

VEICHI

Manual

SD650 Series Servo Driver

VEICHI

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Operation Qualification

All the products must be performed by trained professionals for installation, wiring, operation, maintenance and other operations. The "trained professionals" referred in this manual must undergo professional training, being familiar with the installation, wiring, operation and maintenance of the equipment and must be able to handle with all kinds of arising emergencies.

Safety Guidance

Safety rules and warning signs are set for users' safety and to prevent personal injury, damage of product and associated systems; to ensure safe, reliable and rational use of this product, please fully understand the safety precautions described in this manual before use.

Safety rules and warning signs are divided into the following categories: routine guidance, transportation and storage guidance, installation guidance wiring, operation and maintenance guidance, as well as dismantlement and disposal guidance.

• Routine Guidance

	<ul style="list-style-type: none"> • This product contains dangerous voltage and it controls the movement mechanism with potential danger. There might be accidents like personal injury and damage to the product and associated systems if requirements in this manual are not followed. • Only trained personnel should operate this product, and before using the product in this manual the personnel should be familiar with all safety instructions and regulations of the operation; proper operation and maintenance are the key to achieve security and stability of the product. • No wiring when power on. Otherwise, there might be danger of electric shock; when operating wiring, inspection, maintenance and other operations, please turn off the power of all related equipment and make sure the main circuit DC voltage has dropped to security level, and wait for five minutes before any relevant job.
	<ul style="list-style-type: none"> • Away from children and public. • This product could only be used in special areas specified by the manufacturer and should not be used in fields like emergency, rescue, marine, medical, aerospace, nuclear facilities without permission. • Unauthorized alteration or use of accessories not sold or recommended by the manufacturer may cause a malfunction.
	<ul style="list-style-type: none"> • Please make sure this manual is in the final user's hand before use. • Before installation and debugging please carefully read and totally understand these safety regulation and warning signs.

• Transportation and Storage Guidance

	<ul style="list-style-type: none"> • Correct transportation, storage, installation, and careful operation and maintenance are essential for the safe operation of the servo driver.
	<ul style="list-style-type: none"> • In transport and store process, make sure the servo driver is free from shock and vibration. It must be stored in places dry without corrosive air and conductive dust, and the temperature must be lower than 60 °C.

• Installation and Wiring Guidance

 Warn	<ul style="list-style-type: none"> • Only trained personnel can operate. • Power lines, motor lines, control lines must be connected tightly, and the ground terminal must be grounded, and the grounding resistance must be less than 10Ω. • Before opening the servo driver panel, turn off the power of all related equipment, and make sure the main circuit DC voltage has dropped to a safe level, and wait five minutes before any relevant job. • Human body electrostatic would seriously damage the inner sensitive components. Before operation, please follow ESD measures. Otherwise, there might be danger of servo driver damage. • The voltage of the servo driver outputs in form of pulse wave, and if capacitor that improve power factor that is against thunder is installed on the output side, make sure to dismantle them or modify them to the input side of the servo driver. • No switch components such as breaker and contactor at the output side. (If there must be one, please make sure the output current is 0 while the switch acting).
 Caution	<ul style="list-style-type: none"> • The power supply cable and motor cable specifications must satisfy all conditions in this manual.

• Running Guidance

 Warn	<ul style="list-style-type: none"> • Servo driver runs at high voltage. So dangerous voltage is in some components inevitably. • No matter where the fault is, there is danger of serious accident, even human body injury which means dangerous malfunction possibility. So there must be additional external preventing measures or other safety devices, such as independent current limiting switch, machinery fence and so on. • In order to ensure that the motor overload protection can operate correctly, motor parameters must exactly match the motor in use.
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• Maintenance Guidance

 Warn	<ul style="list-style-type: none"> • Maintenance and service of this product can only be done by the service sectors or authorized service center of Veichi Electric Co., Ltd or professional person trained and authorized by Veichi. And these personnel should be familiar with the safety warnings and proposed operating essentials referred in this manual. • Any defective components must be changed in time. • Before opening the equipment, be sure to disconnect the power, and make sure the main circuit DC voltage has dropped to a safe level, and wait five minutes before any relevant job
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• Dismantlement and Disposal Guidance

 Caution	<ul style="list-style-type: none"> • The servo driver's packaging is reusable, please keep the packaging for future use or please return it to the manufacturer. • Dismantlement of metal components can be recycled. • Some components such as electrolytic capacitor are harmful to the environment. Please dispose according to the requirements of environmental protection departments.
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1.2 Technical Criterion

Items		Criterion
Power input	Voltage, frequency	three-phase 380V 50 / 60Hz
	Allowable fluctuations	Voltage:±15%, Frequency±5% Distortion rate: meet IEC61800-2 requirements
	Closing inrush current	Lower than rated current
	Power factor	≥0.94(with DC reactor)
	servo driver efficiency	≥96%
Output	Output voltage	Under nominal conditions Output: 3 phase, 0 to the input voltage, the error is less than 5%;
	Output frequency range	0 ~ 320 Hz (320 Hz or more can be factory customized)
	Output frequency accuracy	±0.1%
	Overload capacity	150% of rated current for 60 seconds;180% of rated current for 5 seconds, max 2.5 times
	Modulate mode	SVPWM
	Carrier frequency range	2.0~8.0kHz (model set)
	Rotating-speed accuracy	Digital setting: max speed × ±0.01%; Analog setting: max frequency × ±0.2%
	Rotating-Speed resolution	Digital setting: 1rpm Analog setting: Max speed×0.05%
	Acceleration/Deceleration curve	Two ways: one linear acceleration and deceleration, S-curve acceleration and deceleration;
	Energy-saving running	Depending on the load condition, automatically optimizing the output voltage to save energy.
	Current auto-limiting	Auto-limit the current while running to prevent frequent over current break trouble.
	Standard functions	Oil pressure closed loop control, Speed control,RS485,Analog output
	Rotating-speed setting channel	Keyboard digital setting, analog voltage/current terminal AI1,analog voltage/current terminal AI2,analog voltage/current terminal P-AI, communication given and multi-channel terminal selection, main and auxiliary channel combinations
	Feedback input channel	Voltage/current terminals AI1, voltage/current terminals AI2, voltage/current terminals P-AI, communication given.
	Running command channel	Operation panel given, external terminal given, communication given.
	Input command signal	Start, stop, FOR/REV, JOG, multi-speed, free stop, reset, acceleration/Deceleration time selection, frequency set channel selection, external fault alarm.

	External output signal	2- relay outputs, 1-transistor output; 2-analog output, voltage output range: 0-10V/0-10V, current output range: 0-20mA/0-20mA	
	Protection function	Overvoltage, under voltage, current limiting, over-current, overload, overheating, data protection	
Keyboard display	LED display	Single row 5 digital tube display	Can monitor one state variable
	State monitoring	Pressure command, pressure feedback, given speed, speed feedback, flux command, output current, output voltage, output torque, output power, DC bus voltage, module temperature, motor temperature, input terminal X connect state, output terminal Y connect state etc.	
	fault alarm	Self-learning anomaly, sensor feedback disconnection, motor overheating, driver overheating, encoder failure, communication failure, overvoltage, under voltage, over-current, short circuit, phase, overload, stall, current limit, destruction of data protection, Current operating fault, history fault	
Environment	Installation site	Indoor, altitude $\leq 1000\text{m}$, no corrosive air or direct sunshine	
	Temperature, humidity	-10-+40℃ 20%-90%RH(no condensation)	
	Vibration	0.5g	
	Storage temperature	-25- +65℃	
	Installation method	Hanging type, cabinet type	
	Protection level	IP20	
	Cooling method	Forced air cooling, liquid cooling	

Table 1-1: Technic criterion

Chapter 2. Product Information

2.1 Purchase Inspection

On receiving your order, please check the package and confirm intact before opening, and check if there's any damage, scratch or dirt (damages caused during transportation are not within the company's warranty). If there's any damage caused during transportation, please contact us or the transport company immediately.

After confirming the receipt of the goods intact, please re-confirm if the product and your order are consistent. Model of the product is on the "MODEL" column. If you find the product model is not the one you ordered, please contact the dealer you purchased the product or the sales department of VEICHI immediately.

2.2 Nameplate

Nameplate Position and Content

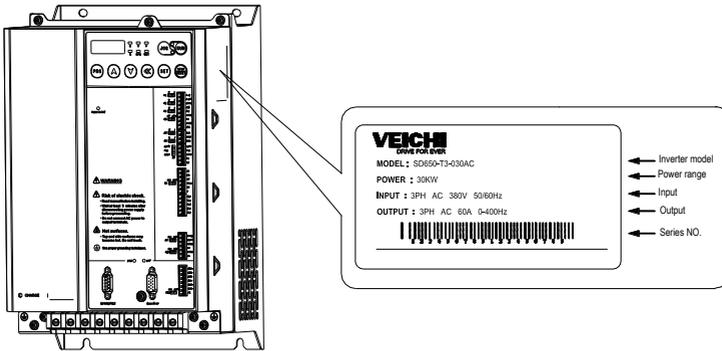


Fig 2-1: Nameplate Position and Content

Model Specification

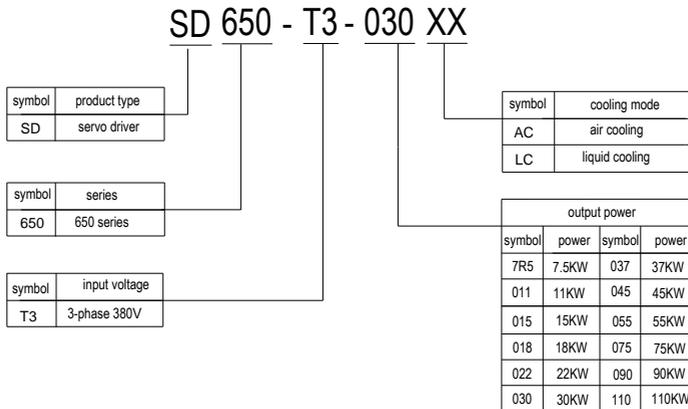


Fig 2-2: Meaning and Naming Rules of SD650 Series Servo Driver Nameplate

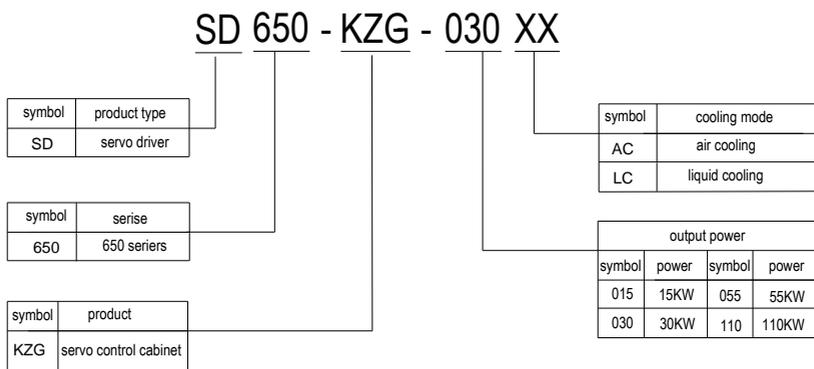


Fig 2-3: Meaning and Naming Rules of SD650 Series Control Cabinet Nameplate

2.3 Standard Models and Rated Parameters

Model	Max adaptive synchronous motor	Rated current	Model	Max adaptive synchronous motor	Rated current
SD650-T3-7R5AC	7.5kW	17A	SD650-T3-037AC	37kW	75A
SD650-T3-011AC	11kW	25A	SD650-T3-045AC	45kW	90A
SD650-T3-015AC	15kW	32A	SD650-T3-055AC	55kW	110A
SD650-T3-018AC	18kW	38A	SD650-T3-075AC	75kW	150A
SD650-T3-022AC	22kW	45A	SD650-T3-090AC	90kW	180A
SD650-T3-030AC	30kW	60A	SD650-T3-110AC	110kW	210A

Table 2-1:SD650 Series Servo Driver (air cooling) Specification and Rated Parameters

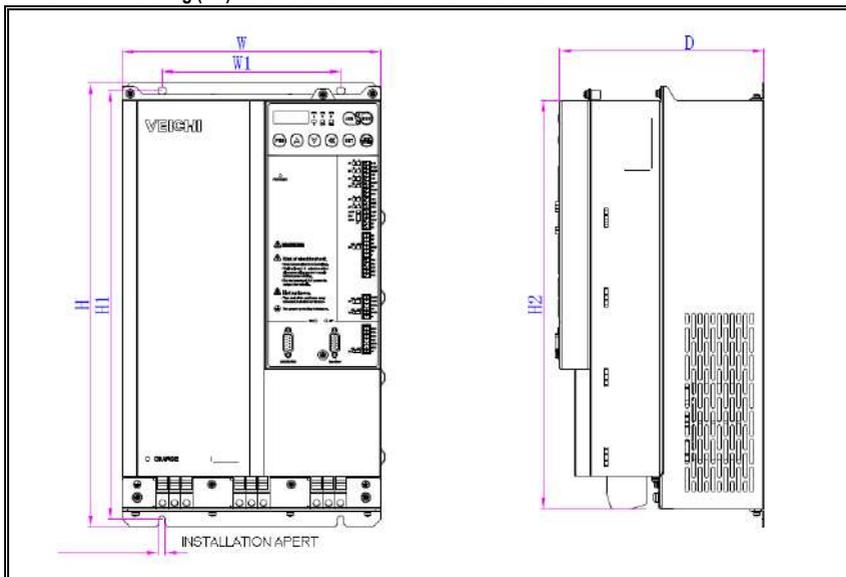
Model	Max adaptive synchronous motor	Rated current	Model	Max adaptive synchronous motor	Rated current
SD650-T3-7R5LC	7.5kW	17A	SD650-T3-037LC	37kW	75A
SD650-T3-011LC	11kW	25A	SD650-T3-045LC	45kW	90A
SD650-T3-015LC	15kW	32A	SD650-T3-055LC	55kW	110A
SD650-T3-018LC	18kW	38A	SD650-T3-075LC	75kW	150A
SD650-T3-022LC	22kW	45A	SD650-T3-090LC	90kW	180A
SD650-T3-030LC	30kW	60A	SD650-T3-110LC	110kW	210A

Table 2-2:SD650 Series Servo Driver (liquid cooling) Specification and Rated Parameter

Chapter 3. Installation and Wiring

3.1 Overall Dimension

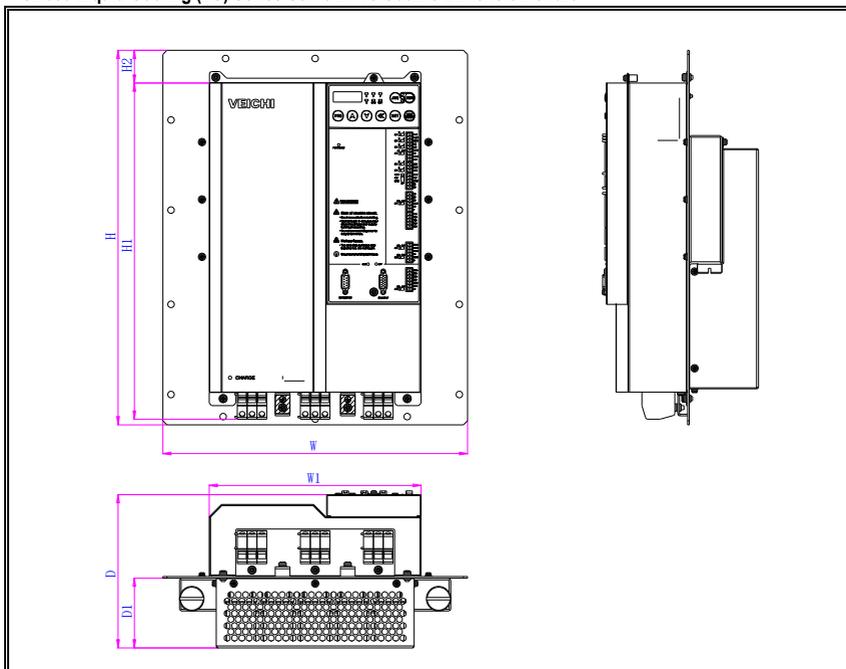
● SD650 Air Cooling (AC) Series Servo Drive Outline Dimension Chart



MODEL	Overall Dimension				Mounting Aperture		Mounting Aperture Diameter
	W	H	H2	D	W1	H1	
SD650-T3-7R5AC	210mm	328mm	294mm	165mm	160mm	314mm	φ7mm
SD650-T3-011AC							
SD650-T3-015AC							
SD650-T3-018AC	260mm	446mm	410mm	202mm	180mm	430mm	φ7mm
SD650-T3-022AC							
SD650-T3-030AC							
SD650-T3-037AC	320mm	568mm	518mm	272mm	180mm	543mm	φ10mm
SD650-T3-045AC							
SD650-T3-055AC							
SD650-T3-075AC	390mm	621mm	565mm	312mm	240mm	596mm	φ11mm
SD650-T3-090AC							
SD650-T3-110AC							

Table 3-1: SD650 Air Cooling (AC) Series Servo Drive Outline Dimension Chart

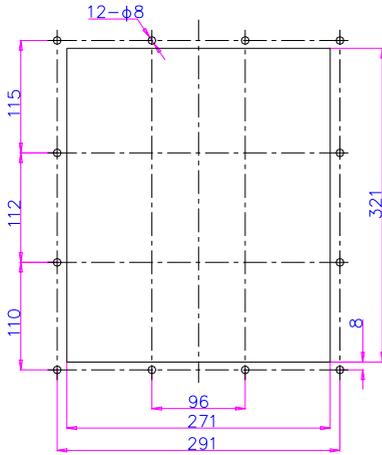
● SD650 Liquid Cooling (LC) Series Servo Drive Outline Dimension Chart



