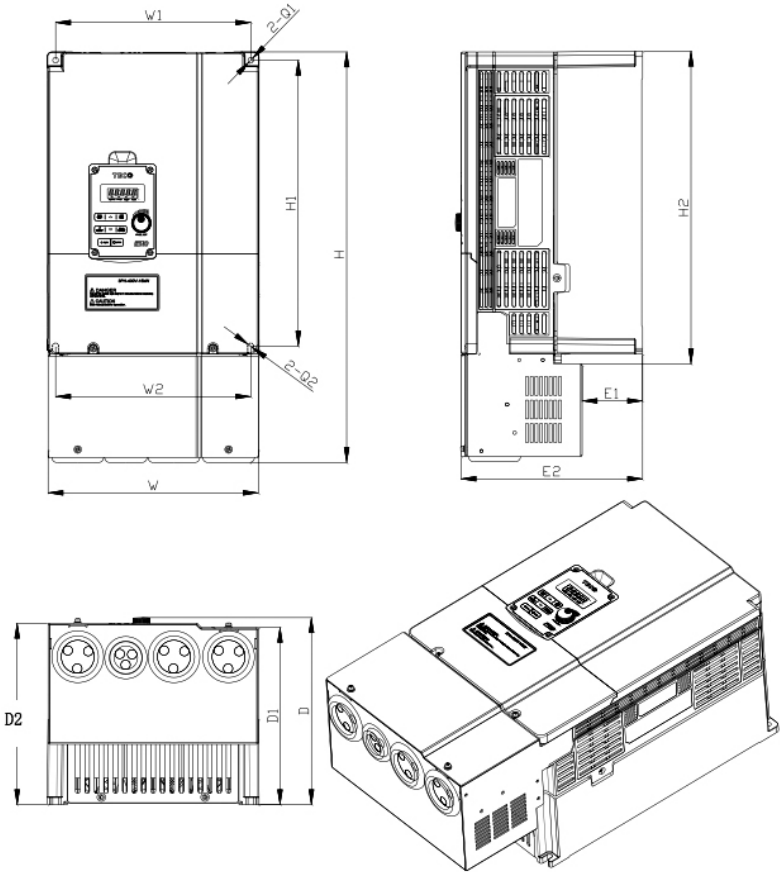
Model	Dimensions (mm)												N.W (Kg)
	W	W1	W2	H	H1	H2	D	D1	D2	E	Q1	Q2	
EM16-123-0150-F-20	128.7	118	118	187.6	177.6	197.5	150	133.8	141.8	48.2	4.5	4.5	2.5
EM16-123-0220-F-20													
EM16-340-0400-F-20													

FRAME 3 (IP20)
 Three phase: 400V 5.5~11 kW



Model	Dimensions (mm)												N.W (Kg)
	W	W1	W2	H	H1	H2	D	D1	D2	E	Q1	Q2	
EM16-340-0550-F-20	186.9	175	176	260.9	249.8	273	197.2	184	189	76.7	4.5	4.5	6.7
EM16-340-0750-F-20													
EM16-340-1100-F-20													

FRAME 4 (IP20)
Three phase: 400V 15~18.5 kW



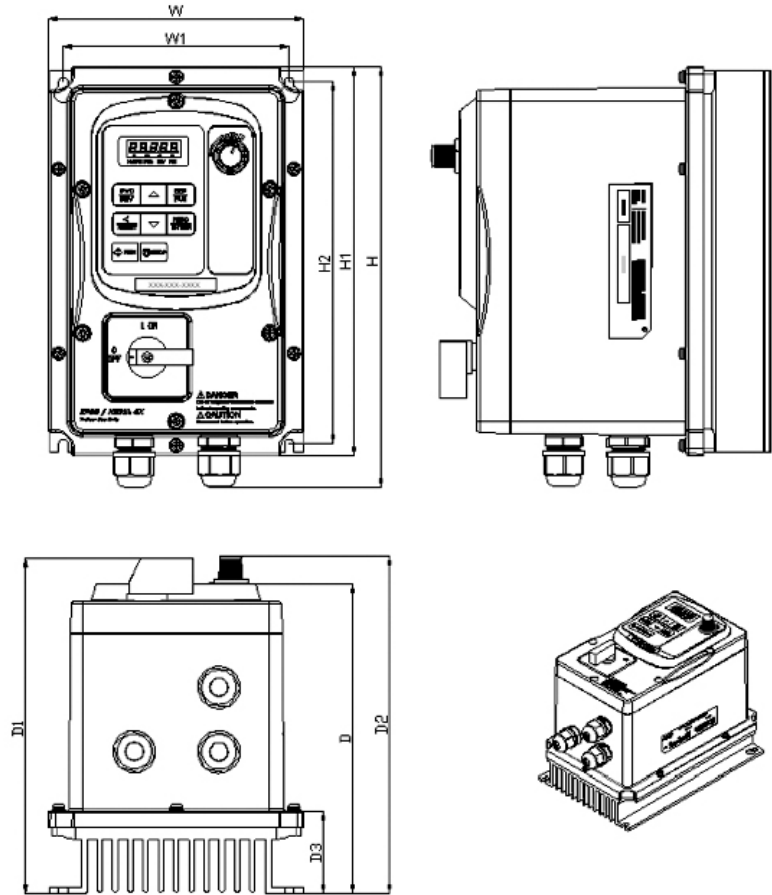
Model	Dimensions (mm)													N.W (Kg)
	W	W1	W2	H	H1	H2	D	D1	D2	E1	E2	Q1	Q2	
EM16-340-1500-F-20	224.6	207	20	436	303.5	330.9	200.7	187.5	192.5	64	192.5	6	6	13.7
EM16-340-1850-F-20														

2.5.2 IP66 dimensions

FRAME 1 (IP66)

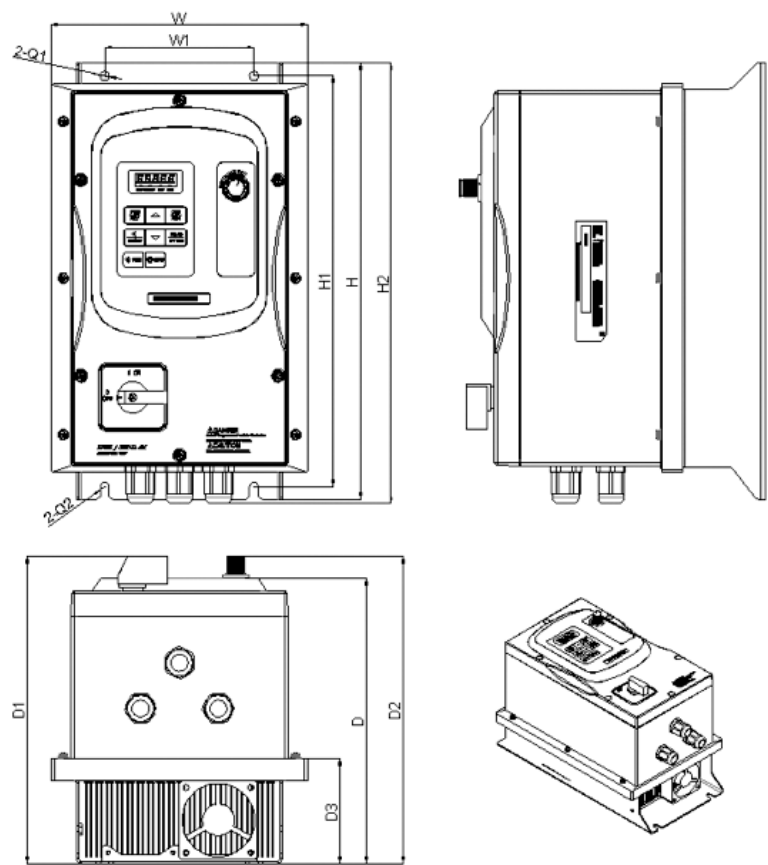
Single phase: 230V 0.37~0.75 kW

Three phase: 400V 0.75~1.5 kW



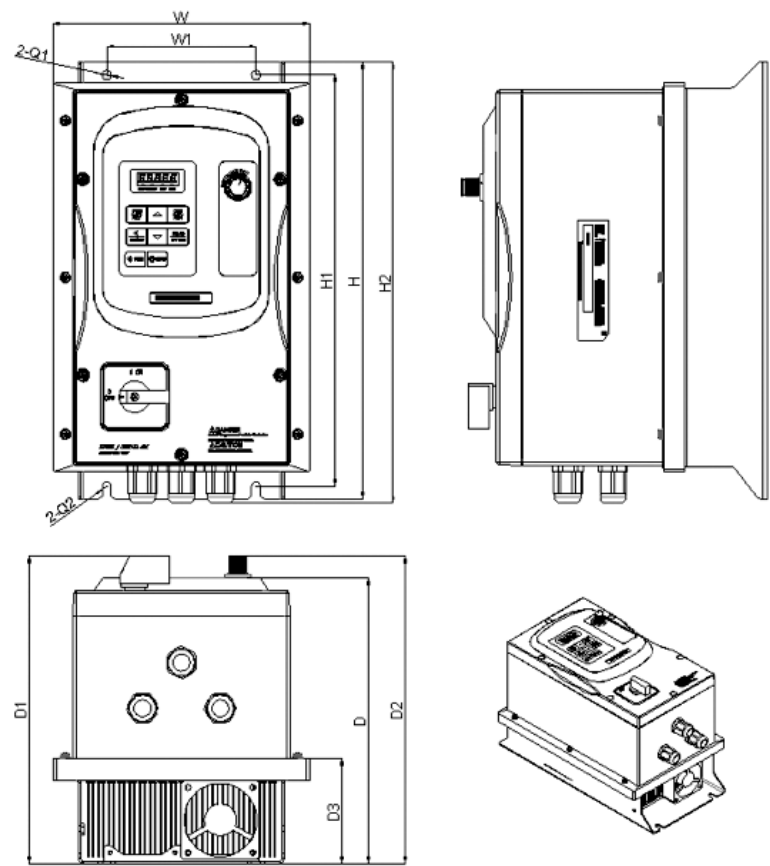
Model	Dimensions (mm)												N.W (Kg)
	W	W1	H	H1	H2	D	D1	D2	D3	Q1	Q2	Q3	
EM16-123-0037-F-66-S	150.8	133.3	248.7	230.2	214.2	183	200	200	49.5	5.4	5.4	10.6	2.9
EM16-123-0075-F-66-S													
EM16-340-0075-F-66-S													
EM16-340-0150-F-66-S													

