Reference Manual

BKC Series Servo Driver

v2017.2.0

Yuhai Electromechanical Co.,Ltd

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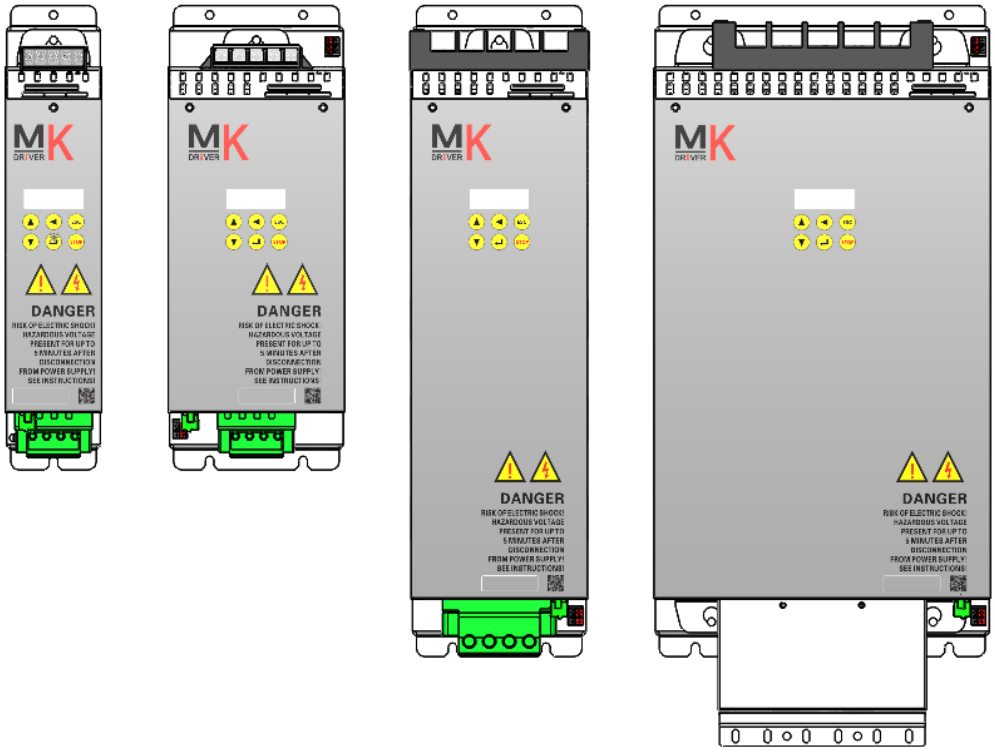
2 Model Specifications

2.1 Nomenclature Plate

BK C – CS - 4T 018 – G P 8 R – 0000 - 0304
1 2 3 4 5 6 7 8 9 10 11

No	Name	Options
1	Series	BK Book Series
2	Type	C：Integrated Motor Driver Unit S：Single Motor Driver Unit D：Double Motor Driver Unit P：AC Rectification / Braking Unit
3	Exterior	AS、CS、AH、CH、EH、FH、GH
4	Voltage Class	2T：220V 4T：400V 6T：600V
5	Rated Current	S1 Duty Rated Output AC Current Effective Value (A)
6	Encoder Interface Type	N：No Encoder Interface G：Incremental Quadrature Interface (RS422) X：Resolver Interface
7	Instruction InterfaceType	X：No Interface Module , just mBUS P：GPIO Module E：ECAT Module
8	Platform Type	
9	mBUS Interface Type	K：mBUS Non-isolated (RS485) R：mBUS Isolated (RS422) C：mBUS Isolated (CAN 2.0B)
10	Hardware version code	0000
11	Software version code	-

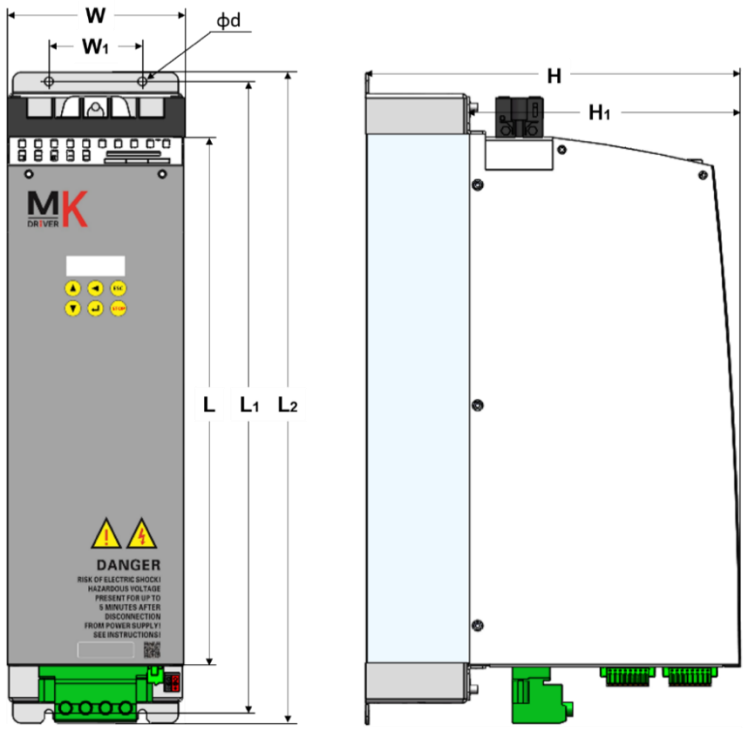
2.2 Specification Summarizing



Type	Shape Type	Power of Matched Motor (kW)	S_1 Rated Output Current (A_{ACeff})	Brake Resistor (Ω/W)
BKC-AS-4T008	AS	3.7	8.5	40/1000
BKC-AS-4T012		5.5	12	40/1000
BKC-AS-4T017		7.5	17	32/1000
BKC-CS-4T018	CS	7.5	18	32/1000
BKC-CS-4T024		11	24	26/1500
BKC-CS-4T030		13	30	20/2500
BKC-CS-4T035		15	35	20/2500
BKC-CH-4T037	CH	18.5	37	20/2500
BKC-CH-4T045		22	45	26/1500 x 2
BKC-CH-4T060		30	60	26/1500 x 2
BKC-EH-4T075	EH	37	75	20/2500 x 2
BKC-EH-4T090		45	90	20/2500 x 2

[Note]For the detailed technical parameters of the driver, please see *BK Series device manual*.

2.3 Installation

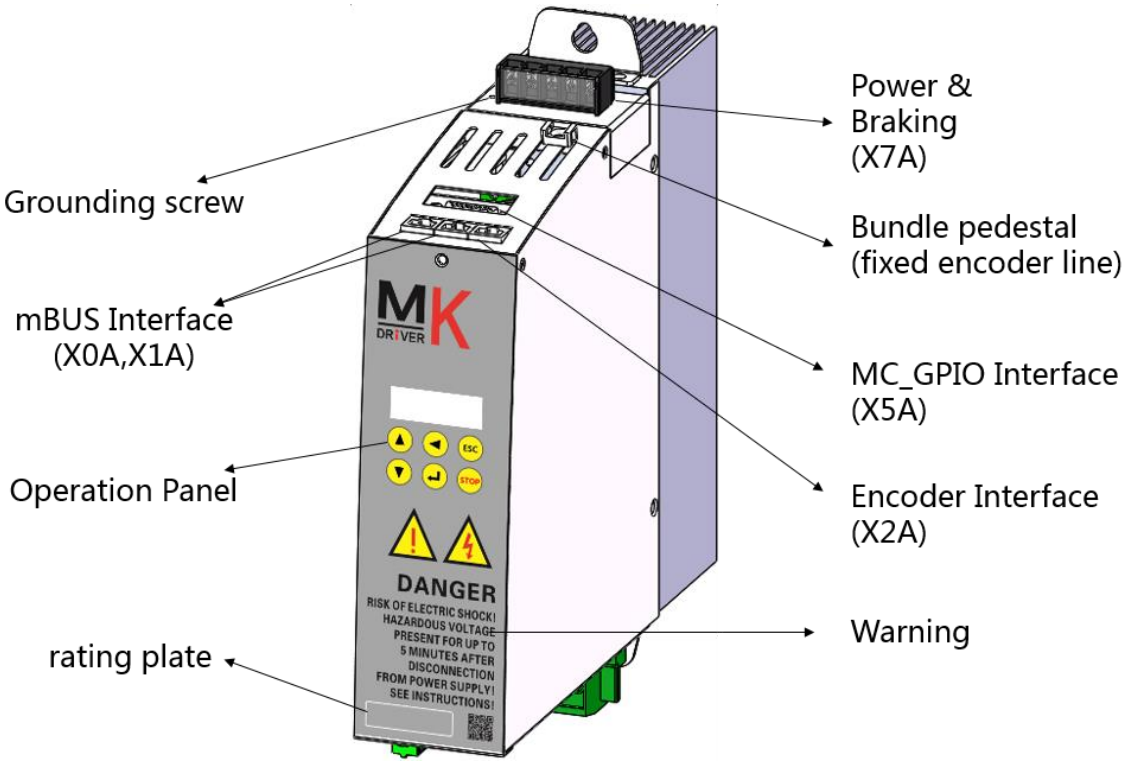


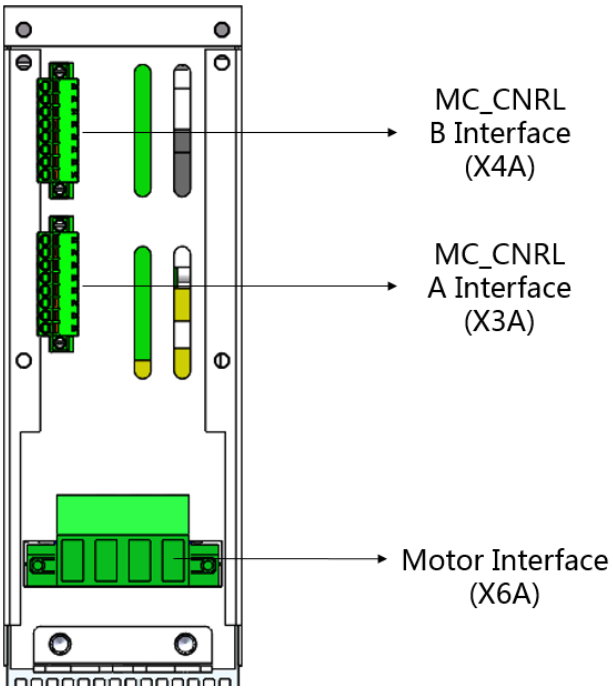
Type	Φd	L	L1	L2	W	W1	H	H1
BKC-AS-4T008	6.5	260	334	348	72	-	278	202
BKC-AS-4T012								
BKC-AS-4T017								
BKC-CS-4T018	6.5	260	334	348	132	70	278	202
BKC-CS-4T024								
BKC-CS-4T030								
BKC-CS-4T035								
BKC-CH-4T037								
BKC-CH-4T045	6.5	400	474	488	132	70	280	204
BKC-CH-4T060								
BKC-EH-4T075	6.5	400	474	556	252	190	280	204
BKC-EH-4T090								