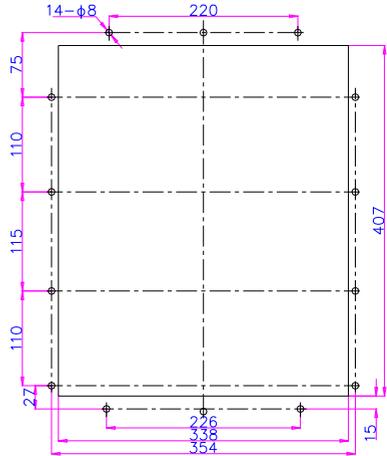
MODEL	W	W1	H	H1	H2	D	D1
SD650-T3-7R5LC	311mm	210mm	357mm	292mm	30mm	165mm	72mm
SD650-T3-011LC							
SD650-T3-015LC							
SD650-T3-018LC	374mm	260mm	457mm	410mm	40mm	187mm	85mm
SD650-T3-022LC							
SD650-T3-030LC							
SD650-T3-037LC	432mm	320mm	598mm	518mm	40mm	297mm	138mm
SD650-T3-045LC							
SD650-T3-055LC							
SD650-T3-075LC	535mm	390mm	635mm	550mm	42.5mm	337mm	138mm
SD650-T3-090LC							
SD650-T3-110LC							

Table 3-2: SD650 Liquid Cooling (LC) Series Servo Drive Outline Dimension Chart

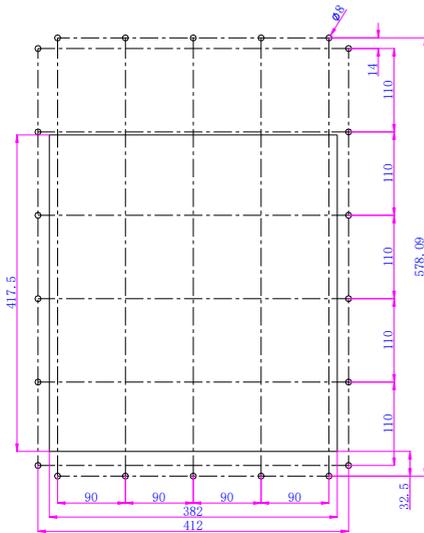
● SD650 Liquid Cooling (LC) Series Servo Driver Mounting Holes Diagram:



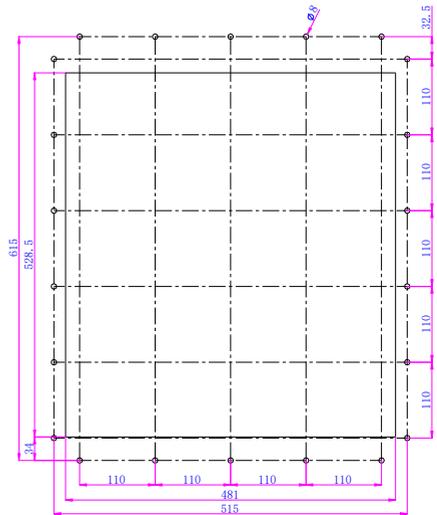
7.5kW-15kW Mounting Holes Diagram



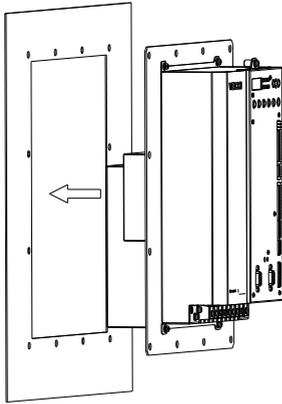
18.5kW-30kW Mounting Holes Diagram



37kW-55kW Mounting Holes Diagram



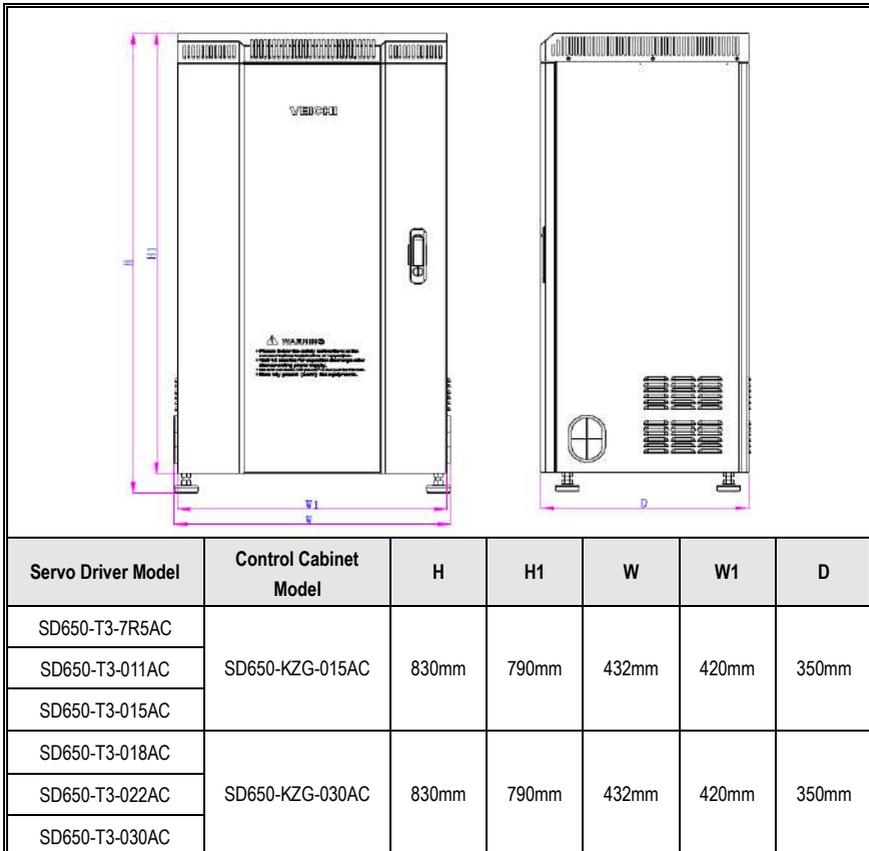
75kW-110kW Mounting Holes Diagram



Mounting Holes Diagram

Fig 3-1: SD650 Liquid Cooling (LC) Series Servo Driver Mounting Holes Diagram

• SD650 Series Servo Control Cabinet Dimensions



SD650-T3-037AC	SD650-KZG-055AC	950mm	910mm	492mm	480mm	370mm
SD650-T3-045AC						
SD650-T3-055AC						
SD650-T3-075AC	SD650-KZG-110AC	1000mm	960mm	562mm	550mm	450mm
SD650-T3-090AC						
SD650-T3-110AC						
SD650-T3-7R5LC	SD650-KZG-015LC	730mm	690mm	422mm	410mm	286mm
SD650-T3-011LC						
SD650-T3-015LC						
SD650-T3-018LC	SD650-KZG-030LC	830mm	790mm	422mm	410mm	300mm
SD650-T3-022LC						
SD650-T3-030LC						
SD650-T3-037LC	SD650-KZG-055LC	950mm	910mm	472mm	460mm	355mm
SD650-T3-045LC						
SD650-T3-055LC						
SD650-T3-075LC	SD650-KZG-110LC	1000mm	960mm	592mm	580mm	400mm
SD650-T3-090LC						
SD650-T3-110LC						

Table 3-3: SD650 Series Servo Driver Control Cabinet Dimensions

3.2 Standard Connection Diagram

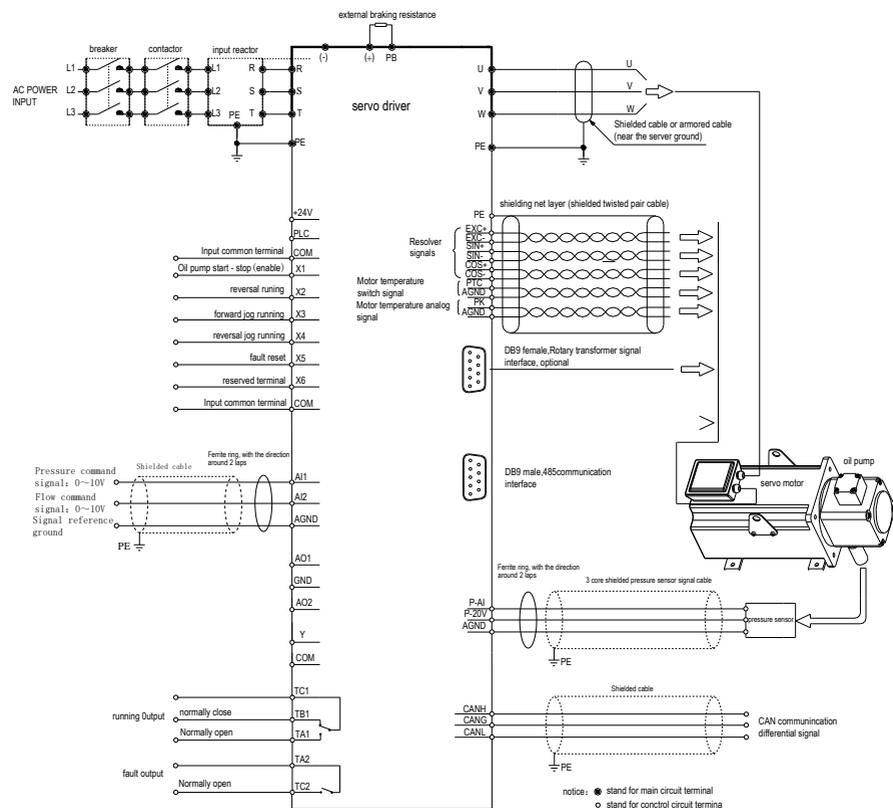


Fig 3-2: SD650 Series Servo Driver Control Wiring Diagram

Note 1.NPN or PNP transistor signal can be selected as input of multi-function input terminal (X1-X6) servo driver built-in power supply (+24V terminal) or external power supply (PLC terminal) can be chosen as bias voltage.

Note 2.Analog signal, resolver signal, communication and other signal wiring, Should use Twisted-pair shielded cable; relay signal, X terminal, Y terminal and other signal wiring, Recommend using twisted-pair cable.

- Auxiliary Terminal Output Capacity

Terminal	Function Definition	Max Output
+20V	20V auxiliary power supply output, constitutes loop with GND.	20mA
AO1/AO2	Analog monitor output, constitutes loop with GND.	Voltage or Current output, Output range:0-10V/4-20mA
+24V	24V auxiliary power supply output, constitutes loop with COM.	100mA
TA1/TB1/TC1	Operation output, TB1-TC1 normal close, TA1-TC1 normal open, TC1 common terminal.	Contact capacity: AC240V/3A, DC30V/5A.
TA2/TC2	Fault output, Normal open.	
Y	Open collector output	24V/50mA

Table 3-4:SD650 Series Servo Driver Auxiliary Terminals Output Capacity

3.3 Main circuit connection diagram and Device Selection

- Main Circuit Connection Diagram

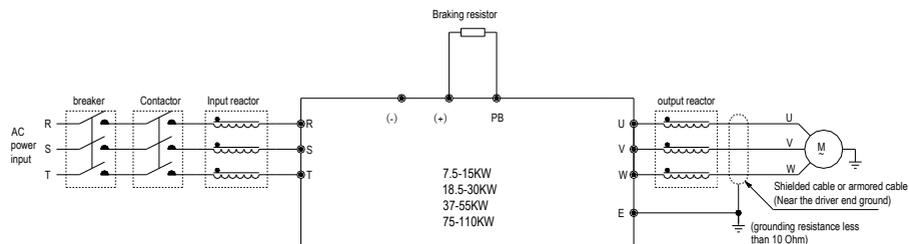


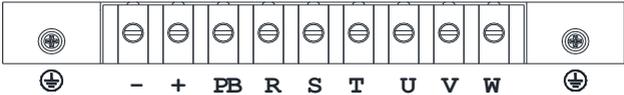
Fig 3-3: SD650 Series Servo Drive Main Circuit Wiring Diagram

Notes: Fuse, Brake unit, Brake resistance, input reactor, Input filter, Output reactor are optional parts.

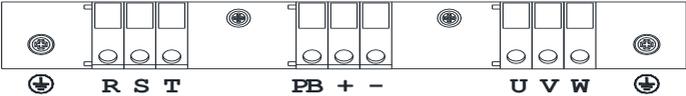
• Main Circuit Terminals

- Main circuit terminals array and definition

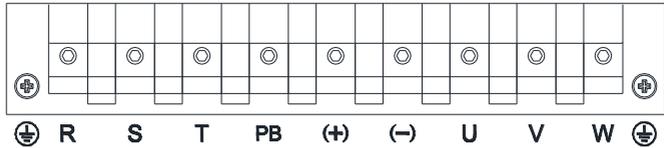
Arrangement sequence of main circuit terminal with 7.5-15KW:



Arrangement sequence of main circuit terminal with 18.5-30KW:



Arrangement sequence of main circuit terminal with 37-110KW:



Terminal Symbol	Name	Function Definition
(+)	Braking resistance terminal	Used for external braking resistance to realize quick stop.
PB		
R	input terminal	Used to connect 3-phase AC power supply.
S		
T		
U	servo driver output terminal	Used to connect the motor.
V		
W		
⊕	Earth	Earth terminal, earth resistance<10Ω
PE		

Table 3-5: Main Circuit Terminals Array and Definition

- SD650 Main Circuit Wiring

Model	Main Circuit Terminals Screw Specifications	Suggested Fixed Moment (N·m)	Suggested Copper-core Cable Specification mm ² (AWG)
SD650-T3-7R5AC/LC	M4	1.2-1.5	6mm ² (9)
SD650-T3-011AC/LC	M4	1.2-1.5	10mm ² (7)
SD650-T3-015AC/LC	M4	1.2-1.5	10mm ² (7)
SD650-T3-018AC/LC	M5	2.0-2.5	16mm ² (5)
SD650-T3-022AC/LC	M5	2.0-2.5	16mm ² (5)
SD650-T3-030AC/LC	M5	2.0-2.5	25mm ² (3)
SD650-T3-037AC/LC	M6	4-6	25mm ² (3)
SD650-T3-045AC/LC	M6	4-6	35mm ² (2)
SD650-T3-055AC/LC	M6	4-6	35mm ² (2)
SD650-T3-075AC/LC	M8	8-10	50mm ² (1)
SD650-T3-090AC/LC	M8	8-10	50mm ² (1/0)
SD650-T3-110AC/LC	M8	8-10	70mm ² (2/0)

Table 3-6: Suggested Cable Diameter and Fixed Moment Main Circuit

- Suggested Main Circuit Components Specification

Model	Contactor Specification	Breaker Specification	DC Reactor	Input Filter
SD650-T3-7R5AC/LC	25A	30A	NFI-020	NFO-020
SD650-T3-011AC/LC	32A	40A	NFI-036	NFO-036
SD650-T3-015AC/LC	40A	50A	NFI-036	NFO-036
SD650-T3-018AC/LC	50A	60A	NFI-050	NFO-050
SD650-T3-022AC/LC	50A	75A	NFI-050	NFO-050
SD650-T3-030AC/LC	63A	100A	NFI-080	NFO-080
SD650-T3-037AC/LC	80A	125A	NFI-100	NFO-100
SD650-T3-045AC/LC	100A	150A	NFI-100	NFO-100
SD650-T3-055AC/LC	125A	175A	NFI-150	NFO-150
SD650-T3-075AC/LC	160A	200A	NFI-150	NFO-150
SD650-T3-090AC/LC	220A	250A	NFI-200	NFO-300
SD650-T3-110AC/LC	220A	300A	NFI-200	NFO-300

Note: For specification details and circuit mode of DC reactor, input filter, output filter and other components, please refer to Chapter 7 "Peripheral Equipments and Options".