FRAME 2 (IP66)
 Single phase: 230V 1.5~2.2 kW
 Three phase: 400V 2.2~4 kW



Model	Dimensions (mm)											N.W (Kg)
	W	W1	H	H1	H2	D	D1	D2	D3	Q1	Q2	
EM16-123-0150-F-66-S	198	115	335	315	337.9	218.4	235.2	235.2	79.8	7	7	5.98
EM16-123-0220-F-66-S												
EM16-340-0220-F-66-S												
EM16-340-0400-F-66-S												

FRAME 3 (IP66)
Three phase: 400V 5.5~18.5 kW



Model	Dimensions (mm)											N.W (kg)
	W	W1	H	H1	H2	D	D1	D2	D3	Q1	Q2	
EM16-340-0550-F-66-S	222.8	140	460	440	466.3	246.6	266.5	263.5	96	7	7	12.68
EM16-340-0750-F-66-S												
EM16-340-1100-F-66-S												

3. SOFTWARE INDEX

3.1 Keypad Description

3.1.1 Operator Panel Functions



Type	Item	Function
Digital display & LEDs	Main digital displays	Frequency Display, Parameter, voltage, Current, Temperature , Fault messages.
	LED Status	Hz/RPM: ON when the frequency or line speed is displayed. OFF when the parameters are displayed. FWD: ON while the inverter is running forward. Flashes while stopped. REV: ON while the inverter is running reverse. Flashes while stopped. FUN: ON when the parameters are displayed. OFF when the frequency is displayed.
Variable Resistor	FREQ SET	Used to set the frequency
Keys On Keypad (8 buttons)	RUN	RUN: Run at the set frequency
	STOP	STOP: Decelerate or Coast to Stop
	▲	Increment parameter number and preset values
	▼	Decrement parameter number and preset values
	FWD/REV (Dual function keys)	FWD: Forward Run REV: Reverse Run
	DSP/FUN (Dual function keys)	DSP: Switch between available displays FUN: Used to examine the parameter content
	READ/ENTER (Dual function keys)	READ: ENTER: Used to display the preset value of parameters and for saving the changed parameter values
	</ RESET (Dual function keys)	"<" Left Shift: used while changing the parameters or parameter values RESET: Use to Reset alarms or resettable faults

3.2 Programmable Parameter Groups

Parameter Group No.	Description
Group 00	Basic parameters
Group 01	V/F Pattern selections & setup
Group 02	Motor parameters
Group 03	Multi function digital Inputs/Outputs
Group 04	Analog signal inputs/ Analog output
Group 05	Preset Frequency Selections.
Group 06	Auto Run function (Auto Sequencer)
Group 07	Start/Stop command setup
Group 08	Drive and motor Protection
Group 09	Communication function setup
Group 10	PID function setup
Group 11	Performance control functions
Group 12	Digital Display & Monitor functions
Group 13	Inspection & Maintenance functions
Group 14	PLC Setting function
Group 15	PLC Monitoring function

Parameter notes for Parameter Groups	
*1	Parameter can be adjusted during running mode
*2	Cannot be modified in communication mode
*3	Does not change with factory reset
*4	Read only
*5	Available for above V1.1
*6	Available for above V1.3
*7	Available for above V1.7

Group 00 - Basic parameters					
No.	Description	Range	Factory Setting	Unit	Note
00-00	Control Mode Selection	0:V/F Mode	0	-	
		1:Vector Mode			
00-01	Reserved				
00-02	Main Run Command Source Selection	0:Keypad	0	-	
		1:External Run/Stop Control			
		2:Communication			
		3:PLC			
00-03	Alternative Run Command Source Selection	0:Keypad	0	-	
		1:External Run/Stop Control			
		2:Communication			
00-04	Operation Modes for External Terminals	0:Forward/Stop-Reverse/Stop	0	-	
		1:Run/Stop- Reverse/Forward			
		2:3 Wire Control Mode-Run/Stop			
00-05	Main Frequency Command Source Selection	0:UP/DOWN of Keypad	0	-	
		1:Potentiometer on Keypad			
		2:External AI1Analog Signal Input			
		3:External AI2 Analog Signal Input			
		4:External Up/Down Frequency Control			
		5:Communication Setting Frequency			
		6:PID Ouput Frequency			
		7:Pulse Input			*6
00-06	Alternative Frequency Command Source Selection	0:UP/DOWN of Keypad	4	-	
		1:Potentiometer on Keypad			
		2:External AI1Analog Signal Input			
		3:External AI2 Analog Signal Input			
		4:External Up/Down Frequency Control			
		5:Communication Setting Frequency			
		6:PID Ouput Frequency			
		7:Pulse Input			*6
00-07	Main and Alternative Frequency Command Modes	0:Main or Alternative Frequency 1:Main Frequency+ Alternative Frequency	0	-	

Group 00 - Basic parameters					
No.	Description	Range	Factory Setting	Unit	Note
00-09	Frequency Command Save on Power Down	0: Disable	0	-	
		1: Enable			
00-10	Initial Frequency Selection (keypad mode)	0: by Current Frequency Command	0	-	
		1: by 0 Frequency Command			
		2:by 00-11			
00-11	Initial Frequency Setpoint	0.00~599.00	50.00/60.00	Hz	
00-12	Frequency Upper Limit	0.01~599.00	50.00/60.00	Hz	
00-13	Frequency Lower Limit	0.00~598.99	0.00	Hz	
00-14	Acceleration Time 1	0.1~3600.0	10.0	Sec	*1
00-15	Deceleration Time 1	0.1~3600.0	10.0	Sec	*1
00-16	Acceleration Time 2	0.1~3600.0	10.0	Sec	*1
00-17	Deceleration Time 2	0.1~3600.0	10.0	Sec	*1
00-18	Jog Frequency	0.00~599.00	2.00	Hz	*1*7
00-19	Jog Acceleration Time	0.1~3600.0	0.5	Sec	*1*7
00-20	Jog Deceleration Time	0.1~3600.0	0.5	Sec	*1*7

Group 01 - V/F Pattern selection & Setup					
No.	Description	Range	Factory Setting	Unit	Note
01-00	Volts/Hz Patterns	0~18	0/9	-	
01-01	V/F Max voltage	200V: 170.0 ~ 264.0 400V: 323.0 ~ 528.0	220.0/440.0	Vac	
01-02	Base Frequency	0.20 ~ 599.00	50.00/60.00	Hz	
01-03	Max Frequency Voltage Ratio	0.0 ~ 100.0	100.0	%	
01-04	Mid Frequency 2	0.10 ~ 599.00	25.00/30.00	Hz	
01-05	Mid Frequency Voltage Ratio 2	0.0 ~ 100.0	50.0	%	
01-06	Mid Frequency 1	0.10 ~ 599.00	10.00/12.00	Hz	
01-07	Mid Frequency Voltage Ratio 1	0.0 ~ 100.0	20.0	%	
01-08	Min Frequency	0.10 ~ 599.00	0.50/0.60	Hz	
01-09	Min Frequency Voltage Ratio	0.0 ~ 100.0	1.0	%	
01-10	Volts/Hz Curve Modification (Torque Boost)	0 ~ 10.0	0.0	%	*1
01-11	V/F start Frequency	0.00~10.00	0.00	Hz	
01-12	Slip compensation gain	0.05~10.00	0.10	S	
01-13	V/F Mode Select	0 : Mode 0 1 : Mode 1	by models	-	*7

Group 02- Motor parameters					
No.	Description	Range	Factory Setting	Unit	Note
02-00	Motor No Load Current	0~[(Parameter 02-01)-0.1]	-	Amps(AC)	*3
02-01	Motor Rated Current (OL1)	0.2~100	-	A	*3
02-02	Motor rated Slip Compensation	0.0 ~ 200.0	0.0	%	*1
02-03	Motor rated speed	0~39000	-	Rpm	*3
02-04	Motor rated voltage	200V: 170.0~264.0 400V: 323.0~528.0	220.0/440.0	V	
02-05	Motor rated power	0.1~37.0	-	KW	
02-06	Motor rated frequency	0~599.0	50.0/60.0	Hz	
02-07	Motor pole number	2 ~16	4	-	
02-08 ~ 02-13	Reserved				
02-14	Auto Tune	0: Disable	0		
		1: Start Auto tune function.			
02-15	Stator resistance gain	----			*3*4
02-16	Rotor resistance gain	----			*3*4

Group 03- External Digital Inputs and Relay Output Functions

No.	Description	Range	Factory Setting	Unit	Note
03-00	Multifunction Input Term. S1	0: Forward/Stop Command	0	-	
03-01	Multifunction Input Term. S2	1: Reverse/Stop Command	1	-	
03-02	Multifunction Input Term. S3	2: Speed Selection 1	2	-	
03-03	Multifunction Input Term. S4	3: Speed Selection 2	3	-	
03-04	Multifunction Input Term. S5	4: Speed Selection 3	4	-	
03-05	Multifunction Input Term. S6	5: Speed Selection 4	17		
		6: Jog Forward Command			
		7: Jog Reverse Command			
		8: Up Command			
		9: Down Command			
		10: Acc/Dec 2			
		11: Acc/Dec Disabled			
		12: Main/Alternative run source select			
		13: Main/ Alternative Frequency Command select			
		14: Rapid Stop (Decel to stop)			
		15: Base Block			
		16: Disabl PID Function			
		17: Fault Reset			
		18: Auto Run Mode Enable			
		19: Speed Search			
		20: Energy Saving (only V/F)			
		21 Reset PID integral value to Zero			
		22: Counter Input			
		23: Counter Reset			
		24: PLC Input			
		25: Pulse Input-Width Measure (S3)			*6
		26: Pulse Input-Frequenct Measure (S3)			*6
		27: Enable KEB Function			
		28 :Fire mode function			*5
03-06	Up/Down frequency step	0.00~5.00	0.00	Hz	
03-07	Up/Down Keep Frequency Status after Stop Command	0: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down function is disabled	0	-	
		1: When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops			
		2: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available.			