[Note]For the detailed installation information, please see *BK Series device manual*; unit mm.

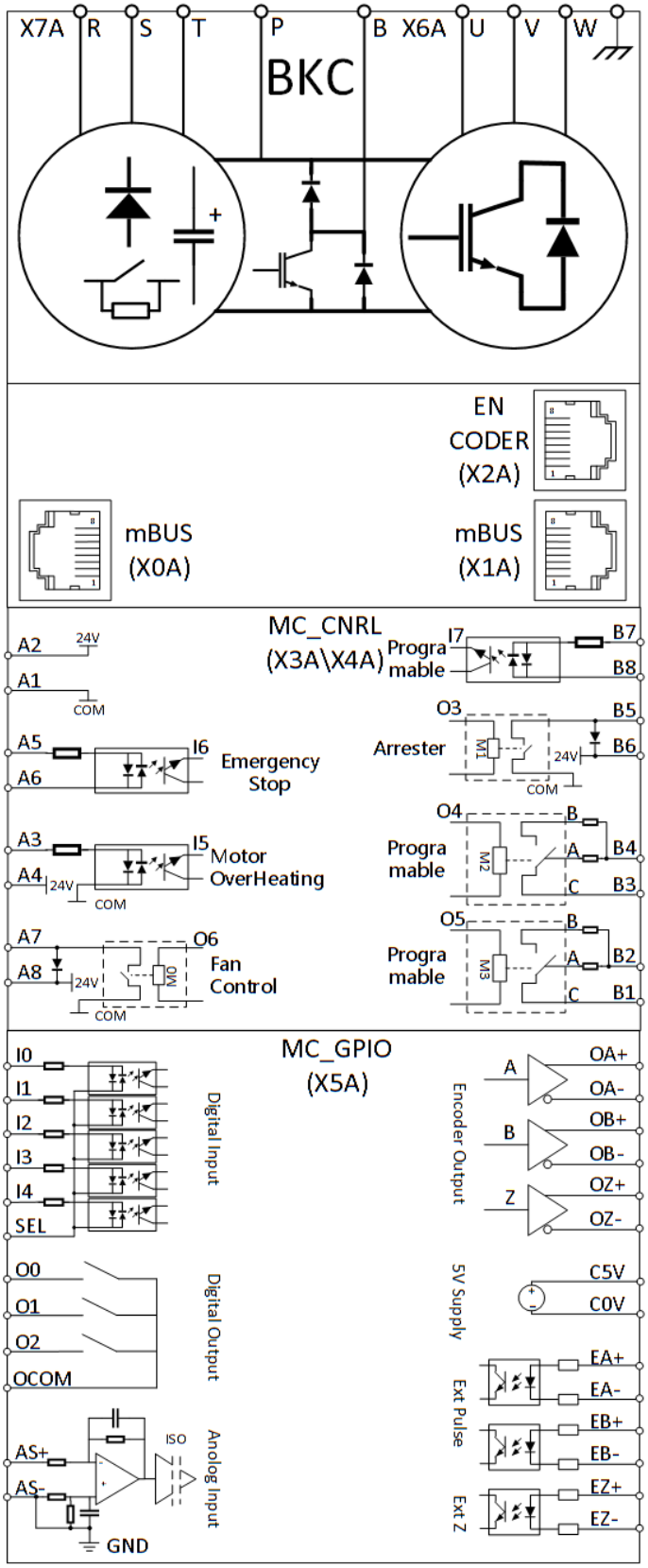
3 Terminal

3.1 Interface Terminal





3.2 Electrical Schematic Diagram



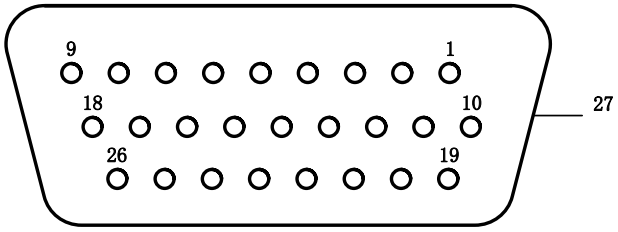
3.3 High Voltage Circuit

Terminal Name	R , S , T	P , B	U , V , W	⏚
Position	X7A		X6A	
Function	AC Power Input	Brake Resistor	Motor	Earth

Note：

1. Primary loop connection cable should choose appropriate cable according to power of driver.
2. Grounding terminals must be reliable grounding, otherwise there is risk of electric shock.
3. Main circuit wiring should be separated from the control circuit wiring, otherwise control signal will be interfered.
4. It is forbidden to input the AC power to the output terminals U, V, W, otherwise it will damage the driver.

3.4 Control Signal Terminal X5



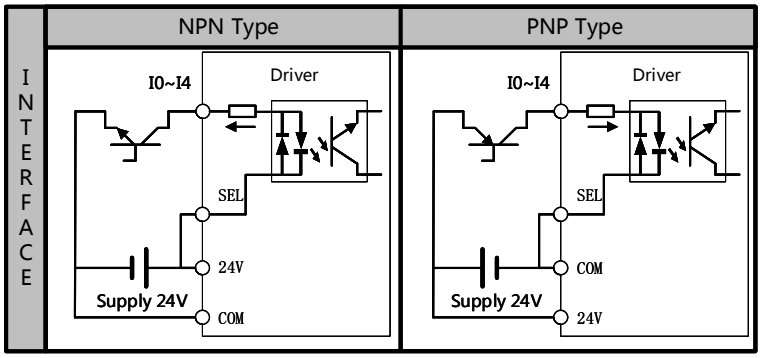
HDB-26-FEMALE

3.4.1 Terminal Definition

	Programmable Input		Programmable Output		Analog Input		Pulse Input		Motor Encoder Output	
	Terminal Name	Pin	Terminal Name	Pin	Terminal Name	Pin	Terminal Name	Pin	Terminal Name	Pin
Input Output	I0	10	O0	14	AS+	25	EA+/EP+/CW+	2	OA+	9
	I1	19	O1	5	AS-	26	EA-/EP-/CW-	11	OA−	18
	I2	1	O2	24			EB+/ED+/CCW+	4	OB+	17
	I3	20	OCOM	23			EB-/ED-/CCW-	13	OB−	8
	I4	21					EZ+	3	OZ+	7
	SEL	22					EZ-	12	OZ−	16
							C5V Power	6		
							CGND	15		
Description	5 Point NPN、PNP According to SEL Pin		3 Point Normally Open Relay Output 24V/50mA		AS+ : Signal+ AS - : Signal- ±10V , 0～+10V or 4～20mA		AB Pulse、PD Pulse or CW Pulse Max Frequency 500KHz		RS422	

3.4.2 Interface Type

3.4.2.1 Digital Input

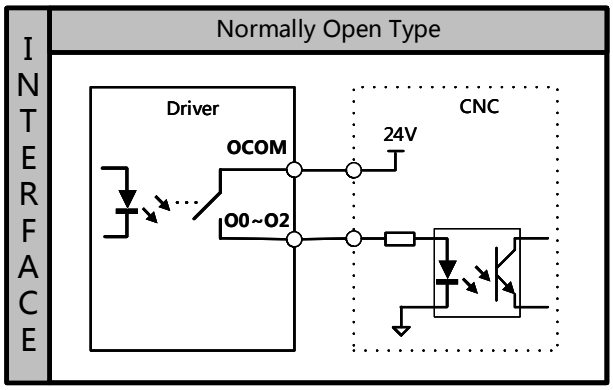


Note： Digital input type is chosen by SEL Pin：

a) SEL connect to 24V，input type is NPN;

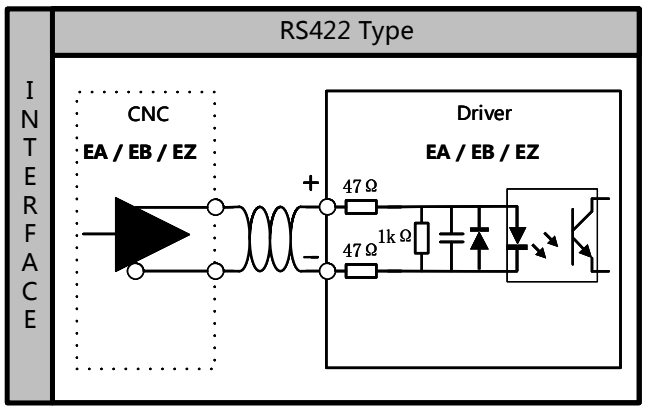
b) SEL connect to 0V，input type is PNP.

