HOLIP®

133R6017

HLP-SK Series Operating Manual

ZHEJIANG HOLIP ELECTRONIC TECHNOLOGY CO.,LTD.

Tel: +86-0571-28891071 Fax: +86-0571-28891072
Service Hotline: +86-400-809-5335
Add: Room 15A03-2,14F Yefeng Modern Center,No.161
Shaoxing Road,Hangzhou,China
Website: www.holip.com

Due to product upgrades or specification changes,
the contents of the manual will be timely revised.
It is subject to change without notice.

For software edition V03.29

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HOLIP®

HLP-SK Series

Operating Manual

Introduction

Thank you for purchasing and using the general-purpose vector drive of HLP-SK series.

Please read carefully the operation manual before putting the drive to use so as to correctly install and operate the drive, give full play to its functions and ensure the safety. Please keep the operation manual handy for future reference, maintenance, inspection and repair.

Due to the drive of a kind of power electronics product it must be installed, tested and adjusted with specialized electrical engineering workers.

The marks of ⚠ (Danger), ⚠(Caution) and other symbols in the manual remind you of the safety and prevention cautions during the handling, installation, running and inspection. Please follow these instructions to make sure the safe use of the drive. In case of any doubt please contact our local agent for consultation. Our professional persons are willing and ready to serve you.

The manual is subject to change without notice.

Index

Chapter 1 Safety Precautions

SECURITY DEFINITION:

The attentions fall into two categories in this instruction.

⚠ **Caution:** Indicates misuse may damage the drive or mechanical system.

⚠ **Danger:** Indicates misuse may result in casualty.

1.1 Before Power-up

⚠ Caution

● Check to be sure that the voltage of the main circuit AC power supply matches the input voltage of the drive.

● Install the drive in a safe location, avoiding high temperature, direct sunlight, humid air or water.

● The drive can only be used at the places accredited by our company. Any unauthorized working environment may have the risks of fire, gas explosion, electric shock and other incidents.

● If more than one drive installed on the same control cabinet, make additional cooling fan, so that the inside temperature is lower than 40℃ , in order to prevent overheating or fire occurs.

● It will affect the service life of the drive if a contactor is installed on the input side to control the start and stop. Generally it is required to control it through terminal commands. Special attention should be paid to its use in the case of the start and stop more frequently places.

● Do not install any switch component like circuit breaker or contactor at the output of the drive. If any of such components must be installed due process and other needs, it must be ensured that the drive has no output when the switch acts. In addition, it is forbidden to install any capacitor for improvement of power factor or any varistor against thunder at the output. Otherwise it will cause malfunctions, tripping protection and damages of components of the drive.

● Please use an independent power supply for the drive. Do avoid using the common power supply with an electrical welder and other equipment with strong disturbance.

Otherwise it will cause the drive to protect or even damage the drive.

● Motor overload protection is not included in the default settings. If this function is desired, set C01.90 (motor thermal protection) to date value ETR trip or date value ETR warning.

● Do not make any high voltage test with any component inside the drive. These semi-conductor parts are subject to the damage of high voltage.

● The IC board of the drive are susceptible to the effect and damage of static electricity. Don't touch the main circuit board.

● Installation, commissioning and maintenance must be performed by qualified professional personnel.

● Don't carry the front cover of the drive directly when handling. It should be handled with the base to prevent the front cover off and avoid the dropping of the drive, which may possibly cause the injuries to people and the damages to the drive.

Danger

● Be sure to turn off the power supply before wiring.

● Mount the drive in the metal and other non-combustible materials to avoid the risk of fire.

● Don't install the drive in a space with explosive gas, otherwise, they lead to explosion.

● R, S, T terminals are power input terminals, never mixed with U.V.W terminals. Be sure that the wiring of the main circuit is correct. Otherwise it will cause damages of the drive when the power is applied to it.

● The terminal of ⏚ must be grounded separately and never connected to N-line. Otherwise it will easily cause the protection or errors of the drive.

● Do not dissemble or modify any internal connecting cord, wiring or component of the drive by yourself.

● Never remodel it or exchange control boards and components by yourself. It may expose you to an electrical shock or explosion, etc.

● Keep the drive from the reach of children or persons not concerned.

1.2 During the Power-up

Danger

● Do not plug the connectors of the drive during the power up to avoid any surge into the main control board due to plugging, which might cause the damage of the drive.

● Always have the protective cover in place before the power up to avoid electrical shock injury.

1.3 During the Operation

Caution

● Do not measure the signals on circuit boards while the drive is running to avoid danger.

● The drive has been optimized before sold. Please make proper adjustments according to the desired functions.

● Do consider the vibration, noise and the speed limit of the motor bearings and the mechanical devices.

Danger

● Never connect or disconnect the motor set while the drive is in running. Otherwise it will cause over-current trip and even burn up the main circuit of the drive.

● Never remove the front cover of the drive while the drive is powered up to avoid any injury of electric shock.

● Do not come close to the machine when the Reset Function is used to avoid anything unexpected. The motor may automatically recover from fault.

1.4 After the Power-off

Caution

● Even in the case of the main power, the other voltage inputs and the share load (linkage of DC intermediate circuit) all have been disconnected from the mains; the internal of the drive may still have residual energy. Before touching any potentially live parts of the drive, please wait at least 4 minutes for the drives of less than 22kW (including 22kW), and wait at least 15 minutes for the drives of more than 30kW (including 30kW). Otherwise, it may expose you to a risk of electrical shock.

Chapter 2 Standards and Specifications

2.1 Label Description

Type 1:

Significance of the product type code:

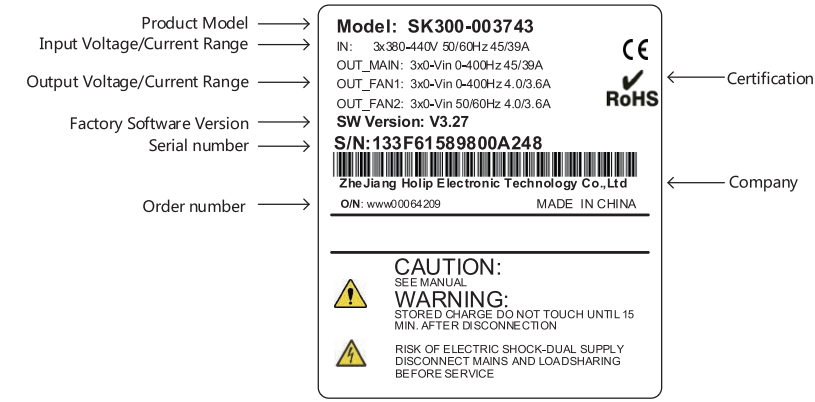
T/C:HLP-SK19007D543P20XBX1CX0XXXVXXX

1-9 10-13 14-15 16-18 19 20 21 22 23 24 25 26 27-28 29-32

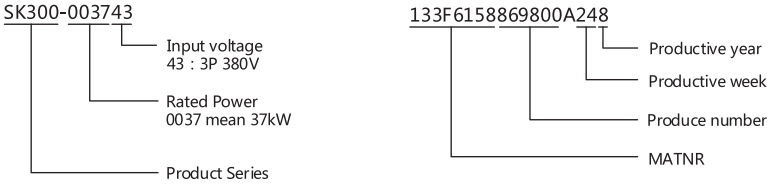
1-9	HLP-SK190	Indicate Product Series
10-13	07D5	Indicate 7.5kW
14-15	21	Indicate 1-Phase AC 220V
	23	Indicate 3-Phase AC 220V
	43	Indicate 3-Phase AC 380V
16-18	P20	IP rating is 20
19	X	Without AC choke
	A	With AC choke
20	X	Without Brake unit
	B	With Brake unit
21	X	Without DC choke
	D	With DC choke

22	1	Control panel with LED display and potentiometer
23	C	With coating on PCB
24	X	Reserved
25	0	Domestic sale
	1	Overseas sale
26	X	Reserved
27-28	XX	Reserved
29-32	VXXX	Indicate software version number, such as V235 means the version number is 2.35

Type 2:



Product Model Description:



2.2 SK190 Series

2.2.1 Particular Specification

Mode	Input Voltage	Input Current (A)	Output Current (A)	Rated Power (Kw)	Heat Release (W)	Air Volume (m^3/h)	Net Weight (kg)
HLP-SK19007D523	3×200-240V	43.4	32	7.5	210	124	5.6
HLP-SK190001123	3×200-240V	61	45	11	323	272	7.8
HLP-SK190001523	3×200-240V	73	61	15	447	300	18.5
HLP-SK19018D523	3×200-240V	88	75	18.5	795	376	19
HLP-SK190002223	3×200-240V	106	91	22	974.8	408	26
HLP-SK190003023	3×200-240V	130	112	30	1246	476	26
HLP-SK190003723	3×200-240V	171	150	37	1635	595	37
HLP-SK19004D043	3×380-440V	15.8	9.9	4.0	122.9	51	2.0
	3×440-480V	13.6	9				
HLP-SK19005D543	3×380-440V	21.3	13.3	5.5	139.4	51	2.0
	3×440-480V	18.4	12.1				
HLP-SK19007D543	3×380-440V	24.8	17.7	7.5	211.6	68	2.5
	3×440-480V	21.4	16				
HLP-SK190001143	3×380-440V	35.9	25	11	262.4	124	5.8
	3×440-480V	31.4	22.7				
HLP-SK190001543	3×380-440V	43.4	32	15	339.3	170	5.8
	3×440-480V	38.8	29.1				
HLP-SK19018D543	3×380-440V	51.5	38	18.5	418.0	230	8
	3×440-480V	46.1	34.5				
HLP-SK190002243	3×380-440V	61.0	45	22	468.2	272	8
	3×440-480V	54.5	40.9				
HLP-SK190003043	3×380-440V	73	61	30	676.3	303	19
	3×440-480V	64	52				
HLP-SK190003743	3×380-440V	72	75	37	795	374	22
	3×440-480V	65	68				
HLP-SK190004543	3×380-440V	86	91	45	974.8	408	26
	3×440-480V	80	82				
HLP-SK190005543	3×380-440V	110	112	55	1246	476	26
	3×440-480V	108	110				
HLP-SK190007543	3×380-440V	148	150	75	1635	595	37
	3×440-480V	135	140				
HLP-SK190009043	3×380-440V	175	180	90	2204	646	60
	3×440-480V	154	160				

Mode	Input Voltage	Input Current (A)	Output Current (A)	Rated Power (Kw)	Heat Release (W)	Air Volume (m^3/h)	Net Weight (kg)
HLP-SK190011043	3×380-440V	206	215	110	2600	714	60
	3×440-480V	183	190				
HLP-SK190013243	3×380-440V	251	260	132	3178	850	60
	3×440-480V	231	240				
HLP-SK190016043	3×380-440V	304	315	160	3689	1029	99
	3×440-480V	291	302				
HLP-SK190018543	3×380-440V	350	365	185	4268	1190	99
	3×440-480V	320	335				
HLP-SK190020043	3×380-440V	381	395	200	4627	1292	99
	3×440-480V	348	361				
HLP-SK190022043	3×380-440V	420	435	220	4935	1411	99
	3×440-480V	383	398				
HLP-SK190025043	3×380-440V	472	480	250	5323	1564	250
	3×440-480V	436	443				
HLP-SK190028043	3×380-440V	525	540	280	6543	1700	250
	3×440-480V	475	490				
HLP-SK190031543	3×380-440V	590	605	315	7251	1870	250
	3×440-480V	531	540				
HLP-SK190035543	3×380-440V	647	660	355	7497	2125	250
	3×440-480V	580	590				
HLP-SK190041543	3×380-440V	718	745	415	8284	2380	250
	3×440-480V	653	678				

2.2.2 Technical Specifications

Item		Specification
Power supply	Supply voltage	Single/Three phase 200~240V -20%~+10%; Three phase 380~480V -20%~+10%;
	Frequency	48~62Hz;
	Max. imbalance	3%;
Motor output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	0-400Hz;

Item		Specification
Main control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	150% 60s, 200% 1s;
	PWM switch frequency	2~16kHz;
	Speed setting resolution	Digital: 0.001Hz; Analogy: 0.5‰ of the max. operating frequency ;
	Speed open-loop control accuracy	30~4000 rpm: tolerance±8 rpm;
	Control command source	LCP, digital terminal, local bus;
	Frequency setting source	LCP, analog, pulse, local bus;
	Ramp control	Selectable 8-speed steps ramp up and down times 0.05-3600.00s;
Basic Functions	Speed Open-loop Control; Process Closed-loop Control; Torque Open-loop Control; AMA Function; Motor Magnetisation; Slip Compensation; Torque compensation; Automatic Voltage Regulation; V/F Control, DC Brake; AC brake; Speed Limit; Current Limit; Flying Start; Reset Function; Counter; Timer;	
Application Functions	Wobble Function; Jogging; Multi-speed Control via Digital input; SLC(including Order Control and Parallel Control); Mechanical Braking; UP/DOWN ; Catch up /Slow down; Relative Scaling Reference etc.	
Protection Functions	Missing Motor Phase Protection; Low-voltage Protection; Over-voltage Protection; Over-current Protection; Output Phase Loss Protection; Output Short Circuit Protection; Output Grounding Fault Protection; Motor Thermal Protection; Live Zero Timeout Function; AMA Fails; CPU Fault; EEPROM Faults; Button freeze; Duplicate Fails; LCP Invalid; LCP Incompatible; Parameter Read-only; Reference Out of Range; Invalid While Running etc.	
IO board control terminals	Input	6 digital inputs; 2 analog input, both can receive voltage or current signals.
	Output	2 digital output; 2 relay output; 2 analog input (1 can be selected as current output or voltage output via jumper switch).
	Power supply	1 +10V, max current output 10mA; 1 +24V, max current output 200mA;
	Communication	RS+, RS-, max baud rate 115200bit/s;

Item		Specification
Display	8 segments, 5 numeric displays	Display frequency, warnings, status and so on;
	Indicator	Light FWD, REV, HZ, A, RPM display various status of the drive;
	Data read-outs	Frequency setting, output frequency, feedback value, output current, DC link voltage, output voltage, output power, input terminals state, output terminals state, analogue input , analogue output, 1-10 fault records and accumulated working time etc.;
Environment	Enclosure	IP20;
	Ambient temperature	-10℃ ~50℃ , derating use when over 40℃ ;
	Humidity	5%-85% (95% without condensation);
	Vibration test	≤75kW: 1.14g; ≥90kW: 0.7g;
	Max. altitude above sea level	1000m, derating use when more than 1000 meters;
	Motor cable length	Shield cable: 50 meters, unshield cable: 100 meters;
others	DC choke	≥37kW Built-in
	Braking unit	≤22kW Built-in

2.3 SK200 Series

2.3.1 Particular Specification

Model	Input voltage	Input Current (A)	Load	Output Current (A)	Rated Power (kW)	Air Volume (m^3/h)	Net Werght (kg)
HLP-SK20007D543	3×380-440V 50/60Hz	26	Host	17.7	7.5	68	4.8
			Cooling	1.5	0.5		
HLP-SK200001143		37	Host	25	11	124	7
			Cooling	1.5	0.5		
HLP-SK200001543		45	Host	32	15	170	7
			Cooling	2.4	0.8		
HLP-SK200002243		48	Host	45	22	230	17.5
			Cooling	4	1.5		
HLP-SK200003743		75	Host	75	37	272	23.5
			Cooling	4	1.5		
HLP-SK200004543		90	Host	91	45	374	29
			Cooling	5.3	2.2		
HLP-SK200005543		115	Host	112	55	408	29
			Cooling	12	5.5		
HLP-SK200007543		158	Host	150	75	476	41
			Cooling	12	5.5		
HLP-SK200009043		185	Host	180	90	595	41
			Cooling	12	5.5		

2.3.2 Technical Specifcations

Item		Specification
Power supply	Supply voltage	Three phase 380~440V -20%~+10%;
	Frequency	48~62Hz;
	Max. imbalance	3%;
Motor output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	0-400Hz;
Fan output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	0-400Hz;
220V output	Output voltage	220~250V
	Rated power	50VA

Item		Specification
Main control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	150% 60s, 200% 1s;
	PWM switch frequency	2~16kHz;
	Speed setting resolution	Digital: 0.001Hz; Analogy: 0.5‰ of the max. operating frequency ;
	Speed open-loop control accuracy	30~4000 rpm: tolerance±8 rpm;
	Control command source	LCP, digital terminal, local bus;
	Frequency setting source	LCP, analog, pulse, local bus;
	Ramp control	Selectable 8-speed steps ramp up and down times 0.05-3600.00s;
Basic Functions	Speed Open-loop Control; Process Closed-loop Control; Torque Open-loop Control; AMA Function; Motor Magnetisation; Slip Compensation; Torque compensation; Automatic Voltage Regulation; V/F Control, DC Brake; AC brake; Speed Limit; Current Limit; Flying Start; Reset Function; Counter; Timer;	
Application Functions	Wobble Function; Jogging; Multi-speed Control via Digital input; SLC(including Order Control and Parallel Control); Mechanical Braking; UP/DOWN ; Catch up /Slow down; Relative Scaling Reference etc.	
Protection Functions	Missing Motor Phase Protection; Low-voltage Protection; Over-voltage Protection; Over-current Protection; Output Phase Loss Protection; Output Short Circuit Protection; Output Grounding Fault Protection; Motor Thermal Protection; Live Zero Timeout Function; AMA Fails; CPU Fault; EEPROM Faults; Button freeze; Duplicate Fails; LCP Invalid; LCP Incompatible; Parameter Read-only; Reference Out of Range; Invalid While Running etc.	
IO board control terminals	Input	6 digital inputs; 2 analog input, both can receive voltage or current signals.
	Output	2 digital output; 2 relay output; 2 analog input (1 can be selected as current output or voltage output via jumper switch).
	Power supply	1 +10V, max current output 10mA; 1 +24V, max current output 200mA;
	Communication	RS+, RS-, max baud rate 115200bit/s;

Item		Specification
Display	8 segments, 5 numeric displays	Display frequency, warnings, status and so on;
	Indicator	Light FWD, REV, HZ, A, RPM display various status of the drive;
	Data read-outs	Frequency setting, output frequency, feedback value, output current, DC link voltage, output voltage, output power, input terminals state, output terminals state, analogue input , analogue output, 1-10 fault records and accumulated working time etc.;
Environment	Enclosure	IP20;
	Ambient temperature	-10℃ ~50℃ , derating use when over 40℃ ;
	Humidity	5%-85% (95% without condensation);
	Vibration test	≤75kW: 1.14g; ≥90kW: 0.7g;
	Max. altitude above sea level	1000m, derating use when more than 1000 meters;
	Motor cable length	Shield cable: 50 meters, unshield cable: 100 meters;
others	DC choke	≥18.5kW Built-in

2.4 SK300 Series

2.4.1 Particular Specification

Model	Input voltage	Input Current (A)	Load	Output Current (A)	Rate Power (kW)	Heat Release (W)	Air Volume (m^3/h)	Net Weight (kg)
SK300-07D543	3×380-440V	25	Main	17.7	7.5	225	374	5.8
			Cooling	1.5	0.5			
SK300-001143	3×380-440V	37	Main	25	11	225	374	8
			Cooling	1.5	0.5			
			Motor fan	0.1	0.03			
SK300-001543	3×380-440V	45	Main	32	15	305	374	8
			Cooling	2.4	0.8			
			Motor fan	0.15	0.045			
SK300-18D543	3×380-440V	55	Main	38	18.5	427	374	15
			Cooling	4	1.5			
			Motor fan	0.2	0.055			

Model	Input voltage	Input Current (A)	Load	Output Current (A)	Rate Power (kW)	Heat Release (W)	Air Volume (m^3/h)	Net Weight (kg)
SK300-002243	3×380-440V	65	Main	45	22	533	374	15
			Cooling	4	1.5			
			Motor fan	0.2	0.060			
SK300-003043	3×380-440V	63	Main	60	30	660	374	23
			Cooling	4	1.5			
			Motor fan	0.2	0.060			
SK300-003743	3×380-440V	75	Main	75	37	825	374	23
			Cooling	4	1.5			
			Motor fan	0.3	0.080			

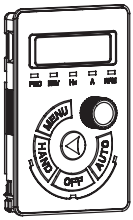
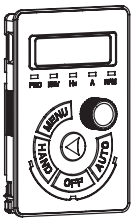
2.4.2 Technical Specifcations

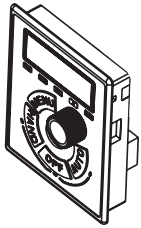
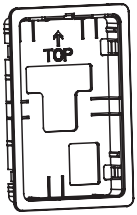
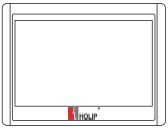
Item		Specification
Power supply	Supply voltage	Three phase 380~440V -20%~+10%;
	Frequency	48~62Hz;
	Max. imbalance	3%;
Motor output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	0-400Hz;
Fan output	Output voltage	Three phase 0-100% of supply voltage;
	Output frequency	0-400Hz;
Cooling Fan	Output voltage	≤15kW: Base voltage; ≥18.5kW: Three phase 0-100% of supply voltage;
	Output frequency	≤15kW: Base frequency; ≥18.5kW: 0~400Hz;
Motor Fan	Output voltage	Base voltage;
	Output frequency	Base frequency;
220V Power	Output voltage	220~250V;
	Rated power	50VA;

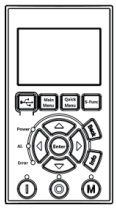
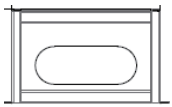
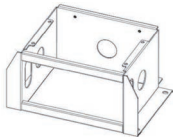
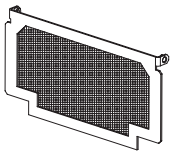
Item		Specification
Main control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	150% 60s, 200% 1s;
	PWM switch frequency	2~16kHz;
	Speed setting resolution	Digital: 0.001Hz; Analogy: 0.5‰ of the max. operating frequency;
	Control command source	LCP, digital terminal, local bus;
	Frequency setting source	LCP, analog, pulse, local bus;
	Ramp control	Selectable 8-speed steps ramp up and down times 0.05-3600.00s;
Fan control functions	Control mode	V/F, VVC+;
	Start torque	0.5Hz 150%;
	Overload capacity	110% 60s;
	PWM switch frequency	2~16kHz;
Basic Functions	Speed Open-loop Control; Process Closed-loop Control; Torque Open-loop Control; AMA Function; Motor Magnetisation; Slip Compensation; Torque compensation; Automatic Voltage Regulation; V/F Control, DC Brake; AC brake; Speed Limit; Current Limit; Flying Start; Reset Function; Counter; Timer;	
Application Functions	Wobble Function; Jogging; Multi-speed Control via Digital input; SLC(including Order Control and Parallel Control); Mechanical Braking; UP/DOWN ; Catch up /Slow down; Relative Scaling Reference etc.	
Protection Functions	Missing Motor Phase Protection; Low-voltage Protection; Over-voltage Protection; Over-current Protection; Output Phase Loss Protection; Output Short Circuit Protection; Output Grounding Fault Protection; Motor Thermal Protection; Live Zero Timeout Function; AMA Fails; CPU Fault; EEPROM Faults; Button freeze; Duplicate Fails; LCP Invalid; LCP Incompatible; Parameter Read-only; Reference Out of Range; Invalid While Running etc.	

Item		Specification
IO board control terminals	Input	4 digital inputs, DI2,DI3 support PTC function; 2 pressure inputs: support 4-20mA/0-20mA; 2 temprature inputs: support PT100;
	Output	3 relay outputs; D/N: only support load valve; Attention: 220V with Terminal D/N, F/N;
	Power supply	24V: max 600mA.
	Communication	Max baud rate 115200bit/s;
	LEDs	3 LEDs: Power, Run, Error;
Environment	Enclosure	IP20;
	Ambient temperature	-10℃ ~50℃ , derating use when over 50℃ ;
	Humidity	5%-85% (95% without condensation);
	Vibration test	1.14g;
	Max. altitude above sea level	1000m, derating use when more than 1000 meters;
	Motor cable length	Shield cable: 50 meters, unshield cable: 100 meters;
Others	DC choke	≥30kW Built-in

2.5 Accessories

	Name: Control Panel E10 (Black) Model: LCP-E10 Function: Local Control Panel (LCP) is used to modify parameters, monitor status and control the drive. The standard length of extension cable is 3 meters when mounting LCP-E10 on control cabinet. Remark: Only support SK190, Standard configuration O/N: 133B5814
	Name: Control Panel E20 (Light grey) Model: LCP-E20 Function: Local Control Panel (LCP) is used to modify parameters, monitor status and control the drive. The standard length of extension cable is 15 meters when mounting LCP-E20 on control cabinet. O/N: 133B4028

	Name: Control Panel E21 Model: LCP-E21 Function: Local Control Panel (LCP) is used to modify parameters, monitor status and control the drive. The standard length of extension cable is 15 meters when mounting LCP-E21 on control cabinet. LCP-E21 has the same installation dimensions with HLP-A series control panel (OP-AB01). O/N: 133B5808
	Name: Gradle 01 Model: Cradle-01 Function: For the LCP-E10 or LCP-E20 is mounted on the control cabinet O/N: 133B4264
	Name: CopyCard01 Model: Copy Card-01 Function: Copy Card can copy parameters from one drive to another. O/N: 133B5806, only support SK190
	Name: Net cable Model: none Function: Standard net cable, used to link LCP and inverter.
	Name: HMI Model: HF1070 Function: Operator panel for compressor

	Name: Text screen Model: LCP-C31 Function: Operator panel for compressor O/N: 133G1802
	Name: Base A0BS07~09 Model: A0BS07~09 Function: Used for cabinet installation with SK190 series. O/N: 133B5809, Base A0BS07, For frame SK190-F7 133B5810, Base A0BS08, For frame SK190-F8 133B6320, Base A0BS09, For frame SK190-F9
	Name: Base SK2BS02~05 Model: SK2BS02~05 Function: Used for cabinet installation with SK200 series. O/N:133B5809, Base SK2BS02, For frame SK200-F2 133B5810, Base SK2BS03, For frame SK200-F3 133B6320, Base SK2BS04, For frame SK200-F4 133B6320, Base SK2BS05, For frame SK200-F5
	Name: Sieve A0SI01~09 Model: A0SI01~09 Function: Used for preventing dust sucked into the drive wind way O/N:133B9667, Sieve A0SI01, For frame SK190-F0 133B9668, Sieve A0SI02, For frame SK190-F1 133B9669, Sieve A0SI03, For frame SK190-F2 133B9658, Sieve A0SI04, For frame SK190-F3 133B9659, Sieve A0SI05, For frame SK190-F4 133B9660, Sieve A0SI06, For frame SK190-F5 133B9661, Sieve A0SI07, For frame SK190-F6 133B9670, Sieve A0SI08, For frame SK190-F7 133B9671, Sieve A0SI09, For frame SK190-F8

	Name: IP50 Box for A0 Model: A0IP01~05 Function: Install this option box allows the drive to achieve IP50 enclosure. O/N: 133B5835, A0IP01, For frame SK190-F0 133B5836, A0IP02, For frame SK190-F1 133B5837, A0IP03, For frame SK190-F2 133B5838, A0IP04, For frame SK190-F3 133B5839, A0IP05, For frame SK190-F4
	Name: Flange for A0 Model: A0FL01~08 Function: Used for flange installation O/N: 133B4604, A0FL01, For frame SK190-F0 133B4605, A0FL02, For frame SK190-F1 133B4606, A0FL03, For frame SK190-F2 133B4607, A0FL04, For frame SK190-F3 133B4608, A0FL05, For frame SK190-F4 133B4609, A0FL06, For frame SK190-F5-1 133B4610, A0FL07, For frame SK190-F5-2 133B4611, A0FL08, For frame SK190-F6

Note: Frame sizes, see Chapter 3.

2.6 Derating Specifications

1. Derating for ambient temperature: If the drive is operated over 40°C ambient temperature, the continuous output current should be decreased. The drive has been designed for operation at max 50°C ambient temperation with one motor size smaller than normal. Continuous operation at full load at 50°C ambient temperation will reduce the lifetime of the drive.

2. Derating for low air pressure: The cooling capability of air is decreased at low air pressure. Below 1000m altitude no de-rating is necessary but above 1000m the ambient temperature or the maximum output current should be decreased. Dcrease the output by 1% per 100m altitude above 1000m or reduce the max. ambient temperature by 1 degree per 200m.

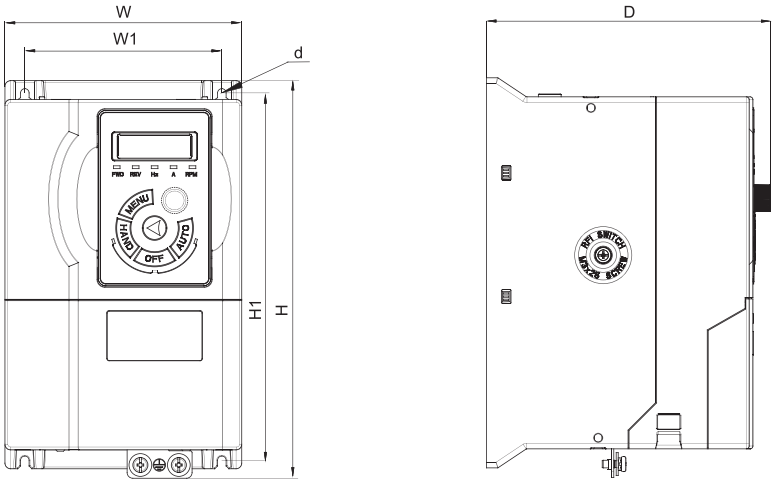
Chapter 3 Mechanical and Electrical Installation

3.1 SK190 Series

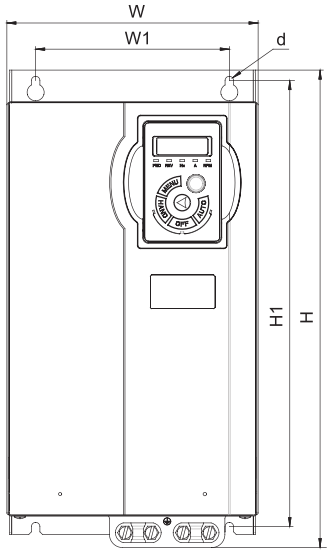
3.1.1 Mechanical Installation

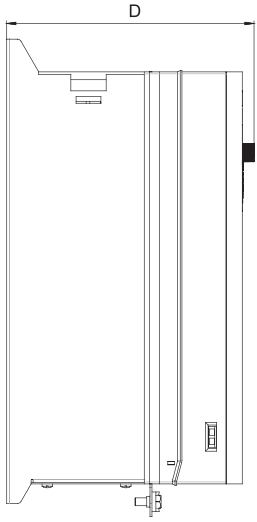
1. Ambient temperature in the range of -10°C ~ 50°C ;
2. Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation;
3. Installation should be performed where vibration is less than 1.14g (<= 75kW) or 0.7g (>= 90kW);
4. Avoid from moisture and direct sunlight;
5. Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases;
6. Protect the cooling fan by avoiding oil, dust and metal particles;
7. Prevent drilling residues, wire ends and screws falling into drive;

3.1.2 External and Installation Dimensions

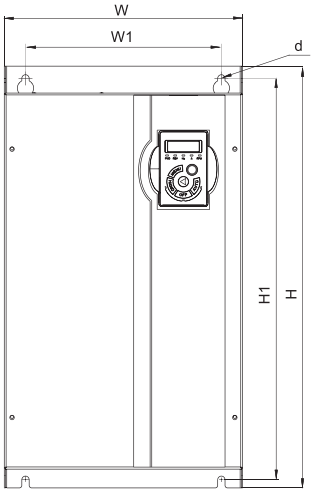


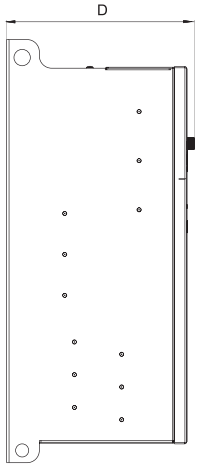
Frame F2



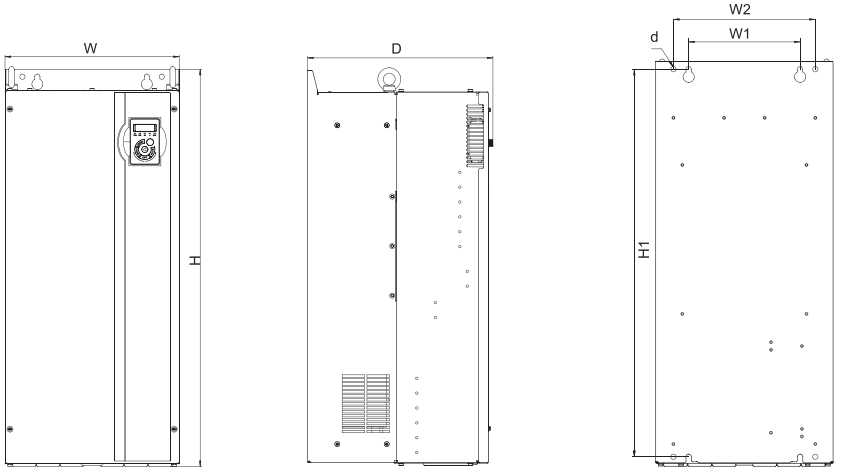


Frame F3~F4

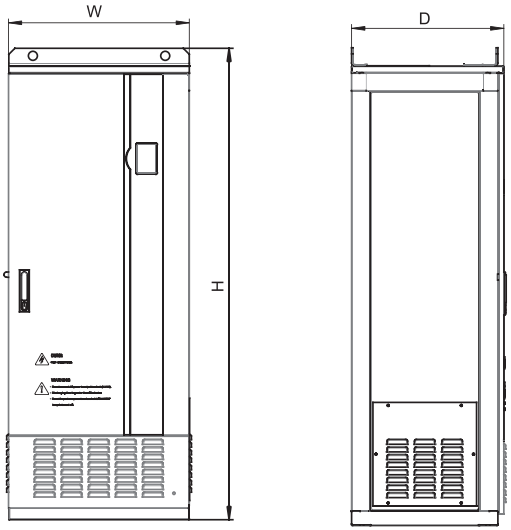


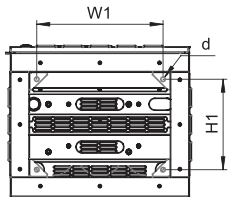


Frame F5~F6



Frame F7~F8





Frame F9

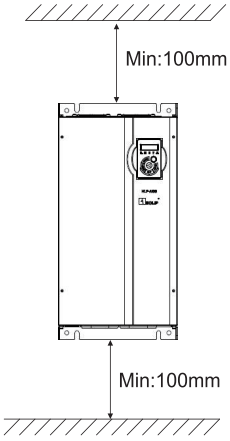
External and installation dimensions (unit: mm)

Frame	Voltage & Power		Dimension(mm)						
	3x200~240V	3x3800~480V	W	H	D	W1	H1	W2	d
F1	-	4-5.5kw	145	250	167	124	230	-	4.5
F2	-	7.5kw	155	263	177	133	243	-	4.5
F3	7.5 kw	11-15kw	192	365	189	150	340	-	6.5
F4	11kw	18.5-22kw	216	420	194	150	340	-	6.5
F5-1	15-18.5kw	30-37kw	292	517	229	240	492	-	9
F5-2	22-30kw	45-55kw	292	562	249	240	537	-	9
F6	37kw	75kw	292	665	277	240	640	-	9
F7	-	90-132kw	350	799	375	220	765	280	10.5
F8	-	160-220kw	486	900	390	345	863	410	10.5
F9	-	250-415kw	600	1568	509	524	1578	440	15

3.1.3 Installation and Direction

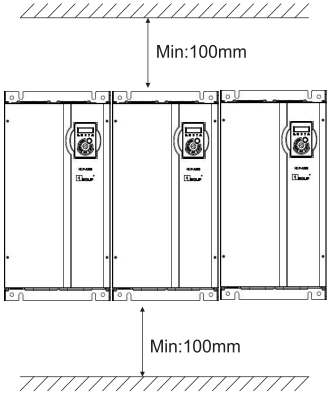
1. Single Installation

The drive must be installed vertically with smooth ventilation. Enough space must be left around the drive to ensure good cooling, as shown below:



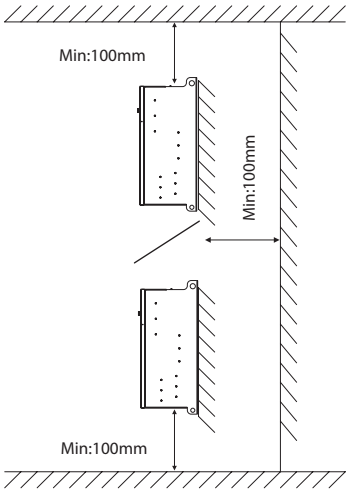
2. Side by Side Installation

The drive can be mounted side by side, a minimum space must be reserved above and below the enclosure, as shown below:



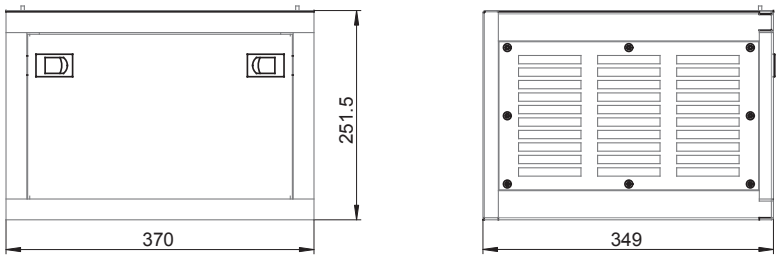
3. Upper and Lower Installation

If several drives need to be installed together in one cabinet, upper and lower installation can be adopted. Enough space must be reserved to ensure effective cooling, as shown below:

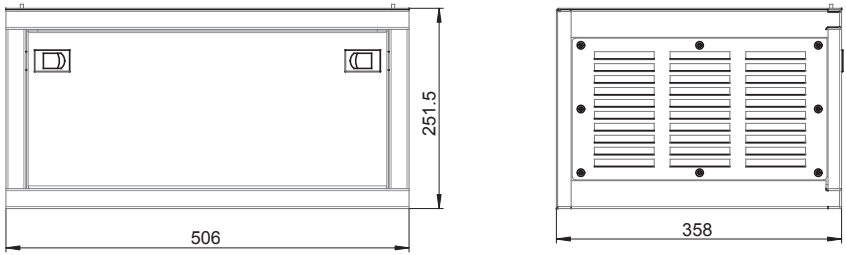


3.1.4 Base Installation

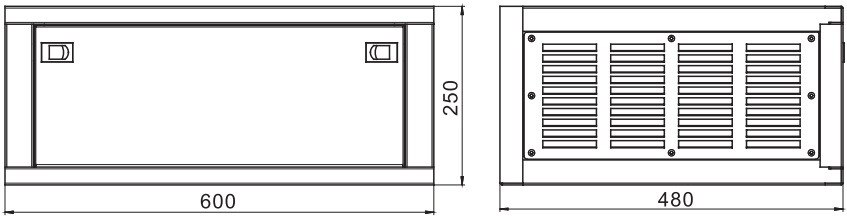
Base A0BS07 is for frame F7, its external dimensions are shown below (unit: mm):



Base A0BS08s for frame F8, its external dimensions are shown below (unit: mm):

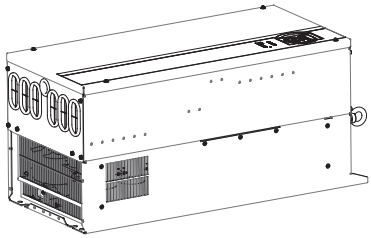


Base A0BS09 is for frame F9, its external dimensions are shown below (unit: mm):

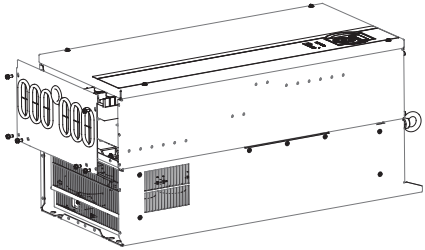


The installation steps of Base A0BS07 and A0BS08 are the same, shown below:

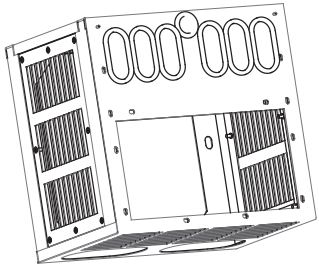
Step1: Original state.



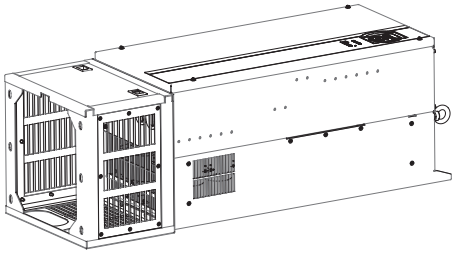
Step2: Remove the bottom cable entry sheet metal and fixing screws.



Step3: Move the rubber pieces from the bottom of the sheet metal to the Base.

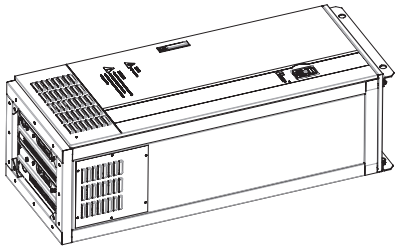


Step4: Use M5 * 12 screws to fix the Base and drive.

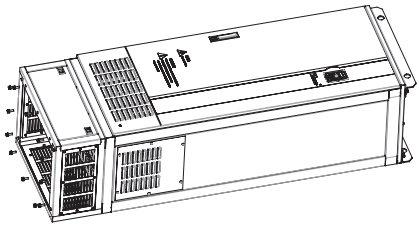


The installation steps of Base A0BS09 are shown below:

Step1: Original state



Step2: Use 12 M8 * 20 screws to fix the Base and drive.

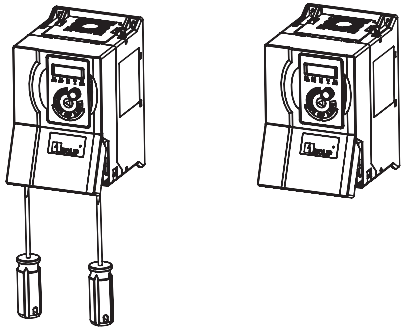


3.1.5 Removal of the Front Cover

It is needed to remove the front cover before wiring the main circuit and control circuit.

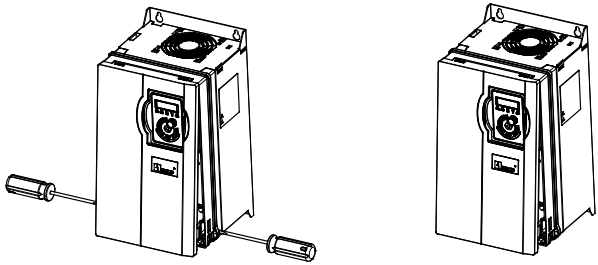
Frame F1~F2

Use a screwdriver to push out the hook of the front cover inward.



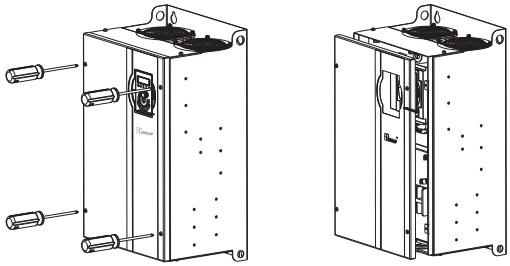
Frame F3~F4

Use a screwdriver to push out the hook of the front cover inward.



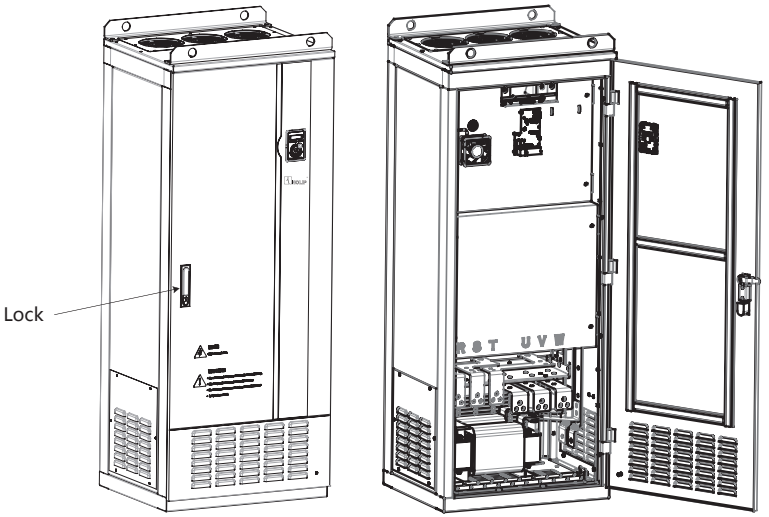
Frame F5-1~F8

Use a screwdriver to loosen the screws on the front cover.



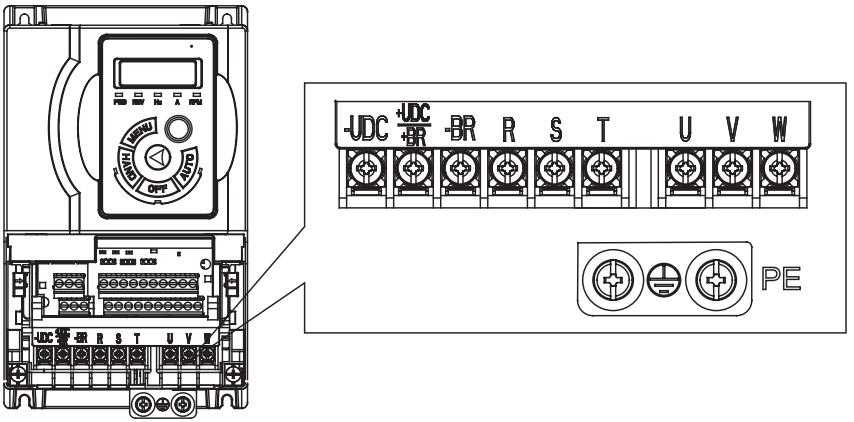
Frame F9

Screw the lock on the door.