Table 3-7: Suggested Mains Circuit Components Specifications

3.4 Control Loop Terminals

●Control Loop Terminals Array

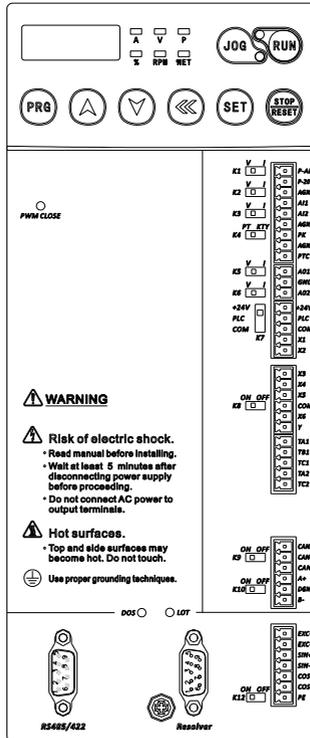


Fig 3-4: SD650 Series Servo Drive Control Circuit Wiring Diagram

Category	Terminal Symbol	Name	Function Definition
Relay output	TA1	Normally open contact	Contact capacity: 3A/240VAC 5A/30VDC
	TB1	Normally close contact	
	TC1	Public contact	
Fault output	TA1	Public contact	Contact capacity: 3A/240VAC, 5A/30VDC
	TC1	Normally open contact	
Y output	Y	open collector circuit output	Maximum allow voltage/current:+24V/50mA
auxiliary power	+24V	Internal 24V power	Maximum output 24VDC/100mA
	COM	24V power reference ground	
	PLC	external 24V power	
multi-function input terminal	X1	multi-function input terminal 1	Internal photoelectric converter, the program can set the action object, input conditions:
	X2	multi-function input terminal 2	

	X3	multi-function input terminal 3	maximum DC30V/8mA
	X4	multi-function input terminal 4	
	X5	multi-function input terminal 5	
	X6	multi-function input terminal 6	
Pressure sensor signal	P-AI	Pressure sensor signal input	0-10V/4-20mA, impedance 20kΩ/500Ω
	P-20V	Pressure sensor power	Provide +20V + 10% power, the maximum output current 20mA
	AGND	Analog signal ground	Analog signal ground
Analog signal input/output	AI1	Analog input terminal 1 (Default pressure setting)	Input voltage: 0-10V, 10 bit resolution, the input impedance of 100K. AGND
	AI2	Analog input terminal 2 (Default pressure setting)	Input voltage: 0-10V, 10 bit resolution, the input impedance of 100K. AGND
	AO1	Analog output 1(Default pressure output)	Voltage or current output, the output range: 0-10V/4 -20mA, 10 bit resolution. GND
	AO2	Analog output 2(Default pressure output)	Voltage or current output, the output range: 0-10V/4-20mA, 10 bit resolution. GND
	GND	AO signal ground	
Motor temperature detection	PTC	PTC Motor temperature detection switch	Nonlinear thermistor detection signal input for motor temperature switch control. Connected to AGND.
	AGND	Analog signal ground	
	PK	KTY/PT100 Temperature sensor	Linear thermistor detection signal input for motor temperature analog display, Connected to AGND.
	AGND	Analog signal ground	
CAN communication	CANH	CAN Communication differential signal	The highest speed of communication by 1Mbps, From the control panel to choose whether jumper connects terminal resistance
	CANL		
	CANG	CAN Communication reference ground	
RS485 Communication terminal	A+	RS485 Communication differential signal	RS485 communication interface
	B-		
	DGND	RS485 Communication reference ground	RS485 Communication reference ground
Motor encoder signal	EXC+	Resolver excitation differential signal	Motor encoder(Resolver)signal
	EXC-		
	SIN+	Motor encoder(Resolver) feedback sine cosine differential signal	
	SIN-		
	COS+		
	COS-		
	PE	ground terminal	

Table 3-8: Control board Terminal Signal Description

- Control Loop Terminal Wiring Specification

Terminal	Bolt Specification (mm)	Fixed Moment (N·m)	Cable specification (mm ²)	Cable Type
All control wiring terminals	M2	0.4-0.6	0.75	Twisted-pair shielded cable

Table 3-9: Control Circuit Terminal Wiring Specifications

- Selection Of the Control board Sliding Switch and Description Of the Corresponding Position

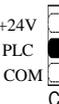
Pin No	Switch position	Function description	Switch position	Function description
K1	V I 	P-AI: Voltage input mode	V I 	P-AI: Current input mode
K2	V I 	AI1:Voltage input mode	V I 	AI1:Current input mode
K3	V I 	AI2:Voltage input mode	V I 	AI2:Current input mode
K4	PT KTY 	Temperature detection mode PT100	PT KTY 	Temperature detection mode :KTY
K5	V I 	AO1:Voltage output mode	V I 	AO1:Current output mode
K6	V I 	AO2:Voltage output mode	V I 	AO2:Current output mode
K7	 A. B.	A. Internal +24V connected to the public end of X B. Internal COM connected to the public end of X	+24V PLC COM C. 	C. Use the external +24V to connect to the public end of X, dial the dial switch to PLC
K8	ON OFF 	GND, AGND terminal connected to ground capacitance (When the driver is grounded good)	ON OFF 	GND,AGND terminal is not connected to ground capacitance (When the driver is grounded bad)
K9	ON OFF 	CAN communication matching resistor is switched on	ON OFF 	CAN communication matching resistor disconnect
K10	ON OFF 	485 communication matching resistor is switched on	ON OFF 	485 communication matching resistor disconnect
K12	ON OFF 	CANG,COM terminal connected to ground capacitance (When the driver is grounded good)	ON OFF 	CANG,COM terminal is not connected to ground capacitance (When the driver is grounded bad)

Table 3-10: Control board Pin Short Connection Function Description

- DB9 Male and Female Head Terminal Diagram and Signal Description

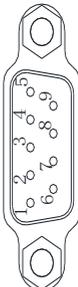
Pin Number	Signal name	Description	DB9 female terminal signal diagram
1	EXC-	Excitation signal	
2	EXC+		
3	SIN+	SIN feedback signal	
4	SIN-		
5	COS+	COS feedback signal	
9	COS-		
Cable housing	PE	Cable shielding layer	

Table3-11: Control board DB9 female terminal function description

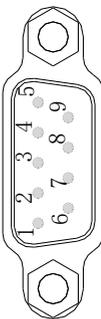
Pin Number	Signal name	Description	DB9 male terminal signal diagram
4/5	GND	Power ground	
3	A+	RS485 Communication differential signal	
2	B-		
1		Reserved	
9			
7,8	+5V	Power	
Cable housing	PE	Cable shielding layer	

Table 3-12: Control board DB9 male terminal function description

3.5 Multi-functional Contact Input Connection

- NPN transistor connection mode

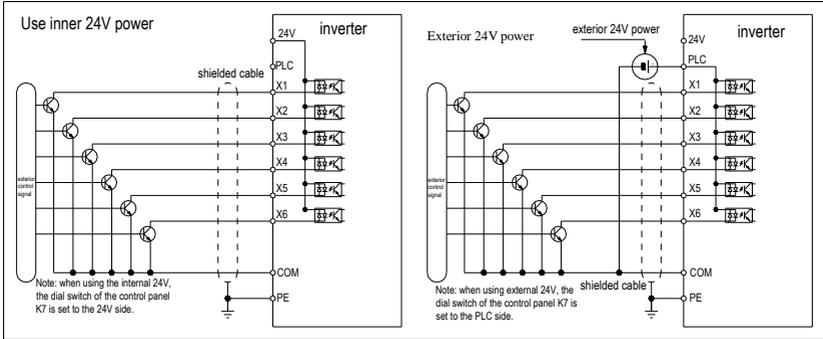


Fig 3-5: NPN Transistor Digital Input Signal Connection Mode

- PNP transistor connection mode

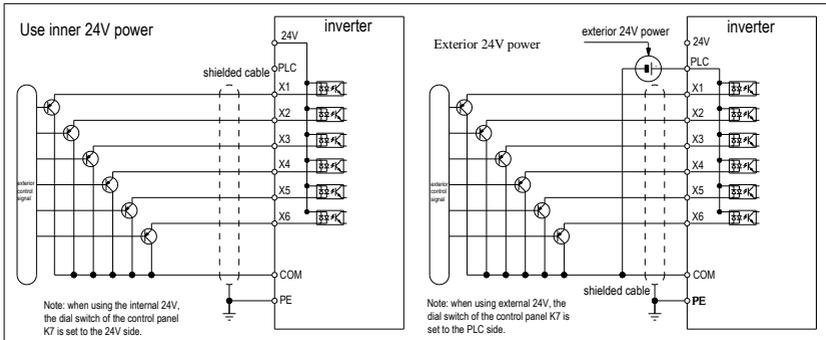


Fig 3-6: PNP Transistor Digital Input Signal Connection Mode

3.6 Braking Unit (Braking Resistance) Connection

- Brake resistance wiring of machine with 110KW or less power

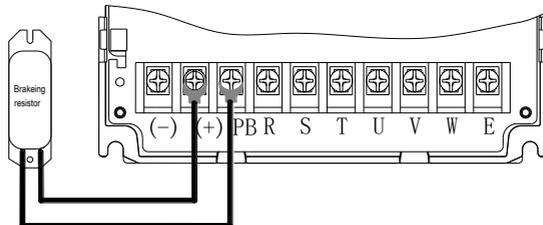


Fig 3-7: SD650 Brake resistance wiring of machine with 110KW or less power

- Suggested braking resistance specification parameters

The braking resistance value and resistance power in the chart below are in accordance with the general inertia of the load and intermittent braking mode. In large inertia and long braking frequent occasions, adjust resistance value and power according to the servo driver specification and the rated parameter of braking unit. If any problem, please consult customer service department of Veichi Electric Co., Ltd.

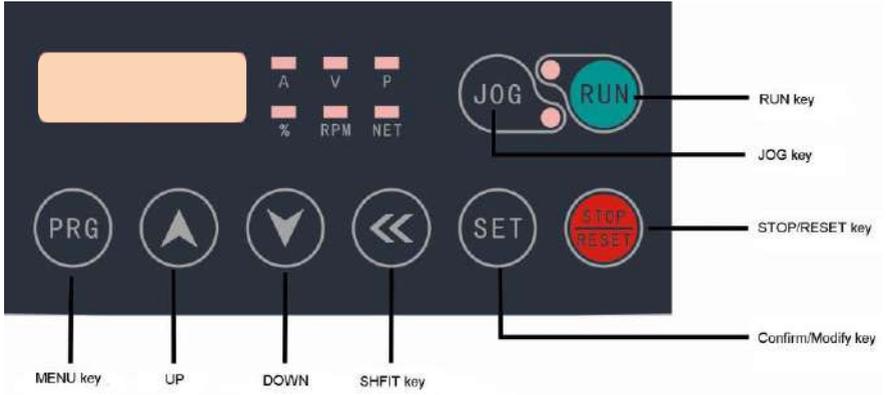
Motor power(kW)	Minimum resistance value (Ω)	Minimum resistance value corresponding resistance power (W)
7.5 kW	$\geq 32\Omega$	$\geq 800W$
11 kW	$\geq 32\Omega$	$\geq 800W$
15 kW	$\geq 32\Omega$	$\geq 800W$
18.5 kW	$\geq 27\Omega$	$\geq 1000W$
22 kW	$\geq 27\Omega$	$\geq 1000W$
30 kW	$\geq 27\Omega$	$\geq 1000W$
37 kW	$\geq 13\Omega$	$\geq 2500W$
45 kW	$\geq 13\Omega$	$\geq 2500W$
55 kW	$\geq 13\Omega$	$\geq 2500W$
75 kW	$\geq 10\Omega$	$\geq 3000W$
90 kW	$\geq 8\Omega$	$\geq 4000W$
110 kW	$\geq 7.5\Omega$	$\geq 4500W$

Table 3-13: Suggested Braking Resistance Specification Parameters of sd650

Chapter 4. Debugging and Operation

4.1 Operation Panel Layout and Function Description

SD650 series servo driver is designed with a LED operation panel, the user can perform the drive function parameter modification, working status monitoring, operation and other operations, the panel is shown below:



Function Indicator Light



Light on indicates the driver is in running.



Light off indicates the driver is in stop.



Light on indicates the driver is in jog.



Light off indicates the driver is not in jog.

 A	Current unit: A (Amps)	 RPM	Speed unit: RPM
 V	Voltage unit: V (Volt)	 P	Pressure unit:0.1kg
 %	Percentage unit:%		

Digital Tube Display Area

SD650 series servo driver has five LED display can show the set speed, the output speed, voltage, current, first grade alarm code and so on. Digital Tube display area as shown below:



Operator Panel Keyboard Button

Name	Function
	Key to start jog.
	In the operation panel operation mode, press this key to start the driver.
	In the operation panel operation mode, press this key to stop the driver running; While fault alarm, press this key to reset fault.
	Primary menu entry and exit, second menus and third menu exit
	Under second menu, you can change the group code; Under third menu, the blinking character left shift can be used to modify the higher set character value; Under monitoring mode, you can switch low five-bit data and high five-bit data.
	Monitoring code, function code or data increment
	Monitoring code, function code or data decreasing
	Step-by-step access to the menu screen, confirm the parameter setting

4.2 Basic Operation

• Basic LED Operation

It displays frequency at 50.00Hz when stop. Here F0.09=100.00 setting is an example to explain the basic LED operation.

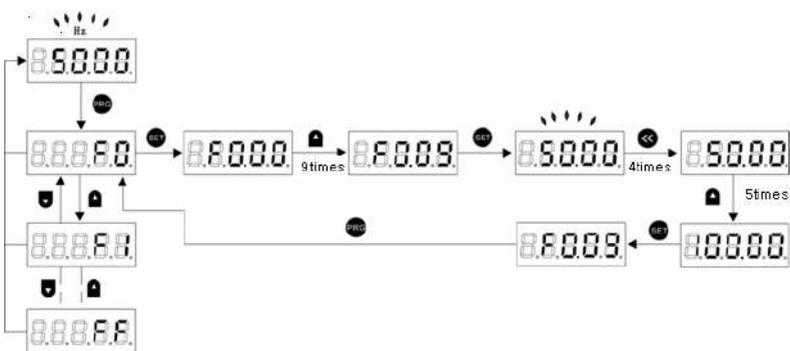


Fig 4-1: Basic LED Operation

5) Operating mode

There are two driving modes for VEICHI driver: speed mode and oil pressure closed-loop control mode, which can be set by function code FE.00.

Under speed mode, there are a variety of speed source given modes, which are set by function code F0.03.

Under oil pressure closed-loop mode, there are for modes of pressure / flux command source: internal digital given, analog AI1 given, analog AI2 given, RS485 communication given and CAN communication given.

6) Motor operation direction adjustment

After setting parameters and motor self-learning finished, users can presses the key  to driver the motor and observe the rotation direction of motor. If opposite with the direction required, set F0.16 to 1, and operated the motor self-learning. Have a trail to observe the motor direction after line sequence adjusted.

4.3 Adjustment Process

1, Motor Parameter Setting and Self-learning

SD650 series servo drive adopts vector closed-loop control, which has strong dependency on the motor parameters. In order to make the servo drive have good driving performance and running efficiency, please set the parameters according to the nameplate parameter of the adapter motor.SD650. Need to set the parameters as follows:

Motor Parameter function code	Parameter description
F5.01	Motor pole number
F5.02	Motor rated power
F5.03	Motor rated frequency
F5.04	Motor rated speed
F5.05	Motor rated voltage
F5.06	Motor rated current

Please user set the motor parameters, such as rated power, current, frequency, speed. All parameters can be found in the motor parameter table.

Note :1, Before starting the motor self-learning function, please be sure to fully open the overflow valve. Motor will have a slight deflection while self-learning, At this time try to ensure that the motor is no load or light load while self-learning ,so as not to affect the self-learning results due to load, thus affecting the motor performance.

2, After learning the parameters of the motor, set the function code F5.12 = 2 to start the drive to identify the motor pole position of the motor.

After the motor self-learning is finished, the user can try running by pressing the jog operation  key on the panel to observe whether the motor has rotation (Default frequency is 100Hz, can be changed by function code F0.08). Note the following during commissioning:

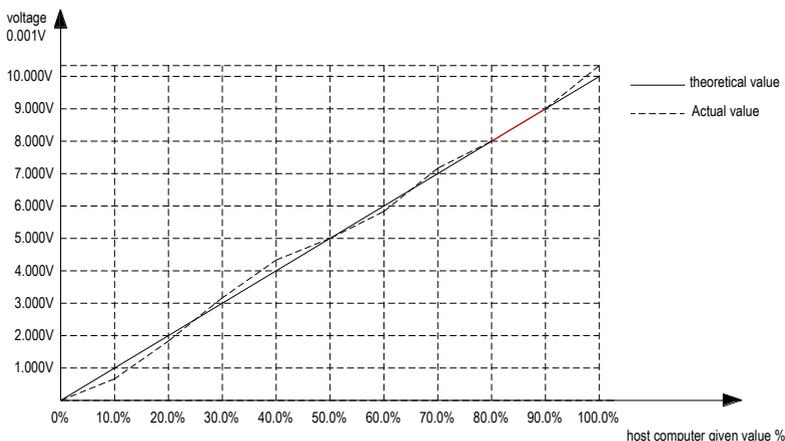
- (1) In the trial run, observe whether the drive current is small and stable;
- (2) In the trial run,If the current is large, check whether the motor parameters and the number of rotary encoder pulses are set correctly. If they are different, change the corresponding parameter values and perform self-learning. If the parameters are correct, re-start the motor self-learning and observe whether the current is small And smooth, if the current is still large after learning many times, please contact technical support.

- (3) After the trial run normally, please check the motor running direction is correct, if not correct, set the drive function code F0.16 = 1, and re-identification of the motor pole position!
- (4) In the trial run, If the motor is vibrating, please reduce the speed parameters properly.

- ★ Unrecognized rotor magnetic pole position or identification is not successful, absolutely not allowed to run the servo system!
- ★ Change the motor U, V, W any two-phase wiring, the motor must be re-identification of the magnetic pole position!

2, Analog Input Channel Correction

During the actual using process, the pressure value given by host computer may be biased with actual pressure value, which need to be corrected.



Note Before Correction:

1. In the actual use process, if the host computer given signal is not a 0~10V signal, the signal must be converted to 0~10V through the signal conversion board;
2. SD650 series servo driver is a specialized servo driver, when the user uses the closed loop function of the oil pump, the function of the three analog input channels is limited. Among them, AI1 is used to detect the pressure command signal given by the host computer; AI2 is used to detect the flow instruction signal given by the host computer; and users can set the pressure instruction and the flow instruction source by function codes FE.01 and FE.02; P-AI Can only be used to detect pressure sensor signals.
3. Analog input channel can detect 0-10V pressure sensor voltage signal and 4-20mA pressure sensor current signal, and users must set the signal type basing on the pressure sensor.

2.1 Analog Channel Correction Method

(1) Analog Input Channel Multi-inflection Point Manual Correction

Data acquired by AI1 channel is the pressure command given by injection molding machine computer, and set relevant parameters according to the actual situation. For example, if the host computer sets the pressure corresponding to 10V is 160, then set F3.32 = 160.0 in the servo driver, and turn on the channel 1 correction function (F3.15).

Take three different pressure values, convert into percentage according to the maximum system maximum pressure, and then followed by input to F3.32-F3.37.

Note :1, If the host computer setting value is not the actual value, but expressed as a percentage, then enter corresponding percentage value in the host computer, without conversion, recording the corresponding value, Enter the recorded value into F3.32-F3.37, and then Re-power.

2, Open the pressure command Multi-point correction function through F3.15.