Group 03- External Digital Inputs and Relay Output Functions

No.	Description	Range	Factory Setting	Unit	Note
03-08	S1 ~ S6 scan confirmation	1~200 Number of Scan cycles	10	2ms	
03-09	S1~ S5 switch type select	xxxx0:S1 NO xxx1:S1 NC	00000	-	
		xxx0x:S2 NO xxx1x:S2 NC			
		xx0xx:S3 NO xx1xx:S3 NC			
		x0xxx:S4 NO x1xxx:S4 NC			
		0xxxx:S5 NO 1xxxx:S5 NC			
03-10	S6 switch type select	xxxx0:S6 NO xxx1:S6 NC	00000	-	
03-11	Output Relay RY1 (Terminals R1A, R1B, R1C)	0: Run	0	-	
03-12	Output Relay RY2. (Terminals R2A, R2B)	1: Fault	1		
		2: Output Frequency Reached			
		3: Output Frequency Reached within Preset Range (3-13±3-14)			
		4: Output Frequency Detection 1 (> 3-13)			
		5: Output Frequency Detection 2 (< 3-13)			
		6: Auto Restart			
		7: Momentary AC Power Loss			
		8: Rapid Stop			
		9: Base Block			
		10: Motor Overload Protection (OL1)			
		11: Drive Overload Protection (OL2)			
		12: Over-torque Threshold Level (OL3)			
		13: Preset Output Current Reached (03-15~16)			
		14: Brake Control (03-17~18)			
		15: PID Feedback Signal Loss			
		16: Single pre-set count (3-22)			
		17: Dual pre-set count (3-22~23)			
		18:PLC Status Indicator (00-02)			
		19:PLC control			
		20:Zero Speed			*6
03-13	Preset Frequency Reached Level	0.00~599.00	0.00	Hz	*1
03-14	Frequency Reached Detection Range (±)	0.00~30.00	2.00	Hz	*1
03-15	Preset output current reached	0.1~15.0	0.1	A	

Group 03- External Digital Inputs and Relay Output Functions					
No.	Description	Range	Factory Setting	Unit	Note
03-16	Preset output Current detection delay Time	0.1~10.0	0.1	Sec	
03-17	Brake Release Level	0.00~20.00	0.00	Hz	
03-18	Brake Engage Level	0.00~20.00	0.00	Hz	
03-19	Relay Output function type	0:A (Normally open) 1:B (Normally close)	0	-	
03-20	Internal / external multi-function input terminal selection	0~63	0	-	
03-21	Action to set the internal multi-function input terminals	0~63	0	-	
03-22	Pre-set count 1	0~9999	0	-	
03-23	Pre-set count 2	0~9999	0	-	
03-24	Output under current detection	0:Disable	0	-	
		1:Enable			
03-25	Output under current detection level	5%~100%	20%	%	
03-26	Output under current detection delay time	0.0~50.0s	20.0	Sec	
03-27	Pulse Frequency	0.01~0.20	0.1	kHz	*7
03-28	Pulse Frequency Gain	0.01~9.99	1.00		*6

* "NO" indicates normally open, "NC" indicates normally closed.

Group 04- Analog signal inputs / Analog output					
No.	Description	Range	Factory Setting	Unit	Note
04-00	Analog Input Signal Type Select (AI1/AI2)	AI1 AI2	1	-	*7
		(0): 0~10V (0~20mA) 0~10V (0~20mA)			
		(1): 0~10V (0~20mA) 2~10V (4~20mA)			
		(2): 2~10V (4~20mA) 0~10V (0~20mA)			
		(3): 2~10V (4~20mA) 2~10V (4~20mA)			
04-01	AI1 Signal Verification Scan Rate	1~200	50	2ms	
04-02	AI1 Gain	0 ~ 1000	100	%	*1
04-03	AI1 Bias	0 ~ 100	0	%	*1
04-04	AI1 Bias Selection	0: Positive 1: Negative	0	-	*1
04-05	AI1 Slope	0: Positive 1: Negative	0	-	*1
04-06	AI2 Signal Verification Scan Rate	1~200	50	2ms	

Group 04- Analog signal inputs / Analog output

No.	Description	Range	Factory Setting	Unit	Note
04-08	AI2 Bias	0 ~ 100	0	%	*1
04-09	AI2 Bias Selection	0: Positive 1: Negative	0	-	*1
04-10	AI2 Slope	0: Positive 1: Negative	0	-	*1
04-11	Analog Output (AO) Mode	0: Output Frequency 1: Frequency Command 2: Output Voltage 3: DC Bus Voltage 4: Motor Current (100% rated current)	0	-	*1
04-12	Analog Output (AO) Gain	0 ~ 1000	100	%	*1
04-13	Analog Output (AO) Bias	0 ~ 100	0	%	*1
04-14	AO Bias Selection	0: Positive 1: Negative	0	-	*1
04-15	AO Slope	0: Positive 1: Negative	0	-	*1
04-16	F-Gain Function	0: Invalid 1: Effective	0	-	*1

Group 05- Preset Frequency Selections

No.	Description	Range	Factory Setting	Unit	Note
05-00	Preset Speed Control Mode Selection	0: Common Accel/Decel Accel/Decel 1 or 2 apply to all speeds	0	-	
		1: Individual Accel/Decel for each preset speed 0-15 apply to the selected preset speeds (Acc0/Dec0~Acc15/Dec15)			
05-01	Preset Speed 0 (Keypad Freq)	0.00 ~ 599.00	5.00	Hz	
05-02	Preset Speed1 (Hz)		5.00	Hz	*1
05-03	Preset Speed2 (Hz)		10.00	Hz	*1
05-04	Preset Speed3 (Hz)		20.00	Hz	*1
05-05	Preset Speed4 (Hz)		30.00	Hz	*1
05-06	Preset Speed5 (Hz)		40.00	Hz	*1
05-07	Preset Speed6 (Hz)		50.00	Hz	*1
05-08	Preset Speed7 (Hz)		50.00	Hz	*1
05-09	Preset Speed8 (Hz)		0.00	Hz	*1
05-10	Preset Speed9 (Hz)		0.00	Hz	*1
05-11	Preset Speed10 (Hz)		0.00	Hz	*1
05-12	Preset Speed11 (Hz)		0.00	Hz	*1
05-13	Preset Speed12 (Hz)		0.00	Hz	*1
05-14	Preset Speed13 (Hz)		0.00	Hz	*1
05-15	Preset Speed14 (Hz)		0.00	Hz	*1
05-16	Preset Speed15 (Hz)		0.00	Hz	*1

Group 05- Preset Frequency Selections					
No.	Description	Range	Factory Setting	Unit	Note
05-17	Preset Speed0-Acctime	0.1 ~ 3600.0	10.0	Sec	*1
05-18	Preset Speed0-Dectime		10.0	Sec	*1
05-19	Preset Speed1-Acctime		10.0	Sec	*1
05-20	Preset Speed1-Dectime		10.0	Sec	*1
05-21	Preset Speed2-Acctime		10.0	Sec	*1
05-22	Preset Speed2-Dectime		10.0	Sec	*1
05-23	Preset Speed3-Acctime		10.0	Sec	*1
05-24	Preset Speed3-Dectime		10.0	Sec	*1
05-25	Preset Speed4-Acctime		10.0	Sec	*1
05-26	Preset Speed4-Dectime		10.0	Sec	*1
05-27	Preset Speed5-Acctime		10.0	Sec	*1
05-28	Preset Speed5-Dectime		10.0	Sec	*1
05-29	Preset Speed6-Acctime		10.0	Sec	*1
05-30	Preset Speed6-Dectime		10.0	Sec	*1
05-31	Preset Speed7-Acctime		10.0	Sec	*1
05-32	Preset Speed7-Dectime		10.0	Sec	*1
05-33	Preset Speed8-Acctime		10.0	Sec	*1
05-34	Preset Speed8-Dectime		10.0	Sec	*1
05-35	Preset Speed9-Acctime		10.0	Sec	*1
05-36	Preset Speed9-Dectime		10.0	Sec	*1
05-37	Preset Speed10-Acctime		10.0	Sec	*1
05-38	Preset Speed10-Dectime		10.0	Sec	*1
05-39	Preset Speed11-Acctime		10.0	Sec	*1
05-40	Preset Speed11-Dectime		10.0	Sec	*1
05-41	Preset Speed12-Acctime		10.0	Sec	*1
05-42	Preset Speed12-Dectime		10.0	Sec	*1
05-43	Preset Speed13-Acctime		10.0	Sec	*1
05-44	Preset Speed13-Dectime		10.0	Sec	*1
05-45	Preset Speed14-Acctime		10.0	Sec	*1
05-46	Preset Speed14-Dectime		10.0	Sec	*1
05-47	Preset Speed15-Acctime		10.0	Sec	*1
05-48	Preset Speed15-Dectime		10.0	Sec	*1

Group 06- Auto Run Function (Auto Sequencer)					
No.	Description	Range	Factory Setting	Unit	Note
06-00	Auto Run Mode Selection (Sequencer)	0: Disabled. 1: Single cycle. (Continues to run from the Unfinished step if restarted). 2: Periodic cycle. (Continues to run from the unfinished step if restarted). 3: Single cycle, then holds the speed Of final step to run. (Continues to run from the unfinished step if restarted). 4: Single cycle. (Starts a new cycle if restarted). 5: Periodic cycle. (Starts a new cycle if restarted). 6: Single cycle, then hold the speed of final step to run. (Starts a new cycle if restarted).	0	-	
06-01	Auto _ Run Mode Frequency Command 1	0.00~599.00	0.00	Hz	*1
06-02	Auto _ Run Mode Frequency Command 2		0.00	Hz	*1
06-03	Auto _ Run Mode Frequency Command 3		0.00	Hz	*1
06-04	Auto _ Run Mode Frequency Command 4		0.00	Hz	*1
06-05	Auto _ Run Mode Frequency Command 5		0.00	Hz	*1
06-06	Auto _ Run Mode Frequency Command 6		0.00	Hz	*1
06-07	Auto _ Run Mode Frequency Command 7		0.00	Hz	*1
06-08	Auto _ Run Mode Frequency Command 8		0.00	Hz	*1
06-09	Auto _ Run Mode Frequency Command 9		0.00	Hz	*1
06-10	Auto _ Run Mode Frequency Command10		0.00	Hz	*1
06-11	Auto _ Run Mode Frequency Command 11		0.00	Hz	*1
06-12	Auto _ Run Mode Frequency Command 12		0.00	Hz	*1
06-13	Auto _ Run Mode Frequency Command 13		0.00	Hz	*1
06-14	Auto _ Run Mode Frequency Command 14		0.00	Hz	*1
06-15	Auto _ Run Mode Frequency Command 15		0.00	Hz	*1