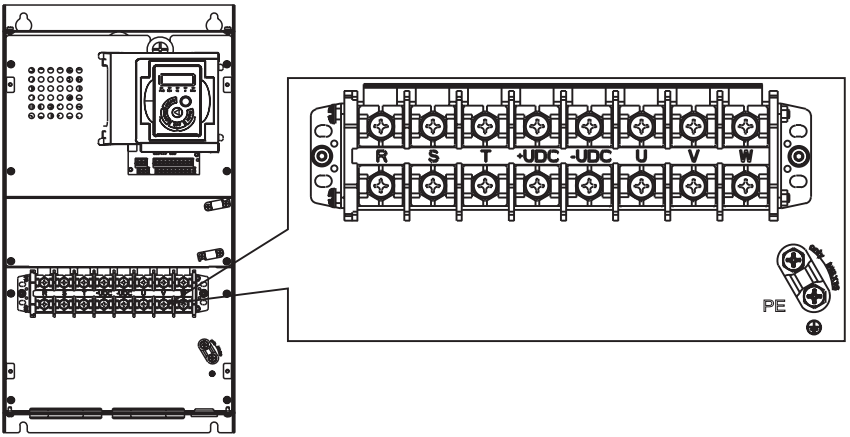


3.1.6 Description of Main Circuit

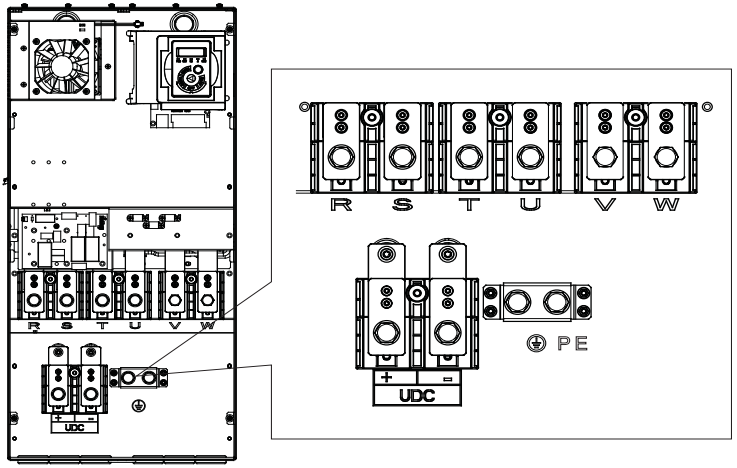
3.1.6.1 Schematic of Main Circuit Terminals



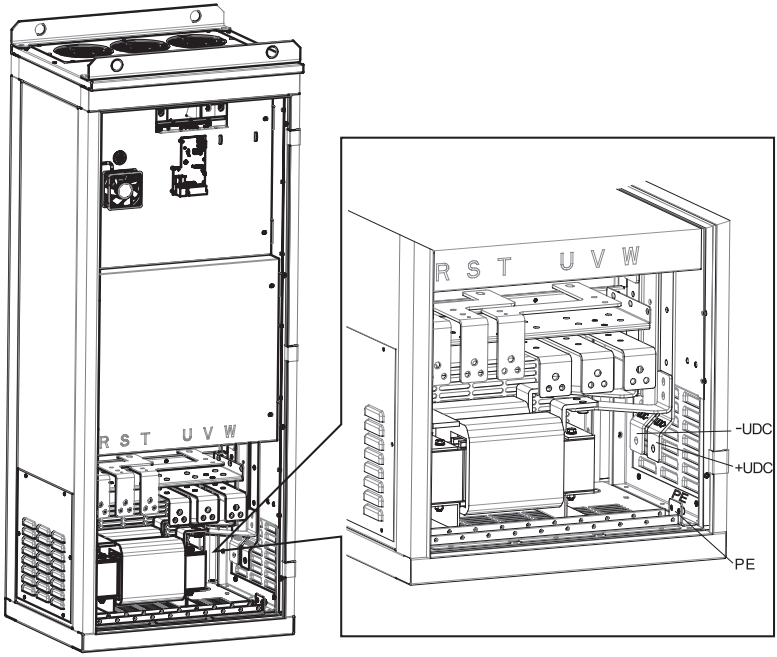
Frame F1~F4



Frame F5~F6



Frame F7-F8



Frame F9

Symbol	Function
R, S, T	Power input, Single phase connected to R, T
U, V, W	Power output, connect to the motor
+BR, -BR	Wiring is prohibited
+UDC, -UDC	DC bus
PE	Ground terminal

3.1.6.2 Main Circuit Terminal Screws and Wiring Recommended Specifications

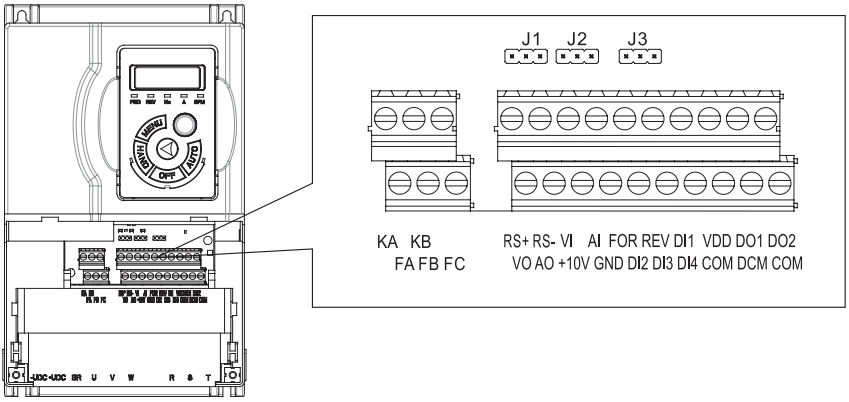
Model	Input Cable (mm^2)	Output Cable (mm^2)	Input and Output Terminals' Screws	Input and Output Terminals' Torque (N·m)	Ground Terminal Screw	Ground Terminal Torque (N·m)
HLP-SK19007D523	6	4	M4	1.0-1.2	M6	2.0-2.5

HLP-SK190001123	10	6	M5	1.6-2.0	M6	2.0-2.5
HLP-SK190001523	10	10	M8	8-10	M6	2.0-2.5
HLP-SK19004D043	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-SK19005D543	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-SK19007D543	2.5	1.5	M4	1.0-1.2	M4	1.0-1.2
HLP-SK190001143	4	2.5	M4	1.0-1.2	M6	2.0-2.5
HLP-SK190001543	6	4	M4	1.0-1.2	M6	2.0-2.5
HLP-SK19018D543	10	4	M5	1.6-2.0	M6	2.0-2.5
HLP-SK190002243	10	6	M5	1.6-2.0	M6	2.0-2.5
HLP-SK190003043	10	10	M8	8-10	M6	2.0-2.5
HLP-SK190003743	16	16	M8	8-10	M6	2.0-2.5
HLP-SK190004543	16	16	M8	8-10	M6	2.0-2.5
HLP-SK190005543	25	25	M8	8-10	M6	2.0-2.5
HLP-SK190007543	35	35	M8	8-10	M6	2.0-2.5
HLP-SK190009043	70	70	M10	12-16	M10	12-16
HLP-SK190011043	70	70	M10	12-16	M10	12-16
HLP-SK190013243	95	95	M10	12-16	M10	12-16
HLP-SK190016043	120	150	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-SK190018543	150	185	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-SK190020043	185	185	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-SK190022043	240	240	M12*1 (M10*2)	12-16	M10*2	12-16
HLP-SK190025043	70*2	70*2	M10*1	26-33	M8*1	13-16
HLP-SK190028043	95*2	95*2	M10*1	26-33	M8*1	13-16
HLP-SK190031543	95*2	95*2	M10*1	26-33	M8*1	13-16
HLP-SK190035543	120*2	120*2	M10*1	26-33	M8*1	13-16
HLP-SK190040043	120*2	120*2	M10*1	26-33	M8*1	13-16
HLP-SK190041543	120*2	120*2	M10*1	26-33	M8*1	13-16

Note: This specification is under using single-core line VV and 25℃ , if use other cables or under higher temperature environment, please refer to electrical manual.

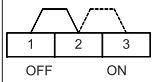
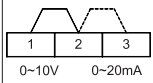
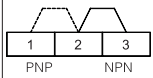
3.1.7 Description of Control Circuit

3.1.7.1 Schematic of Control Circiut Terminals



Terminals' specification:

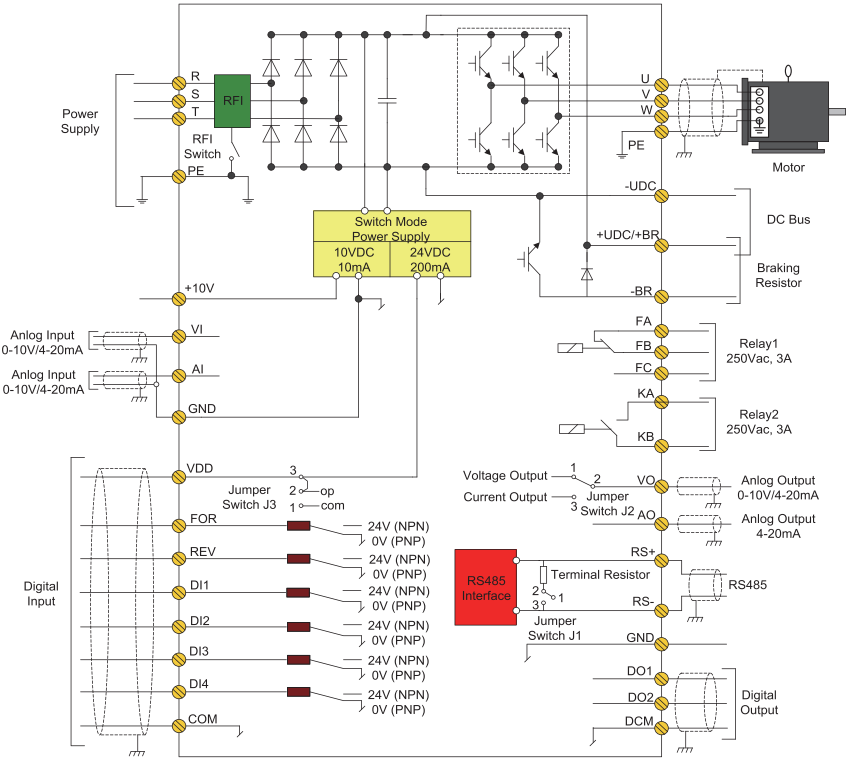
Symbol	Description	Specification
KA-KB, FA-FB-FC	Relay output	1. Resistive Load: 250VAC 3A/30VDC 3A; 2. Inductive Load: 250VAC 0.2A/24VDC 0.1A (cosφ=0.4);
RS+, RS-	RS485 communication	Max baud rate: 115200bit/s;
VI, AI	Analog input	Both VI and AI can be configurated to 0-20mA or 0-10V by paramters: 1. Input Impedance of Voltage: about 10kΩ; 2. Input Impedence of Current: ≤200Ω;
FOR, REV, DI1, DI2, DI3, DI4	Digital input	1. Logic: >DC 19V Logic: 0; <DC 14V Logic: 1; 2. Voltage: DC 0-24V; 3. Input resistance: 5kΩ; 4. Input voltage Rang: Max ±30V; 5. Digital input can be selected to NPN or PNP mode by Jump switch J3, the default is: NPN mode;
DI4	Pulse input	1. Pulse input: 0.00-100.00kHz; 2. Voltage range: 24V ± 20%; 3. Input duty ratio: 40%-60%;
VDD	24V power supply	Max load 200 mA, with over load and short circuit protection functions.

DO1, DO2	Digital output	1. Open collector output; 2. Output current range: 0-50mA; 3. Max voltage 30V;
VO, AO	Analog output	VO can be selected to the current output or voltage output via J2, default is: voltage output; AO only has current output mode; 1. Output Mode: 0~20mA or 0~10V; 2. Voltage Output: load larger than 500Ω; 3. Current Output: load less than 500Ω;
+10V	10V power supply	Max load 10mA, with over load and short circuit protection functions.
GND	Analog and communication ground	Isolated from internal COM.
COM	Digital ground	Isolated from internal GND.
DCM	Digital output common terminal	Connect COM as Digital output reference ground.
J1	RS485 termination resistor jumper switch	 Jumper switch 1-2 connected: OFF, termination resistor not connected, default state; Jumper switch 2-3 connected: ON, termination resistor connected;
J2	VO jumper switch	 Jumper switch 1-2 connected: 0~10V , default state; Jumper switch 2-3 connected: 0~20mA;
J3	Digital input jumper switch	 Jumper switch 1-2 connected: PNP mode; Jumper switch 2-3 connected: NPN mode, default state;

3.1.7.2 Control Terminals' Screws and Wiring Recommended Specifications

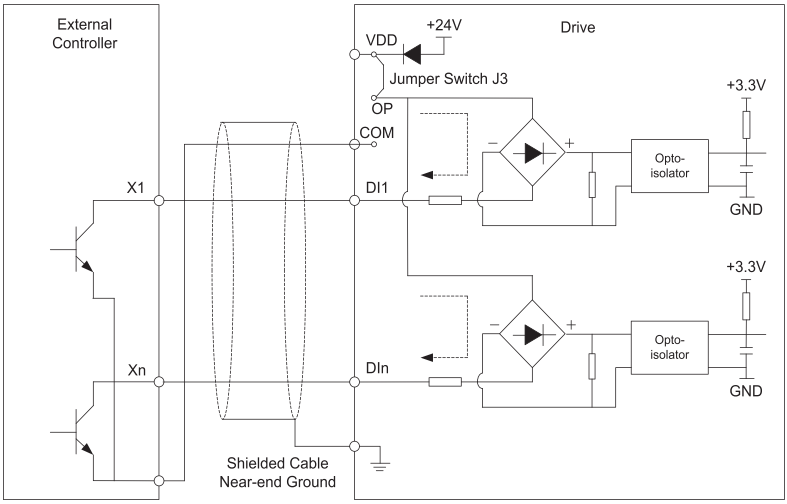
Cable types	Cable specifications (mm^2)	Torque (N·m)
Shielded cables	0.4	0.4

3.1.7.3 Control Circuit Wiring



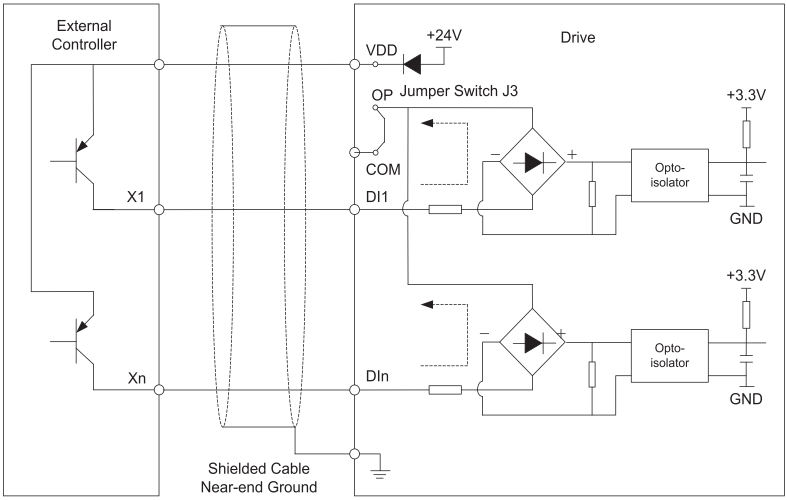
3.1.7.4 Digital Input Terminals Usage Specification

1. Open collector NPN mode wiring



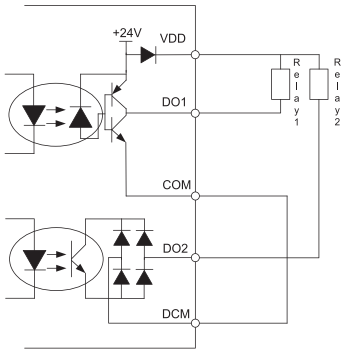
While using this mode, J3 1-2 must be connected (default state: VDD connects to OP).

2. Open collector PNP mode wiring

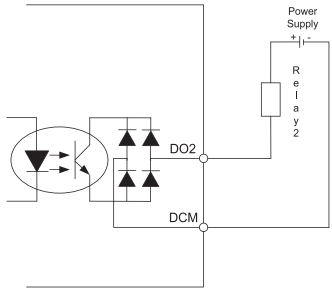


While using this mode, J3 2-3 must be connected (COM connects to OP).

3.1.7.5 Digital Output Terminals' Usage Specification



a. Use internal power supply



b. DO2 uses external power supply isolation

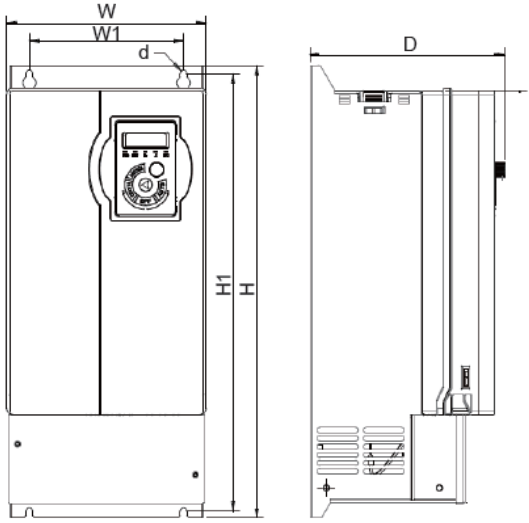
3.2 SK200 Series

3.2.1 Mechanical Installation

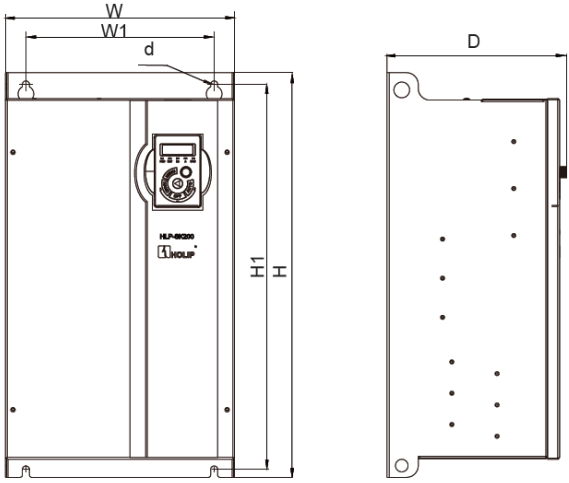
1. Ambient temperature in the range of -10°C ~ 50°C ;
2. Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation;
3. Installation should be performed where vibration is less than 1.14g (<= 75kW) or 0.7g (>= 90kW);
4. Avoid from moisture and direct sunlight;
5. Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases;
6. Protect the cooling fan by avoiding oil, dust and metal particles;
7. Prevent drilling residues, wire ends and screws falling into drive;

3.2.2 External and Installation Dimensions

■ Wall-mounted



Frame F2~F3

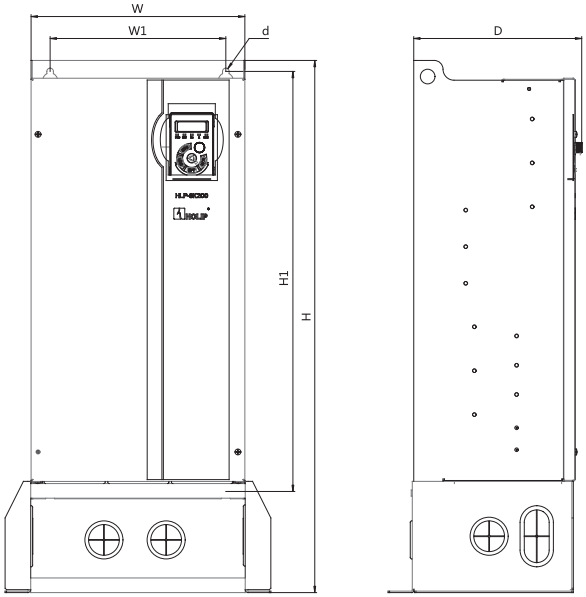


Frame F4~F7

External and installation dimensions (unit: mm)

Frame	Voltage & Power	Dimensions(mm)					
	3x380-440V	W	H	D	W1	H1	d
F2	7.5kW	158	340	178	133	330	4.5
F3	11~15kW	194	440	190	150	426	6.5
F4	18.5~22kW	234	509	210	150	491	7
F5	30~37kW	292	599	230	240	574	9
F6	45~55kW	292	650	249	240	625	9
F7	75~90kW	292	742	278	240	717	9

■ Base-mounted



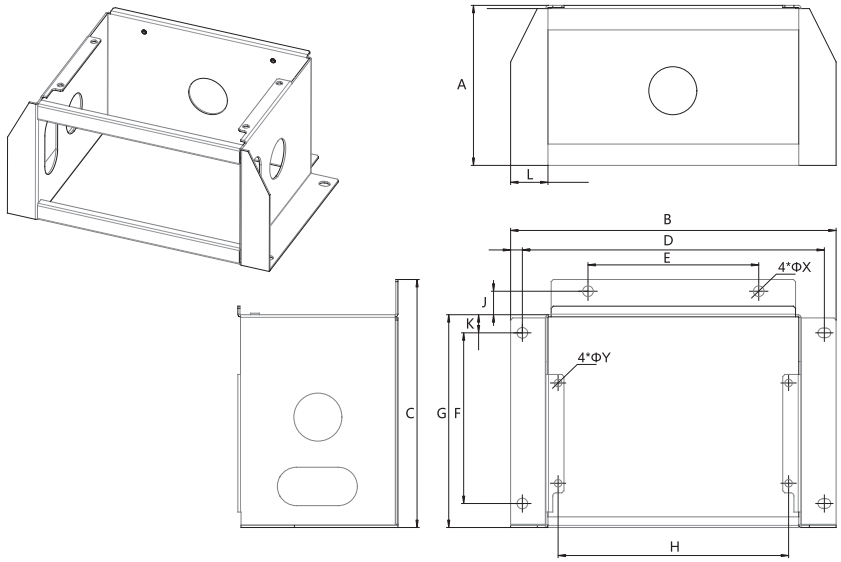
Frame F4~F7

External and installation dimensions (unit: mm)

Frame	Voltage & Power	Dimensions(mm)					
	3x380-440V	W	H	D	W1	H1	d

F4	18.5~22kW	234	635	210	150	491	7
F5	30~37kW	292	727	230	240	574	9
F6	45~55kW	292	773	249	240	625	9
F7	75~90kW	292	872	278	240	717	9

■ Base Dimensions(unit: mm)

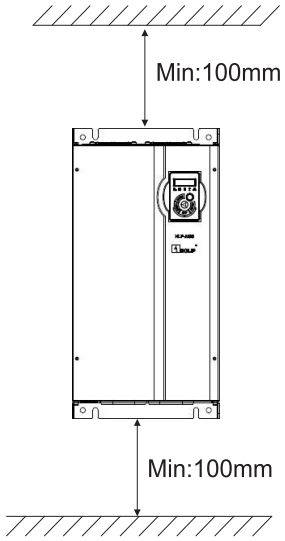


Frame	A	B	C	D	E	F	G	H	J	K	L	X	Y
F4	150	305	233	283	160	160	200	216	22	17	35	10	7
F5	152	363	253	341	218	181	220	274	22	17	35	10	7
F6	150	363	273	341	220	200	240	274	22	17	35	10	7
F7	152	363	303	341	218	181	269	274	22	17	35	10	7

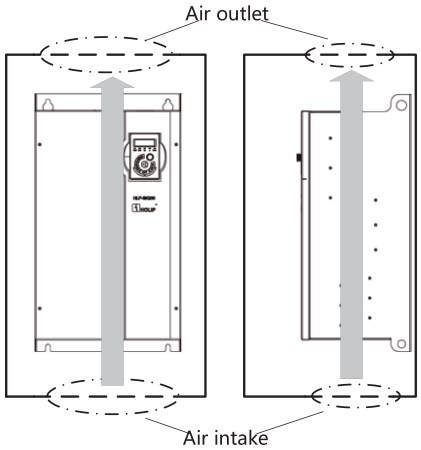
Note: Only supply design drawing for Frame F2~3 .

3.2.3 Installation and Direction

The drive must be installed vertically with smooth ventilation. Enough space must be left around the drive to ensure good cooling, as shown below:



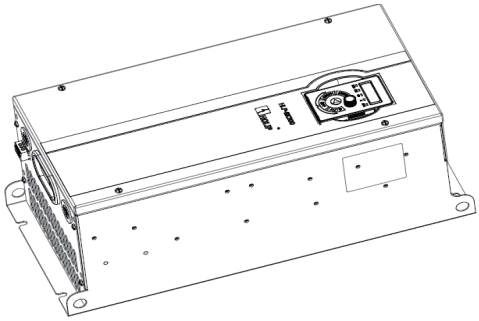
Inverter duck is shown below:



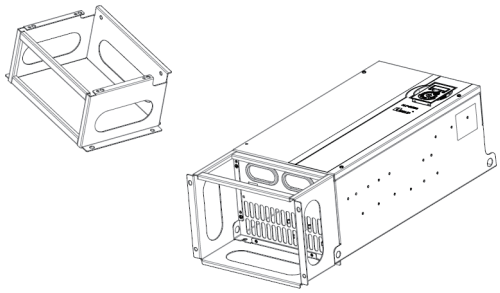
3.2.4 Base installation

Installation mode as below:

Step 1: Original state

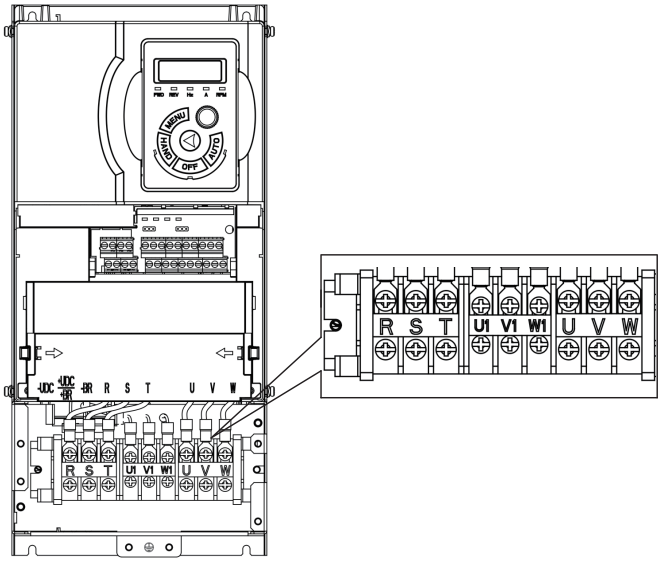


Step 2: Use M5 * 12 screws to fix the Base and drive.

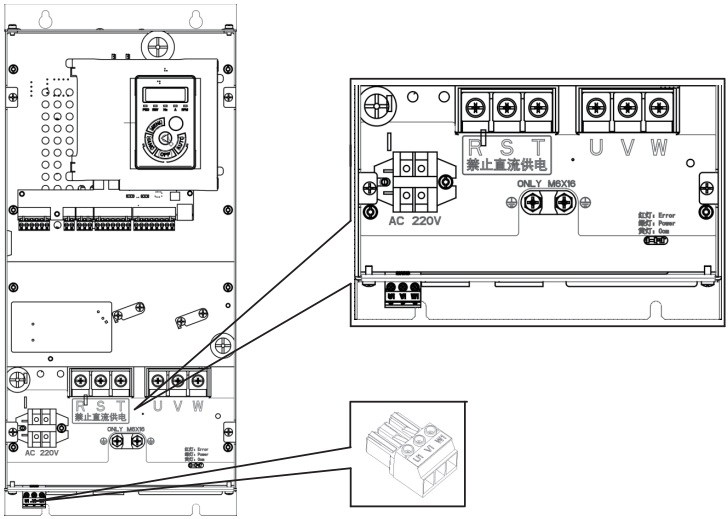


3.2.5 Description of Main Circuit

Schematic of Main Circuit Terminals



Frame F2~F3



Frame F4~F7

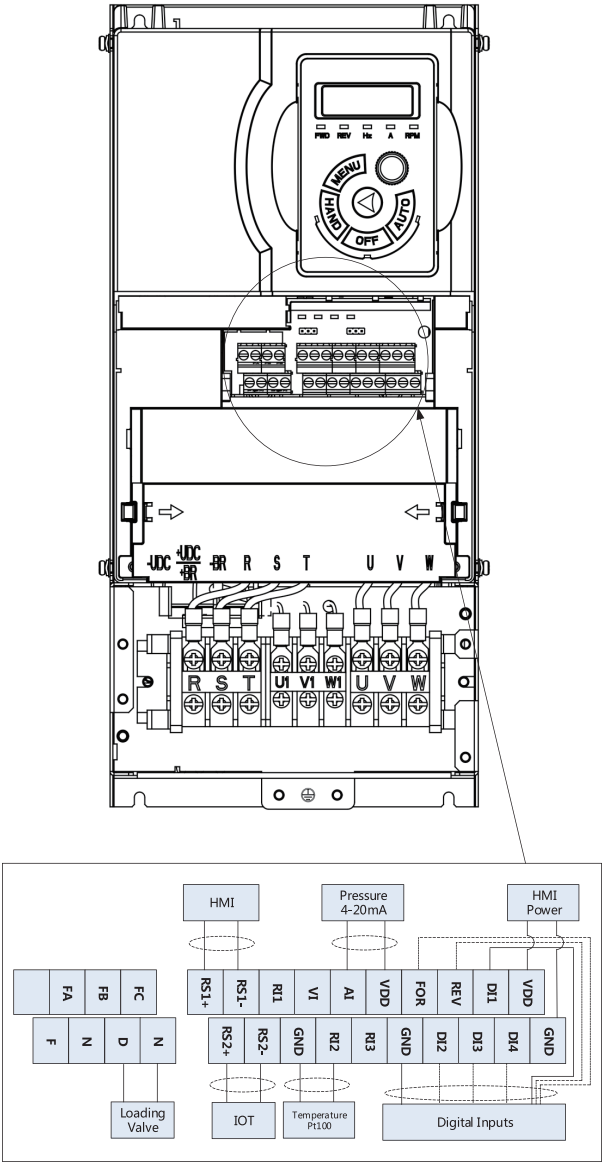
Description of main circuit terminals:

Symbol	Function
R, S, T	Power input, Single phase connected to R, T
U, V, W	Power output, connect to the main motor
U1,V1,W1	Power output, connect to the cooling fan
AC220V	220V power supply
⏚	Ground terminal

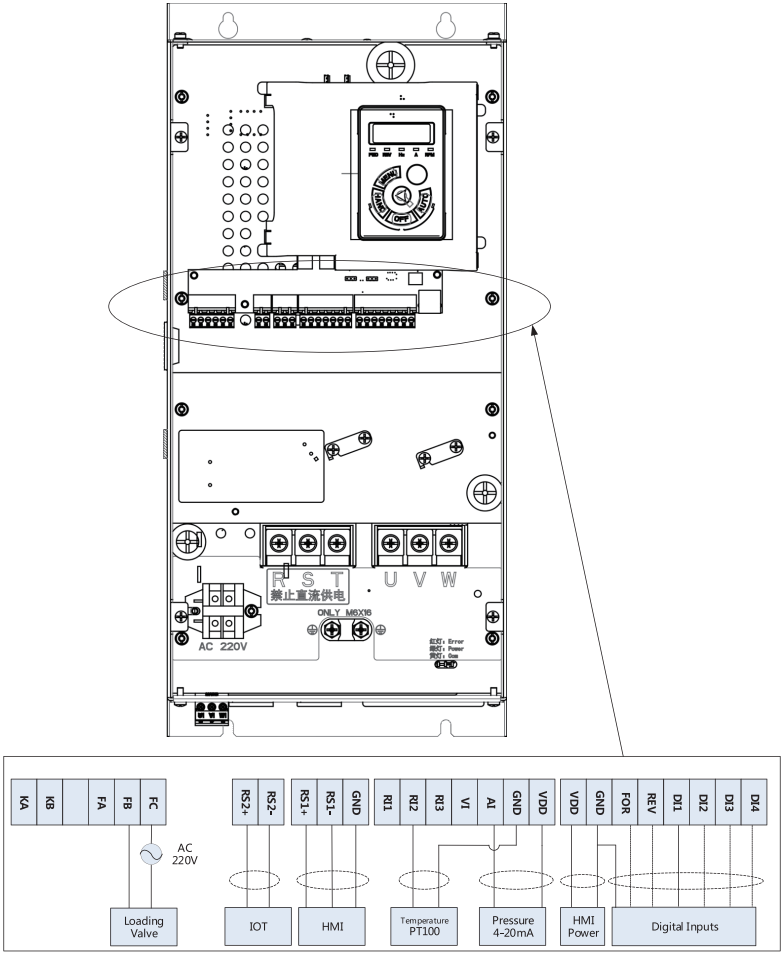
3.2.6 Description of Control Circuit

3.2.6.1 Schematic of Control Circuit Terminals

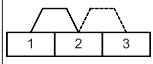
Frame F2~F3 as below:

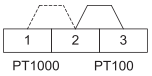


Frame F4~F7 as below:



Terminals' specification:

Symbol	Description	Specification
VDD	24V Power Supply	≤15kw Max 270mA; >15kw Max 500mA, with over load and short circuit protection functions;
FOR、REV、DI1、DI2、DI3、DI4	Digital input	1. Logic: >DC 19V Logic: 0; <DC 14V Logic: 1; 2. Voltage: DC 0-24V; 3. Input resistance: 5kΩ; 4. Input voltage Rang: Max ±30V;
VI、AI	Analog input	Both VI and AI can be configurated to 0-20mA or 0-10V by paramters: 1. Input Impedance of Voltage: about 10kΩ; 2. Input Impedence of Current: ≤200Ω;
RI1、RI2、RI3	Resistance input	RI1: PT100 or PT1000; RI2, RI3: PT100; PT100 range: 0-400Ω PT1000 range: 0-2000Ω
GND	Control ground	Digital, analog and communication ground
KA-KB、FA-FB-FC	Relay output	1. Resistive Load: 250VAC 3A/30VDC 3A; 2. Inductive Load: 250VAC 0.2A/24VDC 0.1A (cosφ=0.4); ≤15kw Model only FA-FB-FC;
F-N 、D-N	Relay output (220V)	Only for ≤15kw Model; With 220V power supply, it is necessary to pay attention to safety when using, and the D-N is fixed as the function of the loading valve.
RS1+、RS1-RS2+, RS2-	RS485 Communication	Max baud rate: 115200bit/s;
J1	RS485 termination resistor jumper switch	 Jumper switch 1-2 connected: OFF, termination resistor not connected, default state; Jumper switch 2-3 connected: ON, termination resistor connected;

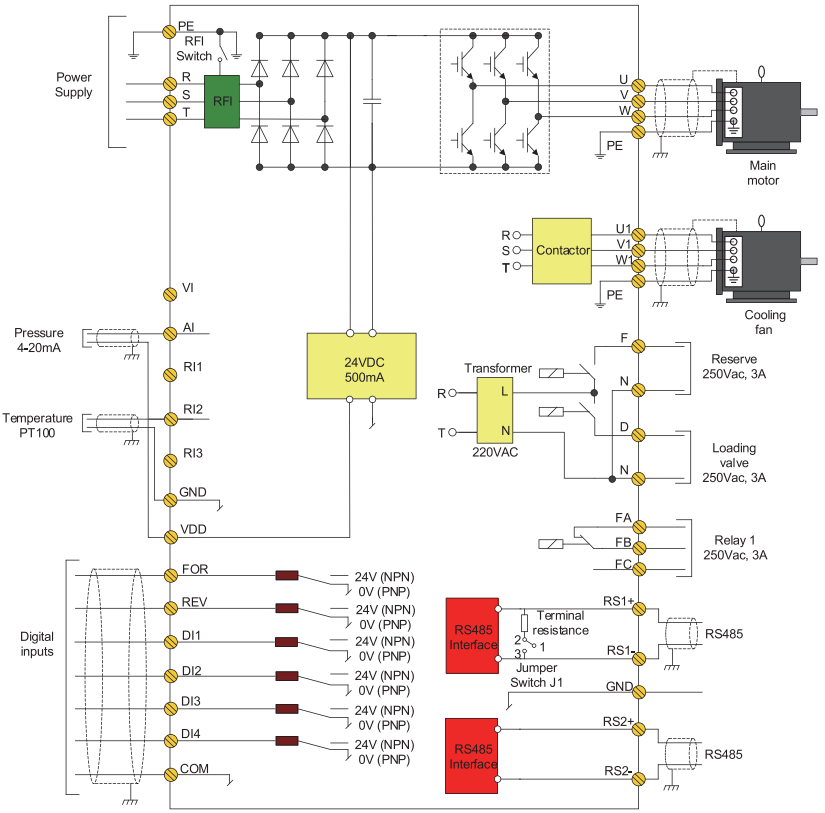
J2	Analog input Jumper switch	 Jumper switch 1-2 connected: PT1000; Jumper switch 2-3 connected: PT100, default state;

3.2.6.2 Control Terminals' Screws and Wiring Recommended Specifications

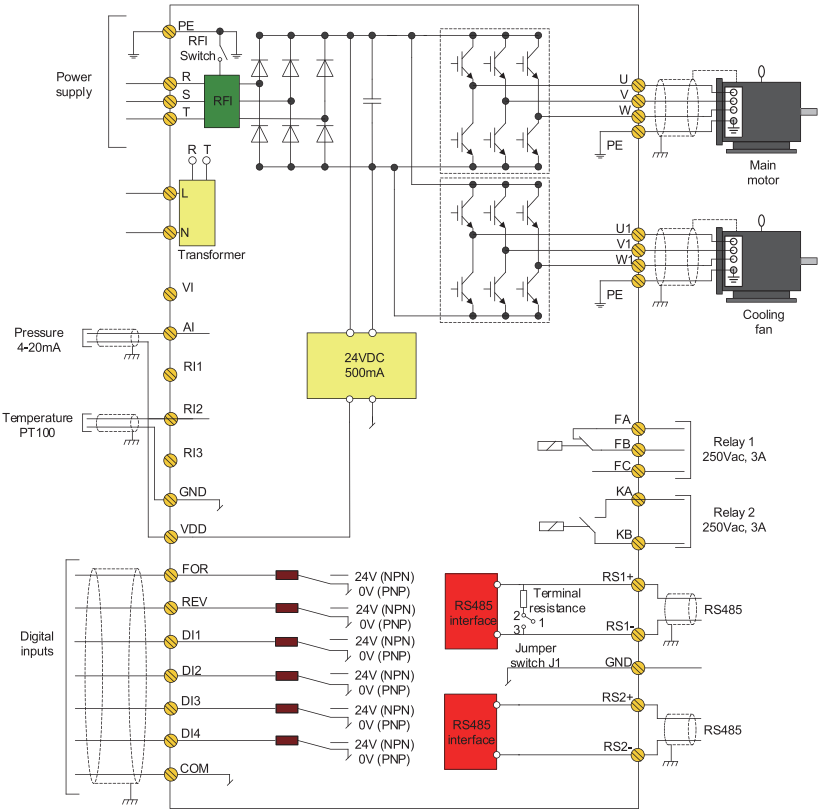
Cable types	Cable specifications (mm^2)	Torque (N·m)
Shielded cables	0.4	0.4

3.2.6.3 Control Circuit Wiring

Frame F2~F3 as below:

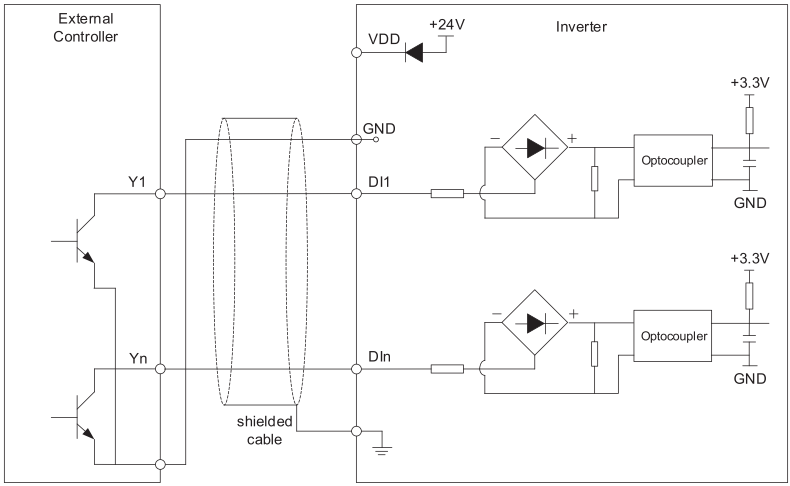


Frame F4~F7as below:



3.2.6.4 Digital Input Terminals Usage Specification

1. Open collector NPN mode wiring



3.3 SK300 Series

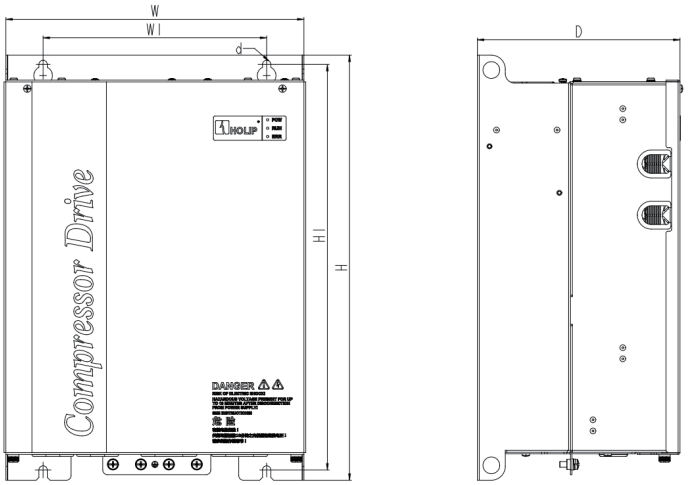
3.3.1 Mechanical Installation

1. Ambient temperature in the range of -10°C ~ 50°C ;
2. Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation;
3. Installation should be performed where vibration is less than 1.14g (<= 75kW) or 0.7g (>= 90kW);
4. Avoid from moisture and direct sunlight;
5. Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases;
6. Protect the cooling fan by avoiding oil, dust and metal particles;

7. Prevent drilling residues, wire ends and screws falling into drive;

3.3.2 External and Installation Dimensions

■ Wall-mounted

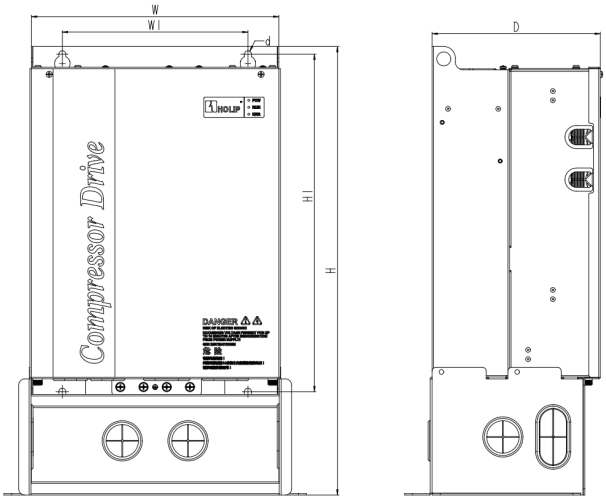


Frame F3~F5

External and installation dimensions (unit: mm)

Frame	Voltage & Power	Dimensions(mm)					
	3x380-440V	W	H	D	W1	H1	d
F2	7.5kW	176	310	179	126	300	5.5
F3	11~15kW	210	360	188	166	350	5.5
F4	18.5~22kW	265	427	219	221	405	9
F5	30~37kW	320	457	219	240	436	9

■ Base-mounted

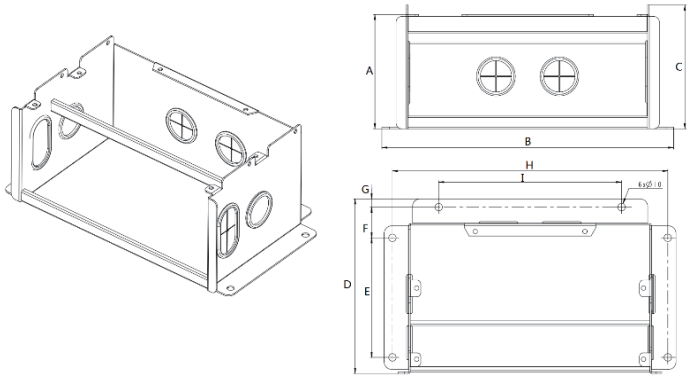


Frame F4~F5

External and installation dimensions (unit: mm)

Frame	Voltage & Power	Dimensions(mm)					
	3x380-440V	W	H	D	W1	H1	d
F2	7.5kW	176	406	181	126	300	5.5
F3	11~15Kw	210	448	188	166	342	5.5
F4	18.5~22kW	265	550	219	221	405	9
F5	30~37kW	320	579	219	240	436	9

■ Base Dimensions(unit: mm)



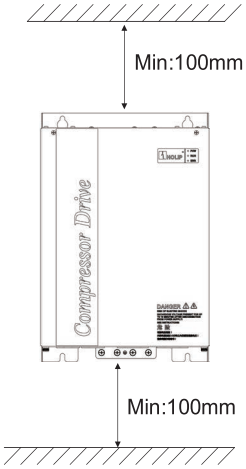
Frame F4~F5

Frame	A	B	C	D	E	F	G	H	I
F2	111	227	140	163	100	35	11	205	140
F3	102.5	267	140	178	110	45	11	245	184
F4	152.5	336	165	233	159.5	41	11	314	190
F5	152.5	391	165	233	159.5	41	11	369	245

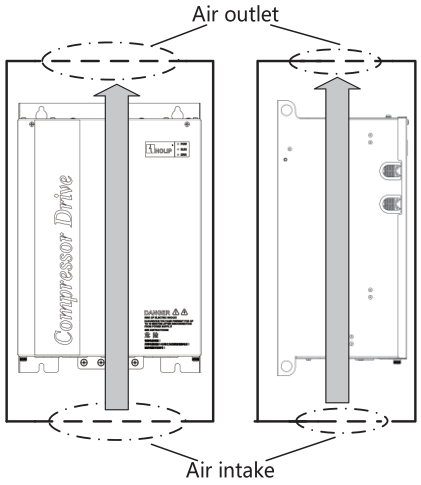
Note: Only supply design drawing .

3.3.3 Installation and Direction(e.g. 22kW)

The drive must be installed vertically with smooth ventilation. Enough space must be left around the drive to ensure good cooling, as shown below:



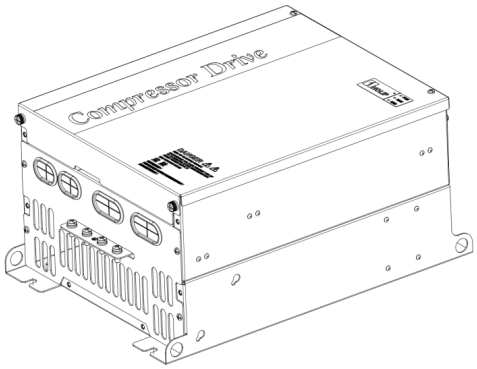
Inverter duck is shown below:



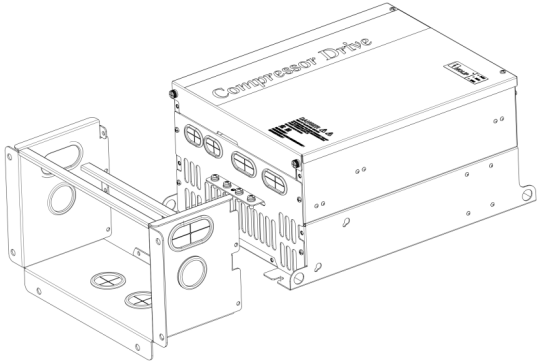
3.3.4 Base installation

Installation mode as below:

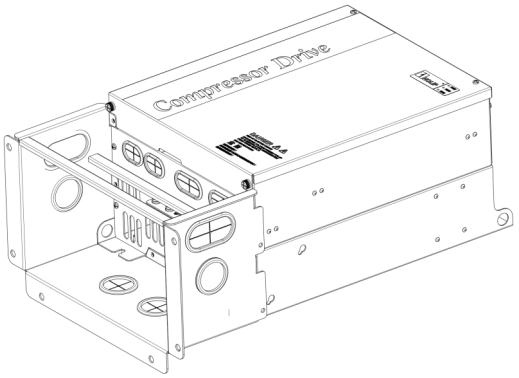
Step 1: Original state



Step 2: Use M5 * 12 screws to fix the Base and drive.

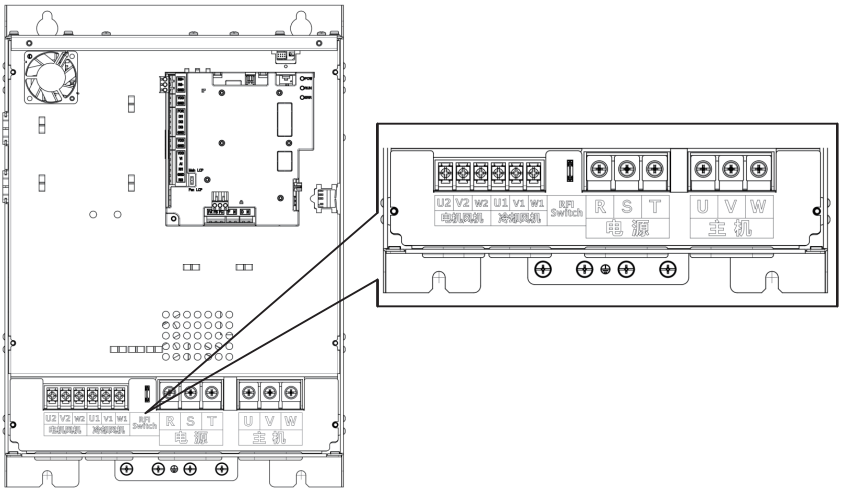


Step 3: Compelete.



