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ELEMENT VFD CONTROLLER

Set Up Guide & Manual

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 (\blacklozenge)

Chapter 1 Safety Precautions

1.1 Before Power Up

Danger

Make sure the main circuit connections are correct. Single phase L1(L),L3(N), and Three phase L1(L),L2,L3(N); 400V : L1,L2,L3 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.
- If several inverters are placed in the same control panel, provide heat removal means to maintain the temperature below 50 degree C to avoid overheat or fire.
- When disconnecting the remote keypad, turn the power off first to avoid any damage to the keypad or the inverter.

Installation limitation, -10~50°C (cooling fan inside model), -10~40°C (without cooling fan inside model)

Warning

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.

▲ _{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 & 07-01.

1.3Before Operation

▲ Caution

- Make sure the model and inverter capacity 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 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.

Danger

- > 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.
- Note the settings related to the braking unit.
- 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 40°C) and relative humidity of 95%.

Note: models with fan : -10~50 $^\circ\!\mathrm{C}$, models without fan : -10~40 $^\circ\!\mathrm{C}$

Danger

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

1.5 Inverter Disposal

ACaution

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.



Equipment containing electrical components may not be disposed of together with

domestic waste. It must be separately collected with electrical and electronic waste according to local and currently valid legislation.

1.6 Guaranteed Liability Exemption

Loss of opportunity caused by the company's products, damage to customers of your company or your company, damage to non-company products, or compensation for other businesses, whether within the warranty period or not, is not covered by the company.

Chapter 2 Environment & Installation

2.1 System Diagram

	Power supply:
Power Supply	\wedge
	 Make sure the correct voltage is applied to avoid damaging the
	inverter.
Molded	Molded-case circuit breaker (MCCB) or fused disconnect:
Circuit	 A molded-case circuit breaker or fused disconnect must be installed
Breaker	between the AC source and the inverter that conforms to the rated
	voltage and current of the inverter to control the power and protect the
	inverter.
Magnetic	Do not use the circuit breaker as the run/stop switch for the
Contactor	inverter.
	Ground fault detector / breaker:
	\mathbf{A}
	Install a ground fault breaker to prevent problems caused by
	current leakage and to protect personnel. Select current range up to
AC	200mA, and action time up to 0.1 second to prevent high frequency
Reactor	failure.
	Magnetic contactor:
	 Normal operations do not need a magnetic contactor. When performing
Fast	functions such as external control and auto restart after power failure, or
	when using a brake controller, install a magnetic contactor.
Euco	
luse	• Construction of the magnetic contactor as the run/stop switch for
	the inverter.
\sim	AC line reactor for power quality:
Input Noise	 When inverters are supplied by a high capacity power source (>
Filter	600KVA), an AC reactor can be connected to improve the power factor.
	Install Fast Acting Fuse:
* *	• To protect peripheral equipment, install fast acting fuses in accordance
	with the specifications in the instruction manual for peripheral devices.
	Input Noise filter:
888.88	• A filter must be installed when there are inductive loads affecting the
	inverter. The inverter meets EMC standard when the special filter is
Inverter	used. See the instruction manual for peripheral devices.
	Inverter:
	• Output terminals T1, T2, and T3 are connected to U, V, and W terminals
Ground	of the motor. If the motor runs in reverse while the inverter is set to run
	forward, swap any two terminals connections for T1, T2, and T3.
~	
	To avoid damaging the inverter, do not connect the output
Filter	terminals T1, T2, and T3 to AC input power.
Filler	$\mathbf{\Lambda}$
~	• Connect the ground terminal properly. (200V class: Rg <100 Ω ;
	400V class: Rg <10Ω.)
	Output Noise filter:
	 An output noise filter may reduce system interference and induced
	noise.
Induction F	Motor:
Motor	 If the inverter drives multiple motors the output rated current of the
	inverter must be greater than the total current of all the motors.
Ground 🔟	

2.2 Standard wiring 2.2.1 Single phase (NPN) input



Model:

100V : L510-1P2-SH1-N, L510-1P5-SH1-N, L510-101-SH1-N 200V : L510-2P2-SH1(F)-N, L510-2P5-SH1(F)-N, L510-201-SH1(F)-N, L510-202-SH1(F)-N, L510-203-SH1(F)-N

2.2.2 Single phase (PNP) input





2.2.3 Three phase (NPN) input



Model:

- 200V : L510-2P2-SH3-N, L510-2P5-SH3-N, L510-201-SH3-N L510-202-SH3-N, L510-203-SH3-N
- 400V: L510-401-SH3-N, L510-402-SH3-N, L510-403-SH3-N

2.2.4 Three phase (PNP) input



Model:



2.2.5 NPN/PNP selectable models



Model:

- 200V: L510-205-SH3, L510-208-SH3, L510-210-SH3
- 400V : L510-405-SH3(F), L510-408-SH3(F), L510-410-SH3(F), L510-415-SH3(F)

NPN/PNP input is selected by "SC" terminal.

If you need to use NPN input, please you shorted +24V and SC terminal. If you need to use PNP input, please you shorted COM and SC terminal.

Notes : If the SC terminal does not be connected correctly, the functions of group 3 will be malfunctioned.

2.3 Terminal Description 2.3.1 Description of main circuit terminals

Terminal symbols	TM1 Function Description
L1(L)	Main power input, single phase: L1(L) / L3(N)
L2	three phase(200V): L1(L) / L2 / L3(N)
L3(N)	three phase(400V): L1 / L2 / L3
P*	ovtornally connected braking register
BR*	
T1	
T2	Inverter output, connect to U, V, W terminals of motor
Т3	
	Ground terminal

*P,BR for 205/208/210/401/402/403/405/408/410/415 series

Single phase



Note: the screw on L2 terminal is removed for the single phase input supply models.

Three phase(200V series)



Three phase (205 & 208 & 210 & 400V series)



2.3.2 Description of control circuit terminals

Framel&Fram	lez	
Terminal symbols	TM2 Function Description	Signal Level
RA	Relay output terminal, Specification:	
RB	250VAC/1A(30VDC/1A)	230 VAC/ TA(30 VDC/ TA)
COM	S1~S5 (COMMON) 【NPN】	±15%,Max output current
24V	S1~S5 (COMMON) 【PNP】	30mA
S1		
S2		24 VDC, 4.5 mA, Optical
S3	Multi-function input terminals(refer to group3)	(Max voltage 20 Vde
S4		Input impedance 6kO)
S5		
10V	Built in Power for an external speed potentiometer	10V,(Max current:20mA)
AVI	Analog voltage input, Specification : 0/2~10VDC (choose by parameter 04-00)	0~10V(Input impedance 200kΩ)
ACI	Analog current input, Specification : 0/4~20mA (choose by parameter 04-00)	0~20mA(Input impedance 249Ω)
AO	Multi-function analog output terminal. Maximum output 10VDC/1mA	0~10V(Max current 2mA)
AGND	Analog ground terminal	

Frame1&Frame2

NPN:



PNP:



Frame3&Frame4			
Terminal symbols	TM1 Function Description		
RA	Delay autout terminal Cassification, 250\/AC/5A/20\/DC/5A)		
RB	Relay output terminal, Specification: 250 VAC/5A(30 VDC/5A)		
RC	TA. Normally open TD. Normally close TTO. common point		