Group 06- Auto Run Function (Auto Sequencer)					
No.	Description	Range	Factory Setting	Unit	Note
06-16	Auto_Run Mode Running Time Setting 0	0.0~3600.0	0.0	Sec	
06-17	Auto_Run Mode Running Time Setting 1		0.0	Sec	
06-18	Auto_Run Mode Running Time Setting 2		0.0	Sec	
06-19	Auto_Run Mode Running Time Setting 3		0.0	Sec	
06-20	Auto_Run Mode Running Time Setting 4		0.0	Sec	
06-21	Auto_Run Mode Running Time Setting 5		0.0	Sec	
06-22	Auto_Run Mode Running Time Setting 6		0.0	Sec	
06-23	Auto_Run Mode Running Time Setting 7		0.0	Sec	
06-24	Auto_Run Mode Running Time Setting 8		0.0	Sec	
06-25	Auto_Run Mode Running Time Setting 9		0.0	Sec	
06-26	Auto_Run Mode Running Time Setting 10		0.0	Sec	
06-27	Auto_Run Mode Running Time Setting 11		0.0	Sec	
06-28	Auto_Run Mode Running Time Setting 12		0.0	Sec	
06-29	Auto_Run Mode Running Time Setting 13		0.0	Sec	
06-30	Auto_Run Mode Running Time Setting 14		0.0	Sec	
06-31	Auto_Run Mode Running Time Setting 15		0.0	Sec	
06-32	Auto_Run Mode Running Direction 0	0: Stop 1: Forward 2: Reverse	0	-	
06-33	Auto_Run Mode Running Direction 1		0	-	
06-34	Auto_Run Mode Running Direction 2		0	-	
06-35	Auto_Run Mode Running Direction 3		0	-	
06-36	Auto_Run Mode Running Direction 4		0	-	
06-37	Auto_Run Mode Running Direction 5		0	-	

Group 06- Auto Run Function (Auto Sequencer)					
No.	Description	Range	Factory Setting	Unit	Note
06-38	Auto_Run Mode Running Direction 6	0: Stop 1: Forward 2: Reverse	0	-	
06-39	Auto_Run Mode Running Direction 7		0	-	
06-40	Auto_Run Mode Running Direction 8		0	-	
06-41	Auto_Run Mode Running Direction 9		0	-	
06-42	Auto_Run Mode Running Direction10		0	-	
06-43	Auto_Run Mode Running Direction 11		0	-	
06-44	Auto_Run Mode Running Direction12		0	-	
06-45	Auto_Run Mode Running Direction13		0	-	
06-46	Auto_Run Mode Running Direction 14		0	-	
06-47	Auto_Run Mode Running Direction 15		0	-	

*Frequency of the step 0 is set by parameter 05-01, keypad frequency.

Group 07- Start/Stop Command Setup					
No.	Description	Range	Factory Setting	Unit	Note
07-00	Momentary Power Loss and Restart	0: Momentary Power Loss and Restart Disable 1: Momentary Power Loss and Restart Enable	0	-	
07-01	Auto Restart Delay Time	0.0~800.0	0.0	Sec	
07-02	Number of Auto Restart Attempts	0~10	0	-	
07-03	Reset Mode Setting	0: Enable Reset Only when Run Command is Off 1: Enable Reset when Run Command is On or Off	0	-	
07-04	Direct Running on Power Up	0: Enable Direct run on power up 1: Disable Direct run on power up	1	-	
07-05	Delay-ONTimer	1.0~300.0	1.0	Sec	

Group 07- Start/Stop Command Setup					
No.	Description	Range	Factory Setting	Unit	Note
07-06	DC Injection Brake Start Frequency	0.10 ~ 10.00	1.5	Hz	
07-07	DC Injection Brake Level (Current Mode)	0.0 ~ 150.0	50.0	%	
07-08	DC Injection Brake Time	0.0 ~ 25.5	0.5	Sec	
07-09	Stopping Method	0: Deceleration to stop 1: Coast to stop	0	-	
07-10	Starting Methods	0: Normal Start 1: Speed Search	0	-	
07-11	Starting method for auto restart after fault	0: Speed Search 1: Normal start	0	-	
07-12	Power Loss Ride Through Time	0.0 ~ 2.0	0.5	Sec	
07-13	Main Circuit Low Voltage Detection Level	150.0~210.0 300.0~420.0	190.0/380.0	Vac	
07-14	Kinetic Energy Back-up Deceleration Time	0.0~25.0: KEB Deceleration Time	0.0	Sec	
07-15	DC Injection Brake Mode	0: Current Mode 1: Voltage Mode	1	-	*6
07-16	DC Injection Brake Level (Voltage Mode)	0.0~10.0	4.0	-	*6

Group 08- Drive & Motor Protection Functions					
No.	Description	Range	Factory Setting	Unit	Note
08-00	Trip Prevention Selection	xxxx0: Enable Trip Prevention During Acceleration xxxx1: Disable Trip Prevention During Acceleration xxx0x: Enable Trip Prevention During Deceleration xxx1x: Disable Trip Prevention During Deceleration xx0xx: Enable Trip Prevention in Run Mode xx1xx: Disable Trip Prevention in Run Mode x0xxx: Enable Over Voltage Prevention in Run Mode x1xxx: Disable Over Voltage Prevention in Run Mode	01000	-	*5

Group 08- Drive & Motor Protection Functions					
No.	Description	Range	Factory Setting	Unit	Note
08-01	Trip Prevention Level During Acceleration (%)	50 ~ 200	200	% ¹	
08-02	Trip Prevention Level During Deceleration (%)	50 ~ 200	200		
08-03	Trip Prevention Level in Run Mode (%)	50 ~ 200	200		
08-04	Over Voltage Prevention Level in Run Mode	350.0~390.0/700.0~780.0	380.0/760.0	VDC	
08-05	Electronic Motor Overload Protection Operation Mode	0: Disable 1: Enable	1	-	*7
08-06	Operation After Overload Protection is Activated	0: Coast-to-Stop After Overload Protection is Activated 1: Drive Will Not Trip when Overload Protection is Activated (OL1)	0	-	
08-07	Over Heat Protection (cooling fan control)	0: Auto (Depends on temp.) 1: Operate while in RUN Mode 2: Always Run 3: Disabled	1	-	
08-08	AVR Function (Auto Voltage Regulation)	0: AVR Function Enable	4	-	*5
		1: AVR Function Disable			
		2: AVR Function Disable for Stop			
		3: AVR Function Disable for Deceleration.			
		4: AVR Function Disabled for Stop and Deceleration.			
		5: When VDC>360V, AVR Function is Disabled for Stop and Deceleration.			
08-09	Input Phase Loss Protection	0: Disabled 1: Enabled	0	-	
08-10	Output Phase Loss Protection	0: Disabled	0	-	
		1: Enabled			
08-11	Motor Type Selection	0: Overload protection (Standard Motor)	0	-	
		1: Overload protection (Inverter Duty Motor)			

¹Base on the percentage of inverter rated current.

Group 08- Drive & Motor Protection Functions					
No.	Description	Range	Factory Setting	Unit	Note
08-12	Motor Overload Protection Curve	0: Motor Overload Protection for General loads (OL=103 %) (150% for 1 Minutes)	0	-	
		1: Motor Over load Protection for HVAC (Fan & Pump) (OL=113%) (123% for 1 Minutes).			
08-13	Over Torque Detection Control	0: Over Torque Detection Disabled	0	-	
		1: Over torque detection after set frequency is reached			
		2: Over torque detection after run command			
08-14	Over torque protection action	0: Stop Output After Over Torque Detection (Free Run to Stop)	0	-	
		1: Continue Running After Over Torque Detection (Display only OL3)			
08-15	Over Torque Detection Level	30~300	160	-	
08-16	Over Torque Detection Time	0.0~25.0	0.1	-	
08-17	Fire Mode (for firmware below v1.1)	0: Disabled	0	-	*5
		1: Enabled			
08-18	Ground Fault Detection	0: Disabled	0		*7
		1: Enabled			

Notes: Regarding fire mode function, please refer to the conditions below

1. Below firmware v1.1, Fire Mode is enabled by setting 08-17 = 1
2. Above (including) firmware v1.1, Fire Mode is enabled by setting digital inputs 03-00~03-05 = 28. Parameter 08-17 is then removed.
3. 08-18 is applicable to frame 3 and 4 only.

Group 09- Communication function setup					
No.	Description	Range	Factory Setting	Unit	Note
09-00	Assigned Communication Station Number	1 ~ 32	1	-	*2*3
09-01	RTU/ASCII Code Selection	0: RTU Code 1: ASCII Code	0	-	*2*3
09-02	Baud Rate Setting (bps)	0: 4800 1: 9600 2: 19200 3: 38400	2	bps	*2*3
09-03	Stop Bit Selection	0: 1 Stop Bit 1: 2 Stop Bits	0	-	*2*3
09-04	Parity Selection	0: Without Parity 1: With Even Parity 2: With Odd Parity	0	-	*2*3
09-05	Data Format Selection	0: 8-Bits Data 1: 7-Bits Data	0	-	*2*3
09-06	Communication Time-Out Detection Time	0.0 ~ 25.5	0.0	Sec	
09-07	Communication Time Out Operation Selection	0: Deceleration to Stop (00-15: Deceleration Time 1) 1: Coast to Stop 2: Deceleration to Stop (00-17: Deceleration Time 2) 3: Continue Operating	0	-	
09-08	Comm. Fault Tolerance Count.	1 ~ 20	3		
09-09	Wait Time of Inverter Transmission	5 ~ 65	5	ms	

Group 10- PID Function Setup					
No.	Description	Range	Factory Setting	Unit	Note
10-00	PID Target Value Selection (When 00-05\00-06=6 T his Function is Enabled)	0: Potentiometer on Keypad 1: Analog Signal Input. (AI1) 2: Analog Signal Input. (AI2) 3: Frequency Set by Communication 4: Keypad Frequency Parameter 10-02	1	-	*1
10-01	PID Feedback Value Selection	0: Potentiometer on Keypad 1: Analog Signal Input. (AI1) 2: Analog Signal Input. (AI2) 3: Frequency Set by Communication	2	-	*1