LED 0 bit: AI1 LED 00 bit: AI2 LED 000 bit: P-AI

0: off (straight line)

1: on

Data acquired by AI2 channel is flux command given by the injection molding machine computer, and set relevant parameters according to the actual situation. For example, the host computer to set the corresponding flow of 10V is 2000rpm, set the servo drive FE.14= 2000, and then turn on the channel 2 correction function (F3.15). Three different inflection points can be set in turn, and input the corresponding percentage correctly. The corresponding function code setting method is similar to AI1, and the flow command correction can be realized.

3, Oil Pressure Function Parameter Setting

Flow and Oil Pressure instruction setting:

Maximum oil pressure [FE.05]: Set the pressure range of the pressure sensor (corresponding to the voltage DC 0~10V of pressure sensor);

System oil pressure [FE.06]: set the maximum pressure of system.

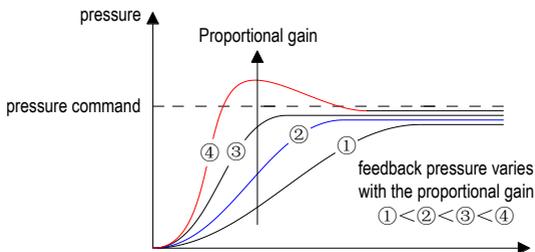
Maximum speed [FE.07]: Set the maximum speed of motor running, Which is the motor speed corresponding to 10V flux command.

Base pressure and flow [FE.09], [FE.10]: Due to the existence of internal leakage, while the system does not give the flow and pressure command, the hydraulic oil in the oil circuit will flow back to the tank, leading to air into the oil circuit, which causes the system running noise and instability, so a certain base pressure and flow is needed to be given. Users can set function code FE.09 and FE.10.

Pressure relief setting [FE.11]: The maximum reverse speed during pressure relief, corresponding to the percentage of maximum speed. The function code FE.11 is used to set maximum reverse operating speed of the motor. The larger value set, the faster pressure relieved. But if set too large, it is easy to cause the pump reverse running noise; on the contrary, the smaller value set, the slower pressure relieved.

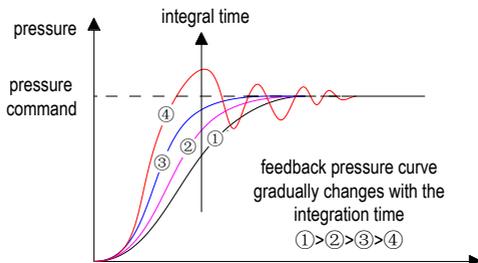
Oil pressure PID proportional gain [FE.21]

The greater proportional gain is, the faster pressure responses. But too large proportional gain will cause the system to shock, on the contrary, the slower pressure responses, which as shown below:



Oil pressure PID integral time [FE.22]

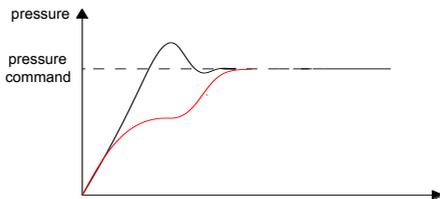
The smaller integral time is, the faster pressure responses. But it is easily to lead to overshoot, and too strong will cause system shock; on the contrary, the slower pressure responses, and too weak will lead to pressure instability, which as shown below:



Oil pressure overshoot suppression [FE.24],[FE.25]

This function is suitable for oil pressure suppression with large flow.

- 1) Overshoot suppression detection level (FE.24) The larger this value is, the later suppression affects with large flow, the worse overshoot suppression effect is, and the larger corresponding overshoot amount will be, which can not afford any effect; On the contrary, the more rapid suppression effect is, the more obvious suppression effect is, and the smaller overshoot is.
- 2) Overshoot suppression coefficient (FE.25) The larger this value is, the better pressure overshoot suppression is, but it is easily to lead to pressure rising delay with too large value; on the contrary, the worse suppression effect is, the larger overshoot is.



Holding pressure stability debugging

During the process of debugging, it is found that the pressure fluctuation is larger when holding pressure. Enhance speed loop to supply pressure stability and change this value properly, otherwise the motor will be shocked.

Chapter 5. Function Parameters List

5.1 Function Parameters Summary Table

“●”: Parameter can be changed in running state.

“○”: Parameter can't be changed in running state.

“x”: Parameter can be read only.

“_”: Factory setting parameter, only factory can set.

“※”: Parameter is related to the model.

Basic Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F0.00	Control mode	Synchronous motor control mode	7	○	0x000
F0.02	Run command channel	0: Keyboard control 1: Terminal control 2: Communication control	0	○	0x002
F0.03	Frequency given main channel selection	0: Keyboard number given frequency	0	○	0x003
F0.04	Main channel gain	0.000-5.000	1.000	○	0x004
F0.05	Frequency given auxiliary channel selection	0: Keyboard digital given frequency	1	○	0x005
F0.06	Auxiliary channel gain	0.000-5.000	1.000	○	0x006
F0.08	Keyboard number setting frequency	0.00-upper limit	100Hz	●	0x008
F0.09	Max frequency output	0.00-320.00Hz	133.33 Hz	○	0x009
F0.10	Upper limit frequency source selection	0: Upper limit frequency digital given	0	○	0x00A
F0.11	Upper limit frequency digital setting	Lower frequency limit-max output frequency	133.33 Hz	●	0x00B
F0.12	lower frequency limit	0.00-upper limit	0.00Hz	●	0x00C
F0.13	Lower frequency limit running mode	0: Stop 1: Run as lower frequency limit	1	○	0x00D
F0.14	ACC time 1	0.01-650.00s	model set	●	0x00E
F0.15	DEC time 1	0.01-650.00s	model set	●	0x00F
F0.16	Rotary direction selection	0: Consistent 1: opposite 2: Reverse banned	0	●	0x010
F0.17	Carrier frequency	2.0 - 15.0kHz	4.0	●	0x011
F0.18	Carrier frequency PWM characteristic selection	LED*0" digit: carrier frequency related with temperature	1010	●	0x012

		0: Unrelated to temperature 1: Related to temperature LED*00"digit: carrier frequency related with output frequency 0: Unrelated to frequency output 1: Related to frequency output LED*000"digit: carrier frequency mode 0: Fixed carrier 1: Random carrier LED*0000"digit: Over modulation options 0: OFF 1: ON			
F0.19	Parameter initialization	0: No action 1: Restore factory default (not restoring motor parameters) 2: Clear malfunction records 3: Restore factory default (restoring motor parameters)	0	○	0x013

Quantum Digital Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F2.00	Multifunction input terminal 1(X1)	0: No function 1: FWD 2: REV 3: 3-line running control(Xi) 4: FWD JOG 5: REV JOG 6: Free stop 7: Emergency stop 8: Malfunction reset 9: External fault input 15: Multispeed terminal1 16: Multispeed terminal 2 17: Multispeed terminal 3 18: Multispeed terminal 4 46: Pressure/flow mode switch 47: Pressure PID select 1 48: Pressure PID select 2 49: Slave machine pressure control	1	●	0x200
F2.01	Multifunction input terminal 2(X2)	50: Internal multi step pressure given	2	●	0x201
F2.02	Multifunction input terminal	51: Internal multi step pressure selection 1	4	●	0x202

	3(X3)	52: Internal multi step pressure selection 2 53: Internal multi step pressure selection 3			
F2.03	Multifunction input terminal 4(X4)		5	●	0x203
F2.04	Multifunction input terminal 5(X5)		8	●	0x204
F2.08	X1-X4 terminal trait selection	LED "0" digit: X1 terminal 0: On valid 1: Off valid LED "00" digit: X2 terminal 0: On valid 1: Off valid LED "000" digit: X3 terminal 0: On valid 1: Off valid LED "0000" digit: X4 terminal 0: On valid 1: Off valid	0000	○	0x208
F2.09	X1-X4 input terminal filter time	0.000-60.000s	0.010s	●	0x209
F2.10	X5 terminal trait selection	LED "0" digit: X5 terminal 0: On valid 1: Off valid	0000	○	0x20A
F2.11	X5 input terminal filter time	0.000-60.000s	0.010s	●	0x20B
F2.12	Terminal control operating mode	0: 2-line 1 1: 2-line 2 2: 3-line 1 3: 3-line 2	0	○	0x20C
F2.13	Terminal operation mode selection	LED "0" digit: free stop terminal reset mode 0: Reset to original order when invalid 1: Not reset to original order when invalid LED "00" digit: emergency stop terminal reset mode 0: Reset to original order when disconnected 1: Not reset to original order when disconnected LED "000" digit: terminal run mode after fault reset 0: Terminal control to restart directly 1: Terminal control to restart	0111	○	0x20D

		after stop LED "0000" digit: reserved			
F2.23	ACC/DEC rate of UP/DW terminal controlling frequency	0.01-50.00Hz/s	0.50Hz/s	●	0x217
F2.25	Timer time unit	0: Second 1: Minute 2: Hour	0	●	0x219
F2.26	Timer setting value	0-65000	0	●	0x21A
F2.27	Counter max value	0-65000	1000	●	0x21B
F2.28	Counter setting value	0-65000	500	●	0x21C
F2.29	Output terminal (Y)	0: No output	0	●	0x21D
F2.30	Relay output 1 (TA1-TB1-TC1)	1: FWD Running 2: REV Running	1	●	0x21E
F2.31	Relay output 2 (TA2-TC2)	3: Fault trip alarm 1(alarm when fault self-recover) 4: Fault trip alarm 2(no alarm when fault self-recover) 5: Fault retrying 6: External fault stop 7: Driver under voltage 8: Driver finish ready for running 20: Motor overload pre alarm 21: Timer time arrived 22: Counter reaching max value 23: Counter reaching setting value 24: Energy braking 25: PG feedback wire break 26: Emergency stop 27: Pre alarm output when over load 28: Pre alarm output when under load 30: Pressure reaching output	3	●	0x21F
F2.32	Output frequency level 1 (FDT1)	0.00-Max frequency	30.00Hz	●	0x220
F2.33	FDT1 lag	0.00-Max frequency	0.00Hz	●	0x221
F2.34	Output frequency level 2 (FDT2)	0.00-Max frequency	50.00Hz	●	0x222
F2.35	FDT2 lag	0.00-Max frequency	0.00Hz	●	0x223
F2.36	Given frequency reaching detection range	0.00-50.00Hz	0.50Hz	●	0x224
F2.37	Over load pre alarm level	0.0-200.0%	180.0%	●	0x225

F2.38	Over load pre alarm delay	0.0-100.0s	0.5s	●	0x226
F2.39	Under load pre alarm level	0.0-200.0%	30.0%	●	0x227
F2.40	Under load pre alarm delay	0.0-100.0s	0.5s	●	0x228
F2.41	X1 rising delay time	0.0-360.0s	0	●	0x229
F2.42	X1 falling delay time	0.0-360.0s	0	●	0x22A
F2.43	X2 rising delay time	0.0-360.0s	0	●	0x22B
F2.44	X2 falling delay time	0.0-360.0s	0	●	0x22C
F2.45	X3 rising delay time	0.0-360.0s	0	●	0x22D
F2.46	X3 falling delay time	0.0-360.0s	0	●	0x22E
F2.47	Y output delay time	0.0-360.0s	0	●	0x22F
F2.48	Relay 1 output delay time	0.0-360.0s	0	●	0x230
F2.49	Relay 2 output delay time	0.0-360.0s	0	●	0x231

Analog Terminal Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F3.00	AI1 Lower limit	0.00-10.00V	0.00V	●	0x300
F3.01	AI1 Lower limit corresponding setting	0.00-100.00%	0.00%	●	0x301
F3.02	AI1 upper limit	0.00-10.00V	10.00V	●	0x302
F3.03	AI1 upper limit corresponding setting	0.00-100.00%	100.00%	●	0x303
F3.04	AI1 filter time	0.00-10.00s	1.0ms	●	0x304
F3.05	AI2 Lower limit	0.00-10.00V	0.00V	●	0x305
F3.06	AI2 Lower limit corresponding setting	0.00-100.00%	0.00%	●	0x306
F3.07	AI2 upper limit	0.00-10.00V	10.00V	●	0x307
F3.08	AI2 upper limit corresponding setting	0.00-100.00%	100.00%	●	0x308
F3.09	AI2 filter time	0.00-10.00s	1.0ms	●	0x309
F3.10	P-AI Lower limit	0.00-10.00V	0V	●	0x30A
F3.11	P-AI Lower limit corresponding setting	0.00-100.00%	0.00%	●	0x30B
F3.12	P-AI upper limit	0.00-10.00V	10.00V	●	0x30C
F3.13	P-AI upper limit corresponding setting	0.00-100.00%	100.00%	●	0x30D
F3.14	P-AI filter time	0.00-10.00s	0.2ms	●	0x30E
F3.15	Turn on multi-point correction	LED "0" digit: AI1 LED "00" digit: AI2 LED "000" digit: P-AI 0:OFF (straight line) 1:ON	000	○	0x30F

F3.16	Zero drift learning	LED "0" digit: AI1 LED "00" digit: AI2 LED "000" digit: P-AI 0: no learning 1: learning	000	●	0x310
F3.17	AI1 Zero drift	0.00-1.00V	0.00V	●	0x311
F3.18	AI2 Zero drift	0.00-1.00V	0.00V	●	0x312
F3.19	P-AI Zero drift	0.00-1.00V	0.00V	●	0x313
F3.21	A0 output signal selection	LED "0" digit: A01 output selection 0: 0-10V 1: 4.00-20.00mA 2: 0.00-20.00mA LED "00" digit: A02 output selection 0: 0-10V 1: 4.00-20.00mA 2: 0.00-20.00mA 3: FM frequency pulse output	0000	●	0x315
F3.22	A01 output selection	0: pressure command 1: pressure feedback 2: given speed 3: speed feedback 4: flow command 5: Output current 6: Output voltage 7: Reserved 8: Reserved 9: Output torque 10: Output power 11: Bus voltage 12: AI1 13: AI2 14: P-AI 15: Reserved	0	●	0x316
F3.23	A02 output selection		1	●	0x317
F3.24	A01 output gain	25.0-200.0%	100.0%	●	0x318
F3.25	A01 output signal bias	-10.0-10.0%	0.0%	●	0x319
F3.26	Reserved				0x31A
F3.27	A02 output gain	25.0-200.0%	100.0%	●	0x31B
F3.28	A02 output signal bias	-10.0%-10.0%	0.0%	●	0x31C
F3.29	A02FM frequency output lower limit	0.00-50.00kHz	0.20kHz	●	0x31D
F3.30	A02FM frequency output upper limit	0.00-50.00kHz	50.00 kHz	●	0x31E
F3.31	Reserved				0x31F
F3.32	AI1 inflection point 1 input voltage	Setting range: 0.00-10.00V	0.00V	●	0x320

F3.33	AI1 inflection point 1 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x321
F3.34	AI1 inflection point 2 Input voltage	Setting range:F3.32-10.00V	0.00V	●	0x322
F3.35	AI1 inflection point 2 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x323
F3.36	AI1 inflection point 3 Input pressure	Setting range:F3.34-10.00V	0.00V	●	0x324
F3.37	AI1 inflection point 3 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x325
F3.38	AI2 inflection point 1 Input voltage	Setting range:0.00-10.00V	0.00V	●	0x326
F3.39	AI2 inflection point 1 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x327
F3.40	AI2 inflection point 2 Input voltage	Setting range:F3.38-10.00V	0.00V	●	0x328
F3.41	AI2 inflection point 2 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x329
F3.42	AI2 inflection point 3 Input voltage	Setting range:F3.40-10.00V	0.00V	●	0x32A
F3.43	AI2 inflection point 3 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x32B
F3.44	P-AI inflection point 1 Input voltage	Setting range:F3.42-10.00V	0.00V	●	0x32C
F3.45	P-AI inflection point 1 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x32D
F3.46	P-AI inflection point 2 Input voltage	Setting range:0.00-10.00V	0.00V	●	0x32E
F3.47	P-AI inflection point 2 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x32F
F3.48	P-AI inflection point 3 Input voltage	Setting range:F3.40-10.00V	0.00V	●	0x330
F3.49	P-AI inflection point 3 corresponding setting	Setting range:0.00-100.00%	0.0%	●	0x331

Keyboard and Display Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F4.00	Parameter and key lock selections	0: Not locked 1: Function parameter locked 2: Function parameter and key locked (except for RUN/STOP/JOG) 3: All function parameter and key locked	0	●	0x400
F4.01	User password	0-9999	0	●	0x401
F4.02	REV/JOG selections	0: REV 1: JOG	1	●	0x402

F4.03	STOP key function range	<p>LED "0" digit: terminal control 0: invalid to terminal command 1: valid to terminal command LED "00" digit: communication control 0: invalid to communication command 1: valid to communication command LED "000" digit: reserved LED "0000" digit: reserved</p>	0000	●	0x403
F4.04	UP/DOWN key modification selections	<p>LED "0" digit: keyboard Up/Down key modify selection 0: Invalid 1: Modify keyboard number given frequency (F0.08) 2: Reserved LED "00" digit: keyboard UN/DOWN key store selection 0: No save after power down 1: Save after power down LED "000" digit: reserved LED "0000" digit: reserved</p>	0011	●	0x404
F4.11	The display content of the first line in running state	<p>LED "0" digit: display the first group 0: pressure command 1: pressure feedback 2: given speed 3: speed feedback 4: flow command 5: output current 6: output voltage 7: Reserved 8: Reserved 9: output torque A: output power B: DC bus voltage C: module temperature D: motor temperature E: ON state of input terminal X F: ON state of input terminal Y LED "00" digit: display the second group LED "000" digit: display the third group</p>	35B1	●	0x40B

		LED"0000" digit: display the fourth group			
F4.12	The display content of the first line in stop state	LED "0" digit: display the first group LED"00"digit:display the second group LED"000" digit: display the third group LED"0000"digit:display the fourth group	25B0	●	0x40C