3.3.5 Description of Main Circuit

Schematic of Main Circuit Terminals



Frame F3~F5

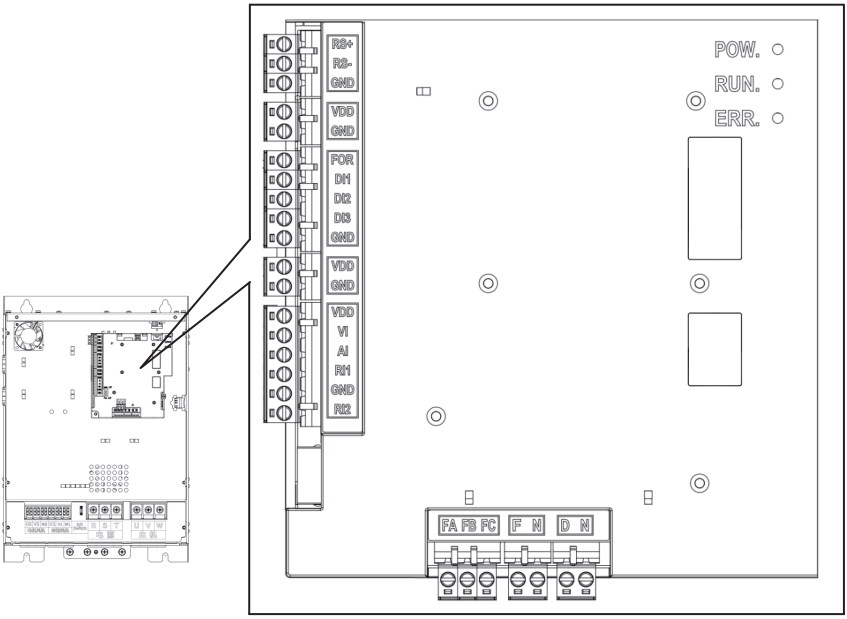
Description of main circuit terminals:

Symbol	Function
R, S, T	Power input
U, V, W	Power output, connect to the main motor
U1,V1,W1	Power output, connect to the cooling fan
U2,V2,W2	Power output, connect to the moror fan
⏚	Ground terminal

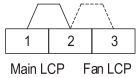
3.3.6 Description of Control Circuit

3.3.6.1 Schematic of Control Circuit Terminals

Frame F3~F5 as below:



Terminals' specification:

Symbol	Description	Specification
VDD	24V Power Supply	Max 600mA, with over load and short circuit protection functions;
FOR、DI1 DI2、DI3	Digital input	1. Logic: >DC 19V Logic: 0; <DC 14V Logic: 1; 2. Voltage: DC 0-24V; 3. Input resistance: 5kΩ; 4. Input voltage Rang: Max ±30V; 5. DI2,DI3 support PTC sensor;
VI、AI	Analog input	Both VI and AI can be configurated to 0-20mA or 0-10V by paramters: VI default: voltage input; AI default: current input; 1. Input Impedance of Voltage: about 10kΩ; 2. Input Impedence of Current: ≤500Ω;
RI1、RI2	Resistance input	PT100 range: 0-200Ω
GND	Control ground	Digital, analog and communication ground
FA-FB-FC	Relay output	1. Resistive Load: 250VAC 3A/30VDC 3A; 2. Inductive Load: 250VAC 0.2A/24VDC 0.1A (cosφ=0.4);
F-N 、D-N	Relay output (220V)	With 220V power supply, it is necessary to pay attention to safety when using, and the D-N is fixed as the function of the loading valve.
RS+、RS-	RS485 Communication	Max baud rate: 115200bit/s;
J1 (≥18.5kW)	LCP Jumper switch (≥18.5kW)	 Jumper switch 1-2 connected: LCP-Main Jumper switch 1-2 connected: LCP-Fan

3.3.6.2 LED Specifications

Indicator Light	Status	Description
Power (PWR)	Dark	No power
	Blink	Internal fault
	Light	Powr on
Run (RUN)	Dark	Stopping
	Blink	AMA
	Light	Running

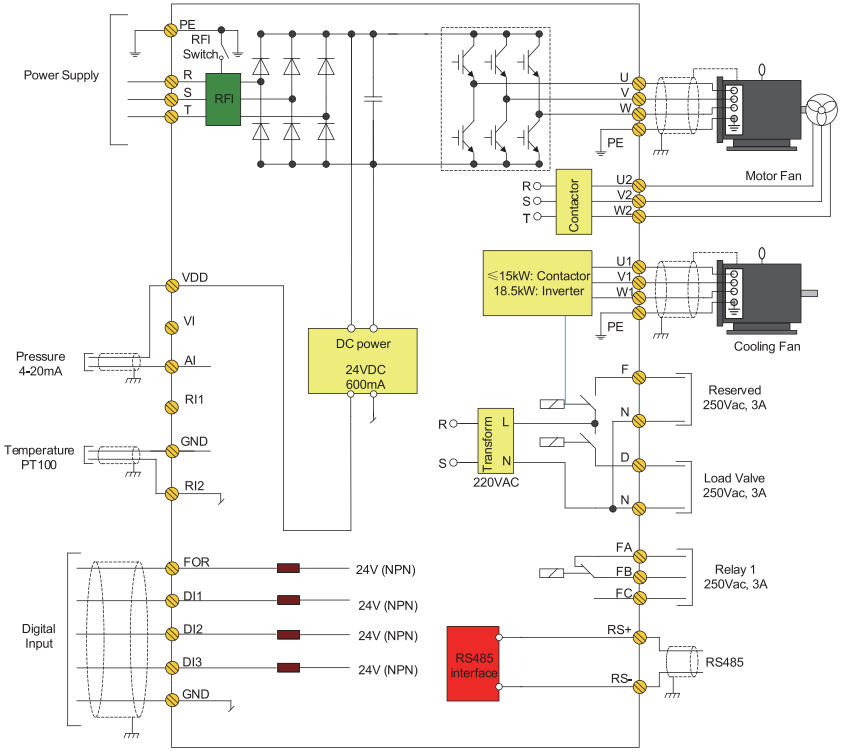
Error (ERR)	Dark	No fault
	Blink	Warning
	Light	Alarm

3.3.6.3 Control Terminals' Screws and Wiring Recommended Specifications

Cable types	Cable specifications (mm^2)	Torque (N·m)
Shielded cables	0.4	0.4

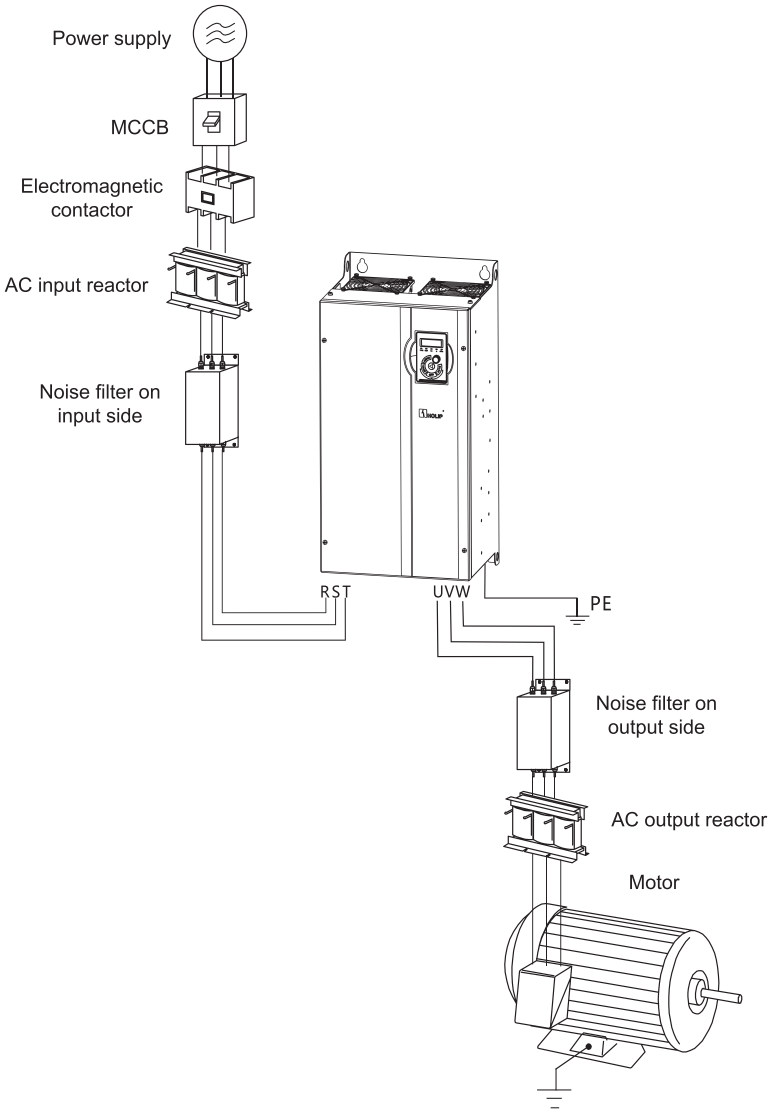
3.3.6.4 Control Circuit Wiring

Frame F2~F3 as below:



3.4 Peripheral Electrical Devices

The peripheral electrical devices of the drive are shown below:



Part	Mounting Location	Function Description
MCCB	Power receiving side	Interrupt the power supply when overcurrent occurs on downstream devices.
Contactor	Between MCCB and drive input side	Do not start and stop the drive frequently by switching the contactor on and off (less than twice per minute) nor use it to directly start the drive.
AC input reactor	Drive input side	Improve the power factor of the input side; Eliminate the input current unbalance due to unbalance between the power phases; Eliminate the higher harmonics of the input side effectively; prevent other devices from being damaged due to distortion of the voltage waveform;
EMC Input filter	Drive input side	Decrease the conduction interference flowing from the power end to the drive and improve the antiinterference capacity of the drive; Reduce the external conduction and radiation interference of the drive;
EMC Output filter	Drive output side	Reduce the external conduction and radiation interference of the drive.
AC output reactor	Between the drive output side and the motor, close to the drive	Degrade the motor insulation performance and damage the motor in the long run; Generate large leakage current and cause frequent AC drive protection trips; If the distance between the drive and the motor is greater than 100 m, install an AC output reactor;

3.4.1 Installation of Earth leakage circuit breaker

Account for the high frequency leakage current (frequency converter will produce high frequency leakage current because of high speed output switching), when installing an Earth leakage circuit breaker between the power supply and the main power input terminal(R,S,T).

Usually, one meter long power cable of inverter will generate leakage current about 100mA. Moreover, each increase in cable length of 1 meters, leakage current will increase about 5mA. Therefore, in order to eliminate high-frequency leakage current and only detect the leakage current in the harmful frequency band, the Earth leakage circuit breaker for power input must be inverter-specific.

- The use of the current sensitivity rating of up to 10mA above the dedicated Earth leakage circuit breaker.

• If you choose a general Earth leakage circuit breaker, its current sensitivity rating needs to reach more than 200mA and the running time needs to reach 0.1s or longer.

3.4.2 Selection of MCCB/Fuse/Contactor

Voltage	Power	MCCB(A)	Fuse(A)	Contactor(A)
3x200~240V	7.5kW	63	63	63
3x200~240V	11kW	100	100	100
3x200~240V	15kW	100	100	100
3x200~240V	18.5kW	150	150	100
3x200~240V	22kW	175	175	135
3x200~240V	30kW	200	200	150
3x200~240V	37kW	250	250	200
3x380~480V	4kW	25	25	25
3x380~480V	5.5kW	32	32	25
3x380~480V	7.5kW	40	40	32
3x380~480V	11kW	63	63	40
3x380~480V	15kW	63	63	63
3x380~480V	18.5kW	100	100	63
3x380~480V	22kW	100	100	100
3x380~480V	30kW	150	150	100
3x380~480V	37kW	150	150	100
3x380~480V	45kW	175	175	135
3x380~480V	55kW	200	200	150
3x380~480V	75kW	250	250	200
3x380~480V	90kW	300	300	240
3x380~480V	110kW	350	350	260
3x380~480V	132kW	400	400	350
3x380~480V	160kW	500	500	450
3x380~480V	185kW	630	630	450
3x380~480V	200kW	630	630	550
3x380~480V	220kW	800	800	550
3x380~480V	250kW	800	800	630
3x380~480V	280kW	800	800	630
3x380~480V	315kW	1000	1000	630
3x380~480V	355kW	1000	1000	800
3x380~480V	415kW	1200	1200	800

3.4.3 Selection of AC Input and Output Reactor

1. The guide of AC input reactor selection

Voltage	Power	Rated current (A)	Maximum continuous current(A)	Inductance (mH) & 3% Impedance
3x200~240V	7.5kW	43	65.1	0.37
3x200~240V	11kW	61	91.5	0.27
3x200~240V	15kW	73	109.5	0.22
3x200~240V	18.5kW	88	132	0.18
3x200~240V	22kW	106	159	0.15
3x200~240V	30kW	130	195	0.12
3x200~240V	37kW	171	256.5	0.09
3x380~480V	4kW	15.8	23.7	2.05
3x380~480V	5.5kW	21.3	31.95	1.52
3x380~480V	7.5kW	28.3	42.45	1.44
3x380~480V	11kW	35.9	53.85	0.90
3x380~480V	15kW	43.4	65.1	0.75
3x380~480V	18.5kW	51.5	77.25	0.63
3x380~480V	22kW	61	91.5	0.53
3x380~480V	30kW	80	120	0.45
3x380~480V	37kW	80	120	0.36
3x380~480V	45kW	100	150	0.3
3x380~480V	55kW	120	180	0.25
3x380~480V	75kW	160	240	0.18
3x380~480V	90kW	200	300	0.15
3x380~480V	110kW	250	375	0.12
3x380~480V	132kW	300	450	0.1
3x380~480V	160kW	350	525	0.085
3x380~480V	185kW	400	600	0.07
3x380~480V	200kW	450	675	0.065
3x380~480V	220kW	500	750	0.06
3x380~480V	250kW	560	710	0.05
3x380~480V	280kW	630	780	0.03
3x380~480V	315kW	700	880	0.0215
3x380~480V	355kW	770	970	0.017

3x380~480V	415kW	860	1070	0.012

2. the guide of AC output reactor selection

Voltage	Power	Rated current (A)	Maximum continuous current(A)	Inductance (mH)
3x200~240V	7.5kW	32	48	0.51
3x200~240V	11kW	45	67.5	0.36
3x200~240V	15kW	61	91.5	0.27
3x200~240V	18.5kW	75	112.5	0.22
3x200~240V	22kW	91	136.5	0.18
3x200~240V	30kW	112	168	0.14
3x200~240V	37kW	150	225	0.11
3x380~480V	4kW	9.9	14.85	3.27
3x380~480V	5.5kW	13.3	19.95	2.43
3x380~480V	7.5kW	17.7	37.5	1.43
3x380~480V	11kW	25	53	0.98
3x380~480V	15kW	32	67.8	0.72
3x380~480V	18.5kW	38	80.6	0.58
3x380~480V	22kW	45	95.4	0.49
3x380~480V	30kW	61	129	0.362
3x380~480V	37kW	75	159	0.294
3x380~480V	45kW	91	193	0.242
3x380~480V	55kW	112	238	0.197
3x380~480V	75kW	150	318	0.147
3x380~480V	90kW	180	382	0.123
3x380~480V	110kW	215	456	0.103
3x380~480V	132kW	260	551	0.085
3x380~480V	160kW	315	668	0.070
3x380~480V	185kW	365	774	0.060
3x380~480V	200kW	395	838	0.056
3x380~480V	220kW	435	923	0.051
3x380~480V	250kW	480	1020	0.009
3x380~480V	280kW	540	1145	0.008
3x380~480V	315kW	605	1280	0.0055
3x380~480V	355kW	660	1400	0.004

3x380~480V	415kW	745	1580	0.0035

3.4.4 Selection of EMC Filter

Voltage	Power	EMC Input Filter		EMC Output Filter	
		Rated Current (A)	Recommended Model *	Rated Current (A)	Recommended Model *
3x200~240V	7.5kW	50	NFI-050	36	NFO-036
3x200~240V	11kW	80	NFI-080	50	NFO-050
3x200~240V	15kW	80	NFI-080	80	NFO-080
3x200~240V	18.5kW	100	NFI-100	100	NFO-100
3x200~240V	22kW	150	NFI-150	100	NFO-100
3x200~240V	30kW	150	NFI-150	150	NFO-150
3x200~240V	37kW	200	NFI-200	200	NFO-200
3x380~480V	4kW	10	NFI-010	10	NFO-010
3x380~480V	5.5kW	20	NFI-020	20	NFO-020
3x380~480V	7.5kW	20	NFI-020	20	NFO-020
3x380~480V	11kW	36	NFI-036	36	NFO-036
3x380~480V	15kW	36	NFI-036	36	NFO-036
3x380~480V	18.5kW	50	NFI-050	50	NFO-050
3x380~480V	22kW	50	NFI-050	50	NFO-050
3x380~480V	30kW	65	NFI-065	65	NFO-065
3x380~480V	37kW	80	NFI-080	80	NFO-080
3x380~480V	45kW	100	NFI-100	100	NFO-100
3x380~480V	55kW	150	NFI-150	150	NFO-150
3x380~480V	75kW	150	NFI-150	150	NFO-150
3x380~480V	90kW	200	NFI-200	200	NFO-200
3x380~480V	110kW	250	NFI-250	250	NFO-250
3x380~480V	132kW	250	NFI-250	250	NFO-250
3x380~480V	160kW	300	NFI-300	300	NFO-300
3x380~480V	185kW	400	NFI-400	400	NFO-400
3x380~480V	200kW	400	NFI-400	400	NFO-400
3x380~480V	220kW	600	NFI-600	600	NFO-600
3x380~480V	250kW	900	NFI-900	900	NFO-900
3x380~480V	280kW	900	NFI-900	900	NFO-900
3x380~480V	315kW	900	NFI-900	900	NFO-900

3x380~480V	355kW	1200	NFI-1200	1200	NFO-1200
3x380~480V	415kW	1200	NFI-1200	1200	NFO-1200

* Recommended models is the Shanghai Eagtop Electronic Technology Co., Ltd. products, website: http://www.eagtop.com/

3.5 EMC instructions

3.5.1 Introduction to EMC Standard

The HLP-SK series satisfies the requirements of standard IEC/EN61800-3: 2004 (Adjustable speed electrical power drive systems part 3: EMC requirements and specific test methods).

3.5.2 Noise Abatement

1. When peripheral equipment and the drive share the power supply of one system, noise from the drive may be transmitted to other equipment in this system via power lines and result in misoperation and/or faults. In such a case, the following measures could be taken:

a. Mount input noise filter at input terminal of the drive;

b. Mount power supply filter at power input terminal of affected equipment;

c. Use isolation transformer to isolate the noise transmission path between other equipment and the drive.

2. As the wiring of peripheral equipment and the drive constitutes a circuit, the unavoidable earthing leakage current of drive will cause equipment misoperation and/or faults. Disconnect the grounding connection of equipment may avoid this misoperation and/or faults.

3. Sensitive equipment and signal lines shall be mounted as far away from drive as possible.

4. Signal lines should be provided with shielded layer and reliably grounded. Alternatively, signal cable could be put into metallic conduits between which the distance shall be no less than 20cm, and shall be kept as far away from drive and its peripheral devices, cables as possible. Never make signal lines in parallel with power lines or bundle them up.

5. Signal lines must orthogonally cross power lines if this cross inevitable.

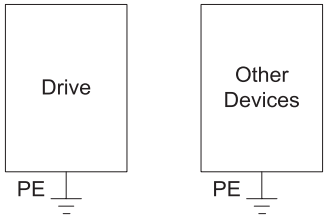
6. Motor cables shall be placed in thick protective screen like more than 2mm-thick pipelines or buried cement groove, also, power lines can be put into metallic conduit and grounded well with shielded cables.

7. Use 4-core motor cables of which one is grounded at close side of the drive and the other side is connected to motor enclosure.

8. Input and output terminals of drive are respectively equipped with radio noise filter and linear noise filter. For example, ferrite common mode choke can restrain radiation noise of power lines.

3.5.3 Grounding

Recommended ground electrode is shown in the figure below:



1. Use to the fullest extent the maximum standard size of grounding cables to reduce the impedance of grounding system;

2. Grounding wires should be as short as possible;

3. Grounding point shall be as close to the drive as possible;

4. One wire of 4-core motor cables shall be grounded at the drive side and connected to grounding terminal of motor at the other side. Better effect will be achieved if motor and drive are provided with dedicated ground electrodes;

5. When grounding terminals of various parts of system are linked together, leakage current turns into a noise source that may influence other equipment in the system, thus, grounding terminals of the drive and other vulnerable equipment should be separated;

6. Grounding cable shall be kept away from input & output of noise-sensitive equipment.

3.5.4 Leakage Current Suppression

Leakage current passes through the line-to-line and ground distributed capacitors at input & output sides of drive, and its size is associated with the capacitance of distributed capacitor and the carrier frequency. Leakage current is classified into ground leakage current and line-to-line leakage current.

1. Ground leakage current not only circulates inside drive system, but may also influence other equipment via ground loop. Such a leakage current may result in malfunction of RCD and other equipment. The higher the carrier frequency of drive is, the bigger the ground leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the ground leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier frequency and minimize the length of motor cables.

2. The higher harmonics of line-to-line leakage current that passes through between cables at output side of drive will accel the aging of cables and may bring about malfunction of other equipment. The higher the carrier frequency of drive is, the bigger the line-to-line leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the line-to-line leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier requency and minimize the length of motor cable. Line-to-line leakage current can also be effectively suppressed by mounting additional output reactors.

3. For the HLP-SK serials, the models which power is less than 22kW (including) can be removed RFI screws; the models which power is greater than 30kW (including) can be set C14.50 = 0 to cut RFI filter to reduce the leakage current;

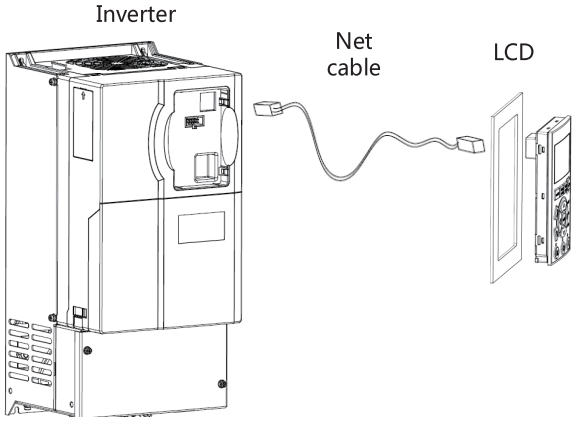
3.5.5 Induction Voltage Suppression

The drive outputs pulse voltage which will form induction voltage in the surface of the motor when the drive is not grounded. The induction voltage can be reduced by connecting the drive's PE terminal to the motor and closing RFI screws (models which power <= 22kW) or setting C14.50 = 1 (models which power >= 30kW).

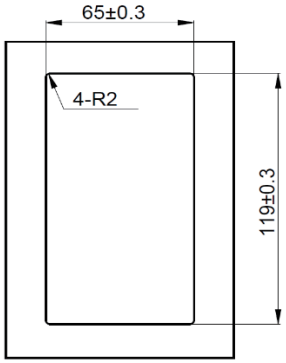
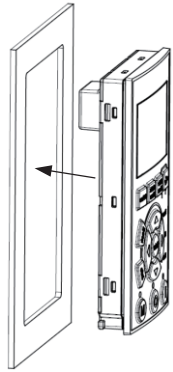
Chapter 4 Operation and Display

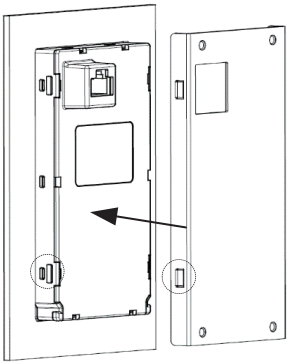
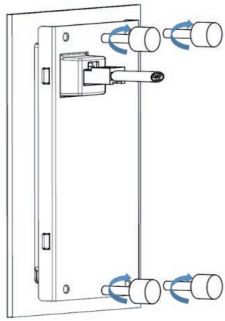
4.1 Liquid Crystal Display

Holip provide the Liquid Crystal Display(hereinafter referred to as LCD) to control compressor system as a simple solution. The LCD can be connected to inverter with net cable.

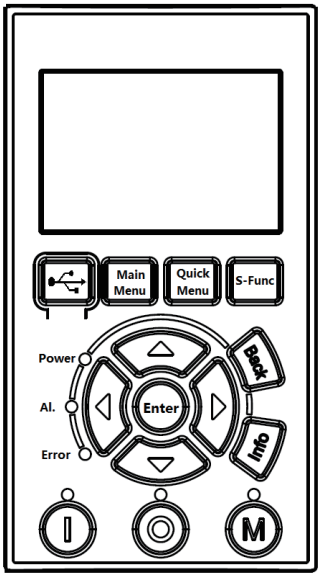


4.1.1 External and Installation Dimensions

Step 1: Open a hole in line with the size of the control panel in the positon needed to install the LCD:	Step 2: Install LCD according to the direction of the arrow.
	

Step 3: Install the backboard on the LCD according to the direction of arrow, make sure the four buckles fixed.	Step 4: Tighten the foue screws, and install the net cable.
	

4.1.2 LCD introduction:

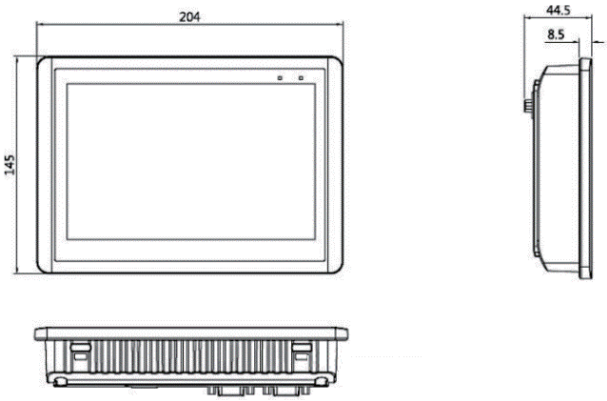


Power ○	Power LED
AL. ○	Alarm LED
Error ○	Error LED
	Mini USB
Main Menu	Main menu
Quick Menu	Compressor debug
S-Func	Special function
Enter	Confirm
Back	Return
Info	Information
	Start
	Stop/Reset
	Fan Jog /Manual Load

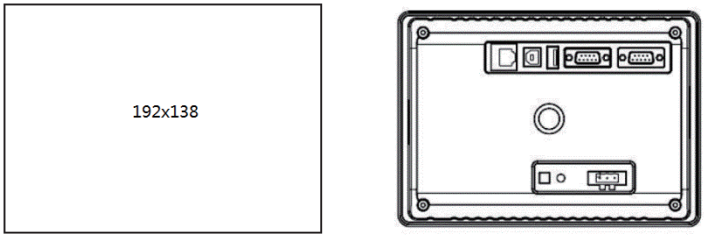
* For detailed instructions, see《SK series operation guide》.

4.2 HMI

4.2.1 External and Installation Dimensions

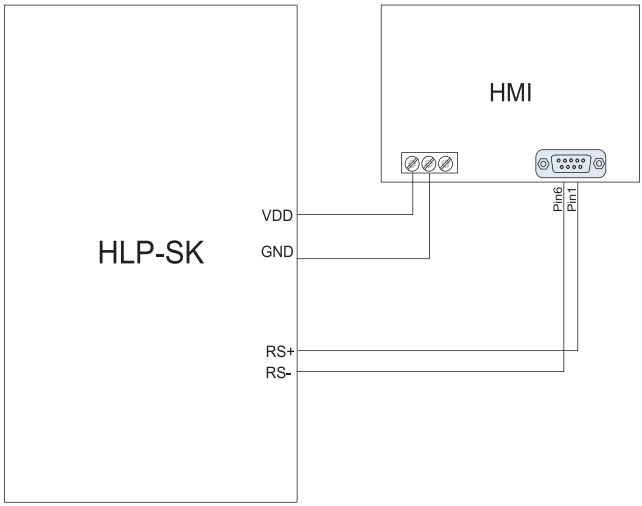


External Dimension: 204*145*44.5(mm)



Hole Dimension: 192*138(mm)

4.2.2 HMI wiring diagram



* For detailed instructions, see《SK series operation guide》.

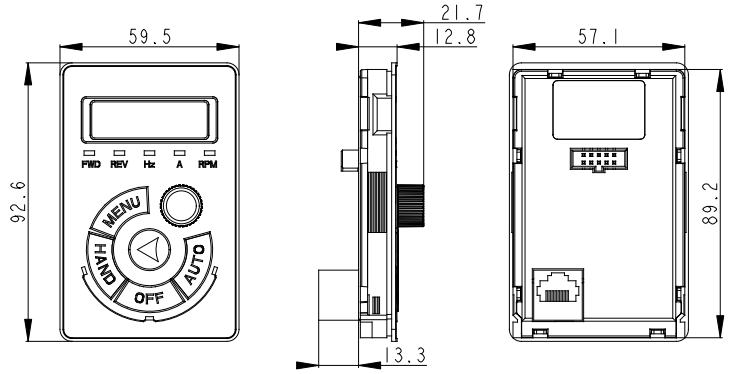
4.3 Local Control Panel

4.3.1 Local Control Pannel External Installation

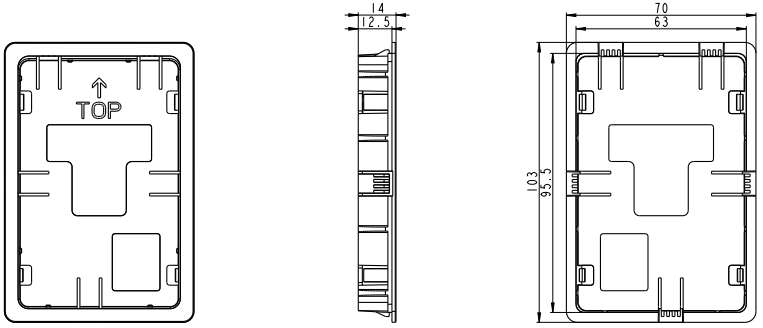
1.LCP-E10 and LCP-E20 Installation

LCP-E10 is configured as standard, LCP-E20 has the same external and installation dimensions and installation method with LCP-E10. The difference between LCP-E10 and LCP-E20 is the length of extension cable (network cable) when mounting LCP on control cabinet.

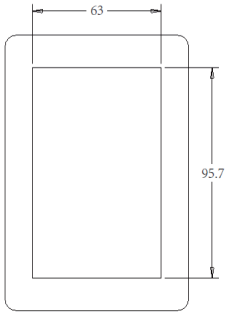
The external dimensions of LCP-E10 and LCP-E20 are shown below (unit: mm):



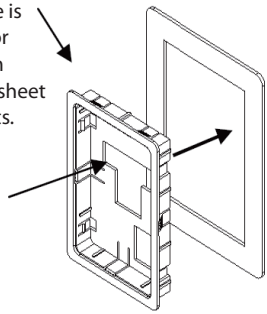
When installing LCP-E10 or LCP-E20 outside, a cradle is needed. The external dimensions of the cradle are shown below (unit: mm):



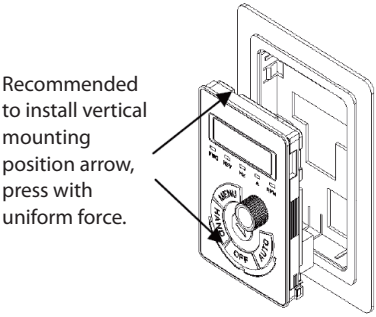
The installation steps of LCP-E10 and LCP-E20 are shown below:



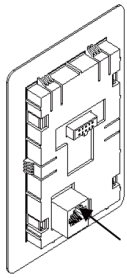
Stepl: Open a hole in line with the size of the control panel in the position need to install the LCP, hole size, as shown;



Press and hold the
snap roots when installation, using buckle deformation install sheet metal.
Step2: Install the LCP according to the diection of the arrow



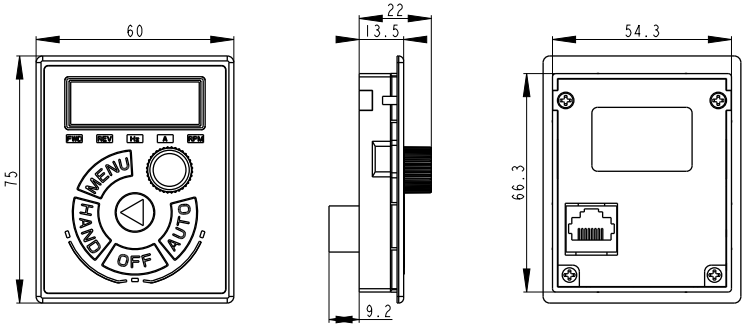
Step 3: The LCP is installed in the cradle, according to the direction of the arrow.



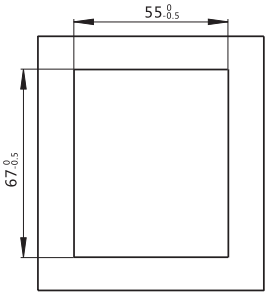
Step 4: Install the external LCP communication cable, insert into RJ45 terminal from the bottom of hole.

2. LCP-E21 Installation

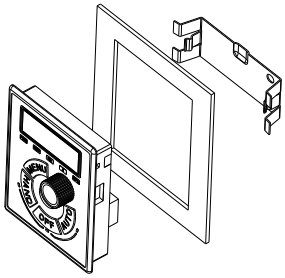
The external dimensions of LCP-E21 are shown below (unit: mm):



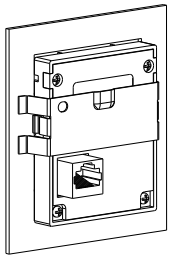
The installation steps of LCP-E21 are shown below:



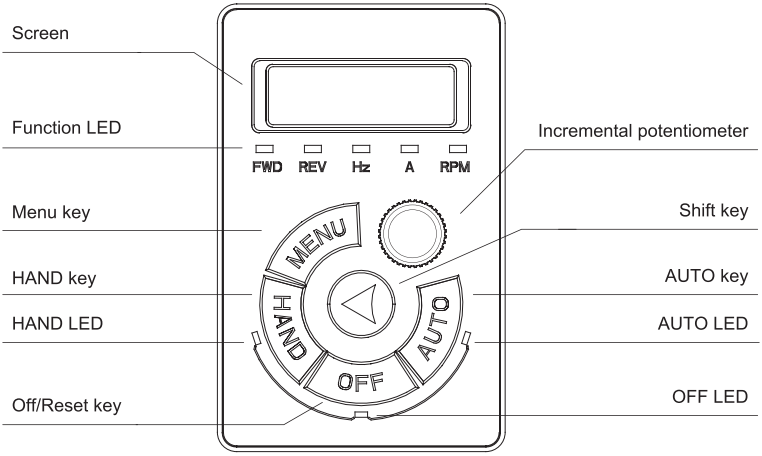
Step 1:Open a hole in the control panel where it is needed to install LCP-E10 or LCP-E20, the hole size is as shown.



Step 2: Install the LCP according to the direction of the arrow.

 Step 3: Install the LCP communication cable, insert into RJ45 terminal from the bottom hole.	

Local Control Panel (LCP) can do the operation of parameters modifications, status monitoring and drive control (start, stop), its appearance is shown blow:



1. State LED

The drive has three operating states: HAND control state, AUTO control state and OFF state. The operating states are indicated by HAND, AUTO and OFF Led.

HAND LED: The drive is in the HAND control state when it is on. The frequency can be changed

by turning the incremental potentiometer. Press "HAND" key to set the drive in the HAND state.

OFF Led: The drive is in the OFF state when it is on. Press "OFF" key to set the drive in the HAND state.

AUTO LED: The drive is in the AUTO state when it is on. In the AUTO state, the drive is controlled by control terminals or communication. Press"AUTO" key to set the drive in the AUTO state.

2. Function Led

FWD, REV Led: Indicates that the drive runs forwards or reverse.

Hz, A, RPM Led: Indicates the meaning of data displayed on the screen.

Local remote running lights running lights, OFF LEDs, three LED lights indicate.

3. Screen

There are 5 LED which can display reference, output frequency, monitoring data and warning/ alarm code.

4. Keys

Symbol	Name	Function
MENU	Programming	Enter or exit menu.
	Shift	Select the displayed parameters in turn in the stop or running state; Select the digit to be modified when modifying parameters.
HAND	Hand	Press it to set the drive in the HAND control state.
OFF	Off/Reset	Stop the drive when it is in the running state and perform the reset operation when it is in the fault state.
AUTO	Auto	Push it to set the drive in the AUTO control state.
	Confirm	Push the incremental potentiometer. Enter the menu or confirm the parameter setting.

5. Incremental Potentiometer

Increase/decrease data or parameter, clockwise to increase, counter-clockwise to decrease.

4.3.2 Parameter Setting

Example: Set C03.10 [0] to 20.5:

Key-press	LCP Display	Action Description
MENU	C00.03	Press MENU key to display the first basic C00.03
	C03.00	Turn clockwise to select parameter group C03
◀	C03.00	Press ◀ key to shift to fractional part
	C03.10	Turn clockwise to select parameter C03.10
	[0]	Press key show the first option of C03.10
	0000	Press key to show the value of the first option of parameter C03.10
	000.5	Turn clockwise to change the fractional part to 5
◀	000.5	Press ◀ key to shift to integral part
	020.5	Press key to change the integral part to 20
	END	Press key to accept the change and save it as 20.5

4.3.3 FWD/REV Status

Confirm the direction of the motor according to the set value, as shown in the following table:

Reference	Running status	Indicator Display
≥0	STOP	○ FWD ● REV
<0	STOP	● FWD ○ REV
≥0	FWD	● FWD ○ REV

≥0	REV	
<0	FWD	
<0	REV	

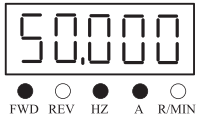
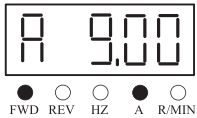
Note: A flash light denotes the status coming, Light on indicates the current state, and light off means not in this state.

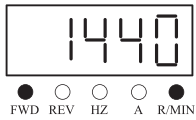
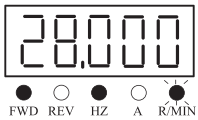
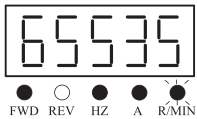
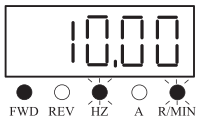
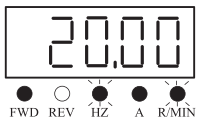
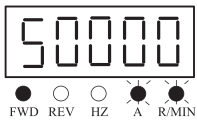
Example 1: The first line of the table indicates the drive stopped and the reference is greater than or equal to 0, it means the dirve at some time in the future will run forward.

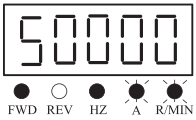
Example 2: The fourth line of the table represents the current drive is reverse running, and the reference setting is greater than or equal to 0, it means the drive at some time in the future will run forward.

4.3.4 Data Read-outs

Press ◀ key to change the display items on LCP while displaying output frequency.

Display Items	Key-press	LCP Display	Action Description
Output Frequency	Initial interface		Show the output frequency C16.13 is 50.0Hz, display accuracy: 0.1
Reference	◀		Show the reference C16.01 is 50.000, display accuracy: 0.001
Motor Current	◀		Show the motor current C16.14 is 9.00A, display accuracy: 0.01
Motor Voltage	◀		Show the motor voltage C16.12 is 380V, display accuracy: 1

Motor Speed	◀		Show the motor speed C16.05 is 1440rpm, display accuracy:1
DC Voltage	◀		Show the DC Voltage C16.30 is 540 V, display accuracy: 1
Drive Temperature	◀		Show the drive temperature C16.34 is 45°C , display accuracy:1
Feedback Value	◀		Show the feedback value C16.52 is 28.000, display accuracy: 0.001
Counter A	◀		Show counter A C16.72 is 65535, display accuracy: 1
Counter B	◀		Show counter B C16.72 is 65535, diaplay accuracy: 1
Analog in VI	◀		Show analog in VI C16.62 is 10.00V, display accuracy: 0.01
Analog in AI	◀		Show Analog in AI C16.63 is 20.00mA, display accuracy: 0.01
Pulse Input	◀		Show pulse input C16.68 is 50.000kHz, display accuracy: 0.001

Pulse Output			Show pulse output (C16.69) is 50000Hz, display accuracy: 1

Note: The drive only monitors output frequency, reference and output current reference by default. For monitoring other status (DC voltage, etc.), please set the parameter C00.33 (refer to instructions).

4.3.5 View Alarm Record

If the drive trips, fault code will be showed to illustrate the reason, the drive will save the latest 10 trip record.

Key-press	LCP Display	Action Description
	C00.03	Press  key to display the first basic C00.03.
	C15.00	Turn  clockwise to select par. group No. C15.
	C15.00	Press  to select parameter number.
	C15.30	Turn  clockwise to select C15.30
	[0]	Press  to show the first option of C15.30
	**	Press  to show the first fault record.
	[1]	Press  to show the second fault record, it can display up to ten recent fault records in turn.

4.3.6 View State Parameter

By viewing the group 16th parameters the current status of the drive can be learned. For example: C16.60 indicates the current state of digital input terminals.

Key-press	LCP Display	Action Description
	C00.03	Press  to display the first basic parameter C00.03.

	C16.00	Turn  clockwise to select Par. group No. C16
	C16.00	Press  to select parameter No.
	C16.60	Turn  clockwise to select C16.60
	2	Press  to view the value in C16.60, 2 indicates status of FOR, DI1, DI2, DI3, DI4 is 0, and status of REV is 1.

4.3.7 LED Display

0	1	2	3	4	5	6	7	8	9
									
A	B	C	D	E	F	G	H	I	J
									
K	L	M	N	O	P	Q	R	S	T
									
U	V	W	X	Y	Z	-	+	.	=
									
a	b	c	d	e	f	g	h	i	j
k	l	m	n	o	p	q	r	s	t
u	v	w	x	y	z				

Chapter 5 Parameter Overview

Par. No.	Name	Range	Unit	Default
Par. Group 00: Operati--on/Display				
*C00.03	Regional Settings	0: 50 Hz; 1: 60 Hz;	-	0
C00.04	Operating State at Power-up	0: Resume 1: Forced stop, ref=old 2: Forced stop, ref=0	-	1
*C00.06	Grid Type	0~122	-	*
C00.10	Active Set-up	1: Set-up 1 2: Set-up 2 9: Multi set-up	-	1
C00.11	Edit Set-up	1: Set-up 1 2: Set-up 2	-	1
*C00.12	Link Set-up	0: Not linked 20: Linked	-	20
C00.31	Custom Readout Min. Value	0.00~99999.00	-	0.00
C00.32	Custom Readout Max. Value	0.00~99999.00	-	100.00
C00.33	LCP Display Option	0~4095	-	0
C00.34	Parameter Type	0: Word mode 1: Double word mode	-	0
C00.40	HAND Key Option	0: Disabled 1: Enabled	-	1
C00.41	OFF Key Option	0: Disabled 1: Enabled 2: Enabled reset only	-	1
C00.42	AUTO Key Option	0: Disabled 1: Enabled	-	1
C00.46	One Key Recovery Time	0: Disabled 5: 5s 10: 10s 15: 15s 20: 20s	-	0
C00.47	LCP Potentiometer Step	0: 0.1; 1: 1; 2: 10	-	0
C00.49	Operation mode	0~3	-	-
*C00.51	Set-up Copy	0: No copy 1: Copy from set-up 1 2: Copy from set-up 2 9: Copy from factory setting	-	0
C00.60	Set-up Locked	0: Disabled 1: Enabled	-	0
C00.70	LCD Access Level	0~6111	-	6111

Par. No.	Name	Range	Unit	Default
Par. Group 01: Load/Motor				
C01.00	Configuration Mode	0: Speed open loop 2: Torque open loop 3: Process closed loop 4: Torque open loop	-	0
*C01.01	Motor Control Principle	0: V/F ; 1: VCC+; 2: vector control 1;	-	1
*C01.03	Torque Characteristics	0: Constant torque 1: Variable torque 3: Auto Energy Optimization (AEO)	-	0
*C01.07	Application Configuration Mode	0: Disable; 5: Compressor mode;	-	0
*C01.10	Motor structure	0: ASYNCHRON 1: SPMSM 2: IPMSM_NON_SAT 3: IPMSM_SAT	-	0
C01.14	PM motor damping gain	0~250	%	120
C01.15	Low speed filter time const	0.01~20.00	s	0.80
C01.16	High speed filter time const	0.01~20.00	s	0.80
C01.17	Voltage filter time const	0.001~1.000	s	0.500
*C01.20	Motor Power	Motor dependant	kW	*
*C01.22	Motor Voltage	50~1000	V	*
*C01.23	Motor Frequency	20~400	Hz	*
*C01.24	Motor Current	Motor dependant	A	*
*C01.25	Motor Speed	100~9999	rpm	*
C01.26	Motor Torque	0.1~6553.5	NM	*
*C01.29	Automatic Motor Adaption (AMA)	0: No function 1: Static complete AMA 2: Static easy AMA 3: Static complete AMA + Back-EMF 4: Static complete AMA + System inertial 5: static complete AMA + Back-EMF + System inertial	-	0
*C01.30	Stator Resistance (Rs)	Motor dependant	Ω	*
*C01.31	Rotor Resistance(Rr)	Motor dependant	Ω	*
*C01.33	Stator Leakage Reactance (X1)	Motor dependant	mH	*
*C01.35	Main Reactance (Xh)	Motor dependant	mH	*
C01.37	Synchronous motor D axis reactance	Motor dependant	mH	*

Par. No.	Name	Range	Unit	Default
C01.38	Synchronous motor Q axis reactance	Motor dependant	mH	*
*C01.39	Motor holes	2~100	P	4
*C01.40	BackEMF in 1000rpm	0~9000	-	*
*C01.42	Motor Cable Length	0~150	m	2
*C01.44	D-axis saturable inductor	C01.37min~C01.37*0.95M	mH	*
*C01.45	Q-axis saturable inductor	C01.37min~C01.37*0.95M	mH	*
*C01.47	Rs_CalibrationMode	0: Disable 1: Enable	-	0
*C01.48	Current at min Inductance d-Axis	20~200	%	100
*C01.49	Current at min Inductance q-Axis	20~200	%	100
C01.50	Motor Magnetisation at Zero Speed	0~300	%	100
C01.52	Min Speed Normal Magnetising	0.0~10.0	Hz	1.0
C01.55	V/F Characteristic-V	0.0~999.0	V	*
C01.56	V/F Characteristic-F	0.0~400.0	Hz	*
C01.60	Low Speed Load Compensation	0~199	%	75
C01.61	High Speed Load Compensation	0~199	%	100
C01.62	Slip Compensation	-400~399	%	0
C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.50
C01.64	Resonance Dampening	0~3000	%	50
C01.65	Resonance Dampening Time constant	0.005~0.050	s	0.005
C01.66	Min. Current at Low Speed	0~120	%	80
C01.67	IE Torque band width	0~300	%	100
C01.68	IE Feed forward Kp	0~100	%	100
C01.69	System inertia	0~10000.0000	kg/m^2	*
C01.70	PM start mode	0: with IPD; 1: without IPD;	-	1
C01.71	Start Delay	0.0~10.0	s	*
C01.72	Start Function	0: DC hold 2: Coast	-	2
*C01.73	Flying Start	0: Disable; 1: Enable;	-	0
*C01.75	Min. Start Frequency	0.00~50.00		0

Par. No.	Name	Range	Unit	Default
C01.76	Jump Frequency	0.0~20.0	Hz	0
C01.80	Function at Stop	0: Coast 1: DC hold	-	0
C01.82	Min Speed for Function at Stop	0.0~400.0	Hz	*
C01.88	AC brake gain	1.0~2.0	-	1.4
C01.90	Motor Thermal Protection	0: No protection 1: Thermistor warning 2: Thermistor trip 3: ETR warning 4: ETR trip 5: ETR warning (Self-cooling mode) 6: ETR trip (Self-cooling mode)	-	0
C01.91	Motor overload protection time	1~60	min	2
C01.92	Motor overload factor	100~160	%	150
*C01.93	Thermistor Resource	0: None 1: Terminal VI 6: DI4	-	0
Par.Group02: Brake function				
C02.00	DC hold current	0~150	%	50
C02.01	DC brake current	0~150	%	50
C02.02	DC brake time	0.0~60.0	s	10.0
C02.04	DC brake cut in speed	0.0~400.0	Hz	0.0
C02.06	PM parking current	0~150	%	80
C02.07	PM parking time	0.1~60.0	s	3.0
C02.08	Motor Demagnetization	0~100	%	100
C02.10	Brake Function	0: Off 1: Resistor brake 2: AC brake	-	0
C02.11	Brake Resistor	5~65535	Ω	*
*C02.14	Brake Resistor Threshold Voltage	220~240 Grid: 360~395 380~440 Grid: 680~780 440~480 Grid: 750~780	V	*
C02.15	Over-voltage Control Threshold Voltage	220~240 Grid: 360~395 380~440 Grid: 680~780 440~480 Grid: 750~780	V	*
C02.16	AC Brake Max Current	0~150	%	100
C02.17	Over-voltage Control	0: Disabled 2: Enable 3: Improved	-	0
C02.18	Over-voltage Control Integral Time	0.01~0.1	s	0.05