Group 10- PID Function Setup					
No.	Description	Range	Factory Setting	Unit	Note
10-02	PID Target (Keypad Input)	0.0~100.0	50.0	%	*1
10-03	PID Mode Selection	0: Disabled 1: Deviation D Control. FWD Characteristic. 2: Feedback D Control FWD Characteristic. 3: Deviation D Control Reverse Characteristic. 4: Feedback D Control Reverse Characteristic.	0	-	
10-04	Feedback Gain Coefficient	0.00 ~ 10.00	1.00		*1
10-05	Proportional Gain	0.0 ~ 10.0	1.0		*1
10-06	Integral Time	0.0 ~ 100.0	10.0	Sec	*1
10-07	Derivative Time	0.00 ~ 10.00	0.00	Sec	*1
10-08	PID Offset	0: Positive 1: Negative	0	-	*1
10-09	PID Offset Adjust	0 ~ 109	0	%	*1
10-10	PID Output Lag Filter Time	0.0 ~ 2.5	0.0	Sec	*1
10-11	Feedback Loss Detection Mode	0: Disabled 1: Enabled - Drive Continues to Operate After Feedback Loss 2: Enabled - Drive "STOPS" After Feedback Loss	0	-	
10-12	Feedback Loss Detection Level	0 ~ 100	0	%	
10-13	Feedback Loss Detection Delay Time	0.0 ~25.5	1.0	Sec	
10-14	Integration Limit Value	0 ~ 109	100	%	*1
10-15	Integral Value Resets to Zero when Feedback Signal Equals the Target Value	0: Disabled 1: After 1 Second 30: After 30 Second (0~30)	0	-	
10-16	Allowable Integral value Error Margin (Units, 1 Unit = 1/8192)	0 ~ 100	0	-	
10-17	PID Sleep Frequency Level	0.00~599.00	0.00	Hz	
10-18	PID Sleep Function Delay Time	0.0 ~25.5	0.0	Sec	

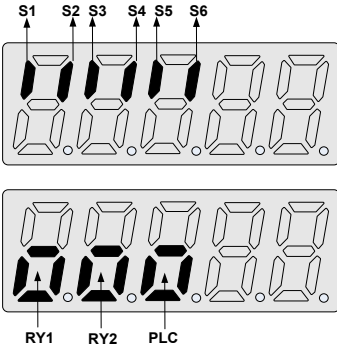
Group 10- PID Function Setup					
No.	Description	Range	Factory Setting	Unit	Note
10-19	PID Wake up frequency Level	0.00~599.00	0.00	Hz	
10-20	PID Wake up function Delay Time	0.0 ~ 25.5	0.0	Sec	
10-21	Max PID Feedback Setting Level	0 ~999	100	-	*1
10-22	Min PID Feedback Setting Level	0 ~999	0	-	*1

Group 11- Performance Control Functions					
No.	Description	Range	Factory Setting	unit	Note
11-00	Reverse Operation Control	0: Reverse Command is Enabled 1: Reverse Command is Disabled	0	-	
11-01	Carrier Frequency (kHz)	1~16	5	KHz	
11-02	Carrier Mode Selection	0: Mode0, 3Phase PWM modulation 1: Mode1, 2Phase PWM modulation 2: Mode2, 2Phase Soft PWM Modulation	0	-	
11-03	Carrier Frequency Reduction by Temperature Rise	0:Disabled 1:Enabled	0	-	
11-04	S-Curve Acc 1	0.0 ~ 4.0	0.2	Sec	
11-05	S-Curve Acc 2	0.0 ~ 4.0	0.2	Sec	
11-06	S-Curve Dec 3	0.0 ~ 4.0	0.2	Sec	
11-07	S-Curve Dec 4	0.0 ~ 4.0	0.2	Sec	
11-08	Skip Frequency 1	0.00 ~ 599.00	0.00	Hz	*1
11-09	Skip Frequency 2	0.00 ~ 599.00	0.00	Hz	*1
11-10	Skip Frequency 3	0.00 ~ 599.00	0.00	Hz	*1
11-11	Skip Frequency Range Bandwidth (±)	0.00 ~ 30.00	0.00	Hz	*1
11-12	Energy Saving Gain (V/F Mode)	0 ~ 100	80	%	
11-13	Regeneration Prevention Function	0:Disable	0	-	
		1:Enable			
		2:Enable (only during constant speed)			
11-14	Regeneration Prevention Voltage Level	200V:300.0~400.0	380.0	V	
		400V:600.0~800.0	760.0		

Group 11- Performance Control Functions					
No.	Description	Range	Factory Setting	unit	Note
11-15	Regeneration Prevention Frequency Limit	0.00 ~ 15.00	3.00	Hz	
11-16	Regeneration Prevention Voltage Gain	0~200	100	%	
11-17	Regeneration Prevention Frequency Gain	0~200	100	%	

Group 12 Digital Display & Monitor Functions					
No.	Description	Range	Factory Setting	Unit	Note
12-00	Extended Display Mode	00000~88888 Each digit can be set from 0 to 8 as listed below	00000	-	*1
		0: Default Display (Frequency and Parameters)			
		1:Output Current			
		2:Output Voltage			
		3:DC Voltage			
		4:Temperature			
		5:PID Feedback			
		6:Analog Signal Input. (AI1)			
		7:Analog Signal Input. (AI2)			
		8: Count Status			
12-01	PID Feedback Display Format	0:Integer (xxx)	0	-	*1
		1:One Decimal Place (xx.x)			
		2:Two Decimal Places (x.xx)			
12-02	PID Feedback Display Unit Setting	0:xxx--	0	-	*1
		1:xxxpb(pressure)			
		2:xxxfl(flow)			
12-03	Custom Units (Line Speed) Value	0~65535	1500/1800	RPM	*1
12-04	Custom Units (Line Speed) Display Mode	0:Drive Output Frequency is Displayed	0	-	*1
		1:Line Speed.Integer.(xxxxx)			
		2:Line Speed.One Decimal Place. (xxxx.x)			
		3:Line Speed.Two Decimal Places (xxx.xx)			
		4:Line Speed.Three Decimal Places (xx.xxx)			

Group 12 Digital Display & Monitor Functions

No.	Description	Range	Factory Setting	Unit	Note
12-05	Inputs and Output Logic Status Display (S1~S6, RY1 and RY2)		-	-	*4
12-06	Alarm Selections for Inverter Components Life Expectancy	xxxx0:Life Alarm of Inrush Current Suppression Circuit is Invalid xxxx1:Life Alarm of Inrush Current Suppression Circuit is Valid xxx0x:Life Alarm of Control Circuit Capacitors is Invalid xxx1x:Life Alarm of Control Circuit Capacitors is Valid xx0xx:Life Alarm of Main Circuit Capacitors is Invalid xx1xx:Life Alarm of Main Circuit Capacitors is Valid	00000	-	*1
12-07	Detect Main Circuit Capacitors	Reserved			
12-08	Display of Inrush Current Suppression Circuit	0~100	100	%	
12-09	Display of Control Circuit Capacitors	0~100	100	%	
12-10	Reserved				
12-11	Output Current when Fault Appeared	----	0	A	
12-12	Output Voltage when Fault Appeared	----	0	Vac	
12-13	Output Frequency when Fault Appeared	----	0	Hz	

Group 12 Digital Display & Monitor Functions					
No.	Description	Range	Factory Setting	Unit	Note
12-14	DC Bus Voltage when Fault Appeared	----	0	Vac	
12-15	Frequency Command when Fault Appeared	----	0	Hz	

Group 13 Inspection & Maintenance Functions					
No.	Description	Range	Factory Setting	unit	Note
13-00	Drive Horsepower Code	----	-	-	*3
13-01	Software Version	----	-	-	*3*4
13-02	Fault Log (Latest 3 Faults)	----	-	-	*3*4
13-03	Accumulated Inverter Operation Time 1	0~23	-	hour	*3
13-04	Accumulated Inverter Operation Time 2	0~65535	----	day	*3
13-05	Accumulated Inverter Operation Time Mode	0: Power On time 1: Operation time	0	-	*3
13-06	Parameter Lock	0: Enable all Functions 1: Preset Speeds from 05-01 to 05-15 Can't be Changed 2: All Functions Can't be Changed Except for Preset speeds from 05-01 to 05-15 3: Disable All Functions Except 13-06	0	-	
13-07	Parameter Lock Code	00000~65535	00000	-	
13-08	Reset Drive to Factory Settings	1150: Reset to factory setting 50Hz,220V/380V system. 1160: Reset to factory setting 60Hz,220V/380V system. 1250: Reset to factory setting 50Hz,230V/400V system 1260: Reset to factory setting 60Hz,230V/460V system 1350: Reset to factory setting 50Hz,220V/415V system 1360: Reset to factory setting 60Hz,230V/400V system 1112: Reset PLC	00000	-	

Group 14 PLC Setting function					
No.	Description	Range	Factory Setting	Unit	Note
14-00	Setting Value1 of T1	0~9999	0	-	
14-01	Setting Value1 of T1 (mode 7)	0~9999	0	-	
14-02	Setting Value1 of T2	0~9999	0	-	
14-03	Setting Value1 of T2 (mode 7)	0~9999	0	-	
14-04	Setting Value1 of T3	0~9999	0	-	
14-05	Setting Value1 of T3 (mode 7)	0~9999	0	-	
14-06	Setting Value1 of T4	0~9999	0	-	
14-07	Setting Value1 of T4 (mode 7)	0~9999	0	-	
14-08	Setting Value1 of T5	0~9999	0	-	
14-09	Setting Value1 of T5 (mode 7)	0~9999	0	-	
14-10	Setting Value1 of T6	0~9999	0	-	
14-11	Setting Value1 of T6 (mode 7)	0~9999	0	-	
14-12	Setting Value1 of T7	0~9999	0	-	
14-13	Setting Value1 of T7 (mode 7)	0~9999	0	-	
14-14	Setting Value1 of T8	0~9999	0	-	
14-15	Setting Value1 of T8 (mode 7)	0~9999	0	-	
14-16	Setting Value1 of C1	0~65535	0	-	
14-17	Setting Value1 of C2	0~65535	0	-	
14-18	Setting Value1 of C3	0~65535	0	-	
14-19	Setting Value1 of C4	0~65535	0	-	
14-20	Setting Value1 of C5	0~65535	0	-	
14-21	Setting Value1 of C6	0~65535	0	-	
14-22	Setting Value1 of C7	0~65535	0	-	
14-23	Setting Value1 of C8	0~65535	0	-	
14-24	Setting Value1 of AS1	0~65535	0	-	
14-25	Setting Value2 of AS1	0~65535	0	-	
14-26	Setting Value3 of AS1	0~65535	0	-	
14-27	Setting Value1 of AS2	0~65535	0	-	
14-28	Setting Value2 of AS2	0~65535	0	-	
14-29	Setting Value3 of AS2	0~65535	0	-	
14-30	Setting Value1 of AS3	0~65535	0	-	
14-31	Setting Value2 of AS3	0~65535	0	-	
14-32	Setting Value3 of AS3	0~65535	0	-	
14-33	Setting Value1 of AS4	0~65535	0	-	
14-34	Setting Value2 of AS4	0~65535	0	-	