Terminal symbols	TM2 Function Description	Signal Level	
+24V	Common point of PNP input		
	NPN/PNP selectable terminal.		
SC	NPN input: +24V&SC need to be shorted.	±15%,Max output current 30mA	
	PNP input: COM&SC need to be shorted.		
COM	voltage reference point for S1~S5		
S1~S5	Multi-function input terminals(refer to group3)	24 VDC, 4.5 mA, Optical coupling isolation (Max,voltage30 Vdc, Input impedance 6kΩ)	
10V	Built in Power for an external speed potentiometer (Max output : 20mA)	10V,(Max current:20mA)	
AVI/PTC	Analog voltage input/motor over temperature protection signal input, Specification : 0~10VDC	0~10V(Input impedance 200kΩ)	
ACI	Analog current input, Specification : 0~20mA / 4~20mA(choose by parameter 04-00)	0~20mA(Input impedance 249Ω)	
AO	Multi-function analog output terminal. Maximum output 10VDC/1mA	0~10V(Max current 2mA)	
AGND	Analog ground terminal		

NPN/PNP:



Chapter 3 Software Index 3.1 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(Auto Sequencer) function
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 function
Group 14	PUMP Application Function

	Parameter notes for Parameter Groups			
*1	Parameter can be adjusted during running mode	\diamondsuit : Revised in version 07		
*2	Cannot be modified in communication mode			
*3	Does not change with factory reset			
*4	Read only			

Group 00- The basic parameters group				
No.	Description	Range	Factory Setting	Note
00-00	control	0: V/F mode	0	
	mode	1: SLV mode	U	
00-01	Motor	0: Forward	0	*1
	rotation	1: Reverse	-	
	Main Run	0: Keypad		
00-02	Source	1: External	1	
	Selection	Run/Stop Control		
		2. Communication		
	Alternative	U. Neypau 1: External Bun/Ston		
00-03	Run Sourco	Control	0	
	Selection	2: Communication		
	Ocicetion			
		0. Fulwalu/ Ston-Reverse/Ston		
		1. Run/		
	Operation	Ston-Reverse/Forward		
00-04	modes for	2: 3-Wire Control	0	\diamond
	external	Mode-Run/Stop	Ũ	~
	terminals	3: 2-Wire		
		self-holding		
		Run/Stop		
		0: Keypad		
		1: Potentiometer		
		on Keypad		
		2: External AVI	1	
		Analog Signal		
		Input		
	Main	3: External ACI		
00-05	Frequency	Analog Signal		
	Source	Input		
	Selection	4: External		
		Up/Down		
		Frequency Control		
		setting Frequency		
		6. PID output		
		frequency		
	<u> </u>	0: Keypad		
		1: Potentiometer		
		on Keypad		
		2: External AVI		
		Analog Signal		
		Input		
	Alternative	3: External ACI		
00-06	Frequency	Analog Signal	0	
00-00	Source	Input	Ū	
	Selection	4: External		
		Up/Down		
		Frequency Control		
		5: Communication		
		nequency.		
	Main and	0. Maill Ul Alternative		
	Alternative	Frequency		
00-07	Frequency	1: Main frequency	0	
	Command	+ Alternative		
	modes	Frequency		
	l	<u> </u>	I	

Gro	oup 00- Th	ne basic param	<mark>eters gr</mark>	oup
No.	Description	Range	Factory Setting	Note
00-08	Communicat ion Frequency Command	0.00~599.00		*4
00-09	Frequency command Save mode (Communica tion mode)	0: Save the frequency before power down 1: Save the communication frequency	0	
00-10	Initial Frequency Selection (keypad mode)	0: by Current Frequency Command 1: by 0 Frequency Command 2: by 00-11	0	
00-11	Initial Frequency Keypad mode	0.00~599.00	50.00/ 60.00	
00-12	Frequency Upper Limit	0.01~599.00	50.00/ 60.00	
00-13	Frequency Lower Limit	0.00~598.99	0.00	
00-14	Acceleration Time 1	0.1~3600.0	3.00	*1
00-15	Deceleration Time 1	0.1~3600.0	3.00	*1
00-16	Acceleration Time 2	0.1~3600.0	10.0	*1
00-17	Deceleration Time 2	0.1~3600.0	10.0	*1
00-18	Jog Frequency	1.00~25.00	2.00	*1
00-19	Jog Acceleration Time	0.1~25.5	0.5	*1
00-20	Jog Deceleration Time	0.1~25.5	0.5	*1
00-21	Application Field Selection	0: Disable 3: Constant Pressure Application	0	\diamond

Group 01- V/F Pattern selection & Setup					
No.	Description	Range	Factory Setting	Note	
01-00	Volts/Hz Patterns	1~7	1/4		
01-01	V/F Max voltage	200V:170.0~ 264.0 400V:323.0~ 528.0	Based on 13-08		
01-02	Max Frequency	0.2 ~ 599.00	50.00/ 60.00		

Group 01- V/F Pattern selection & Setup				&
No.	Description	Range	Factory Setting	Note
01-03	Max Frequency Voltage Ratio	0.0 ~ 100.0	100.0	
01-04	Mid Frequency 2	0.1 ~ 599.00	2.50/3.00	
01-05	Mid Frequency Voltage Ratio 2	0.0 ~ 100.0	7.5/6.8	\diamond
01-06	Mid Frequency 1	0.1 ~ 599.00	2.50/3.00	
01-07	Mid Frequency Voltage Ratio 1	0.0 ~ 100.0	7.5/6.8	\diamond
01-08	Min Frequency	0.1 ~ 599.00	1.30/1.50	
01-09	Min Frequency Voltage Ratio	0.0 ~ 100.0	4.5/3.4	\diamond
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	
01-12	No-load oscillation suppression gain	0.0~200.0	0	
01-13	Motor Hunting Prevention Coefficient	1~8192	800	
01-14	Motor Hunting Prevention Gain	0~100	0	\diamond
01-15	Motor Hunting Prevention Limit	0~100.0	5.0	
01-16	Auto-Torque Compensation Filter Coefficient	0.1~1000.0	0.1	
01-17	Auto-torque Compensatio n Gain	0~100	0	
01-18	Auto-torque Compensatio n Frequency	1.30~5.00	2	

Group 02- Motor parameters				
No.	Description	Range	Factory Setting	Note
02-00	Motor No Load Current		by motor nameplate	
02-01	Motor Rated Current (OL1)		by motor nameplate	
02-02	V/F Slip Compensation	0.0 ~ 100.0	0.0	*1
02-03	Motor Rated Speed		by motor nameplate	
02-04	Motor Rated Voltage		by motor nameplate	
02-05	Motor Rated Power	0~22.0	by motor nameplate	
02-06	Motor Rated Frequency	0~599.0	by motor nameplate	
02-07	Motor Auto Tuning	0: Disable 1: Static auto tuning	0	
02-08	Stator Resistor Gain	0~600	by series	
02-09	Rotor Resistor Gain	0~600	by series	
02-10 ~		Reserved		
02-12			1	
02-13	Compensatio n Gain	0~200	by series	
02-14	SLV Torque Compensatio n Gain	0~200	100	
02-15	Low Frequency Torque Gain	0~100	50	
02-16	SLV Without Load Slip Compensation Gain	0~200	by series	
02-17	SLV With Load Slip Compensation Gain	0~200	150	
02-18	SLV With Load Torque Compensation Gain	0~200	100	
02-19	SLV Slip Compensation Select	0: Slip Compensation 1 2: Slip Compensation 2	0	