3.4.2.2Digital Output

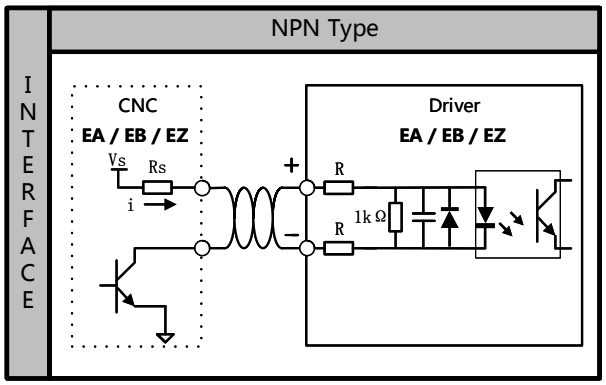


3.4.2.3Pulse Input

- RS422 Differential Input

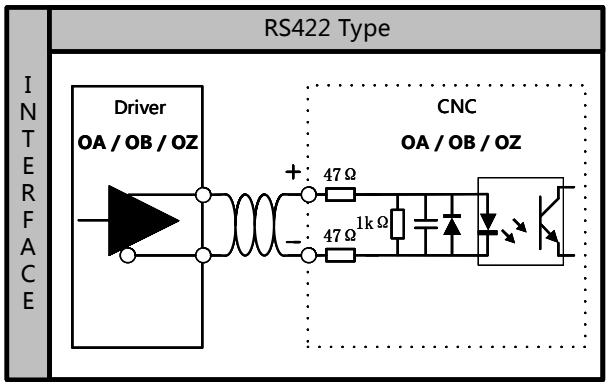


- Open Collection Input

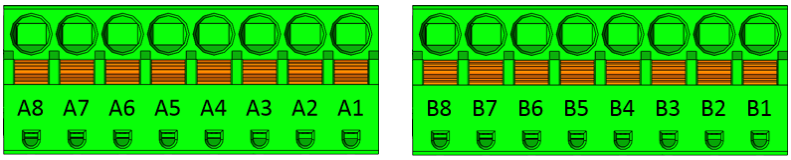


3.4.2.4 **Motor Encoder Output**

- RS422 Differential Output



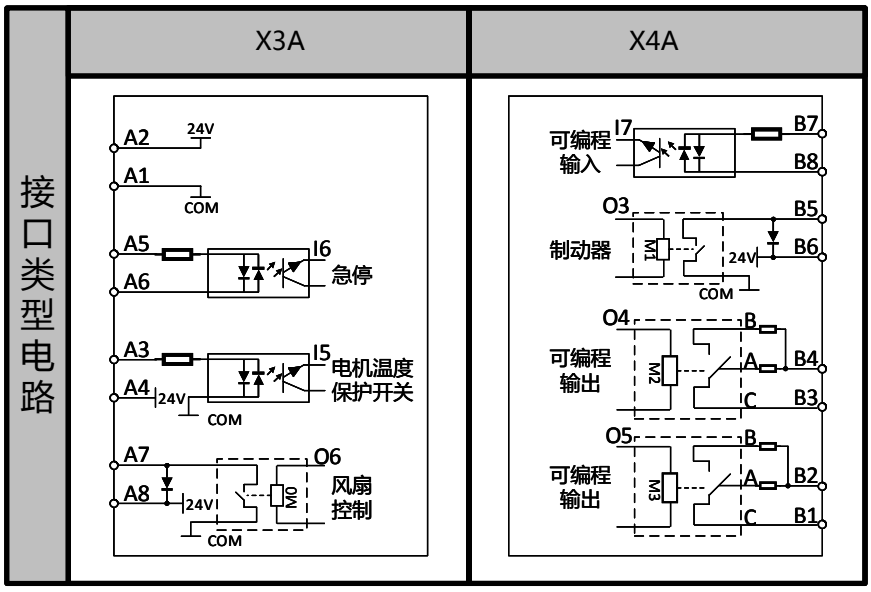
3.5 Motor Signal Interface X3/X4



3.5.1 Terminal Definition

X3A			X4A		
Pin	Name	Description	Pin	Name	Description
A1	COM	Supply 24V Negative	B1	M3C	Programable Relay 3 Common Terminal
A2	24V	Supply 24V Positive	B2	M3B	Programable Relay 3 NC Terminal
A3	MH1	Motor Overheated Protection Switch (NO or NC) Interface	B3	M2C	Programable Relay 2 Common Terminal
A4	MH2		B4	M2B	Programable Relay 2 NC Terminal
A5	ST1	Emergency Stop Switch Interface(24V)	B5	BRK_0V	Motor Brake Control Output Interface
A6	ST2		B6	BRK_24V	
A7	FAN_0V	Fan 0V Terminal	B7	I7A	Programable Input I7
A8	FAN_24V	Fan 24V Terminal	B8	I7B	

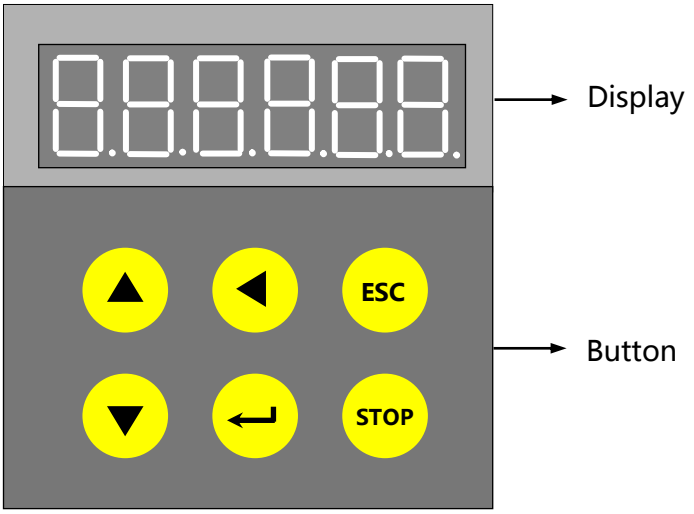
3.5.2 Interface Type



4 Panel Operation

4.1 Panel Appearance

Panel is composed of six buttons and six 8-SEG LED, which is used for the display and modification of performance parameter or real-time parameter of servo system. The operation is easy.



4.2 Button Function

Key	Name	General Function	Multiplex Function
▲	Increase	parameter number or parameter value increase	None
▼	Decrease	parameter number or parameter value decrease	None
◀	Left Shift	Make cursor moves left.	Switch between homologous series parameter set.
↵	Enter	Confirm the operation.	Run the program at stop state.
ESC	Exit	Exit the operation.	Switching between different series of parameter set.
STOP	Stop	Return to Run/Stop	At run state, press shortly will stop speed, press continuously will stop program.

[Note]

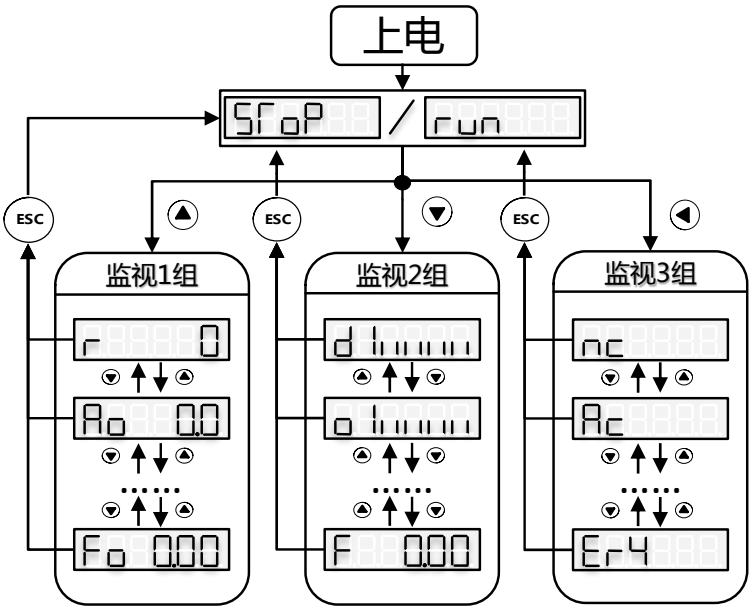
1. RUN on behalf of the servo system is in place, STOP on behalf of the servo system is not ready.

4.3 Parameter Display

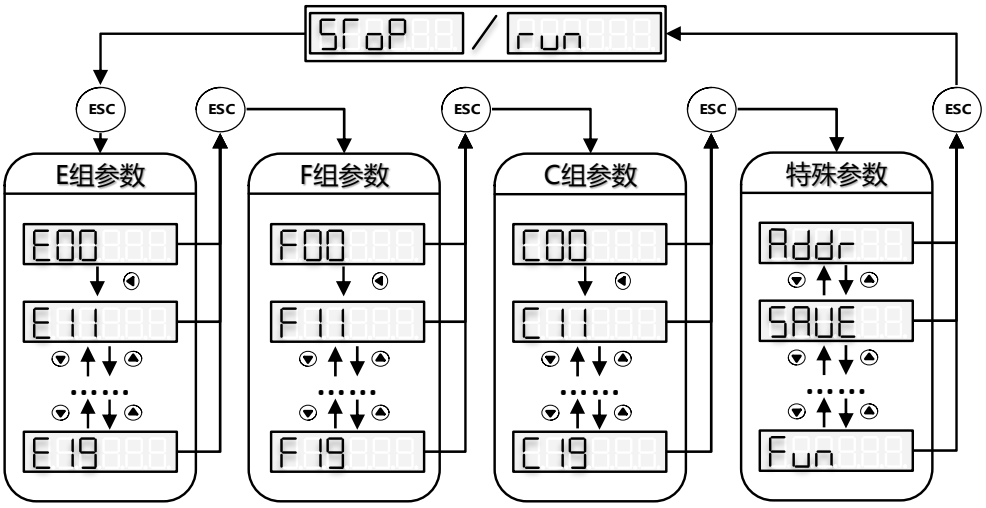
- **Real-time Parameter :** Parameter number is on the left, parameter value is on the right.
- **None Real-time Parameter :** Level 1 menu is for parameter number, displayed on the left; level 2 menu is for current parameter values, displayed on the right; level 3 menu is for target setting value.
- **Minus :** If decimal point before top digit is lighten, the number is negative.