Group 14 PLC Setting function					
No.	Description	Range	Factory Setting	Unit	Note
14-36	Setting Value1 of MD1	0~65535	1	-	
14-37	Setting Value2 of MD1	0~65535	1	-	
14-38	Setting Value3 of MD1	1~65535	1	-	
14-39	Setting Value1 of MD2	0~65535	1	-	
14-40	Setting Value2 of MD2	0~65535	1	-	
14-41	Setting Value3 of MD2	1~65535	1	-	
14-42	Setting Value1 of MD3	0~65535	1	-	
14-43	Setting Value2 of MD3	0~65535	1	-	
14-44	Setting Value3 of MD3	1~65535	1	-	
14-45	Setting Value1 of MD4	0~65535	1	-	
14-46	Setting Value2 of MD4	0~65535	1	-	
14-47	Setting Value3 of MD4	1~65535	1	-	

Group 15 PLC Monitoring function					
No.	Description	Range	Factory Setting	unit	Note
15-00	Current Value of T1	0~9999	0	-	
15-01	Current Value of T1(mode 7)	0~9999	0	-	
15-02	Current Value of T2	0~9999	0	-	
15-03	Current Value of T2(mode 7)	0~9999	0	-	
15-04	Current Value of T3	0~9999	0	-	
15-05	Current Value of T3(mode 7)	0~9999	0	-	
15-06	Current Value of T4	0~9999	0	-	
15-07	Current Value of T4(mode 7)	0~9999	0	-	
15-08	Current Value of T5	0~9999	0	-	
15-09	Current Value of T5(mode 7)	0~9999	0	-	
15-10	Current Value of T6	0~9999	0	-	
15-11	Current Value of T6(mode 7)	0~9999	0	-	
15-12	Current Value of T7	0~9999	0	-	
15-13	Current Value of T7(mode 7)	0~9999	0	-	
15-14	Current Value of T8	0~9999	0	-	
15-15	Current Value of T8(mode 7)	0~9999	0	-	
15-16	Current Value of C1	0~65535	0	-	
15-17	Current Value of C2	0~65535	0	-	
15-18	Current Value of C3	0~65535	0	-	

Group 15 PLC Monitoring function					
No.	Description	Range	Factory Setting	unit	Note
15-20	Current Value of C5	0~65535	0	-	
15-21	Current Value of C6	0~65535	0	-	
15-22	Current Value of C7	0~65535	0	-	
15-23	Current Value of C8	0~65535	0	-	
15-24	Current Value of AS1	0~65535	0	-	
15-25	Current Value of AS2	0~65535	0	-	
15-26	Current Value of AS3	0~65535	0	-	
15-27	Current Value of AS4	0~65535	0	-	
15-28	Current Value of MD1	0~65535	0	-	
15-29	Current Value of MD2	0~65535	0	-	
15-30	Current Value of MD3	0~65535	0	-	
15-31	Current Value of MD4	0~65535	0	-	
15-32	Current Value of TD	0~65535	0	μs	

4. TROUBLESHOOTING AND MAINTENANCE

4.1 Error display and corrective action

4.1.1 Manual Reset and Auto-Reset

Faults which can not be recovered manually			
Display	content	Cause	Corrective action
-OV-	Voltage too high when stopped	Detection circuit malfunction	Consult with the supplier
-LV-	Voltage too low when stopped	1. Power voltage too low 2. Pre-charge resistor or fuse burnt out 3. Detection circuit malfunction	1. Check if the power voltage is correct 2. Replace the pre-charge resistor or the fuse 3. Consult with the supplier
-OH-	The inverter is overheated when stopped	1. Detection circuit malfunction 2. Ambient temperature too high or bad ventilation	Improve the ventilation conditions, if no result then replace the inverter
OH-C	The inverter is overheated during running	1. IGBT temperature is too high or bad ventilation 2. Temperature sensor error or circuit malfunctions	1. Reduce carrier frequency 2. Improve the ventilation conditions, if no result then replace the inverter
EPr	EEPROM problem	Faulty EEPROM	Consult with the supplier
COt	Communication error	Communication disruption	Check the wiring
CtEr	Current Sensor detection error	Current sensor error or circuit malfunction	Consult with the supplier
Err4	CPU Illegal interrupt	External noise	If it occurs too often, please consult with the supplier
r-OFF	Power relay off error	Power relay or relative circuit broken	Consult with the supplier

Faults which can be recovered manually and automatically

Display	Content	Cause	Corrective action
OC-A	Over-current at acceleration	1. Acceleration time too short 2. The capacity of the motor exceeds the capacity of the inverter 3. Short circuit between the motor coil and the case 4. Short circuit between motor wiring and ground 5. IGBT module damaged	1. Set a longer acceleration time 2. Replace inverter with one that has the same rating as that of the motor 3. Check the motor 4. Check the wiring 5. Consult with the supplier
OC-C			
OC-C	Over-current at fixed speed	1. Transient load change 2. Transient power change	1. Increase the capacity of the inverter 2. Install inductor on the power supply input side
OC-C			

Display	Content	Cause	Corrective action
OC-d	Over-current at deceleration	The preset deceleration time is too short	Set a longer deceleration time
OC-d			
OC-S	Over current at start	1. Short circuit between the motor coil and the case 2. Short circuit between motor coil and ground 3. The IGBT module damaged	1. Inspect the motor 2. Inspect the wiring 3. Consult with the supplier
OC-S			
OV-C	Excessive Voltage during operation/deceleration	1. Deceleration time setting too short or excessive load inertia 2. Power voltage varies widely (fluctuates)	1. Set a longer deceleration time 2. Add a brake resistor or brake module 3. Add a reactor at the power input side
OV-C			
PF	Input phase Loss	Abnormal fluctuations in the main circuit voltage	1. Check the main circuit power supply wiring 2. Check the power supply voltage
PF			

Display	Content	Cause	Corrective action
ud-C	Output under current detection	Output current < Output under current detection level	Set the level according to application
ud-[			
LF	Output phase loss	Loss of output voltage on any of the phases	1. Check output cable connection 2. Determine resistance between the lines 3. Check whether the terminals are loose
LF			
Faults which can be recovered manually but not automatically			
Display	Content	Cause	Corrective action
OC	Over-current during stop	Detection circuit malfunction	Consult with the supplier
OC			
OL1	Motor overload	loading too large	Consider increasing the Motor capacity
OL1			
OL2	Inverter overload	Excessive Load	Consider increasing the inverter capacity
OL2			
OL3	Over torque	1. Load too large 2. The setting of (8-15, 8-16) too small	1. Increase the inverter capacity 2. Set (8-15, 8-16) as needed
OL3			
LV-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely (fluctuates)	1. Improve power quality 2. Consider adding a reactor at the power input side
LV-C			
OVSP	Motor rotating too fast	Rotation speed and the set speed value vary widely	1. Load may be too large 2. Check if the set speed is correct.
OVSP			
LIFE1	Inrush current suppression circuit life expectancy alarm	Inrush current suppression circuit is damaged	Consult with the supplier
LIFE1			

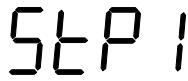
Display	Content	Cause	Corrective action
LIFE2	Control circuit capacitor life expectancy alarm	Control circuit capacitor is damaged	Consult with the supplier
			
LIFE3	Main Circuit Capacitor life expectancy alarm	Capacitor Main Circuit is damaged	Consult with the supplier
			
GF	Output side ground Fault	If ground fault detection is enabled by 08-18, then for any ground faults (short circuit to ground) the inverter output will switch off	1. Check the motor winding resistance for failures 2. Check the motor cable for ground short circuits 3. If the above is correct, then consult with the supplier
			

4.1.2 Keypad Operation Error Instruction

Display	Content	Cause	Corrective action
LOC	1. Parameter already locked 2. Motor direction locked 3. Parameter password (13 - 07) enabled	1. Attempt to modify frequency parameter while 13-06>0 2. Attempt to reverse direction when 11-00 = 1 3. Parameter (13 - 07) enabled, set the correct password will show LOC.	1. Adjust 13-06 2. Adjust 11-00
			
Err1	Keypad operation error	1. Press ▲ or ▼ while 00-05/00-06>0 or running at preset speed. 2. Attempt to modify the Parameter Can not be modified during operation (refer to the parameter list)	1. The ▲ or ▼ is available for modifying the parameter only when 00-05/00-06=0 2. Modify the parameter in STOP mode
			
Err2	Parameter setting error	1. 00-13 is within the range of (11-08 ± 11-11) or (11-09 ± 11-11) or (11-10 ± 11-11) 2. 00-12≤00-13 3. 00-05 = 00-06	1. Modify 11-08~11-10 or 11-11 2. Set 00-12>00-13 3. Set 00-05 and 00-06 to different value
			

Display	Content	Cause	Corrective action
Err5	Modification of parameter is not available in communication	1. Control command sent during communication 2. Attempt to modify the function 09-02 ~ 09-05 during communication	1. Issue enable command before communication 2. Set parameters 09-02 ~ 09-05 function before communication
			
Err6	Communication failed	1. Wiring error 2. Communication parameter setting error 3. Incorrect communication protocol	1. Check hardware and wiring 2. Check Functions (09-00~09-05)
			
Err7	Parameter conflict	1. Attempt to modify the function 13-00/13-08 2. Voltage and current detection circuit is abnormal	If reset is not possible, please consult with the supplier
			

4.1.3 Special conditions

Display	Fault	Description
StP0	Zero speed at stop	Occurs when preset frequency <0.1Hz
		
StP1	Fail to start directly On power up	If the inverter is set for external terminal control mode (00-02/00-03=1) and direct start is disabled (07-04=1) The inverter cannot be started and will flash STP1 The run input is active at power-up, refer to descriptions of (07-04)
		
StP2	Keypad Stop Operated when inverter in external Control mode	If the Stop key is pressed while the inverter is set to external control mode (00-02/00-03=1) then "STP2" flashes after stop. Release and re-activate the run contact to restart the inverter.
		
E.S.	External Rapid stop	When external rapid stop input is activated the inverter will decelerate to stop and the display will flash with E.S. message
		

Display	Fault	Description
b.b.	External base block	When external base block input is activated the inverter stops immediately and then the display will flash with b.b. message.
		
PdEr	PID feedback loss	PID feedback loss is detected.
		