Group 03- Multi function Digital			I		Group 03- Multi function Digital					
	lr	nputs/Outputs	Fastan		-	Inputs/Outputs				
No.	Description	Range	Factory Setting	Note		No.	Description	Range	Factory Setting	Note
03-00	Multifunction Input Term. S1	0: Forward/Stop Command or Run /Stop 1: Reverse/Stop Command Or REV/FWD 2: Preset Speed setting bit 0 (5-02) 2: Preset Speed	0		-	03-08	S1~S5 scan confirmation	2: Preset frequency is held as the inverter stops, and the UP/Down is available. 1~200. Number of Scan cycles	10	
03-01	Multifunction Input Term. S2	setting bit 1 (5-03) 4: Preset Speed setting bit 2 (5-05) 6: Jog Forward Command 7: Jog Reverse Command 8: Up Command 9: Down Command 10: Acc/Dec 2	1			03-09	S1~ S5 switch type select	xxxx0.S1 NO xxxx1:S1 NC xxx0x:S2 NO xxx1x:S2 NC xx0xx:S3 NO xx1xx:S3 NC x0xxx:S4 NO x1xxx:S4 NC 0xxxx:S5 NO 1xxxx:S5 NC	00000	
						03-10		Reserved		
03-02	Multifunction Input Term. S3	Disabled 12: Main / Alternative Run Command select 13: Main / Alternative Frequency	2					0: Run 1: Fault 2: Setting Frequency Reached 3: Frequency Reached (2, 12, 2, 14)		
03-03	Multifunction Input Term. S4	Command select 14: Rapid Stop (Decel to stop) 15: Base Block 16: Disable PID Function 17: Reset 18: Auto Run Mode	ommand select I: Rapid Stop Decel to stop) 5: Base Block 3 5: Disable PID unction 7: Reset 8: Auto Bun Mode			(3-13±3-14) 4: Output Frequency Detection1(> 3-13) 5: Output Frequency Detection2(< 3-13) 6: Auto-Restart				
03-04	Multifunction Input Term. S5	enable 19: Forced Frequency Run(pump model only) 20: Switch to Constant Pressure 2(pump model only)	17			03-11	Output Relay(RY1)	7: Momentary AC Power Loss 8: Rapid Stop 9: Base Block 10: Motor Overload Protection(OL1) 11: Drive Overload Protection(OL2) 12: Beserved	1	
03-05	Llp/Down	Reserved						13: Output Current		
03-06	frequency band	0.00~5.00	0.00					Reached 14: Brake Control 15: PID feedback		
03-07	Up/Down Frequency modes	U: Preset frequency is held as the inverter stops, and the UP/Down function is disabled. 1: Preset frequency is reset to 0 Hz as the	0		-			disconnection detection 16: High Pressure Detection 17: Low Pressure Detection 18: Pressure Loss Detection		
		inverter stops.				03-13	output frequency detection	0.00~599.00	0.00	*1

Group 03- Multi function Digital								
No.	Description	Ran	ge	Factory Setting	Note			
	level (Hz)							
03-14	Frequency Detection band	0.00~30.00)	2.00	*1			
03-15	Output Current Detection Level	0.1~999.9		0.1				
03-16	Output Current Detection Period	0.1~10.0		0.1				
03-17	External Braking Release Ievel	0.00~20.00)	0.00				
03-18	External Braking Engage Level	0.00~20.00)	0.00				
03-19	Relay Output function type	0: A (Normally open) 1: B (Normally close)		0				
	Braking	100/200V: 240.0~400.0V	100/220/2 30V:	380	_			
03-20	I ransistor	400V:	380/400V:	690	\diamond			
		500.0~800.0V	415/460V:	780				
00.01	Braking	100/200V: 240.0~400.0V	100/220/2 30V:	360	\diamond			
03-21	I ransistor	400V:	380/400V:	650				
	UTI Level	500.0~800.0V	415/460V:	740				

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

	Group 04- Analog signal inputs/ Analogue output functions							
No.	Description		Ranç	je	Factory Setting	Note		
			AVI	ACI				
	AVI/ACI analag Input	0:	0~10V	0~20mA				
04-00	analog input	1:	0~10V	4~20mA	0			
	signal type	2:	2~10V	0~20mA				
	501001	3:	2~10V	4~20mA				
04-01	AVI Signal Verification Scan rate	1~200			50			
04-02	AVI Gain	0 ~	1000		100	*1		
04-03	AVI Bias	0 ~	100		0	*1		
04-04	AVI Bias	0:F			0	*1		
04-05	AVI Slope	0: F 1: N	Positive Vegative	•	0	*1		
04-06	ACI Signal Verification Scan rate	1~2	200		50			
04-07	ACI Gain	0~	1000		100	*1		

Group 04- Analog signal inputs/ Analogue output functions

	Androg	ue output fune			
No.	Description	Range	Factory Setting	Note	
04-08	ACIBias	0 ~ 100	0	*1	
04-09	ACI Bias Selection	0: Positive 1: Negative	0	*1	
04-10	ACI Slope	0: Positive 1: Negative	0	*1	
04-11	Analog Output mode(AO)	0: Output Frequency 1: Frequency Command 2: Output Voltage 3: DC Bus Voltage 4: Motor 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	Potentiomet er Gain on Keypad	0~1000	100	*1	
04-17	Potentiomet er Bias on Keypad	0~100	0	*1	
04-18	Potentiomet er Bias Selection on Keypad	0: Positive 1: Negative	0	*1	
04-19	Potentiomet er Slop on Keypad	0: Positive 1: Negative	0	*1	

Gro	Group 05- Preset Frequency Selections.							
No.	Description	Range	Factory Setting	Note				
05-00	Preset Speed Control mode Selection	0: Common Accel/Decel Accel/Decel 1 or 2 apply to all speeds 1: Individual Accel/Decel Accel/ Decel 0-7 apply to the selected preset speeds (Acc0/Dec0~ Acc7/Dec7)	0					
05-01	Preset Speed 0 (Keypad Freq)	,	5.00	*1				
05-02	Preset Speed1 (Hz)	0.00 ~ 599.00	5.00	*1				

Gro	up 05- Pre	eset Frequency	Selection	ons.
			Factory	
No.	Description	Range	Setting	Note
	Preset			
05-03	Speed2		10.00	*1
	(Hz)			
	Preset			
05-04	Speed3		20.00	*1
	(Hz)			
	Preset			
05-05	Speed4		30.00	*1
	(Hz)			
	Preset			
05-06	Speed5		40.00	*1
	(Hz)			
	Preset			
05-07	Speed6		50.00	*1
	(Hz)			
	Preset		50.00	*4
05-08	Speed/		50.00	*1
05.00	(HZ)			
05-09		Decembral		
~ 05 10		Reserved		
03-10	Dreast	[
05 17	Presel		10.0	*1
05-17	speedu-Acc		10.0	I
-	uiiie Drooot			
05-18	Fresei Spood0-Doo		10.0	*1
05-10	Speedo-Dec		10.0	1
	Prosot			
05-19	Speed1-Acc		10.0	*1
05-15	time		10.0	
-	Preset			
05-20	Speed1-Dec		10.0	*1
00 20	time		10.0	
	Preset			
05-21	Speed2-Acc		10.0	*1
	time			
	Preset			
05-22	Speed2-Dec		10.0	*1
	time			
	Preset			
05-23	Speed3-Acc	0.1 ~ 3600.0	10.0	*1
	time			
	Preset			
05-24	Speed3-Dec		10.0	*1
	time			
	Preset			
05-25	Speed4-Acc		10.0	*1
	time			
	Preset			
05-26	Speed4-Dec		10.0	*1
	time			
	Preset			
05-27	Speed5-Acc		10.0	*1
	time			
	Preset			
05-28	Speed5-Dec		10.0	*1
	time			
	Preset			
05-29	Speed6-Acc		10.0	*1
	time			