Motor Parameter Group

NO	Function description	Range of settings and definition	Factory default	Feature	Address
F5.00	Motor type	1: PMSM (PM)	1	×	0x500
F5.01	Number of motor poles	2-48	8	○	0x501
F5.02	Motor rated power	0.4-1000.0kW	Model set	○	0x502
F5.03	Motor rated frequency	0.01-max frequency	Model set	○	0x503
F5.04	Motor rated speed	0-65000rpm	Model set	○	0x504
F5.05	Motor rated voltage	0-1500V	Model set	○	0x505
F5.06	Motor rated current	0.1-2000.0A	Model set	○	0x506
F5.07	Motor no-load current	0.01-650.0A	Model set	○	0x507
F5.08	Motor stator resistance	0.001-65.000	Model set	○	0x508
F5.09	Motor rotor resistance	0.001-65.000	Model set	○	0x509
F5.10	Motor stator & rotor inductance	0.1-6500.0mH	Model set	○	0x50A
F5.11	Motor stator & rotor mutual inductance	0.1-6500.0mH	Model set	○	0x50B
F5.12	Motor parameters self-adjustment selections	0: No operation 1: No-load rotation self-learning 2: No-load low-speed self-learning 3: Oil pump forward self-learning 4:Oil pump reverse Self-learning	0	○	0x50C
F5.13	Reserved		0	○	0x50D

F5.15	Speed feedback or encoder type	LED"0" digit: encoder type 0: common ABZ encoder 1: Resolver 2: UVW encoder 3: Wireless UVW encoder LED "00" digit: encoder direction 0: consistent direction 1: opposite direction LED "000" digit: wire break detection 0: OFF 1: ON LED"0000" digit:reserved	0001	○	0x50F
F5.16	Photoelectric encoder lines	0-60000	1024	○	0x510
F5.17	PG wire break detection time	0.100-60.000s	0.200s	●	0x511
F5.18	Resolver poles	2-128	2	○	0x512
F5.19	Encoder installation DEC ratio	0.100-50.000	1.000	○	0x513
F5.20	Encoder filter time	1-1000ms	1.0ms	●	0x514
F5.21	Synchronous machine stator resistance	0.001-65.000	Model set	○	0x515
F5.22	Synchronous machine d axis inductance	0.01mH-655.35mH	Model set	○	0x516
F5.23	Synchronous machine q axis inductance	0.01mH-655.35mH	Model set	○	0x517
F5.24	Synchronous machine back EMF	0.1V-1000.0V	Model set	○	0x518
F5.25	Synchronous machine encoder installation angle	0.0°-360.0°	Model set	○	0x519
F5.26	High frequency injection frequency	50.0Hz-1000.0Hz	300.0Hz	○	0x51A
F5.27	High frequency injection voltage	0.1%-100.0%	20.0%	○	0x51B
F5.28	Back EMF identification current	0.1%-100.0%	80.0%	○	0x51C
F5.29	Reserved				0x51D
F5.30	Asynchronous no-load current per unit value	Unit: 0.1%	Model set	○	0x51E
F5.31	Asynchronous stator resistance per unit value	Unit: 0.01%	Model set	○	0x51F

F5.32	Asynchronous rotor resistance per unit value	Unit: 0.01%	Model set	○	0x520
F5.33	Asynchronous mutual inductance per unit value	Unit: 0.1%	Model set	○	0x521
F5.34	Asynchronous leakage inductance per unit value	Unit: 0.01%	Model set	○	0x522
F5.35	Reserved				0x523
F5.36	Synchronous stator resistance per unit value	Unit: 0.01%	Model set	○	0x524
F5.37	Synchronous d-axis inductance per unit value	Unit: 0.01%	Model set	○	0x525
F5.38	Synchronous q-axis inductance per unit value	Unit: 0.01%	Model set	○	0x526
F5.39	Synchronous motor back EMF	0.1V-1000.0V	Model set	○	0x527
F5.40	Synchronous motor encoder installation angle	0.0°-360.0°	Model set	○	0x528

VC Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
F6.00	ASR (Speed loop) proportional gain 1	0.00-100	10	●	0x600
F6.01	ASR (Speed loop) integral time 1	0.01-10.00s	0.20s	●	0x601
F6.02	ASR (Speed loop) differential time 1	0.0-100.0s	0.0	●	0x602
F6.03	ASR filter time 1	0.000-0.100s	0.05s	●	0x603
F6.04	ASR switch frequency 1	0.00-50.00Hz	5.00Hz	●	0x604
F6.05	ASR (speed loop) proportional gain 2	0.00-100	10	●	0x605
F6.06	ASR (speed loop) integral time 2	0.01-10.00s	0.20s	●	0x606
F6.07	ASR (speed loop) differential time 2	0.0-100.0s	0.0	●	0x607
F6.08	ASR filter time 2	0.000-0.100s	0.005s	●	0x608
F6.09	ASR switch frequency 2	0.00-50.00Hz	10.00Hz	●	0x609
F6.10	slip compensation coefficient	0-250%	100%	●	0x60A
F6.11	Speed control Max output torque	0.0-200.0%	150.0%	●	0x60B

F6.12	Start frequency of torque compensation in constant power area	100.0%-500.0%	0%	●	0x60C
F6.13	Constant power area torque compensation coefficient	0-100%	0%	●	0x60D
F6.14	Start frequency of torque limit in constant power area	100.0%-500.0%	0%	●	0x60E
F6.15	Constant power area torque limit	50-200%	0%	●	0x60F
F6.16	Current loop D-axis proportional gain	0.1-10.0	1.0	●	0x610
F6.17	Current loop D-axis integral gain	0.1-10.0	1.0	●	0x611
F6.18	Current loop Q-axis proportional gain	0.1-10.0	1.0	●	0x612
F6.19	Current loop Q-axis integral gain	0.1-10.0	1.0	●	0x613

Malfunction and Protection Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FA.00	Over voltage suppression point	110%-150%	135%	●	0xA00
FA.01	Over voltage suppression gain	0-500%	0%	●	0xA01
FA.02	Over voltage suppression filter time	1-1000ms	20ms	●	0xA02
FA.03	Frequency limit	0.00-99.99Hz	0.00Hz	●	0xA03
FA.04	Fan control	0: Fan runs after power on 1: Fan stop related to temperature and works when running 2: Fan stops when machine stops and runs related to temperature	1	●	0xA04
FA.07	Magnetic flow braking gain	0-500%	100%	●	0xA07
FA.08	Dynamic braking action voltage	115.0-140.0%	125.0%	●	0xA08
FA.09	Reserved			●	0xA09
FA.10	Bus under-voltage protection point	40.0% -100.0%	100%	●	0xA0A

FA.11	Output power correction coefficient	0 -1000%	100%	●	0xA0B
FA.12	Power/torque display dimension selection	0: power display percentage (0.1%) Torque display percentage (0.1%) 1: power display kW (0.1KW) Torque display NM (0.1NM)	0	●	0xA0C
FA.13	Speed tracking waiting time	0.00-60.00s	1.00	●	0xA0D
FA.14	Speed tracking frequency gain	0.00Hz-50.00Hz	10.00Hz	●	0xA0E
FA.15	Speed tracking current gain	0.50-1.50	1.00	●	0xA0F
FA.16	PWM parameter setting	"0" digit: PWM mode selection 0: auto switching; 1: CPWM 2: DPWM 3: SPWM	0	●	0xA10
FA.17	Hardware current voltage protection	LED "0" digit: (CBC) 0: off 1: on LED "00" digit: hardware OV protection 0: off 1: on LED "000" digit: SC protection 0 - F (set 0 SC protection off) LED "0000" digit: current interference suppression 0: off 1: on	1111	●	0xA11
FA.18	Motor temperature protection point (Analog detection)	0℃-200.0℃ When set to 0, the protection function is off	0℃	○	0xA12
FA.19	Phase loss/ Motor Temperature protection	"0" digit: output loss phase protection "00" digit: input loss phase protection "000" digit: motor load loss protection "0000" digit: motor temperature protection 0: off 1: on	1111	○	0xA13
FA.20	Motor overload pre alarm coefficient	20.0-250.0%	80.0%	●	0xA14
FA.21	Motor overload protection coefficient	20.0-250.0%	100.0%	●	0xA15

FA.22	Malfunction self recovery times	0-5	0	●	0xA16
FA.23	Malfunction self recovery interval	0.1-100.0s	1.0s	●	0xA17
FA.24	Reserved				0xA18
FA.25	Malfunction types	Please see malfunction code table	--	×	0xA19
FA.26	Malfunction running frequency	0.00-max frequency	--	×	0xA1A
FA.27	Malfunction output voltage	0-1500V	--	×	0xA1B
FA.28	Malfunction output current	0.1-2000.0A	--	×	0xA1C
FA.29	Malfunction bus voltage	0-3000V	--	×	0xA1D
FA.30	Malfunction module temperature	0-100℃	--	×	0xA1E
FA.31	Malfunction machine state	LED "0" digit: run direction 0: FWD 1: REV LED "00" digit: running state 0: stop 1: stable speed 2: ACC 3: DEC LED "000" digit: reserved LED "0000" digit: reserved	--	×	0xA1F
FA.32	Malfunction input terminal state	See input terminal chart	--	×	0xA20
FA.33	Malfunction output terminal state	See output terminal chart	--	×	0xA21
FA.34	The last malfunction types	Please see malfunction code table	--	×	0xA22
FA.35	The last malfunction running frequency	0.00-max frequency	--	×	0xA23
FA.36	The last malfunction output voltage	0-1500V	--	×	0xA24
FA.37	The last malfunction output current	0.1-2000.0A	--	×	0xA25
FA.38	The last malfunction bus voltage	0-3000V	--	×	0xA26
FA.39	The last malfunction module temperature	0-100℃	--	×	0xA27
FA.40	The last machine state	LED "0" digit: running direction 0: FWD	--	×	0xA28

		1: REV LED "00" digit: running state 0: stop 1: stable speed 2: ACC 3: DEC LED "000" digit: reserved LED "0000" digit: reserved			
FA.41	The last malfunction input terminal state	See input terminal chart	--	×	0xA29
FA.42	The last malfunction output terminal state	See output terminal chart	--	×	0xA2A
FA.43	The last two malfunction types	Please see malfunction code table	--	×	0xA2B
FA.44	The last three malfunction types	Please see malfunction code table	--	×	0xA2C

Multi-Speed, PLC Function and Swing Frequency Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FC.00	PLC Speed 1	0.00-320.00Hz	10.00Hz	●	0xC00
FC.01	PLC Speed 2	0.00-320.00Hz	20.00Hz	●	0xC01
FC.02	PLC Speed 3	0.00-320.00Hz	30.00Hz	●	0xC02
FC.03	PLC Speed 4	0.00-320.00Hz	40.00Hz	●	0xC03
FC.04	PLC Speed 5	0.00-320.00Hz	50.00Hz	●	0xC04
FC.05	PLC Speed 6	0.00-320.00Hz	40.00Hz	●	0xC05
FC.06	PLC Speed 7	0.00-320.00Hz	30.00Hz	●	0xC06
FC.07	PLC Speed 8	0.00-320.00Hz	20.00Hz	●	0xC07
FC.08	PLC Speed 9	0.00-320.00Hz	10.00Hz	●	0xC08
FC.09	PLC Speed 10	0.00-320.00Hz	20.00Hz	●	0xC09
FC.10	PLC Speed 11	0.00-320.00Hz	30.00Hz	●	0xC0A
FC.11	PLC Speed 12	0.00-320.00Hz	40.00Hz	●	0xC0B
FC.12	PLC Speed 13	0.00-320.00Hz	50.00Hz	●	0xC0C
FC.13	PLC Speed 14	0.00-320.00Hz	40.00Hz	●	0xC0D
FC.14	PLC Speed 15	0.00-320.00Hz	30.00Hz	●	0xC0E
FC.15	PLC running Mode selection	LED*0"digit:: cycle mode 0: Stop after single cycle 1: Continuous cycles 2: Keep final value after single cycle LED*00"digit: Time unit 0: second 1: minute	0000	●	0xC0F

		2: hour LED"000"digit: Power off storage mode 0: not save 1: save LED"0000"digit: Start-up mode 0: Restart from the 1st stage 1: Restart from the stop stage 2: Continue from the time when stop			
FC.16	PLC 1st Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC10
FC.17	PLC 2nd Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC11
FC.18	PLC 3rd Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC12
FC.19	PLC 4th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC13
FC.20	PLC 5th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC14
FC.21	PLC 6th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC15
FC.22	PLC 7th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC16
FC.23	PLC 8th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC17
FC.24	PLC 9th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC18
FC.25	PLC 10th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC19
FC.26	PLC 11th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC1A
FC.27	PLC 12th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC1B
FC.28	PLC 13th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC1C
FC.29	PLC 14th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC1D
FC.30	PLC 15th Step running time	0.0-6500.0(s/m/h)	10.0	●	0xC1E
FC.31	PLC 1st Step direction and ACC/DEC time	LED "0" digit: current step run direction 0: FWD 1: REV	0000	●	0xC1F
FC.32	PLC 2nd Step direction and ACC/DEC time		0000	●	0xC20

FC.33	PLC 3rd Step direction and ACC/DEC time	LED "00" digit: ACC/DEC time in current step 0: ACC/DEC time 1 1: ACC/DEC time 2 2: ACC/DEC time 3 4: ACC/DEC time 4 LED "000" digit: reserved LED "0000" digit: reserved	0000	●	0xC21
FC.34	PLC 4th Step direction and ACC/DEC time		0000	●	0xC22
FC.35	PLC 5th Step direction and ACC/DEC time		0000	●	0xC23
FC.36	PLC 6th Step direction and ACC/DEC time		0000	●	0xC24
FC.37	PLC 7th Step direction and ACC/DEC time		0000	●	0xC25
FC.38	PLC 8th Step direction and ACC/DEC time		0000	●	0xC26
FC.39	PLC 9th Step direction and ACC/DEC time		0000	●	0xC27
FC.40	PLC 10th Step direction and ACC/DEC time		0000	●	0xC28
FC.41	PLC 11th Step direction and ACC/DEC time		0000	●	0xC29
FC.42	PLC 12th Step direction and ACC/DEC time		0000	●	0xC2A
FC.43	PLC 13th Step direction and ACC/DEC time		0000	●	0xC2B
FC.44	PLC 14th Step direction and ACC/DEC time		0000	●	0xC2C
FC.45	PLC 15th Step direction and ACC/DEC time		0000	●	0xC2D

Communication Control Function Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
Fd.00	Main-slave machine Selection (Modbus and CAN)	LED "0" digit: Modbus main-slave machine selection LED "00" digit: CAN main-slave machine selection 0: Slave machine 1: Main machine	0	○	0xD00
Fd.01	RS485 communication	1-247	1	○	0xD01
Fd.02	Communication baud rate selection	LED "0" digit: RS485 communication: 0:1200 bps 1:2400 bps 2:4800 bps 3:9600 bps	0043	○	0xD02

		4:19200 bps 5:38400 bps LED "00" digit:0:CAN(CAN open & VEICHI CAN) 0:20 kbps 1: 50 kbps 2: 100kbps 3: 125kbps 4: 250kbps 5: 500kbps 6: 1Mbps			
Fd.03	Modbus data format	0:(N,8,1) no checkout, Data digit: 8, Stop digit: 1 1:(E,8,1) even checkout, Data digit: 8, Stop digit: 1 2:(0,8,1) odd checkout, Data digit: 8, Stop digit: 1 3:(N,8,2) no checkout, Data digit: 8, Stop digit: 2 4:(E,8,2) even checkout, Data digit: 8, Stop digit: 2 5:(0,8,2) odd checkout, Data digit: 8, Stop digit: 2	0	○	0xD03
Fd.04	Communication ratio setting	0.00-5.00	1.00	●	0xD04
Fd.05	Modbus communication answer delay	0-500ms	0ms	●	0xD05
Fd.06	Modbus communication overtime time	0.1-100.0s	1.0s	●	0xD06
Fd.07	Modbus communication fault action mode selection	0:Alarm and stop freely 1:Not alarm, go on running 2:Stop without alarm (running command given by communication channels) 3:Stop without alarm (running command given by all channels)	1	●	0xD07
Fd.08	Modbus transmission response dispose	0:Write operation with response 1:Write operation without response	0	●	0xD08
Fd.09	Main machine sending selection	LED"0"digit: the first group transmitting frame selection 0:Invalid 1:Running command given	31	●	0xD09

		2:Main machine given frequency 3:Main machine output frequency 4:Main machine upper limit frequency 5:Reserved 6:Main machine output torque 7:Reserved 8:Reserved 9:Main machine given PID A:Main machine feedback PID LED*00"digit: the second group transmitting frame selection Same as above LED*000"digit: the third group transmitting frame selection Same as above LED*0000"digit: the fourth group transmitting frame selection Same as above			
Fd.10	RS485 communication port configuration	0:Modbus communication 1:serial ports monitoring 2:reserved	0	●	0xD0A
Fd.11	CAN communication protocol selection	0:CANopen protocol 1:CAN self defined protocol 2:CAN oscilloscope protocol	1	●	0xD0B
Fd.12	CAN communication slave address	0-127	1	●	0xD0C
Fd.36	Heartbeat packet sending interval	0-9999	0	●	0xD24
Fd.37	Heartbeat detection disconnection time	0-9999	5000	●	0xD25
Fd.38	CAN disconnection action mode	0: Alarm and free parking 1: No alarm and continue to run 2: Stop, no alarm (run command is given by communication) 3: Stop, no alarm (running is given by all channels)	1	●	0xD26