AtEr	Auto tuning error	1. Motor nameplate data Input errors 2. Emergency stop is activated while auto tuning
		
FlrE	Fire Mode	1. Software rev below 1.1, the fire mode is enabled when 08-17 = 1 2. Software ver 1.1 and above, the fire mode is enabled when 03-00~03-05 =[28] 3. The display on the keypad indicates FlrE Under fire mode function, the inverter will run at full speed
		

4.2 General troubleshooting

Status	Checking point	Remedy
Motor runs in wrong direction	Is the wiring for the output terminals correct?	Wiring must match U, V, and W terminals of the motor.
	Is the wiring for forward and reverse signals correct?	Check for correct wiring
The motor speed can not be regulated	Is the wiring for the analog frequency inputs correct?	Check for correct wiring
	Is the setting of operation mode correct?	Check the Frequency Source set in parameters 00-05/00-06
	Is the load too excessive?	Reduce the load
Motor running speed too high or too low	Check the motor specifications (poles, voltage...) correct?	Confirm the motor specifications
	Is the gear ratio correct?	Confirm the gear ratio
	Is the setting of the highest output frequency correct?	Confirm the highest output frequency

Status	Checking point	Remedy
Motor speed varies unusually	Is the load too excessive?	Reduce the load
	Does the load vary excessively?	1. Minimize the variation of the load 2. Consider increasing the capacities of the inverter and the motor
	Is the input power erratic or is there a phase loss ?	1. Consider adding an AC reactor at the power input side if using single-phase power
		2. Check wiring if using three-phase power
Motor can not run	Is the power connected to the correct L1(L), L2, and L3(N) terminals? Is the charging indicator lit?	1. Is the power applied ? 2. Turn the power OFF and then ON again 3. Make sure the power voltage is correct 4. Make sure screws are secured firmly
	Is there voltage across the output terminals T1, T2, and T3?	Turn the power OFF and then ON again
	Is overload causing the motor to stall?	Reduce the load so the motor will run
	Are there any abnormalities in the inverter?	See error descriptions to check wiring and correct if necessary
	Is there a forward or reverse run command?	
	Has the analog frequency signal been input?	1. Is analog frequency input signal wiring correct? 2. Is voltage of frequency input correct?
	Is the operation mode setting correct?	Operate through the digital keypad

5. INSTRUCTIONS FOR UL

Safety Precautions



DANGER!

Electrical Shock Hazard

Do not connect or disconnect wiring while the power is on.

Failure to comply will result in death or serious injury.



WARNING!

Electrical Shock Hazard

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may show drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the drives and run the drives according to the instructions described in this manual.

Always ground the motor-side grounding terminal.

Improper equipment grounding could result in death or serious injury by contacting the motor case.

Do not touch any terminals before the capacitors have fully discharged.

Failure to comply could result in death or serious injury.

Before wiring terminals, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

Do not allow unqualified personnel to perform work on the drive.

Failure to comply could result in death or serious injury.

Installation, maintenance, inspection, and servicing must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of AC drives.

Do not perform work on the drive while wearing loose clothing, jewelry, or lack of eye protection.

Failure to comply could result in death or serious injury.

Remove all metal objects such as watches and rings, secure loose clothing, and wear eye protection before beginning work on the drive.

Do not remove covers or touch circuit boards while the power is on.

Failure to comply could result in death or serious injury.

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use an improper voltage source.

Failure to comply could result in death or serious injury by fire.

Verify that the rated voltage of the drive matches the voltage of the incoming power supply before applying power.

Do not use improper combustible materials.

Failure to comply could result in death or serious injury by fire.

Attach the drive to metal or other noncombustible material.

NOTICE

Observe proper electrostatic discharge procedures (ESD) when handling the drive and circuit boards.
Failure to comply may result in ESD damage to the drive circuitry.

Never connect or disconnect the motor from the drive while the drive is outputting voltage.
Improper equipment sequencing could result in damage to the drive.

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance. Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.

Do not modify the drive circuitry.

Failure to comply could result in damage to the drive and will void warranty.

Teco is not responsible for any modification of the product made by the user. This product must not be modified.

Check all the wiring to ensure that all connections are correct after installing the drive and connecting any other devices.

Failure to comply could result in damage to the drive.

UL Standards

The UL/cUL mark applies to products in the United States and Canada and it means that UL has performed product testing and evaluation and determined that their stringent standards for product safety have been met. For a product to receive UL certification, all components inside that product must also receive UL certification.



UL Standards Compliance

This drive is tested in accordance with UL standard UL508C and complies with UL requirements. To ensure continued compliance when using this drive in combination with other equipment, meet the following conditions:

• Installation Area

Do not install the drive to an area greater than pollution severity 2 (UL standard).

• Main Circuit Terminal Wiring

UL approval requires crimp terminals when wiring the drive's main circuit terminals. Use crimping tools as specified by the crimp terminal manufacturer. **Motovario** recommends crimp terminals made by NICHIFU for the insulation cap. The table below matches drives models with crimp terminals and insulation caps. Orders can be placed with a **Motovario** representative or directly with the Motovario sales department.

Closed-Loop Crimp Terminal Size

Drive Model	Wire Gauge		Terminal	Crimp Terminal	Tool	Insulation Cap
	mm², (AWG)					
EM16	R/L1 S/L2 T/L3	U/T1 V/T2 W/T3	Screws	Model No.	Machine No.	Model No.
EM16-123-0037	2.1(14)		M3.5	R2-3.5	Nichifu NH 1 / 9	TIC 2
EM16-123-0150	3.3(12)		M4	R3.5-4	Nichifu NH 1 / 9	TIC 3.5
EM16-340-0150	2.1(14)		M3.5	R2-3.5	Nichifu NH 1 / 9	TIC 2
EM16-340-0400	2.1(14)		M4	R2-3.5	Nichifu NH 1 / 9	TIC 2
EM16-340-1100	8.4(8)		M5	R8-5	Nichifu NH 1 / 9	TIC 8
EM16-340-1850	8.4(8)		M5	R8-5	Nichifu NH 1 / 9	TIC 8

Type 1

During installation, all conduit hole plugs shall be removed, and all conduit holes shall be used.

Recommended Input Fuse Selection

Drive Model EM16	Fuse Type	
	Manufacturer: Bussmann	
	Model	Fuse Ampere Rating (A)
200 V Class Single-Phase Drives		
EM16-123-0037	Bussmann 10CT/16CT	690V 10A / 690V 16A
EM16-123-0075	Bussmann 16CT/20CT	690V 16A / 690V 20A
EM16-123-0150	Bussmann 30FE	690V 30A
EM16-123-0220	Bussmann 50FE	690V 50A

Drive Model EM16	Fuse Type	
	Manufacturer: Bussmann	
	Model	Fuse Ampere Rating (A)
400 V Class Three-Phase Drives		
EM16-340-0075	Bussmann 10CT	690V10A
EM16-340-0150	Bussmann 16CT	690V 16A
EM16-340-0220	Bussmann 20CT	690V 20A
EM16-340-0400	Bussmann 25ET	690V 25A
EM16-340-0550	Bussmann 40FE	690V 40A
EM16-340-0750	Bussmann 50ET	690V 50A
EM16-340-1100	Bussmann 63ET	690V 63A
EM16-340-1500	Bussmann 80ET	690V 80A
EM16-340-1850	FERRAZ SHAWMUT A50QS100-4	500V 100A

• **Field Wiring Terminals**

All input and output field wiring terminals not located within the motor circuit shall be marked to indicate the proper connections that are to be made to each terminal and indicate that copper conductors, rated 80°C are to be used.

• **Drive Short-Circuit Rating**

This drive has undergone the UL short-circuit test, which certifies that during a short circuit in the power supply the current flow will not rise above value. Please see electrical ratings for maximum voltage and table below for current.

- The MCCB and breaker protection and fuse ratings (refer to the preceding table) shall be equal to or greater than the short-circuit tolerance of the power supply being used.
- Suitable for use on a circuit capable of delivering not more than (A) RMS symmetrical amperes for (Hp) Hp in 240/480 V class drives motor overload protection.

Horse Power (Hp)	Current (A)	Voltage (V)
0 -50	5,000	240 / 480

• **Drive Motor Overload Protection**

Set parameter 02-01 (motor rated current) to the appropriate value to enable motor overload protection. The internal motor overload protection is UL listed and in accordance with the NEC and CEC.

• **02-01 Motor Rated Current**

Setting Range: Model Dependent

Factory Default: Model Dependent

Set 02-01 to the full load amps (FLA) stamped on the nameplate of the motor.

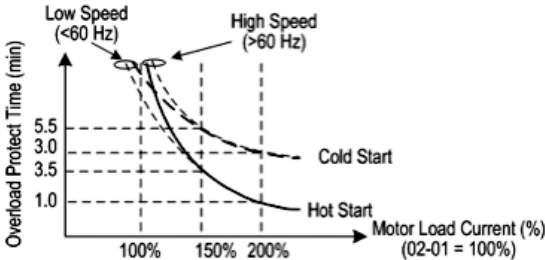
• **08-05 Motor Overload Protection Selection**

The drive has an electronic overload protection function (OL1) based on time, output current, and output frequency, which protects the motor from overheating. The electronic thermal overload function is UL-recognized, so it does not require an external thermal overload relay for single motor operation. This parameter selects the motor overload curve used according to the type of motor applied.

Overload Protection Settings

Setting	Description
XXXX0	Disabled
XXXX1	Enabled

Sets the motor overload protection function in 08-05 according to the applicable motor. Setting 08-05 = XXXX0. Disables the motor overload protection function when two or more motors are connected to a single inverter. Use an alternative method to provide separate overload protection for each motor such as connecting a thermal overload relay to the power line of each motor.



Motor Overload Protection Time

• 08-06 Motor Overload Operation Selection

Setting	Description
0	Free Run to Stop (default setting)
1	Alarm Only

6. PRÉFACE

- Le produit est un lecteur conçu pour commander un moteur à induction triphasé. Lire attentivement ce manuel pour garantir le bon fonctionnement, la sécurité et pour se familiariser avec les fonctions d'entraînement.
- Le lecteur est un appareil électrique / électronique et doit être installé et géré par un personnel qualifié.
- Une mauvaise manipulation peut entraîner un fonctionnement incorrect, cycle de vie plus court, ou l'échec de ce produit ainsi que le moteur.
- Tous les documents sont sujets à changement sans préavis. Soyez sûr d'obtenir les dernières éditions de l'utilisation ou visitez notre site Web.
- Lire le manuel d'instructions avant de procéder à l'installation, les connexions (câblage), le fonctionnement ou l'entretien et l'inspection.
- Vérifiez que vous avez une bonne connaissance de l'entraînement et de vous familiariser avec les consignes de sécurité et les précautions avant de procéder à fonctionner le lecteur.
- Prêter attention aux consignes de sécurité indiquées par l'avertissement ⚠ et symbole Attention ⚠.



AVERTISSEMENT!

Ignorer les informations indiquées par le symbole d'avertissement peut entraîner la mort ou des blessures graves.