4.4 Operation Procedure

- Switch of monitoring parameters and control panel menu：



- Parameters menu switch：



5 Trial Operation

5.1 Wiring

- No matter trial operation or daily operation, please check wiring.

1) Power wire (TAG：R、S、T) , three-phase power input (3AC-380V) ;
2) Motor wire (TAG：U、V、W) , three-phase output (U、V、W) ;
3) Braking resistor wire (TAG：P、B)
4) Motor encoder wire (TAG：X2) connect to motor encoder terminal;
5) Check drive grounding are in good condition.

5.2 Motor Phase Selfcheck

1) Check if the axis of motor can freely rotate;
2) Check parameter such as E00，E04;
3) When the panel display “run”，press “Left Shift” to “OP”，and input 2, motor phase start selfcheck;
4) Motor phase selfcheck will finish in 5 second, if warning occur, please see the warning list in chapter 8;
5) If an exception occurs in selfcheck (such as overcurrent) , then press “stop” continuously to stop the driver;

5.3 Drive Motor by Panel Operation

- Control motor through manually typing drive panel (such as speed, direction, acceleration, etc.) :
- When the control of CNC is abnormal, you can choose panel control to check if the wire between drive and motor is right, and if the parameter is right.

1) When panel display "run", press "Left Shift" 2 times to "OP", enter 1;
2) Press "Left Shift" to "nc", enter the desired speed;
3) Press "Left Shift" to "ac", enter acceleration; Press "Left Shift" to "dc", enter deceleration;
4) Press "Left Shift" to "FE", enter direction;
5) Press "esc" to return to "run", press "Increase" one time to "r00000";
6) Motor zero speed enable. Press "Enter" 1 time, zero speed motor can make; press "Enter" once again, motor will work according to setting speed.
7) Press "Stop" 1 time, motor decelerates to zero and lock shaft; press "Stop" once again and motor disable.
8) Press "stop" continuously, motor free sliding; at "STOP" state, press "enter" to return to "run" state.

6 Function Description

6.1 IO Mapping

6.1.1 Monitored Parameter

Parameter No	mBUS Address	Parameter Name	Description
d1 ~ d4	0x1016	digital input	Digital input monitor, from right to left is I0, I1, I2...
o1 ~ o4	0x101E	digital output	Digital output monitor, from right to left is O0, O1, O2...

6.1.2 DI Input Mapping Parameter

Driver has totally 8 digital input located in X3、X4、X5 terminal. Each digital input can be defined as various kinds of functional meaning.

Parameter No	mBUS Address	Parameter Name	Set Value
F70	0x110D	I0 Defination	0：Speed Control；1：Direction；2：Homing 4：Position Control；5：Emergency Stop； 6：Swing Control；7：Reset； 8：Forward JOG；9：Second Homing 10：Torque Control；11：Third Homing； 12：Fourth Homing 13：Motor Overheated； 17~20：16 Speed（X1、X2、X3、X4）； 127：Invalid
F71	0x110E	I1 Defination	
F72	0x110F	I2 Defination	
F73	0x1110	I3 Defination	
F74	0x1111	I4 Defination	
F75	0x1112	I5 Defination	
F76	0x1113	I6 Defination	
F77	0x1114	I7 Defination	

6.1.3 DO Output Mapping Parameter

Driver has totally 8 digital input located in X3、X4、X5 terminal. Each digital input can be defined as various kinds of functional meaning. Plus 128 to set value, the output is changed to normally closed output type. But when driver is not powered on, the output is open state.

Parameter No	mBUS Address	Parameter Name	Set Value
F80	0x1117	O0 Definitions	0：Warning；1：Homing done； 2：Position Mode Ready 3：Speed Reach；4：Servo Ready； 5：Fan Output 6：Double Speed Switch；7：Motor Brake； 9：Zero Speed 127：No Effect
F81	0x1118	O1 Definitions	
F82	0x1119	O2 Definitions	
F83	0x111A	O3 Definitions	
F84	0x111B	O4 Definitions	
F85	0x111C	O5 Definitions	

Parameter No	mBUS Address	Parameter Name	Set Value
F86	0x111D	O6 Definitions	*Note: Plus 128 to the above figure, the output is changed to normally closed output type. when driver is not powered on, the output is open state.

6.2 Analog Voltage Correction

In the practical application, when analog Voltage is used to control signal, because of environment interference of industrial field, there is certain deviation between the actual collected analog voltage value of driver and theoretical analog voltage issued by numerical control system (or PC), which make the use inconvenience. However, the function of analog voltage correction is to correct the deviation of analog voltage to theoretical voltage.

6.2.1 Parameter

- **Monitored Parameter**

Parameter No	mBUS Address	Parameter Name	Description
A0	0x1026	Non-corrected Analog Input Value	Unit : mv
A1	0x1027	Corrected Analog Input Value	Unit : mv

- **0V~10V Correction Parameter**

Parameter No	mBUS Address	Parameter Name	Set Value
F50	0x10F9	Actual sample voltage at positive 0V	A0 Value at Analog Voltage = 0V
F52	0x10FB	Actual sample voltage at the first positive paragraph	A0 Value at Analog Voltage = F51
F54	0x10FD	Actual sample voltage at the second positive paragraph	A0 Value at Analog Voltage = F53
F56	0x10FF	Actual sample voltage at the third positive paragraph	A0 Value at Analog Voltage = F55
F58	0x1101	Actual sample voltage at the fourth positive paragraph	A0 Value at Analog Voltage = F57
F59	0x1102	Actual sample voltage at positive +10V	A0 Value at Analog Voltage = +10V

- **-10V~0V Correction Parameter**

Parameter No	mBUS Address	Parameter Name	Set Value
F60	0x1103	Actual sample voltage at negative 0V	A0 Value at Analog Voltage = 0V
F62	0x1105	Actual sample voltage at the first negative paragraph	A0 Value at Analog Voltage = F61
F64	0x1107	Actual sample voltage at the second negative paragraph	A0 Value at Analog Voltage = F63
F66	0x1109	Actual sample voltage at the third negative paragraph	A0 Value at Analog Voltage = F65
F68	0x110B	Actual sample voltage at the fourth negative paragraph	A0 Value at Analog Voltage = F67
F69	0x110C	Actual sample voltage at negative -10V	A0 Value at Analog Voltage = -10V

- **Analog filter Parameter**

Parameter No	mBUS Address	Parameter Name	Set Value
E51	0x1082	Analog filter time constant	Analog filter time constant

6.2.2 Zero Correction

1) CNC Execute：M03S0，monitored parameter A0
2) Put value that a little bigger than A0 into F50
3) Put value that a little smaller than A0 into F60

6.2.3 Analog Voltage Correction

Divide 0V~10V analog voltage to 5 segments to correct, segment points are F51,、F53、F57、F59;

Divide -10V~0V analog voltage to 5 segments to correct, segment points are F61,、F63、F67、F69;

For example:

1) In this case, - 10 v ~ 10 v corresponding motor speed range for - 6000 RPM to 6000 RPM;
2) First correct 0~10V analog voltage;

3) Set F00=6000、F51=2.000、F53=4.000、F55=6.000、F57=8.000
4) CNC execute：M03S1200，put the value of A0 into F52；
5) CNC execute：M03S2400，put the value of A0 into F54；
6) CNC execute：M03S3600，put the value of A0 into F56；
7) CNC execute：M03S4800，put the value of A0 into F58；
8) CNC execute：M03S6000，put the value of A0 into F59；
9) Then correct -10V~0V analog voltage;
10) Set F61=.2.000、F63=.4.000、F65=.6.000、F67=.8.000（the point in the front of value means negative）
11) CNC execute：M04S1200，put the value of A0 into F62；
12) CNC execute：M04S2400，put the value of A0 into F64；
13) CNC execute：M04S3600，put the value of A0 into F66；
14) CNC execute：M04S4800，put the value of A0 into F68；
15) CNC execute：M04S6000，put the value of A0 into F69；
16) Now, check corrected analog input value A1.

6.3 Speed Control

Speed control is applied to precise speed control occasions, such as braiding machine, drilling machine, CNC machine, and position control can also be realized through CNC.

6.3.1 Command Sources

There are several different sources of speed instruction in speed control, which is set by parameter E40.

