SV-X6

Hardware Instruction

Installation and Wiring for SV-X6E Series Servo Drive

Manual Number	Manual Version	Date
HPPD12300EN	V1.0	September, 2020

HCFA Website: http://www.hcfa.com.cn
Thank you for purchasing this product.
This manual mainly describes the safety use, installation, wiring and parameter list for SV-X6E series servo drive.

For more details, please refer to <SV-X6E Series Servo Drive User Manual>.
Confirm the following items when unpacking:

Number	Name		Quantity
1	Servo drive		1
2	Accessories	Connecting terminal	3
		Cold-pressed terminal	8
		Crowbar	1
		Straight screwdriver	1
3	This manual		1
4	Certificate of Quality		1

●Check if there are some damage to the products during transportation.
●Any questions, please contact the HCFA Corporation.

Safety Precautions

Please pay attention to the following safety precautions anywhere and any time during acceptance inspection, installation, wiring, operation and maintenance.
In this manual, the safety precautions are ranked as "DANGER" and "CAUTION"

⚠ DANGER	Indicates that incorrect handling may result in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may result in medium or slight personal injury or physical damage.
⊘	Indicates "Prohibitions"(Indicates what must not be done.)
❗	Indicates "Forced".(Indicates what must be done.)

⚠ DANGER

Installing and wiring		
⊘	Do not connect the motor to the commercial power.	To prevent fire or malfunction.
	Do not place the combustibles around the servo motor and drive.	To prevent fire.
❗	Be sure to protect the drives through the case, and leave specified clearances between the case or other equipment and the drive.	To prevent electric shock, fire or malfunction.
	Install it at the place free from excessive dust and dirt, water and oil mist	To prevent electric shock, fire , malfunction or damage
	Install the equipment to incombustibles, such as metal.	To prevent fire.
	Any person who is involved in wiring and inspection should be fully competent to do the work.	To prevent electric shock.
	FG terminal of motor and drive must be grounded.	To prevent electric shock.
	Perform the wiring correctly after cut off the breaker.	To prevent electric shock, injury, malfunction or damage
	Have the insulation processing when connecting cables.	To prevent electric shock, fire or malfunction.
Operation and running		
⊘	During operation, never touch the internal parts of the drive.	To prevent burns or electric shock.
	The cables should not be damaged, stressed loaded, or pinched.	To prevent electric shock, malfunction or damage.
	During operation, never touch the rotating parts of the servo motor.	To prevent injury.
	Do not install the equipment under the conditions with water, corrosive and flammable gas.	To prevent fire.
	Do not use it at the location with great vibration and shock.	To prevent electric shock, injury or fire.
	Do not use the servo motor with its cable soaked in oil or water.	To prevent electric shock, malfunction or damage
	Operate the switches and wiring with dry hand.	To prevent electric shock, injury or fire.
	Do not touch the keyway directly when using the motor with shaft-end keyway	To prevent injury.
	Do not touch the motor and drive heat sink, as they are very hot.	To prevent burns or parts damaged.
	Do not drive the motor by external drive.	To prevent fire.
Other safety instructions		
❗	Confirm the equipment's safety after the earthquake happens.	To prevent electric shock, injury or fire.
	Installing and setting correctly to prevent the fire and personal injury when earthquake happens.	To prevent injury, electric shock, fire, malfunction or damage.
	Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.	To prevent injury, electric shock, fire, malfunction or damage.
About maintenance and inspection		
	As there's dangerous and high-voltage parts inside the drive, before wiring or inspection, turn off the power and wait for 5 minutes or more. Moreover, do not disassemble the drive.	To prevent electric shock.

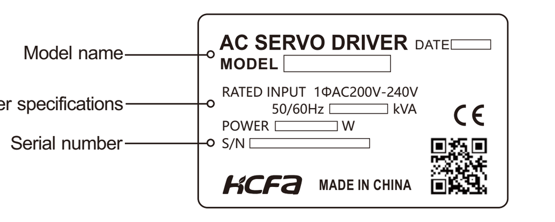
⚠ CAUTION

Installing and wiring		
❗	Please follow the specified combination of the motor and drive.	To prevent fire or malfunction.
	Do not touch the terminals of connector directly.	To prevent electric shock or malfunction.
	Do not block intake and prevent the foreign matters from entering into the motor and drive.	To prevent electric shock or fire.
	Fix the motor and have the test run away from the mechanical system. After confirming the operation, the motor can be securely mounted to mechanical system.	To prevent injury.
	The servo motor must be installed in the specified direction.	To prevent injury or malfunction.
	Install the equipment correctly in accordance with its weight and rated output.	To prevent injury or malfunction.
Operation and running		
⊘	Do not climb or stand on servo equipment. Do not put heavy objects on equipment.	To prevent electric shock, injury, fault or damage.
	The parameter settings must not be changed excessively. Operation will be instable.	To prevent injury.
	Keep it away from the direct sunlight.	To prevent malfunction.
	Do not put strong impact on the motor, drive and motor shaft.	To prevent malfunction.
	The electromagnetic brake on the servo motor is designed to hold the servo motor shaft and should not be used for ordinary braking.	To prevent injury or malfunction.
❗	When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly (design the machine so that it is secured against hazard if restarted).	To prevent injury.
	Do not install or operate a faulty servo motor or drive.	To prevent injury, electric shock or fire
	Check the power specification.	To prevent fault.
	The electromagnetic brake may not hold the servo motor shaft. To ensure safety, install a stopper on the machine side.	To prevent injury.
	A sudden restart is made if an alarm is reset with the run signal on.	To prevent injury.
	Connect the relay for emergency stop and for brake in series.	To prevent injury or malfunction.
Transportation and storage		
⊘	Do not subject the equipment to the place with rain, waterdrop, poisonous gases or liquids.	To prevent malfunction.
	Do not carry the servo motor by the cables, shaft or encoder during transportation.	To prevent injury or malfunction.
❗	Do not drop or dump the motor during transportation and installation.	To prevent injury or malfunction.
	If you want to store it for a long time, follow the instruction manual.	
	Store the unit in a place in accordance with the instruction manual.	To prevent malfunction.
Other safety instructions		
❗	Please dispose the battery according to your local laws and regulations. When disposing of the product, handle it as industrial waste.	
Maintenance and inspection		
⊘	Do not disassemble and/or repair the equipment on customer side.	To prevent malfunction.
	Do not turn on or switch off the main power frequently.	To prevent malfunction.
❗	Do not touch the servo drive heat sink, regenerative resistor, servo motor etc. Their temperatures may be high while power is on or for some time after power-off.	To prevent burns or electric shock.
	When the drive become faulty, switch off the control circuit and main power.	To prevent fire.
	If the servo motor is to be stored for a long time, switch off the power.	To prevent misoperation and injury.