Oil Pressure Control Mode Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FE.00	Oil pressure mode	0:Invalid (speed mode) 1:Single pump mode 2:Multi pump host machine 3:Multi pump slave machine 4:Internal multi-step given	1	○	0xE00
FE.01	Pressure command channel	0:digital setting 1:A11 2:A12 3:P-AI 4:RS485 communication 5:Can communication 6:multi-step pressure/flux given	1	○	0xE01
FE.02	Flux command channel		2	○	0xE02
FE.03	Pressure feedback channel		3	○	0xE03
FE.04	Sensor type	0:0-10V 1:4-20mA 2:1.5V-10V 3:1.5V-5V	0	○	0xE04
FE.05	Pressure sensor range	0.0-500.0 kg/cm ²	250.0	○	0xE05
FE.06	System pressure	0.0-500.0 kg/cm ²	150.0	○	0xE06
FE.07	Flow based speed	1-9999rpm	2000rpm	○	0xE07
FE.08	Parameter unit	LED*0 digit:Setting parameter unit LED*00 digit:Monitor parameter unit 0:Actual value 0.1kg,1rpm 1:Per unit value 0.1%	00	○	0xE08
FE.09	Base pressure	0.0-500.0 kg/cm ² 0.0% -100.0%	3.0kg	○	0xE09
FE.10	Base flow	0-FE.07 0.0%-100.0%	30rpm	○	0xE0A
FE.11	Pressure relief reverse speed	0-FE.07 0.0%-100.0%	200rpm	●	0xE0B
FE.12	Reserved			●	0xE0C
FE.13	Pressure command digital setting	0.0-500.0 kg/cm ² 0.0% -100.0%	30.0kg	●	0xE0D
FE.14	Flux command digital setting	0-FE.07 0.0% -100.0%	1000rpm	●	0xE0E
FE.15	Sensor wire-break detection time	0.00-10.00sec	0.20sec	●	0xE0F
FE.16	Pressure command rising time	0-5000ms	20ms	●	0xE10
FE.17	Pressure command falling time	0-5000ms	20ms	●	0xE11
FE.18	Flux command rising time	0-000ms	20ms	●	0xE12
FE.19	Flow command falling time	0-5000ms	20ms	●	0xE13
FE.20	Reserved				0xE14

FE.21	Pressure PID1 gain Kp	0-999.9%	110.0%	●	0xE15
FE.22	Pressure PID1 integral coefficient Ti	0-999.9ms	30.0ms	●	0xE16
FE.23	Pressure PID1 differential coefficient Td	0-999.9ms	0ms	●	0xE17
FE.24	Overshoot detection 1	0-999.9%	3.0	●	0xE18
FE.25	Overshoot suppression 1	0-999.9%	3.0	●	0xE19
FE.26	Pressure PID2 gain Kp	0-999.9%	110.0%	●	0xE1A
FE.27	Pressure PID2 integral coefficient Ti	0-999.9ms	30.0ms	●	0xE1B
FE.28	Pressure PID2 differential coefficient Td	0-999.9ms	0ms	●	0xE1C
FE.29	Overshoot detection 2	0-999.9%	3.0	●	0xE1D
FE.30	Overshoot suppression 2	0-999.9%	3.0	●	0xE1E
FE.31	Pressure PID3 gain Kp	0-999.9%	110.0%	●	0xE1F
FE.32	Pressure PID3 integral coefficient Ti	0-999.9ms	30.0ms	●	0xE20
FE.33	Pressure PID3 differential coefficient Td	0-999.9ms	0ms	●	0xE21
FE.34	Overshoot detection 3	0-999.9%	3.0	●	0xE22
FE.35	Overshoot suppression 3	0-999.9%	3.0	●	0xE23
FE.36	Pressure PID4 gain Kp	0-999.9%	110.0%	●	0xE24
FE.37	Pressure PID4 integral coefficient Ti	0-999.9ms	30.0ms	●	0xE25
FE.38	Pressure PID4 differential coefficient Td	0-999.9ms	0ms	●	0xE26
FE.39	Overshoot detection 4	0-999.9%	3.0	●	0xE27
FE.40	Overshoot suppression 4	0-999.9%	3.0	●	0xE28
FE.41	Pressure PID selection	0:PID Steps switching 1:Terminal selection 2:PID1 3:PID2 4:PID3 5:PID4	0	●	0xE29
FE.42	PID1/PID2 Switching point	0-100.0%	0.0%	○	0xE2A
FE.43	PID2/PID3 Switching point	0-100.0%	0.0%	○	0xE2B
FE.44	PID3/PID4 Switching point	0-100.0%	0.0%	○	0xE2C
FE.45	Reserved				0xE2D
FE.46	Reserved				0xE2E
FE.47	Slave machine switching to low speed	0-1000rpm	0	●	0xE2F

FE.48	Slave machine switching to high speed	0-1000rpm	0	●	0xE30
FE.49	Slave machine start and stop command	0:host machine given 1:terminal given	0	●	0xE31

Oil Pressure Control Auxiliary Parameter Group

NO.	Function description	Range of settings and definition	Factory default	Feature	Address
FF.00	Multi-Pressure 1	0.0-FE.06 0.0-100.0%	0	●	0xF00
FF.01	Multi-Flux 1	0.0-100.0%	0	●	0xF01
FF.02	Multi-Pressure 2	0.0-FE.06 0.0-100.0%	0	●	0xF02
FF.03	Multi-Flux 2	0.0-100.0%	0	●	0xF03
FF.04	Multi-Pressure 3	0.0-FE.06 0.0-100.0%	0	●	0xF04
FF.05	Multi-Flux 3	0.0-100.0%	0	●	0xF05
FF.06	Multi-Pressure 4	0.0-FE.06 0.0-100.0%	0	●	0xF06
FF.07	Multi-Flux 4	0.0-100.0%	0	●	0xF07
FF.08	Multi-Pressure 5	0.0- FE.06 0.0-100.0%	0	●	0xF08
FF.09	Multi-Flux 5	0.0-100.0%	0	●	0xF09
FF.10	Multi-Pressure 6	0.0-FE.06 0.0-100.0%	0	●	0xF0A
FF.11	Multi-Flux 6	0.0-100.0%	0	●	0xF0B
FF.12	Multi-Pressure e 7	0.0-FE.06 0.0-100.0%	0	●	0xF0C
FF.13	Multi-Flux 7	0.0-100.0%	0	●	0xF0D
FF.14	Multi-Pressure 8	0.0-FE.06 0.0-100.0%	0	●	0xF0E
FF.15	Multi-Flux 8	0.0-100.0%	0	●	0xF0F
FF.16	Multi-Pressure command 1 given mode	0: FF.00 given 1: AI1 2: AI2 3: P-AI 4: RS485 communication 5: Can communication	0	○	0xF10
FF.17	Multi-Flux command 1 given mode	0: FF.01 given 1: AI1 2: AI2 3: P-AI 4: RS485 communication 5: Can communication	0	○	0xF11
FF.18	Reserved				0xF12
FF.19	Reserved				0xF13

FF.20	Pressure arrival detection source	0:FF.21 settings (unit is decided by FE.08) 1: AI1 2: AI2 3: PAI	0	○	0xF14
FF.21	Pressure arrival detection settings	0.0-FE.06	0.0	●	0xF15
FF.22	Pressure arrival detection times	0-9999ms	0ms	●	0xF16
FF.23	Reserved				0xF17
FF.43	Pressure PID gain deviation adjustment	0-9.999	1.000	●	0xF2B
FF.44	Resolver speed measurement interval	0-9999	2	●	0xF2C
FF.45	Pressure PID integral threshold	0-99.99%	2.00%	●	0xF2D
FF.46	Increase in pressure PID integral gain	0-999.9	1.0	●	0xF2E
FF.47	Pressure PID proportion threshold	0-99.99%	3.00%	●	0xF2F
FF.48	Increase in pressure PID proportional gain	0-999.9	0.0	●	0xF30

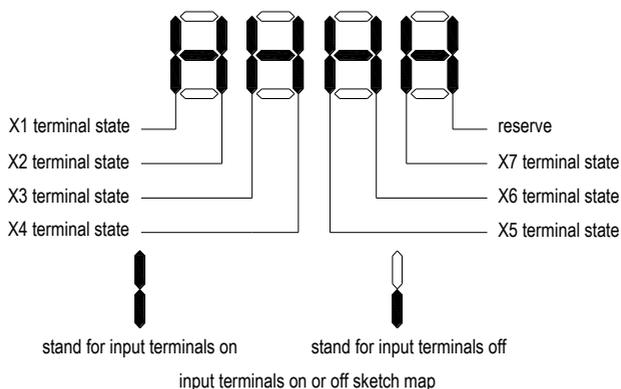
Monitor Code

Access 'C' parameter group by pressing 'PRG' for more than 2s; check out the current state of servo driver

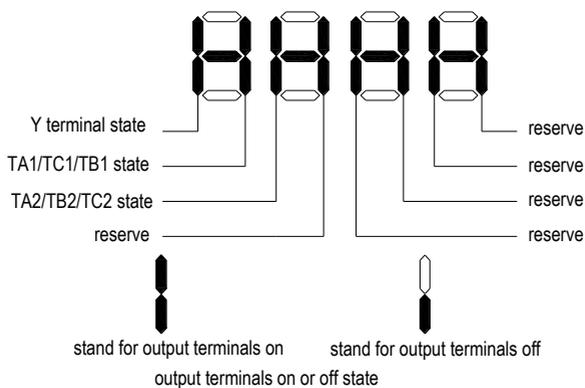
NO.	Function name	Range of settings and definition	Address
C-00	Pressure command	0.1bar	2100H
C-01	Pressure feedback	0.1bar	2101H
C-02	Given speed	1RPM	2102H
C-03	Speed feedback	1RPM	2103H
C-04	Flux command	1RPM	2104H
C-05	Output current	0.1A	2105H
C-06	Output voltage	0.1V	2106H
C-07	Frequency command	0.01Hz	2107H
C-08	Frequency feedback	0.01Hz	2108H
C-09	Output torque	0.1NM	2109H
C-10	Output power	0.1KW	210AH
C-11	Bus voltage	0.1V	210BH
C-12	Module temperature	0.1°C	210CH
C-13	Motor temperature	0.1°C	210DH
C-14	Input terminal X on-off state	refer to input terminal diagram	210EH
C-15	Output terminal Y on-off state	refer to output terminal diagram	210FH
C-16	AI1	V/mA	2110H
C-17	AI2	V/mA	2111H
C-18	P-AI	V/mA	2112H
C-19	Motor temperature detection voltage	mV	2113H

C-20	Analog output AO1	V/mA	2114H
C-21	Analog output AO2	V/mA	2115H
C-22	Counting value of counter		2116H
C-23	Running time after electrifying	0.1h	2117H
C-24	Local accumulative running time	Hour	2118H
C-25	servo driver power class	kW	2119H
C-26	servo driver rated voltage	V	211AH
C-27	servo driver rated current	A	211BH
C-28	Software version		211CH
C-29	PG feedback frequency	0.01Hz	211DH

Input Terminal on/off State Diagram:



Output Terminal on/off State Diagram:



Chapter 6. Fault Diagnoses and Treatment Measures

6.1 Fault Types

Fault displays

With fault alarm information and protection function, once the exception occurs, protection function works, and servo driver stops the output with fault code displaying in the panel. Before seeking service support, users can follow the instructions in this section to diagnose, analyze the fault reason and find a solution.

Type	Driver Action When Fault
Equipment Fault	<p>When driver detects a fault, the following conditions would happen:</p> <ul style="list-style-type: none"> ● Keyboard displays character showing fault content. ● Driver stops output. Motor free sliding stops. ● When function [F2.29] is 3(fault output), Y terminal outputs a valid open-collector switch output. ● When function [F2.30\F2.31] is 3(fault output), TA1-TC1, TA2-TC2 terminals output closed passive switch output.TB1~TC1 terminal outputs open passive switch output. ● For faults such as OL, OC, SC, OV, and LU2, if [FA.22] is not 0, the driver will restart automatically after interval set by [FA.23] if fault happens..
External Fault	<p>In certain applications, external related equipments fault signals are considered in the driver control system as usage of monitoring, protection and switch control. At this time, if one multi function terminal is defined as "external fault", and when the external related equipments fault signals are effective, the driver stops output and gives out alarm signal.</p>

6.2 Fault In formation and Details

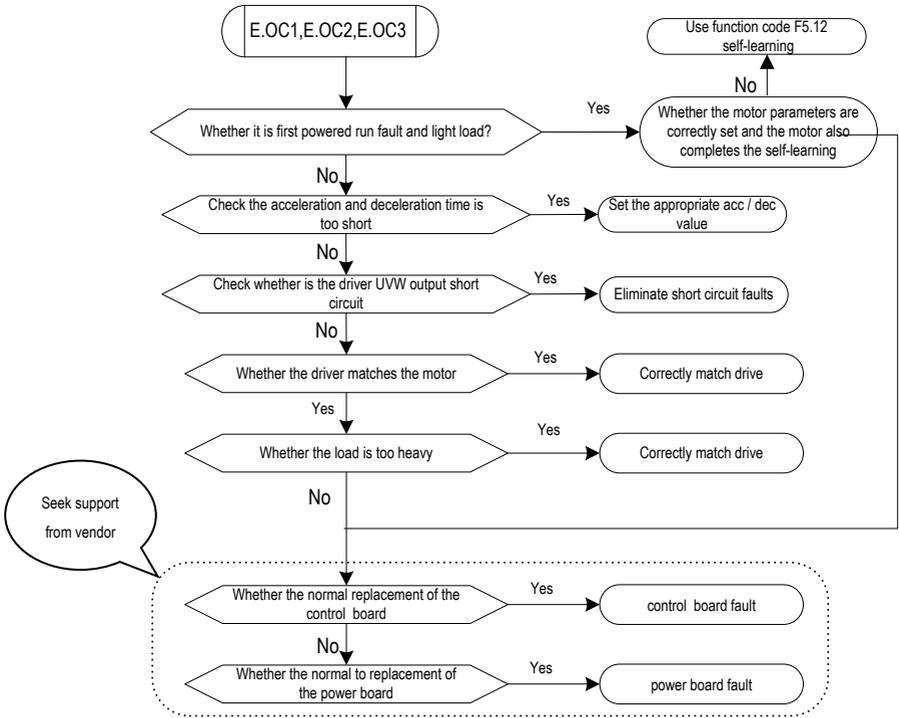
Keyboard Display	Fault Code	Fault Type	Possible Causes	Treatment Measures
	E. SC	System abnormal	<ul style="list-style-type: none"> ● Acceleration time is too short. ● Short circuit between driver output phases or earth. ● Module damaged. ● Electromagnetic disturb. 	<ul style="list-style-type: none"> ● Prolong acceleration time properly. ● Check peripheral equipments and restart after fault eliminating. ● Seek support from vendor. ● Check system wiring, earth, shield and deal as required.
	E.oH1	servo driver over-heat	<ul style="list-style-type: none"> ● Temperature is too high. ● Air channel blocked. ● Fan connection parts loose. ● Fan is damaged. ● Temperature detection circuit fault 	<ul style="list-style-type: none"> ● Meet the environment requirement. ● Clear the air channel. ● Check and reconnect wire ● Change the same new fan. ● Seek support from vendor.
	E.oH2	Rectifier over-heat	<ul style="list-style-type: none"> ● Temperature is too high. ● Air channel is 	<ul style="list-style-type: none"> ● Meet the environment requirement. ● Clear the air channel.

			<p>blocked.</p> <ul style="list-style-type: none"> ● Fan connection parts loose. ● Fan is damaged. ● Temperature detection circuit fault 	<ul style="list-style-type: none"> ● Check and reconnect the wire. ● Change the same new fan. ● Seek support from vendor.
	E.Fb1	Sensor feedback failure	<ul style="list-style-type: none"> ● Sensor feedback Break line. ● Sensor feedback channel parameter setting error. ● Analog feedback Channel is abnormal. 	<ul style="list-style-type: none"> ● Check sensor feedback signal line. ● Check sensor feedback channel parameter setting. ● Seek support from vendor.
	E.TE1	Motor static detection fault	<ul style="list-style-type: none"> ● Detection overtime ● Start static detection when motor is running. ● Capacitance difference is too big between motor and driver. ● Motor parameter setting mistake. 	<ul style="list-style-type: none"> ● Check motor connection wire. ● Detect after motor stops totally. ● Change driver model. ● Reset parameter according to nameplate.
	E.TE2	Motor rotation detection fault	<ul style="list-style-type: none"> ● Detect when motor is running. ● Detect with load. ● Detection overtime ● Capacitance difference is too big between motor and driver. ● Motor parameter setting mistake. 	<ul style="list-style-type: none"> ● Detect after motor stops totally. ● Re-detect without load. ● Check motor connection. ● Change driver model. ● Reset parameter according to nameplate.
	E.EEP	Storage failure	<ul style="list-style-type: none"> ● Electromagnetic Disturb in storage period. ● EEPROM damage. 	<ul style="list-style-type: none"> ● Resume load and save. ● Seek support from vendor.
	LIFE	Reserved	<ul style="list-style-type: none"> ● 	<ul style="list-style-type: none"> ● Seek support from vendor.
	E.iLF	Input side open phase	<ul style="list-style-type: none"> ● 3-phase input power open phase. 	<ul style="list-style-type: none"> ● Check 3-phase power supply and the phase. ● Check 3-phase power supply wiring.
	E.oLF	Output side open phase	<ul style="list-style-type: none"> ● 3-phase output power open phase 	<ul style="list-style-type: none"> ● Check 3-phase output voltage and current. ● Check wiring.
	E.Gnd	Output earth	<ul style="list-style-type: none"> ● Output earth terminal short circuit. 	<ul style="list-style-type: none"> ● Check wiring and insulation.