Parameter No	Description	Explanation
0	Analog Quantity Speed Command：0~10V	Port AS+ and AS- input Analog Voltage
1	Analog Quantity Speed Command：±10V	Port AS+ and AS-input Analog Voltage
2	Pulse Speed Command：External Pulse	Port EA+,EA-,EB+EB- Impulse Frequency
3	Bus Speed Command：mBUS	mbus set target speed

6.3.2 Monitored Parameter

Parameter No	mBUS Address	Parameter Name	Description
d	0x1016	Digital Input	Digital Input Monitor
A1	0x1027	Corrected Analog Input Value	Unit：mv
F	0x102E	External Impulse Frequency	Impulse Frequency (Hz)
E82	0x10B0	mBUS Speed Command Value	Unit：rpm
FI	0x1034	Motor Command Frequency	Unit：0.01HZ
Fo	0x1036	Motor Output Frequency	Unit：0.01HZ
Ao	0x1032	Motor Output Current	0.1A
To	0x1033	Motor Output Torque	%
r	0x1038	Motor Rotation Speed	Unit：rpm

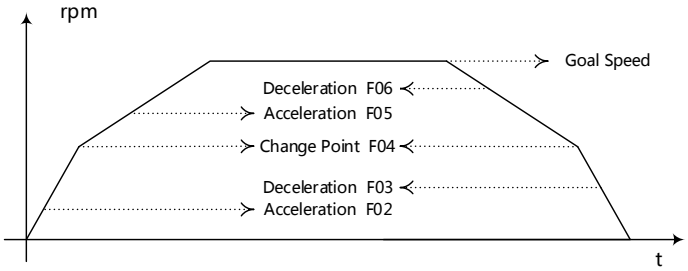
6.3.3 Performance Parameter

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
E05	0x1054	Motor Excitation Current	1~100	50	%
E06	0x1055	Motor Encoder Pulse Filter Time	1~200	30	0.1ms
E10	0x1059	Motor Slip at Speed Control	1~900	45	rpm
E11	0x105A	Motor Slip Gain at Speed Control	0~100	0	-
E20	0x1063	Torque Limit at Acceleration(Speed Control)	1~200	180	%
E21	0x1064	Torque Limit at Deceleration (Speed Control)	1~200	150	%
E22	0x1065	Torque Saturation Gain	0~550	450	-
E23	0x1066	S Curve Set Value	1~20000	1000	-
E24	0x1067	Steady speed integral time constant transformation	1~50000	5000	0.01Hz
E25	0x1068	Acceleration and Deceleration integral time constant transformation	1~50000	5000	0.01Hz
E30	0x106D	Proportional Gain	0~100	80	%
E31	0x106E	Integral Gain	0~150	100	%
E32	0x106F	Zero Speed Current Gain	1~100	40	%
E33	0x1070	Current Gain	1~150	60	%
E34	0x1071	Current Gain Transformation Point	1~30000	5000	0.01Hz
E35	0x1072	Speed Control Integral Time Constant	1~1000	20	0.1ms
E36	0x1073	Integral Time Constant at Steady Speed	1~20000	200	0.1ms
E37	0x1074	Integral Time Constant at Acceleration	1~20000	200	0.1ms
E38	0x1075	Integral Time Constant at Deceleration	1~20000	1000	0.1ms

6.3.4 Acceleration and Deceleration

Parameter No	mBUS Address	Parameter Name	Set Value	Unit
F02	0x10C5	Acceleration at Low Speed (Speed Control)	1500	0.05Hz/s
F03	0x10C6	Deceleration at Low Speed (Speed Control)	1500	0.05Hz/s
F04	0x10C7	acceleration transformation point	3000	rpm
F05	0x10C8	Acceleration at High Speed (Speed Control)	1500	0.05Hz/s
F06	0x10C9	Deceleration at High Speed (Speed Control)	1500	0.05Hz/s
F30	0x10E5	Emergency Stop Deceleration	3000	0.05Hz/s

At speed control，motor will control speed according to the setting acceleration and deceleration. As shown in the figure below, F02 sets the acceleration curve of motor at low speed, F03 sets the deceleration curve of motor at low speed, F05 sets



the acceleration curve of motor at high speed，F06 sets the deceleration curve of motor at high speed, F04 sets the acceleration transformation point of motor.

- Formula of Acceleration and Deceleration Parameter（F02，F03，F05，F06，F30）and Time：

$$F_x = \frac{2}{3} * \frac{|r_1 - r_2|}{t}$$

Note：r1 is current speed (rpm)，r2 is target speed (rpm)，t is acceleration time or deceleration time (s).

- Example：Time of motor speed from 0rpm to 3000rpm is 1s。
  - ✓ If F04>3000（use acceleration at low speed），F02=(2/3)*(3000-0)/1=2000
  - ✓ If F04=1500（acceleration is different at low and high speed）：
    Acceleration time at low speed is 0.4s，F02=(2/3)*(F04-0)/0.4=2500；
    Acceleration time at high speed is 0.6s，F05=(2/3)*(3000-F04)/0.6=1667;

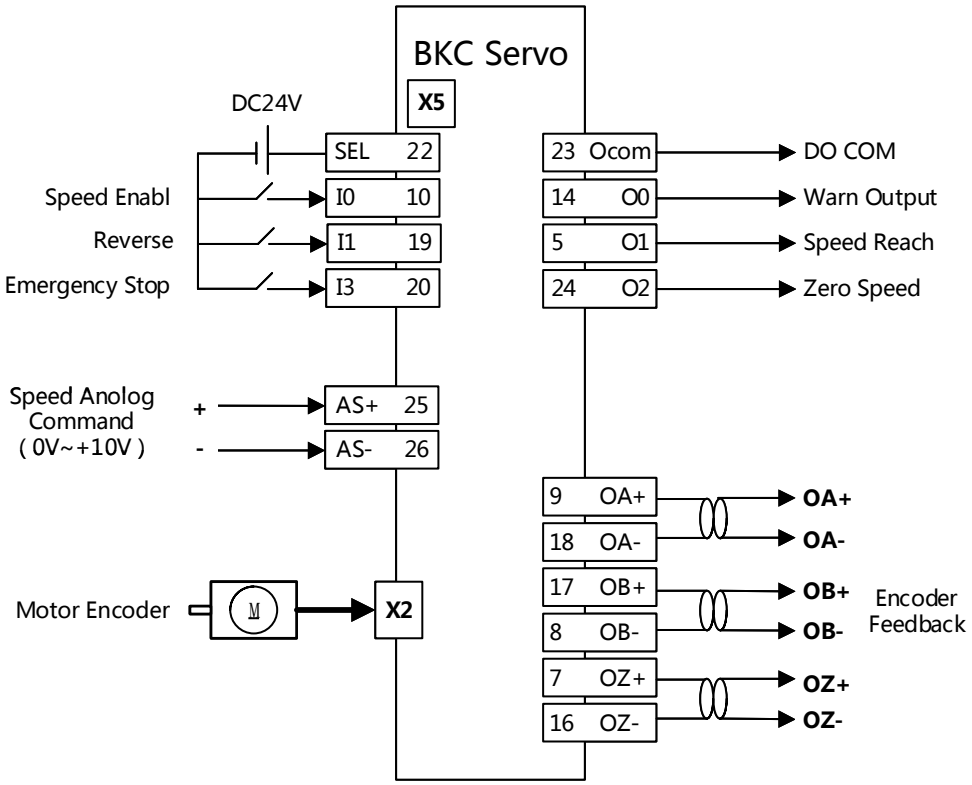
6.3.5 Speed Direction

No	E41	E42	Description
1	0	0	r=r
2	1	0	r = - r
3	X	1	If r < 0 , r = 0

6.3.6 Example

6.3.6.1 Instruction Type : 0~10V Analog Voltage

- Speed command is analog voltage input, below is the wiring diagram:



- Parameter of Example:

Parameter No	mBUS Address	Parameter Name	Set Value
E48	0x107F	Digital Input Type	0
F70	0x110D	I0 Defination	0
F71	0x110E	I1 Defination	1
F73	0x1110	I3 Defination	5
F80	0x1117	O0 Output Definitions	0
F81	0x1118	O1 Output	3

Parameter No	mBUS Address	Parameter Name	Set Value
		Definitions	
F82	0x1119	O2 Output Definitions	9
E40	0x1077	Speed Command Type	0

- Associated parameter between speed command and analog voltage:

Parameter No	mBUS Address	Parameter Name	Set Value
A1	0x1027	Corrected Analog Input Value	
E50	0x1081	Speed Instruction Resolution	2
F00	0x10C3	Max Speed (Speed Control)	3000
F01	0x10C4	Mini Speed (Speed Control)	0
F08	0x10CB	Speed Command Gear Ratio Numerator	1000
F09	0x10CC	Speed Command Gear Ratio Denominator	1000

- Speed Command Formulas : (F01 ≦ |r| ≦ F00)

$$r = \frac{A1}{10.000} * F00 * \frac{F08}{F09}$$

6.4 Positioning Control

Positioning control is applied to precision positioning systems, such as numerically-controlled machine tools, robots, etc. Positioning command source include pulse command, analog command, mBUS bus command.

6.4.1 Command Source

E47	Description	Explanation
0	External Pulse	AB Pulse、PD Pulse、CCW Pulse
1	mBUS (Incremental)	Unit Time Pulse Increasing Number
2	mBUS (Absolute)	Pulse Interpolation Count
3	Analog Voltage：0~10V	10V Corresponding Max Speed
4	Analog Voltage：±10V	±10V Corresponding Max Speed

6.4.2 Monitored Parameter

Parameter No	mBUS Address	Parameter Name	Description
d	0x1016	Digital Input	Digital Input Monitor
P	0x1028	Motor Encoder Count	Unit：pulse
E	0x102C	External Pulse Count	Unit：pulse
Pc	0x1039	Synchro Error	Unit：pulse
E84	0x10B2	mBUS Position Command Value	Unit：pulse
A1	0x1027	Corrected Analog Input Value	Unit：mv
Ao	0x1032	Motor Output Current	Unit：0.1A
To	0x1033	Motor Output Torque	Unit：%
r	0x1038	Motor Speed	Unit：rpm

6.4.3 Performance Parameter

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
E12	0x105B	Motor Slip at Position Control	1~900	45	rpm
E26	0x1069	Torque Limit at Acceleration (Position Control)	1~200	180	%
E39	0x1076	Position Control Integral Time Constant	1~1000	20	0.1ms

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
E44	0x107B	Position Control Model	0~1	0	0：Synchronous Mode; 1：Following Mode
F10	0x10CD	Max Speed (Position Control)	0~6000	1000	rpm
F11	0x10CE	Mini Speed (Position Control)	0~60	1	rpm
F12	0x10CF	Acceleration Gain (Position Control)	0~10000	600	0.05Hz/s
F13	0x10D0	Deceleration Gain (Position Control)	0~10000	400	0.1Hz/s
F15	0x10D2	Inertial Fixed Point	0~60000	200	pulse
F16	0x10D3	Crawl Pulse before End of the Positioning	0~60000	20	pulse
F17	0x10D4	Position Control Accuracy	1~250	2	pulse

6.5 Homing Control

6.5.1 Homing Mode

F26	Description	Explanation
0	Forward Homing	After find Z pulse, motor forward rotate homing.
1	Backward Homing	After find Z pulse, motor backward rotate homing.
2	Nearby Homing	Motor speed stop to 0, homing nearby.