Par. No.	Name	Range	Unit	Default
C02.19	Over-voltage Control Proportional Gain	0~200	%	100
C02.20	Release Brake Current	0.00~1200.00	A	0.00
C02.22	Activate Brake Speed	0.0~400.0	Hz	0.0
Par.Group 03: Reference/Ramps				
C03.00	Reference Range	0: 0~C03.03 1: -C03.03~C03.03	-	0
C03.03	Maximum Reference	0.0~6553.5	-	50.0
C03.07	Main Reference Calculation	0: Preset reference + Reference source1, 2, 3 1: Preset reference priority 2: Reference source 2,3 operation 3: Switchover between Reference source 1 and Reference source 2 4: Switchover between Reference source 1 and Reference source 2,3 operation	-	0
C03.08	Reference source 2,3 operation mode	0: Reference source 2 + Reference source 3 1: Reference source 2 - Reference source 3 2: Max(Reference source 2, Reference source 3) 3: Min(Reference source 2, Reference source 3)	-	0
C03.10	Preset Reference	-100.00~100.00	%	0.00
C03.11	Jog speed	0.0~400.0	Hz	5.0
C03.12	Catch up/Slow down Value	0.00~100.00	%	0.00
C03.13	Speed Up/Down Value	0.01~50.00	Hz	0.10
C03.14	Preset Relative Reference	-100.00~100.00	%	0.00
C03.15	Reference Source 1	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer	-	0
C03.16	Reference Source 2		-	2
C03.17	Reference Source 3		-	0
C03.18	Relative Reference Source		-	0
C03.19	Speed Up/Down Value Store	0: No function 1: Stop save 2: Power down save	-	0
C03.39	Ramp Time Scale	0: 0.1s 1: 0.01s	-	1
C03.40	Ramp 1 Type	0: Linear 2: S ramp	-	0
C03.41	Ramp 1 Ramp Up Time	0.05~655.35	s	*
C03.42	Ramp 1 Ramp Down Time	0.05~655.35	s	*
C03.50	Ramp 2 Type	0: Linear 2: S ramp	-	0
C03.51	Ramp 2 Ramp Up Time	0.05~655.35	s	*

Par. No.	Name	Range	Unit	Default
C03.52	Ramp 2 Ramp Down Time	0.05~655.35	s	*
C03.60	Ramp 3 Type	0: Linear 2: S ramp	-	0
C03.61	Ramp 3 Ramp Up Time	0.05~655.35	s	*
C03.62	Ramp 3 Ramp Down Time	0.05~655.35	s	*
C03.70	Ramp 4 Type	0: Linear 2: S ramp	-	0
C03.71	Ramp 4 Ramp Up Time	0.05~655.35	s	*
C03.72	Ramp 4 Ramp Down Time	0.05~655.35	s	*
C03.80	Jog Ramp Time	0.05~655.35	s	*
C03.85	Ramp 5 Ramp Up Time	0.05~655.35	s	*
C03.86	Ramp 5 Ramp Down Time	0.05~655.35	s	*
C03.88	Ramp 6 Ramp Up Time	0.05~655.35	s	*
C03.89	Ramp 6 Ramp Down Time	0.05~655.35	s	*
C03.91	Ramp 7 Ramp Up Time	0.05~655.35	s	*
C03.92	Ramp 7 Ramp Down Time	0.05~655.35	s	*
C03.94	Ramp 8 Ramp Up Time	0.05~655.35	s	*
C03.95	Ramp 8 Ramp Down Time	0.05~655.35	s	*
C03.96	Link reference and ramp time	0: Not Link 1: Link	-	0
Par. Group 04: Limits/Warnings				
C04.00	Current Limit Function	0: Algorithm 1 1: Algorithm 2	-	0
C04.01	Current Limit Feed Forward Gain	0~400	%	0
C04.09	Imax0 Limit	95~140	%	120
*C04.10	Motor Speed Direction	0: Clockwise 1: Counter clockwise 2: Both directions	-	0
*C04.12	Motor Speed Low Limit	0.0~C04.14	Hz	25.0
*C04.14	Motor Speed High Limit	C04.12~C04.19	Hz	65.0
C04.16	Torque Limit Motor Mode	0~1000	%	1000
C04.17	Torque Limit Generator Mode	0~1000	%	1000
C04.18	Current Limit	0~300	%	IM:200 PM:150
*C04.19	Max Output Frequency	0.0~400.0	Hz	65.0

Par. No.	Name	Range	Unit	Default
C04.21	Frequency Upper Limit Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 10: Preset reference [0] 11: Local bus 21: LCP potentiometer	-	0
C04.23	Power Limit Motor Mode	0~400	%	400
C04.24	Power Limit Generator Mode	0~400	%	400
C04.28	Low Voltage Overload Limit	5~100	%	100
C04.29	Low Voltage Udc Limit	50~1000	V	220/380
C04.50	Warning Current Low	0.00~C16.37	A	0.0
C04.51	Warning Current High	0.00~C16.37	A	*
C04.52	Warning Frequency Low	0.0~400.0	Hz	0.0
C04.53	Warning Frequency High	0.1~400.0	Hz	65.0
C04.54	Warning Reference Low	-200.00~200.00	%	0.00
C04.55	Warning Reference High	-200.00~200.00	%	100.00
C04.56	Warning Feedback Low	-200.00~200.00	%	0.00
C04.57	Warning Feedback High	-200.00~200.00	%	100.00
*C04.58	Missing Motor Phase Function	0: Disable 1: Enable	-	PM:0 IM:1
C04.59	Current/Torque Limit Warning Selection	0: Disable 1: Enable	-	1
C04.61	Bypass Speed From	0.0~400.0	Hz	0.0
C04.63	Bypass Speed to	0.0~400.0	Hz	0.0
C04.70	Minimum Torque at Zero Speed	0~100	%	5
C04.71	Minimum Torque Cut-off Frequency	0.1~50.0	Hz	3.0
C04.72	Torque open loop stop mode	0: Torque mode 1: Speed mode	-	0
Par. Group 05: Digital In/Out				
C05.04	DI Filter Time	2~32	ms	16
C05.05	DI Terminal Logic Selection	0~255	-	0
C05.06	DO/Relay Terminal Logic Selection	0~255	-	0

Par. No.	Name	Range	Unit	Default
C05.09	Function at External Alarm	0: Disable 1: Freezing output frequency 2: Stop and warning 3: Jogging and warning 4: Max. speed and warning 5: Stop and trip 6: Alarm only 7: Immediately stop and trip	-	7
C05.10	Terminal FOR	0: No operation 1: Reset 2: Coast inverse 3: Coast and reset inverse 6: Stop inverse 8: Start 9: Latched start 10: Reversing 11: Start reversing 12: Enable start forward only 13: Enable start reverse only 14: Jog 15: Preset ref. bit0 16: Preset ref. bit1 17: Preset ref. bit2 18: Preset ref. bit3 19: Freeze reference 20: Freeze output 21: Speed up 22: Speed down 23: Set-up select 24: Main reference calculation switchover 28: Catch up 29: Slow down 32: Pulse input 34: Ramp bit0 35: Ramp bit1 37: Latched reversing 42: Coast 43: External alarm input 46: Stop 50: Speed control/torque control switchover 60: Counter A 62: Reset counter A 63: Counter B 65: Reset counter B 70: DO1 Control 71: DO2 Control 74: Realy1 Control 75: Relay2 Control 76: Relay3 Control	-	8
C05.11	Terminal REV		-	0
C05.12	Terminal DI1		-	0
C05.13	Terminal DI2		-	0
C05.14	Terminal DI3		-	0
C05.15	Terminal DI4		-	0

Par. No.	Name	Range	Unit	Default
		110: PID pause; 160: Compressor run; 161: Oil filter plugging; 162: Oil separator plugging 163: Air filter plugging; 164: Loading valve control; 165: Fan overlaod; 166: Motor over temperature; 167: Emergency stop; 168: External fault 169: Phase sequence error 170: External sleep signal 171: Oil pump run detection 172: Cooling Fan Control 173: Pulse Stop 174: Pulse Start		
C05.30	Terminal DO1	0: No operation 1: Drive ready 3: Remote control ready 4: Drive running/No warning 5: Drive running 7: Run in range/No warning 8: Run on reference/No warning 9: Alarm 10: Alarm or warning 12: Out of current range 13: Below current low 14: Above current high 15: Out of frequency range 16: Below frequency low 17: Above frequency high 18: Out of feedback range 19: Below feedback low 20: Above feedback high 21: Thermal warning 22: Ready 23: Remote ready 24: Ready, voltage OK 25: Reverse 26: Bus OK 32: Mech. brake control 36: Control word bit 11 37: Control word bit 12 38: Control by Communication 39: Control by DI Terminal 40: Out of reference range 41: Below reference low 42: Above reference high 43: External alarm	-	0
C05.31	Terminal DO2		-	0

Par. No.	Name	Range	Unit	Default
		44: Unbalance warning 51: Drive in HAND state 52: Drive in AUTO state 53: No alarm 56: Drive in HAND state 57: Drive in AUTO state 60: Comparator 0 61: Comparator 1 62: Comparator 2 63: Comparator 3 90: Up to wobble limit 91: Up to wobble ref. 160: Loading valve; 161: Cooling fan; 162: Fan overload; 163: Pressure sensor error; 164: Temperature sensor error; 165: External error 1; 166: External dormancy function open; 167: External error 2; 168: Drain valve; 171: Oil pump control; 172: Error or maintain timeout 173: Dryer Control		
C05.34	DO On Delay Time	0.00~600.00	s	0.00
C05.35	DO Off Delay Time	0.00~600.00	s	0.00
C05.40	Relay Function	See C05.30	-	-
C05.41	Relay On Delay Time	0.00~600.00	s	0.00
C05.42	Relay Off Delay Time	0.00~600.00	s	0.00
Par. Group 06: AnalogIn/Out				
C06.00	Live Zero Timeout Time	1~99	s	10
C06.01	Live Zero Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip	-	0
C06.10	Terminal VI Low Voltage	0.00~C06.11	V	0.07
C06.11	Terminal VI High Voltage	C06.10~10.00	V	10.00
C06.12	Terminal VI Low Current	0.00~C06.13	mA	4.00
C06.13	Terminal VI High Current	C06.12~20.00	mA	20.00
C06.14	Terminal VI Low Ref./Feedb. Value	0.00~200.00	%	0.00

Par. No.	Name	Range	Unit	Default
C06.15	Terminal VI High Ref./ Feedb. Value	0.00~200.00	%	100.00
C06.16	Terminal VI Filter Time	0.01~10.00	s	0.010
C06.17	Terminal VI Dead Zone	0.00~10.00/20.00	V/mA	0.00
C06.18	Terminal VI Zero Dead Band	0.0~20.00	V/mA	0.00
C06.19	Terminal VI Mode	0: Voltage mode 1: Current mode	-	1
C06.20	Terminal AI Low Voltage	0.00~C06.21	V	0.07
C06.21	Terminal AI High Voltage	C06.20~10.00	V	10.00
C06.22	Terminal AI Low Current	0.00~C06.23	mA	4.00
C06.23	Terminal AI High Current	C06.22~20.00	mA	20.00
C06.24	Terminal AI Low Ref./Feedb. Value	0.00~200.00	%	0.00
C06.25	Terminal AI High Ref./ Feedb. Value	0.00~200.00	%	100.00
C06.26	Terminal AI Filter Time	0.01~10.00	s	0.010
C06.27	Terminal AI Dead Zone	0.00~10.00/20.00	V/mA	0.00
C06.28	Terminal AI Zero Dead Band	0.0~20.00	V/mA	0.00
C06.29	Terminal AI Mode	0: Voltage mode 1: Current mode	-	1
C06.70	Terminal VO Mode	0: 0-20mA; 1: 4-20mA; 3: 0-10V;	-	3
C06.71	Terminal VO Analog Output	0: Digital output 10: Output frequency 11: Reference 12: Feedback 13: Output current 16: Power 17: Speed 18: Motor voltage 20: Bus control 21: Terminal DI4 pulse input 22: Terminal VI input 23: Terminal AI input 26: DC link voltage 30: Output torque 38: Commucation control; 80: Fan PID result;	-	0
C06.73	Terminal VO Output Min. Scale	0.00~200.00	%	0.00
C06.74	Terminal VO Output Max. Scale	0.00~200.00	%	100.00

Par. No.	Name	Range	Unit	Default
C06.75	Terminal VO Min. Output	0.00~C06.76	V/mA	0
C06.76	Terminal VO Max. Output	Voltage mode: C06.75~10.00 Current mode: C06.75~20.00	-	10.00
C06.77	Terminal VO Dead Zone	0.00~10.00/20.00	V/mA	0.00
C06.81	LCP Pot. Min. Ref.	0.00~200.00	%	0.00
C06.82	LCP Pot. Max. Ref.	0.00~200.00	%	100.00
C06.90	Terminal AO Mode	0: 0~20mA 1: 4~20mA	-	0
C06.91	Terminal AO Analog Output	See C06.71	-	0
C06.93	Terminal AO Output Min. Scale	0.00~200.00	%	0.00
C06.94	Terminal AO Output Max. Scale	0.00~200.00	%	100.00
C06.95	Terminal AO Min. Output	0.00~C06.96	mA	0
C06.96	Terminal AO Max. Output	C06.95~20.00	mA	20.00
C06.97	Terminal AO Dead Zone	0.00~10.00/20.00	V/mA	0.00
Par. Group 07: Controllers				
C07.12	Torque PI Proportional Gain	0~500	%	100
C07.13	Torque PI Integration Time	0.002~2.000	s	0.020
C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus	-	0
C07.30	Process PID Normal/Inverse	0: Normal 1: Inverse	-	0
C07.31	Process PID Anti Windup	0: Disable 1: Enable	-	1
C07.32	Process PID Start	0.0~200.0	Hz	0.0
C07.33	Process PID Proportional Gain	0.00~10.00	-	10.00
C07.34	Process PID Integral Time	0.01~655.35	s	12.00
C07.35	Process PID Differentiation Time	0.00~10.00	s	0.00
C07.36	Process PID Diff Gain Time	1.0~50.0	-	5.0
C07.38	Process PID Feed Forward Factor	0~400	%	0
C07.39	On Reference Bandwidth	0.0~200.0	%	0.0
C07.41	Process PID Output Low	-100.00~100.00	%	0.00
C07.42	Process PID Output High	-100.00~100.00	%	100.00

Par. No.	Name	Range	Unit	Default
C07.45	Feed Forward Factor Resource	0: Setting Value 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus 21: LCP potentiometer	-	0
C07.46	Feed Forward Factor Normal/ Inverse Control	0: Positive; 1: Negtive;	-	0
C07.47	PID MaxRef Coefficient Resource	0: Setting Value 1: Terminal VI 2: Terminal AI 8: Pulse input DI4 11: Local bus	-	0
C07.48	PID MaxRef Coefficient	0.00~100.00	%	100.00
C07.49	PID switch deviation	0.0~200.0	%	200.0
C07.50	PID Integral time Neg. Clamp	-100.00~100.00	%	0.00
C07.51	PID Integral time Pos. Clamp	-100.00~100.00	%	100.00
C07.55	PID Control Mode	0: Mode 0; 1: Mode 1; 2: Mode 2;	-	0
Par. Group 08: Communiction				
C08.01	Control Site	0: Digital and communication 1: Digital only 2: Communication only	-	0
C08.02	Communication Timeout Time	0.01~650.0	-	1
C08.03	Communication Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip 6: Warning	s	10.00
C08.04	Reset Communication Timeout	0: Do not reset 1: Do reset 2: Stop and warning	-	2
C08.06	Control Site	0: Digital and communication 1: Digital only 2: Communication only	-	0
C08.08	Control word timeout mode	[0] C16.00 [1] 4x51000(Reserved)	-	64/0
C08.20	Diagnosis Mode	0: Disable 1: Enable	-	1
C08.29	Alarm/warning mode	0: Bit 1: Word	-	0

Par. No.	Name	Range	Unit	Default
C08.30	Protocol	0: FC; 2: MODBUS RTU;		2
C08.31	Address	1-247;		1
C08.32	Baud Rate	0: 2400; 1: 4800; 2: 9600; 3: 19200; 4: 38400; 5: 57600; 6: 76800; 7: 115200;		2
C08.33	Parity/Stop Bits	0: Even parity (1 stop bit) 1: Odd parity (1 stop bit) 2: No parity (1 stop bit) 3: No parity (2 stop bit)		0
C08.35	Min. Response Delay	0.000~0.500	s	0.002
C08.36	Max. Response Delay	0.010~10.000	s	5.000
C08.38	Message Response	0: Normal 1: Only response exception message 2: Not response		0
C08.39	Modbus Parameter Write Store	0: Not saved at power down 1: Saved at power down		1
C08.50	Coasting Select	0: Digital input 1: Bus 2: Logic AND 3: Logic OR	-	3
C08.51	Quick Stop Select		-	3
C08.52	DC Brake Select		-	PM: 0 IM: 3
C08.53	Start Select		-	3
C08.54	Reversing Select		-	3
C08.55	Set-up Select		-	3
C08.56	Preset Reference Select		-	3
C08.94	Bus feedback 1	-32768~32767	-	0
Par. Group 14: SpecialFunctions				
C14.01	Switching Frequency	2~6: 2~6kHz 7: 8kHz 8: 10kHz 9: 12kHz 10: 16kHz	-	*
*C14.03	Overmodulation	90.0~105.5	-	105.5
C14.08	Damping Gain Factor	0~200	%	96

Par. No.	Name	Range	Unit	Default
*C14.10	Action at Mains Failure	0: No function 1: Ctrl ramp-down 2: Ctrl ramp-down, trip 3: Coasting 4: Kinetic back-up 5: Kinetic back-up, trip 6: Alarm 8: Warning	-	8
C14.11	Mains Voltage at Mains Failure	100~800	V	180/315
C14.12	Function at Mains Imbanlance	0: Trip (Low sensitivity) 1: Warning (Low sensitivity) 2: Disabled 4: Warning (Middle sensitivity) 5: Trip (Middle sensitivity) 6: Trip (High sensitivity)	-	0
C14.14	Kinetic Backup Gain	0~500	%	100
*C14.16	Low Voltage Mode	0: Disable 1: Enable	-	1
*C14.17	Automatic Voltage Regulation	0: Disable 1: Enable	-	1
C14.18	Delay Time of Auto Restart When Power up Again	0.0~3600.0	s	0.0
C14.20	Reset Mode	0: Manual reset 1~10: Auto reset 1-10 times 11: Auto reset 15 times 12: Auto reset 12 times 13: Infinite auto reset	-	0
C14.21	Automatic Restart Time	0~600	s	10
C14.22	Operation Mode	0: Normal operation 2: Initialization 3: Backup user settings 4: Recover user settings	-	0
C14.23	Trip lock	0: Disable 1: Enable	-	0
C14.24	Trip Delay at Current Limit	0~60	s	60
C14.25	Trip Delay at Torque Limit	0~60	s	60
C14.27	Action at Drive Fault	0: Trip 1: Warning	-	1
C14.30	Current Controller 1 Proportional Gain	0~500	%	100
C14.31	Current Controller 1 Integration Time	0.000~2.000	s	0.020
C14.32	Current Controller Filter Time	2.0~100.0	ms	*

Par. No.	Name	Range	Unit	Default
C14.33	Current Controller 2 Proportional Gain	0~300	%	0
C14.34	Current Controller 2 Integration Time	0.000~2.000	s	0.020
*C14.40	VT Level	40-90	%	90
*C14.41	AEO Min. Magnetisation	40~75	%	66
C14.44	D-axis Current Optimization For IPM	-400~400	%	10
C14.49	Motor Current coeff	0.6~1.4	%	1.0
*C14.50	RFI Filter Selection	0: Off 1: On	-	1
*C14.51	DC Link Compensation	0: Off 1: On 2: Compensation for voltage variation	-	0
C14.52	Fan Control	0: Automatic; 4: Low temperature;	-	0
*C14.55	Output Filter	0: Off; 1: sine wave filtering; 3: Sinusoidal Filter with feedback;	-	0
*C14.63	Min Switch Frequency	2~6: 2kHz~6kHz; 7: 8kHz; 8: 10 kHz; 9: 12kHz; 10: 16kHz;	-	*
C14.68	Overheat warning relative temperature	0~25	℃	5
C14.70	Sustained Under Voltage Protection	220V type: 171~198 380V type: 296~342	V	176/304
C14.71	Sustained Under Voltage Protection Time	60~3600	s	3600
C14.72	Isx PI Controller Bandwidth	10~200	Hz	30
C14.73	Isx PI Controller Damp	1~200	-	100
C14.74	Isx Load Comp	0.1~1.0	-	0.5
C14.75	Isy Controller Bandwidth	0.010~1.000	Hz/s	0.030
C14.76	Isy Controller Damp	1~200	-	1
C14.77	FWC Controller Bandwidth	0.1~10.0	Hz	2.0
C14.78	FWC Controller Damp	0.01~1.00	-	0.10
C14.81	Parameters Initialization	0: No function >0: customization	-	0

Par. No.	Name	Range	Unit	Default
C14.82	Customer Define1	0. No function 1. Reference 2. Output Voltage 3. Output Torque 4. IGBT Temperature 5. DI Status 6. DO Status 7. Relay Status 8. VI Value 9. AI Value 10. VO Value 11. AO Value 12. DI4 Pulse Value 13. DO1Pulse Value 30.Exhaust Pressure 31.VI Source Pressure 40.Exhaust Temperature 41.RI1 Temperature 42.RI3 Temperature	-	*
Par. Group 15: Drive Information				
C15.00	Operating Days	0~9999	d	0
C15.01	Running Hours	0~60000	h	0
C15.02	kWh Counter	0~65535	kWh	0
C15.03	Power Up's	0~65535	-	0
C15.04	Over Temperatures	0~65535	-	0
C15.05	Over Voltages	0~65535	-	0
C15.06	Reset kWh Counter	0: Invalid 1: Reset	-	0
C15.07	Reset Running Hours Counter	0: Invalid 1: Reset	-	0
C15.19	Internal Alarm Code	0: Invalid 1: Reset	-	0
C15.30	Alarm Code	0~255	-	0
C15.31	Internal Fault Reason	-32767~32767	-	0
C15.32	Frequency at Alarm	0.0~6553.5	Hz	0.0
C15.33	Current at Alarm	0.01~655.35	A	0.00
C15.34	DC Voltage at Alarm	0~65535	V	0
C15.35	Runtime at Alarm	0.0~6553.5	min	0.0
C15.36	Custom defined value 1 at Alarm	0~65535	-	0
C15.37	Custom defined value 2 at Alarm	0~65535	-	0
C15.38	Warning Code	0~255	-	0

Par. No.	Name	Range	Unit	Default
*C15.40	FC Mode	-	-	-
*C15.41	Power Section	-	-	-
*C15.42	Voltage Section	-	-	-
*C15.43	Software Version	-	-	-
C15.76	Random Code	0~65535	-	*
C15.77	User Code	0~65535	-	0
C15.78	Passwaord 1	0~65535	-	0
C15.79	Passwaord 2	0~65535	-	0
Par. Group 16: DataReadouts				
C16.00	Control Word	0~65535	-	0
C16.01	Reference	-4999.0~4999.0	-	0.0
C16.02	Reference	-200.0~200.0	%	0.0
C16.03	Status Word	0~65535	-	0
C16.04	Active Set-up	0: Set-up 1 1: Set-up 2	-	0
C16.05	Motor Speed	0~9999	rpm	0
C16.06	Low Voltage Frequency Limit	0.0~400.0	Hz	0.0
C16.09	Custom Readout	0.00~9999.00		0.00
C16.10	Output Power	0.00~655.35	kW	0.00
C16.12	Motor Voltage	0~65535	V	0
C16.13	Output Frequency	0.0~400.0	Hz	0.0
C16.14	Output Current	0.00~655.35	A	0.00
C16.15	Output Frequency	0.0~200.0	%	0.0
C16.16	Output Torque	-200.00~200.00	%	0.00
C16.18	Motor Thermal	0~100	%	0
C16.30	DC Link Voltage	0~65535	V	0
C16.34	IGBT Temperature	-128~127	℃	0
C16.35	Drive Thermal	0~255	%	0
C16.36	Drive Nominal Current	0.0~6553.5	A	0.0
C16.37	Drive Max. Current	0.0~6553.5	A	0.0
C16.38	Simple PLC State	0~255		0
C16.40	Wobble Length	0.000~60.000	Km	0.000
C16.48	Power Board Temperature	-128~127	℃	0
C16.49	Rectifier Temperature	-128~127	℃	0
C16.50	Main Reference	-200.0~200.0	%	0.0

Par. No.	Name	Range	Unit	Default
C16.51	Pulse Reference	-200.0~200.0	%	0.0
C16.52	Feedback	-200.00~200.00	%	0.00
C16.57	RI1 Temperature	-60~260	℃	0
C16.58	RI2 Temperature	-60~260	℃	0
C16.59	RI3 Temperature	-60~260	℃	0
C16.60	Digital Input	0~65535	-	0
C16.61	Terminal VI Setting	0: 0~10V; 1: 0~20mA;	-	0
C16.62	Analog Input VI	0.00~20.00	V/mA	0.00
C16.63	Terminal AI Setting	0: 0~10V; 1: 0~20mA;	-	1
C16.64	Analog Input AI	0.00~20.00	V/mA	0.00
C16.65	Analog Output VO	0.00~20.00	V/mA	0.00
C16.66	Digital Output	0~255	-	0
C16.67	Pulse Input DI4	9999.000~9999.000	KHz	0.000
C16.68	Pulse Output DO1	0.00~100.00	KHz	0.00
C16.69	Digital Input	0.00~100.00	KHz	0.00
C16.71	Relay Output	0~65535	-	0
C16.78	Analog Output AO	0.00~20.00	-	0
C16.86	Communication Reference	-32768~32767	-	0
C16.90	Alarm Word 1	0~0xFFFFFFFFUL	-	0
C16.91	Alarm Word 2	0~0xFFFFFFFFUL	-	0
C16.92	Warning Word 1	0~0xFFFFFFFFUL	-	0
C16.93	Warning Word 2	0~0xFFFFFFFFUL	-	0
C16.94	External Status Word	0~0xFFFFFFFFUL	-	0
C16.96	APP Alarm Word	0~0xFFFFFFFFUL	-	0
C16.97	APP Warning Word	0~0xFFFFFFFFUL	-	0
Par. Group 19: Fan				
C19.00	Cooling Fan structure	0: ASYNCHRON 1: SPMSM 2: IPMSM_NON_SAT 3: IPMSM_SAT	-	0
C19.01	Cooling Fan Control Principle	0: V/F; 1: VCC+;	-	1
C19.02	Cooling Fan Rated Power	Motor dependant	kW	*
C19.03	Cooling Fan Rated Frequency	0.0~400.0	Hz	50
C19.04[0]	Cooling Fan Rated Current	Motor dependant	A	*

Par. No.	Name	Range	Unit	Default
C19.04[1]	Motor Fan Rated Current	Motor dependant	A	*
C19.05	Cooling Fan Rated Speed	0~9999	rpm	*
C19.06	Cooling Fan Speed Lower Limit	0.0~400.0	Hz	0.0
C19.07	Cooling Fan Speed Upper Limit	0.0~400.0	Hz	50.0
C19.08	Cooling Fan Max Frequency	0.0~400.0	Hz	50.0
C19.09	Cooling Fan Jog Frequency	0.0~50.0	Hz	5.0
C19.11	Cooling Fan Ramp Up Time	0.05~3600.00	s	*
C19.12	Cooling Fan Ramp Down Time	0.05~3600.00	s	*
C19.15	Cooling Fan VF-U	*	V	*
C19.16	Cooling Fan VF-F	*	Hz	*
C19.17	Min Speed for Function at Stop	0.0~400.0	Hz	0.0
C19.18	Cooling Fan Rated Torque	Motor dependant	Nm	*
C19.19	Cooling Fan Motor Poles	2~100	P	4
C19.20	Cooling Fan EMF in 1000 rpm	0~9000	V	*
C19.21	Cooling Fan AMA	0: No function 1: Static complete AMA	-	0
C19.22	Cooling Fan Stator Resistance	Motor dependant	Ω	*
C19.23	Cooling Fan Rotor Resistance	Motor dependant	Ω	*
C19.24	Cooling Fan Stator Leakage Reactance	Motor dependant	Ω	*
C19.25	Cooling Fan Main Reactance	Motor dependant	Ω	*
C19.26	Cooling Fan D-axis Inductance	Motor dependant	Ω	*
C19.27	Cooling Fan Q-axis Inductance	Motor dependant	Ω	*
C19.28	D-axis Inductance Sat.	Motor dependant	Ω	*
C19.29	Q-axis Inductance Sat.	Motor dependant	Ω	*
C19.30	Current at Min Inductance for D-axis	20~200	%	100
C19.31	Current at Min Inductance for Q-axis	20~200	%	100
C19.36	Min. Current at Low Speed	0~120	%	80
C19.37	Parking Current	0~150	%	80
C19.38	Parking Time	0.1~60.0	s	3.0

Par. No.	Name	Range	Unit	Default
C19.54[0]	Cooling Fan Control Mode	0: Disable 1: Inverter 2: Grid with running detection 3: Grid without running detection	-	1/2
C19.54[1]	Motor Fan Control Mode		-	0
C19.55	Phase Detection	0: Disable 1: Enable	-	0
C19.60	Cooling Fan Control Word	See C16.00	-	0
C19.61	Cooling Fan Reference	0.0~400.0	Hz	0.0
C19.62	Communicate status with cooling fan	bit0: Normal with Main and Fan bit1: Normal with LCP and Fan FC bit2: Normal with LCP and Main bit3: 1: Double inverter 0:Single inverter	-	*0
C19.63[0]	Cooling Fan Status Word	*	-	0
C19.63[1]	Cooling Fan Alarm Code	*	-	0
C19.64	Cooling Fan Output Frequency	0.0~400.0	Hz	0
C19.65[0]	Cooling Fan Output Current	0~655.35	A	0
C19.65[1]	Motor Fan Output Cruuent	0~655.35	A	0
C19.66	Fan Output Speed	0~9999	rpm	0
C19.68	Phase Detection Result	0: Fault 1: Normal 2: Phase loss 3: Timeout	-	*
C19.99	Cooling Fan User Defined Parameter	*	-	*
Par. Group 28: Compressor Parameter				
C28.00[0]	Load-unload Mode	0: Manual 1: Auto	-	1
C28.00[1]	Run Mode	0: Single 1: Slave 2: Linkage Mode	-	0
C28.00[2]	Compact Mode	0: Single Host 1: Double Host	-	0
C28.00[3]	Oil Pump Mode	0: Pump - Host 1: Host – Pump	-	0
C28.00[4]	Cooling Fan Control Mode	0: Synchronize with host 1: Synchronize with system	-	0
C28.01	Load Delay	0~300	S	20
C28.02	Stop Delay	0~300	S	10
C28.03	Restart Delay	0~300	S	80
C28.04	Pre-run Frequency	0~C04.14	Hz	30.0
C28.05	Dormancy Delay	0~10000(10000 means Disable)	s	10000

Par. No.	Name	Range	Unit	Default
C28.06	Min Dormant Time	1~ 3600	s	5
C28.07	Idle Frequency	0.0~C28.04	Hz	25.0
C28.08	Frequency Bandwidth of Dormancy Detection	0.0~50.0	Hz	2.0
C28.09	Host Jog Freq.	C04.12~C28.04	Hz	30.0
C28.10	Lower Limit of Pressure Sensor	0.00~C28.12	Mpa	0.00
C28.11	Upper Limit of Pressure Sensor	C28.43~2.00	Mpa	1.60
C28.12	Loading Pressure	0.00~C28.14	Mpa	0.50
C28.13	Unloading Pressure	C28.14~C28.43	Mpa	0.82
C28.14	Target Pressure	C28.12~C28.13	Mpa	0.80
C28.15	Linkage Loading Pressure	0.00~C28.16	MPa	0.63
C28.16	Linkage Unloading Pressure	C28.15~10.00	MPa	0.78
C28.19	Pressure Control Mode	0~2	-	0
C28.20	Cooling Fan Starting Temperature	C28.21~C28.42	℃	80
C28.21	Cooling Fan Stopping Temperature	0~C28.20	℃	70
C28.22	Cooling Fan Target Temperature	0~150	℃	75
C28.23[0]	Cooling Fan PID -I	0.10~600.00	s	10.00
C28.23[1]	Cooling Fan PID – Kp	0.10~600.00	s	10.00
C28.23[2]	Cooling Fan PID -Deviation Limit	0.00~100.00	%	0.10
C28.23[3]	Pre-cooling - speed up	0.00~100.00	%	8.00
C28.23[4]	Pre-cooling - speed down	0.00~100.00	%	8.00
C28.23[5]	Pre-cooling – speed down in constant temperature	0.00~100.00	%	1.00
C28.23[6]	Pre-cooling – filter time	0.00~50.00	s	0.50
C28.23[7]	Temp. Diff. for Exiting PID	0.00~100.00	℃	1.00
C28.23[8]	Min. Percentage of Cooling Fan Speed	0.00~100.00	%	20.00
C28.24	Cooling Fan Fault Delay	0~60	s	10
C28.25	Temp. Sensor Lower Limit	-50~C28.21	℃	-20
C28.26	Temp. Sensor Upper Limit	C28.43~250	℃	150
C28.27[0]	Cooling Fan Current Protection Factor	1~100	%	10
C28.27[1]	Motor Fan Current Protection Factor	1~100	%	10

Par. No.	Name	Range	Unit	Default
C28.28	Transformer current protection factor	0~2.55	A	1.00
C28.29[0]	Drain Valve Turn-on Time	0~10	s	0
C28.29[1]	Drain Valve Turn-off Time	0~60000	min	60
C28.30	Auto-pressure Control	0~1	*	0
C28.31	Starting Pressure	C28.10~C28.14	MPa	0.50
C28.32	Starting Frequency	C28.34~C04.14	Hz	50.0
C28.33	Stopping Pressure	C28.14~C28.11	MPa	0.80
C28.34	Stopping Frequency	C28.07~C28.32	Hz	40.0
C28.35	Intelligence Constant Pressure	0~5	-	0
C28.36	Min. Oil Pressure	0.00~0.60	MPa	0.15
C28.37	Oil Pump Start Delay	0~60	s	0
C28.38	Oil Pump Fault Delay	0~60	s	5
C28.40	Temperature Sensor Fault Delay	1~60	s	2
C28.41	Pressure Sensor Fault Delay	1~60	s	2
C28.42	Warning Temperature	0~C28.43	℃	105
C28.43	Alarm Temperature	C28.42~150	℃	110
C28.44	Warning Pressure	0.00~C28.45	MPa	0.84
C28.45	Alarm Pressure	C28.44~1.60	MPa	0.86
C28.46	Oil Filter Time Limit	0~60000	h	500
C28.47	Oil Filter Service Time	0~60000	h	*
C28.48	Oil Separator Time Limit	0~60000	h	4000
C28.49	Oil Separator Service Time	0~60000	h	*
C28.50	Air Filter Time Limit	0~60000	h	4000
C28.51	Air Filter Service Time	0~60000	h	*
C28.52	Grease Time Limit	0~60000	h	2000
C28.53	Grease Service Time	0~60000	h	*
C28.54	Lube Time Limit	0~60000	h	2000
C28.55	Lube Service Time	0~60000	h	*
C28.56	Max Limit Run Time	0~60000	h	0
C28.57	Run Time - H	0~60000	h	*
C28.58	Run Time - M	0~59	min	*
C28.59	Load Time - H	0~60000	h	*
C28.60	Load Time - M	0~59	min	*

Par. No.	Name	Range	Unit	Default
C28.61	Min. Oil Temperature	-50~100	℃	-50
C28.62	Starting Value for Detecting Pressure Diff.	0.00~10.00	MPa	0.00
C28.63	Pressure Diff. Warning Value	0.00~0.60	MPa	0.15
C28.64	Pressure Diff. Alarm Value	0.00~0.60	MPa	0.20
C28.66	Warning over Limit Time	0~1000	h	0
C28.70	PTC Function	0~1	-	1
C28.71	Speed Correction	0~1000	rpm	0
C28.72	Power Correction	0~200	%	100
C28.74	Pressure Terminal Configuration	0~4	-	2/0
C28.75	Temperature Terminal Configuration	0~3	-	2/0
C28.79	Temperature Correction	-10~10	℃	0
C28.80	Pressure Correction	0.00~1.60	MPa	0
C28.81	Actual Temperature	-50~250	℃	0
C28.82	Actual Pressure	0~10.000	MPa/S	0
C28.83	Countdown Time (Only one displayed)	Load Delay	s	20
		Restart Delay	s	80
		Stop Delay	s	10
		Domancy Delay	s	0
		Domancy Keep	s	5
C28.84	Actual Status	*	-	*
C28.85	Actual CMD Souce	*	-	*
C28.86	Signal Run Time - H	0~65535	h	0
C28.87	Signal Run Time - M	0~59	min	0
C28.88	Signal Power Consumption	0.0~99999999.9	kwh	0.0
C28.89	Total Power Consumption	0.0~99999999.9	kwh	0.0
C28.90	System Status	0~15	-	0
C28.93	Cooling Status	0~3	-	0
C28.99	Emergency Domancy Function	*	-	63

Note: The "*" in the parameter number column means the parameter cannot be modified during the motor running.

The "*" in the default column means the value of this parameter according to the model.

Chapter 6 Parameter Description

Group 00: Operation/Display

C00.0* Basic Settings

Par. No.	Name	Range	Unit	Default
*C00.03	Regional Settings	0: 50Hz 1: 60Hz	-	0

This parameter is used to select motor frequency default value according to different regions.

0: 50Hz, Motor frequency default value is 50 Hz, see C01.23;

1: 60Hz, Motor frequency default value is 60 Hz, see C01.23;

Attention: This parameter can not be adjusted when motor is running. Change this parameter may result in changes in the value of the following parameters: C01.23, C01.25, C01.39, C01.56, C01.30, C01.31, C01.33, C01.35, C01.39 and C01.56.

Par. No.	Name	Range	Unit	Default
C00.04	Operating State at Power-up	0: Resume 1: Forced stop, ref=old 2: Forced stop, ref=0	-	1

Selects the operating mode upon reconnection of the drive to mains voltage after power down in Hand operation mode.

0: Resume, restarts the drive maintaining the same local reference and the same start/stop settings as before the drive was powered down.

1: Forced stop, ref=old, restarts the drive with a saved local reference, after mains voltage reappears and after pressing HAND key.

2: Forced stop, ref=0, resets the local reference to 0 upon restarting the drive.

Attention: This parameter is only active in Hand operation mode.

Par. No.	Name	Range	Unit	Default
*C00.06	Grid Type	0~122	-	*

Selects the grid type. Output frequency and voltage will be changed according to the grid type.

0: 200-240V/50Hz/IT-Grid

1: 200-240V/50Hz/IT-Delta

2: 200-240V/50Hz

10: 380-440V/50Hz/IT-Grid

11: 380-440V/50Hz/IT-Delta

12: 380-440V/50Hz

20: 440-480V/50Hz/IT-Grid

21: 440-480V/50Hz/IT-Delta

22: 440-480V/50Hz

100: 200-240V/60Hz/IT-Grid

101: 200-240V/60Hz/IT-Delta

102: 220-240V/60Hz

110: 380-440V/60HZ/IT-Grid

111: 380-440V/60Hz/IT-Delta

112: 380-440V/60Hz

120: 440-480V/60Hz/IT-Grid

121: 440-480V/60Hz/IT-Delta

122: 440-480V/60Hz

C00.1* Set-up Operations

Define and control the individual parameter setups.

The drive has two parameter setups that can be programmed independently of each other. This makes the drive very flexible and able to solve advanced control functionality problems, often saving the cost of external control equipment. For example these can be used to program the drive to operate according to one control scheme in one setup (e.g. motor 1 for horizontal movement) and another control scheme in another setup (e.g. motor 2 for vertical movement). Alternatively they can be used by an OEM machine builder to identically program all their factory fitted drives for different machine types within a range to have the same parameters

and then during production/commissioning simply select a specific setup depending on which machine the drive is installed on.

Par. No.	Name	Range	Unit	Default
C00.10	Active Set-up	1: Set-up 1 2: Set-up 2 9: Multi Set-up	-	1

Selects the set-ups to control the drive functions.

1: Set-up 1, Set-up 1 to Set-up 2 are the two separate parameter set-ups within which all parameters can be programmed.

2: Set-up 2

9: Multi Set-up, two set-ups can be changed each other via digital input or communication commands.

Par. No.	Name	Range	Unit	Default
C00.11	Edit Set-up	1: Set-up 1 2: Set-up 2	-	1

Selects the set-up to be edited during operation, either the active set-up or one of the inactive set-ups.

Par. No.	Name	Range	Unit	Default
C00.12	Link Set-up	0: Not linked 20: Linked	-	20

0: Not linked, parameters between two set-ups can not be changed each other while the motor is running;

20: Linked, parameters between two set-ups can be changed each other while the motor is running via digital input or communication commands. But this facility is best for the same motor, else the link will synchronize the parameters that can not be changed while the motor is running (mainly motor parameters).

C00.3* LCP Custom Readout

Par. No.	Name	Range	Unit	Default
C00.31	Custom Readout Min. Value	0.00~99999.00	-	0.00
C00.32	Custom Readout Max. Value	0.00~99999.00	-	100.00

It is possible to customize a readout value in the drive. Custom Readout Value is linear proportional to speed, it is stored in parameter C16.09.

The calculation of Custom Readout Value (C16.09) is shown below:

$$C16.09 = (C00.32 - C00.31) \times C16.13 \div C04.14 + C00.31$$

Par. No.	Name	Range	Unit	Default
C00.33	LCP Display Option	0~4095	-	0

The LCP is fixed to display the output frequency、reference and motor current (switch by ◀ key). This parameter is used to show another 11 basic operating states of the drive, each states corresponds to a binary code : "1" means display the item, "0" means does not display the item. For example, if you want to display the states of the temperature and the terminal VI on LCP. Transform the binary code to decimal digit,

C00.33=8+128=136.

Value	Parameter	Description
1	C16.12	Motor Voltage
2	C16.05	Motor Speed
4	C16.30	DC-Voltage
8	C16.34	IGBT Temperature
16	C16.52	Feedback Value
32	C16.72	Counter A
64	C16.73	Counter B
128	C16.62	VI
256	C16.64	AI
512	C16.68	Pulse Input
1024	C16.69	Pulse Output
2048	C16.09	Custom Readout
4096	C16.10	Power

Par. No.	Name	Range	Unit	Default
C00.34	Parameter Type	0: Word mode 1: Double word mode	-	0

This parameter is only used for SK190.

C00.4* LCP Keypad

Enable, disable individual keys on the LCP.

Par. No.	Name	Range	Unit	Default
C00.40	HAND Key Option	0: Disabled 1: Enabled	-	0

0: Disabled, No effect when HAND key is pressed. Select [0] Disabled to avoid accidental start of the drive in Hand operation mode;

1: Enabled, HAND key is functional;

Par. No.	Name	Range	Unit	Default
C00.41	OFF Key Option	0: Disabled 1: Enabled 2: Enabled reset only	-	1

0: Disabled, avoids accidental start of the drive in AUTO operation mode;

1: Enabled, AUTO key is functional;

Par. No.	Name	Range	Unit	Default
C00.42	AUTO Key Option	0: Disabled 1: Enabled	-	1

0: Disabled, avoids accidental start of the drive in AUTO operation mode;

1: Enabled, AUTO key is functional;

Par. No.	Name	Range	Unit	Default
C00.46	One Key Recovery Time	0: Disabled 5: 5s 10: 10s 15: 15s 20: 20s	-	0

"One Key Recovery" is that user can press OFF key to recover the backup settings if the settings have been backuped. If the settings have not been backuped, this function is disabled.

One key Recovery Time is used to determine how many seconds should OFF key pressed to recover the backup settings, it is set to 0 to disable one key recovery function.

Note: If an alarm happens, press OFF key will reset alarm first.

Par. No.	Name	Range	Unit	Default
C00.47	LCP Potentiometer Step	0: 0.1 1: 1 2: 10	-	0

This parameter determines the reference value increase or decrease when the LCP potentiometer rotates.

Par. No.	Name	Range	Unit	Default
C00.49	Operation Mode	0~3	-	3

0: OFF Mode(Previous Mode is Hand Mode);

1: Hand Mode

2: OFF Mode(Previous Mode is Auto Mode)

3: Auto Mode

C00.5* Copy/Save

Par. No.	Name	Range	Unit	Default
C00.51	Set-up Copy	0: No copy 1: Copy from set-up 1 2: Copy from set-up 2 9: Copy from factory setting	-	0

0: No copy;

1: Copy from set-up 1, Copies all parameters in the Set-up 1 to the edit set-up (defined in C00.11);

2: Copy from set-up 2, Copies all parameters in the Set-up 2 to the edit set-up (defined in C00.11);

9: Copy from factory setting, Copies factory setting to the edit set-up (defined in C00.11);

Attention: When selected set-up is the same to the edit set-up, copy function doesn't work; both LCP and parameter database are locked while copying.

C00.6* Protection

Par. No.	Name	Range	Unit	Default
C00.60	Set-up Locked	0: Disabled 1: Enabled	-	0

0: Disabled

1: Enabled, prevent unauthorized editing of parameters.

Attention: This function is only valid to LCP, not active to local bus.

Par. No.	Name	Range	Unit	Default
C00.70	LCD Access Level	0~65535	-	6111

Group 01: Load and Motor

C01.0*General Settings

Par. No.	Name	Range	Unit	Default
C01.00	Configuration Mode	0: Speed open loop 3: Process closed loop 4: Torque open loop	-	0

0: Speed open loop, Enables speed control (without feedback signal from motor) with automatic slip compensation for almost constant speed at varying loads. Compensations are active but can be disabled in the Load/Motor par. group C01.0*;

3: Process closed loop, Enables the use of process control in the drive. The process control parameters are set in par. groups 7-2* and 7-3*.

4: Torque open loop, Enables the use of torque open loop in VVC+ mode (C01.01 Motor Control Principle). The torque PID parameters are set in par. group C07.1*;

Attention: If configuration mode is changed, C03.00, C03.03 will be restored to factory setting.

Par. No.	Name	Range	Unit	Default
*C01.01	Motor Control Principle	0: V/F 1: VVC+	-	0

Selects which motor control principle to employ.

0: V/F, for special motor or parallel connected motors in special motor applications. When V/F is selected the characteristic of the control principle can be edited in C01.55 V/F Characteristic - V and C01.56 V/F Characteristic – F;

1: VVC+, Voltage Vector Control principle suitable for higher requirements on control performance applications. The main benefit of VVC+ operation is that it uses a robust motor model;

Attention: When V/F control principle is selected, slip compensation and load compensation are invalid; When VVC+ control principle is selected, it includes slip compensation and load compensation itself.

Par. No.	Name	Range	Unit	Default
*C01.03	Torque Characteristics	0: Constant torque 1: Variable torque 3: Auto Energy Optimization (AEO)	-	0

Select the torque characteristic required. VT and AEO are both energy saving operations.

0: Constant torque, Motor shaft output provides constant torque under variable speed control.

1: Variable torque, Motor shaft output provides variable torque under variable speed control, usually used for fan or pump applications. Set the variable torque level in C14.40 VT Level.

3: Auto Energy optimization (AEO), Automatically optimises energy consumption by minimising magnetisation and frequency via C14.41 AEO Minimum Magnetisation;

Par. No.	Name	Range	Unit	Default
C01.07	Application Configuration Mode	0: No function 5: AIO mode	-	0

SK serirs has built-in Compressor AIO mode. When this function is turned on, Par. Group 28 are valid.

Par. No.	Name	Range	Unit	Default
*C01.10	Motor Type Selection	0: Asynchronous motor 1: SPM 2: Unsaturated IPM (Salient) 3: IPM (Salient)	-	0

Different parameters are active when the option is selected. See the following table.

	[0] Asynchronous motor	[1]~[3] PM
C01.03 Torque Characteristics	√	
C01.14 Damping Gain		√
C01.15 Low Speed Filter Time Const.		√
C01.16 High Speed Filter Time Const.		√
C01.17 Voltage Filter Time Const.		√
C01.37 D-axis Inductance		√
C01.38 Q-axis Inductance		√

C01.39 Motor Poles		√
C01.40 Back EMF at 1000RPM		√
C01.44 D-axis Inductance Sat.		√
C01.45 Q-axis Inductance Sat.		√
C01.47 PM Resistance Correction		√
C01.48 Current at Min Inductance for D-axis		√
C01.49 Current at Min Inductance for Q-axis		√
C01.50 Motor Magnetisation at Zero Speed	√	
C01.52 Min Speed Normal Magnetising	√	
C01.55 V/F Characteristic-V	√	
C01.56 V/F Characteristic-F	√	
C01.60 Low Speed Load Compensation	√	
C01.61 High Speed Load Compensation	√	
C01.62 Slip Compensation	√	
C01.63 Slip Compensation Time Constant	√	
C01.64 Resonance Dampening	√	
C01.65 Resonance Dampening Time constant	√	
C01.66 Min. Current at Low Speed		√
C01.67 PM Inertia AMA Torque Bandwidth		√
C01.68 PM Inertia AMA Feedforward Proportional Gain		√
C01.69 System Inertia		√
C01.70 PM Start Mode		√
C02.06 Parking Current		√
C02.07 Parking Time		√

Par. No.	Name	Range	Unit	Default
C01.14	Damping Gain	0~250	%	120

The damping gain stabilizes the PM machine. The value of damping gain controls the dynamic performance of the PM machine. High damping gain gives high dynamic performance, and low damping gain gives low dynamic performance. The dynamic performance is related to the machine data and load type. If the damping gain is too high or low, the control becomes unstable.