Gro	Group 05- Preset Frequency Selections.						
No.	Description	Range	Factory Setting	Note			
05-30	Preset Speed6-Dec time		10.0	*1			
05-31	Preset Speed7-Acc time		10.0	*1			
05-32	Preset Speed7-Dec time		10.0	*1			

Gr	oup 06- A	uto Run(Auto S function	equenc	er)
No.	Description	Range	Factory Setting	Note
06-00	Auto Run (sequencer) mode selection	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). 6: Single cycle, then hold the speed of final step to run (Starts a new cycle if restarted).	0	
The	frequency o command	f the Auto _ Run Mo 0 is set by paramete	ode freque er 05-01	ency
06-01	Auto _ Run Mode frequency command 1	0.00~599.00	0.00	*1
06-02	Auto _ Run Mode frequency command 2		0.00	*1
06-03	Auto _ Run Mode frequency command 3		0.00	*1

Gr	oup 06- A	uto Run(Auto S function	equenc	er)
No.	Description	Range	Factory Setting	Note
06-04	Auto _ Run Mode frequency command 4		0.00	*1
06-05	Auto _ Run Mode frequency command 5		0.00	*1
06-06	Auto _ Run Mode frequency command 6		0.00	*1
06-07	Auto _ Run Mode frequency command 7		0.00	*1
06-08 ~		Reserved		
06-15 06-16	Auto_ Run Mode running time setting 0		0.0	*1
06-17	Auto_Run Mode running time setting 1		0.0	*1
06-18	Auto_ Run Mode running time setting 2		0.0	*1
06-19	Auto_ Run Mode running time setting 3	0.0 ~ 3600.0	0.0	*1
06-20	Auto_ Run Mode running time setting 4	0.0 * 3000.0	0.0	*1
06-21	Auto_ Run Mode running time setting 5		0.0	*1
06-22	Auto_ Run Mode running time setting 6		0.0	*1
06-23	Auto_ Run Mode running time setting 7		0.0	*1
06-24 ~		Reserved		
06-31				
06-32	Mode running direction 0	0: Stop 1: Forward 2: Reverse	0	

Group 06- Auto Run(Auto Sequencer) function							
No.	Description	Range	Factory Setting	Note			
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				
06-38	Auto_ Run Mode running direction 6		0				
06-39	Auto_ Run Mode running direction 7		0				

Gr	Group 07- Start/Stop command setup						
No.	Description	Range	Factory Setting	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	0.0~6000.0	0.0				
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 After Power Up	0: Enable Direct run on power up 1: Disable Direct run on power up	1				
07-05	Delay-ON Timer	1.0~300.0	1.0				
07-06	DC Injection	0.10 ~ 10.00	1.5				

Gr	oup 07- S	tart/Stop comm	and set	up
No.	Description	Range	Factory Setting	Note
	Brake Start Frequency (Hz) In Stop mode			
07-07	DC Injection Brake Level (%) In stop	0 ~ 20 (Frame1/2). Based on the 20% of maximum output voltage	5	
	mode	0 ~ 100 (Frame3/4) based on the rated current	50	
07-08	DC Injection Brake Time (Seconds) In stop mode	0.0 ~ 25.5	0.5	
07-09	Stopping Method	0: Deceleration to stop 1: Coast to stop	0	
07-10	DC Braking Level at Start	0 ~ 20 (Frame1/2). Based on the 20% of maximum output voltage	0	
		0 ~ 100 (Frame3/4) based on the rated current	50	
07-11	DC Braking Time at Start	0.0~25.5	0.0	
07-12	Run Command Retention	0: Run command retention during power loss 1: Run command not retained during power loss	1	

Note:

Set 14-00=0, 07-12 will be set to 1 automatically. Set 14-00=1, 07-12 will be set to 0 automatically.

Gı	oup 08-	Drive & Motor I functions	Protecti	on
No.	Description	Range	Factory Setting	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	00000	

Gı	Group 08- Drive & Motor Protection functions				
No.	Description	Range	Factory Setting	Note	
		Prevention in Run Mode x0xxx: Enable over voltage Prevention in Run Mode x1xxx: Disable over voltage Prevention in Run Mode			
08-01	Trip Prevention Level During Acceleration (%)	50 ~ 200	by series		
08-02	Trip Prevention Level During Deceleration (%)	50 ~ 200	by series		
08-03	Trip Prevention Level In Run Mode (%)	50 ~ 200	by series		
08-04	over voltage Prevention Level in Run Mode	200V: 350.0~390.0 400V: 700.0~780.0	380.0/76 0.0	*1	
08-05	Electronic Motor Overload Protection Operation Mode	xxxx0: Disable Electronic Motor Overload Protection xxxx1: Enable Electronic Motor Overload Protection xxx0x: Motor Overload Cold Start xxx1x: Motor Overload Hot Start xx0xx: Standard Motor xx1xx: Invertor Duty Motor (Force Vent)	00001		
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		

Group 08- Drive & Motor Protection functions					
No.	Description	Range	Factory Setting	Note	
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 1: AVR function Disable 2: AVR function disable for stop 3: AVR function disable for deceleration 4: AVR function disable for stop and deceleration. 5: When VDC>(360V/740V) , AVR function disable for stop and deceleration.	4		
08-09	Input phase lost protection	0: Disabled 1: Enabled	0		
08-10	PTC Overheat Function	0: Disable 1: Decelerate to stop 2: Coast to stop 3: Continue running, when warning level is reached. Coast to stop, when protection level is reached.	0		
08-11	PTC Signal Smoothing Time	0.01~10.00	0.2		
08-12	PTC Detection Time Delay	1~300	60		
08-13	PTC Protection Level	0.1~10.0	0.7		
08-14	PTC Detection Level Reset	0.1~10.0	0.3		
08-15	PTC Warning Level	0.1~10.0	0.5		
08-16	Fan Control Temperatur e Level	10.0~50.0	50.0		
08-17	Over current protection level	0.0 ~ 60.0	0.0		

G	Group 08- Drive & Motor Protection functions					
No.	Description	Range	Factory Setting	Note		
08-18	Over current protection time	0.0 ~ 1500.0	1.0			
08-19	Motor Overload Protection Level	0: Motor Overload Protection Level 0 1: Motor Overload Protection Level 1 2: Motor Overload Protection Level 2	0			

G	Group 09- Communication function setup				
No.	Description	Range	Factory Setting	Note	
09-00	Assigned Communicat ion Station Number	1 ~ 32	1	*2*3	
09-01	Communicat ion Mode Select	0: Modbus RTU code 1: Modbus ASCII code 2: BACnet	0	*2*3	
09-02	Baud Rate Setting (bps)	0 :4800 1: 9600 2: 19200 3: 38400 4: Remote Control is enabled	2	*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	Communicat ion time-out detection time	0.0 ~ 25.5	0.0		
09-07	Communicat ion 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	Error 6 verification time.	0 ~ 20	3		
09-09	Drive Transmit delay Time (ms)	5 ~ 65	5		
09-10	BACnet stations	1~254	1	*2*3	