6.5.2 Monitored Parameter

Parameter No	mBUS Address	Parameter Name	Description
d	0x1016	Digital Input	Digital Input Monitor
P	0x1028	Motor Encoder Count	Unit：pulse
H	0x102A	Motor Axis Absolute Position	Unit：pulse
Ao	0x1032	Motor Output Current	0.1A
To	0x1033	Motor Output Torque	%
r	0x1038	Motor Speed	Unit：rpm

6.5.3 Performance Parameter

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
E27	0x106A	Torque Limit at Acceleration (Homing)	1~200	180	%
F11	0x10CE	Mini Speed (Position Control)	0~60	1	rpm
F15	0x10D2	Inertial Fixed Point	0~60000	200	Pulse
F16	0x10D3	Crawl Pulse before End of the Positioning	0~60000	20	Pulse
F17	0x10D4	Position Control Accuracy	1~250	2	Pulse
F32	0x10E7	Homing Max Speed	0~10000	1500	rpm
F33	0x10E8	Homing Crash Judge Time	0~10000	0	10ms

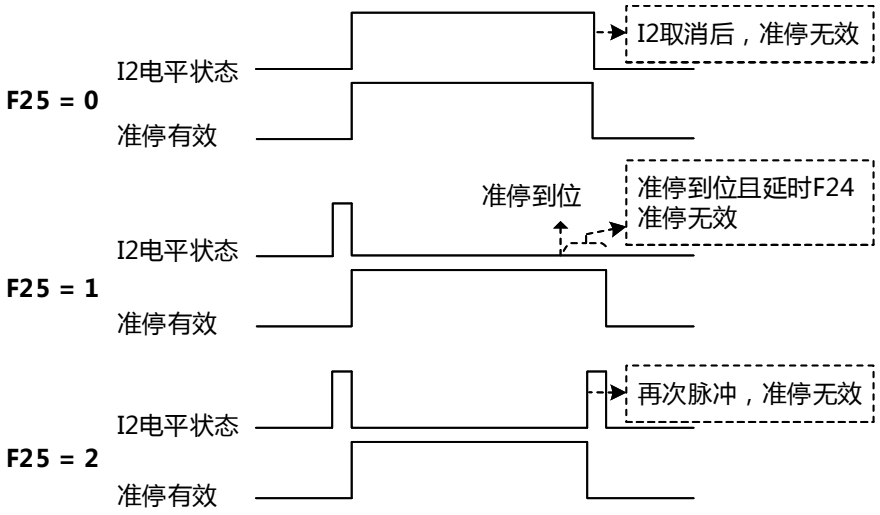
6.5.4 Origin Signal (Z Pulse) Parameter

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
E60	0x108B	Z Pulse Polarity Selection	0：Default Direction; 1：Contrary to Defult Direction		
E65	0x1090	Z Phase Input	0：Motor Encoder Z; 1：External Z		
E67	0x1092	Z Pulse Width	0~1000	4	Pulse

6.5.5 Homing Trigger

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
F24	0x10DC	Homing Finish Power off Delay Time	0~60000	0	0.1s
F25	0x10DD	Homing Trigger Type	0：High Level Effective， 1：Pulse Effective /Delayed Power off 2：Pulse Effective /Input Change Power off		

- There are three mode to trigger homing:



6.5.6 Homing Movement Parameter

Parameter No	mBUS Address	Parameter Name	Range	Default	Unit
F20	0x10D7	Deceleration at Homing	0~10000	1000	0.05Hz
F21	0x10D8	Locate Gain at Homing	0~10000	200	0.1Hz/s
F23	0x10DB	Speed at Searching Z Phase	1~1000	60	rpm
F34	0x10E9	Homing Monitoring Precision	0~100	5	Pulse
F22	0x10D9	First Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F27	0x10DF	Second Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F28	0x10E1	Third Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F29	0x10E3	Fourth Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse

- Driver provide 4 homing position which can be triggered by I2、I9、I11、I12.

6.6 Swing/JOG

- Parameter of example:

Parameter No	mBUS Address	Parameter Name	Set Value	Description
E48	0x107F	Digital Input Type	0	Terminal
F70	0x110D	I0Defination	8	JOG
F71	0x110E	I1Defination	6	Swing
F73	0x1110	I3Defination	5	Emergency Stop
F80	0x1117	O0 Output Definitions	0	Warning Output
F81	0x1118	O1 Output Definitions	4	Servo Ready

[Note]：Motor forward JOG only when JOG IO is effective; motor swing only when swing IO is effective; Motor backward JOG only when both IO is effective.

- Parameter of Swing/JOG speed command:

Parameter No	mBUS Address	Parameter Name	Set Value	Description
F35	0x10EA	Swing Angle	180	°
F36	0x10EB	Swing Speed	60	rpm
F37	0x10EC	Swing Torque	100	%
F38	0x10ED	JOG Speed	60	rpm
F39	0x10EE	JOG Acceleration	1500	0.05Hz/s

7 Parameter

7.1 Parameter Summary

Servo driver mainly contains two kinds of parameters : monitored parameter and system parameter (E、F、C series);

7.1.1 Monitored Parameter

Code	Address	Parameter Name	Range	Default	Unit
Tid	0x1000	Local Address	0~255	0x30	-
Tbd	0x1001	Baud Rate	0~9	3	-
Fun	0x1004	Special Function Code	0~65535	0	-
Save	0x1006	Save Parameter Enable	0~1	1	-
Addr	0x1007	3048 Address	0~65535	0	-
Value	0x1008	3048 Data	0~65535	0	-
OP	0x100B	Control Mode	0：Terminal Control；1：OP Control；2：Phase Selfcheck；		
nc	0x100C	Motor setting speed (OP Mode)	0~65535	0	rpm
Ac	0x100D	Motor Acceleration (OP Mode)	0~65535	0	0.05Hz/s
dc	0x100E	Motor Deceleration (OP Mode)	0~65535	0	0.05Hz/s
FE	0x100F	Motor Rotate Direction (OP Mode)	0~1	0	-
Error	0x1010	Warning Code	0~65535	0x01FF	-
d1~d4	0x1016	Digital Input Monitor	U128	0	-
o1~o4	0x101E	Digital Output Monitor	U128	0	-
A0	0x1026	Non-corrected Analog Input Value	-12000~12000	0	1mv
A1	0x1027	Corrected Analog Input Value	-12000~12000	0	1mv
P	0x1028	Motor Encoder Counter	I32	0	Pulse
H	0x102A	Motor Axis Absolute Position	I32	0	Pulse
E	0x102C	External Pulse Counting	I32	0	Pulse
F	0x102E	External Pulse Frequency	I32	0	0.01Hz
C	0x1030	Internal Pulse Counting	I32	0	Pulse
Ao	0x1032	Motor Output Current	0~65535	0	0.1A

Code	Address	Parameter Name	Range	Default	Unit
To	0x1033	Motor Output Torque	-200~200	0	%
FI	0x1034	Motor Command Frequency	-50000~50000	0	0.01Hz
Fo	0x1036	Motor Output Frequency	-50000~50000	0	0.01Hz
Fr	0x1038	Motor Speed	-32768~32767	0	rpm
Pc	0x1039	Synchronization Error	-32768~32767	0	Pulse

7.1.2 E Series Parameter

Code	Address	Parameter Name	Range	Default	Unit
E00	0x104F	Motor Base Frequency	0~50000	5000	0.01Hz
E01	0x1050	Motor Type	0~3	0	-
E02	0x1051	Motor Pole Number	2~12	4	-
E03	0x1052	Motor Slip	1~900	45	rpm
E04	0x1053	Motor Encoder Line Number	1~60000	1024	-
E05	0x1054	Motor Excitation Current	1~100	50	%
E06	0x1055	Motor Encoder Pulse Filter Time	1~200	30	0.1ms
E07	0x1056	Motor zero Speed Slip Compensation	1~100	80	%
E08	0x1057	Motor Slip Compensation Upon Base Frequency	0~150	30	%
E10	0x1059	Motor Slip at Speed Control	1~900	45	rpm
E11	0x105A	Motor Slip Gain at Speed Control	0~100	0	-
E12	0x105B	Motor Slip at Position Control	1~900	45	rpm
E20	0x1063	Torque Limit at Acceleration (Speed Control)	1~200	180	%
E21	0x1064	Torque Limit at Deceleration (Speed Control)	1~200	150	%
E22	0x1065	Torque Saturation Gain	0~550	450	-
E23	0x1066	S Curve Set Value	1~20000	1000	-
E24	0x1067	Steady speed integral time constant transformation	1~50000	5000	0.01Hz
E25	0x1068	Acceleration and Deceleration integral time constant transformation	1~50000	5000	0.01Hz
E26	0x1069	Torque Limit at Acceleration (Position Control)	1~200	180	%