Par. No.	Name	Range	Unit	Default
C01.15	Low Speed Filter Time Const.	0.01~20.00	s	0.80

This time constant is used below 10% rated speed. Obtain quick control through a short damping time constant. However, if this value is too short, the control becomes unstable.

Par. No.	Name	Range	Unit	Default
C01.16	High Speed Filter Time Const.	0.01~20.00	s	0.80

This time constant is used above 10% rated speed. Obtain quick control through a short damping time constant. However, if this value is too short, the control becomes unstable.

Par. No.	Name	Range	Unit	Default
C01.17	Voltage Filter Time Const.	0.010~1.000	s	0.500

Reduces the influence of high frequency ripple and system resonance in the calculation of supply voltage. Without this filter, the ripples in the currents can distort the calculated voltage and affect the stability of the system.

C01.2* Motor Parameter

Par. No.	Name	Range	Unit	Default
*C01.20	Rated Motor Power	Motor dependant	kW	*
*C01.22	Rated Motor Voltage	50~1000	V	*
*C01.23	Rated Motor Frequency	20~400	Hz	*
*C01.24	Rated Motor Current	Motor dependant	A	*
*C01.25	Rated Motor Speed	100~9999	rpm	*
C01.26	Rated Motor Torque	0.1~6553.5	N•m	0

Set the parameters according to the motor nameplate no matter which control mode is adopted. Changing the value of C01.20-C01.22, C01.30-C01.35 will be automatically modified to factory settings.

Par. No.	Name	Range	Unit	Default
*C01.29	Automatic Motor Adaption (AMA)	0: No function 1: Static complete AMA 2: Static easy AMA 3: Static complete AMA + Back-EMF 4: Static complete AMA + System inertial 5: Static complete AMA + Back-EMF + System inertial	-	0

Use Automatic Motor Adaption (AMA) to obtain accurate motor parameters to further optimize control performance.

There are four AMA states: stator resistance AMA, inductance AMA, back EMF AMA, and system inertia AMA. Among them, stator resistance AMA and inductance AMA are static AMA, and the motor does not need to run. Back-EMF AMA and system inertia AMA are dynamic AMA. The motor needs to run (without disconnecting the load); the asynchronous motor cannot perform back-EMF AMA and system inertia AMA;

Static esay AMA is stator resistance AMA.

Static complete AMA is stator resistance AMA plus inductance AMA.

The parameters for various AMA states are as follows:

AMA State	Asynchronous motor	Permanent magnet synchronous motor	Panel display
Stator Resistance AMA	C01.30 Stator Resistance (Rs)	C01.30 Stator Resistance (Rs)	AT-1
Inductance AMA	C01.33 Stator Leakage Reactance (X1) C01.35 Main Reactance (Xh)	C01.33 Stator Leakage Reactance (X1) C01.35 Main Reactance (Xh) C01.37 D-axis Inductance C01.38 Q-axis Inductance C01.44 D-axis Inductance Sat. C01.45 Q-axis Inductance Sat. C01.48 Current at Min Inductance for D-axis C01.49 Current at Min Inductance for Q-axis	AT-2
Back EMF AMA	None	C01.40 Back EMF at 1000RPM	AT-3
System Inertia AMA	None	C01.69 System Inertia	AT-4

Before using AMA function, set the following motor parameters according to the motor nameplate: C01.20 rated motor power, C01.22 rated motor voltage, C01.23 rated motor frequency, C01.24 rated motor current, C01.25 rated motor speed, and C01.26 rated motor torque.

When the motor is in AMA, the "AT-1~4" indication will be displayed on the LCP. You can press the OFF key to stop the AMA.

In order to obtain accurate motor data, it should do AMA in the motor cooling state.

Note: Back-EMF AMA and system inertia AMA require that the motor can run in the same direction for a long time. If the equipment does not allow long-term operation in the same direction, you cannot perform both studies to avoid danger!

While doing system inertia AMA, the drive recognizes the inertia of the system converted to the motor shaft through continuous acceleration and deceleration. The process of deceleration is affected by C02.17 Over-voltage Control. If C02.17 is equal to 0 (invalid), deceleration is performed according to the deceleration time of C03.42; if C02.17 is not equal to 0, the internal control achieves rapid deceleration to speed up the AMA process. The direct DC-bus voltage control algorithm is used to achieve rapid deceleration. During deceleration, the DC bus voltage is always controlled at 680V.

C01.3*Motor Parameter 2

Par. No.	Name	Range	Unit	Default
*C01.30	Stator Resistance (Rs)	Motor dependant	Ω	*
*C01.31	Rotor Resistance(Rr)	Motor dependant	Ω	*
*C01.33	Stator Leakage Reactance (X1)	Motor dependant	mH	*
*C01.35	Main Reactance (Xh)	Motor dependant	mH	*
C01.37	D-axis Inductance	Motor dependant		*
C01.38	Q-axis Inductance	Motor dependant		*

Parameters for advanced motor data. The motor data in C01.30 Stator Resistance (Rs) to C01.35 Main Reactance (Xh) must match the relevant motor in order to run the motor optimally. The default settings are figures based on common motor parameter values from standard motors. If the motor parameters are not set correctly, a malfunction of the drive system may occur. If the motor data is not known, running an AMA (Automatic Motor Adaptation) is recommended.

Par. No.	Name	Range	Unit	Default
*C01.39	Motor Poles	2~100	P	4

Enter the motor poles from the nameplate data.

Par. No.	Name	Range	Unit	Default
*C01.40	Back EMF at 1000RPM	0~9000	V	*

Set the nominal back EMF for the motor when running at 1000 RPM. Back EMF is the voltage generated by a PM motor when no frequency converter is connected and the shaft is turned externally. Back EMF is normally specified for nominal motor speed or for 1000 RPM measured between 2 lines.

Par. No.	Name	Range	Unit	Default
*C01.42	Motor Cable Length	0~150	m	2

Enter the motor cable length connected between the motor and the drive. Set correct cable length can suppress noises resulted from the motor.

Par. No.	Name	Range	Unit	Default
*C01.44	D-axis Inductance Sat.	Motor dependant	Ω	*
*C01.45	Q-axis Inductance Sat.	Motor dependant	Ω	*

Usually, this parameter is not on the nameplate of the motor, and it needs to be acquired by motor AMA.

Par. No.	Name	Range	Unit	Default
C01.47	PM Resistance Correction	0: Disable 1: Enable		0

This parameter is used to set whether to perform stator resistance correction at each start.

Since the drive does not know the actual rotor position at start-up, a parking or an initial position detection (IPD) process is required. This process is determined by C01.70 PM start mode.

If C01.70 PM start mode is equal to [0] initial position detection (IPD) start, this parameter is enabled, then after the initial position detection, it needs 600ms to correct the stator resistance of the synchronous motor;

If C01.70 PM start mode is equal to [1] parking start, this parameter is enabled, then the stator resistance of synchronous motor is calibrated in the parking process, and the parking time is determined by C02.07 Parking time, if C02.07 is less than 600ms, the system will automatically extend the time for correction.

This parameter enable will increase the PM start-up time, but it can bring better control performance.

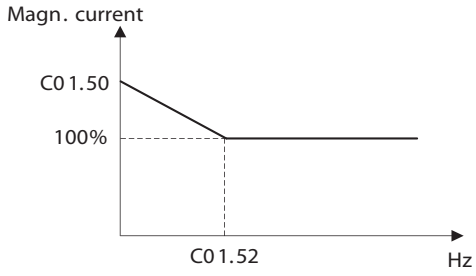
Par. No.	Name	Range	Unit	Default
*C01.48	Current at Min Inductance for D-axis	20~200	%	100
*C01.49	Current at Min Inductance for Q-axis	20~200	%	100

Usually, this parameter is not on the nameplate of the motor, and it needs to be acquired by motor AMA.

Par. No.	Name	Range	Unit	Default
C01.50	Motor Magnetisation at Zero Speed	0~300	%	100
C01.52	Min Speed Normal Magnetising	0.0~10.0	Hz	0.0

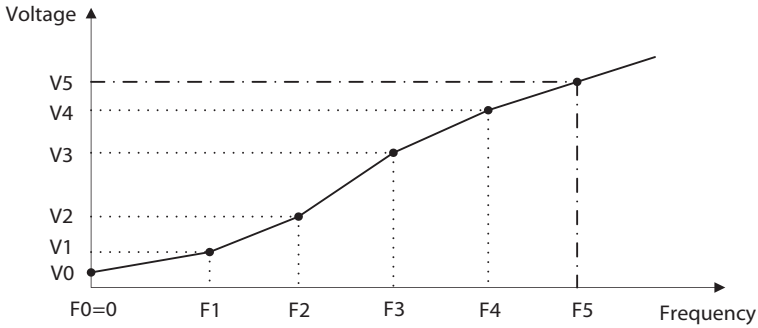
Use C01.50 Motor Magnetisation at Zero Speed along with C01.52 Min Speed Normal Magnetising to obtain a different thermal load on the motor when running at low speed (under C01.52).

The value of C01.50 is a percentage of the motor current. If the setting is too low, the torque on the motor shaft may be reduced.



Par. No.	Name	Range	Unit	Default
C01.55	V/F Characteristic-V	0.0~999.9	V	
C01.56	V/F Characteristic-F	0.0~400.0	Hz	

These parameters are array parameters [0-5], used to manually form a V/F characteristic matching the motor. The frequency points [F0-F5] are defined in C01.56 V/F Characteristic - F. The voltage at each point [V0-V5] is defined in C01.55 V/F Characteristic - V. These parameters are only accessible when C01.01 Motor Control Principle is set to V/F.

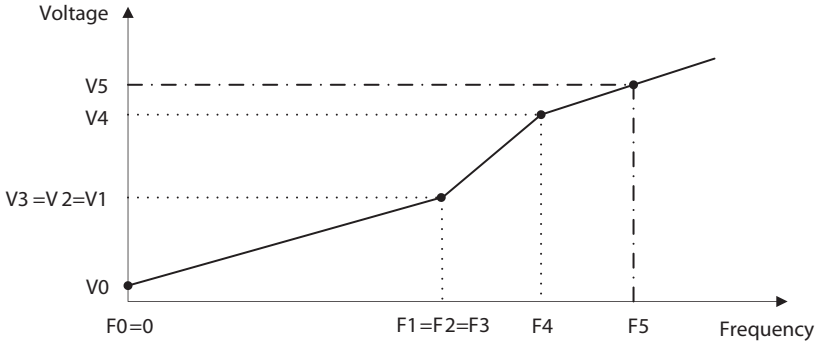


C01.55[0]~C01.55[5] is respective to V0~V5, C01.56[0]~C01.56[5] is respective to F0~F5, Vn is motor rated voltage, Fn is the motor rated frequency.

The set of C01.56 must met F0=0 and F1≤F2≤F3≤F4≤F5.

Simplify V/F characteristic by merging 2 or more points (voltages and frequencies), which respectively are set equal.

The slope (ratio of V/F) after point (F5, V5) must be equal to the slope between point (F5, V5) and the previous point.



The default settings of V/F Characteristic are:

200V model:

	[0]	[1]	[2]	[3]	[4]	[5]
C01.55	0.0	7.0	230.0	230.0	230.0	230.0
C01.56	0.0	0.5	50.0	50.0	50.0	50.0

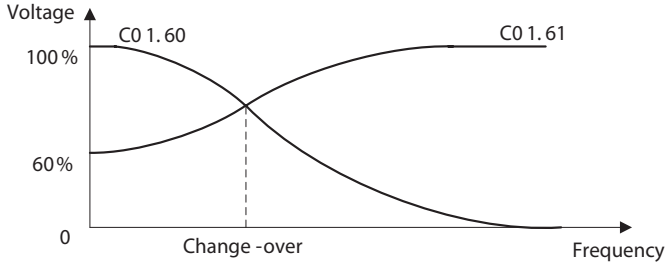
400V model:

	[0]	[1]	[2]	[3]	[4]	[5]
C01.55	0.0	12.0	400.0	400.0	400.0	400.0
C01.56	0.0	0.5	50.0	50.0	50.0	50.0

Par. No.	Name	Range	Unit	Default
C01.60	Low Speed Load Compensation	0~199	%	100
C01.61	High Speed Load Compensation	0~199	%	100

Enter the % value to compensate voltage in relation to load when the motor is running at low speed (C01.60)/high speed (C01.61) and obtain the optimum V/F characteristic.

The low and high speed change-over point is automatically calculated based on motor size. Usually it is 5Hz.

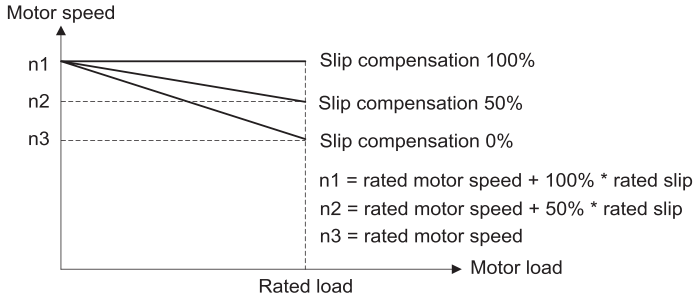


Par. No.	Name	Range	Unit	Default
C01.62	Slip Compensation	-400~399	%	*

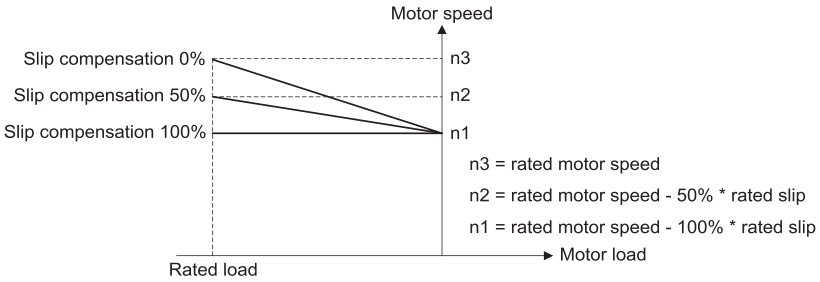
When the motor is driving an electric-driven load, motor speed drops with the increase of load. When the motor is driving a power generating load, motor speed will increase with the increase of load. Appropriate slip compensation can maintain constant motor speed when the motor load is changing.

If this parameter is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip.

Diagram of slip compensation is shown below:



slip compensation on electric driven load



slip compensation on power generating load

When having more than one motor on the same shaft there is a need for some kinds of load share between the drives controlling the motors. This has typically been made with two drives running in speed open loop mode and one with negative slip compensation.

Par. No.	Name	Range	Unit	Default
C01.63	Slip Compensation Time Constant	0.05~5.00	s	0.50

Enter the slip compensation reaction speed. A high value results in slow reaction, and a low value results in quick reaction. If lowfrequency resonance problems occur, use a longer time setting.

Par. No.	Name	Range	Unit	Default
C01.64	Resonance Dampening	0~3000	%	50

Motor (especially >=30kW motor) speed and current resonance is likely to occur due to load vibration, and may lead to system failure even over current protection. This is particularly obvious during no-load or light-load applications.

Do not change this parameter if the motor has no resonance. Increase the value properly only when the motor has obvious resonance. The larger the value is, the better the resonance dampening result will be.

Par. No.	Name	Range	Unit	Default
C01.65	Resonance Dampening Time constant	0.005~0.050	s	0.005

Enter the resonance dampening reaction speed. A high value results in slow reaction, and a low value results in quick reaction.

Par. No.	Name	Range	Unit	Default
C01.66	Min. Current at Low Speed	0~120	%	50

Enter the minimum motor current at lowspeed. Increasing this current improvesmotor torque at low speed. Parameter C01.66 Min. Current at Low Speed is enabled only for PM motor.

Par. No.	Name	Range	Unit	Default
C01.67	PM Inertia AMA Torque Bandwidth	0~300	%	100
C01.68	PM Inertia AMA Feedforward Proportional Gain	0~100	%	100

This group of parameters are only used in the PM system inertia AMA phase. The drive recognizes the inertia of the system converted to the motor shaft through continuous acceleration and deceleration.

This group of parameters will affect the acceleration process time, increase the parameters, reduce the acceleration process time, and vice versa.

This group of parameters generally do not need to be adjusted.

Par. No.	Name	Range	Unit	Default
C01.69	System Inertia	0~10000.0000	$kg \cdot m^2$	*

This parameter generally needs to be obtained through AMA.

Par. No.	Name	Range	Unit	Default
C01.70	PM Start Mode	0: IPD 1: Parking	-	1

Since the drive does not know the actual rotor position at start-up, a parking or an initial position detection (IPD) process is required.

The initial position detection starts quickly and its time can generally be ignored.

For parking start, the parking time is determined by C02.07.

Par. No.	Name	Range	Unit	Default
C01.71	Start Delay	0.0~10.0	s	0.0
C01.72	Start Function	0: DC hold 2: Coast	-	2

C01.71 enables a delay of the starting time. The drive begins with the start function selected in C01.72. Enter the time delay required before commencing acceleration. Setting start delay to 0.0 sec. disables start function when start command is given.

Select the start function during start delay by C01.72. This parameter is linked to C01.71 Start Delay.

0: DC Hold, energizes motor with a DC holding current (C02.00 DC Hold Current) during the start delay time;

2: Coast, Motor coasted during the start delay time (drive off);

Par. No.	Name	Range	Unit	Default
*C01.73	Flying Start	0: Disabled 1: Enabled	-	0

This function applies for the inertia load to restart due to mains drop-out; If [0] Clockwise is selected in C04.10, and no rotating motor is found, It is possible to use DC-brake command to ramp down the motor speed to 0 rpm, and then start the motor in the normal way; If [2] Both directions is selected in C04.10, and no rotating motor is found, the drive will assume the motor is stationary or in low-speed rotation, and then start the motor in the normal way. When Flying start is enabled, C01.71 Start delay and C01.72 Start function is disabled.

Warning: This function is not suitable for hoisting applications.

Par. No.	Name	Range	Unit	Default
C01.75	Min. Start Frequency	0.00~10.0	Hz	0.0

If the drive frequency reference is less than C01.75 Min. Start Frequency, the drive will not run even the start command is given (the start command will be shielded). Only the drive frequency reference is greater than or equal C01.75, then the drive starts to run. The drive still accelerates from 0 to frequency reference using ramp time.

Par. No.	Name	Range	Unit	Default
C01.76	Jump Frequency	0.0~20.0	Hz	0.0

If the drive frequency reference's absolute value (not zero, frequency reference maybe negative) is less than C01.76 Jump Frequency, the drive will run at jump frequency (maybe reversing if the reference is negative).

For example:

Set C01.76 = 3. if the frequency reference is 2, the drive will run forward at 3Hz; If the frequency reference is -2, the drive will run reversing at 3Hz; If the frequency reference is 0, the drive will stop. If the frequency reference is 20, the drive will run at 3Hz immediately, then accelerates from 3Hz to 20Hz using ramp time.

Note: it is not recommended for using C01.75 and C01.76 together.

If C01.75 and C01.76 are used together, the following talbe is its behaviour.

Freq. ref. / Par. setting	3Hz	8Hz	15Hz
C01.75 = 5.00 C01.76 = 10.0	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref > C01.75, the start command is given, Freq. ref < C01.76 the drive runs at 10.0Hz	Freq. ref > C01.75, the start command is given, Freq. ref > C01.76 the drive runs at 10Hz immediately, then accelerates from 10Hz to 15Hz using ramp time.
C01.75 = 10.00 C01.76 = 5.0	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref < C01.75 the start command is shielded, the drive stop.	Freq. ref > C01.75, the start command is given, Freq. ref > C01.76 the drive runs at 5Hz immediately, then accelerates from 5Hz to 15Hz using ramp time.

Attention: When C01.76 Jump Frequency and C02.04 DC Brake Cut in Speed are not zero, DC brake will only be active when C02.04 > C01.76.

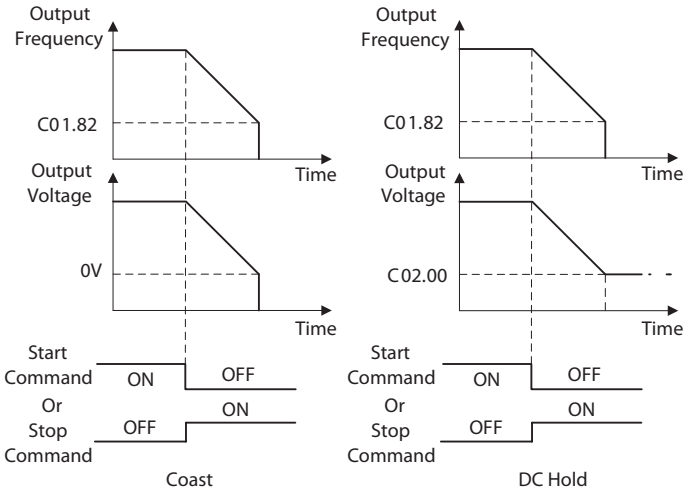
Par. No.	Name	Range	Unit	Default
C01.80	Function at Stop	0: Coast 1: DC hold	-	0

Select the drive function after stop command is given or start command is removed (standby), and output frequency is ramped down to C01.82 Min Speed for Function at Stop.

0: Coast, leaves motor in free mode. the drive is off;

1: DC hold, the motor is energized with a DC current. See C02.00 DC Hold Current for more information;

Diagram of Function at Stop is shown below:



Par. No.	Name	Range	Unit	Default
C01.82	Min Speed for Function at Stop	0.0~400.0	Hz	0.0

Set the output frequency at which to activate C01.80 Function at Stop.

Par. No.	Name	Range	Unit	Default
C01.88	AC Brake Gain	1.0~2.0		1.4

Enter AC brake reaction speed. A high value results in slow reaction, and a low value results in quick reaction.

NOTE: Generally, it does not need adjustments.

Par. No.	Name	Range	Unit	Default
C01.90	Motor Thermal Protection	0: No protection 1: Thermistor warning 2: Thermistor trip 3: ETR warning 4: ETR trip 5: ETR warning (Self-cooling mode) 6: ETR trip (Self-cooling mode)	-	0

The drive determines the motor temperature for motor protection in two different ways:

• Via a thermistor sensor connected to the analog input terminal VI (C01.93 Thermistor Source);

• Via calculation (ETR = Electronic Terminal Relay) of the thermal load, based on the actual load and time. The calculated thermal load is compared with the rated motor current and the rated motor frequency. The calculations estimate the need for a lower load at lower speed due to less cooling from the fan incorporated in the motor.

0: No protection;

1: Thermistor warning, a thermistor connected to analog input VI gives a warning if upper limit of motor temperature range is exceeded, (see 01.93, Thermistor Resource);

2: Thermistor trip, a thermistor connected to analog input VI gives an alarm and makes the drive trip if upper limit of motor temperature range is exceeded, (see 01.93, Thermistor Resource);

3: ETR warning, if calculated upper limit of motor temperature range is exceeded, a warning occurs

4: ETR trip, if calculated upper limit of motor temperature range is exceeded, an alarm occurs and the drive trips.

5: ETR warning (Self-cooling mode)

6: ETR trip (Self-cooling mode)

Option [5]/[6] is similar with the option [3]/[4], it uses ETR function to protect the motor, if the motor exceeds the maximum temperature range, the drive will report a "A.10" warning, or "E.10" alarm, this two options are suitable for motor with no forced cooling (Self-cooling). When the drive is going into the protected status, it requires more stop time to wait motor temperature down.

Par. No.	Name	Range	Unit	Default
C01.91	Motor Overload protection time	1~60	min	2
C01.92	Motor Overload protection factor	100~160	%	150

When ETR function is used, if motor current exceeds C01.24 motor rated current * C01.92 motor overload protection factor, and the duration exceeds C01.91 motor overload protection time, the drive will send out motor overload warning or alarm.

Motor overload protection is inverse time protection, overload current and protection time (corresponding to C01.91) are as follows:

Overload current	Protection time	Overload current	Protection time
C01.92	100%	C01.92+30%	20%
C01.92+6%	50%	C01.92+36%	18%
C01.92+12%	33%	C01.92+42%	17%
C01.92+18%	29%	C01.92+48%	16%
C01.92+24%	21%	C01.92+54%	14%

This protection relationship corresponds to the rated frequency and the protection time will be shortened if the output frequency is lower or higher than the rated frequency. The relationship between the output frequency and the overload protection correction factor is as follows:

Output frequency	Correction factor	Output frequency	Correction factor
0-12.5	2.1	100%-112.5%	1
12.5%-25%	2.1	112.5%-125%	1.05
25%-37.5%	1.67	125%-137.5%	1.12
37.5%-50%	1.45	137.5%-150%	1.2
50%-62.5%	1.31	150%-162.5%	1.31
62.5%-75%	1.2	162.5%-175%	1.45
75%-87.5%	1.12	175%-187.5%	1.67
87.5%-100%	1.05	187.5%-Max.	2.1

For example, set C01.91 = 10, C01.92 = 120%, run at rated frequency, current is 132% rated motor current, protection time is 10 × 33% = 3.3 minutes. If the operating frequency is 30Hz (60% of rated frequency), the protection time is 3.3÷1.31 = 2.52 minutes.

Note: It is necessary to correctly set the C01.92 motor overload protection factor according to

the actual overload capacity of the motor. If this parameter is set too large, it may happen that the motor is overload and the inverter is not in alarm!

Par. No.	Name	Range	Unit	Default
*C01.93	Thermistor Resource	0: None 1: Terminal VI		0

Select the input to which the thermistor (PTC sensor) should be connected.

0: None

1: Terminal VI, Connect thermistor to analog input terminal VI;

Attention: Analog input can't be selected for other purpose when selected as thermistor resource.

Thermistor specifications:

Input Signal Type	Voltage Supply	Termistor Threshold
Analog	10V	<0.8kΩ, >2.9kΩ

Group 02: Brakes

Par. No.	Name	Range	Unit	Default
C02.00	DC Hold Current	0~150	%	50

Enter a value for holding current as a percentage of the rated motor current set in C01.24 Motor Current. 100% DC holding current corresponds to IM,N. This parameter either holds the motor (holding torque) or pre-heats the motor. This parameter is active if DC Hold has been selected in either C01.72 Start Function or C01.80 Function at Stop.

Attention: Avoid 100% current too long as it may overheat the motor.

Par. No.	Name	Range	Unit	Default
C02.01	DC Brake Current	0~150	%	50

Enter a value for current as a percentage of the rated motor current IM,N, see C01.24 Motor Current. 100% DC braking current corresponds to IM,N.

DC brake current is applied on a stop command, when the speed is lower than the limit set in C02.04 DC Brake Cut in Speed; or via the serial communication port. The braking current is active during the time period set in C02.02 DC Braking Time.

Par. No.	Name	Range	Unit	Default
C02.02	DC Braking Time	0.0~60.0	s	10.0

This parameter defines DC brake current (C02.01) time during which DC-brake current is applied to the motor.

Par. No.	Name	Range	Unit	Default
C02.04	DC Brake Cut in Speed	0.0~400.0	%	0.0

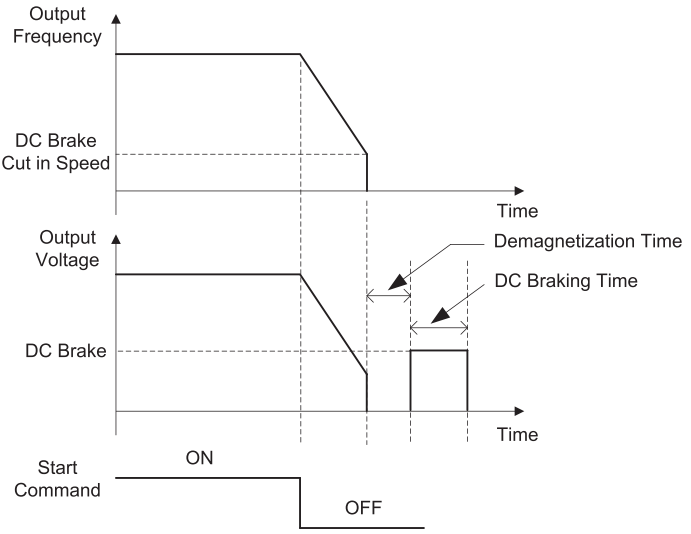
Set the DC brake cut-in speed for activation of the DC braking current set in C02.01 DC Brake Current, upon a stop command.

Par. No.	Name	Range	Unit	Default
C02.08	Motor Demagnetization	0~100	%	100

when the drive output frequency less than DC brake cut in frequencies, motor demagnetization process needs to be done before starting a DC brake for preventing overcurrent at a high

speed or great inertia starting DC brake. The smaller this parameter is, the faster motor demagnetization will be done, the time shorter entering the DC brake. If the Load inertia is small and DC brake cut in frequency is lower, this parameter can be reduced to 0.

Diagram of DC Brake process is shown below:



Par. No.	Name	Range	Unit	Default
C02.06	Parking Current	0~150	%	100
C02.07	Parking Time	0.1~60.0	s	3.0

This group of parameters are enabled when C01.70 PM Start Mode is equal to [1] Parking. C02.07 is used to determine the parking time. C02.06 is used to determine the current during the parking process. 100% corresponds to C01.24 rated motor current.

Par. No.	Name	Range	Unit	Default
C02.10	Brake Function	0: Off 1: Resistor brake 2: AC brake		0

0: Off;

1: Resistor brake, use the resistor brake to consume surplus energy resulting from motor braking, and prevent the drive to trip due to over-voltage in the intermediate circuit;

2: AC brake, dissipate surplus energy in the motor core, and prevent the energy back into drive causing trips. It is important to keep in mind that frequent use of this function will cause an increase in motor temperature;

Attention: Resistor brake is only functional when the drive build-in braking unit or external braking unit must be installed.

Par. No.	Name	Range	Unit	Default
C02.11	Brake Resistor	5~65535	Ω	*

Set brake resistor value. This parameter is only active in drives with an integral brake unit.

Par. No.	Name	Range	Unit	Default
*C02.14	Resistor Brake Threshold Voltage	Grid type dependant	V	*

This parameter takes effect only to the drives with built-in brake chopper.

If C02.10 is set to 1, When the DC link voltage exceeds the value of C02.14, resistor brake will perform, the energy will be rapidly consumed through brake resistor. This value is used to regulate the brake effect of brake chopper.

The following table is the Resistor Brake Threshold Voltage's range and default value which depends on C00.06 Grid Type:

Grid Type	Range	Default
200~240V	360~395V	390V
380~440V	680~780V	700V
440~480V	750~780V	770V

Par. No.	Name	Range	Unit	Default
C02.15	Over-voltage Control Threshold Voltage	Grid type dependant	V	*

When the DC link voltage exceeds the value of C02.15, over-voltage control is active.

The following table is the Over-voltage Control Threshold Voltage's range and default value which depends on C00.06 Grid Type:

Grid Type	Range	Default
200~240V	360~395V	395V
380~440V	680~780V	710V
440~480V	750~780V	780V

Par. No.	Name	Range	Unit	Default
C02.16	AC Brake, Max Current	0~150	%	100

Enter the maximum permissible current when using AC brake to avoid overheating of motor windings. 100% equals motor current set in C01.24.

Par. No.	Name	Range	Unit	Default
C02.17	Over-voltage Control	0: Disabled 2: Mode 1 3: Mode 2		0

Over-voltage control (OVC) reduces the risk of the drive tripping due to an over voltage on the DC link caused by generative power from the load.

0: Disabled;

2: Mode 1, used to consume surplus energy by increasing the output frequency;

3: Mode 2, used for very short deceleration;

Attention: If C02.10 = 1 (Resistor brake), C02.17 = 2 or 3, resistor brake function starts first, if the DC link voltage still can not be controlled, OVC starts.

Par. No.	Name	Range	Unit	Default
C02.18	Over-voltage Control Integral Time	0.01~0.10	s	0.05
C02.19	Over-voltage Control Proportional Gain	0~200	%	100

Over-voltage control (OVC) reduces the risk of the drive tripping due to an over voltage on the DC link caused by generative power from the load.

Note: These parameters are only active when selecting [2] Mode 1or [3] Mode 2 in C02.17 Over-voltage Control

Par. No.	Name	Range	Unit	Default
C02.20	Release Brake Current	0.00~1200.00	A	0.00

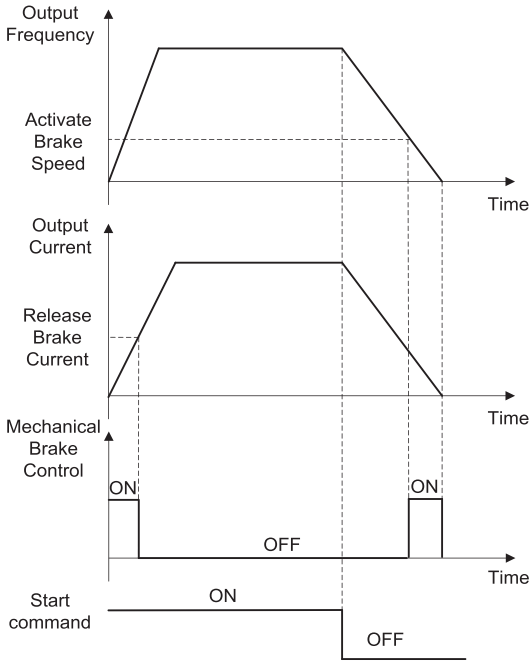
Set the motor current for release of the mechanical brake, when a start condition is present.

Attention: When Mechanical brake control output is selected but no mechanical brake is connected, the function will not work. If start delay time has passed, and motor current is below Release brake current, the drive trips.

Par. No.	Name	Range	Unit	Default
C02.22	Activate Brake Speed	0.0~400.0	Hz	0.0

Set the motor frequency for activation of the mechanical brake, when a stop condition is present.

Diagram of Mechanical Brake Control process is shown below:



Group 03: Reference/Ramps

C03.0* Reference Limits

Reference is the drive control target. Reference value is a dimensionless number, reference unit depends on configuration mode (C01.00). When select [0] speed open loop in configuration mode, motor frequency is the drive control target, the reference unit is Hz; When select [4] torque open loop in configuration mode, motor torque is the drive control target, the reference unit is Nm; When select [3] process closed loop in configuration mode, process variable (such as temperature, pressure) is the drive control target, the reference unit may be ℃ or kg, etc.

Par. No.	Name	Range	Unit	Default
C03.00	Reference Range	0: 0~C03.03 1: -C03.03~C03.03	-	0

Select the range of the reference.

0: 0~Max, Reference set point ranges can have positive values only;

1: -Max~+Max, Ranges can have both positive and negative values;

Par. No.	Name	Range	Unit	Default
C03.03	Maximum Reference	0.0~6553.5	-	50.0

Enter value for Maximum Reference. The Maximum Reference is the highest value obtainable by summing all references.

Par. No.	Name	Range	Unit	Default
C03.07	Main Reference Calculation	0: Preset reference + Reference source1, 2, 3 1: Preset reference priority 2: Reference source 2,3 operation 3: Switchover between Reference source 1 and Reference source 2 4: Switchover between Reference source 1 and Reference source 2,3 operation	-	0

Select reference source.

0: Reference source 1, only reference source 1 is used;

1: Preset reference priority

For example, set C03.15 = 1 (reference source 1 is terminal VI), C03.16 = 13 (reference source 2 is preset reference), C05.12 = 15, C05.16 = 16, C05.17 = 17, If DI1 is valid and DI2 and DI3 are invalid, the reference value is C03.10[1]. If DI1~DI3 are all invalid, the setting value is the corresponding value of terminal VI.

2: Reference source 1 and 2 operation

3: Switchover between reference source 1 and 2

It can be switched by the digital input terminal setting option [24] reference source switchover. When the terminal is invalid, the reference source 1 is selected; when the terminal is valid, the reference source 2 is selected.

4: Switchover between reference source 1 and "reference source 1 and 2 operation"

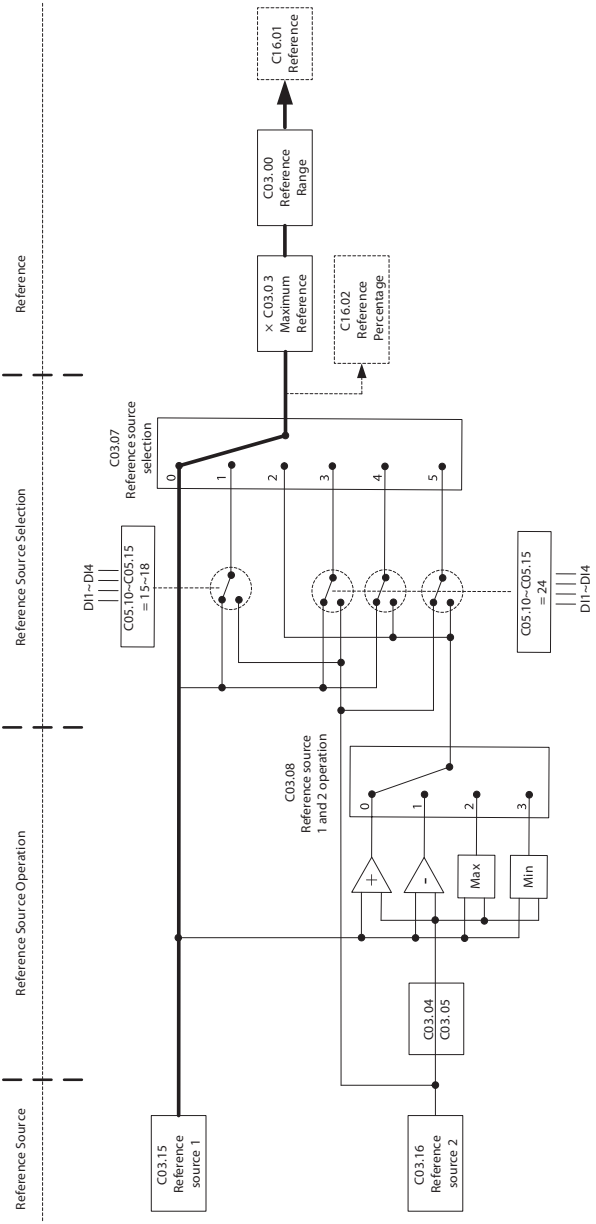
5: Switchover between reference source 2 and "reference source 1 and 2 operation"

It can be switched by the digital input terminal setting option [24] reference source switchover. When the terminal is invalid, the reference source 1 or 2 is selected; when the terminal is valid, the reference source 1 and 2 operation is selected.

Par. No.	Name	Range	Unit	Default
C03.08	Reference Source 1 and 2 Operation	0: Reference source 1 + Reference source 2 1: Reference source 1 - Reference source 2 2: Max (Reference source 1, Reference source 2) 3: Min (Reference source 1, Reference source 2)	-	0

This parameter is used to set the reference source 1 and 2 operation, the results can be used for parameter C03.07 options [2] and [5].

The reference value calculation logic as shown below:


Reference Source
Reference Source Operation
Reference Source Selection
Reference
C03.15 Reference source 1
C03.16 Reference source 2
C03.04 C03.05
C03.08 Reference source 1 and 2 operation
+
-
Max
Min
0
1
2
3
C03.07 Reference source selection
0
1
2
3
4
5
DI1~DI4
C05.10~C05.15 = 15~18
C05.10~C05.15 = 24
DI1~DI4
× C03.03 Maximum Reference
C03.00 Reference Range
CI6.01 Reference
CI6.02 Reference Percentage

Par. No.	Name	Range	Unit	Default
C03.10	Preset Reference	-100.00~100.00	%	0.00

This parameter is an array-16 to be used for presetting different references. 16 preset references are selectable via digital terminals or communication. See C05.1*. 0% equals 0, 100% equals value set in C03.03.

Par. No.	Name	Range	Unit	Default
C03.11	Jog Speed	0.0~400.0	Hz	0.0

The jog speed is a fixed output speed at which the drive is running when the jog function is activated.

The drive with the highest priority will operate at jog speed when a variety of run command activates. Removing the jog signal makes the drive run according to the selected configuration, this parameter is set limited by C04.14.

Par. No.	Name	Range	Unit	Default
C03.13	Up/Down Value	0.01~50.00	Hz	0.10

Enter the Speed Up/Down value.

Par. No.	Name	Range	Unit	Default
C03.15	Reference Source 1	0~21	-	2
C03.16	Reference Source 2	See C03.15	-	0
C03.17	Reference Source 2	See C03.15	-	0

Select the reference input to be used for the first and second reference source.

0: No function;

1: Terminal VI, use analog input VI as reference source, see C06.1*;

2: Terminal AI, use analog input AI as reference source, see C06.2*;

8: Pulse input DI3, use pulse input DI3 as reference source, see C05.5*;

10: Preset reference [0] + Up/Down, use preset reference [0] and Up/Down, see C03.10[0] and C03.13;

11: Communication, use bus reference as reference source, see C08.**;

12: Process PID, use Process PID as reference source, see Process PID;

13: Preset reference, see C03.10;

21: LCP, use LCP Up/Down key or potentiometer as reference source, see C06.8*;

Par. No.	Name	Range	Unit	Default
C03.19	Up/Down Value Store	0: No function 1: Stop save 2: Power down save	-	0

This parameter is used for setting whether to save the data changed in the Speed Up/Down function if the drive stops or after it power down.

Par. No.	Name	Range	Unit	Default
C03.39	Ramp Time Scale	0: 0.1s 1: 0.01s	-	1

There are two kinds of ramp time scale for different applications.

After modifying the parameter, ramp time scale will be changed, the ramp time will be changed too.

Par. No.	Name	Range	Unit	Default
C03.40	Ramp 1 Type	0: Linear 2: S ramp	-	0
C03.41	Ramp 1 Ramp Up Time	0.05~655.35	s	*
C03.42	Ramp 1 Ramp Down Time	0.05~655.35	s	*
C03.50	Ramp 2 Type	0: Linear 2: S ramp		0
C03.51	Ramp 2 Ramp Up Time	0.05~655.35	s	*
C03.52	Ramp 2 Ramp Down Time	0.05~655.35	s	*
C03.60	Ramp 3 Type	0: Linear 2: S ramp		0
C03.61	Ramp 3 Ramp Up Time	0.05~655.35	s	*
C03.62	Ramp 3 Ramp Down Time	0.05~655.35	s	*
C03.70	Ramp 4 Type	0: Linear 2: S ramp		0
C03.71	Ramp 4 Ramp Up Time	0.05~655.35	s	*
C03.72	Ramp 4 Ramp Down Time	0.05~655.35	s	*
C03.80	Jog Ramp Time	0.05~655.35	s	*

C03.85	Ramp 5 Ramp Up Time	0.05~655.35	s	*
C03.86	Ramp 5 Ramp Down Time	0.05~655.35	s	*
C03.88	Ramp 6 Ramp Up Time	0.05~655.35	s	*
C03.89	Ramp 6 Ramp Down Time	0.05~655.35	s	*
C03.91	Ramp 7 Ramp Up Time	0.05~655.35	s	*
C03.92	Ramp 7 Ramp Down Time	0.05~655.35	s	*
C03.94	Ramp 8 Ramp Up Time	0.05~655.35	s	*
C03.95	Ramp 8 Ramp Down Time	0.05~655.35	s	*

Ramp Type:

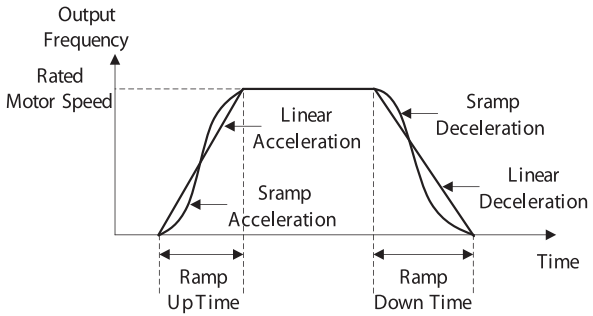
0: Linear, motor ramps up/down with constant acceleration/deceleration;

2: S ramp, motor ramps up/down with non-linear acceleration/deceleration;

Ramp Up Time is the time motor accelerates from 0Hz to rated motor frequency (C01.25).

Ramp Down Time is the time motor decelerates from rated motor frequency (C01.25) to 0Hz.

Diagram of Ramp Type, Ramp Up Time and Ramp Down Time are shown below:



Par. No.	Name	Range	Unit	Default
C03.96	Link preset reference and ramp time	0: No link 1: Link	-	0

If choose [1] link preset reference and ramp time, preset reference 0-7 are corresponding to ramp time 1-8. For example, choose preset reference 2 by using terminals control, the ramp time is 3rd.

Group 04: Limits/Warnings

Par. No.	Name	Range	Unit	Default
*C04.00	PM Current Control Algorithm	0: Control Algorithm 1 1: Control Algorithm 2	-	0

The control algorithm 1 is suitable for applications where Back-EMF and system inertial AMA cannot be performed. The control algorithm is more adaptable, but the control performance is weaker than the control algorithm 2.

The control algorithm 2 is suitable for Static complete AMA, Back-EMF and system inertial AMA. This control algorithm offer better control performance.

Par. No.	Name	Range	Unit	Default
*C04.01	PM Current Controller Feed Forward Gain	0~400	%	100

This parameter and C14.30 current controller 1 proportional coefficient and C14.31 current controller 1 integral time constitute the PM current controller, which is enabled when the output current is higher than the C04.18 current limit. By setting the feedforward gain, proportionality factor and integration time of the current controller, the dynamic response characteristics of the current controller can be adjusted.

Increasing the feed forward gain, the proportional coefficient, and reducing the integral time can speed up the dynamic response of the current controller. However, the feedforward gain, the proportional coefficient is too large, or the integral time is too small may destabilize the current control.

Par. No.	Name	Range	Unit	Default
*C04.10	Motor Speed Direction	0: Clockwise 1: Counter clockwise 2: Both directions	-	2

Select the motor speed direction(s) required. Use this parameter to prevent unwanted reversing.

0: Clockwise, the motor shaft rotates in clockwise direction, this setting prevents the motor from running in counter clockwise direction;

1: Counter clockwise, motor shaft rotates in counter clockwise direction, this setting

prevents the motor from running in clockwise direction;

2: Both directions, with this setting, the motor can run in both directions;

Par. No.	Name	Range	Unit	Default
*C04.12	Motor Speed Lower Limit	0.0~C04.14	Hz	25.0

Set the minimum limit for Motor Speed, the motor speed low limit can be set to correspond to the minimum output frequency of the motor shaft. The Motor Speed Low Limit must not exceed the setting in C04.14 Motor Speed High Limit.

Par. No.	Name	Range	Unit	Default
*C04.14	Motor Speed Upper Limit	C04.12~C04.19	Hz	65.0

Set the maximum limit for Motor Speed, the motor speed high limit can be set to correspond to the maximum manufacture's rated motor speed. The motor speed high limit must exceed the Motor Speed Low Limit in C04.12.

Par. No.	Name	Range	Unit	Default
C04.16	Torque Limit Motor Mode	0~1000	%	1000
C04.17	Torque Limit Generator Mode	0~1000	%	1000

These parameters limit the torque on the shaft to protect the mechanical installation. 100% equals motor rated torque set in C01.26. If the motor torque is bigger than C04.16/C04.17, the drive will report "A.12".

Par. No.	Name	Range	Unit	Default
C04.18	Current Limit	0~300	%	IM:200 PM:150

This parameter is used to set drive output current limit, 100% equals C01.24 rated motor current. If the output current exceeds the C04.18 motor current limit, the drive will report A.59 warning and current limit controllers (see C14.3*) start.

Par. No.	Name	Range	Unit	Default
*C04.19	Max. Output Frequency	0.0~400.0	Hz	65

Provides a final limit on the output frequency for improved safety in applications where you want to avoid accidental over-speeding. This limit is final in all configurations (independent of

the setting in C01.00 Configuration Mode).

Par. No.	Name	Range	Unit	Default
*C04.21	Frequency Upper Limit Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI3 10: Preset reference [0] 11: Communication 21: LCP potentiometer	-	1

In some occasions, it needs to set a dynamic frequency upper limit. For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the drive reaches the upper limit, it will continue to run at this speed.