About maintenance and inspection
< Warranty period> The term of warranty for the product is 18 months from the date of manufacture. It's exceptional to brake motors as they are warranted when acceleration / deceleration times is not beyond the specified service life.
< Warranty coverage > This warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are stated in the instruction manual and user manual for the Product. However, even during warranty period, the repair cost will be charged on customer in the following cases. 1) A failure caused by improper storing or handling, repair and modification. 2) A failure caused by the parts which have dropped down or damaged during transportation 3) A failure caused when the products have been used beyond the product specification 4) A failure caused by external factors such as inevitable accidents, including but not limited to fire, earthquake, lightning stroke, windstorm disaster, flood, salt damage, abnormal fluctuation of voltage and other natural disaster. 5) A failure caused by the intrusion of water, oil, metal and other foreign matters. The warranty coverage is only for the product itself. We assume no responsibilities for any losses of opportunity and/or profit incurred by you due to a failure of the product

1. Product introduction and model selection

Introduction for drive nameplate



Model name identification

SV-X6 E A XXX A-A 0-00 000

Serial name

Function type	
Symbol	Types
E	Standard type
F	Full-function type
L	Linear-type

Function type	
Symbol	Types
A	Pulse type
B	EtherCAT type
N	CANOpen type
R	PROFINET type

Voltage spec.	
Symbol	Types
A	AC220V
T	AC380V

Product power	
Symbol	Types
005	50W
010	100W
020	200W
040	400W
075	750W
100	1000W
150	1500W
200	2000W
250	2500W
300	3000W
500	5000W
750	7500W

Software customized mark P21.55	
Symbol	Types
000	N/A
001	
···	
005	

Hardware customized mark	
Symbol	Types
00	N/A

Products updates no.	
Symbol	Types
0	N/A
1	

Control power	
Symbol	Types
A	AC power

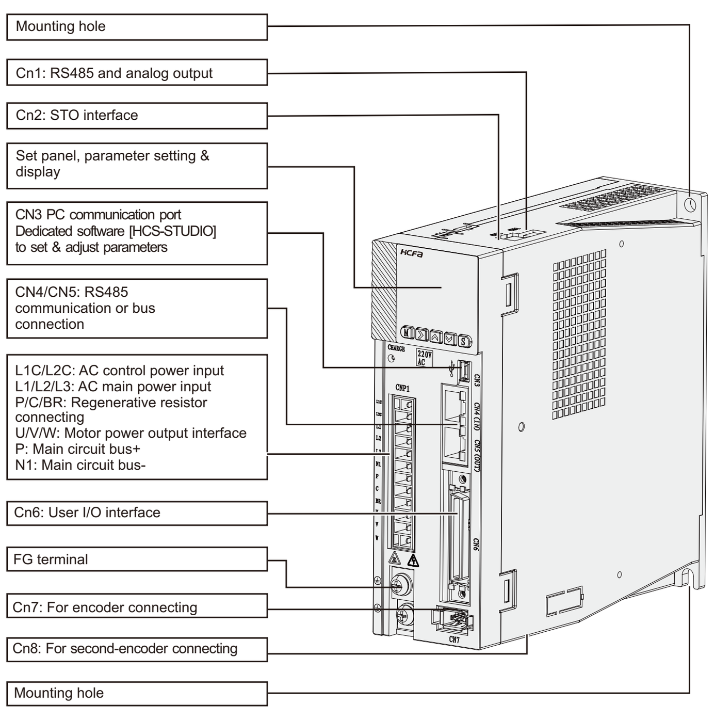
Examples	
SV-X6EA200A-A	X6 series, 220V, 2kw, standard pulse type
SV-X6EB200A-A	X6 series, 220V, 2kw, standard EtherCAT type
SV-X6EN200A-A	X6 series, 220V, 2kw, standard CANOpen type
SV-X6ER200A-A	X6 series, 220V, 2kw, standard PROFINET type
SV-X6FA200A-A	X6 series, 220V, 2kw, full-function pulse type
SV-X6FB200A-A	X6 series, 220V, 2kw, full-function EtherCAT type
SV-X6FN200A-A	X6 series, 220V, 2kw, full-function CANOpen type
SV-X6FR200A-A	X6 series, 220V, 2kw, full-function PROFINET type

Functions and Ports for X6E Series

Model name / Function	Pulse Standard	Pulse Full-function	EtherCAT bus standard	EtherCAT Bus full-function	CANopen Bus standard	CANopen Bus full-function	ProfiNet Bus standard	ProfiNet Bus full-function
Analog input	N/A	2-ch	N/A	2-ch	N/A	2-ch	N/A	2-ch
Analog output	N/A	2-ch	N/A	2-ch	N/A	2-ch	N/A	2-ch
Pulse input	Supported	Supported	N/A	N/A	N/A	N/A	N/A	N/A
Pulse frequency division output	Supported	Supported	N/A	Supported	N/A	Supported	N/A	Supported
Z-phase collector output	Supported	Supported	N/A	Supported	N/A	Supported	N/A	Supported
Serial communication	USB/485	USB/485	USB	USB/485	USB	USB/485	USB	USB
Full-closed mode	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported
Gantry synchronization	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported
Direct-drive	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported

Model name / Ports	Pulse Standard	Pulse Full-function	EtherCAT bus standard	EtherCAT Bus full-function	CANopen Bus standard	CANopen Bus full-function	ProfiNet Bus standard	ProfiNet Bus full-function
CN1：Analog output	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported
CN2：STO port	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported
CN3：USB port	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
CN4/CN5 port	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
CN6：User I/O	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
CN7：Encoder	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
CN8:Second encoder	N/A	Supported	N/A	Supported	N/A	Supported	N/A	Supported

Drive parts name



2. Product specification

Items			005	010	020	040	075	100	150	200	250	200	300	500	750
Model NameSV-X6????? -A			005	010	020	040	075	100	150	200	250	200	300	500	750
General specification	Applicable motor		50W	100W	200W	400W	750W	1KW	1.5KW	2KW	2.5KW	2KW	3KW	5KW	7.5KW
	Dimension	W(mm)	40				52		70		80	70	80	92	
		H(mm)	160				160		160		160	160	160	160	
		D(mm)	154				154		188		188	188	188	209	
		Weight(Kg)	0.8				1		1.5		1.7	1.5	1.7	3.1	