Group10- PID function Setup				
No.	Description	Range	Factory Setting	Note
10-00	PID target value selection (when 00-05\00-06 =6 ,this function is enabled)	0: Potentiometer on Keypad 1: Analog Signal Input. (AVI) 2: Analog Signal Input. (ACI) 3: Frequency set by communication 4: KeyPad Frequency parameter 10-02 5: Preset frequency	1	*1
10-01	PID feedback value selection	0: Potentiometer on Keypad 1: Analog Signal Input. (AVI) 2: Analog Signal Input. (ACI) 3: Communication Setting Frequency	2	*1
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. 5: Frequency Command + Deviation D Control. FWD Characteristic. 6: Frequency Command + Feedback D Control FWD Characteristic. 7: Frequency Command + Deviation D Control FWD Characteristic. 7: Frequency Command + Deviation D Control FWD Characteristic. 8: Frequency Command + Deviation D Control Reverse Characteristic. 8: Frequency Command + Feedback D Control Reverse Characteristic. 8: Frequency Command + Feedback D Control Reverse Characteristic. 1: Frequency Command + Deviation D Control Reverse Characteristic. 1: Frequency Command + Deviation D Control Reverse Characteristic. 1: Frequency Command + Deviation D Control Reverse Characteristic. 1: Frequency Command + Deviation D Control Reverse Characteristic. 2: Frequency Command + Feedback D Control Reverse Characteristic. 2: Frequency Command + Feedback D Control Reverse Characteristic. 2: Frequency Command + Feedback D Control Reverse Characteristic. 2: Frequency Command + Feedback D Control Reverse Characteristic. 3: Frequency Command + Feedback D Control Reverse Characteristic.	0	
10-04	Feedback Gain Coefficient	0.00 ~ 10.00	1.00	*1

	Group10- PID function Setup				
No.	Description	Range	Factory Setting	Note	
10-05	Proportional Gain	0.0 ~ 10.0	3.0	*1	
10-06	Integral Time	0.0 ~ 100.0	0.5	*1	
10-07	Derivative Time	0.00 ~ 10.00	0.00	*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	*1	
10-11	Feedback Loss Detection Mode	0: Disabled 1: Drive keeps running after feedback loss 2: 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		
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: 1 Second 30: 30 Seconds (0 ~ 30)	0		
10-16	Allowable Integration Error Margin (units)(1unit = 1/8192)	0 ~ 100	0		
10-17	PID Sleep Frequency Level	0.00~599.00	0.00		
10-18	PID Sleep Function Delay Time	0.0 ~25.5	0.0		
10-19	PID Wake up frequency Level	0.00 ~ 599.00	0.00		
10-20	PID Wake up function Delay Time	0.0 ~ 25.5	0.0		
10-21	Max PID Feedback Setting	0 ~999	100	*1	
10-22	Min PID	0 ~999	0	*1	

	Group10- PID function Setup				
No.	Description	Range	Factory Setting	Note	
	Feedback Setting				

	Group11- Performance Control functions					
No.	Description	Range	Factory Setting	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			
11-02	Carrier mode Selection	0: Mode0, 3phase PWM modulation 1: Mode1, 2phase PWM modulation 2: Mode2, 2phase soft PWM modulation	1			
11-03	Carrier Frequency Reduction by temperature rise	0: disabled 1: enabled	0			
11-04	S-Curve Acc 1	0.0 ~ 4.0	0.00			
11-05	S-Curve Acc 2	0.0 ~ 4.0	0.00			
11-06	S-Curve Dec 3	0.0 ~ 4.0	0.00			
11-07	S-Curve Dec 4	0.0 ~ 4.0	0.00			
11-08	Skip Frequency 1	0.00 ~ 599.00	0.00	*1		
11-09	Skip Frequency 2	0.00 ~ 599.00	0.00	*1		
11-10	Skip Frequency 3	0.00 ~ 599.00	0.00	*1		
11-11	Skip Frequency Bandwidth (±)	0.00 ~ 30.00	0.00	*1		
11-12		Reserved	1	1		
11-13	Regeneratio n Prevention Function	0: Disable 1: Enable 2: Enable (during constant speed only)	0			
11-14	Regeneration Prevention Voltage Level	200v: 300.0~400.0 400v: 600.0~800.0	380/760			

	Group11- Performance Control functions				
No.	Description	Range	Factory Setting	Note	
11-15	Regeneration Prevention Frequency Limit	0.00~15.00	3.00		
11-16	Regeneration Prevention Voltage Gain	0~200	100		
11-17	Regeneration Prevention Frequency Gain	0~200	100		
11-18	Speed loop proportion gain	0~65535	10000		
11-19	Speed loop integration gain	0 ~65535	800		
11-20	Speed loop differential gain	0 ~65535	0		
11-21	Stop Key Selection	0: Enable Stop Key when Run Command not from Keypad 1: Disable Stop Key when Run Command not from Keypad	0		

Group12 Digital Display & Monitor functions					
No.	Description	Range	Factory Setting	Note	
12-00	Extended Display Mode	00000 ~77777. Each digit can be set to 0 to 7 0: Default display (frequency & parameters) 1: Output Current 2: Output Voltage 3: DC voltage 4: Temperature of Heat sink 5: PID feedback 6: Analog Signal Input. (AVI) 7: Analog Signal Input. (ACI)	00321	*1	
12-01	PID Feedback Display format	0: Integer (xxx) 1: One decimal Place (xx.x) 2: Two Decimal Places (x.xx)	0	*1	
12-02	PID Feedback	0: xxx 1: xxxpb (pressure)	0	*1	

G	Group12 Digital Display & Monitor functions			
No.	Description	Range	Factory Setting	Note
	Display Unit Setting	2: xxxfl (flow)		
12-03	Custom Units (Line Speed) Value	0~65535	1500/180 0	*1
12-04	Custom Units (Line Speed) Display Mode	0: Drive Output Frequency is Displayed 1: Line Speed. Integer.(xxxxx) 2: Line SpeedOne Decimal Place (xxxx.x) 3: Line Speed.Two Decimal Places (xxx.xx) 4: Line Speed.Three Decimal Places (xx.xxx)	0	*1
12-05	Inputs and output Logic status display (S1 to S5) & RY1	S1 S2 S3 S4 S5 		*4
12-06	Output Power		0.0	
12-07	Motor Current Percentage		0	

Group 13 Inspection & Maintenance				
	functions			
No.	Description	Range	Factory Setting	Note
13-00	Drive Horsepower Code		-	*3
13-01	Software Version		-	*3*4
13-02	Fault Log (Last 3 Faults)		-	*3*4
13-03	Accumulated Operation Time1 1	0~23	-	*3
13-04	Accumulated Operation Time1 2	0~65535		*3
13-05	Accumulated Operation Time Mode	0: Time Under Power 1: Run Mode Time Only	0	*3

Gr	Group 13 Inspection & Maintenance functions			ice
No.	Description	Range	Factory Setting	Note
13-06	Parameter Lock	0: Enable all Functions 1: Preset speeds 05-01~05-08 cannot be changed 2: All Functions cannot be changed Except for Preset speeds 05-01~05-08 3: Disable All Function 4: Parameters 00-00 cannot be modified, cannot be restored to factory settings, other parameters can be changed	0	
13-07	Parameter Lock Code	00000~65535	00000	
13-08	Reset Drive to Factory Settings	1150: Initialization (50Hz,220V/380V) 1160: Initialization (60Hz,220V/380V) 1250: Initialization (50Hz,230V/400V) 1260: Initialization (60Hz,230V/460V) 1350: Initialization (50Hz,220V/415V) 1360: Initialization (60Hz,230V/400V)	1250/1 360 (Note)	

Notes:

For built-in EMC filter models, the default setting of

13-08 is "1250". For without built-in EMC filter models, the default setting of 13-08 is "1360"