0: No function, use C04.19 as frequency upper limit;

1: Terminal VI, use analog input VI as frequency upper limit, see C06.1*;

2: Terminal AI, use analog input AI as frequency upper limit, see C06.2*;

8: Pulse input DI3, use pulse input DI3 as frequency upper limit, see C05.5*;

11: Communication, use communication reference as frequency upper limit, see C08.**;

21: LCP, use LCP Up/Down key or potentiometer as frequency upper limit, see C06.8*;

Par. No.	Name	Range	Unit	Default
C04.23	Power Limit Motor Mode	0~400	%	400
C04.24	Power Limit Generator Mode	0~400	%	400

This group of parameters are used to set the output power limit to protect the system. 100% corresponds to C01.20 rated motor power(Rated Power of PM motor is depend on Rated Torque and Rated Speed). When the output power exceeds the value of C04.23 and C04.24, the drive will report A.104 warning. When set to the maximum value of 400, this warning detection is masked.

Par. No.	Name	Range	Unit	Default
C04.28	Low Voltage Overload Limit	5~100	%	100

When the grid voltage is low, the drive will limit output frequency for overload protection.

When C16.35 Drive Thermal factor is greater than C04.28 Low Voltage Overload Limit, the drive goes into the low voltage output frequency limit protection and reports "A.101"; When C16.35 is less than 1%, the drive quits from the protection and runs at the original frequency, the warning disappears.

When C04.28 is set to 100, the low voltage frequency limit protection is disabled; When setting to other values, it is turned on; The smaller the value is, the more likely the drive goes into the low voltage frequency limit protection.

Par. No.	Name	Range	Unit	Default
C04.29	Low Voltage Udc Limit	50~1000	V	220/380

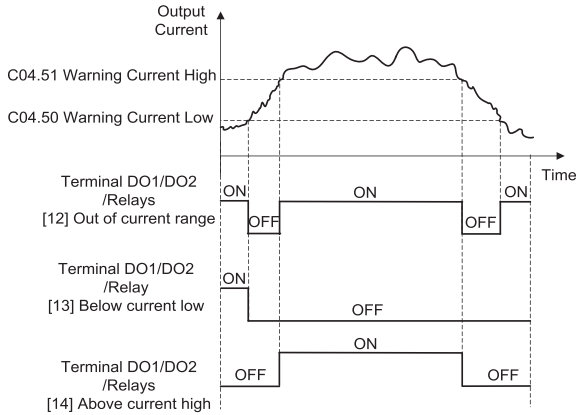
When entering the low-voltage protection limit frequency, the inverter maximum output frequency:

Fmax(C16.06) = Grid voltage/C04.29 * C01.23

Par. No.	Name	Range	Unit	Default
C04.50	Warning Current Low	0.00~C16.37	A	0.00
C04.51	Warning Current High	0.00~ C16.37	A	*

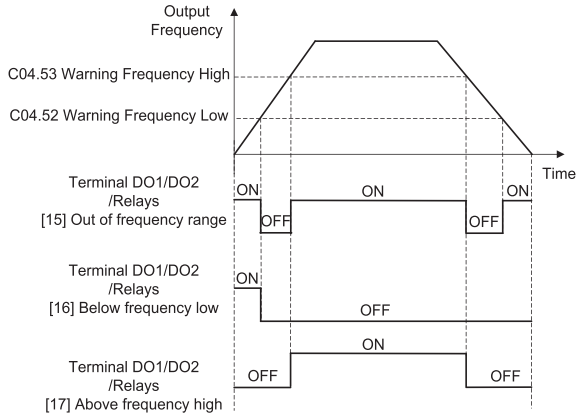
When the motor current falls below C04.50 or exceeds C04.51, a signal can be produced on relays or terminal DO1/DO2. See [12] Out of current range, [13] Below current low and [14] Above current high in C05.30/31/40.

Diagram of Warning Current Low and Warning Current High are shown below:



Par. No.	Name	Range	Unit	Default
C04.52	Warning Frequency Low	0.0~400.0	Hz	0.0
C04.53	Warning Frequency High	0.1~400.0	Hz	65.0

When the motor frequency falls below C04.52 or exceeds C04.53, a signal can be produced on relays or terminal DO1/DO2. See [15] Out of frequency range, [16] Below frequency low and [17] Above frequency high in C05.30/31/40.Diagram of Warning Frequency Low and Warning Frequency High are shown below:



Par. No.	Name	Range	Unit	Default
C04.54	Warning Reference Low	-200.00~200.00	%	0.00
C04.55	Warning Reference High	-200.00~200.00	%	100.00

When the actual reference falls below C04.54 or exceeds C04.55, a signal can be produced on relays or terminal DO1/DO2. 100% equals value set in C03.03.

See [40] Out of reference range, [41] Below reference low and [42] Above reference high in C05.30/31/40.

Par. No.	Name	Range	Unit	Default
C04.56	Warning Feedback Low	-200.00~200.00	%	0.00
C04.57	Warning Feedback High	-200.00~200.00	%	100.00

When the feedback falls below C04.56 or exceeds C04.57, a signal can be produced on relays or terminal DO1/DO2. 100% equals value set in C03.03.

See [18] Out of feedback range, [19] Below feedback low and [20] Above feedback high in C05.30/31/40.

Par. No.	Name	Range	Unit	Default
*C04.58	Missing Motor Phase Function	0: Disable 1: Enable	-	1

Displays an alarm in the event of a missing motor phase (E.30, E.31 or E.32). Select disabled for no missing motor phase alarm. It is strongly recommended to make an active setting to avoid motor damage.

Par. No.	Name	Range	Unit	Default
*C04.59	Current/Torque Limit Warning Selection	0: Disable 1: Enable	-	1

This parameter is used to control whether the drive reports A.12/A.59 warning or not when the motor torque exceeds C04.16/C04.17, the output current exceeds C04.18.

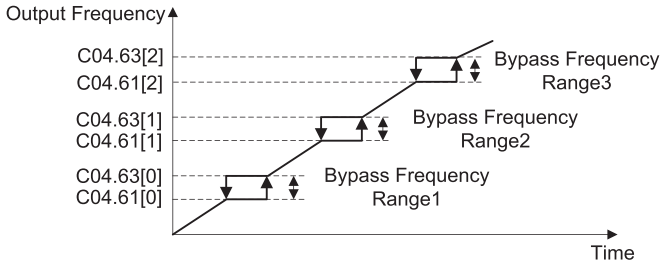
Note: Even if you select disable warning, C14.3* current limit controller still works.

Par. No.	Name	Range	Unit	Default
C04.61	Bypass Speed From	0.0~400.0	Hz	0.0
C04.63	Bypass Speed to	0.0~400.0	Hz	0.0

Some systems call for avoiding certain output frequencies, due to resonance problems in the system. A maximum of three frequency ranges can be avoided. The drive will pass quickly when it approaching to the Bypass Speed area.

These parameters are dyadic array, [0] is used to set the bypass speed range 1, [1] is used to set the bypass speed range 2, and [2] is used to set the bypass speed range 3.

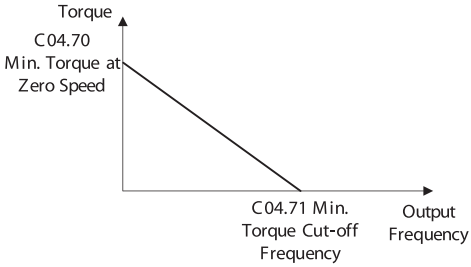
Diagram of bypass speed ranges are shown below:



Par. No.	Name	Range	Unit	Default
C04.70	Minimum Torque at Zero Speed	0~100	%	5
C04.71	Minimum Torque Cut-off Frequency	0.1~50.0	Hz	3.0

In torque control mode, the device may not start if the torque reference is too small due to the presence of static friction. So it needs a minimum torque reference at low speed.

The following figure is a graph showing the minimum torque at zero speed and minimum torque cut-off frequency. When the output frequency is less than the minimum torque cutoff frequency, if the torque reference is greater than the corresponding value in curve, then use torque reference; If the torque reference is less than the corresponding value in curve, then use curve corresponding value;



Par. No.	Name	Range	Unit	Default
C04.72	Torque open loop stop mode	0: Torque mode 1: Speed mode	-	0

This parameter is used to set the stop mode in torque open loop configuration mode:

0: Torque mode. When the stop signal is activated, the drive torque is reduced to zero according to the ramp down time.

1: Speed mode. When the stop signal is activated, the drive speed is reduced to zero according to the ramp down time.

Group 05: Digital In/Out

Par. No.	Name	Range	Unit	Default
C05.04	DI Filter Time	2~32	ms	16

It is used to set the software filter time of DI terminal status. If DI terminals are liable to interference and may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increase of DI filter time will reduce the response of DI terminals.

Par. No.	Name	Range	Unit	Default
C05.05	DI Terminal Logic Selection	0~255	-	0

This parameter is used to control the digital input terminal positive or negative logic. Each digital input terminal corresponds to a weight. For example: if you want to set FOR and DI2 terminal as negative logic, set the C05.05 to

1 + 8 = 9

Terminal	DI4	DI3	DI2	DI1	REV	FOR
Weight	32	16	8	4	2	1

When the digital input selects positive logic, connecting the digital input terminal and GND terminal is ON state (active), disconnecting is OFF state (inactive);

When the digital input selects negative logic, connecting the digital input terminal and GND terminal is OFF state (inactive), disconnecting is ON state (active);

Note: There are some digital input function is inverse. If the terminal logic is set as negative and the function of the terminal is inverse, then the function of the terminal is positive. For example: When C05.10 Terminal FOR is set to [6] Stop inverse, C05.05 is set to 1 (The logic of terminal FOR is negative), then connect the terminal FOR and GND, function "stop" is active, disconnect the terminal FOR and GND, function "stop" is inactive.

Par. No.	Name	Range	Unit	Default
C05.06	DO/Relay terminal logic selection	0~255	-	0

This parameter is used to control the DO/Relay terminal positive or negative logic. Each DO/

Relay terminal corresponds to weight. For example: If you want to set DO1 and Relay1 terminal as negative logic, set the C05.06 to 1 + 4 = 5

Terminal	Relay2	Relay1	DO2	DO1
Weight	8	4	2	1

Positive logic: When the selected function of DO/Relay terminals is activated, the DO/Relay terminal outputs ON signal, else outputs OFF signal.

Negative logic: When the selected function of DO/Relay terminals is activated, the DO/Relay terminal outputs OFF signal, else outputs ON signal.

Par. No.	Name	Range	Unit	Default
C05.09	Function at External Alarm	0: Off 2: Stop and warning 3: Jogging and warning 4: Max. speed and warning 5: Stop and trip	-	0

The function activates when the digital input terminal function [43] external alarm input is active.

0: Off, resumes control via serial bus using the most recent control word;

2: Stop and warning, drive stops and reports "A.102";

3: Jogging and warning, overruled to jog speed and reports "A.102";

4: Max. speed, overruled to max. speed and reports "A.102";

5: Stop and trip, overruled to stop with subsequent trip ("E.102").

Par. No.	Name	Range	Unit	Default
C05.10	Terminal FOR	0~175	-	8
C05.11	Terminal REV		-	11
C05.12	Terminal DI1		-	15
C05.13	Terminal DI2		-	16
C05.14	Terminal DI3		-	17
C05.15	Terminal DI4		-	18

The digital inputs are used for selecting various functions in the drive. All digital inputs can be set to the following functions:

0: No operation, no reaction to signals transmitted to the terminal;

1: Reset, reset the drive after a Trip/Alarm;

2: Coast inverse, no output, leaving the motor coasting to stop. Terminal logic '0' => coasting stop;

3: Coast and reset inverse, the drive resets leaving the motor coasting to stop. Terminal logic '0' => coasting stop;

6: Stop inverse, the drive is stopped according to selected ramp time. Terminal logic '0' => stop;

8: Start, select start for a start/stop command. Terminal logic '1' = start, logic '0' = stop;

9: Latched start, the motor starts, if a pulse is applied for min. 4ms. The motor stops when [6] Stop inverse/[46] Stop is activated;

10: Reversing, change direction of motor shaft rotation, reversing signal only changes direction of rotation, it does not activate start function, C04.10 must choose [2] Both directions;

11: Start reversing, used for start/stop and for reversing at the same time;

12: Enable start forward only, disengages the counterclockwise movement and allows for the clockwise direction;

13: Enable start reverse only, disengages the clockwise movement and allows for the counterclockwise direction;

14: Jog, used for activating jog speed, see C03.11;

15: Preset ref. bit0, Preset ref. bit0, bit1, bit2, bit3 enables a choice between one of the sixteen preset references (see C03.10) according to the table below;

16: Preset ref. bit1, same as [15];

17: Preset ref. bit2, same as [15];

18: Preset ref. bit3, same as [15];

Terminal of Preset ref. bit3	Terminal of Preset ref. bit2	Terminal of Preset ref. bit1	Preset ref. bit0	Parameter
OFF	OFF	OFF	OFF	C03.10[0]

OFF	OFF	OFF	ON	C03.10[1]
OFF	OFF	ON	OFF	C03.10[2]
OFF	OFF	ON	ON	C03.10[3]
OFF	ON	OFF	OFF	C03.10[4]
OFF	ON	OFF	ON	C03.10[5]
OFF	ON	ON	OFF	C03.10[6]
OFF	ON	ON	ON	C03.10[7]
ON	OFF	OFF	OFF	C03.10[8]
ON	OFF	OFF	ON	C03.10[9]
ON	OFF	ON	OFF	C03.10[10]
ON	OFF	ON	ON	C03.10[11]
ON	ON	OFF	OFF	C03.10[12]
ON	ON	OFF	ON	C03.10[13]
ON	ON	ON	OFF	C03.10[14]
ON	ON	ON	ON	C03.10[15]

19: Freeze reference, freezes the actual reference, if freezing reference is active, stop the drive via a terminal programmed for [2] Coast inverse, [3] Coast and reset inverse, [42] Coast and [46] Stop;

20: Freeze output, freezes the output frequency, if freezing output is active, stop the drive via a terminal programmed for [2] Coast inverse, [3] Coast and reset inverse, [42] Coast and [46] Stop;

21: Up, when speed up is activated for less than 400 ms. the resulting reference will be increased by C03.13 Up/Down Value. If Speed up is activated for more than 400 ms, the resulting reference will ramp according to ramp 4;

22: Down, similar to [21] Speed up;

24: reference source switchoverr;

This function is used C03.07 Reference Source Selection option [3]-[5].

32: Pulse input, select pulse input when using a pulse sequence as either reference or feedback. Scaling is done in par. group C05.5*, the function is available for C05.15 Terminal DI4 only;

34: Ramp bit0, ramp bit0, bit1 are used for selecting one of the four ramps;

35: Ramp bit1, same as [34];

Terminal of Ramp bit1	Terminal of Ramp bit0	Parameters
OFF	OFF	Ramp1 (C03.41, C03.42)
OFF	ON	Ramp2 (C03.51, C03.52)
ON	OFF	Ramp3 (C03.61, C03.62)
ON	ON	Ramp4 (C03.71, C03.72)

37: Latched Reversing, motor starts counter-clockwise if a pulse is applied for min. 4ms. The motor stops when [6] Stop inverse/[46] Stop is activated;

38 Jog reversing.

42: Coast, similar to [2] coast reverse, but logic contrary: Terminal logic '1' => coasting stop;

43: External alarm input, when terminal is in ON state, the drive will run as C05.09 specified.

46: Stop, similar to [6] stop reverse, but logic contrary: Terminal logic '1' => stop;

50: Speed control/torque control switchover;

When C01.00 Configuration Mode is set to [4] Torque open loop, torque open loop and speed open loop can be switched via digital input terminal. The terminal is in the OFF state, it is torque open loop; The terminal is in the ON state, it is speed open loop;

60: Counter A

62: Reset counter A, to clear counter A to "0";

63: Counter B, to count the pulse number inputted into the terminal;

65: Reset counter B, to clear counter B to "0";

70: DO1 control, This function will work when DO1 is set to 39;

71: DO2 control, This function will work when DO2 is set to 39;

74: Realy 1 control, This function will work when Relay 1 is set to 39;

75: Realy 2 control, This function will work when Relay 2 is set to 39;

76: Realy 3 control, This function will work when Relay 3 is set to 39;

110: Process PID pause, the Process PID is temporarily stopped and the drive maintains the

current output frequency.

160: Compressor run;

161: Oil filter clogging, when terminal is in ON state, system will warning A.166;

162: Oil separator clogging, when terminal is in ON state, system will warning A.167;

163: Air filter clogging, when terminal is in ON state, system will warning A.168;

164: Load valve control, when terminal is in ON state, system will control the valve;

165: External fan overload, when terminal is in ON state, system will alarm E.173;

166: PTC fault, when terminal is in OFF state, system will warning A.162 or alarm E.162; The action depends on the parameters C28.70;

167: Emergency stop, when terminal is in OFF state, system will in stop mode;

168: External fault, when terminal is in ON state, system will alarm E.174;

169: Phase fault, when terminal is in ON state, system will alarm E.175;

170: External dormancy signal, when terminal is in ON state, system will enter dormancy state.

171: Oil pump running detection

172: Cooling fan control, this function will work when C01.07=0;

173: Pluse stop. Stopping compressor with pluse command;

174: Pluse start. Starting compressor with pluse command;

Par. No.	Name	Range	Unit	Default
C05.30	Terminal DO1	0~91	-	0

Set the Terminal DO1 output function.

Terminal DO1 is a programmable multiplex terminal, it can be a high-speed pulse output terminal, also available as a collector's digital output terminal. If C05.60 = 0, DO1 is as a collector's digital output terminal; If C05.60 is not set to 0, DO1 is as a high-speed pulse output terminal.

If terminal DO1 is as collector's digital output terminals, their output function options are the same as C05.40 relay output.

Par. No.	Name	Range	Unit	Default
C05.40[0]	Relay 1 Function	0~120	-	5
C05.40[1]	Relay 2 Function	0~120	-	9

This parameter is a array parameter.

Index	Model	Power	Terminal
[0]	All	All	FA-FB-FC
[1]	SK190	All	KA-KB
	SK200	7.5~15kw	F-N
		18.5~90kw	KA-KB
	SK300	All	F-N
[2]	SK190	All	-
	SK200	7.5~15kw	D-N
		18.5~90kw	-
	SK300	All	D-N

0: No operation;

1: Drive ready, the drive control card has received supply voltage;

3: Remote control ready, the drive is ready for operation and is in AUTO mode;

4: Drive running/No warning, the drive is running and no warning is present;

5: Drive running, the drive is running;

7: Run in range/No warning, the drive is running within the programmed speed ranges set in C04.12 Motor Speed Low Limit and C04.14 Motor Speed High Limit. No warnings are present;

8: Run on reference/No warning, the drive runs at reference speed without warnings;

9: Alarm, the drive alarms;

10: Alarm or warning, an alarm or warning occurs;

12: Out of current range, output current is outside the range set in C04.50 and C04.51;

13: Below current low, output current is lower than set in C04.50;

14: Above current high, output current is higher than set in C04.51;

15: Out of frequency range, output frequency is outside the range set in C04.52 and C04.53;

16: Below frequency low, output frequency is lower than set in C04.52;

17: Above frequency high, output frequency is higher than set in C04.53;

18: Out of feedback range, feedback is outside the range set in C04.56 and C04.57;

19: Below feedback low, feedback is lower than set in C04.56;

20: Above feedback high, feedback is higher than set in C04.57;

21: Thermal warning, a thermal warning occurs;

22: Ready, no thermal warning, the drive is ready for operation and no over-temperature warning is present;

23: Remote ready, no thermal warning, the drive is ready for operation in AUTO mode, and no over-temperature warning is present;

24: Ready, voltage OK, the drive is ready for operation, no over-voltage or under-voltage is present;

25: Reverse, the drive runs in counter clockwise;

26: Bus OK, local bus communication is normal;

32: Mech. brake control, enter mechanical brake control signal, see C02.2*;

36: Control word bit 11, bit 11 in control word is active;

37: Control word bit 12, bit 12 in control word is active;

38: Communication control, When the corresponding bit of the register 51003 is valid, an ON signal is output;

39: DI control

40: Out of reference range, reference is outside the range set in C04.54 and C04.55;

41: Below reference low, reference is lower than set in C04.54;

42: Above reference high, reference is higher than set in C04.55;

43: External alarm, the digital input terminal function [43] external alarm input is active;

44: Unbalance warning, unbalance occurs, see C04.8*;

51: Drive in HAND state;

52: Drive in AUTO state;

53: No alarm;

56: Drive in HAND state;

57: Drive in AUTO state;

160: Load valve control;

161: Cooling fan control;

162: Cooling fan overload signal;

168: Drain valve;

171: Oil pump control.

172: Alarm or Maintenance Timeout

173: Dryer control

Par. No.	Name	Range	Unit	Default
C05.41	Relay On Delay Time	0.00~600.00	s	0.00
C05.42	Relay Off Delay Time	0.00~600.00	s	0.00

These parameters 2-array parameters which are used to set the relay output turn-on and turn-off delay time. Array [0] is corresponding to the relay 1; array [1] is corresponding to the relay 2.

For example:

When the relay 1 function is activated, it delays C05.41[0] time, then outputs ON.

When the relay 1 function is not activated, it delays C05.42[0] time, then outputs OFF.

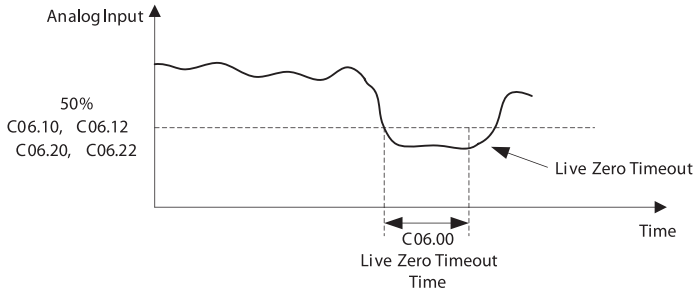
Group 06: Analog In/Out

Par. No.	Name	Range	Unit	Default
C06.00	Live Zero Timeout Time	1~99	s	10

Live Zero Time-out Function is used for analog input signal detection. To active the Live Zero Timeout Function, if voltage input is selected, then the low input voltage (C06.10, C06.20) settings must be greater than 1V; if current input is selected, the low input current (C06.12, C06.22) settings must be greater than 2mA or more. If the analog input signal is lower than 50% of the settings of parameters of C06.10, C06.12, C06.20, C06.22, and lasts longer than the settings of C06.00 Live Zero Timeout Time, this feature takes effect.

If the analog input signal is back to normal within the delay time, then reset the timer.

Diagram of Live Zero Timeout Function is shown below:



Par. No.	Name	Range	Unit	Default
C06.01	Live Zero Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip	-	0

Select the live zero time-out function.

0: Off;

1: Freeze output, frozen at the present value;

2: Stop, overruled to stop;

3: Jogging, overruled to jog speed;

4: Max. speed, overruled to Max.speed;

5: Stop and trip, overruled to stop with subsequent trip.

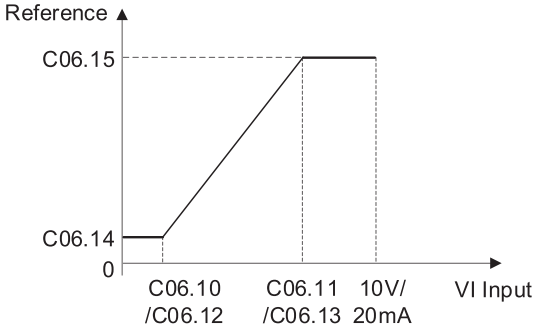
Par. No.	Name	Range	Unit	Default
C06.10	Terminal VI Low Voltage	0.00~C06.11	V	0.07
C06.11	Terminal VI High Voltage	C06.10~10.00	V	10.00
C06.12	Terminal VI Low Current	0.00~C06.13	mA	0.14
C06.13	Terminal VI High Current	C06.12~20.00	mA	20.00
C06.14	Terminal VI Low Reference Value	-200.00~200.00	%	0.00
C06.15	Terminal VI High Reference Value	-200.00~200.00	%	100.00

C06.10 is used to set low voltage input; C06.12 is used to set low current input; The low voltage and current analog input scaling value corresponds to the low reference. value, set in C06.14.

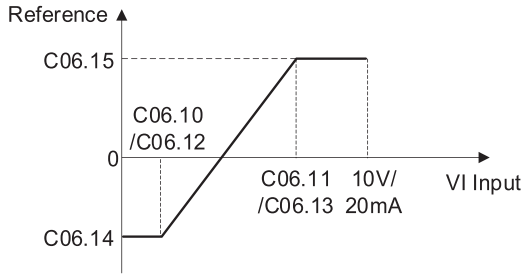
C06.11 is used to set high voltage input; C06.12 is used to set high current input; The high voltage and current analog input scaling value corresponds to the high reference value, set in C06.15.

For C06.14 and C06.15, 0% equals 0, 100% equals value set in C03.03.

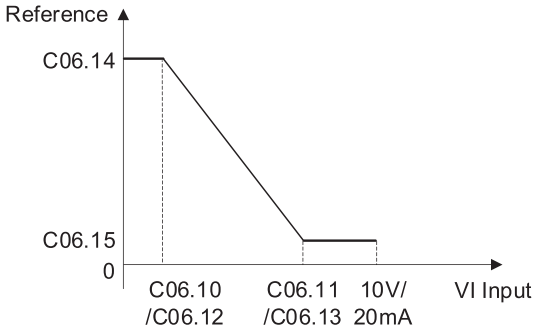
There are 4 kinds of curves between terminal VI input voltage/current and its scale value:



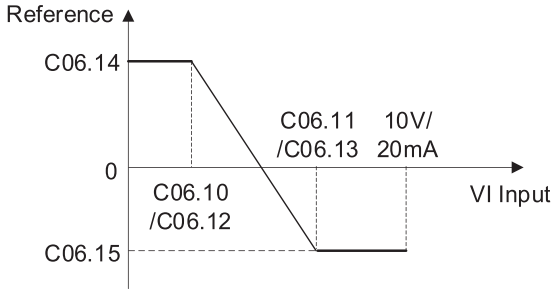
C06.14 < C06.15 and C06.14 >= 0



C06.14 < C06.15 and C06.14 < 0



C06.14 > C06.15 and C06.15 >= 0



C06.14 > C06.15 and C06.15 < 0

Terminal VI reference/feedback value calculated as follows:

If C06.10 <= VI Input <= C06.11,

VI Reference Value = ((C06.15 - C06.14) ÷ (C06.11 - C06.10) × (VI input - C06.10) + C06.14) × C03.03;

If VI Input < C06.10, VI Reference Value = C06.14 × C03.03;

If VI Input > C06.11, VI Reference Value = C06.15 × C03.03;

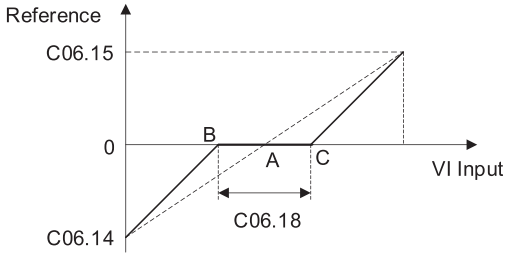
Note: Above formulas are for voltage input. If it is a current input, C06.10 and C06.11 use C06.12 and C06.13 instead respectively.

Par. No.	Name	Range	Unit	Default
C06.16	Terminal VI Filter Time	0.001~10.000	s	0.010

Enter the terminal VI filter time. This is a first-order digital low pass filter for suppressing electrical noise in terminal VI. A high time constant value improves dampening but also increases the time delay through the filter.

Par. No.	Name	Range	Unit	Default
C06.18	Terminal VI Zero Dead Band	0.0~20.00	V/mA	0.00

Set the dead-band of VI at 0 speed. When analog input VI ref. low and ref. high have opposite signs, there must be a set point that corresponding to an analogue value equals 0. In order to prevent the set point jitter at zero point due to analog interference, this parameter should be set properly.



Point A as shown in the figure is the analog value that corresponds to a setpoint that equals 0. It is calculated via analog low, high values and low, high reference values. After set terminal VI zero dead band, UAB=UAC=C06.18/2. If the VI input is between B and C, the VI reference is 0.

Par. No.	Name	Range	Unit	Default
C06.19	Terminal VI Mode	0: Voltage mode 1: Current mode	-	1

Select the input to be present on analog input VI.

Par. No.	Name	Range	Unit	Default
C06.20	Terminal AI Low Voltage	0.00~C06.21	V	0.07
C06.21	Terminal AI High Voltage	C06.20~10.00	V	10.00
C06.22	Terminal AI Low Current	0.00~C06.23	mA	0.14
C06.23	Terminal AI High Current	C06.22~20.00	mA	20.00
C06.24	Terminal AI Low Reference Value	-200.00~200.00	%	0.00
C06.25	Terminal AI High Reference Value	-200.00~200.00	%	100.00
C06.26	Terminal AI Filter Time	0.001~10.000	s	0.010
C06.28	Terminal AI Zero Dead Band	0.0~20.00	V/mA	0.00
C06.29	Terminal AI Mode	0: Voltage mode 1: Current mode	-	1

The usage of terminal AI is similar to terminal VI, please refer to C06.1* Analog Input VI.

Par. No.	Name	Range	Unit	Default
C06.70	Terminal VO Mode	0: 0-20mA 1: 4-20mA 3: 0-10V	-	3

Select output to be present on analog output VO.

Par. No.	Name	Range	Unit	Default
C06.71	Terminal VO Analog Output	0~80	-	0

Select choices of the analog output VO

Option	Function	Scale
0	No function	
10	Output frequency	In torque open loop: 0% = 0Hz, 100% = C04.19 In speed open loop mode: 0% = 0Hz, 100% = C03.03

11	Reference	If C03.00 = 0,
		then 0% = 0, 100% = C03.03;
		If C03.00 = 1,
		then 0% = -C03.03, 100% = C03.03;

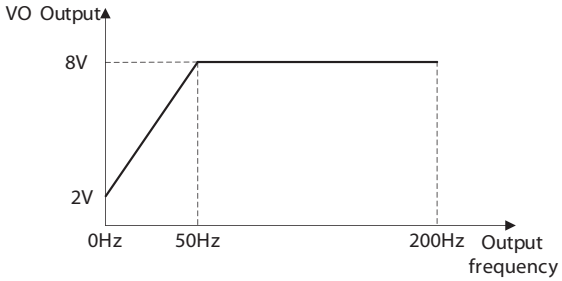
12	Feedback	
13	Output current	0% = 0, 100% = C16.37
16	Power	0% = 0, 100% = C01.20
17	Speed	0% = 0, 100% = C01.25
18	Motor voltage	0% = 0, 100% = C01.22
20	Bus control	
21	Pulse input	0% = C05.55, 100% = C05.56
22	Terminal VI input	0% = C06.10/C06.12, 100% = C06.11/C06.13
23	Terminal AI input	0% = C06.20/C06.22, 100% = C06.21/C06.23
26	DC link voltage	0% = 0V, 100% = 1000V
30	Output torque	0% = 0N•m, 100% = C01.26
38	Communcation Control	Write register 51004 to control VO output. 0.00% corresponds to C06.75, 100.00% corresponds to C06.76.
80	Cooling Fan PID result	This parameter is valid only for SK190. The cooling fan will run according to the PID result

Par. No.	Name	Range	Unit	Default
C06.73	Terminal VO Output Min. Scale	0.00~200.00	%	0.00
C06.74	Terminal VO Output Max. Scale	0.00~200.00	%	100.00
C06.75	Terminal VO Min. Output	0.00~C06.76	mA	0.00 /4.00
C06.76	Terminal VO Max. Output	C06.75~10.00/20.00	mA	10.00 /20.00

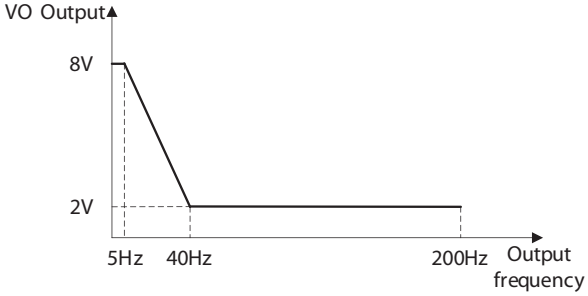
Scale minmum/maximum output of selected ananlog signal at terminal VO as percentage of

minmum/maximum signal value.

For example: In speed open loop mode, set C03.03 = 50.0, C06.70 = 3 (0~10V), C06.70 = 10 (Output frequency 0% = 0.0Hz, 100% = 50.0Hz), C06.73 = 0.00% (0.0Hz), C06.74 =100.00% (50.0Hz), C06.75 = 2V, C06.76 = 8V, the relationship between the output frequency and VO output is shown below:



If C06.73 = 80.00% (40Hz), C06.74 = 10.00% (5Hz), then the relationship between the output frequency and VO output is shown below:



Par. No.	Name	Range	Unit	Default
C06.81	LCP Min. Ref.	-200.00~200.00	%	0.00
C06.82	LCP Max. Ref.	-200.00~200.00	%	100.00

These parameters are used to set the minimum/maximum reference of LCP Up/Down key or potentiometer.

Par. No.	Name	Range	Unit	Default
C06.90	Terminal AO Mode	0: 0-20mA 1: 4-20mA	-	0
C06.91	Terminal AO Analog Output	0~23	-	0
C06.93	Terminal AO Output Min. Scale	0.00~200.00	%	0.00
C06.94	Terminal AO Output Max. Scale	0.00~200.00	%	100.00
C06.95	Terminal AO Min. Output	0.00~C06.96	mA	0.00
C06.96	Terminal AO Max. Output	C06.95~20.00	mA	10.00

The usage of terminal AO is similar to terminal VO, please refer to C06.7* Analog Output VO.

Group 07: Controllers

Par. No.	Name	Range	Unit	Default
C07.02	Speed PID Proportional Gain	0.000~1.000	-	0.010
C07.03	Speed PID Integral Time	2.0~2000.0	ms	8.0
C07.04	Speed PID Differentiation Time	0.0~200.0	s	30.0

Speed closed loop PID parameters.

Par. No.	Name	Range	Unit	Default
C07.05	Speed PID Diff. Gain Limit	1.000~20.000	s	5.000

Set a limit for the gain provided by the differentiator.

Par. No.	Name	Range	Unit	Default
C07.06	Speed PID Lowpass Filter Time	1.0~100.0	s	10.0

Severe filtering can be detrimental to dynamic performance. Set a time constant for the speed control lowpass filter.

Par. No.	Name	Range	Unit	Default
C07.12	Torque PI Proportional Gain	0~500	%	100

Enter the proportional gain value for the torque controller. Selection of a high value makes the controller react faster. Too high a setting leads to control instability.

Par. No.	Name	Range	Unit	Default
C07.13	Torque PI Integration Time	0.002~2.000	s	0.020

Enter the integration time for the torque controller. Selection of a low value makes the controller react faster. Too low a setting leads to control instability.

Par. No.	Name	Range	Unit	Default
C07.20	Process PID Feedback Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI3 11: Communication	-	0

Select source of feedback signal.

Par. No.	Name	Range	Unit	Default
C07.21	Process PID Reference Source	0: No function 1: Terminal VI 2: Terminal AI 8: Pulse input DI3 10: Preset reference [0] 11: Communication 13: Preset reference 21: LCP	-	0

Select process PID reference source.

0: No function;

1: Terminal VI, use analog input VI as reference source, see C06.1*;

2: Terminal AI, use analog input AI as reference source, see C06.2*;

8: Pulse input DI3, use pulse input DI3 as reference source, see C05.5*;

10: Preset reference [0] + Up/Down, use preset reference [0] and Up/Down, see C03.10[0] and C03.13;

11: Communication, use bus reference as reference source, see C08.**;

13: Preset reference, see C03.10;

21: LCP, use LCP Up/Down key or potentiometer as reference source, see C06.8*;

Par. No.	Name	Range	Unit	Default
C07.30	Process PID Normal/ Inverse	0: Normal 1: Inverse	-	0

Normal and inverse control are implemented by introducing a difference between the reference signal and the feedback signal.

0: Normal, the drive is to reduce/increase the output frequency if the feedback signal is larger/lower than reference;

1: Inverse, the drive is to reduce/increase the output frequency if the feedback signal is lower/larger than reference;

Par. No.	Name	Range	Unit	Default
C07.31	Process PID Anti Windup	0: Disable 1: Enable	-	0

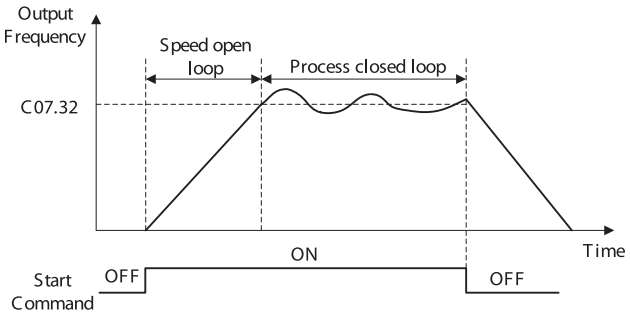
This function ensures the output frequency reaches to frequency limit. PID-controller will be initialized to the current frequency when the output frequency can not be changed. This can prevent the integrator continue to integrate on an error when the PID-controller can't adjust output frequency.

0: Disable, continue regulation of a given error even when the output frequency can't be increased/decreased;

1: Enable, ceases regulation of a given error when the output frequency can't be increased/decreased;

Par. No.	Name	Range	Unit	Default
C07.32	Process PID Start	0.0~200.0	Hz	0.0

Enter the motor speed to be attained as a start signal for commencement of PID control. When the power is switched on, the drive will commence ramping and then operate under speed open loop control. Thereafter, when the Process PID Start Speed is reached, the drive will change over to Process PID Control.



Par. No.	Name	Range	Unit	Default
C07.33	Process PID Proportional Gain	0.00~10.00	-	10.00

Enter the PID proportional gain. The proportional gain multiplies the error between the set point and the feedback signal.

Attention: This function is disabled when it is set to "0".

Par. No.	Name	Range	Unit	Default
C07.34	Process PID Integral Time	0.01~655.35	s	12.00

Enter the PID integral time. The integrator provides an increasing gain at a constant error between the set point and the feedback signal. The integral time is the time needed by the integrator to reach the same gain as the proportional gain.

Par. No.	Name	Range	Unit	Default
C07.35	Process PID Differential Time	0.00~10.00	s	0.00

Enter the PID differential time. The differentiator does not react to a constant error, but provides a gain only when the error changes. The shorter the PID differentiation time, the stronger the gain from the differentiator.

Par. No.	Name	Range	Unit	Default
C07.36	Process PID Differential Limit	1.0~50.0	s	5.0

Enter a limit for the differentiator gain. If there is no limit, the differential increases when there are fast changes.

Par. No.	Name	Range	Unit	Default
C07.39	Process PID Deviation Limit	0.0~200.0	%	0.0

When the process PID deviation (the difference between the reference and the feedback) is less than the set value of this parameter, the process PID control stops.

Par. No.	Name	Range	Unit	Default
C07.41	Process PID Output Lower Limit	-100.00~100.00	%	0.00
C07.42	Process PID Output Upper Limit	-100.00~100.00	%	100.00

These parameters are used to set process PID controller output lower/upper limit, 100% corresponds to C04.19.

Par. No.	Name	Range	Unit	Default
C07.49	Process PID Parameter Switchover Deviation	0.0~200.0	%	200.0

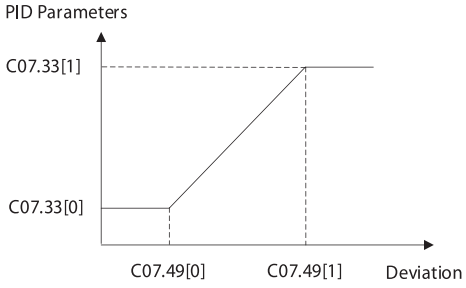
In some applications, one group of PID parameters cannot satisfy the requirement of the whole running process. PID parameters switchover is required.

This parameter is a 2-array parameter. Two sets of process PID parameters will be automatically switched according to the setting of this parameter. 100% corresponds to the maximum setting of C03.03.

When the absolute value of the deviation between the PID reference and feedback is less than C07.49[0], the first set (C07.33~07.35[0]) of PID parameters is used

When the absolute value of the deviation between the PID reference and feedback is greater than C07.49[1], the second set of PID parameters (C07.33~07.35[1]) is used;

When the absolute value of the deviation between the PID reference and feedback is between C07.49[0] and C07.49[1], the linear interpolation value of the two sets of PID parameters is used;



Par. No.	Name	Range	Unit	Default
C07.50	Process PID Integral Lower Limit	-100.00~100.00	%	0.00
C07.51	Process PID Integral Upper Limit	-100.00~100.00	%	100.00

This group of parameters are used to set the process PID controller integral upper and lower limits.

Par. No.	Name	Range	Unit	Default
C07.55	Process PID Deviation Control Mode	0: Mode 0 1: Mode 1 2: Mode 2	-	0

0: Mode 0

The absolute value of the deviation >= C07.39, PID is enabled;

The absolute value of the deviation < C07.39, PID is disabled, PID output freezes;

1: Mode 1

The absolute value of the deviation >= C07.39, PID is enabled. If deviation > 0, use deviation + C07.39 as deviation to do PID calculation; If deviation < 0, use deviation - C07.39 as deviation to do PID calculation;

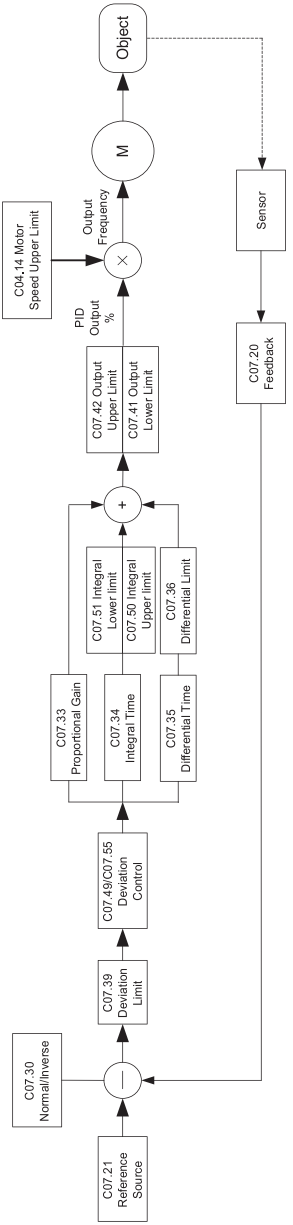
The absolute value of the deviation < C07.39, PID is enabled too;

2: Mode 2

The absolute value of the deviation >= C07.39, PD is enabled, I part does not calculate.

The absolute value of the deviation < C07.39, PID is enabled too;

The process PID control block diagram is as follows:


Object
M
Output Frequency
C04.14 Motor Speed Upper Limit
PID Output %
C07.42 Output Upper Limit
C07.41 Output Lower Limit
+
C07.51 Integral Lower limit
C07.50 Integral Upper limit
C07.36 Differential Limit
C07.33 Proportional Gain
C07.34 Integral Time
C07.35 Differential Time
C07.49/C07.55 Deviation Control
C07.39 Deviation Limit
C07.30 Normal/Inverse
C07.21 Reference Source
Sensor
C07.20 Feedback

Group 08: Communication

Par. No.	Name	Range	Unit	Default
C08.01	Control Site	0: Digital and Communication 1: Digital only 2: Communication only	-	0

The drive start, stop, reverse, jog commands can be given both through digital input terminals and communication, this parameter is used to set the drive control command site.

0: Digital and Communication, controlled by using both digital input and Communication;

1: Digital only, controlled by using digital inputs only;

2: Communication only, controlled by using communication only;

Par. No.	Name	Range	Unit	Default
C08.03	Communication Timeout Time	0.00~650.00	s	10.00

Enter the maximum time expected to pass between the reception of two consecutive telegrams. If this time is exceeded, it indicates that the serial communication has stopped. The function selected in C08.04 Communication Timeout Function will then be carried out. The time-out counter is triggered by a valid communication.

Par. No.	Name	Range	Unit	Default
C08.04	Communication Timeout Function	0: Off 1: Freeze output 2: Stop 3: Jogging 4: Max. speed 5: Stop and trip	-	2

The communication time-out function activates when the communication fails to be updated within the time period specified in C08.03 Communication Timeout Time.

0: Off, resumes control via serial bus using the most recent control word;

1: Freeze output, frozen at the present value;

2: Stop, overruled to stop;

3: Jogging, overruled to jog speed;

4: Max. speed, overruled to max. speed;

5: Stop and trip, overruled to stop with subsequent trip (“E.17”).

Par. No.	Name	Range	Unit	Default
C08.06	Reset Communication Timeout	0: Do not reset 1: Do reset	-	0
C08.08	Control Word Timeout Mode	[0] Control Word [1] Reserved	-	0

Resetting communication timeout will remove any timeout function. After communication timeout occurs, a communication interrupt flag will be within the drive. It must be use the parameter to clear the flag (Do reset), else even to restore communication or clear "E.17" alarm, the drive will continue to report communication timeout.

0: Do not reset, communication timeout is not reset;

1: Do reset, communication timeout is reset;

Par. No.	Name	Range	Unit	Default
C08.29	Warning/Alarm Type	0: bit 1: Code	-	0

See detail in communication chapter.

Par. No.	Name	Range	Unit	Default
C08.30	Protocol	0: FC 2: Modbus RTU		0

Select the protocol to be used.

Par. No.	Name	Range	Unit	Default
C08.31	Address	0~247	-	1

Select the address for the bus. FC-bus range is 1-126, and Modbus range is 1-247.

Par. No.	Name	Range	Unit	Default
C08.32	Baud Rate	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 76800 7: 115200 8~9: Reserved	bits/s	2

Select baud rate for communication.

Par. No.	Name	Range	Unit	Default
C08.33	Parity/Stop Bits	0: Even parity (1 stop bit) 1: Odd parity (1 stop bit) 2: No parity (1 stop bit) 3: No parity (2 stop bit)	-	2

This parameter only effective for Modbus and FC bus always has even parity.

Par. No.	Name	Range	Unit	Default
C08.35	Min. Response Delay	0.000~0.500	s	0.002

Specify the minimum delay time between receiving a request and transmitting a response. This is used for overcoming modem turnaround delays.

Par. No.	Name	Range	Unit	Default
C08.36	Max. Response Delay	0.010~10.000	s	5.000

Specify the maximum permissible delay time between transmitting a request and receiving a response. If exceeds this delay time, the drive will not respond to received data.

Par. No.	Name	Range	Unit	Default
C08.38	Message Response	0: Normal 1: Only response exception message 2: Not response	-	0

This parameter is used to control Modbus message response.

Attention: the drive will response the READ instruction no matter what C08.38 set.

Par. No.	Name	Range	Unit	Default
C08.39	Parameter Write Store	0: Not saved at power down 1: Saved at power down	-	0

This parameter is used to control whether the parameters which is changed by communication WRITE instruction are saved or not at power down.

Par. No.	Name	Range	Unit	Default
C08.50	Coasting Select	0: Digital input 1: Bus 2: Logic AND 3: Logic OR	-	0
C08.53	Start Select	See C08.50	-	0
C08.54	Reversing Select	See C08.50	-	3
C08.56	Preset Reference Select	See C08.50	-	3

Select control of the coasting, start, reverse, set-up and preset reference function via the terminals (digital input) and/or via the bus.

0: Digital input, activate via a digital input;

1: Bus, activate via serial communication port;

2: Logic AND, activate via serial communication port and a digital input;

3: Logic OR, activate via serial communication port or a digital input;

Group 14: Special Functions

Par. No.	Name	Range	Unit	Default
C14.01	Switching Frequency	2~6: 2~6kHz 7: 8kHz 8: 10kHz 9: 12kHz 10: 16kHz	kHz	*

Switching frequency has a significant influence to the drive and the motor. Select appropriate switch frequency can help to adjust acoustic noise from the motor, power consumption and the drive efficiency. When switching frequency increases, the consumption and the noise of the motor are reduced, but the drive's temperature will increase, and motor leakage and the interference to the external device will increase; the contrary, the opposite.

Par. No.	Name	Range	Unit	Default
*C14.03	Overmodulation	90.0~105.5	%	105.5

The overmodulation function can obtain an output voltage greater than mains voltage.

Par. No.	Name	Range	Unit	Default
C14.08	Damping Gain Factor	0~200	%	96

Damping gain factor can help to improve the response speed of the DC link of the drive making the DC loop signal more smooth.