Group	Subgroup	Item	Specification
General specification	Input power	Main circuit power	Single/three-phase 200～240V 50/60Hz (005–250); Three-phase 323～440V 50/60Hz (200–750)
		Control circuit power	Single-phase 200～240V 50/60Hz (005–250); Single-phase 323～440V 50/60Hz (200–750)
	Environmental specifications: Temperature	Ambient temperature for use	0~55℃
		Ambient temperature for storage	-20~65℃
	Humidity	Ambient humidity for use	20~85% RH or less (Without condensation)
		Ambient humidity for storage	20~85% RH or less (Without condensation)
		Atmosphere for use & storage	Indoors (Not subject to direct sunlight); free from corrosive gas, flammable gas, oil mist, or dust
		Altitude	1000m or less above sea level
		Vibration	5.8m/s2 (0.6G) or less, 10~60Hz (No continuous operation allowed at frequency of resonance)
		Dielectric strength	1 minute at 1500 VAC across the primary and FG
		Control type	Three-phase PWM inverting sine-wave
		Encoder feedback	Single-turn absolute 23-bit ， 17-bit supported (multi-turn absolute with battery)
	Digital signal	Input	9 inputs (24VDC, photo-coupler insulation) Switch by control mode
		Output	9 outputs (24VDC, photo-coupler insulation, open -collector output) Switch by control mode
	Analog signal	Input	2 inputs (±10V) Switch by control mode
		Output	2 outputs (±10V) Switch by control mode
	Pulse signal	Input	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)
		Output	4 outputs (A/B/Z-phase RS-422 differential, Z-phase open collector output)
	Communication function	USB	Connection with PC (with "Servostudio" software)
		RS-485	Remote communication(1: n)
		Regeneration function	Built-in braking resistor, and external larger power braking resistor is possible
		Dynamic brake	Built-in for 220V; No dynamic brake for 380V.
		Control mode	7 control modes: Position control, speed control, torque control, position/speed control, position/torque control, speed/tor que control, fully closed-loop control (optional part needed)
Functions: Position control		Digital input signals	Servo ON, alarm reset, deviation counter clear, positive/negative direction over-travel, internal command selection, homing start etc.
		Digital output signals	Alarm state, servo ready, brake off, homing complete, position reached, servo state, torque limiting, speed limiting zero-speed output, etc.
	Pulse input	Max input pulse requency	General pulse input: Up to 500KHz, pulse width larger than 1us High-speed pulse input: Up to 4MHz, pulse width larger than 1.25ns; Open-collector input: Up to 200KHz, pulse width larger than 2.5us
		Input pulse type	Differential input; open-collector
		Input pulse form	Pulse+ direction, A-Phase + B-Phase, CW+CCW
		Electronic gear	A/B A: 1~1073741824 B: 1~1073741824, Encoder resolution/10000000 < A/B <Encoder resolution/2.5
		Smoothing	Smoothing filter, FIR filter
	Pulse output	Output pulse form	A-Phase, B-Phase: Differential output Z-Phase: Differential output or open collector output
		Division ratio	Arbitrary frequency division
		Output pulse	Encoder pulse or position Pulse instruction(can be set)
Functions: Speed control		Digital input signals	Servo ON, alarmreset, speed instruction negation, zerospeed clamp, internal speed control, external forward/reverse torque limit etc.
		Digital output signals	Alarm state, servo ready, brake off, speed reached, torque limiting, speed limiting, zero-speed output, etc.
	Analog input	Speed input	Input voltage -10V to +10V (Maximum speed at ±10V)
		Torque limit source	Internal torque limit by P03.09, P03.10 External torque limit by P03.11, P03.12 enabled by P_CL/N_CL signals 2-TLMTP i.e. AI1 or AI2 as external forward/reverse torque limit 3-TLMTP as forward limit; TLMTN as reverse limit
		Torque feedforward	Internal torque feedforward TFFD, AI1 or AI2
		Internal speed command	0~16-stage speed selection by DI terminal combination
Functions: Torque control		Digital input signals	Servo ON, alarm reset, torque instruction negation, zero-speed clamp etc.
		Digital output signals	Alarm state, servo ready, brake off, speed reached, torque limiting etc.
	Analog input	Torque input	DC±10V as to rated torque(adjustable by function codes)
		Speed limit	1) Positive/ negative speed limit P03.27, P03.28 2) SPL i.e. AI input
Functions: Common		Speed monitoring	Provided
		Vibration control	Provided
		Adaptive notch filter	Provided
		Auto-tuning	Provided
		Encoder output division and multiplication	Provided
		Internal position control	Provided
		PC setting	SV-X6 support setup software [HCS-studio]
		Protective functions	Overvoltage, power supply error, overcurrent, overheat, overload, encoder error, over speed, position deviation too large, parameter error

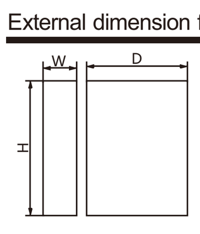
Note 1) Some models do not contain the functions above. For details, pls refer to Section 1.1.1 Models for servo drive. Note 2) For input pulse forms, refer to the User Manual.

3.Installation and size of servo motor and drive

Model name identification

Installation environment conditions
About the environmental conditions, make sure to follow the company's instructions. If you need to use the product outside the scope of the environmental conditions, please consult HCFA Corporation in advance.
1 Keep it away from the direct sunlight.
2 Drive must be installed in the cabinet.
3 Keep it away from the water, oil (cutting oil, oil mist) and moisture.
4 Do not install the equipment under the conditions with water, corrosive and flammable gas.
5 Free from the dust, iron powder, cutting powder and so on.
6 Keep it away from the area with high temperature, excessive vibration and shock

External dimension for servo drive

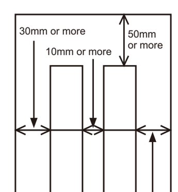


Model SV-X6FA□□□A	Dimensions W(mm)	H(mm)	D(mm)	Weight (kg)
005、010、02、040	42	160	154	0.8
075、100	52	160	154	1.0
150、200	70	160	188	1.5
250、300	80	160	188	1.7
500、750	92	210	209	3.1

Installation direction and space

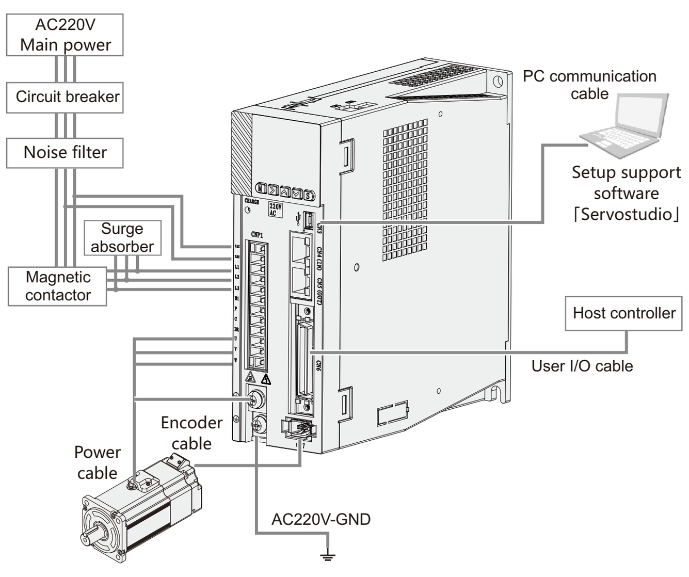
Leave sufficient space around the drive t o ensure the heat dissipation and convection in the cabinet when installing the drive.