Code	Address	Parameter Name	Range	Default	Unit
E27	0x106A	Torque Limit at Acceleration (Homing)	1~200	180	%
E28	0x106B	Count Limit of Torque Overload Protection	1~250	10	-
E29	0x106C	threshold value of Torque Overload Protection	10~200	180	%
E30	0x106D	Proportional Gain	0~100	80	%
E31	0x106E	Integral Gain	0~150	100	%
E32	0x106F	Zero Speed Current Gain	1~100	40	%
E33	0x1070	Current Gain	1~150	60	%
E34	0x1071	Current Gain Transformation Point	1~30000	5000	0.01Hz
E35	0x1072	Speed Control Integral Time Constant	1~1000	20	0.1ms
E36	0x1073	Integral Time Constant at Steady Speed	1~20000	200	0.1ms
E37	0x1074	Integral Time Constant at Acceleration	1~20000	200	0.1ms
E38	0x1075	Integral Time Constant at Deceleration	1~20000	1000	0.1ms
E39	0x1076	Position Control Integral Time Constant	1~1000	20	0.1ms
E40	0x1077	Speed Command Type	0：0~10V; 1：±10V; 2：External Pulse; 3：mBUS; 4：16 Speed		
E41	0x1078	Speed Control Direction Selection	0：Defult Direction; 1：Contrary to Defult Direction		
E42	0x1079	Speed Control Reverse Forbidden	0：None Reverse Forbidden; 1：Reverse Forbidden		
E43	0x107A	Control Model Selection	0：Normal Mode; 1：High Speed Mode		
E44	0x107B	Position Control Model Selection	0：Synchronous Mode; 1：Following Mode		
E45	0x107C	JOG Direction	0：Positive JOG; 1：Negative JOG		
E46	0x107D	Under-voltage Protection	0：Protection; 1：None Protection		
E47	0x107E	Position Command Type	0：External Pulse； 1：mBUS(Increment-type)； 2：mBUS(Absolute Type)； 3：0~10V；4：±10V		
E48	0x107F	Digital Input Type	0：Terminal；1：mBUS		
E49	0x1080	Torque Command Type	0：0~10V；1：±10V; 2：External Pulse；3：mBUS		
E50	0x1081	Speed Instruction Resolution	1~1000	2	0.01Hz

Code	Address	Parameter Name	Range	Default	Unit
E51	0x1082	Analog Filter Time Constant	1~100	50	1ms
E52	0x1083	Motor Speed Filter Time Constant	1~200	50	1ms
E53	0x1084	Pulse Frequency Filter Time Constant	1~200	50	1ms
E54	0x1085	Digital Input Filter Time Constant	1~100	50	1ms
E60	0x108B	Z Pulse Polarity Selection	0：Default Direction; 1：Contrary to Defult Direction		
E61	0x108C	External Input Pulse Type	0：AB Pulse; 1：Direction + Pulse; 2：CW Pulse；3：MCU		
E62	0x108D	Motor Encoder Phase	0：A Phase lead B Phase; 1：B Phase lead A Phase		
E63	0x108E	Motor Overheat Protection	0：Unprotect; 1：Normally Open Type Switch; 2：Normally Close Type Switch		
E64	0x108F	External Input Pulse Direction	0：Default Direction; 1：Contrary to Defult Direction		
E65	0x1090	Z Phase Input	0：Motor Encoder Z; 1：External Z		
E67	0x1092	Z Pulse Width	0~1000	4	Pulse
E69	0x1094	I6 Emergency Stop Definition	0：On Effective；1：Off Effective		
E70	0x1095	Reserve	0~65535	0	-
E71	0x1096	VFB Control Mode at Deceleration	0：Unmodify VFB；1：Modify VFB		
E72	0x1097	Speed Range at Steady Speed	0~100	0	rpm
E80	0x10A0	mBUS Digital Input	0~0X7FFFFFFF	0	-
E81	0x10A8	mBUS Digital Output	0~0X7FFFFFFF	0	-
E82	0x10B0	mBUS Speed Command Value	-15000~15000	0	rpm
E83	0x10B1	mBUS Torque Command Value	-1000~1000	0	%
E84	0x10B2	mBus Position Command Value	0X80000000~0X7FFFFFFF	0	Pulse
E85	0x10B4	Reserve	0~65535	0	
E86	0x10B5	Reserve	0~65535	0	
E87	0x10B6	Reserve	0~65535	0	
E88	0x10B7	Reserve	0~65535	0	
E89	0x10B8	Reserve	0~65535	0	

7.1.3 F Series Parameter

Code	Address	Parameter Name	Range	Default	Unit
F00	0x10C3	Max Speed (Speed Control)	1~15000	6000	rpm
F01	0x10C4	Mini Speed (Speed Control)	0~1000	0	rpm
F02	0x10C5	Low Speed Acceleration (Speed Control)	0~10000	1500	0.05Hz/s
F03	0x10C6	Low Speed Deceleration (Speed Control)	0~10000	1500	0.05Hz/s
F04	0x10C7	Speed Control Acceleration and Deceleration Transformation Point	0~15000	3000	rpm
F05	0x10C8	High Speed Acceleration (Speed Control)	0~10000	1500	0.05Hz/s
F06	0x10C9	High Speed Deceleration (Speed Control)	0~10000	1500	0.05Hz/s
F07	0x10CA	Speed Reach Range	0~300	45	rpm
F08	0x10CB	Speed Command Gear Ratio Numerator	0~60000	1000	-
F09	0x10CC	Speed Command Gear Ratio Denominator	1~60000	1000	-
F10	0x10CD	Max Speed (Position Control)	1~6000	1000	rpm
F11	0x10CE	Mini Speed (Position Control)	1~60	1	rpm
F12	0x10CF	Acceleration Gain (Position Control)	1~10000	800	0.05Hz/s
F13	0x10D0	Deceleration Gain (Position Control)	1~10000	600	0.1Hz/s
F14	0x10D1	External Input Pulse Filter Time	1~10000	20	0.1ms
F15	0x10D2	Inertial Fixed Point	0~60000	200	Pulse
F16	0x10D3	Crawl Pulse before End of the Positioning	0~60000	20	Pulse
F17	0x10D4	Position Control Accuracy	1~250	2	Pulse
F18	0x10D5	Position Command Gear Ratio Numerator	0~60000	1000	-
F19	0x10D6	Position Command Gear Ratio Denominator	1~60000	1000	-

Code	Address	Parameter Name	Range	Default	Unit
F20	0x10D7	Deceleration at Homing	0~10000	1000	0.05Hz
F21	0x10D8	Locate Gain at Homing	0~10000	200	0.1Hz/s
F22	0x10D9	First Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F23	0x10DB	Speed at Searching Z Phase	1~1000	60	rpm
F24	0x10DC	Homing Finish Power off Delay Time	0~60000	0	0.1s
F25	0x10DD	Homing Trigger Type	0：High Level Effective， 1：Pulse Effective /Delayed Power off 2：Pulse Effective /Input Change Power off		
F26	0x10DE	Homing Mode	0：Forward Homing; 1：Backward Homing; 2：Nearby Homing		
F27	0x10DF	Second Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F28	0x10E1	Third Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F29	0x10E3	Fourth Homing Position	0X80000000~0X7FFFFFFF	1000	Pulse
F30	0x10E5	Emergency Stop Deceleration	0~10000	1500	0.05Hz
F31	0x10E6	Motor Power off Delay Time after Emergency Stop	0~10000	0	2.5ms
F32	0x10E7	Homing Max Speed	0~10000	1500	rpm
F33	0x10E8	Homing Crash Judge Time	0~10000	0	10ms
F34	0x10E9	Homing Monitoring Precision	0~100	5	Pulse
F35	0x10EA	Swing Angle	0~3600	180	°
F36	0x10EB	Swing Speed	1~300	60	rpm
F37	0x10EC	Swing Torque	0~200	100	%
F38	0x10ED	JOG Speed	1~1500	60	rpm
F39	0x10EE	JOG Acceleration	0~10000	1500	0.05Hz/s
F40	0x10EF	Torque Control Direction	0：Defult Direction; 1：Contrary to Defult Direction		
F41	0x10F0	Torque Control Reverse Forbidden	0：None Reverse Forbidden; 1：Reverse Forbidden		
F42	0x10F1	Max Torque Command	0~1000	1000	%
F43	0x10F2	Torque Acceleration and Deceleration	1~6000	1000	10/s
F44	0x10F3	Torque Control Positive Attenuation Speed	0~60000	1000	0.01Hz
F45	0x10F4	Torque Control Negative Attenuation Speed	0~60000	1000	0.01Hz

Code	Address	Parameter Name	Range	Default	Unit
F46	0x10F5	Torque Auto Attenuation Coefficient	1~60000	1200	-
F50	0x10F9	Actual sample voltage at positive 0V	-2000~12000	20	mV
F51	0x10FA	User Instruction Voltage at the first positive paragraph	0~12000	2000	mV
F52	0x10FB	Actual sample voltage at the first positive paragraph	0~12000	2000	mV
F53	0x10FC	User Instruction voltage at the second positive paragraph	0~12000	4000	mV
F54	0x10FD	Actual sample voltage at the second positive paragraph	0~12000	4000	mV
F55	0x10FE	User Instruction voltage at the third positive paragraph	0~12000	6000	mV
F56	0x10FF	Actual sample voltage at the third positive paragraph	0~12000	6000	mV
F57	0x1100	User Instruction voltage at the fourth positive paragraph	0~12000	8000	mV
F58	0x1101	Actual sample voltage at the fourth positive paragraph	0~12000	8000	mV
F59	0x1102	Actual sample voltage at positive +10V	0~12000	10000	mV
F60	0x1103	Actual sample voltage at negative 0V	-12000~2000	-20	mV
F61	0x1104	User Instruction Voltage at the first negative paragraph	-12000~0	-2000	mV
F62	0x1105	Actual sample voltage at the first negative paragraph	-12000~0	-2000	mV
F63	0x1106	User Instruction voltage at the second negative paragraph	-12000~0	-4000	mV