Par. No.	Name	Range	Unit	Default
C14.10	Action at Mains Failure	0: No function 1: Ctrl ramp-down 2: Ctrl ramp-down, trip 3: Coasting 4: Kinetic back-up 5: Kinetic back-up, trip 6: Alarm 8: Warning	-	8

This parameter is typically used to where very short mains interruptions (voltage dips) are present. At 100% load and a short voltage interruption, the DC voltage on the main capacitors drops quickly. For larger drive it only takes a few milliseconds before the DC level is down to about 373V DC and the IGBTs cut off and looses the control over the motor. When the mains

is restored, and the IGBTs start again, the output frequency and voltage vector does not correspond to the speed/frequency of the motor, and the result is normally an overvoltage or overcurrent, mostly resulting in a trip lock. C14.10 Mains Failure can be programmed to avoid this situation.

This parameter is used to select the function to which the drive must act when the threshold in C14.11 Mains Voltage at Mains Fault has been reached.

0: No function. The drive will not compensate for a mains interruption. The voltage on the DC-link will drop quickly and motor control will be lost within milliseconds to seconds.

1: Ctrl ramp-down. This selection is particularly useful in pump applications, where the inertia is low and the friction is high. When the mains is restored, the output frequency will ramp the motor up to the reference speed (if the mains interruption is prolonged, the controlled ramp down might take the output frequency all the way down to 0rpm, and when the mains is restored, the application is ramped up from 0rpm to the previous reference speed via the normal ramp up). If the energy in the DC-link disappears before the motor is ramped to zero the motor will be coasted.

2: Ctrl ramp-down, trip. This selection is similar to selection [1] except that in [2] a reset is necessary for starting up after power-up.

3: Coasting. Centrifuges can run for an hour without power supply. In those situations, it is possible to select a coast function at mains interruption, together with a flying start which occurs when the mains is restored.

4: Kinetic back-up. Kinetic back-up ensures that the frequency converter keeps running as long as there is energy in the system due to the inertia from motor and load. This is done by converting the mechanical energy to the DC-link and thereby maintaining control of the drive and motor. This can extend the controlled operation, depending on the inertia in the system. For fans it is typically several seconds, for pumps up to 2 seconds and for compressors only for a fraction of a second. Many industry applications can extend controlled operation for many seconds, which is often enough time for the mains to return.

5: Kinetic back-up, trip. The difference between kinetic back-up with and without trip is that the latter will always ramp down to 0RPM and trip, regardless of whether mains return or not.

The function is made so that it will not even detect if mains return, this is the reason for

the relatively high level on the DC-link during ramp down.

6: Alarm. The drive reports alarm "E.36".

8: Warning. The drive reports alarm "A.36".

Note: For option [1] to [5], the drive will report warning "A.36" while doing the selected operation.

Par. No.	Name	Range	Unit	Default
C14.11	Mains Voltage at Mains Failure	100~800	V	*

This parameter defines the threshold votlage at which the selected function in C14.10 Mains Failure should be activated.

Par. No.	Name	Range	Unit	Default
C14.12	Function at Mains Imbanlance	0: Trip (Low sensitivity) 1: Warning (Low sensitivity) 2: Disabled 4: Warning (Middle sensitivity) 5: Trip (Middle sensitivity) 6: Trip (High sensitivity)	-	0

Select actions when a mains imbalance is detected. The dection of mains imbalance depends on load. In order to meet different applications, different sensitivity options are set for this parameter.

0: Trip (Low sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

1: Warning (Low sensitivity), the drive issues a warning (reports "A.04") but continues to run when a mains imbalance is detected;

The dection method for option [0] and [1] is low sensitive, even if a severe mains imbalance occurs, the drive will continue to run and do not report warning if the load is low, the drive and motor will not damage in this occasion; The drive trips (option [0]) or issues a warning (option [1]) only the load exceeds a certain range.

2: Disabled, the drive does nothing when a mains imbalance is detected. Be attention to use this option;

4: Warning (Middle sensitivity), the drive issues a warning (reports "A.04") but continues to

run when a mains imbalance is detected;

5: Trip (Middle sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

The dection method for option [4] and [5] is middle sensitive. The drive trips (option [5]) or issues a warning (option [4]) at low frequency and heavy loaded, or high frequency and low load.

6: Trip (high sensitivity), the drive trips (reports "E.04") when a mains imbalance is detected;

The dection method for option [6] is high sensitive. Mains imbalance can be detected immediately. But there is minimum risk of false positives (generally occurs in an abnormal grid or the drive over-current protection frequently).

Par. No.	Name	Range	Unit	Default
C14.14	KEB Gain	0~500	%	100

Par. No.	Name	Range	Unit	Default
C14.17	Automatic Voltage Regulation	0: Disable 1: Enable	-	1

When motor voltage 12%~20% higher than rated, motor temperature will increase, insulation capability destroyed, the torque output is unstable, long-term operation will cause the motor life shorter.

Automatic voltage regulation can automatically control the output voltage at the motor's rated voltage when the grid voltage exceeds the rated motor voltage.

Turn off automatic voltage regulation will improve the ability of rapid deceleration, but turn off this option need to be cautious, it will cause the output voltage different due to different grid voltage, there is an increased risk of heat damage to the motor.

This feature can only be turned off when in VF mode.

Par. No.	Name	Range	Unit	Default
C14.18	Delay Time of Auto Restart When Power up Again	0.0~3600.0	s	0.0

This parameter is used to define the drive action when power up again after power loss during

running.

If it is set to 3600.0, the drive does not respond to the start command valid upon drive power-on (for example, start terminal is ON before power-on). The drive responds only after the start command is cancelled and becomes valid again.

If it is set to 0.0~3599.9, the drive will respond to the start command delaying the C14.18 setting time upon drive power-on (for example, start terminal is ON before power-on).

Par. No.	Name	Range	Unit	Default
C14.20	Reset Mode	0: Manual reset 1~10: Auto reset 1-10 times 11: Auto reset 15 times 12: Auto reset 12 times 13: Infinite auto reset	-	0

Select reset function after tripping.

0: Manual reset, perform reset via "OFF" button or digital inputs;

1~10: Auto reset 1-10 times, can perform 1-10 automatic resets after trips;

11: Auto reset 15 times, can perform 15 automatic resets after trips;

12: Auto reset 20 times, can perform 20 automatic resets after trips;

13: Infinite auto reset, can perform an infinite number of automatic resets after trips;

Once option [1] - [13] is selected, the drive will be restarted after an alarm. If reset has been done and the running signal is active, the drive will restart automatically. For option [1] – [12], if the drive performs a set number of automatic reset, fault still cannot be removed, the drive will remain a trip state. It needs power off and on to reset the trip after shooting fault.

Be attention to select option [13], it may cause infinite auto reseted.

Par. No.	Name	Range	Unit	Default
C14.21	Automatic Restart Time	0~600	s	10

Enter time interval from trip to start of automatic reset function after an alarm. This parameter is active when C14.20 Reset Mode is set to automatic reset [1]-[13].

Par. No.	Name	Range	Unit	Default
C14.22	Operation Mode	0: Normal operation 2: Initialization 3: Backup user settings 4: Recover user settings	-	0

0: Normal operation;

2: Initialization, initialise all the parameters except information about the drive itself and the recorded parameters.

3: Backup user settings;

4: Recover user settings;

For option [3] to [4], after modifying the drive parameters based on the functional requirements, OEM manufacturers can set C14.22 = 3 to backup settings. If the end users modify parameters and cannot be self-recovery, it can be recovered by setting C14.22 = 4 or pressing "OFF" key on LCP 5 seconds (the default time, can be modified by C00.46 One Key Recovery Time).

Par. No.	Name	Range	Unit	Default
C14.23	Trip lock	0: Disable 1: Enable	-	0

0: Disable, trip lock fault reset does not need power off;

1: Enable, trip lock fault reset need power off;

Par. No.	Name	Range	Unit	Default
C14.24	Trip Delay at Current Limit	0~60	s	60

Enter the current limit trip delay in seconds. When the output current reaches the current limit (parameter C04.18 Current Limit), a warning istriggered. When the current limit warning has been continuously present for the period specified in this parameter, the frequency converter trips set the parameter to 60 s=Off.

Par. No.	Name	Range	Unit	Default
C14.25	Trip Delay at Torque Limit	0~60	s	60

Enter the torque limit trip delay in seconds. When the output torque reaches the torque limits (parameter C04.16 Torque Limit Motor Mode and parameter C04.17 Torque Limit Generator

Mode), a warning is triggered. When the torque limit warning has been continuously present for the period specified in this parameter, the frequency converter trips. Disable the trip delay by setting the parameter to 60 s=Off.

Par. No.	Name	Range	Unit	Default
C14.27	Action at Drive Fault	0: Trip 1: Warning	-	0

Select how the drive should react at inerter fault (output short circuit, over-current, earth fault or over-voltage).

0: Trip, drive issues an alarm and trips immediately if it detects a fault;

1: Warning, when a fault occurs, drive issues a warning and stops the PWM outputs, and repeatlly try to open the normal PWM, if the fault still can't be removed, the drive issues an alarm and trips.

Par. No.	Name	Range	Unit	Default
C14.30	Current Controller 1 Proportional Gain	0~500	%	100
C14.31	Current Controller 1 Integration Time	0.000~2.000	s	0.020
C14.32	Current Controller Filter Time	0.1~100.0	ms	10.0
C14.33	Current Controller 2 Proportional Gain	0~300	%	0
C14.34	Current Controller 2 Integration Time	0.000~2.000	s	0.020

It can adjust the dynamic response characteristics of the current controllers by setting the proportional gain and integration time.

Choose a higher value of proportional gain and lower integration time causes the controller response more quickly, but too high value of proportional gain and tow low value of integration time will cause the controller unstable.

Par. No.	Name	Range	Unit	Default
*C14.40	VT Level	40~90	%	90

Enter the level of motor magnetisation at low speed. Selection of a low value reduces energy loss in the motor, but also reduces load capability.

Par. No.	Name	Range	Unit	Default
*C14.41	AEO Min. Magnetisation	40~75	%	66

Enter the minimum allowable magnetisation for AEO. Selection of a low value reduces energy loss in the motor, but can also reduce resistance to sudden load changes.

Par. No.	Name	Range	Unit	Default
*C14.51	DC Link Compensation	0: Off 1: On	-	0

This function ensures the output voltage is independent of any voltage fluctuations in the DC link. Low torque ripple. In some cases, this dynamic compensation may cause resonance problems in DC link circuit and then this function should be disabled.

Par. No.	Name	Range	Unit	Default
C14.68	Overheat warning relative temperature	0~25	℃	5

This temperature is the overheat (E.69) relative temperature protection point, the default value is 5 ℃ , that is, 5 ℃ lower than the overheat (E.69) temperature protection point, When the drive temperature reaches the relative protection point for a few seconds, it will report A.69 warning. With this parameter, users can more easily control the overheat warning report.

Par. No.	Name	Range	Unit	Default
C14.70	Steady state undervoltage threshold	200V: 171~198V 400V: 296~342V	V	176/304
C14.71	Steady state undervoltage threshold protection time	60~3600	S	3600

When the DC link voltage is lower than the C14.70 and the duration reaches the C14.71, an E.20 fault is reported.

When C14.71 is set to 3600s, the steady state undervoltage protection is turned off.

Par. No.	Name	Range	Unit	Default
C14.72	Excitation Current Controller Bandwidth	10~200	Hz	30
C14.73	Excitation Current Controller Damping	1~200	-	100

C14.74	Excitation Current Controller Load Compensation Factor	0.1~1.0	-	0.5
C14.75	Torque Current Controller Bandwidth	0.01~1.00	Hz	0.03
C14.76	Torque Current Controller Damping	1~200	-	1

This group of parameters are valid only when C01.01 is equal to [2] vector 1. They are current loop adjustment parameters for vector control, and generally do not need to be adjusted.

Par. No.	Name	Range	Unit	Default
C14.77	Weak Magnetic Controller Bandwidth	0.1~10.0	Hz	2.0
C14.78	Weak Magnetic Controller Damping	0.01~1.00	-	0.10

This group of parameters are valid only when C01.01 is equal to [2] vector 1. They are used to set field weakening control for the synchronous motor, and generally do not need to be adjusted.

Par. No.	Name	Range	Unit	Default
C14.81	Dedicated machine parameter initialization	0: No function >0: Customer dedicated	-	0

This parameter is used to set the dedicated parameters.

Par. No.	Name	Range	Unit	Default
C14.82	User-defined Readout at Failure	0: No function 1: Reference 2: Output voltage 3: Output Torque 4: IGBT Temperature 5: Digital Input State 6: Digital Output State 7: Relay Output State 8: VI Input 9: AI Input 10: VO Output 11: AO Output 12: DI3 Pulse Input 13: DO1 Pulse Output 30.Exhaust Pressure 31.VI Source Pressure 40.Exhaust Temperature 41.RI1 Temperature 42.RI3 Temperature	-	0

This parameter is a 2-array parameter that is used to select the status of the drive that was custom-recorded in the event of a fault.

Group 15: Drive Information

Par. No.	Name	Range	Unit	Default
C15.00	Operating Days	0~9999	d	0

View how many days the drive has run. The value is saved automatically at power off and can't be reset.

Par. No.	Name	Range	Unit	Default
C15.01	Running Hours	0~60000	h	0

View how many hours the motor has run. Reset the counter in C15.07 Reset Running Hours Counter.

Par. No.	Name	Range	Unit	Default
C15.02	kWh Counter	0~65535	kWh	0

View the power consumption of the motor as a mean value over one hour. Reset the counter in C15.06 Reset kWh Counter.

Par. No.	Name	Range	Unit	Default
C15.03	Power Up's	0~65535	-	0

View the number of times the drive has been powered up. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.04	Over Temperatures	0~65535	-	0

View the number of the drive temperature faults that have occurred. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.05	Over Voltages	0~65535	-	0

View the number of drive over-voltages that have occurred. This parameter can't be reset.

Par. No.	Name	Range	Unit	Default
C15.06	Reset kWh Counter	0: Do not reset 1: Do reset	-	0

0: Do not reset;

1: Do reset, kWh counter is reset to zero (see C15.02 kWh Counter);

Attention: This parameter can't be set via local bus.

Par. No.	Name	Range	Unit	Default
C15.07	Reset Running Hours Counter	0: Do not reset 1: Do reset	-	0

0: Do not reset;

1: Do reset, running hours counter is reset to zero (see C15.01 Running Hours);

Attention: This parameter can't be set via local bus.

Par. No.	Name	Range	Unit	Default
C15.30	Alarm Code	0~255	-	0

View the alarm code and look up its meaning in chapter 8. This parameter is an array [10] parameter. It contains an alarm log showing reasons for the ten latest trips. C15.30[0] represents the latest, C15.30[9] is a recent 10th, this parameter cannot be reset.

Par. No.	Name	Range	Unit	Default
C15.31	Internal Fault Reason	-32767~32767	-	0

This parameter contains internal fault reasons, mostly used in combination with alarm E.38.

Par. No.	Name	Range	Unit	Default
C15.32	Output Frequency at Failure	0.0~6553.5	Hz	0.0
C15.33	Output Current at Failure	0.01~655.35	A	0.00
C15.34	DC Link Voltage at Failure	0~65535	V	0
C15.35	Running Time at Failure	0~65535	Min	0
C15.36	User-defined Readout 1 at Failure	*	-	0
C15.37	User-defined Readout 2 at Failure	*	-	0

This group of parameters are 10-array parameters, and record the latest 10 sets of fault information. The array [0] is the most recent and the array [9] is the third most recent.

Par. No.	Name	Range	Unit	Default
C15.38	Warning Code	0~255	-	0

View the warning code and look up its meaning in chapter 8. This parameter is an array [10] parameter. It contains a warning log showing reasons for the ten latest warnings. C15.38[0] represents the latest, C15.38[9] is a recent 10th, this parameter cannot be reset.

Par. No.	Name	Range	Unit	Default
C15.43	Software Version	-	-	*

View the software version of the drive.

Par. No.	Name	Range	Unit	Default
C15.76	Random Code	0~65535	-	*
C15.77	User Code	0~65535	-	0
C15.78	Password 1	0~65535	-	0
C15.79	Password 2	0~65535	-	0

Group 16: Data Readouts

C16.0* General Status

Par. No.	Name	Range	Unit	Default
C16.00	Control Word	0~65535		

View latest valid control word that sent to the drive via local bus. Turn it into 16-bit binary code.

Bit	0	1
0	Preset reference bit0 set to 0	Preset reference bit0 set to 1
1	Preset reference bit1 set to 0	Preset reference bit1 set to 1
2	DC brake	No DC brake
3	Coast stop	No coast stop
4	Reserved	
5	Freeze freq.	No freeze freq.
6	Ramp stop	Ramp start
7	No reset	Reset
8	No jog	Jog
9	Ramp 1	Ramp2
10	Data invalid	Data valid
11	Relay 1 off	Relay 1 on
12	Relay 2 off	Relay 2 on
13	Setup 1	Setup 2
14	Reserved	
15	No reversing	Reversing

Par. No.	Name	Range	Unit	Default
C16.01	Reference	-4999.0~4999.0	-	0.0

View the actual reference.

Par. No.	Name	Range	Unit	Default
C16.02	Reference	-200.0~200.0	%	0.00

View the actual reference in percentage.

Par. No.	Name	Range	Unit	Default
C16.03	Status Word	0~65535	-	0

View active status word, the following shows the definition for each bit.

Communication Status Word		
bit	0	1
0	Control Not Ready	Control Ready
1	Drive Not Ready	Drive Ready
2	Coasting	Enabled
3	No Error	Trip
4	Error	Error Without Trip
5	Undefined	AMA OK
6	No Error	Trip
7	No Warning	Warning
8	Not On Reference	On Reference
9	Local Control	Remote Control
10	Frequency Not In Range	Frequency In Range
11	Stop	Running
12	Brake Resistor Is Normal	Brake Resistor Fault
13	Voltage Limit	Out Of Voltage Limit
14	Undefined	Undefined
15	No Terminal Warning	Terminal Warning

Par. No.	Name	Range	Unit	Default
C16.04	Active Set-up	0: Set-up 1 1: Set-up 2 2: Multi Set-up	-	0
C16.05	Motor Speed	0~9999	rpm	0
C16.06	Low Voltage Freq. Limit	0.0~400.0	Hz	0.0
C16.09	Custom Readout	0.00~9999.00		0.00

View the drive active set-up, motor speed, the value of user-defuned readout.

Par. No.	Name	Range	Unit	Default
C16.10	Output Power	0.00~655.35	kW	0.00
C16.12	Motor Voltage	0~65535	V	0

C16.13	Output Frequency	0.0~400.0	Hz	0.0
C16.14	Output Current	0.00~655.35	A	0.00
C16.15	Output Frequency	0.0~200.0	%	0.0
C16.16	Output Torque	-200.00~200.00	%	0.00
C16.18	Motor Thermal	0~100	%	0

View the actual data of motor.

C16.3*Drive Status

Par. No.	Name	Range	Unit	Default
C16.30	DC Link Voltageq	0~65535	V	*
C16.34	IGBT Temperature	-128~127	°C	*
C16.35	Drive Thermal	0~255	%	*
C16.36	Drive Normal Current	0.0~6553.5	A	*
C16.37	Drive Man. Current	0.0~6553.5	A	*
C16.48	Power Board Temperature	-128~127	°C	*
C16.49	Rectifier Temperature	-128~127	°C	*

C16.5* Ref./Feedb.

Par. No.	Name	Range	Unit	Default
C16.50	Main Reference	-200.00~200.00	%	0.00
C16.51	Pulse Reference	-200.0~200.0	%	0.00
C16.52	Feedback	-200.00~200.00	%	0.00
C16.57	RI1 Temperature	-50~260	°C	*
C16.58	RI2 Temperature	-50~260	°C	*
C16.59	RI3 Temperature	-50~260	°C	*

C16.6*、C16.7* Inputs and Outputs

Par. No.	Name	Range	Unit	Default
C16.60	Digital Input	0~65535	%	0

View signal states from active digital inputs, which indicates in a 16-bit binary code. If the drive detects digital input terminals connected, the corresponding position is set to "1", otherwise "0". Digital input terminal and the corresponding relationship between the binary code are as below:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Resvered	DI5	DI4	DI3	DI2	DI1	REV	FOR
0	1	0	0	0	0	1	0

Par. No.	Name	Range	Unit	Default
C16.61	Terminal VI Setting	0: 0~10V 1: 0~20mA	-	1

View actual state of analog input VI.

Par. No.	Name	Range	Unit	Default
C16.62	Analog Input VI	0.00~20.00	V/mA	0.00

View actual input voltage or current value on analog input VI.

Par. No.	Name	Range	Unit	Default
C16.63	Terminal AI Setting	0: 0~10V 1: 0~20mA	-	0

View actual state of analog input AI.

Par. No.	Name	Range	Unit	Default
C16.64	Analog Input AI	0.00~20.00	V/mA	0.00

View actual input voltage or current value on analog input AI.

Par. No.	Name	Range	Unit	Default
C16.65	Analog Output VO	0.00~20.00	V/mA	0.00

View actual output voltage or current on analog output VO.

Par. No.	Name	Range	Unit	Default
C16.66	Digital Output	0~255	-	0

View actual state of digital output, which indicates in a 4-bit binary code; If the digital output terminal is active, the corresponding position is set to "1", otherwise "0". Corresponding relationship between state of the digital output terminals and the binary code are as below:

Binary	bit3	bit2	bit1	bit0
Term. No.	Reserved	Reserved	DO2	DO1

Par. No.	Name	Range	Unit	Default
C16.68	Pulse Input DI4	0.00~100.00	kHz	0.00

View input frequency on pulse input terminal DI4.

Par. No.	Name	Range	Unit	Default
C16.69	Pulse Output DO1	0.00~100.00	kHz	0.00

View output frequency on pulse output terminal DO1.

Par. No.	Name	Range	Unit	Default
C16.71	Relay Output	0~65535	-	0

View the output status of the relay, the corresponding bit is set to "1"when the relay output is active, otherwise it will be set to "0".

Bit1	Bit0
Relay 2	Relay 1
1	0

Par. No.	Name	Range	Unit	Default
C16.78	Analog Output AO	0.00~20.00	mA	0.00

View actual output current on analog output AO.

C16.8* Field bus/FC Port

Par. No.	Name	Range	Unit	Default
C16.86	Communication	-32768~32767	-	0.00

View the last received reference from communication.

C16.9* Diagnosis Readouts

Par. No.	Name	Range	Unit	Default
C16.90	Alarm Code 1	0~0xFFFFFFFFUL	-	*
C16.91	Alarm Code 2	0~0xFFFFFFFFUL	-	*
C16.92	Warning Code 1	0~0xFFFFFFFFUL	-	*
C16.93	Warning Code 2	0~0xFFFFFFFFUL	-	*
C16.94	Extension Status Word	0~0xFFFFFFFFUL	-	*

C16.96	APP Alarm Code	0~0xFFFFFFFFUL	-	*
C16.97	APP Warning Code	0~0xFFFFFFFFUL	-	*

View the alarm/warning word sent via the serial communication port in hex code.

Group 19: Fan & Others

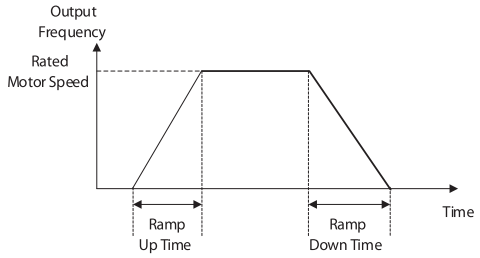
Par. No.	Name	Range	Unit	Default
C19.00	Cooling Fan Structure	0~3	-	0
C19.01	Cooling Fan Control Principle	0: VF 1: VCC+	-	*
C19.02	Cooling Fan Rated Power	Motor dependant	kW	*
C19.03	Cooling Fan Rated Freq.	0.0~400.0	Hz	50
C19.04[0]	Cooling Fan Rated Current	Motor dependant	A	*
C19.04[1]	Motor Fan Rated Current	Motor dependant	A	*
C19.05	Cooling Fan Rated Speed	0~9999	rpm	*

Motor dependant.

Par. No.	Name	Range	Unit	Default
C19.06	Cooling Fan Speed Lower Limit	0.0~400.0	Hz	0.0
C19.07	Cooling Fan Speed Upper Limit	0.0~400.0	Hz	50.0
C19.08	Cooling Fan Max Freq.	0.0~400.0	Hz	50.0
C19.09	Cooling Fan Jog Freq.	0.0~50.0	Hz	5.0
C19.10	Cooling Fan Max Reference	0.0~50.0	Hz	50.0

Frequency setting.

Par. No.	Name	Range	Unit	Default
C19.11	Cooling Fan Ramp Up Time	0.05~3600.00	s	*
C19.12	Cooling Fan Ramp Down Time	0.05~3600.00	s	*



Par. No.	Name	Range	Unit	Default
C19.15	Cooling Fan VF-U	*	V	*
C19.16	Cooling Fan VF-F	*	Hz	*

These parameters are array parameters [0-5], used to manually form a V/F characteristic matching the motor. The frequency points [F0-F5] are defined in C19.16 V/F Characteristic - F. The voltage at each point [V0-V5] is defined in C19.15 V/F Characteristic - V. These parameters are only accessible when C19.01 Motor Control Principle is set to V/F.

See C01.55 and C01.56 for more explanation.

Par. No.	Name	Range	Unit	Default
C19.17	Min Speed for Function at Stop	0.0~400.0	Hz	20.0

This parameter has the same explanation as C01.82.

Par. No.	Name	Range	Unit	Default
C19.18	Cooling Fan Rated Torque	Motor dependant	N.m	*

This parameter has the same explanation as C01.26.

Par. No.	Name	Range	Unit	Default
C19.19	Cooling Fan Motor Poles	2~100	P	4

This parameter has the same explanation as C01.39.

Par. No.	Name	Range	Unit	Default
C19.20	Cooling Fan EMF in 1000rpm	0~9000	V	*

This parameter has the same explanation as C01.40.

Par. No.	Name	Range	Unit	Default
C19.21	Cooling Fan AMA	0: No function 1: Static complete AMA	-	0

This parameter has the same explanation as C01.29.

Par. No.	Name	Range	Unit	Default
C19.22	Cooling Fan Stator Resistance	Motor dependant	Ω	*
C19.23	Cooling Fan Rotor Resistance	Motor dependant	Ω	*
C19.24	Cooling Fan Stator Leakage Reactance	Motor dependant	Ω	*
C19.25	Cooling Fan Main Reactance	Motor dependant	Ω	*
C19.26	Cooling Fan D-axis Reactance	Motor dependant	mH	0
C19.27	Cooling Fan Q-axis Reactance	Motor dependant	mH	0
C19.28	D-axis Inductance Sat.	Motor dependant	Ω	*
C19.29	Q-axis Inductance Sat.	Motor dependant	Ω	*
C19.30	Current at Min Inductance for D-axis	20~200	%	100
C19.31	Current at Min Inductance for Q-axis	20~200	%	100

Fan parameters, gain by AMA.

Par. No.	Name	Range	Unit	Default
C19.36	Min. Current at Low Speed	0~120	%	80

This parameter has the same explanation as C01.66.

Par. No.	Name	Range	Unit	Default
C19.37	Parking Current	0~150	%	80
C19.38	Parking Time	0.1~60.0	s	3.0

These parameters have the same explanation as C02.06 and C02.07.

Par. No.	Name	Range	Unit	Default
C19.54[0]	Cooling Fan Control Mode	0~3	-	1
C19.54[1]	Motor Fan Control Mode	0~3	-	0

Setting range:

0: Disable;

1: Inverter control;

2: Grid with running detection;

3: Grid without running detection.

Parameter setting must be based on hardware configuration.

Power	Cooling Fan	Motor Fan
≤15kW	Grid	Grid
≥18.5kW	Inverter	Grid

Par. No.	Name	Range	Unit	Default
C19.55	Phase Detection	0: Disable 1: Enable	-	0

This parameter only work with SK300 and SK200(7.5~15kW)

Par. No.	Name	Range	Unit	Default
C19.60	Cooling Fan Control Word	*	-	0

This parameter has the same explanation as C16.00, only works when C01.07=0.

Par. No.	Name	Range	Unit	Default
C19.61	Cooling Fan Reference	C19.06~C19.07	Hz	0.0

It only works when C01.07=0.

Par. No.	Name	Range	Unit	Default
C19.62	Communicate Status with Cooling Fan	*	-	*

Bit	0	1
0	-	Normal Communication with Host and Fan
1	-	Normal Communication with LCP and Fan
2	-	Normal Communication with LCP and Host
3	Single	Double Inverter

Par. No.	Name	Range	Unit	Default
C19.63[0]	Cooling Fan Status Word	*	Hz	0

C19.63[1]	Cooling Fan Alarm Code	*	-	0

This parameter has the same explanation as C16.03.

Par. No.	Name	Range	Unit	Default
C19.64	Cooling Fan Output Frequency	0.0~400.0	Hz	0.0
C19.65[0]	Cooling Fan Output Currrent	0~655.35	A	0.00
C19.65[1]	Motor Fan Output Current	0~655.35	A	0.00
C19.66	Cooling Fan Output Speed	0~9999	rpm	0

The current running status of fan.

Par. No.	Name	Range	Unit	Default
C19.68	Result of Phase Detecting	0~4	-	*

0: Fault

1: Noamal

2: Phase loss

4: Timeout

Par. No.	Name	Range	Unit	Default
C19.99	Cooling Fan User Defined Parameter	*	-	*

This parameter is an array[10] parameter, it is used to configure read-write of seldom-used fan parameters. Please modify this parameter under the guidance of professionals.

Corresponding address:

Function	Address
Configuration	4x61000~61009
Data read-write	4x61050~61059

For example:

When C19.99[2]=1634, you can read the value of C16.34 from address 4x61052. The data address won't be updated, if the configured address does not exist in fan inverter.

Index	Config. Addr.	Range	Default	Data Addr.
[0]	61000	0~9999	1610	61050
[1]	61001	0~9999	1612	61051
[2]	61002	0~9999	1634	61052
[3]	61003	0~9999	0	61053
[4]	61004	0~9999	0	61054
[5]	61005	0~9999	0	61055
[6]	61006	0~9999	0	61056
[7]	61007	0~9999	0	61057
[8]	61008	0~9999	0	61058
[9]	61009	0~9999	0	61059

Group 28: Compressor Parameters

Par. No.	Name	Range	Unit	Default
C28.00[0]	Load-unload Mode	0: Manual 1: Auto	-	1
C28.00[1]	Run Mode	0: Single 1: Slave 2: Linkage	-	0
C28.00[2]	Compact Mode	0: Single Host 1: Double Host	-	0
C28.00[3]	Oil Pump Mode	0: Pump – Host 1: Host - Pump	-	0
C28.00[4]	Cooling Fan Control Mode	0: Synchronize with host 1: Synchronize with system	-	0

Load-unload Mode:

When this mode is set to manual, the loading valve can be controlled by HMI. But it still would be unloaded when the pressure reaches Unloading Pressure.

Run Mode:

0: Single The output frequency controlled by PID

1: Slave The output frequency controlled by external controller.

2: Linkage The compressor will work in linkage mode

Compact Mode:

0: Single Host Default;

1: Double Host This inverter will read the first stage inverter, as the second stage inverter.

Oil Pump Mode:

This parameter is used to select oil pump starting mode.

Par. No.	Name	Range	Unit	Default
C28.01	Load Delay	0~300	s	20

This parameter indicates that the loading valve will delay loading after this time when the system is running.

Par. No.	Name	Range	Unit	Default
C28.02	Stop Delay	0~300	s	10

The drive will keep running at idle frequency when it receives a stop or dormancy command. After this time delay, the drive stops completely.

Par. No.	Name	Range	Unit	Default
C28.03	Restart Delay	0~300	s	80

It's not allowed frequent startup to protect the host. The drive resarting must go through this delay.

Par. No.	Name	Range	Unit	Default
C28.04	Pre-run Frequency	0.0~C04.14	Hz	30.0

The drive runs to this frequency before the loading valve is opened.

Par. No.	Name	Range	Unit	Default
C28.05	Dormancy Delay	0~10000	s	10000
C28.06	Min. Dormancy Time	0~3600	s	5

When the pressure is greater than the load pressure and the drive is running at the idle frequency, the air compressor will enter the dormant state after the dormancy delay.

This function is disabled when the parameter value is set to 10000.

When the pressure is lower than the loading pressure and after minimum dormancy time, the drive will wake up automatically.

Par. No.	Name	Range	Unit	Default
C28.07	Idle Frequency	0.0~C28.04	Hz	25.0

This parameter represents the lowest frequency of drive when the air compressor enters PID regulation.

Par. No.	Name	Range	Unit	Default
C28.08	Freq. Bandwidth of Dormancy Detection	0.0~50.0	Hz	2.0

This parameter is used to solve the problem that the output frequency of the drive may

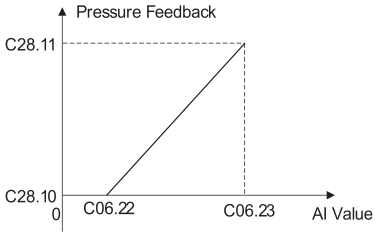
fluctuate so slightly that it is difficult to enter the dormancy mode normally.

Par. No.	Name	Range	Unit	Default
C28.09	Host Jog Frequency	0.0~C28.04	Hz	30.0

Jogging frequency in AIO mode.

Par. No.	Name	Range	Unit	Default
C28.10	Lower Limit of Pressure Sensor	0.00~C28.12	MPa	0.00
C28.11	Upper Limit of Pressure Sensor	C28.43~10.00	MPa	1.60

This set of parameters is used to modify the range of the pressure sensor.



Note: The pressure can be calibrated by adjusting C06.22 and C06.23 when it is not correct.

Par. No.	Name	Range	Unit	Default
C28.12	Loading Pressure	0.00~C28.14	MPa	0.50
C28.13	Unloading Pressure	C28.14~C28.44[0]	MPa	0.80

At runtime, system will load when the pressure is less than the loading pressure, and it will unload when the pressure is greater than the unloading pressure.

Par. No.	Name	Range	Unit	Default
C28.14	Target Pressure	C28.12~C28.13	MPa	0.70

This parameter is used to set the required pressure.

When C28.30 =1, the modified range of this paramter is :

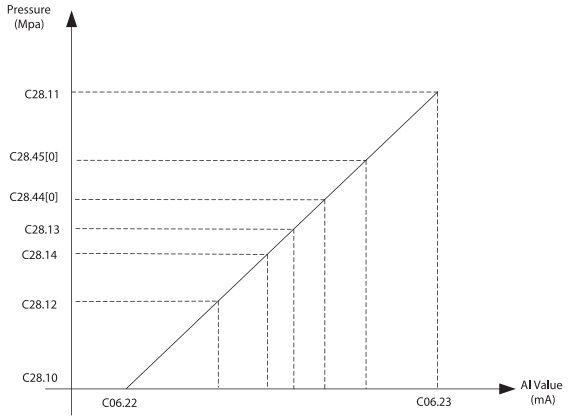
$$MAX (C28.12, C28.31) \leq C28.14 \leq MIN (C28.13, C28.33).$$

Par. No.	Name	Range	Unit	Default
C28.15	Linkage Loading Pressure	0.00~C28.16	MPa	0.63
C28.16	Linkage Unloading Pressure	C28.15~10.00	MPa	0.78

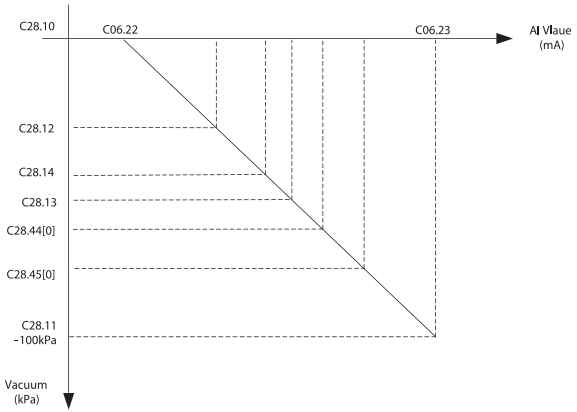
These two parameters determine add/reduce one compressor.

Par. No.	Name	Range	Unit	Default
C28.19	Pressure Control Mode	0: 0~10.00MPa; 1: 0~ -100kPa; 2: 1000~0mBar	-	0

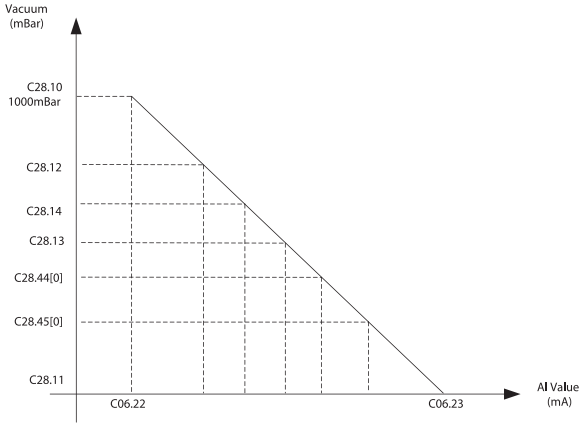
This parameter defaults to 0, which is used for display of common air compressor.1 and 2 are used for pressure display and control of vacuum pump.When this parameter is modified, it will affect the units of all relevant pressure parameters and their logical relationship.



P-Diagram when C28.19=0



P-Diagram when C28.19=1



P-Diagram when C28.19=2

Par. No.	Name	Range	Unit	Default
C28.20	Cooling Fan Starting Temperature	C28.21~C28.42	℃	85

C28.21	Cooling Fan Stopping Temperature	0~C28.20	°C	75
C28.22	Cooling Fan Target Temperature	0~150	°C	80

When the exhaust temperature is greater than the starting temperature, the cooling fan starts; When the exhaust temperature is lower than the stopping temperature, the cooling fan stops.

Par. No.	Name	Range	Unit	Default
C28.23[0]	Cooling Fan PID -I	0.01~20.00	s	10.00
C28.23[1]	Cooling Fan PID – Kp	0.01~20.00	-	4.00
C28.23[2]	Cooling Fan PID -Deviation Limit	0.00~100.00	%	0.10
C28.23[3]	Pre-cooling - speed up	0.00~100.00	%	8.00
C28.23[4]	Pre-cooling - speed down	0.00~100.00	%	8.00
C28.23[5]	Pre-cooling – speed down in constant temperature	0.00~100.00	%	1.00
C28.23[6]	Pre-cooling – filter time	0.00~50.00	s	0.50
C28.23[7]	Temp. Diff. for Exiting PID	0.00~100.00	°C	1.00
C28.23[8]	Min. Percentage of Cooling Fan Speed	0.00~100.00	%	20.00

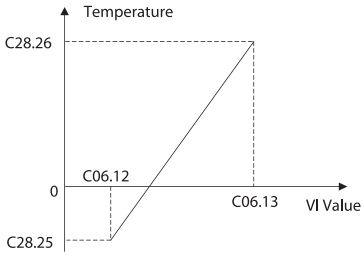
When the cooling fan is variable frequency, this set of parameters is effective.

Par. No.	Name	Range	Unit	Default
C28.24	Cooling Fan Fault Delay	0~60	s	10

This parameter indicates that the host will stop after this delay, when it receives alarm signal of cooling fan.

Par. No.	Name	Range	Unit	Default
C28.25	Temp. Sensor Lower Limit	-50~C28.21	°C	-20
C28.26	Temp. Sensor Upper Limit	C28.43~250	°C	150

This set of parameters is used to modify the range of the temperature sensor. And it is only valid for SK190 series.



Note: The tempressure can be calibrated by adjusting C06.12 and C06.13 when it is not correct.

Par. No.	Name	Range	Unit	Default
C28.27[0]	Cooling Fan Current Protection Factor	1~100	%	10
C28.27[1]	Motor Fan Current Protection Factor	1~100	%	10

This parameter is only valid for SK200(≤15kw) and SK300 series. The smaller setting, the faster protectiing. And the sample is as follows:

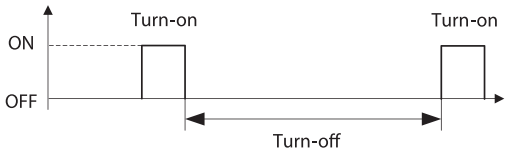
Fan current percent	Protection time when setting to 100%(s)		Protection time when setting to 10%(s)	
	Warning	Alarm	Warning	Alarm
118.75	674.94	749.95	67.49	75.00
131.25	224.98	249.98	22.50	25.00
150.00	142.09	157.88	14.21	15.79
175.00	107.99	119.99	10.80	12.00
181.25	96.42	107.14	9.64	10.71
≥193.75	84.37	93.74	8.44	9.37

Par. No.	Name	Range	Unit	Default
C28.28	Transformer Current Protection Factor	0~2.55	A	1.00

This parameter is only valid for SK200(≤15kw) and SK300 series.

Par. No.	Name	Range	Unit	Default
C28.29[0]	Drain Valve Turn-on Time	0~10	s	0
C28.29[1]	Drain Valve Turn-off Time	0~60000	min	60

This parameter is used to turn on/off the water valve. This function will be disabled when DrainValve Trun-on Time =0.



Par. No.	Name	Range	Unit	Default
C28.30	Auto-pressure Control	0~1	-	0
C28.31	Starting Pressure	C28.10~C28.14	MPa	0.50
C28.32	Starting Frequency	C28.34~C04.14	Hz	50.0
C28.33	Stopping Pressure	C28.14~C28.11	MPa	0.80
C28.34	Stopping Frequency	C28.07~C28.32	Hz	40.0

0: Disable

1: Enable, the drive works according to parameters C28.31~C28.34.

Par. No.	Name	Range	Unit	Default
C28.35	Intelligence Constant Pressure	*	Q1	0

This parameter is a 6-dimensional array.

C28.35[0]: Low pressure response sensitivity

The function will be disabled when it is set to 0. When the driver detects that the pressure is rising and the drop rate is higher than the set value of this parameter, the drive will output according to the following formula.

Fout =Idle Freqency ~ FACT*(1-C28.35[2])

The drive will not turn to normal PID controller until the drop rate of pressure is less than this value.

C28.35[1]: High pressure response sensitivity

When the driver detects that the pressure is rising and the drop rate is higher than the set value of this parameter, the drive will output according to the following formula.

Fout =Idle Freqency ~ FACT*(1-C28.35[3])

The drive will not turn to normal PID controller until the drop rate of pressure is less than this value.

C28.35[2]: Low pressure Kp, See detail in C28.35[0];

C28.35[3]: High pressure Kp, See detail in C28.35[1];

C28.35[4]: System response time

This parameter is only valid for Intelligence Constant Pressure. The smaller this value is, the more sensitive the response of the drive becomes; the greater the value is, the slower the drive responses.

C28.35[5]: Starting pressure

When the current pressure is greater than the set value of C28.35[5], the intelligent constant pressure function will be effective, meanwhile the current system will be controlled by PID mode.

Par. No.	Name	Range	Unit	Default
C28.36	Min. Oil Pressure	0.00~10.00	MPa	0.15
C28.37	Oil Pump Start Delay	0~60	s	0
C28.38	Oil Pump Fault Delay	0~60	s	5

The function of oil pump will execute different processes according to the selection of oil pump control mode of C28.00[3].

Min. Oil Pressure: This function is valid when C28.74[1]=4. If oil pressure is still lower than C28.36 after the time of C28.38, the system will alarm.

Oil Pump Start Delay: Delay time between oil pump and host.

Oil Pump Fault Delay: It does the same function for DI terminal detection and oil pressure detection.

Par. No.	Name	Range	Unit	Default
C28.40[0]	Exhaust Temp. Sensor Fault Delay	1~60	s	2
C28.40[1]	Temp. Sensor RI1 Fault Delay	1~60	s	2

C28.40[2]	Temp. Sensor RI3 Fault Delay	1~60	s	2

When the corresponding sensor fails and exceeds this delay time, the corresponding pressure sensor fault will be reported.

Terminal RI2/VI(for exhaust temperature) corresponds to E.171; Terminal RI1 corresponds to E.184; Terminal RI3 corresponds to E.185.

Par. No.	Name	Range	Unit	Default
C28.41[0]	Exhaust Pressure Sensor Fault Delay	1~60	s	2
C28.41[1]	Pressure Sensor VI Fault Delay	1~60	s	2

When the input value of the corresponding sensor is less than 3mA and exceeds this delay time, the corresponding pressure sensor fault will be reported.

Terminal AI corresponds to E.172; Terminal VI for pressure corresponds to E.186.

Par. No.	Name	Range	Unit	Default
C28.42[0]	Exhaust Temp. Warning Value	C28.20~C28.43[0]	℃	105
C28.42[1]	RI1 Temp. Warning Value	0~ C28.43[1]	℃	105
C28.42[2]	Motor Temp. Warning Value	0~ C28.43[2]	℃	125

When the detecting temperature of the corresponding sensor is greater than the warning temperature, the system will warn. When the setting value is equal to the upper limit of the sensor, the relevant alarm function will be disabled.

Terminal RI2/VI corresponds to A.161; Terminal RI1 corresponds to A.181; Terminal RI3 corresponds to A.184.

Par. No.	Name	Range	Unit	Default
C28.43[0]	Exhaust Temp. Alarm Value	C28.42[0]~150	℃	110
C28.43[1]	RI1 Temp. Alarm Value	C28.42[1]~150	℃	110
C28.43[2]	Motor Temp. Alarm Value	C28.42[2]~150	℃	130

When the detecting temperature of the corresponding sensor is greater than the alarm

temperature, the system will alarm.When the setting value is equal to the upper limit of the sensor, the relevant alarm function will be disabled.

Terminal RI2/VI corresponds to E.161; Terminal RI1 corresponds to E.181; Terminal RI3 corresponds to E.184.

Par. No.	Name	Range	Unit	Default
C28.44[0]	Exhaust Pressure Warning Valve	C28.13~C28.45[0]	MPa	0.84
C28.44[1]	VI Pressure Warning Valve	0.00~ C28.45[1]	MPa	0.28

When the detecting pressure of the corresponding sensor is greater than the warning pressure, the system will warn.When the setting value is equal to the upper limit of the sensor, the relevant warning function will be disabled.

Terminal AI corresponds to A.160; Terminal VI for pressure corresponds to A.183.

Par. No.	Name	Range	Unit	Default
C28.45[0]	Exhaust Pressure Alarm Valve	C28.44[0]~C28.11	MPa	0.86
C28.45[1]	VI Pressure Alarm Valve	C28.44[1]~C28.11	MPa	0.32

When the detecting pressure of the corresponding sensor is greater than the alarm pressure, the system will alarm.When the setting value is equal to the upper limit of the sensor, the relevant alarm function will be disabled.

Terminal AI corresponds to E.160; Terminal VI corresponds to E.183.

Par. No.	Name	Range	Unit	Default
C28.46	Oil Filter Service Time	0~60000	h	500
C28.47	Oil Filter Using Time	0~60000	h	0

When the Oil Filter Using Time is greater than Service Time, system will warn A.163; and if it continues running for the time of C28.66, it will alarm E.163.

This function is disabled when C28.46 is set to 0.

Par. No.	Name	Range	Unit	Default
C28.48	Oil Separator Service Time	0~60000	h	4000
C28.49	Oil Separator Using Time	0~60000	h	0

When the Oil Separator Using Time is greater than Service Time, system will warn A.164; and if it continue running for the time of C28.66, it will alarm E.164.

This function is disabled when C28.48 is set to 0.

Par. No.	Name	Range	Unit	Default
C28.50	Air Filter Service Time	0~60000	h	4000
C28.51	Air Filter Using Time	0~60000	h	0

When the Air Filter Using Time is grater than Service Time, system will warn A.165; and if it continues running for the time of C28.66, it will alarm E.165.

This function is disabled when C28.50 is set to 0.

Par. No.	Name	Range	Unit	Default
C28.52	Grease Service Time	0~60000	h	2000
C28.53	Grease Using Time	0~60000	h	0

When the Grease Using Time is greater than Service Time, system will warn A.169; and if it continues running for the time of C28.66, it will alarm E.177.

This function is disabled when C28.52 is set to 0.

Par. No.	Name	Range	Unit	Default
C28.54	Lube Service Time	0~60000	h	2000
C28.55	Lube Using Time	0~60000	h	0

When the Lube Using Time is greater than Service Time, system will warn A.170; and if it continues running for the time of C28.66, it will alarm E.178.

This function is disabled when C28.54 is set to 0.

Par. No.	Name	Range	Unit	Default
C28.56	Max Using Time	0~10000	h	0

When the total run time≥0.8*C28.56(≠0), system will warnA.176; When the total run time≥C28.56(≠0), system will be disabled and alarm E.176 when it is stopped manually or after failure.

This function is disabled when this parameter is set to 0.

Par. No.	Name	Range	Unit	Default
C28.57	Running Time - H	0~60000	h	0
C28.58	Running Time - M	0~59	min	0
C28.59	Loading Time - H	0~60000	h	0
C28.60	Loading Time - M	0~59	min	0

The total running and loading time of this compressor.