●Install the drives in the vertical direction. Please use two M5 screws to fix the drive of 750W or less respectively. Use three M5 screws to fix the drive and master drive of 1kW or more respectively.
●In order to ensure that surrounding temperature between internal boards is not more than 55℃, cooling fan or cooler is needed to reduce the temperature, when the drives are installed in the sealed cabinet.
●The temperature on the surface of cooling plate would be 30℃ higher than the surrounding temperature.
●Use heat-resistant material for the wiring and isolate wiring from the machine and other cables which are easily affected by the emperature.
●The service life of servo drive depends on the temperature around the electrolytic capacitor. When the electrolytic capacitor is close to the service life, the static capacity will decrease and internal resistance will increase. Consequently, it will lead to overvoltage alarm, malfunction caused by noise and components damage. The service life of electrolytic capacitor is approx. 5 to 6 years under the condition「average annual temperature 30℃, load rate 80% and operation of less than 20 hours a day on average」



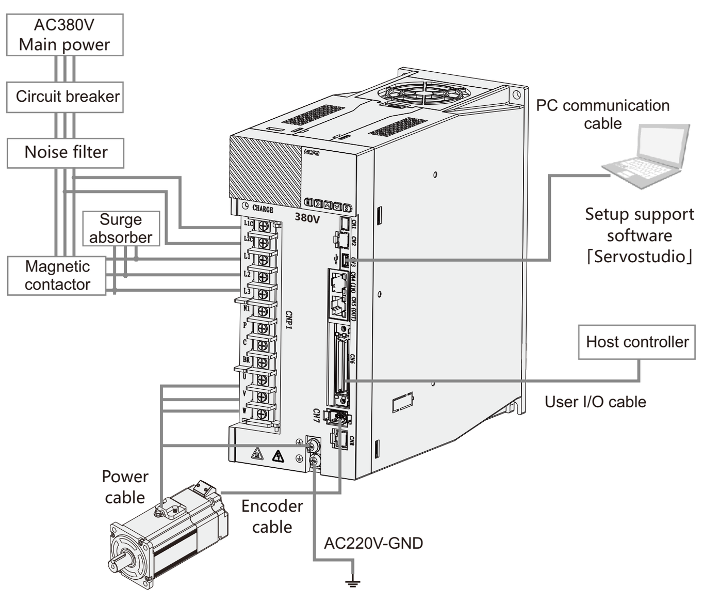
4. Wiring explanation for servo motor and drive

220V AC input



[Points for correct wiring]
●Control circuit power and main circuit power should be wired from the same 220VAC.
●The main power can select single-phase or three-phase 220VAC input. When selecting single-phase, select two inputs from L1,L2 and L3.
●A twisted-pair shielded cable should be used when I/O cable length is over 50cm.
●The encoder cable should be less than 20m.
●Same voltage class must be used and powered on simultaneously when connected to a common DC bus.

380V AC input



[Points for correct wiring]
●Control circuit power and main circuit power should be wired from the same 380VAC.
●The main power must use three-phase 380VAC input..
●A twisted-pair shielded cable should be used when I/O cable length is over 50cm.
●The encoder cable should be less than 20m.
●Same voltage class must be used and powered on simultaneously when connected to a common DC bus.

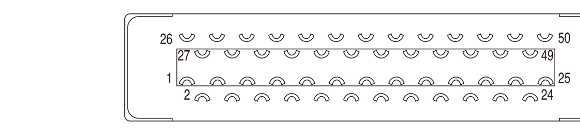
5. Wiring description for user I/O connector (CN6)

Terminal arrangements for user I/O connector(CN6)

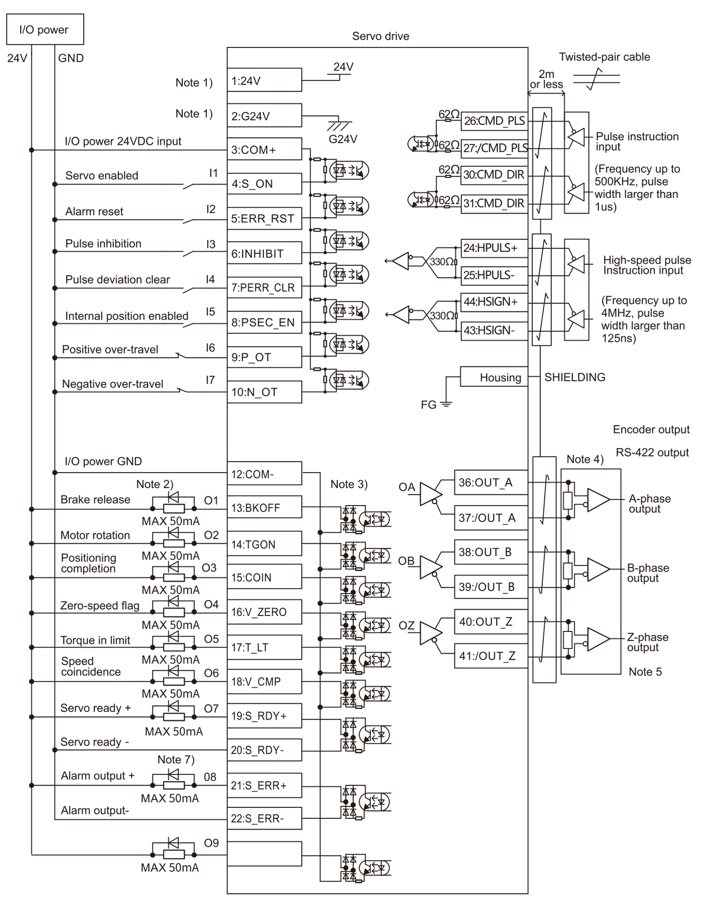
■ Terminal arrangements

26 CMD_PLS	28 CC-P	30 CMD_DIR	32 A_SPEED	34 A_TRQ	36 OUT_A	38 OUT_B	40 OUT_Z	42 GND	44 HSIGN+	46 OCZ	48 O9	50 CC-D_5V
27 /CMD_PLS	29 CC-D	31 /CMD_DIR	33 A_GND	35 A_GND	37 OUT_/A	39 OUT_/B	41 OUT_/Z	43 HSIGN-	45 GND	47 I9	49 CC-P_5V	
1 VCC	3 COM1	5 I2	7 I4	9 I6	11 I8	13 O1	15 O3	17 O5	19 07+	21 08+	23 5V	25 HPULS-
2 G24	4 I1	6 I3	8 I5	10 I7	12 COM2	14 O2	16 O4	18 06	20 07-	22 08-	24 HPULS+	