Code	Address	Parameter Name	Range	Default	Unit
F64	0x1107	Actual sample voltage at the second negative paragraph	-12000~0	-4000	mV
F65	0x1108	User Instruction voltage at the third negative paragraph	-12000~0	-6000	mV
F66	0x1109	Actual sample voltage at the third negative paragraph	-12000~0	-6000	mV
F67	0x110A	User Instruction voltage at the fourth negative paragraph	-12000~0	-8000	mV
F68	0x110B	Actual sample voltage at the fourth negative paragraph	-12000~0	-8000	mV
F69	0x110C	Actual sample voltage at negative +10V	-12000~0	-10000	mV
F70	0x110D	I0 Definition	0：Speed Control；1：Reverse Direction ；2：First Homing 4：Position Control；5：Emergency Stop；6：Swing Control 7：Reset Warning；8：Forward JOG；9：Second Homing 10：Torque Control；11：Third Control；12：Fourth Control 13：Motor Over-heated；14：Double Speed Switch(Low Speed)； 15：Swithch Flag；22：Double Speed Switch(High Speed)； 17~20：16 Speed（X1、X2、X3、X4）； 23~25：Pulse Generator Rate（x1、x10、x50）； 26~29：16 Homing (X1 、X2、X3、X4)； 127：No Effect		
F71	0x110E	I1 Definition			
F72	0x110F	I2 Definition			
F73	0x1110	I3 Definition			
F74	0x1111	I4 Definition			
F75	0x1112	I5 Definition			
F76	0x1113	I6 Definition			
F77	0x1114	I7 Definition			
F80	0x1117	O0 Definition	0：Warning；1：Homing done；2：Position Mode Ready 3：Speed Reach；4：Servo Ready；5：Fan Output 6：Double Speed Switch；7：Motor Brake；8：Reserve； 9：Zero Speed 127：No Effect		
F81	0x1118	O1 Definition			
F82	0x1119	O2 Definition			
F83	0x111A	O3 Definition			
F84	0x111B	O4 Definition			
F85	0x111C	O5 Definition			
F86	0x111D	O6 Definition			

Code	Address	Parameter Name	Range	Default	Unit
			*Note： Plus 128 to set value, the output is changed to normally closed output type. But when driver is not powered on, the output is open state.		
F90	0x1121	Analog Pulse Analog Filter Time Constant	0~65535	60	1ms
F91	0x1122	Low Speed Crawl Analog Range	0~10000	0	mv
F92	0x1123	Crawl at Low Speed	0~1000	1	Pulse
F93	0x1124	Analog Position Control Max Speed	0~15000	1000	rpm
F94	0x1125	Reserve	0~65535	0	-
F95	0x1126	Reserve	0~65535	0	-
F96	0x1127	mbus Position Control ABS Type Plan Max Speed	0~15000	1000	rpm
F97	0x1128	mbus Position Control ABS Type Plan Acceleration	0~65535	500	1ms
F98	0x1129	mbus Position Control ABS Type Plan Deceleration	0~65535	500	1ms

8 Warning

8.1 Warning List

Code	Description	Cause	Troubleshooting
Err-00	Over Voltage	Deceleration Time too Short Braking Resistor Broken Braking Resistor not Fit	Extend Deceleration Time Check Braking Resistor
Err-01	Under Voltage	Power Interruption Input Voltage is too low. Voltage fluctuation of input power is too big.	Check Source Power
Err-02	Acceleration Over Current	Motor Broken Source Power Under Voltage Overload，Acceleration Time too Short Driver Output Short Power of Driver too Small	Check Motor Check Source Power Extend Acceleration Time Check U、V、W Short Choose Matched-power Driver
Err-03	Deceleration Over Current	Braking Resistor not Fit System Parameter not Right Overload，Deceleration Time too Short Driver Output Short Power of Driver too Small	Check Braking Resistor Extend Deceleration Time Check U、V、W Short Choose Matched-power Driver
Err-04	IGBT Overheated	Motor Broken Temperature of Driver Overheated Output Current of Driver overload	Check Motor Check Heat Sink Whether motor is in state of overload for a long time

Code	Description	Cause	Troubleshooting
Err-05	Encoder Malfunction	Motor Phase Uncorrect Motor Encoder Parameter not Right Motor Encoder Wire Broken	Check Motor Phase Check System Parameter E04 Check Monitored Parameter P
Err-06	Motor Overheated	Motor temperature exceed the default value.	Check Motor Check Heat Sink of Motor
Err-07	Current Sensor Abnormal	Current Sensor Circle Fault	Communicate with FAE
Err-08	Program Fault	Driver is interfered, program is lost.	Reset to Defaults
Err-09	Over Load	Motor Phase not Right Motor Encoder Broken Torque Overload Protection Threshold unreasonable	Check Motor Phase Check Motor Encoder Check Load Modify System Parameter E20
Err-10	Communication Error A	Internal Write to MCU not Success	Communicate with FAE
Err-11	Parameter Save Error	Write EEPROM Error	Communicate with FAE
Err-12	Communication Error When Power On	MCU Communication Error When Power On	Communicate with FAE
Err-13	Write Parameter Error When Power On	Write Parameter to MCU Error When Power On	Communicate with FAE
Err-14	Stop Program Error	Write STOP Command to MCU Error	Communicate with FAE

Code	Description	Cause	Troubleshooting
Err-15	Run Program Error	Write RUN Command to MCU Error	Communicate with FAE
Err-16	Program Other Error	MCU Unconventional Alarm	Communicate with FAE
Err-17	Reserve	-	-
Err-18	Double Speed Relay Switch State Error	Double Speed Relay Switch State Missing	Check Double Speed Relay
Err-19	Encoder Wire Lost Error	Encoder Wire not Connect	Check Encoder Wire Connect
Err-20	Encoder Z Error	Encoder Z Phase Lost	Change Encoder
Err-21	Encoder Parameter Setting Error	Encoder Parameter Setting Abnormal	Check E04
Err-22	Parameter Recovery Error When Power on	EEPROM Parameter CRC Error When Power on	Communicate with FAE
Err-23	UVW Phase Selfcheck Error	Phase Selfcheck	Communicate with FAE
Err-24	Homing Precision Error	Homing Position not Precise Enough	Amplification F34
Err-25	Homing Function Error	Homing Overtime	Communicate with FAE

8.2 Fault Information and Troubleshooting

- **No display on driver after power up**
  - Description: After power up, there is no display on driver. Tear down all the wiring, only retain R/S/T three-phase inlet wires.
  - Cause and Troubleshooting:
    - If the power supply is normal, the rectifier bridge or charging resistor is damaged. Return to factory to repair or have professional maintenance;
    - Charging indicator light is on: the rectifier bridge and the charging resistor is normal, then the switching power supply is damaged or the fuse is burnt down. Return to factory to repair.
- **Leakage protector action**
  - Description: When servo spindle starts, leakage protector trips.
  - Cause and Troubleshooting:
    - If ordinary leakage protector is used, the threshold value of electric leakage protection should be greater than 200 mA, or the leakage protector should be canceled;
    - Recommend use servo (frequency) dedicated leakage protector, electric leakage protection threshold should be greater than 30 mA;
    - Put isolation transformer Between servo driver and ordinary leakage protector;
- **Error Result From Encoder**
  - Description:
    - Err-05 Encoder Waring;
    - Spindle rotation at low speed，not control by the speed command;
    - Spindle over speed;
    - Speed uneven during operation，have significant impact type mechanical vibration;
    - Monitor current Ao when no-load，large current is observed;
    - Monitor torque To when no-load，high torque or the full torque has been reached;
    - Frequently appears Err-02，Err-03，Err-09 warning.
  - Troubleshooting:
    - Check if X2 terminal and motor encoder air plug connect to encoder wire;
    - If it has been properly connected, you can rotate motor manually, and check monitored parameter P. If motor encoder is 1024, then motor roate a circle, parameter P should change 4096 pulse;
    - If parameter P have no change, please carefully check encoder wire or replace the encoder;

- If the connection is correct and power is good, then maybe encoder is damaged and need to be changed;

➢ Err-01 Under-voltage Error

- ✧ Cause:
  - Power voltage instability, please use the multimeter to measure the R/S/T port of driver to determine whether the power fluctuation is too big ;
  - Start of large scale equipment nearby can lead to instantaneous undervoltage, and this kind of situation can't use multimeter to check
- ✧ Troubleshooting:
  - Add voltage stabilizer: modify parameter E46, shielding under-voltage protection.

➢ Spindle Speed not Precise

- ✧ Cause and Troubleshooting:
  - Pulse Speed Control：
    - ✓ Check whether encoder line parameter in CNC system match E04 parameter;
    - ✓ Whether spindle has transmission ratio;
  - Analog Quantity Speed Control：
    - ✓ Check whether the highest spindle speed in CNC system match F00 parameter;
    - ✓ Whether receive of analog voltage is accurate, you can monitor through A1;
    - ✓ First correct analog in accordance with method in section 6.2.

➢ Spindle Homing Position not Precise

- ✧ Cause and Troubleshooting:
  - For the first time use or replacing the spindle assembly：readjust the parameter F22 to the right value ;
  - Deviation appears after a period of time use, and deviation is stable: synchronous pulley or synchronous belt is loose;
  - Deviation appears during homing, and deviation progressively increase: check whether the motor encoder is loose ;
  - Deviation appears during homing, and deviation changes randomly: check if encoder wire is interfered , and if synchronous belt is loose;
  - If the above countermeasures are invalid, please contact technical support;