Group 14 PUMP Application Function				
No.	Description	Range	Factory Setting	Note
14-00	Function Selection	0: Disable 1: PUMP	0	
14-01	Setting of Single & Multiple Pumps and Master & Slave Machines	0: Single Pump 1: Multiple pumps -Master 2: Multiple pumps -Slave 1 3: Multiple pumps -Slave 2 4: Multiple pumps -Slave 3	0	
14-02	Operation Pressure Setting	0.1~(the value of 14-03)	4.00	
14-03	Maximum Pressure	0.10 ~ 650.00	10.00	

Gr	Group 14 PUMP Application Function Group 1				<mark>oup 14</mark>		
No.	Description	Range	Factory Setting	Note		No.	Descrip
	Setting of Pressure Transmitter Pump						of Loss Pressure Detection Switching
14-04	Pressure Command Source	0:Set by 14-02 1:Set by Al	0			14-20	Pressure and Percenta
		0: Display of Target and Pressure				14-22	Slave Tr Frequent
14-05	Display Mode Selection	Feedback (14-03<99) 1: Target Pressure Only	0		,	14-23	Water Pressure Detection
	Proportion	2: Feedback Pressure Only				14-24	Range o Water Pressure
14-06	Gain(P)	0.00~10.00	3.00				Detectio
14-07	Integral Time(I)	0.0~100.0	0.5		,	14-25	Period of Water
14-08	Differential Time(D)	0.00~10.00	0.00				Pressure Detection
14-09	Tolerance Range of Constant Pressure	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	5		,	14-26	Accelera Time of Water Pressure
	Sleep				-		Decelera
14-10	Frequency of Constant Pressure	0.00~599.00	30.00			14-27	Time of Water Pressure
14-11	Sleep Time of Constant Pressure	0.0~255.5	0.0			14-28	Detection Forced F Commar
14-12	Maximum Pressure Limit	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	50			14-29	Switching Time of Water Pressure Detection
14-13	Warning Time of High Pressure	0.0~600.0	10				Detection Time of Multiple
14-14	Stop Time of High Pressure	0.0~600.0	20			14-30	Pumps iı Parallel Running
14-15	Minimum Pressure Limit	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	5			14-31	Start Synchroi s Selecti of Multip Pumps ii
14-16	Warning Time of Low Pressure	0.0~600.0	0.0				Parallel Toleranc Bange o
14-17	Fault Stop Time of Low Pressure	0.0~600.0	0.0			14-34	Constan Pressure
14-18	Time of Loss Pressure Detection	0.0~600.0	0.0		,	14-35	Selectior Multiple Pumps S
14-19	Proportion	0~100	0				Operatio

Gr	oup 14 PU	MP Application	n Functi	on
No.	Description	Range	Factory Setting	Note
	of Loss Pressure Detection			
4-20	Switching of Pressure and Percentage	0: Pressure 1: Percentage	1	
4-22	Slave Trip Frequencv	0.00 ~ 599.00	45.00	
4-23	Direction of Water Pressure Detection	0: Upward Detection 1: Downward Detection	1	
4-24	Range of Water Pressure Detection	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	1	
4-25	Period of Water Pressure Detection	0.0~200.0	30.0	
4-26	Acceleration Time of Water Pressure Detection	0.1~3600.0	12.0	
4-27	Deceleration Time of Water Pressure Detection	0.1~3600.0	35.0	
4-28	Forced Run Command	0.00~(the value of 00-12)	0.00	
4-29	Switching Time of Water Pressure Detection	0~240	3	
4-30	Detection Time of Multiple Pumps in Parallel Running Start	0~30.0	0.0	
4-31	Synchronou s Selection of Multiple Pumps in Parallel	0: Disable 1: Pressure Setting Run/Stop 2: Pressure Setting 3: Run/Stop	1	
4-34	Tolerance Range of Constant Pressure 2	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	5	
4-35	Selection of Multiple Pumps Shift Operation	0: No Function 1: Timer Alternately Selection	1	

Gr	oup 14 PU	IMP Applicatior	n Functi	on
No.	Description	Range	Factory Setting	Note
		2: Sleep Stop Alternately Selection 3: Timer and Sleep Stop Alternately Selection 4: Multiple Pumps Test Mode		
14-37	Leakage Detection Time	0.0~100.0	0.0	
14-38	Pressure Variation of Leakage Detection Restart	When 14-20=0, range is 0.00~65.00 When 14-20=1, range is 0~100	1	
14-39	Pressure Tolerance Range of Leakage Detection Restart	When 14-20=0, range is 0.00~650.00 When 14-20=1, range is 0~100	5	
14-71	Maximum Pressure Setting	0.10~650.00	10	
14-72	Switching Time of Alternation in Parallel	0: Hour 1: Minute	0	
14-73	Slave Wake-Up Selection	0: Disable 1: Enable	0	
14-74	Proportion Time 2 (P)	0.00~10.00	3.00	\diamond
14-75	Integral Time 2 (I)	0.0~100.0	0.5	\diamond
14-76	Differential Time 2 (D)	0.00~10.00	0.00	\diamond
14-77	The Value of Water Pressure Detection	0~100	1	\diamond
14-78	Maximum Current Limit	0.1~6553.5	6.1	
14-79	Minimum Current Limit	0.1~6553.5	6.1	
14-80	Current limit cumulative time	0~600.0	0	

**(Group 14 only can be used once parameter 14-00=1)

Note: When 14-00 set to 1, 07-12 will be set to 0 at the same time. (After version 1.13)

Chapter 4 Troubleshooting and maintenance

4.1 Error display and corrective action

4.1.1 Manual Reset and Auto-Reset

Faults which cannot be recovered		
manually		
Display	Corrective action	
-OV-		
-[][]-	Consult with the supplier	
-LV-	1.Check if the power	
-[]]-	voltage is correct 2. failed resistor or fuse 3. Consult with the supplier	
-OH-	Improve the ventilation	
-04-	conditions, if no result then replace the inverter	
OH-C	1. Reduce carrier	
0H-C	frequency 2. Improve the ventilation conditions, if no result then replace the inverter	
CtEr		
[EEr	Consult with the supplier	
HPErr	Check the inverter	
HPE	capacity setting (13-00) to meet the hardware voltage levels.	
Err4	1.Remove the interference	
ЕггЧ	source then restart by switching power OFF/ON 2 If not resolved then Consult with the supplier	
EPr		
EPr	Consult with the supplier	
COt		
[[] E	Check the wiring	

Faults which can be recovered		
manually and automatically		
	1 Set a longer acceleration	
00-4	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	1.Increase the capacity of	
]-]0	the inverter 2.Install inductor on the power supply input side	
	Set a longer deceleration time	
	1.Inspect the motor 2.Inspect the wiring 3.Consult with the supplier	
OV-C	1.Set a longer deceleration	
00-0	2.Consider use of a brake resistor and/or brake module (For 400V models or 200V 5hp~15hp models) 3.Consider use of a reactor at the power input side	
PF	1.Check the main circuit	
PF	power supply wiring. 2.Check the power supply voltage	
LPBFT	1.Check feedback signal is	
гърг	correct and with connection. 2.Check if feedback value of pressure is lower than limit of minimum pressure (14-15).	
OPBFT	1.Check feedback signal is	
орьғғ	2.Check if feedback value of pressure is lower than limit of maximum pressure (14-12).	
FBLSS	1.Check if the proportion of	
Fb L 55	set correctly. 2.Make sure the feedback sensor is installed correctly and PID feedback signal operates normally.	