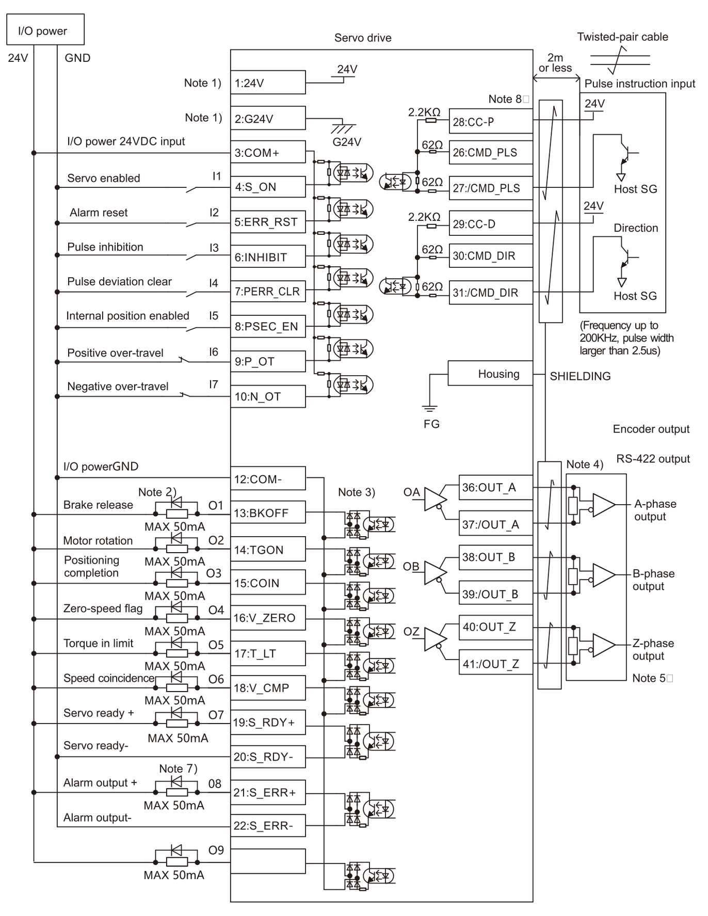
■ Connector description



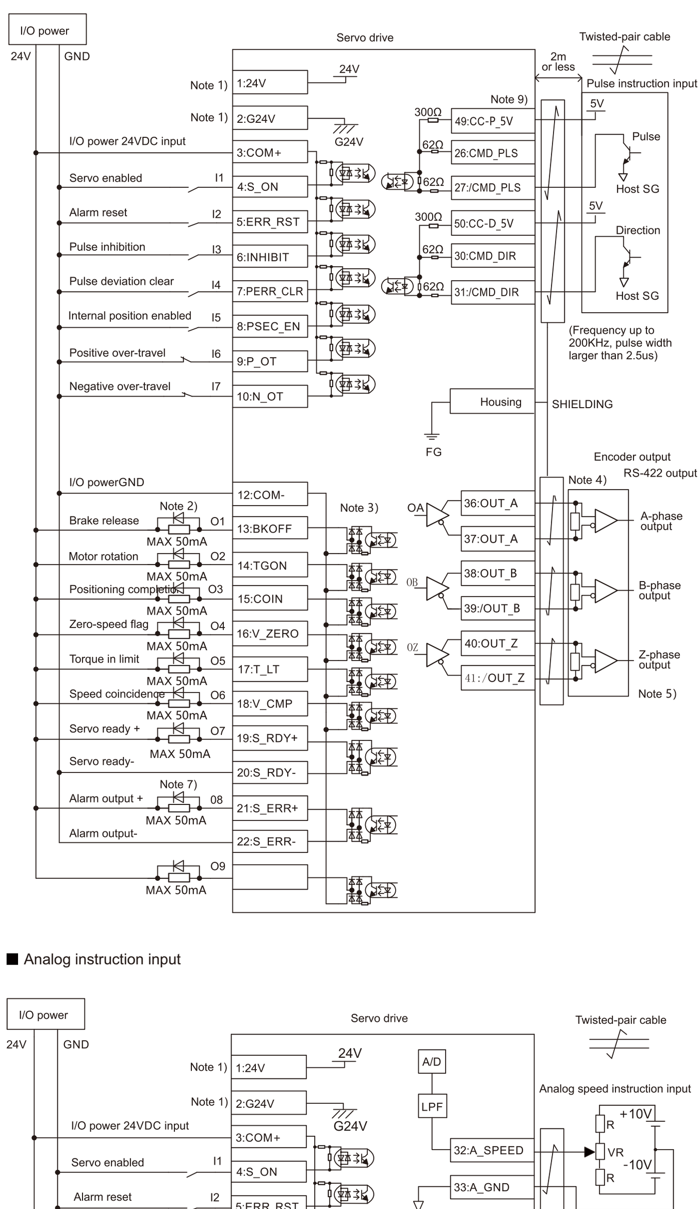
■ Pulse instruction differential input



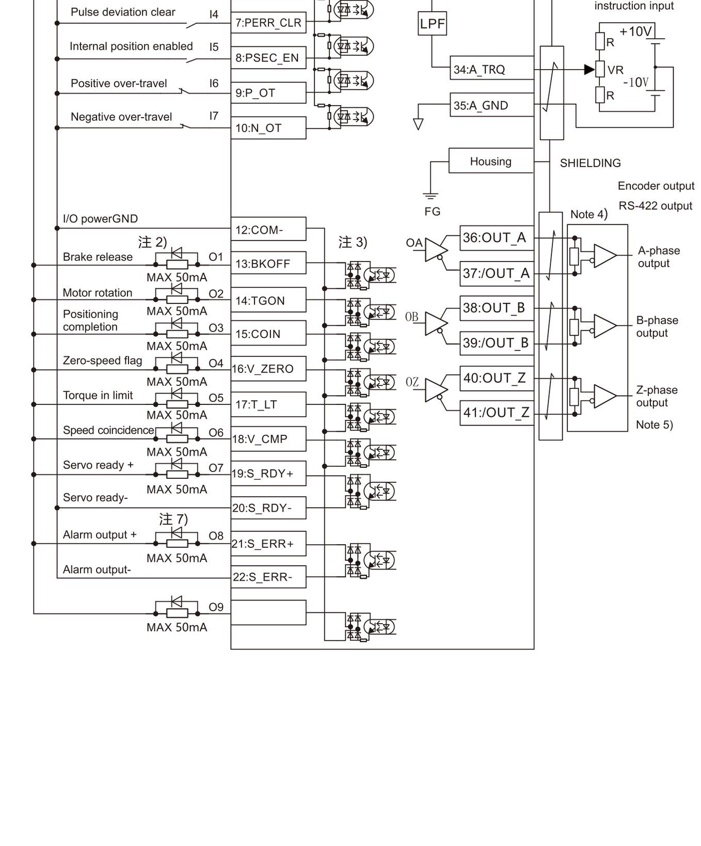
■ Pulse instruction 24V open collector input



Pulse instruction 5V open collector input



■ Analog instruction input



Note 1: Control power output (24V, G24V) can be used as I/O power. But the maximum output current is 150mA, and when driving the output such as relay and brake, please use external independent power.
Note 2: Please connect protective circuit (diode) when driving load with inductive component such as relay.
Note 3: According to different wiring methods, the output pin can output high level or low level. So make wiring according to actual needs.
Note 4: The differential pulse output and 485 communication circuits need to connect the terminal resistor.
Note 5: Connect the signal ground on the host control device of output signal of the encoder. The connection of signal ground and power supply GND may cause malfunction.
Note 6: O8 is alarm output by default. The logic state of alarm output by default is normally-closed. The logic state can be set by function code. For details, refer to Section 7.2 Parameter list –P04 group Digital I/O.
Note 7: Two types according to the pulse generation method: NPN &PNP.
Note 8: Two types according to the pulse generation method: NPN &PNP.
※ DI function can be configured by function code flexibly. DI becomes valid when connected and the positive/ negative logic can be changed by function code.
※ DO function can be configured by function code flexibly. DO becomes valid when connected and the positive/ negative logic can be changed by function code.