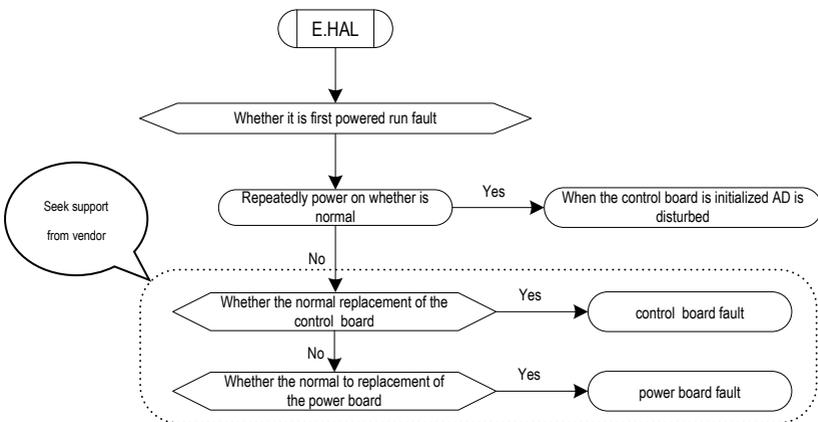
	E.HAL	Current detection fault	<ul style="list-style-type: none"> ● Detect circuit fault. ● Phase imbalance 	<ul style="list-style-type: none"> ● Seek for technical support. ● Check motor and wiring.
	E.EF	servo driver external fault	<ul style="list-style-type: none"> ● Peripheral equipment fault protection. 	<ul style="list-style-type: none"> ● Check peripheral equipment.
	E.PAn	Keyboard connect fault	<ul style="list-style-type: none"> ● Keyboard wire fault. ● Keyboard component damage. 	<ul style="list-style-type: none"> ● Check keyboard wire. ● Seek support from vendor.
	E.CE	Rs485communication fault	<ul style="list-style-type: none"> ● Unsuitable baud rate setting. ● Communication wire breaks. ● Communication format not match upper machine. 	<ul style="list-style-type: none"> ● Set suitable baud rate setting. ● Check communication wire. ● Set right communication format.
	E.PG	PG card connection abnormal	<ul style="list-style-type: none"> ● PG card and driver connection failure 	<ul style="list-style-type: none"> ● Check the connection
	E.PID	PID feedback failure	<ul style="list-style-type: none"> ● PID feedback upper limit of disconnection alarm is improper ● PID feedback lower limit of disconnection alarm is improper ● PID feedback wiring unreliable ● Sensor with feedback failure ● Feedback input loop failure 	<ul style="list-style-type: none"> ● Confirm the sensor state, if broken, change it. ● Repair the wiring. ● Confirm the setting value of [Fb.16] and [Fb.17].
	L.U.1	Too low when stop	<ul style="list-style-type: none"> ● Power supply is too low ● Voltage detection circuit is abnormal 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Seek support from vendor.
	E.LU2	Under voltage in run	<ul style="list-style-type: none"> ● Power supply is too low ● Power capacitance is too small, or there is enormous impact current in the power grid. ● Inner DC main contactor isn't close. 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Improve power-supply system. ● Seek support from vendor.
	E.OU1	Acc overvoltage	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. ● Start motor when running. 	<ul style="list-style-type: none"> ● Detect power voltage and eliminate fault. ● Restart motor until it totally stop; Set F1.00 to 1or 2.
	E.oU2	Dec overvoltage	<ul style="list-style-type: none"> ● Deceleration time is too short. 	<ul style="list-style-type: none"> ● Prolong deceleration time properly.

			<ul style="list-style-type: none"> ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Reduce load inertia or improve driver capacitance or add braking unit. ● Detect input power and clear fault.
E.oU3	E.oU3	Constant speed over-voltage	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Detect input power voltage and eliminate fault. ● Install input reactor.
E.oU4	E.oU4	Over-voltage when stop	<ul style="list-style-type: none"> ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Seek support from vendor.
E.oC1	E.oC1	Acc over-current	<ul style="list-style-type: none"> ● Acceleration time is too short. ● Start motor when running. ● Driver capacitance is too small. 	<ul style="list-style-type: none"> ● Prolong acc time. ● Restart motor until it totally Stop; Set F1.00 to 1or 2. ● Select driver with right capacitance.
E.oC2	E.oC2	Dec over-current	<ul style="list-style-type: none"> ● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit. 	<ul style="list-style-type: none"> ● Prolong deceleration time. ● Connect external braking resistance or braking unit. ● Select driver with right capacitance.
E.oC3	E.oC3	Constant speed over-current	<ul style="list-style-type: none"> ● Sudden load change. ● Power grid voltage is too low. 	<ul style="list-style-type: none"> ● Check load change and eliminate it. ● Check input power, eliminate fault.
E.oL1	E.oL1	Motor over-load	<ul style="list-style-type: none"> ● Power grid voltage is too low. ● Wrong overload protection setting. ● Locked-rotor run or too heavy load. ● Universal motor runs at low speed for a long time 	<ul style="list-style-type: none"> ● Check input power, eliminate fault. ● Unreasonable F5.06setting. ● Adjust load or select driver with right capacitance. ● If long-term low-speed operation is needed, please choose special motor for Driver.
E.oL2	E.oL2	Driver over-load	<ul style="list-style-type: none"> ● Load is too heavy. ● Acceleration time is too short. ● Start motor when running. 	<ul style="list-style-type: none"> ● Select driver with right capacitance. ● Prolong acceleration time ● Restart motor until it totally stops. Set [F1.00] as 1or2.

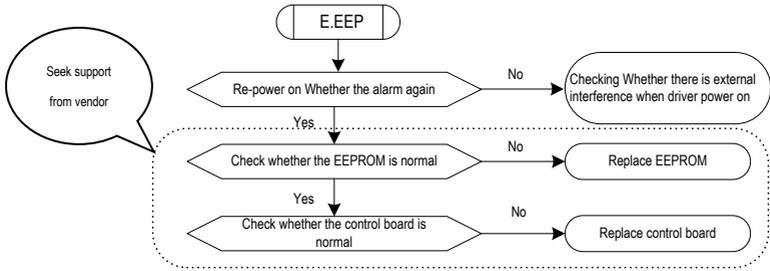
6.3 Fault Treatment



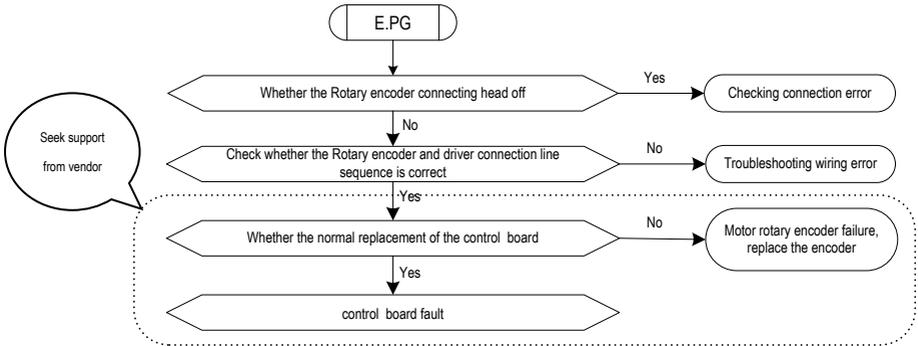
Overcurrent Fault (E.OC1, E.OC2, E.OC3)



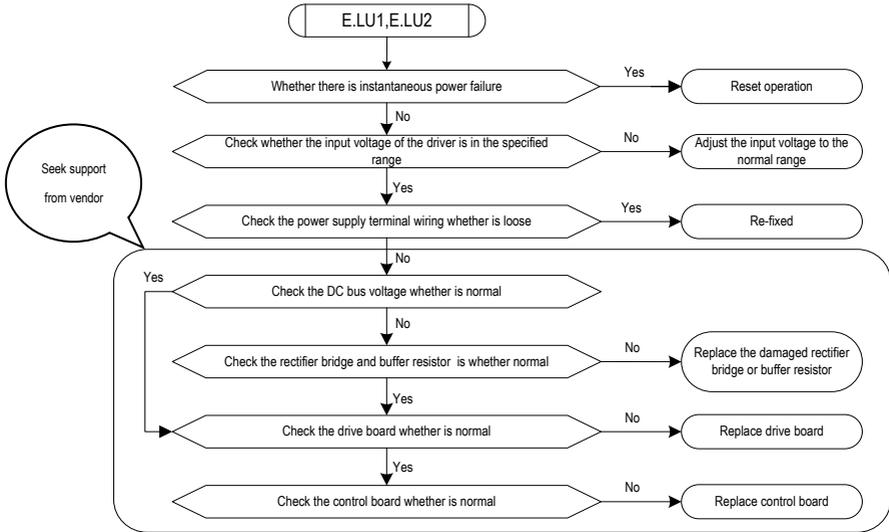
Current Detection Initialization Fault (E.HAL)



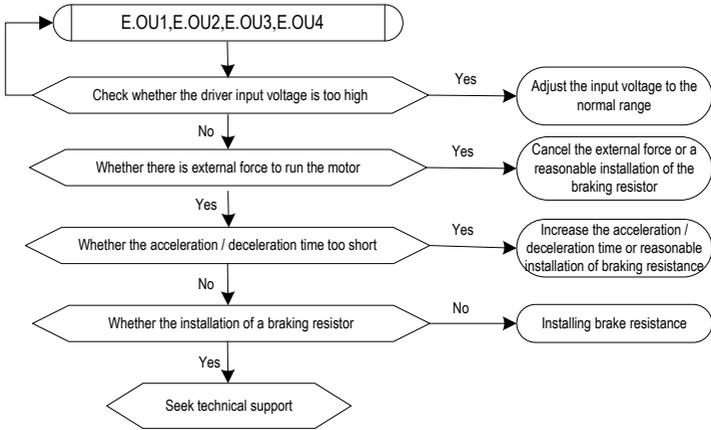
Parameter Storage Abnormal Fault (E.EEP)



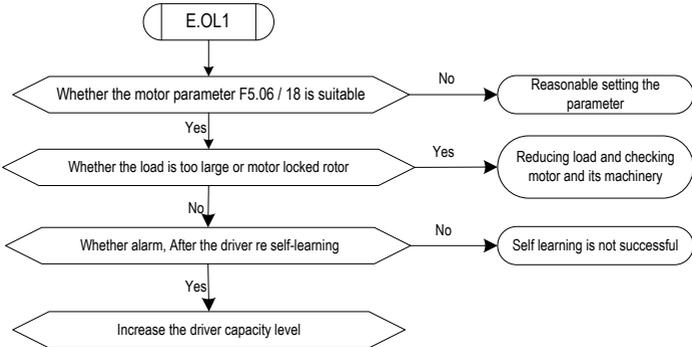
Rotary Encoder Signal Break Wire Fault (E.PG)



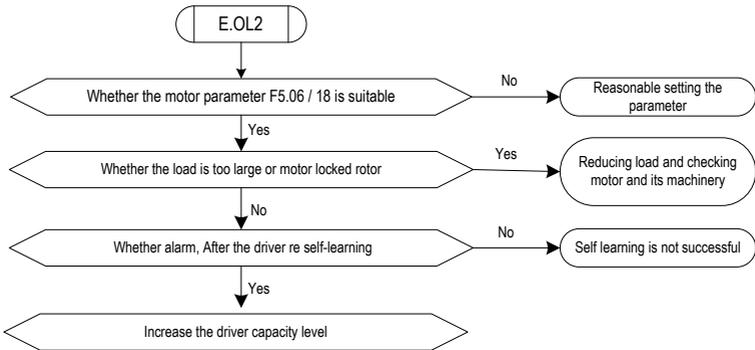
Driver Under-voltage Fault (E.LU1, E.LU2)



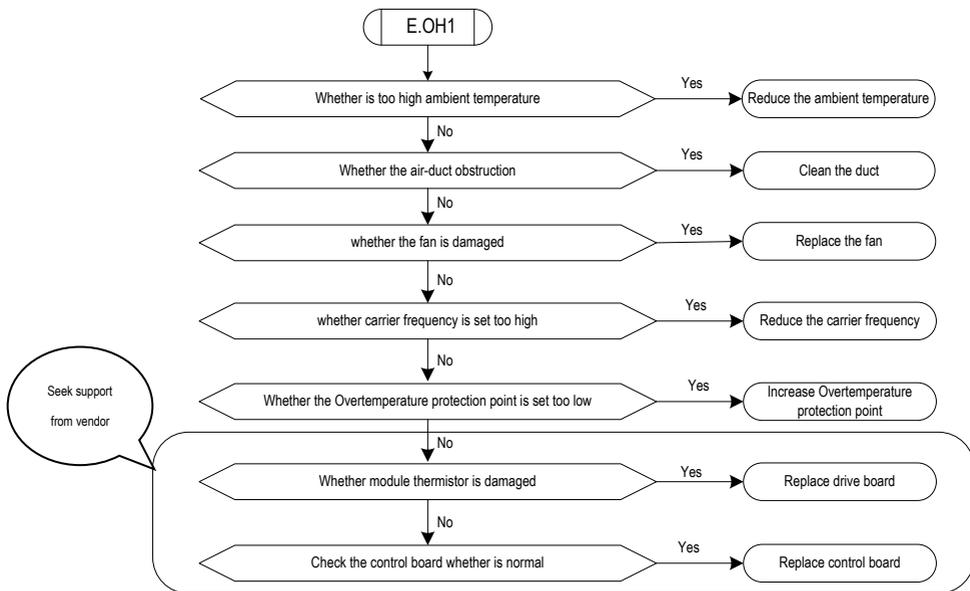
Driver Over Voltage Fault (E.OU1, E.OU2, E.OU3, E.OU4)



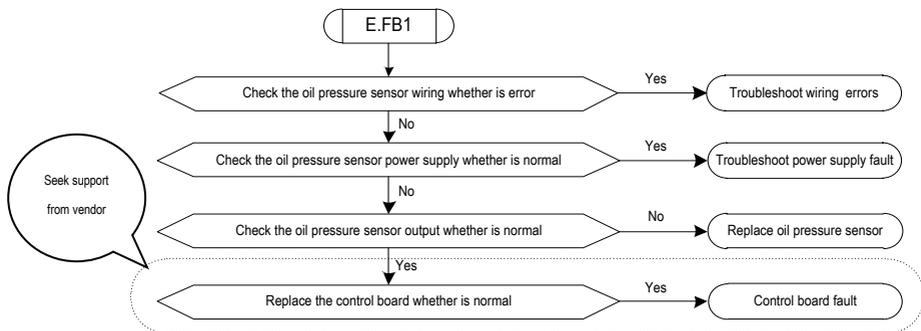
Motor Overload Fault (E.OL1)



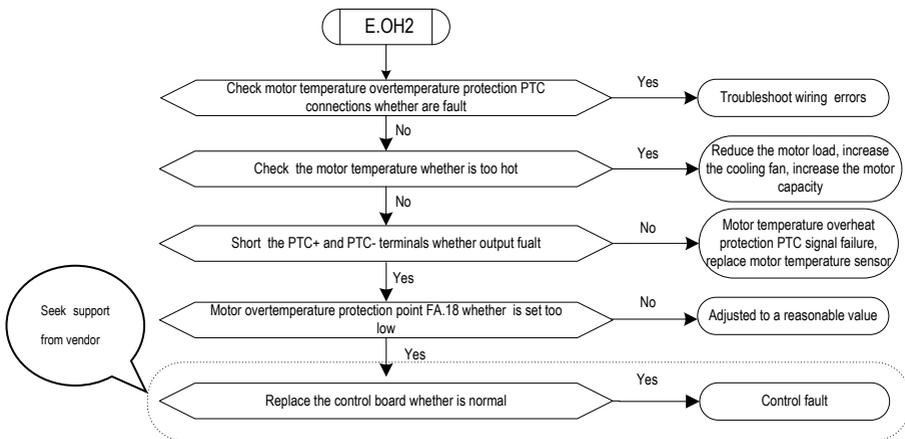
Driver Overload Fault (E.OL2)



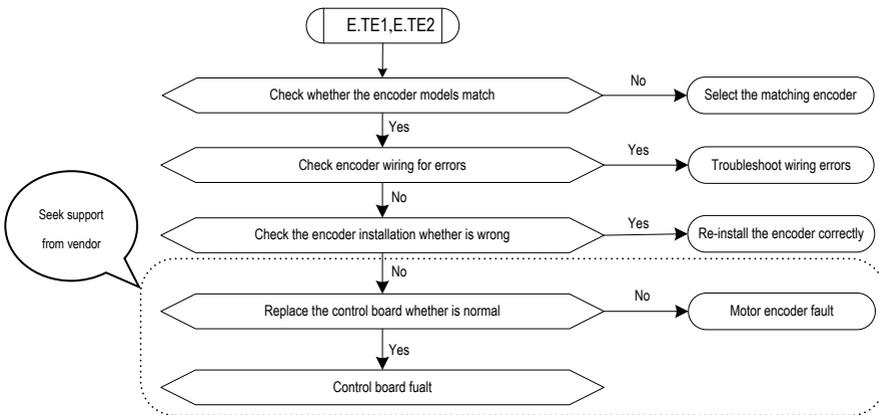
Driver Overheat Fault (E.OH1)



Sensor Fault (E.FB1)



Motor Temperature Overheat Fault (E.OH2)

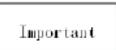


Motor Parameter Identification Encoder Fault (E.TE1, E.TE2)

Chapter 7. Peripherals and Options

7.1 Safety Precautions

In the use of peripherals and options, users shall comply with the following safety precautions and requirements.