Faults which can be recovered manually but not automatically		
Display	Corrective action	
OC		
	Consult with the supplier	
	Consider increasing the Motor capacity	
	Consider increasing the inverter capacity	
	Check load condition and running period time.	
	1.Improve power quality 2.Consider adding a reactor at the power input side	
	1.Check for excessive load 2.Check weather frequency setting signal is right or not	
	 To improve the ventilation condition Adjust parameter 08-15 	
OPErr OPErr	 Use "RESET" key of inverter to remove the error code Set 09-02 to 0~3 	

4.1.2 Keypad Operation Error Instruction

Display	Corrective action
LOC	
LOC	1.Adjust 13-06 2.Adjust 11-00
Err1	
Err I	 1.The ▲ or ▼ is available for modifying the parameter only when 00-05/00-06=0 2.Modify the parameter in STOP mode.
Err2	1.modify11-08~11-10

Display	Corrective action
Еггд	or 11-11 2.00- 12>00-13 3.set 00-05 and 00-06 to be different 4.set 03-21 <03-20 5.PTC function source can not be set the same source(AVI) with frequency command and PID command. 6.Please set correct password
Err5	1.Issue enable command
ErrS	before communication 2.Set parameters 09-02~ 09-05 function before communication
Err6	1.Check hardware and
86	 wiring 2.Check Functions(09-00~ 09- 05). 3.CON2 needs to connect to the earth. 4.Please increase the setting value of 09-08
Err7	If reset is not possible,
	please consult with the supplier.

4.1.3 Special conditions

Display	Description
StP0	In V/f mode, STP0 comes
SEPO	out at less than 1.3Hz (50Hz set) or at less than 1.5Hz (60Hz set) In SLV mode, STP0 comes out at less than 1Hz
StP1	1. If the inverter is set for
SFb I	external terminal control mode (00-02/00-03=1) and direct start is disabled (07-04=1) 2. The inverter cannot be started and will flash STP1. 3. The run input is active at power-up, refer to descriptions of (07-04).
StP2	1. If the Stop key is

Display	Description
Display	pressed while the inverter
	is set to external control
	mode (00-02/00-03=1)
	then'STP2'flashes after
	stop.
	2. Release and re-activate
	the run contact to restart
	the inverter.
E.S.	When external rapid stop
	input is activated the
}- 5	stop and the display will
•- •• - ••	flash with E.S. message
hh	When external base
	block input is activated
	the inverter stops
	immediately and then
	the display will flash
	with b.b. message.
	PID feedback loss is
-	detected.
Alter	other errors show up in the
HFFC	process of auto tuning.
OH3	It $08-10 = 3$, When over
	signal at torminal AVI
	increasing above the
	warning detection limit set
רוח	in parameter 08-15, then
UΠJ	the display will show
	"OH3"(motor
	over heat warning level)
	and the motor will continue
LOPB	Check if feedback value of
	pressure is lower than limit
	of minimum pressure
HIPB	
	Uneck if feedback value of
│╎╎╎╎	of maximum pressure
COPUP	Communication breaking
	or disconnection of pump
ιίμνη	cascade control.

Appendix-A Instructions for UL

Safety Precautions

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.

NOTICE

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. Teco 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 Teco representative or directly with the Teco sales department.

Closed-Loop	Crimp	Terminal	Size
-------------	-------	----------	------

Drive Medel	Wire G	lauge	Torminal	Crimp Torminal	Tool	Inculation Can			
Drive Woder	mm² , ((AWG)	TerminalCrimp TerminalToolInsulation (ControlScrewsModel No.Machine No.Model No.M3.5R2-3.5Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 3.5M3.5R2-3.5Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 2M3.5R2-3.5Nichifu NH 1 / 9TIC 2M3.5R2-3.5Nichifu NH 1 / 9TIC 2M3.5R2-3.5Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 3.5M4R5.5-4Nichifu NH 1 / 9TIC 3.5M4R5.5-4Nichifu NH 1 / 9TIC 3.5M4R3.5-4Nichifu NH 1 / 9TIC 2.5M5R8-5Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 2M4R3.5-4Nichifu NH 1 / 9TIC 2M4R2-3.5Nichifu NH 1 / 9TIC 2M5R2-3.5Nichifu NH 1 / 9TIC 2	insulation cap					
L510s	R/L1 S/L2 T/L3	U/T1 V/T2 W/T3	Screws	Model No.	Machine No.	Model No.			
1P2	1.3	(16)	M3 5	P2-3.5	Nichifu NH 1 / 9	TIC 2			
1P5	2.1	(14)	WI3.5	HZ-3.5		TIC 2			
101	3.3	(12)	M4	R3.5-4	Nichifu NH 1 / 9	TIC 3.5			
2P2	1.3	(16)			Nichifu NH 1 / 9	TIC 2			
2P5	1.3	(16)	M2 5	B 0.2.5	Nichifu NH 1 / 9	TIC 2			
2P7	2.1	(14)	W3.5	H2-3.5	Nichifu NH 1 / 9	TIC 2			
201	2.1	(14)			Nichifu NH 1 / 9	TIC 2			
202	3.3	(12)	M4	R3.5-4	Nichifu NH 1 / 9	TIC 3.5			
203	5.3	(10)	M4	R5.5-4	Nichifu NH 1 / 9	TIC 3.5			
205	5.3	(10)	M4	R5.5-4	Nichifu NH 1 / 9	TIC 5.5			
208/210	8.4	(14)	Nichifu NH 1 / 9	TIC 8					
401	2.1	(14)			Nichifu NH 1 / 9	TIC 2			
402	2.1	(14)	M4	R3.5-4	Nichifu NH 1 / 9	TIC 2			
403	2.1	(14)			Nichifu NH 1 / 9	TIC 2			
405	2.1	(14)	M4	R2-3.5	Nichifu NH 1 / 9	TIC 2			
408/410/415	8.4	(8)	M5	R8-5	Nichifu NH 1 / 9	TIC 8			

Recommended Input Fuse Selection

Drive Model L510s	Fuse Type							
	Manufacturer: Bussmann							
	Model	Fuse Ampere Rating (A)						
	100 V Class Single-Phase Drive	S						
1P2	Bussmann 16CT	690V 16A						
1P5	Bussmann 20CT	690V 20A						
101	Bussmann 25ET	690V 25A						

	Fuse Type							
Drive Model L510s	Manufacturer: Bussmann							
	Model	Fuse Ampere Rating (A)						
200 V Class Single-Phase Drives								
2P2	Bussmann 10CT	690V 10A						
2P5	Bussmann 10CT/16CT	690V 10A / 690V 16A						
2P7	Bussmann 16CT/20CT	690V 16A / 690V 20A						
201	Bussmann 16CT/20CT	690V 16A / 690V 20A						
202	Bussmann 30FE	690V 30A						
203	Bussmann 50FE	690V 50A						

	Fuse Type							
Drive Model L510s	Manufacturer: Bussmann							
	Model	Fuse Ampere Rating (A)						
	200 V Class Three-Phase Drive	S						
2P2	Bussmann 10CT	690V 10A						
2P5	Bussmann 10CT	690V 10A						
201	Bussmann 10CT	690V 10A						
202	Bussmann 16CT	690V 16A						
203	Bussmann 20CT	690V 20A						
205	Bussmann 50FE	690V 50A						
208	Bussmann 63CT/100FE	690V 63A						
210	Bussmann 80CT/100FE	690V 80A/690V 100A						

	F	use Type							
Drive Model L510s	Manufacturer: Bussmann								
	Model	Fuse Ampere Rating (A)							
400 V Class Three-Phase Drives									
401	Bussmann 10CT	690V10A							
402	Bussmann 16CT	690V 16A							
403	Bussmann 20CT	690V 20A							
405	Bussmann 25ET	690V 25A							
408	Bussmann 40FE	690V 40A							
410	Bussmann 50ET	690V 50A							
415	Bussmann 63ET	690V 63A							

Motor Over temperature Protection

Motor over temperature protection is not provided. Motor over temperature protection shall be provided in the end use application.