6. Parameter List for SV-X6E Series Servo Drive

Common Parameters

Parameter No.	Parameter name	Description
P00. 00	Motor positive direction definition	Check the positive direction of the motor rotation, generally by default
P00. 02	Real time auto-tuning	Set the "Real time auto-tuning" to 1 or 2, change the rigidity, the servo gain parameter adjust automatically. Set it to 0, adjust the gain parameter by manual
P00. 03	Stiffness grade setting	
P00. 04	Load inertia ratio	set up the ratio of the load inertia against the rotor (of the motor) inertia
P00. 16	Pulse output positive direction definition	Set the reversal of pulse output B-phase, generally by default
P00. 19	Position deviation too large threshold	Set excess range of positional deviation by the command unit (default).
P00. 21	Brake resistor setup	Select either to use built-in brake resistor or externally install the brake resistor. Default setting: 1 (external). No need to change.
P00. 22	External regenerative resistor capacity	Set the external resistor capacity and resistance in accordance with the actual conditions. For the resistance, please refer to Model selection of peripheral braking resistor in Instruction Manual.
P00. 23	External regenerative resistor resistance value	
P03. 08	Torque limit source	Set the torque limit source and setting value, generally internal torque limit by default. Default value 300%.
P03. 09	Internal forward torque limit	
P03. 10	Internal reverse torque limit	
P03. 11	External forward torque limit	
P03. 12	External reverse torque limit	
P09. 00	Modbus axis address	Set the parameters related to the communication.
P09. 01	Modbus baud rate	
P09. 02	Modbus data format	
P09. 03	Communication response delay	

Position control mode – External pulse input

Parameter No.	Parameter name	Description
P00. 01	Control mode selection	Set it to 0 – Position control mode
P00.05	Position instruction source	Set it to 0-Pulse instruction
P00.07	Pulse train form	Select one of the following pulse format: 0-Direction + pulse, positive logic 1-Direction + pulse, negative logic 2-A-phase+ B-phase orthogonal pulse, 4 multiplication, positive logic 3-A-phase+ B-phase orthogonal pulse, 4 multiplication, negative logic 4-CW +CCW, positive logic 5- CW +CCW, negative logic
P00.08	Instruction units per motor one revolution	0 Unit/Turn ～1073741824 Unit/Turn
P00.10	Electronic gear numerator 1	1～1073741824(Electronic gear is valid when setting P00.08 to 0)
P00.12	Electronic gear denominator	1～1073741824(Electronic gear is valid when setting P00.08 to 0)

Position control mode –Internal multi- stage position command

Parameter No.	Parameter name	Description
P00. 01	Control mode selection	Set it to 0 – Position control mode
P00.05	Position instruction source	Set it to 2-Internal position command
P00.08	Instruction units per motor one revolution	0 Unit/Turn ～1073741824 Unit/Turn
P00.10	Electronic gear numerator 1	1～1073741824(Electronic gear is valid when setting P00.08 to 0)
P00.12	Electronic gear denominator	1～1073741824(Electronic gear is valid when setting P00.08 to 0)
P08.01	Starting stage number	Set the Start stage No. of internal position command (1-P08.02)
P08.02	Ending stage number	Set the End stage No. of internal position command (P08.01-16)
P08.06	Internal position control 1st stage length	-1073741824～1073741824
P08.08	Internal position control 1st stage max speed	1 ～ 9000rpm
P08.09	Internal position control 1st stage acceleration/deceleration time	0 ～ 65535ms
P08.10	Waiting time after internal position control 1st stage completed	0 ～ 65535ms
P08.11-P08.85		Arrange by the order of parameter from the 1st stage position command, then from the 2nd stage to 16th stage in turn
Notes	When using internal position command, set the DI function 25(internal position command enabling)	

Related parameters for analog speed control

Parameter No.	Parameter name	Description
P00. 01	Control mode selection	Set to 1 – Speed control mode
P03.00	Speed command	Set to 1 –External analog(AI1 input by default)
P05.16	AI1 function selection	Set to 0-Speed analog input
P03.14	Acceleration time 1	Set the acceleration/deceleration time, range is between 0 and 65535ms
P03.15	Deceleration time1	
Analog input setup		
P05.00	AI1 minimum input	-10.00V～10.00V
P05.01	Corresponding value of AI1 minimum input	-100.0%～100.0%(max. speed at 100% speed)
P05.02	AI1 maximum input	-10.00V～10.00V
P05.03	Corresponding value of AI1 maximum input	-100.0%～100.0%(max. speed at 100% speed)
P05.04	AI1 zero offset	-500mV～500mV
P05.05	AI1 dead-zone setting	0.0~20.0%
P05.06	AI1 input filtering time	0.0ms～6553.5ms
P05.14	AI setting 100% speed	Set to 0 ~ max. speed of the motor

Related parameters for internal multi-speed control

Parameter No.	Parameter name	Description
P00. 01	Control mode selection	Set to 1 – Speed control mode
P03.00	Speed command source	Set to 3- internal multi-stage speed 1-16 switchover
P03.14	Acceleration time 1	Set the acceleration/deceleration time, range is between 0 and 65535ms
P03.15	Deceleration time1	
P03.36-P03.51	Speed from segment 1 to 16	Parameter P03.36 is the 1st stage speed and so on P03.51 the 16th stage speed. Initial value is 0 and make the setting by the actual usage
Notes	When using internal multi-stage speed, set the DI function 6-9 and select the speed by the switch combination	

Related parameters for analog torque control

Parameter No.	Parameter name	Description
P00. 01	Control mode selection	Set to 2 – Torque control mode
P03.22	Torque instruction source	Set to 1 – External analog input setup
P05.17	AI2 function selection	Set to 1-Analog torque input
P03.26	Speed limit source in torque control	Set to 0- Internal speed limit
P03.27	Internal positive speed limit	Set to 0 ~ max. speed of the motor
P03.28	Internal negative speed limit	
Analog input setup		
P05.07	AI2 minimum input	-10.00V～10.00V
P05.08	Corresponding value of AI2 minimum input	-100.0%～100.0%(max. torque at 100% torque)
P05.09	AI2 maximum input	-10.00V～10.00V
P05.10	Corresponding value of AI2 maximum input	-100.0%～100.0%(max. torque at 100% torque)
P05.11	AI2 zero offset	-500mV～500mV
P05.12	AI2 dead-zone setting	0.0~20.0%
P05.13	AI2 input filtering time	0.0ms～6553.5ms
P05.14	AI setting 100% speed	Set the motor speed at 100% by AI
P05.15	AI setting 100% torque	Set the motor speed at 100% by AI