Par. No.	Name	Range	Unit	Default
C28.61	Min Oil Temperature	-50~100	℃	-50

The system will be diabled if oil temperature is lower than this value when starting, and the drive will alarm E.179.

This function will be disabled when the setting value is -50.

Par. No.	Name	Range	Unit	Default
C28.62	Starting Value for Detecting Pressure Diff.	0.00~10.00	MPa	0.00
C28.63	Pressure Diff. Warning Value	0.00~0.60	MPa	0.15
C28.64	Pressure Diff. Alarm Value	0.00~0.60	MPa	0.20

Pressure Difference = Pressure of Oil Seperator – Exhaust Pressure.

Detecting condition:

1) Terminal VI is set as oil separator pressure detection.

2) C28.62>0.00MPa.

3) The compressor is in loading mode.

When Pressure Difference is greater than C28.63, the system will warn A.167; When Pressure Difference is greater than C28.64, the system will alarm E.167.

Par. No.	Name	Range	Unit	Default
C28.66	Warning Time Over	0~1000	h	0

This feature will impact all maintenance time.

When the relevant timing is greater than or equal to the relevant time limit + C28.66, the drive

will be unable to start after manual stop, and alarm E.xxx.

See C28.46~C28.55 for more information.

Par. No.	Name	Range	Unit	Default
C28.70	PTC Function	0: Warning 1: Alarm and Trip	-	1

When the thermal protection of the motor is detected by DI terminal, the action after failure is carried out by the selection value of the parameter C28.70.

Par. No.	Name	Range	Unit	Default
C28.71	Speed Correction	0~1000	rpm	0
C28.72	Power Correction	0~200	%	100

Correction for related display values.

Par. No.	Name	Range	Unit	Default
C28.74[0]	Terminal AI Function	0: Disable 1: First Stage Pressure 2: Second Stage/Output Pressure 3: Oil separator pressure 4: Oil Pump Pressure	-	2
C28.74[1]	Terminal VI Function		-	0

This parameter is an array-2 to be used for selecting function of pressure terminal. Among them, function of AI is fixed for exhaust pressure, function of VI can be configued.

First Stage Pressure: It is used for the feedback and alarm of the first stage pressure in two stages of compression.

Oil Seperator Pressure: It is used for the pressure detection of oil drum inside. When open, the VI warning/stop pressure is effective.At the same time, C28.62~C28.64 can be set as required to enable the detection function of oil partial pressure difference.

Oil Pump Pressure: It is used for pressure detection of oil pump.

Par. No.	Name	Range	Unit	Default
C28.75[0]	Terminal RI2 Function	0: No Function 1: First Stage Temp. 2: Exhaust Temp. 3: Motor Temp.	-	2
C28.75[1]	Terminal RI1 Function		-	0
C28.75[2]	Terminal RI3 Function		-	0

This parameter is an array-3 to be used for selecting function of temperature terminal. Among them, function of RI2 is fixed for exhaust temperature, function of RI1 and RI3 can be configured.

First Stage Temperature: It is used for the feedback and alarm of the first stage temperature under two-stage compression.

Motor Temperature: When PT100 is used for real-time temperature detection and alarm of motor, this parameter should be configured.

Par. No.	Name	Range	Unit	Default
C28.79[0]	RI2 Value Correction	-10~10	°C	0
C28.79[1]	RI1 Value Correction	-10~10	°C	0
C28.79[2]	RI3 Value Correction	-10~10	°C	0

This parameter is used to correct the detected value.

Par. No.	Name	Range	Unit	Default
C28.80[0]	Exhaust Pressure	0~10.00	MPa	0
C28.80[1]	VI Pressure	0~10.00	MPa	0

Read only.

Par. No.	Name	Range	Unit	Default
C28.81[0]	Exhaust Temperature	-50~250	°C	0
C28.81[1]	RI1 Temperature	-50~250	°C	0
C28.81[2]	RI3 Temperature	-50~250	°C	0

Read only.

Par. No.	Name	Range	Unit	Default
C28.82	Exhaust Pressure Rising Rate	0~10.000	MPa	0

Read only.

Par. No.	Name	Range	Unit	Default
C28.83	Countdown Time	*	s	0

The countdown time for each state. Please refer to C28.84.

Par. No.	Name	Range	Unit	Default
C28.84	Actual Status	*	*	*

Each bit is defined as follows:

Bit	0	1
0	Invalid	
1	-	Stopping
2	-	Loading delay
3	-	Running
4	-	Stopping delay
5	-	Domancy
6	-	Oil pump start delay
7-10	Reserved	
11	Unloading	Loading
12	-	Emergency stop from DI
13	Reserved	
14	-	Warning
15	-	Alarm

Par. No.	Name	Range	Unit	Default
C28.85	Actual CMD Source	*	*	*

This parameter is used to show actual command source. Itis a thousand digital number, each number is defined as follows:

Thousand	Hundred	Decade	Units
Previous state	Target state	Command	Cmd source

1. Previous/Target State:

Number	1	2	3	4	5
Description	Stopping	Loading Delay	Running	Stopping delay	Dormancy

2. Command Source:

Command	Code	Soure	Combination	Implication

Emergency Stop	0	1	01	DI Terminal
		2	02	LCP
		3	03	Internal Fault
		4	04	-
		5	05	Cooling Fan Fault
Run	1	1	11	DI Terminal
		2	12	Communication
Stop	2	1	21	DI Terminal
		2	22	Communication
Dormancy	3	1	31	Warning A.09
		2	32	Warning A.69
		3	33	Warning A.160
		4	34	Warning A.161
		5	35	Warning A.162
		6	36	Normal Dormancy

Par. No.	Name	Range	Unit	Default
C28.86	Single Run Time - H	0~65535	h	*
C28.87	Single Run Time - M	0~59	min	*

Single run time of the compressor.

Par. No.	Name	Range	Unit	Default
C28.88	Single Power Consumption	0.0~99999999.9	kWh	0.0
C28.89	Total Power Consumption	99999999.9	kWh	0.0

The power consumaption of compressor, Paramter invisible.

Par. No.	Name	Range	Unit	Default
C28.90	System Status	0~17	-	0

Actual compressor status.

Value	Status
0	Stopping
1	Loading Delay
2	Loading Running

3	Unloading Running
4	Stopping Delay
5	Domancy Delay
6	Keep Domancy
7	Domancy
8	Error
9	Pre-running
10	Keep Stopping
11	Will Stop
12	-
13	Starting Delay
14	Emergency Stop
15	Max Using Limited
16	Jogging
17	Oil Pump Starting

Par. No.	Name	Range	Unit	Default
C28.93	Cooling Status	0~3	-	0

Actual cooling status.

Value	Status
0	Stopping
1	Running
2	Error
3	Jogging

Par. No.	Name	Range	Unit	Default
C28.99	Emergency Domancy Function	0~255	-	63

This parameter is used to enable /disable emergency dormancy function. Each binary corresponds to a function : "1" means disable the function, "0" means enable it.

Bit	15~7	6	5	4	3	2	1	0
Description	Reserved	Grid Abnormal A.36	Overload A.09	Over Temp. A.69	High Pressure	PTC Protection	Reserved	High Temp.

Group 39: Communication User-Defined Par.

Par. No.	Name	Range	Default
C39.00	Communication User-Defined Par. 0	0~9999	1603
C39.01	Communication User-Defined Par. 1	0~9999	1603
C39.02	Communication User-Defined Par. 2	0~9999	1603
C39.03	Communication User-Defined Par. 3	0~9999	1613
C39.04	Communication User-Defined Par. 4	0~9999	1614
C39.05	Communication User-Defined Par. 5	0~9999	1612
C39.06	Communication User-Defined Par. 6	0~9999	1605
C39.07	Communication User-Defined Par. 7	0~9999	1610
C39.08	Communication User-Defined Par. 8	0~9999	1630
C39.09	Communication User-Defined Par. 9	0~9999	0
C39.10	Communication User-Defined Par. 10	0~9999	0
C39.11	Communication User-Defined Par. 11	0~9999	0
C39.12	Communication User-Defined Par. 12	0~9999	0
C39.13	Communication User-Defined Par. 13	0~9999	0
C39.14	Communication User-Defined Par. 14	0~9999	0
C39.15	Communication User-Defined Par. 15	0~9999	0
C39.16	Communication User-Defined Par. 16	0~9999	0
C39.17	Communication User-Defined Par. 17	0~9999	0
C39.18	Communication User-Defined Par. 18	0~9999	0
C39.19	Communication User-Defined Par. 19	0~9999	0
C39.20	Communication User-Defined Par. 20	0~9999	0
C39.21	Communication User-Defined Par. 21	0~9999	0
C39.22	Communication User-Defined Par. 22	0~9999	0
C39.23	Communication User-Defined Par. 23	0~9999	0
C39.24	Communication User-Defined Par. 24	0~9999	0
C39.25	Communication User-Defined Par. 25	0~9999	0
C39.26	Communication User-Defined Par. 26	0~9999	0
C39.27	Communication User-Defined Par. 27	0~9999	0
C39.28	Communication User-Defined Par. 28	0~9999	0
C39.29	Communication User-Defined Par. 29	0~9999	0
C39.30	Communication User-Defined Par. 30	0~9999	0
C39.31	Communication User-Defined Par. 31	0~9999	0
C39.32	Communication User-Defined Par. 32	0~9999	0

C39.33	Communication User-Defined Par. 33	0~9999	0
C39.34	Communication User-Defined Par. 34	0~9999	0
C39.35	Communication User-Defined Par. 35	0~9999	0
C39.50	Communication User-Defined Par. 0 index	0~9999	0
C39.51	Communication User-Defined Par. 1 index	0~9999	1
C39.52	Communication User-Defined Par. 2 index	0~9999	2
C39.53	Communication User-Defined Par. 3 index	0~9999	0
C39.54	Communication User-Defined Par. 4 index	0~9999	0
C39.55	Communication User-Defined Par. 5 index	0~9999	0
C39.56	Communication User-Defined Par. 6 index	0~9999	0
C39.57	Communication User-Defined Par. 7 index	0~9999	0
C39.58	Communication User-Defined Par. 8 index	0~9999	0
C39.59	Communication User-Defined Par. 9 index	0~9999	0
C39.60	Communication User-Defined Par. 10 index	0~9999	0
C39.61	Communication User-Defined Par. 11 index	0~9999	0
C39.62	Communication User-Defined Par. 12 index	0~9999	0
C39.63	Communication User-Defined Par. 13 index	0~9999	0
C39.64	Communication User-Defined Par. 14 index	0~9999	0
C39.65	Communication User-Defined Par. 15 index	0~9999	0
C39.66	Communication User-Defined Par. 16 index	0~9999	0
C39.67	Communication User-Defined Par. 17 index	0~9999	0
C39.68	Communication User-Defined Par. 18 index	0~9999	0
C39.69	Communication User-Defined Par. 19 index	0~9999	0
C39.70	Communication User-Defined Par. 20 index	0~9999	0
C39.71	Communication User-Defined Par. 21 index	0~9999	0
C39.72	Communication User-Defined Par. 22 index	0~9999	0
C39.73	Communication User-Defined Par. 23 index	0~9999	0
C39.74	Communication User-Defined Par. 24 index	0~9999	0
C39.75	Communication User-Defined Par. 25 index	0~9999	0
C39.76	Communication User-Defined Par. 26 index	0~9999	0
C39.77	Communication User-Defined Par. 27 index	0~9999	0
C39.78	Communication User-Defined Par. 28 index	0~9999	0
C39.79	Communication User-Defined Par. 29 index	0~9999	0
C39.80	Communication User-Defined Par. 30 index	0~9999	0
C39.81	Communication User-Defined Par. 31 index	0~9999	0
C39.82	Communication User-Defined Par. 32 index	0~9999	0

C39.83	Communication User-Defined Par. 33 index	0~9999	0
C39.84	Communication User-Defined Par. 34 index	0~9999	0
C39.85	Communication User-Defined Par. 35 index	0~9999	0

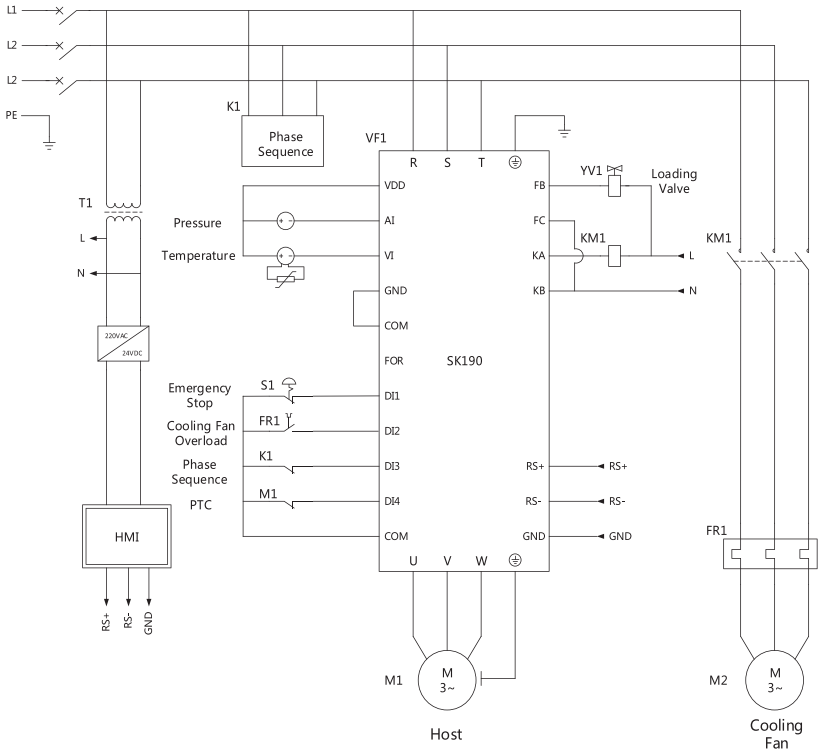
Parameters C39.00~C39.35 are user-difined parameters, and parameters C39.50~C39.85 are the index values corresponding to the parameters in C39.00~C39.35.

Because the parameter number is discontinuous, and some parameters are array parameters, it is difficult to directly read and write the parameters through one message. In order to read and write the parameters continuously, the user can set the parameter number in the C39.00~C39.35 to form a mapping relationship, and then you can read/write parameters set in group 39 by accessing the registers 60800-60835. How to use group 39, please refer to "Appendix A Modbus Communication Specification".

Chapter 7 Quick Application Guide

7.1 All in One Application with Single SK190

7.1.1 Wiring Diagram



7.1.2 Bill of Materials

No.	Name	Model	Description
1	Host Inverter	SK190	-
2	HMI	HF1070	-
3	Transformer	50VA	380V to 220V
4	Switching Power Supply	24VDC/1.1A	For HMI

5	Contactor	*	For cooling fan
6	Thermal Relay	*	For cooling fan
7	Phase Sequence Protector	*	NC
8	Temperature Transmitter	PT100 to 4~20ma	-

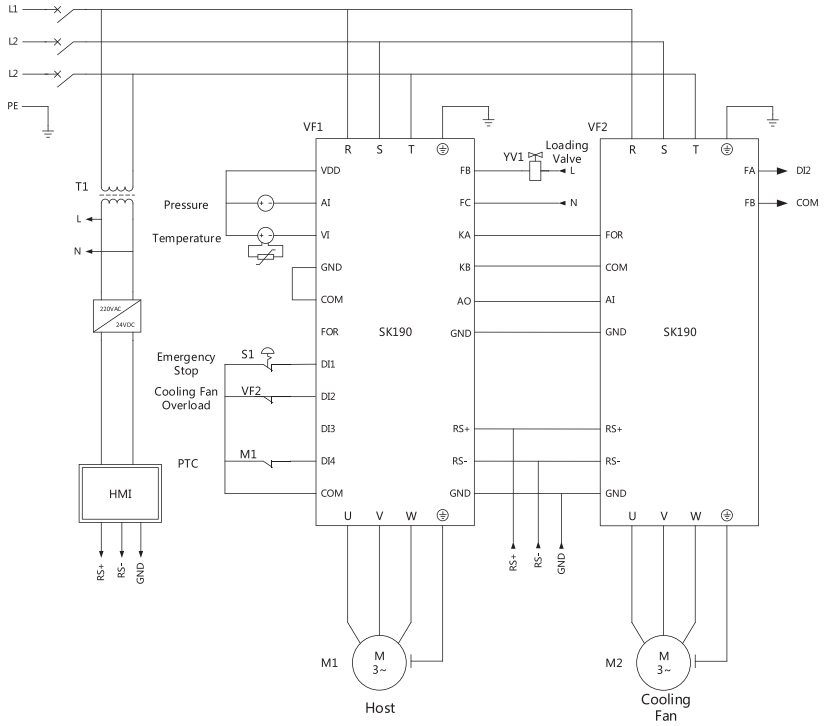
7.1.3 Parameters

No.	Par.No.	Name	Value
1	C01.07	Application Mode	5
2	C01.10	Motor Sructure	*
3	C01.24	Motor Current	*
4	C01.25	Motor Speed	*
5	C01.26	Motor Torque	*
6	C01.39	Motor Holes	*
7	C01.40	BackEMF in 1000rpm	*
8	C03.41	Ramp Up Time	*
9	C03.42	Ramp Down Time	*
10	C04.19	Max Output Frequency	*
11	C04.14	Motor Speed Upper Limit	*
12	C05.12	DI1 Function	167(Default)
13	C05.13	DI2 Function	165
14	C05.14	DI3 Function	173
15	C05.15	DI4 Function	166
16	C05.40[0]	FB-FC Function	160(Default)
17	C05.40[1]	KA-KB Function	161
18	C07.33[0]	Precess PID Proportional Gain	10(Default)
19	C07.34[0]	Precess PID Integral Time	12(Default)
20	C08.30	Protocol	2
21	C08.31	Address	1(Default)
22	C08.32	Baud Rate	2(Default)
23	C08.33	Parity/Stop Bits	2(Default)

Note: You can set all these parameters by HMI except C08.30~C08.33.

7.2 All in One Application with double SK190

7.2.1 Wiring Diagram



7.2.2 Bill of Materials

No.	Name	Model	Description
1	Host Inverter	SK190	-
2	Fan Inverter	SK190	-
3	HMI	HF1070	-
4	Transformer	50VA	380V - 220V
5	Switching Power Supply	24VDC/1.1A	For HMI
6	Temperature Transmitter	PT100 to 4~20ma	-

7.2.3 Parameters

Host Inverter

No.	Par.No.	Name	Value

1	C01.07	Application Mode	5
2	C01.10	Motor Sructure	*
3	C01.24	Motor Current	*
4	C01.25	Motor Speed	*
5	C01.26	Motor Torque	*
6	C01.39	Motor Holes	*
7	C01.40	BackEMF in 1000rpm	*
8	C03.41	Ramp Up Time	*
9	C03.42	Ramp Down Time	*
10	C04.19	Max Output Frequency	*
11	C04.14	Motor Speed Upper Limit	*
12	C05.12	DI1 Function	167(Default)
13	C05.13	DI2 Function	165
14	C05.14	DI3 Function	173
15	C05.15	DI4 Function	166
16	C05.40[0]	FB-FC Function	160(Default)
17	C05.40[1]	KA-KB Function	161
18	C07.33[0]	Precess PID Proportional Gain	10(Default)
19	C07.34[0]	Precess PID Integral Time	12(Default)
20	C08.30	Protocol	2
21	C08.31	Address	1(Default)
22	C08.32	Baud Rate	2(Default)
23	C08.33	Parity/Stop Bits	2(Default)

Fan Inverter

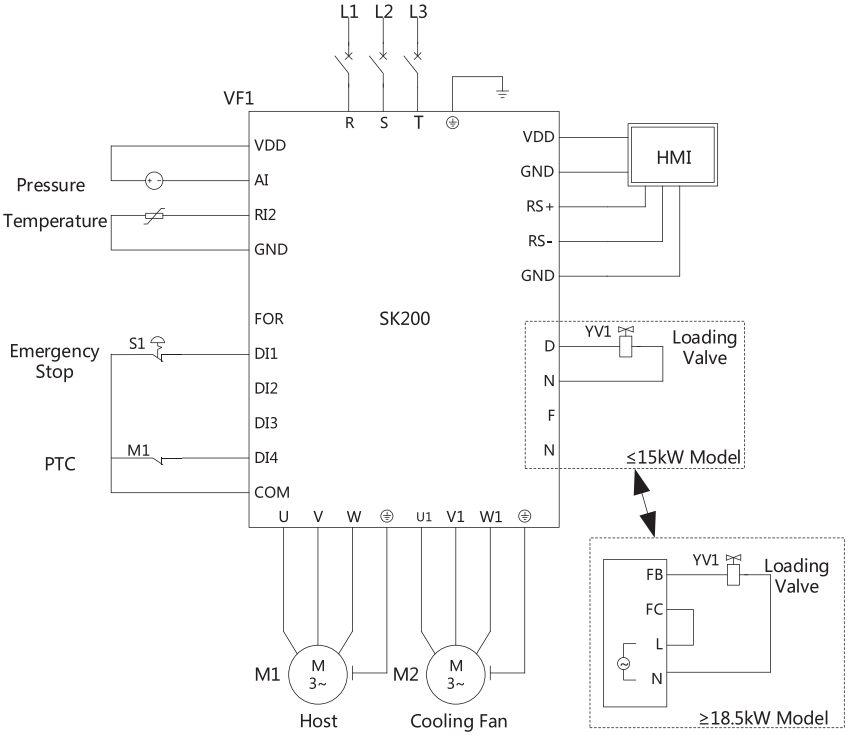
No.	Par.No.	Name	Value
1	C01.01	Motor Control Principle	*
2	C01.10	Motor Structure	*
3	C01.24	Motor Current	*
4	C01.25	Motor Speed	*
5	C01.26	Motor Torque	*
6	C01.39	Motor Holes	*
7	C01.40	BackEMF in 1000rpm	*
8	C01.82	Min. Speed for Function at Stop	50
9	C03.41	Ramp Up Time	*

10	C03.42	Ramp Down Time	*
11	C04.12	Motor Speed Lower Limit	20
12	C04.19	Motor Speed Upper Limit	*
13	C04.14	Max Output Frequency	*
14	C08.30	Protocol	2
15	C08.31	Address	2
16	C08.32	Baud Rate	2(Default)
17	C08.33	Parity/Stop Bits	2(Default)

Note: You can set all these parameters by HMI except C08.30~C08.33.

7.3 All in One Application with SK200

7.3.1 Wiring Diagram



7.3.2 Bill of Materials

No.	Name	Model	Description
1	Inverter	SK200	-
2	HMI	HF1070	-

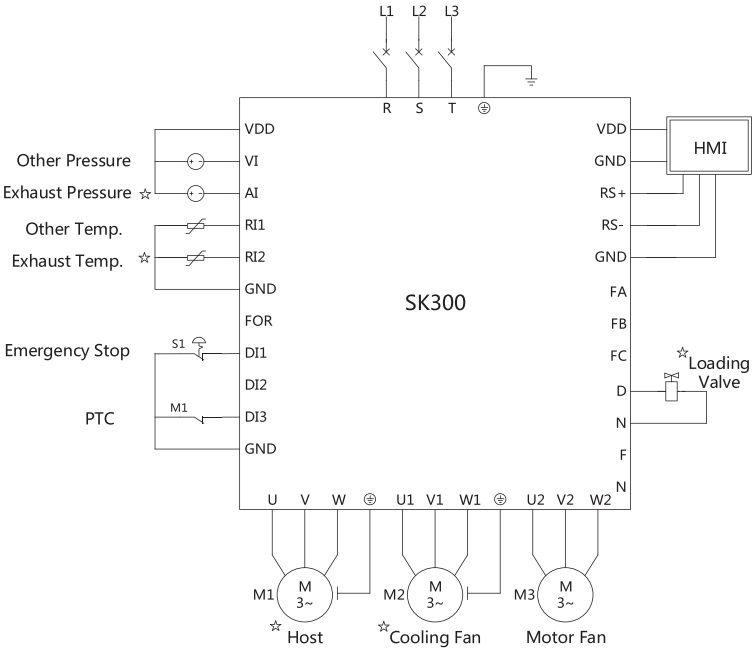
7.3.3 Parameters

No.	Par.No.	Name	Value
1	C01.07	Application Mode	5
2	C01.10	Motor Sructure	*
3	C01.24	Motor Current	*
4	C01.25	Motor Speed	*
5	C01.26	Motor Torque	*
6	C01.39	Motor Holes	*
7	C01.40	BackEMF in 1000rpm	*
8	C03.41	Ramp Up Time	*
9	C03.42	Ramp Down Time	*
10	C04.19	Max Output Frequency	*
11	C04.14	Motor Speed Upper Limit	*
12	C05.12	DI1 Function	167(Default)
13	C05.15	DI4 Function	166
14	C05.40[0]	FB-FC Function	160(Default)
15	C05.40[1]	KA-KB Function	161(Default)
16	C07.33[0]	Precess PID Proportional Gain	10(Default)
17	C07.34[0]	Precess PID Integral Time	12(Default)
18	C08.30	Protocol	2(Default)
19	C08.31	Address	1(Default)
20	C08.32	Baud Rate	2(Default)
21	C08.33	Parity/Stop Bits	2(Default)

Note: You can set all these parameters by HMI except C08.30~C08.33.

7.4 All in One Application with SK300

7.4.1 Wiring Diagram



The common componets marked with ☆ in the figure.

7.4.2 Bill of Materials

No.	Name	Model	Description
1	Inverter	SK300	-
2	HMI	HF1070	-

7.4.3 Parameters

No.	Par.No.	Name	Value
1	C01.07	Application Mode	5
2	C01.10	Motor Sructure	*
3	C01.24	Motor Current	*
4	C01.25	Motor Speed	*
5	C01.26	Motor Torque	*
6	C01.39	Motor Holes	*

7	C01.40	BackEMF in 1000rpm	*
8	C03.41	Ramp Up Time	*
9	C03.42	Ramp Down Time	*
10	C04.19	Max Output Frequency	*
11	C04.14	Motor Speed Upper Limit	*
12	C05.12	DI1 Function	167(Default)
13	C05.14	DI3 Function	166
14	C07.33[0]	Precess PID Proportional Gain	10(Default)
15	C07.34[0]	Precess PID Integral Time	12(Default)
16	C07.33[0]	Precess PID Proportional Gain	10(Default)
17	C07.34[0]	Precess PID Integral Time	12(Default)
18	C08.30	Protocol	2(Default)
19	C08.31	Address	1(Default)

Note: You can set all these parameters by HMI except C08.30~C08.33.

7.5 Communication Setting

Common usage in the air compressor industry.

Par.No.	Name	Value	Description
C08.30	Protocol	2	MODBUS RTU
C08.31	Address	1	Host: 1; Cooling Fan: 2
C08.32	Baud Rate	2	9600bps
C08.33	Parity/Stop Bits	2	No parity(1 stop bit)

7.6 Parameter Initialization

1. Set C14.22 = 2;

2. Cut off the main power and Re-power on, LCP displays "E.80";

3. Press "OFF" key on LCP;

7.7 AMA Operation

1. Press "OFF" key to stop the drive;

2. Eneter motor nameplate data to C01.20 to C01.39;

3. Choose option [1] to enable AMA;

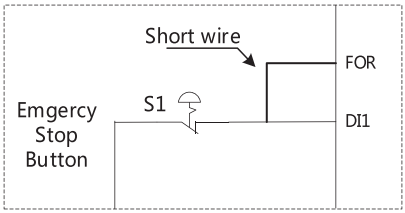
4. LCP displays "PUSH", "HAND", press "HAND" key on LCP, AMA status will be displayed;

5. Wait for the LCP displays "PUSH", "ENT", press " " key, AMA complete.

Attention: Motor must be static when starting AMA.

7.8 Emergency Start

The compressor with broken HMI is allowed to start, if it is working in AIO mode. Using a short wire to connect Terminal FOR and DI1, then the emergency stop button can work as a start/stop button. The wiring diagram is as follow:



7.9 Fault Reset

1、Manual reset

C14.23=0: Cut off and power on again, then press "OFF" key on LCP;

C14.23=1: Press "OFF" key on LCP to reset;

2、Automatic reset after power off

Par.No.	Value	Description
C14.20	1	Auto reset 1 time
C14.21	0	Reset immediately
C14.23	1(Default)	Trip lock fault reset need power off

Attention: If start command is always valid, drive will work immediately after fault reset.

Chapter 8 Faults and Solutions

The drive has three different fault types: warning, alarm and error. When a fault happens, the drive shows a specific code to indicate it.

When a warning happens, it means that the drive is close to its design limits for some reason, but the drive still works. If the drive fault disappears, the warning will also disappear. When a warning happens, LCP displays "A.XX" (XX is warning code).

An alarm means that the drive has exceeded its design limits for some reason. When this happens, the drive will trip. The driver must be reset in order to re-run. When an alarm happens, LCP displays "E.XX" (XX is alarm code).

Error means the drive is in a state and unable to carry out an operation. When an error happens, LCP display "Er.XX" (XX is error code).

When a fan error happens, LCP display "FE.xx".

Warning	Alarm	Error	Fault Description	Reason analysis
A.02	E.02	-	Live Zero Error	Please refer to C06.0 Live Zero Timeout Time.
A.03	E.03	-	Motor Loss	1. Motor cable connection problems; 2. The drive power is greater than the motor power;
A.04	E.04	-	Mains Phase Loss	1. Missing phase on supply side; 2. Too high voltage imbalance.
A.07	E.07	-	Over Voltage	1. The input voltage is too high; 2. An external force drives the motor during acceleration or deceleration; 3. The deceleration time is too short; 4. The braking unit and braking resistor are not installed.
A.08	E.08	-	Under Voltage	1. Instantaneous power failure occurs on the input power supply; 2. The drive's input voltage is not within the allowable range; 3. The rectifier bridge and buffer resistor are faulty.

A.09	E.09	-	Drive Overload	1. The load is too heavy or lockedrotor occurs on the motor; 2. The drive model is of too small power class; 3. C01.** is set improperly.
A.10	E.10	-	Motor Overload	1. C01.24 is set improperly; 2. The load is too heavy or lockedrotor occurs on the motor; 3. The drive model is of too small power class; 4. C01.** is set improperly.
-	E.11	-	Motor Over Temperature	Thermistor damage, incorrectly installed or motor cooling equipment fails.
A.12	E.12	-	Torque Limit	Torque exceeds the max. torque limit.
A.13	E.13	-	Over Current	1. The acceleration time is too short; 2. Manual torque boost or V/F curve is not appropriate; 3. The input voltage is too low; 4. The startup operation is performed on the rotating motor; 5. A sudden load is added during acceleration/deceleration; 6. The drive model is of too small power class.
A.13	E.14	-	Earth fault	Discharge from output phases to ground (22kW and below)
-	E.16*	-	Short Circuit	Short circuit in motor or on motor terminals.
A.17	E.17	-	Control Word Timeout	Drive communication timeout, this alarm occurrs when C08.04 is set to 1 or 5.
A.20	E.20	-	Low AC Voltage	AC volate lower than C14.70 value, and over 50% C14.71, LCP display A.20; when over 100% C14.71, LCP display E.20.
-	E.21	-	Over Current caused by Low Voltage	Over current when DC voltage is lower than 384V(380V Model) or 202V(220V Model),
A.24	E.24	-	Fan Fault	Too much dust on the fan or the fan is aged.
-	E.25*	-	Brake resistor short-circuit	Brake resistor is short circuit, leading the brake function invalid.

-	E.27	-	Brake transisitor short-circuit	Brake transistor is short circuit leading brake function invalid.
-	E.28	-	Brake Detect	Brake resistor is not connected or working.
-	E.30*	-	Motor phase U missing	Check the phase and motor.
-	E.31*	-	Motor phase V missing	Check the phase and motor.
-	E.32*	-	Motor phase W missing	Check the phase and motor.
A.33	E.33	-	Communication timeout with host and fan	1.Check fan inverter's power 2.Check communication cable 3.Communication jamming
A.36	E.36	-	Instantaneous power cut	Power supply is unstable
-	E.38*	-	Internal Fault	Contact the local distributor or Holip Company.
-	E.44*	-	Earth fault	1.Motor cable leakage 2.Motor leakage
-	E.46	-	IGBT driving voltage fault	Normal IGBT driving voltage is-9~+15V, the current voltage is abnormal.
-	E.47*	-	Power board voltage fault	Power board broken
-	E.48*	-	Power board voltage fault	1.24V is overloaded 2.24V output part damage
-	E.50	-	AMA Fault	-
-	E.51	-	AMA check Unom and Inom	Motor voltage and motor current error setting.
-	E.52	-	AMA Low Inom	Motor current is too low, check the settings.
-	E.53	-	AMA Motor is too large	Motor configuration is too large to perform AMA.
-	E.54	-	AMA Motor is too small	Motor configuration is too small, unable to perform AMA.
-	E.55	-	AMA Paremeter Error	Motor parameter is out of the range
-	E.56	-	AMA Interrupt	Interrupted by the user when running AMA.
-	E.57	-	AMA Time-out	AMA takes too long to run.
-	E.58	-	AMA Internal Error	Contact Local distributor or Holip Company.
A.59	E.59	-	Current Limit	Current exceeds value set in C04.18.
-	E.63	-	Mechenical Brake Current Low	Actual motor current can not exceed release brake current set in C02.20 within start delay time.

A.69	E.69	-	IGBT Over Temperature	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged; 4. The thermally sensitive resistor of the IGBT is damaged; 5. The drive IGBT is damaged.
A.74	E.74	-	Rectifier Temperature Sensor Error	Rectifier Temperature Sensor Error
A.75	E.75	-	Rectifier Temperature High	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged.
A.76	E.76	-	IGBT Temperature Sensor Error U	IGBT Temperature Sensor Error U
A.77	E.77	-	IGBT Temperature Sensor Error V	IGBT Temperature Sensor Error V
A.78	E.78	-	IGBT Temperature Sensor Error W	IGBT Temperature Sensor Error W
-	E.80	-	Parameter Initialization	Make parameter initialized.
A.83	E.83	-	Power Board Over Temperature	1. The ambient temperature is too high; 2. The air filter is blocked; 3. The fan is damaged.
-	E.88*	-	Power Board 24V Fault	1. Cooling fan of drive is broken 2. Power for drive's fan failed
A.96	-	-	Drive disabled	Using time of drive reach the maximum value
A.101	-	-	Low Voltage Frequency Limit	See C04.28/C04.29 for more information.
A.102	E.102	-	External Fault 43	External Fault, some terminal DI is set to 43
A.104	-	-	Reach the Setting Power	See C04.23/C04.24 for more information.
A.116	-	-	User 1 is Locked	Please contact the manufacturer
A.117	-	-	User 2 is Locked	Please contact the manufacturer
A.124	-	-	Internal Fan Fault	Internal cooling fan short circuit or not running
-	E.126	-	AMA Fault	-
-	E.148	-	Low Voltage of 24V DC on IO Board	1.24V is overloaded 2.24V output part damage
A.160	E.160	-	High Exhaust Pressure	The exhaust pressure reaches the warning/alarm value

A.161	E.161	-	High Exhaust Temperature	The exhaust temperature reaches the warning/alarm value
A.162	E.162	-	Motor Over Temperature	The motor temperature reaches the warning/alarm value
A.163	E.163	-	Oil Filter need Maintence	The using time of oil filter reaches the warning/alarm value
A.164	E.164	-	Oil Seperator need Maintence	The using time of oil seperator reaches the warning/alarm value
A.165	E.165	-	Air Filter need Maintence	The using time of air filter reaches the warning/alarm value
A.166	-	-	Oil Filter Clogging	Please replace the oil filter
A.167	E.167	-	Oil Seperator Clogging	Please replace the oil seperator
A.168	-	-	Air Filter Clogging	Please replace the air filter
-	E.168	-	Phase Sequence Detection Timeout	Three times of pahse sequence detecting are inconsistent
A.169	E.177	-	Grease need replacing	Please replace the grease
-	E.169	-	Transformer Short Circuit	External 220V devices short circuit
A.170	E.178	-	Lube need replacing	Please replace the lube
-	E.170	-	Cooling Fan cannot start	Host send a command to start cooling fan, but fan's current can't be detected.
-	E.171	-	Temperature sensor Fault	Temperature sensor is broken or disconnected
-	E.172	-	Pressure sensor Fault	Pressure sensor is broken or disconnected
A.173	E.173	-	Cooling Fan Overload	1. Fan is blocked 2. Check the rated current
-	E.174	-	External Fault 168	External Fault, some terminal DI is set to 168
-	E.175	-	Phase Sequence Fault	Check the phase sequence
A.176	E.176	-	Max Using Time Limit	Total running time reach the maximum time
-	E.179	-	Low Temperature of Oil	Actual temperature is below the minimum allowable value
A.180	E.180	-	Motor Fan Overlaod	1. Fan is blocked 2. Check the rated current
-	E.181	-	Motor Fan cannot Run	Host send a command to start motor fan, but fan's current can't be detected.
A.182	E.182	-	RI1 Over Temperature	RI1's temperature is over the maximum allowable value

A.183	E.183	-	VI Over Pressure	VI's pressure is over the maximum allowable value
-	E.184	-	RI1 Sensor Fault	RI1 > 170°C or < -60°C
-	E.185	-	RI3 Sensor Fault	RI1 > 170°C or < -60°C
-	E.186	-	VI Sensor Fault	VI value < 3mA
-	E.189	-	Low Pressure of Oil Pump	Pressure of oil pump is still low, after a start command given by host for a long time
-	E.190	-	Oil Pump cannot Run	Host send a command to start oil pump, but can't detect a singnal from terminal DI.
-	-	Er.84	LCP Connection with the drive failed	No communication between LCP and the drive.
-	-	Er.85	Button is disabled	Refer to parameter group C00.4*.
-	-	Er.89	Parameter read-only	Try to write read-only parameter.
-	-	Er.91	Parameter value is invalid in this mode	Invalid parameter value to write.
-	-	Err	Unchangbale	Parameter is freezed or can't be changed during running.
-	-	-	Dormancy 31# Overload	Host goes to dormancy , due to drive overload
-	-	-	Dormancy 32# Drive over Temperature	Host goes to dormancy , due to drive over temperture
-	-	-	Dormancy 33# Higher Pressure	Host goes to dormancy , due to the overpressure of exhaust pressure
-	-	-	Dormancy 34# Higher Temperature	Host goes to dormancy , due to the overtemperature of exhaust temperature
-	-	-	Dormancy 35#Motor over Temperture	Host goes to dormancy , due to the overpressure of motor
-	A.F01	-	Cooling Fan - Internal Fault	Contact the local distributor or Holip Company.
-	A.F02	-	Cooling Fan - Over Current	The description is same as E.13
-	A.F03	-	Cooling Fan – Earth Fault	The description is same as E.14
-	A.F04	-	Cooling Fan - Short Circuit	The description is same as E.14
-	A.F05	-	Cooling Fan - IGBT Over Temperature	The description is same as E.16
-	A.F06	-	Cooling Fan – Drive Overload	The description is same as E.09

-	A.F07	-	Cooling Fan -Motor Overload	The description is same as E.11
-	A.F08	-	Cooling Fan – Other Faults	See detail by connecting LCP to Fan drive

Note: Trip-lock alarm is with *.

Chapter 9 Maintenance

9.1 Note

Confirm the main circuit power supply has been turned off, and the display has disappeared before carrying out inspection and maintenance. Make sure the system is in dynamic state, please pay attention to the following:

- Check whether the power supply voltage matches to the rated voltage of the drive;
- Check whether the motor makes unexpected noises or abnormal vibration when running;
- Check whether there is abnormal heating;
- Check whether the drive output voltage, output current, output frequency, and monitor display is greater than the value commonly used.
- Check whether the cooling fan installed at the lower part of the drive runs normally;
- Check whether the ambient temperature is too high and whether there is dust, iron filings, corrosive fluid in the drive;
- Check whether the ambient temperature of the drive is between -10 ℃ ~40 ℃ , and whether the humidity is between 5%-85% (95% is without condensation), phenomenon of water droplets is not allowed;

The drive should be discarded as industrial waste. It is forbidden to burn it;

9.2 Storage and Transport

The drive must be kept in its original package box before installation. Pay attention to the followings when keeping it in storage if the drive is not used for the time being:

- It must be stored in a dry place without rubbish or dust;
- The suitable temperature for storage is between -25℃ ~65℃ ;
- The relative humidity required is 5%~95% without condensation;
- There is no corrosive gas or liquid in the storage ambience;
- It is better to lay the drive on a rack and keep it in a proper package;

- The ambient temperature for transport is between -25℃ ~70℃ ;
- The relative humidity of transport ambience must be less than 95% (Ambient temperature is 40℃).

Attention: It is better not to store the drive for long time. Long time storage of the drive will lead to the deterioration of electrolytic capacity. If it needs to be stored for a long time make sure to power it up one time within a year and the power-up time should be at least above five hours. When powering up, supply voltage must be increased slowly with a voltage regulator to the rated voltage value.

Appendix A Modbus Communication Specification

The drive provide RS485 communication interface. It adopts international standard Modbus communication protocol to perform master-slave communication. The user can realize centralized control through PC/PLC to adapt specific application requirements.

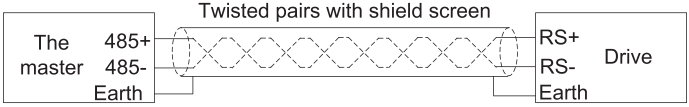
A.1 Interface Mode

A.1.1 Interface Mode

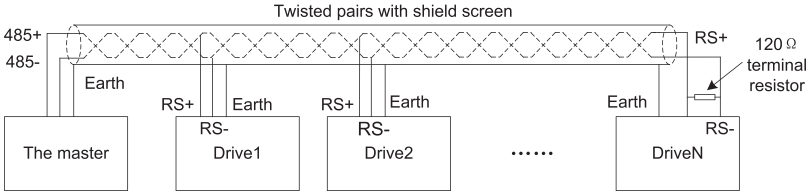
The communication interface is RS485. RS485 works on semiduplex and its data signal applies differential transmission which is called balance transmission too.

A.1.2 Networking Mode

The drive has two networking modes: single master/multiple slaves networking and single master/single slave networking.



Single master/single slave networking diagram



Single master/multiple slaves networking diagram

Specification:

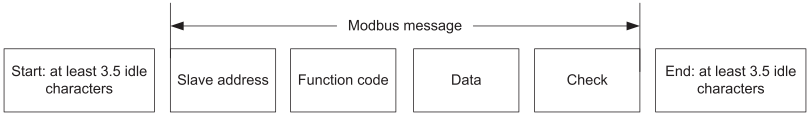
1. No matter which mode, the drive is used as a slave in communication. When master sends commands using broadcast address, the slave does not respond;

2. It is recommended to use shield cables in multiple connection. The basic parameter of the devices, such as baud rate and digital check bit in RS485 should be the same as

slave device's and there should be no repeated addresses in slave devices.

A.2 Protocol Format

Modbus protocol supports RTU mode. RTU data frame format is shown as the figure below:



Specification:

Start	at least 3.5 idle characters
Slave address	Address: 0-247 (0 is broadcast address)
Function code	Modbus function code
Data (N-1)	2 * N data
Data (N-2)	
…	
Data 0	
CRC CHK high-8-bit	CRC check
CRC CHK low-8-bit	
End	at least 3.5 idle characters

A.3 Function Code

Function code supported by the drive Modbus protocol are as shown in the table below:

Function code	Description	Meaning
0x03	Read Holding Registers	Read drive functional parameters and running status parameters
0x06	Preset Single Register	Over-write individual drive functional parameters
0x10	Preset Multiple Regs	Over-write multiple drive functional parameters

A.4 Register Address Definition

All the following register addresses are started from 0.

A.4.1 The Rules of Register Address of the Parameter Number

The parameters can be mapping to register address. The rules of register address of the

parameter number are shown below:

$$\text{Register address} = \text{PNU} \times 10 - 1$$

For example:

The register address of C03.03 is 303 × 10 - 1 = 3029 (0x0BD5)

The register address of C16.13 is 1613 × 10 - 1 = 16129 (0x3F01)

A.4.2 Other Register Addresses Specification

In addition to parameter number is mapped to Modbus registers, there are some additional registers within the drive which can be used to control the drive, monitor the drive's status.

Address	Specification	R/W
6	The internal error code of last communication error	R
7	Register address of last occurred communication error	R
8*	Parameter index	R, W
2809*	Control command	R, W
2810*	Communication reference	R, W
2909	State word	R
2910*	Output frequency ratio	R
2911	Output current	R
2912	DC bus voltage	R
2913	Output voltage	R
2914	Output frequency	R
2915	Feedback	R
2916	Reserved	R
2917	Alarm code	R

Written by communication:

C01.07=0 AIO mode off		
51000	Control command	W
51001	Frequency command(0~Fmax, Unit 0.1Hz)	W
51002	Communication reference	W

51003	Bit0: DO1 output control; Bit1: DO2 output control; Bit2: Reserved; Bit3: Reserved; Bit4: Relay 1 output control; Bit5: Relay 2 output control; Bit6~12: Reserved;	W
51004	VO output control 0~10000 indicates 0.00~100.00%	W
51005	AO output control 0~10000 indicates 0.00~100.00%	W
51006	DO1 pulse output control 0~10000 indicates 0.00~100.00%	W
C01.07=5 AIO mode on		
51000	Control command 1: Start 2: Stop 3: Reset fault 4: Load 5: Unload 6: Fan 1(Cooling fan) Jog start 7: Fan 1(Cooling fan) Jog stop 8: Reserved 9: Clear run time 10: Clear load time 11: Load/unload 12: Host Jog start 13: Host Jog stop 14: Fan 2(Cooling fan) Jog start 15: Fan 2(Cooling fan) Jog stop	W
51001	Frequency setting when C28.00[1]=1(0~Fmax, unit 0.1Hz)	W
51002	Frequency setting when C28.00[1]=1(0.00~100.00%)	W

Read by communication:

Address	Specification	Scale	Type	Refer to
51100*	Alarm code 1	1	*	See below
51101*	Alarm code 2	1	*	See below
51102*	Warning code 1	1	*	See below
51103*	Warning code 2	1	*	See below

51104*	Fan status&alarm	1	*	See below
51105	System status	1	Bit	C28.84
51106	Countdown time	1	s	C28.83
51107	Command source	*	*	C28.85
51108	Exhaust pressure	0.01	MPa	C28.80[0]
51109	Exhause temperature	1	°C	C28.81[0]
51110	VI pressure	0.01	MPa	C28.80[1]
51111	RI1temperature	1	°C	C28.81[1]
51112	Single power consumption	0.1	kWh	C28.88(16 位)
51113	Single run time	1	h	C28.86
51114	Single run time	1	min	C28.87
51115	Total run time	1	h	C28.57
51116	Total run time	1	min	C28.58
51117	Total load time	1	h	C28.59
51118	Total load time	1	min	C28.60
51119	Host output frequency	0.1	Hz	C16.13
51120	Host output voltage	1	V	C16.12
51121	Host output current	0.1	A	C16.14
51122	Host output power	0.1	kW	C16.10
51123	Host output speed	1	rpm	C16.05
51124	Host DC bus voltage	1	V	C16.30
51125	Cooling fan output frequency	0.1	Hz	-
51126	Cooling fan output current	0.01	A	-
51127	Cooling fan output speed	1	rpm	-
51128~29	Reserved	-	-	-

*Reg. 51100~51104 specification

The following address have different meanings according to the setting of C08.29.

Address	Description	C08.29	
		0	1
51100*	Alarm code 1	Bit, see below	Host alarm code
51101*	Alarm code 2	Bit, see below	Reserved
51102*	Warning code 1	Bit, see below	Host warning code
51103*	Warning code 2	Reserved	Cooling fan alarm code
51104*	Fan status&alarm	Bit, see below	Cooling fan status word

C08.29=0:

Bit	Modbus address			
	51100	51101	51102	51104
0	Host alarm	E.160	-	AF.01
1	E.13	E.161	A.160	AF.02
2	E.14	E.162	A.161	AF.03
3	E.16	E.171	A.162	AF.04
4	E.04	E.172	A.163	AF.05
5	E.09	E.174	A.164	AF.06
6	E.69	E.175	A.165	AF.08
7	E.11	-	A.166	Coolin fan alarm
8	E.30/31/32	Emergency stop	A.167	Cooling fan running
9	E.75	E.173	A.168	Cooling fan jogging
10	-	-	A.169	-
11	-	-	A.170	-
12	-	-	A.11	-
13	-	-	A.33	-
14	-	-	-	-
15	-	-	-	-