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
oveniouu	1 1010011011	ocuingo

	-
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

Manufacturer's Statement for L510s series

L510s efficiency according to IEC/EN 61800-9-2

Drive models: L510s series, please refer to the table below for the model list

Efficiency class: IE2

Nominal voltage: Please refer to the tabel below

Nominal frequency: 50Hz

Nominal power: Please refer to the tabel below

Motor control: V/f, vector

Nominal current: Please refer to the table below Nominal apparent power: Please refer to the table below Maximum operating temperature: 50° C for frame 2~4, 40° C for frame 1

CDM losses and efficiency (calculated with default settings) point: As the picture right



Manufacturer: TECO Electric & Machinery CO., LTD. – 10F, No.3-1, Park St., Nan-Kang, Taipei, 115603, Taiwan

EU contact: MOTOVARIO S.p.A – Via Quattro Passi 1/3 – 41043 – Formigine (MO) – ITALY. MOTOVARIO EORI number: IT02569681204

CDM losses and efficiency table

						9	6	•	0	•	6)	6	0 5		6 0) ()		0		0		
Frame	Model	Nominal voltage (V)	Nominal current (A)	Nominal power (kW)	Nominal apparent power (KVA)	CDM STANDBY LOSS	CDM (or (*12	25,25) Hz,25)	CDM(or (*12	25;50) 2Hz,50)	CDM(2 or (*12)	5; 100) Hz,100)	CDM (50,25)	CDM	(50,50)	CDM (50,100)	CDM	(90,50)	CDM (90,100)	CDM (1	00,100)
110V 1	phase					p Loss(W)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)	p Loss(W)	η(%)
1	L510-1P2-SH1-X	110	1.8	0.2	0.7	8.0	14	60.7	15	69.9	17	78.1	15	75.5	16	81.9	19	86.9	18	87.5	24	90.3	26	90.6
1	L510-1P5-SH1-X	110	2.6	0.4	1.0	8.0	19	62.9	19	71.7	23	78.9	20	76.9	21	82.9	27	87.1	26	87.8	36	89.9	40	90.2
2	L510-101-SH1-X	110	4.3	0.75	1.7	11.0	24	64.6	28	75.2	37	80.7	25	78.3	31	85.1	44	88.0	38	89.2	63	90.2	69	90.3
220V 1	phase																							
1	L510-2P2-SH1(F)-X	220	1.8	0.2	0.7	8.0	15	74.6	15	81.6	18	87.2	15	85.6	16	89.8	19	93.0	18	93.6	28	94.1	23	95.6
1	L510-2P5-SH1(F)-X	220	2.6	0.4	1.0	8.0	20	76.3	20	82.8	24	87.7	21	86.6	21	90.5	26	93.2	24	93.9	32	95.3	34	95.6
1	L510-201-SH1(F)-X	220	4.3	0.75	1.7	8.0	23	79.4	27	86.3	36	89.5	23	88.5	28	92.5	41	94.1	33	95.0	51	95.8	55	96.0
2	L510-202-SH1(F)-X	220	7.5	1.5	3.0	11.0	35	81.2	42	87.5	58	90.3	36	89.6	45	93.1	66	94.4	53	95.3	102	95.2	93	96.1
2	L510-203-SH1(F)-X	220	10.5	2.2	4.0	11.0	50	80.9	61	87.1	86	89.8	52	89.4	66	92.8	99	94.1	80	95.0	152	94.9	144	95.6
440V 3	phase																							
2	L510-401-SH3(F)-X	380	2.3	0.75	1.7	13.9	25	76.4	27	84.9	34	89.5	25	87.0	28	92.0	35	94.5	29	95.3	37	96.7	37	97.0
2	L510-402-SH3(F)-X	380	3.8	1.5	2.9	13.9	33	80.0	38	87.0	50	90.5	34	89.2	39	93.2	52	95.0	41	95.9	66	96.4	56	97.2
2	L510-403-SH3(F)-X	380	5.2	2.2	4.0	13.9	36	83.3	42	89.2	57	92.0	37	91.1	44	94.4	59	95.8	46	96.6	64	97.4	65	97.6
3	L510-405-SH3(F)	380	9.2	3.7	7.0	16.9	58	84.6	70	89.9	96	92.3	60	91.8	72	94.7	100	96.0	76	96.8	108	97.5	111	97.7
3	L510-408-SH3(F)	380	13	5.5	9.9	16.9	60	88.4	77	92.0	125	93.3	62	93.9	81	95.8	137	96.4	91	97.3	165	97.5	174	97.7
4	L510-410-SH3(F)	380	17.5	7.5	13.3	25.9	94	86.6	121	90.7	198	92.2	97	92.9	128	95.1	216	95.8	142	96.9	258	97.2	271	97.3
4	L510-415-SH3(F)	380	24	11	18.3	25.9	120	87.5	157	91.2	265	92.4	124	93.37	166	95.3	291	95.8	188	97.0	359	97.1	382	97.2
220V 3	phase																							
1	L510-2P2-SH3-X	220	1.8	0.2	0.7	8.0	15	74.7	15	81.6	17	87.3	15	86	16	90.0	18	93.2	17	93.9	20	95.8	20	96.1
1	L510-2P5-SH3-X	220	2.6	0.4	1.0	8.0	20	76.4	20	82.9	24	87.8	20	87	21	90.7	25	93.5	22	94.3	28	95.9	29	96.2
1	L510-201-SH3-X	220	4.3	0.75	1.7	8.0	22	79.4	26	86.4	36	89.6	23	89	28	92.7	39	94.4	30	95.4	44	96.4	46	96.6
2	L510-202-SH3-X	220	7.5	1.5	3.0	11.0	35	81.3	41	87.6	57	90.4	36	90	44	93.3	62	94.8	48	95.8	73	96.5	77	96.7
2	L510-203-SH3-X	220	10.5	2.2	4.0	11.0	50	81.0	60	87.2	84	90.0	51	90	63	93.1	92	94.5	70	95.6	109	96.3	114	96.5
3	L510-205-SH3	220	17.5	3.7	6.7	11.9	58	85.9	70	90.6	100	92.7	60	92	75	95.0	110	96.0	84	96.8	128	97.4	134	97.5
4	L510-208-SH3	220	26	5.5	9.9	23.0	78	87.1	100	91.0	164	92.5	81	93	107	95.2	183	95.8	123	96.9	231	97.0	246	97.2
4	L510-210-SH3	220	35	7.5	13.3	23.0	104	87.2	137	90.9	235	92.1	108	93	146	95.1	261	95.6	169	96.8	310	97.1	348	97.0

L510s EMC Ferrite Core Installation

In order to comply with EMC requirements, install the supplied ferrite cores as shown below :

Suitable for 2P2/2P5/201 (frame 1 models)



Suitable for 202/203 (frame 2 models)





Columbus McKinnon Corporation

13320 Ballantyne Corporate Place Charlotte, NC 28277 Tel: (800) 397-8664 | (262) 367-7600 info@dorner.com

www.dornerconveyors.com/products/controls-solutions/magnetek-element

Manufacturer: TECO Electric & Machinery Co., Ltd. 10F., No.3-1, Park St., Nangang District, Taipei City 115, Taiwan



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