Fault and warning code description

Code and name	Cause	What to do
Err. 001：System parameter error	1. Control circuit power suddenly drops; 2. After updating servo software, some previously saved parameters exceed settings range.	1. Make sure input power is within specified range; 2. Set P20.06=1 to initialized system parameters.
Err.002 Product model selection fault	1. Encoder cable connection broken or loose; 2. Invalid drive or motor model.	1. Check and fasten encoder cable; 2. Replace with valid drive or motor model.
Err.003 Fault during parameter storage	1. Parameter reading/writing too frequent; 2. Parameter storage component fault; 3. Control circuit power unstable; 4. Drive fault.	1. Check if upper controller is reading/writing E2PROM too frequent; 2. Check control circuit power cable and ensure control circuit power voltage is within specified range.
Err.004 FPGA fault	Software version fault.	Check if software version is correct.
Err.005 Product matching fault	1. Encoder cable connection broken or loose; 2. Use third-party encoder which is not supported; 3. Motor capacity and drive capacity don't match. Motor capacity class is larger than or two levels off the drive; 4. Product model code doesn't exist.	1. Check and fasten encoder cable; 2. Replace products that don't match; 3. Choose correct encoder type or replace the drive.
Err.006 Software abnormal	1. System parameter abnormal; 2. Drive internal fault.	Set P20.06=1 to initialized system parameters and restart power.
Err.007 Encoder initialization abnormal	Encoder signal abnormal at power on.	Check or replace encoder cable.
Err.008 Short circuit to ground detection fault	1. UVW wiring fault; 2. Motor breakdown; 3. Drive fault.	1. Check if UVW is short circuited to ground. If so replace cable; 2. Check if motor cable or grounding resistance is abnormal. If so replace the motor.
Err.009 Overcurrent fault 1	1. Instruction input is too fast; 2. Regenerative resistor too small or short circuited; 3. Motor cable bad contact; 4. Motor cable grounding; 5. Motor UVW short circuited; 6. Motor burnt; 7. Software detected power transistor overcurrent	1. Check instruction input time sequence and input after S-RDY; 2. Replace regenerative resistor; 3. Check and fasten encoder cable; 4. Replace motor if UVW insulation resistor is broken; 5. Check if UVW is short circuited; 6. Replace motor if UVW don't have equal resistance; 7. Reduce load, use bigger drive and motor, increase acceleration/deceleration time.
Err.010 Overcurrent fault 2	1. Instruction input is too fast; 2. Regenerative resistor too small or short circuited; 3. Motor cable bad contact; 4. Motor cable grounding; 5. Motor UVW short circuited; 6. Motor burnt; 7. Software detected power transistor overcurrent	1. Check instruction input time sequence and input after S-RDY; 2. Replace regenerative resistor; 3. Check and fasten encoder cable; 4. Replace motor if UVW insulation resistor is broken; 5. Check if UVW is short circuited; 6. Replace motor if UVW don't have equal resistance; 7. Reduce load, use bigger drive and motor, increase acceleration/deceleration time.
Err.012 Incremental encoder Z breakage or absolute encoder number of turns abnormal	Incremental encoder: Z-phase signal loss due to cable breakage or encoder fault; Absolute encoder: battery shortage, encoder cable plugging & unplugging during power off, or after P06.47=1 not initialize the encoder.	1. Rotate motor shaft manually, if error still occurs, replace cable or encoder; 2. Replace battery if undervoltage; 3. P20.06=7 and initialize.
Err.013 Encoder communication abnormal	1. Communicational encoder cable breakage; 2. Encoder not grounded; 3. Communication verification abnormal.	1. Check or replace encoder cable; 2. Check if encoder is grounded properly.
Err.014 Encoder data abnormal	1. Serial encoder breakage or bad contact; 2. Serial encoder data reading/writing abnormal	Check or replace encoder cable.
Err.015 Encoder battery undervoltage	Encoder battery voltage is less than P06.48 and ten's place of P06.47 is 1.	Replace encoder battery.
Err.016 Speed deviation too large	Speed instruction and speed feedback deviation exceeds settings of P06.45.	1. Increase P06.45 value; 2. Increase acceleration/deceleration time or increase system responsiveness; 3. Set P06.45=0 to disable speed deviation too large function.
Err.017 Torque saturation overtime	Torque maintains saturated for time longer than settings of P06.46.	1. Increase P06.46 value; 2. Check if UVW is broken.