ATTENTION!

ignorer les informations indiquées par le symbole de mise en garde peut entraîner des blessures mineures ou modérées et / ou des dommages matériels importants.

6.1 Consignes de sécurité

6.1.1 Avant d'alimenter le disque dur



AVERTISSEMENT!

- Le circuit principal doit être correctement câblée. Pour les terminaux monophasés d'approvisionnement de l'utilisation des intrants (R/L1, T/L3) et de trois bornes d'entrée de l'utilisation de l'offre de phase (R/L1, S/L2, T/L3). U/T1, V/T2, W/T3 ne doivent être utilisés pour connecter le moteur. Raccordement de l'alimentation d'entrée à l'un des U/T1, V/T2 W/T3 ou bornes risque d'endommager le lecteur.



ATTENTION!

- Pour éviter que le couvercle ne se désengage ou de tout autre dommage physique, ne portez pas le lecteur par son couverture. Soutenir le groupe par son dissipateur de chaleur lors du transport. Une mauvaise manipulation peut endommager le lecteur ou blesser le personnel, et doit être évitée.
- Pour éviter que les risques d'incendie, ne pas installer le lecteur sur ou à proximité d'objets inflammables. Installer sur des objets ininflammables comme les surfaces métalliques.
- Si plusieurs disques sont placés dans le même panneau de contrôle, fournir une ventilation adéquate pour maintenir la température en dessous de 40 ° C/104 ° F (50° C/122 ° F sans housse de protection) pour éviter la surchauffe ou incendie.
- Lors d'un retrait ou d'installation de l'opérateur numérique, éteignez-le d'abord, puis de suivre les instructions de ce manuel pour éviter les erreurs de l'opérateur ou de la perte de l'affichage causé par des connexions défectueuses.



AVERTISSEMENT!

- Lors d'un retrait ou d'installation de l'opérateur numérique, éteignez-le d'abord, puis de suivre les instructions de ce manuel pour éviter les erreurs de l'opérateur ou de la perte de l'affichage causé par des connexions défectueuses....

6.2 Câblage



AVERTISSEMENT!

- Coupez toujours l'alimentation électrique avant de procéder à l'installation d'entraînement et le câblage des terminaux utilisateurs.
- Le câblage doit être effectué par un personnel qualifié / électricien certifié.
- Assurez-vous que le lecteur est correctement mis à la terre. (220V Classe: impédance de mise à la terre doit être inférieure à 100Ω Classe 440V: Impédance de mise à la terre doit être inférieure à 10Ω.)
- Vérifier et tester mes circuits d'arrêt d'urgence après le câblage. (L'Installateur est responsable du câblage.)
- Ne touchez jamais de l'entrée ou de lignes électriques de sortie permettant directement ou toute entrée ou de lignes de puissance de sortie à venir en contact avec le boîtier d'entraînement.
- Ne pas effectuer un test de tenue en tension diélectrique (mégohmmètre) sur le disque dur ou cela va entraîner des dommages de lecture pour les composants semi-conducteurs.



ATTENTION!

- La tension d'alimentation appliquée doit se conformer à la tension d'entrée spécifiée par le lecteur. (Voir la section signalétique du produit).
- Raccorder la résistance de freinage et de l'unité de freinage sur les bornes assignées.
- Ne pas brancher une résistance de freinage directement sur les bornes CC P (+) et N (-), sinon risque d'incendie.
- Utilisez des recommandations de la jauge de fil et les spécifications de couple. (Voir Wire Gauge et la section de spécification de couple).
- Ne jamais brancher l'alimentation d'entrée aux bornes onduleur de sortie U/T1, V/T2, W/T3.
- Ne pas brancher un contacteur ou interrupteur en série avec le variateur et le moteur.
- Ne branchez pas un facteur condensateur de correction de puissance ou suppresseur de tension à la sortie du variateur.
- S'assurer que l'interférence générée par l'entraînement et le moteur n'a pas d'incidence sur les périphériques.

6.3 Avant l'opération



AVERTISSEMENT!

- Assurez-vous que la capacité du disque correspond aux paramètres de notation avant d'alimenter.
- Réduire le paramètre de la fréquence porteuse si le câble du variateur au moteur est supérieure à 80 pi (25 m). Un courant de haute fréquence peut être générée par la capacité parasite entre les câbles et entraîner un déclenchement de surintensité du variateur, une augmentation du courant ou d'une lecture actuelle inexacts.
- Veillez à installer tous les couvercles avant de l'allumer. Ne retirez pas les capots pendant que l'alimentation du lecteur est allumé, un choc électrique peut se produire autrement.
- Ne pas actionner d'interrupteurs avec les mains mouillées, un choc électrique pourrait survenir autrement.
- Ne touchez pas les bornes d'entraînement lorsqu'il est alimenté, même si le lecteur est arrêté, un choc électrique pourrait survenir autrement.

6.4 Configuration Paramètre



ATTENTION!

- Ne branchez pas une charge pour le moteur tout en effectuant un auto-tune.
- Assurez-vous que le moteur peut fonctionner librement et il y a suffisamment d'espace autour du moteur lors de l'exécution d'un auto-tune rotation.

6.5 Opération



AVERTISSEMENT!

- Veillez à installer tous les couvercles avant de l'allumer. Ne retirez pas les capots pendant que l'alimentation du lecteur est allumé, un choc électrique peut se produire autrement.
- Ne pas brancher ou débrancher le moteur pendant le fonctionnement. Le variateur pourrait se déclencher et ainsi endommager le lecteur.
- Les opérations peuvent commencer soudainement si une alarme ou un défaut est réarmé avec un ordre de marche active. Assurez-vous qu'un ordre de marche est actif lors de la réinitialisation de l'alarme ou de défaut, autrement des accidents peuvent se produire.
- Ne pas actionner d'interrupteurs avec les mains mouillées, un choc électrique pourrait survenir.
- Un interrupteur d'urgence externe indépendant est fourni, qui s'arrête en urgence vers le bas la sortie de l'onduleur en cas de danger.
- Si le redémarrage automatique après une récupération d'énergie est activée, le variateur démarrera automatiquement après le rétablissement du courant.
- Assurez-vous qu'il est sûr de faire fonctionner le variateur et le moteur avant d'effectuer un auto-tune rotation.
- Ne touchez pas les bornes d'entraînement lorsqu'il est alimenté même si l'onduleur s'est arrêté, un choc électrique pourrait survenir.
- Ne pas contrôler les signaux sur les circuits pendant que le lecteur est en marche.
- Après la mise hors tension, le ventilateur de refroidissement peut continuer à fonctionner pendant un certain temps.



ATTENTION!

- Ne touchez pas les composants générant de la chaleur tels que radiateurs et des résistances de freinage.
- Vérifiez soigneusement la performance du moteur ou de la machine avant d'utiliser à grande vitesse, sous peine de blessure.
- Notez les réglages des paramètres liés à l'unité de freinage lorsque applicable.
- Ne pas utiliser la fonction de freinage d'entraînement pour un maintien mécanique, sous peine de blessure.
- Ne pas contrôler les signaux sur les circuits pendant que le lecteur est en marche.

6.6 Entretien, Inspection et remplacement



AVERTISSEMENT!

- Attendre un minimum de 5 minutes après que l'alimentation a été débranchée avant de commencer une inspection. Vérifiez également que le voyant de charge est éteint et que la tension du bus cc a chuté au-dessous de 25Vdc.
- Ne jamais toucher les bornes à haute tension dans le lecteur.
- Assurez-vous que l'alimentation du lecteur est débranché avant de démonter le lecteur.
- Seul le personnel autorisé peuvent faire l'entretien, l'inspection et les opérations de remplacement. (Enlevez les bijoux en métal tels que les montres et les bagues et utiliser des outils isolés.).



ATTENTION!

- Le variateur peut être utilisé dans un environnement avec une gamme de température allant de 14 ° -104 ° F (10-40 ° C) et l'humidité relative de 95% sans condensation.
- Le variateur doit être utilisé dans un environnement sans poussière, gaz, vapeur et humidité.

6.7 Mise au rebut du variateur



ATTENTION!

- Jeter cet appareil avec soin comme un déchet industriel et selon les réglementations locales nécessaires.
- Les condensateurs du circuit principal d'entraînement et circuits imprimés sont considérés comme des déchets dangereux et ne doivent pas être brûlés.
- The Plastic enclosure and parts of the drive such as the top cover board will release harmful gases if burned.

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UE Declaration of Conformity MOTOVARIO S.p.A

Via Quattro Passi 1/3, 41043 Formigine (MO) Italy

Hereby declares that **the products:**

LM16 – 123 – 0018 / 0037 / 0075 / 0150 / 0220 – F20
LM16 – 340 – 0075 / 0150 / 0220 / 0400 / 0550 / 0750 / 1100 – F20
EM16 – 123 – 0037 / 0075 / 0150 / 0220 – F20
EM16 – 340 – 0075 / 0150 / 0220 / 0400 / 0550 / 0750 / 1100 / 1500 / 1850 – F20
EM16 – 123 – 0037 / 0075 / 0150 / 0220 – F – 66 – S
EM16 – 340 – 0075 / 0150 / 0220 / 0400 / 0550 / 0750 / 1100 – F – 66 – S
AM16 – 340 – 0075 / 0150 / 0220 / 0400 / 0550 / 0750 / 1100 / 1500 / 1850 / 2200 / 3000 / 3700 / 4500 / - F20
AM16 – 340 – 5500 – 20
AM16 – 340 – 7500 / 9000 – 00

Series No all in in conformity with the following directives (including all applicable amendments)

- 2014/35/UE Low Voltage Directive
- 2014/30/UE EMC Directive
and that the standards and/or technical specifications referenced below have been applied:
- EN 61800-5-1:2007 Adjustable speed electrical power drive systems – Part 5-1:
Safety requirements – Electrical , thermal and energy
- EN 61800-3:2004 Adjustable speed electrical power drive system. EMC requirements and specific test methods.

The materials employed for the motors production are in conformity with RoHS Directive 2011/65UE concerning the noxious substances use in electrical and electronic equipment restriction.

Additional Information:

All the inverters are provided with "CE" marking

Formigine, 28/04/2017

Direzione Generale
Maurizio Negro

A handwritten signature in black ink, appearing to read "Maurizio Negro".

MOTOVARIO S.p.A.

Sede legale: Galleria San Babila 4b - 20122 Milano - Italia - Cap. Sociale: Euro 18.010.000 i.v. R.E.A. di Milano n. 1863844 - P.IVA e C.F. 02569681204



EM16



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