	<ul style="list-style-type: none"> • No operation under power connecting state. Otherwise, there is danger of electric shock. • Before operating please cut all related equipments power, ensuring that the main circuit DC current has dropped to safe range. And please operate after 5mins.
	<ul style="list-style-type: none"> • No operation when cover/panel is dismantled. Otherwise, there is danger of electric shock. • Do not dismantle the cover or PCB under power connected state. Otherwise, there is danger of electric shock. • Only professional personnel can install, debug or maintain the peripherals and options. Otherwise, there is danger. • Do not wear loose clothes when installing, debugging or maintaining. Rated protective tools and safeguard should be adopted. • Do not change wire, dismantle jumping wire, optional card, or change cooling fan when the servo driver is running. Otherwise, there is danger of electric shock. • Tighten screw according to specified torque. If main circuit wire connection is loose, there is danger of overheat fire. • Earth of the peripheral equipments and options must be reliable to prevent human body injury.
	<ul style="list-style-type: none"> • When operating, please follow the ESD regulations. Otherwise, the servo driver may be damaged. • Do not cut the power supply when the servo driver is outputting voltage. Otherwise, the servo driver may be damaged.

7.2 Peripherals

Common peripherals are shown in the following table. To order the peripheral equipments, please consult our dealer or sales department.

Peripherals	Peripherals	Functions
	Breaker	Protect power system and prevent malfunction impact on other equipments working when short-circuit happens. And over-load protection.
	Residual-current circuit breaker	Earth protection from electric shock(suggest to use the type that can prevent high-frequency leakage current)
	Electromagnetic contactor	Separate power and servo driver and realize basic relay control.
	AC input reactor	Improve power side factor and isolate the noise disturbance to the frequency servo driver from the power side.

	DC reactor	Restrain ultra-harmonics and improve power factor.
	Input side noise filter	Reduce frequency servo driver disturbance to the power and reduce the power grid disturbance.
	Braking resistor	Passive energy consuming unit of electric braking.
	Consumption braking unit	Electric braking control unit, controlling the braking resistance consumption of the regenerated electric power of the motor efficiently.
	Output side noise filter	Reduce the output side wire electromagnetic disturbance.
	Standby system	Standby system for driver malfunction.
	Heat relay	Protect the motor when overload.
	0-phase reactor	Reduce electromagnetic disturbance of the driver (suitable for input/output side).
	Main loop surge absorption unit	Restrain surge voltage when the main loop switch components act.
	Winding surge absorption unit	Restrain surge voltage when the AC contactor acts.

7.3 The Use of Peripherals

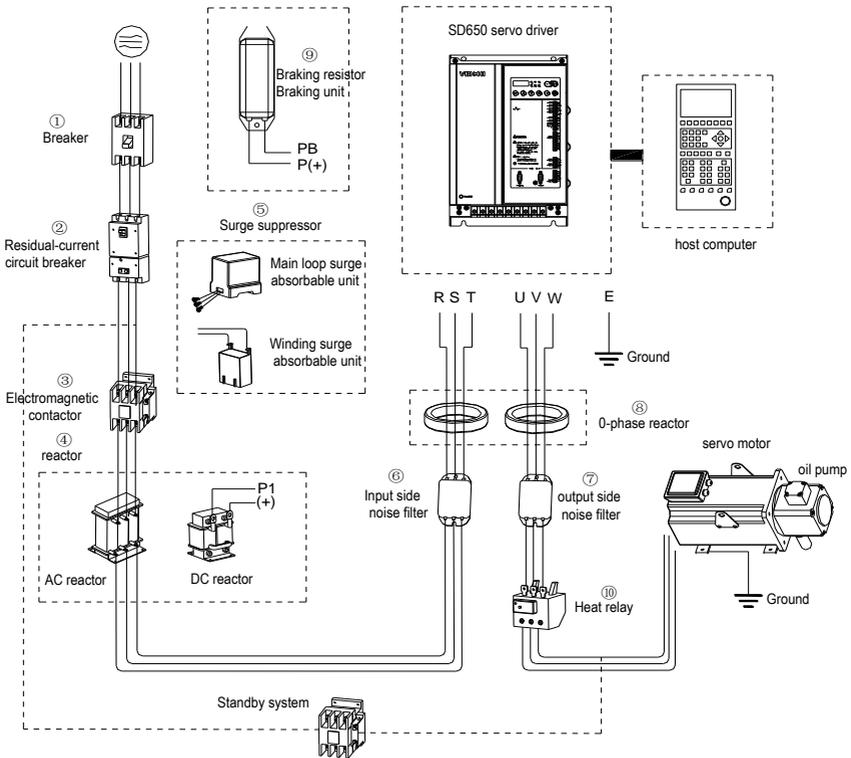


Fig 7-1: Connection of Peripherals

Note:

① Wiring Breaker

To ensure wiring safety and protect power system and prevent malfunction impact on other equipments when short-circuit happens and to ensure over-load protection, please do use wiring breaker between power supply and main loop power input terminals R,S,T.



When choosing the breaker, the capacitance should be about 1.5-2 times of the rated output current of the frequency servo driver. Please compare the time characteristic of the breaker and the time characteristic of the servo driver protection (150% of the rated output current, 1 minute). Make sure there will be no tripping.



Before the wiring of main loop terminal, make sure that the breaker and electromagnetic contactor are cut. Otherwise, there is danger of electric shock.

② Residual-current Circuit Breaker

The driver outputs peak voltage high-speed switch square wave, so there is high frequency leakage current. For protection of preventing electric shock and leakage current fire, please install residual current circuit breaker. Usually, one driver will bring 100mA leakage current (when the power cable length is 1m). If the length prolongs 1m, there will be 5mA more leakage current. So please use residual current circuit breaker specialized for high frequency leakage at the power input side of the driver. The factors which impact leakage current are as follows:

Capacitance of driver;
 Carrier frequency;
 Motor cable type and wire length;
 EMI/RFI filter

To protect human body and the driver, please choose residual current circuit breaker that can use AC/DC power and capable of handling high frequency leakage current. There should be one residual current circuit breaker with more than 200mA sensitive current for every driver. If the driver outputs different wave, the high frequency leakage current might be higher due to the difference of the driver. At this case, please take the following measures:

Improve the sensitive current of the residual current circuit breaker;
 Reduce the carrier frequency of the driver.

③ Electromagnetic Contactor

Electromagnetic contactor is a peripheral set to separate power and servo driver connection. When servo driver protective function is acting or carrying out emergency stop operation, the main loop power can be cut by peripheral controller. Please do not connect the electromagnetic switch or electromagnetic contactor to the output circuit. Otherwise, the servo driver may be damaged. If the power recovers after instant stop, if preventing the servo driver from auto-restart is needed, please install electromagnetic contactor for control at the input side.

④ AC Input Reactor and DC Reactor

To restrain current sharp change and high harmonic current, AC input reactor and DC reactor should be used. At the same time the power factor at the input side can also be improved. In the following cases, AC input reactor or DC reactor must be used (use both will bring better effect):

Need to restrain ultra harmonics current and improve power side factor;
 Need to switch input phase capacitance;

When driver is connected to large capacitance power transformer (600kVA above);

Silicon-controlled converters such as DC motor driver are connected to the same power system.

If user has higher requirement on other harmonic restraint, please connect the external DC reactor. Before connecting the external DC reactor, please dismantle the short connector between the terminals P1 and (+).

⑤ Surge Suppressor

Surge suppressor is divided into winding surge suppressor and main loop surge suppressor according to the use position. Please choose the right suppressor on different occasion. The aim of installing surge suppressor is to restrain the surge voltage brought by switch components such as inductive load around the driver (electromagnetic contactor, electromagnetic relay, electromagnetic valve, electromagnetic winding, electromagnetic detent). Do not connect the surge suppressor to the output side of the driver. Otherwise, the driver might be damaged.

⑥ Input Side Noise Filter

Since the rectifier bridge of the driver is uncontrolled rectifier. And the input current is discontinuous impulse current. The harmonic current noise signal may bring impact on the surrounding machines (radio, phone, non-contact switch, sensor) when it flows to power wire from the inner driver. At this case, we suggest to install input side noise filter to lighten the noise into the power wire. Besides, it can also reduce noise from the power wire into the driver.



Please use the specified noise filter for the driver and the connection wire between the filter and the driver should be as short as possible.

⑦ Output Side Noise Filter

Since the driver outputs square wave with high-speed peak voltage switch. So there is high-speed dv/dt convert on the output cables that will produce a lot of radio interference and inductive interference signal. By installing noise filter at the output side, the impact can be relieved. Please do not install static condenser and the noise filter onto the output circuit. Otherwise, there is danger of damage to the driver.

⑧ 0-phase Reactor

0-phase reactor is used for reducing the electromagnetic interference of the driver, suitable for the input side and output side of the driver. It's the equal of a three-phase common mode choke. In actual use, according to the actual magnetic core size and cable specification, 3-5 circles winding ratio are recommended to bring the best performance.

⑨ Braking Resistor or Braking Unit

Consumption unit of renewable electricity, see Chapter 3, Section 6"Braking resistor (brake unit) connection".

⑩ Heat Relay

Please install heat relay at the output side of the driver. When the motor enters into overload state, the heat relay would cut the power source to protect the motor. When using one driver to drive one motor, it is unnecessary to install heat relay. At this time the motor overload protection current LED"0000"digit is set "1" to work as a protection. When using one driver to drive multiple motors or the motor is driven directly by the power grid, please install heat relay between the driver and the motor. When installing the heat relay, please design to cut the sequence control circuit of the MC at the main loop input side by the connection spot of the relay or design to input the heat relay action into the driver as external malfunction. And please pay attention to the following tips to avoid heat relay malfunction and motor overheating at low speed.

Run at low speed:

Multiple motors running in one driver

Motor cable is very long

Detect malfunction mistakenly because the carrier frequency is too high.

Low Speed and Heat Relay

In normal cases, the heat relay is suitable for universal motor. When using the driver to run the universal motor (standard motor), the motor current would increase 5-10%, compared with the commercial power supply. Besides, at low speed, even in the motor rated current range, the cooling capability of the fan drove by the motor axis would reduce. And this would lead to motor overheat. So please set the motor overheat protection current function of the driver to be valid.

When Motor Cable Is Long

When the motor cable is long and the carrier frequency is high, impacted by the leakage current, the heat relay may malfunction. To avoid it, please reduce the carrier frequency or set higher detection value of the heat relay. Before increasing the detection value, do confirm if there's any other cause for the motor overheat. Otherwise, there might be danger.

Chapter 8. Regular Inspection and Maintenance

8.1 Safety Precautions

This chapter explains the safety rules in inspection and maintenance.

	<ul style="list-style-type: none"> • No operation under power connecting state. Otherwise, there is danger of electric shock even death. • Before operation, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5mins.
	<ul style="list-style-type: none"> • No operation when cover/panel is dismantled. Otherwise there is danger of electric shock. • Do not dismantle the cover or PCB under power connected state. Otherwise there is danger of electric shock death. • Only professional personnel can maintain or change fittings. Otherwise, there might be danger. • Do not wear loose clothes when installing, debugging or maintaining. Related protective tools and safeguard should be adopted. • Tighten screw with specified torque. If main circuit wire connection is loose, there is danger of overheat fire. • Machine and motor earth must be reliable. Otherwise, there is danger of electric shock when touching the motor cover.
	<ul style="list-style-type: none"> • When operation, please follow the ESD regulations. Otherwise, the servo driver may be damaged. • Do not change the circuit or structure of the servo driver. Otherwise, the servo driver may be damaged. • Please confirm the rotate direction when no-load. Wrong direction can cause body injury or Significant property damage. • Do not use damaged machine. Otherwise, there is danger of accident.

8.2 Inspection

Servo driver is composed of semi-conductive components, passive electronic component and motive component. All of these components have useful life even under normal working environment, and some of the components can't work after the life time. There must be maintenance measures such as daily check, regular inspection and component changing to protect the components. We suggest one regular inspection every 3-4 months after installation. The inspection period should be shortened in following situations:

High temperature, high altitude;

Start and stop frequently;

AC power supply or load fluctuates obviously;

Environment with serious vibration or impact;

Environment with dust, metal dust, salt, vitriol, chlorine;

Poor storage environment;

● Daily Checking

To avoid machine damage and to prolong life time, please check the following items every day.

Items	Checking Content	Treatment Measure
Power supply	Check if power supply meets the requirement and if there is lack-phase.	Solve according to requirements on nameplate.
Surroundings	Check if it meets the requirement of table3-1.	Find out the problem and solve it.
Cooling system	Check if the servo driver or the motor heat or change color abnormally and cooling fan working state.	Check if it overloads. Tighten screw. Check if cooling fan is dirty or stall rotate.
Motor	Check if there is abnormal vibration or noise.	Tighten machine and electric connection and lubricate the machine components.
Load	Check if output current is over the rated value of the motor or the servo driver and has lasted for a period.	Check if it overloads and if the machine model is right.



No operation under power connecting state. Otherwise, there is danger of electric shock even death. Before operating, please cut all related equipments power, ensuring that the main circuit DC current has dropped to safe range. And please operate after 5mins.

● Regular Inspection

On normal cases, do one inspection every 3 or 4 months. Please decide the actual inspection period according to the machine use condition and working circumstance when using the machine.

● Main Circuit

Items	Checking Content	Treatment Measure
Overall	Check insulated resistance; Check environment.	Tighten and change bad component; Clear and improve circumstance.
Electric connection	<ul style="list-style-type: none"> Check if the color of wire and connector changes and if there is disrepair, crack color change or aging in insulating layer. Check if the connect terminals are frayed, damaged or loose. Earth checking. 	<ul style="list-style-type: none"> Change bad wire. Fasten terminals and change bad terminals. Measure earth resistance and fasten earth terminals.
Mechanical connection	<ul style="list-style-type: none"> Check if there is abnormal vibration or noise or anything loose. 	<ul style="list-style-type: none"> Tighten, lubricate and change the bad components.
Semi-conductive component	<ul style="list-style-type: none"> Check if there is dust or rubbish. If there is obvious change of appearance? 	<ul style="list-style-type: none"> Clean operation environment Change damaged component
Electrolytic capacitor	<ul style="list-style-type: none"> If there is liquid leak, color change or crack. If the safety valve outcrop, inflation, creak or liquid leak. 	<ul style="list-style-type: none"> Change damaged component
Peripheral equipment	<ul style="list-style-type: none"> Peripheral equipment outlook and insulation checking. 	<ul style="list-style-type: none"> Clear and change damaged component.

PCB	<ul style="list-style-type: none"> • check if there're peculiar smell, color change or bad rust and check if the connection is right. 	<ul style="list-style-type: none"> • Fasten connector • Clear PCB • Change damaged PCB
Cooling system	<ul style="list-style-type: none"> • Check if the fan is damaged or blocking. • If rubbish and dust is stick to the heat sink. • Is air inlet/outlet blocked? Or is there something sticking to the inlet/outlet. 	<ul style="list-style-type: none"> • Clean operation environment • Change damaged component.
Keyboard	<ul style="list-style-type: none"> • If it is damaged. Check if display is complete. 	<ul style="list-style-type: none"> • Change damaged component
Motor	<ul style="list-style-type: none"> • Check if there is abnormal vibration or noise. 	<ul style="list-style-type: none"> • Tighten machine and electric connection and lubricate the machine components.

No operation under power connecting state. Otherwise, there is danger of electric shock even death.



Before operating, please cut all related equipments power, ensure that the main circuit DC current has dropped to safe range. And please operate after 5mins.

8.3 Maintenance

All equipments and components have useful life. Right maintenance can prolong the lifetime. But damage can't be avoided. Please change the components before their lifetime is over.

Component	Useful Lifetime
Fan	2~3year
Electrolytic Capacitor	4~5 year
PCB	8~10 year

• Fan

When changing fan, please use original fan. You can contact the dealer or the sales department of Veichi Company. For those driver models equipped with many fans in one machine, to prolong these machines' lifetime, changing all fans when changing the cooling fan is highly recommended.

• Other Components

The replacement of the other components has strict requirements on maintenance technical and product familiarity. And they can't be used without strict detection after replacement. So we suggest the user not to replace the other inner components by themselves. If you need to change indeed, please contact the dealer or the sales department of Shenzhen Veichi Electric Co., Ltd.

Warranty Card

Profile

User Name : _____

Address : _____

Contacts : _____ Phone : _____ Fax : _____

Model : _____ Machine Code : _____

Agent/Distributor Profile

Delivery Company : _____

Contacts : _____ Phone : _____ Delivery Date : _____

Warranty Clauses

The Company solemnly states that since the day users purchase from my company (hereinafter referred to as manufacturer),they can enjoy the following warranty services;

- 1.Since the date of purchase, users can enjoy the following warranty services of the product:
 - 1) Within 30 days after shipment,the company promises returning,replacement and maintenance of the product.
 - 2) Within 90 days after shipment,the company promises replacement and maintenance of the product.
 - 3) Within 18 months after shipment,the company promises only maintenance of the product.
 - 4) Products exported to countries except China shall not enjoy the warranties mentioned above.
2. Since the date of purchase, users can enjoy the service of the company when they pay for the service.
3. Exception Clauses: Product failures caused by the following reasons would not enjoy the free warranty services of the manufacturer:
 - 1) Failures caused by operations of users that is not operated in accordance with the requirements of the product manual;
 - 2) Failures caused when users repair or renovate the product without communicating with the manufacturer in advance;
 - 3) Failures caused by abnormal aging of the product resulted from poor using environment;
 - 4) Failures caused by earthquake, fire or other natural disasters or abnormal voltage;
 - 5) Failures caused by damage during transportation(mode of transportation is decided by users and the company only helps to handle cargo shipment procedures).
4. In the following conditions, the manufacturer have the right not to provide warranty services:
 - 1) When the marks,trademarks or nameplates of the products are destroyed or can not be identified;
 - 2) When users do not pay for the product according to signed contract;
 - 3) When users intentionally hiding the improper operations during installation, wiring and maintenance;
5. For products that enjoy all returning,replacement and maintenance services, first the product should be returned to the company and after responsibility confirmation,the product can be replaced or repaired.

Certificate of Approval

QC check : _____



The product has been checked and proved to be qualified for delivery in conformity with standard.