Err.018 Control power Undervoltage	Incorrect wiring or input power failure	1. Check input power or wiring 2. Replace the servo drive
Err.019 Tripping	Incorrect wiring may make the control circuit diverge and result in motor stall.	1. Check UVW and encoder wiring. 2. Check the motor and drive. Replace it when necessary.
Err.020 Overvoltage	1. Input power voltage exceeds 280VAC; 2. Regenerative resistor breakage or not matching; 3. Load inertia exceeds allowable range; 4. Drive broken.	1. Check input power voltage; 2. Check or replace regenerative resistor; 3. Increase acceleration/deceleration time or replace more suitable drive/motor.
Err.021 Undervoltage	1. Input power voltage drops; 2. Instantaneous power off; 3. P06.36 setting is too high; 4. Drive broken	1. Make sure input power is stable; 2. Reduce P06.36 value if input power is normal. (Memory is configurable by P07.19)
Err.022 Current sampling fault	Drive internal current sampling fault.	Replace servo drive.
Err.023 AI sampling voltage too large	1. AI wrong wiring; 2. AI external input power voltage too high	Do correct AI wiring and set input power voltage within ±10V.
Err.024 Overspeed	1. Speed instruction exceeds maximum speed setting value; 2. Wrong UVW phase sequence; 3. Speed response over modulation; 4. Drive faulty	1. Lower speed instruction 2. Check if UVW phase sequence is correct; 3. Adjust speed loop gains to reduce over shoot; 4. Replace drive
Err.025 Electrical angle identification failure	1. Load or inertia too large; 2. Wrong encoder cable wiring	1. Reduce load or increase current loop gains 2. Replace encoder cable.
Err.026 Load identification failure	1. Load or inertia too large. Motor cannot run at specified curves; 2. Verification process aborted by other faults.	1. Reduce load or increase current loop gains 2. Make sure verification process correct.
Err.027 DI parameter setting fault	1. Different DOs are assigned with same function; 2. Physical DI and communicational DI have definition conflicts	Reassign DI functions
Err.028 DO parameter setting fault	Different DOs are assigned with same function	Reassign DO functions
Err.040 S-ON instruction invalid fault	Input S-ON signal after motor is energized by other auxiliary functions	Change incorrect operation.
Err.042 Pulse division output overspeed	Pulse division output is over upper limit.	Adjust pulse division output settings.
Err.043 Position deviation too large	1. Servo motor UVW wiring is wrong; 2. Servo drive gain settings are too low; 3. Position instruction pulse frequency is too high; 4 Position instruction acceleration is too large; 5. P00.19 setting is too low; 6. Servo drive/motor faulty; 7. Brake release abnormal. Motor is locked by external forces, gravity etc.	1. Reconnect the cables 2. Increase servo gains 3. Reduce instruction frequency, acceleration or adjust gear ratio 4. Set up smoothing parameters; 5. Adjust the value of P00.19 6. Replace the drive 7. Check brake power and servo motor is not blocked.
Err.044 Main circuit input phase loss	1. Input power cable bad contact; 2. Phase loss fault, i.e. during power on, one phase of R/S/T is too low for over 1s.	1. Check input power cables 2. Measure R/S/T phase-to-phase voltage to ensure 3 phases are balanced and input power is up to standard.
Err.045 Drive output phase loss	1. Motor UVW bad contact; 2. Motor broken	1. Check UVW wiring 2. Replace motor
Err.046 Drive overload	1. Motor UVW or encoder cable bad contact or loose 2. Motor blocked or brake not released 3. Wrong UVW/encoder cable wiring for multiple drives/motors 4. Motor/drive too small for load 5. Phase loss or wrong phase sequence 6. Motor or drive broken	1. Check UVW/encoder cable wiring 2. Check motor is not blocked and brake is released 3. Check there is no wrong UVW/encoder cable wiring for multiple drives/motors 4. Increase acceleration/deceleration time or choose bigger drive/motor 5. Check UVW wiring 6. Replace drive/motor
Err.047 Motor overload	1. Motor UVW or encoder cable bad contact or loose 2. Motor blocked or brake not released 3. Wrong UVW/encoder cable wiring for multiple drives/motors 4. Motor/drive too small for load 5. Phase loss or wrong phase sequence 6. Motor or drive broken	1. Check UVW/encoder cable wiring 2. Check motor is not blocked and brake is released 3. Check there is no wrong UVW/encoder cable wiring for multiple drives/motors 4. Increase acceleration/deceleration time or choose bigger drive/motor 5. Check UVW wiring 6. Replace drive/motor
Err.048 Electronic gear setting fault	Electronic gear ratio exceeds setting range	Set correct electronic gear
Err.049 Heat sink too hot	1. Fan broken 2. Ambient temperature is too high 3. Too many times of restarting power after overload 4. Inappropriate installation directions and spacing 5. Servo drive faulty 6. Motor or drive broken	1. Check fan. Replace fan or drive 2. Measure ambient temperature and improved cooling conditions for servo drive 3. Check error records and see if there has been overload error. Restart after 30s. Increase acceleration/deceleration time. 5. Install the servo drive according to specifications in this manual. 6. Power off and wait for 5 minutes. If this error persists, replace drive.
Err.050 Pulse input abnormal	1. Input pulse frequency is larger than maximum frequency setting 2. Input pulse is interfered.	1. Adjust P06.38 2. Check wiring grounding conditions. Use twisted-pair shielded cable. Separate UVW cable from encoder cable.
Err.051 Fully-closed loop position deviation too large	1. External encoder abnormal. 2. Relative settings too conservative.	1. Check external encoder wirings. Replace external encoder. 2. Check parameters of fully-closed loop deviation and protective functions.
Err.054 User forced fault	User uses DI of function 32 FORCE_ERR to forcibly enter faulty state.	Disconnect DI of function 32.
Err.055 Absolute position resetting fault	Absolute encoder absolute position resetting faulty.	Contact HCFA.
Err.056 Main circuit outage	Power outage or main circuit abnormal	Check if there is instantaneous power failure. Increase power voltage capacity.
Err.060 First start after writing customized software	First start after writing customized software	Initialize the servo drive.
Err.065 CAN bus OFF	CAN bus disconnection or Receive or send failure	Check the wiring
Err.066 Abnormal NMT command	Receive NMT stop or reset command at servo-ON	NMT node reset. Do not stop or reset CAN node at servo-ON.
Err.067 CAN bus failure	CAN bus disconnection or Receive or send failure	Check the wiring
Err.068 External overspeed (reserved)	1. Speed exceeds the max.speed setting value 2. UVW phase error 3. Speed response severely overshoot 4. Drive failure	1. Reduce speed 2. Check UVW phase sequence 3. Adjust speed loop gain 4. Replace servo drive
Err.069 Excessive hybrid deviation	1. External encoder disconnection 2. External encoder breakage 3. Device transmission failure	1. Check or replace external encoder or wiring 2. Check mechanical transmission
Err.071 Node protection or heartbeat overtime	Do not get any response when node protection and heartbeat monitoring reach the setting value	Check the nodes, NMT node reset
Err.072 Synchronization failure	Failure between the CANOpen and host controller in IP mode	NMT node reset or 6040 send failure reset command
Err.073 CANOpen Trace buffer underflow	CANOpen, Synchronous clock loss more than 2 times in IP or CSP mode	Check any interference to the communication and operation of host controller; NMT node reset or 6040 send failure reset command
Err.074 CANOpen Trace buffer overflow	CANOpen Sync. Clock too fast or the actual clock frequency do not match the setting value IP or CSP mode	Check any interference to the communication and operation of host controller; NMT node reset or 6040 send failure reset command
Alarm code and name	Causes	What to do
AL.080 Undervoltage warning	DC bus voltage is relatively low.	1. Check main circuit. 2. Adjust P06.36
AL.081 Drive overload warning	Same as Err.046	Same as Err.046
AL.082 Motor overload warning	Same as Err.046	Same as Err.046
AL.083 Parameter modification needs power restart	Modify parameters which needs restarting.	Restart power
AL.084 Servo not ready	S-ON when servo is not ready.	S-ON after detecting S-RDY signal.
AL.085 EEPROM frequency writing warning	Operating EEPROM too frequent.	Reduce EEPROM using frequency. Use communication2 which do not save in E2PROM.
AL.086 Positive over-travel warning	1. POT & NOT valid simultaneously 2. Servo over-travel in some directions. Can be removed automatically.	Trigger positive limit switch, check operation mode, move the servo towards negative direction. After leaving positive limit switch, this alarm will be removed automatically.
AL.087 Negative over-travel warning	Same as AL.086	Trigger negative limit switch, check operation mode, move the servo towards positive direction. After leaving negative limit switch, this alarm will be removed automatically.

AL.088 Positive instruction overspeed	1. Electronic gear ratio too large 2. Pulse frequency too high	1. Reduce electronic gear ratio 2. Reduce pulse frequency
AL.090 Absolute encoder angle initialization warning	Angle is over 7.2 degree.	Replace motor
AL.093 Regenerative overload	1. Regenerative resistor wrong wiring or bad contact; 2. Internal resistor wiring breakage; 3. Resistor capacity insufficient; 4. Resistor resistance too large and causing long time braking; 5. Input voltage exceeds specifications 6. Resistor resistance, capacity or heating time constant parameters settings are wrong; 7. Drive faulty	1. Check resistor wiring 2. Check internal resistor wiring; 3. Increase resistor capacity 4. Reduce resistor resistance; 5. Reduce input voltage 6. Set correct parameters 7. Replace drive
AL.094 Regenerative resistor too small	1. External regenerative resistor is less than minimum value 2. Wrong parameter settings	1. Replace resistor 2. Check parameters P00.21~P00.24
AL.095 Emergency stop	Emergency stop is triggered.	This is a normal DI function (function 30)
AL.096 Homing error	1. Homing time exceeds P08.95 2. P08.90 is set is 3, 4, or 5 and contacted limit switches 3. Contact limit switches twice when not using limit switches as origin points.	1. Increase the value of P08.95; 2. Reduce homing speeds P08.92, P08.93
AL.097 Encoder battery undervoltage	Encoder battery voltage is lower than what's set in P06.48.	Replace battery.

DI/DO function code

DI function description

Value	Sign	Name	Remarks
1	S_ON	Servo enable	Invalid-Servo disabled Valid- Servo enabled
2	ERR_RST	Error reset	Servo can continue to work after some error reset. Valid when detecting edge changes.
3	GAIN_SEL	Gain switchover	Invalid-Speed loop is PI control. Valid-Speed loop is P control.
4	CMD_SEL	Command switchover	Invalid: present command is A Valid: present command is B
5	PERR_CLR	Pulse deviation clear	Invalid-No action Valid-Clear pulse deviation
6	MI_SEL1	Multi-stage selection 1	For internal position or internal speed control
7	MI_SEL2	Multi-stage selection 2	
8	MI_SEL3	Multi-stage selection 3	
9	MI_SEL4	Multi-stage selection 4	
10	MODE_SEL	Control mode switchover	Switchover of control modes(speed,m position, torque) when P00.01 is set to 3, 4 or 5.
12	ZERO_SPD	Zero-speed clamp	Valid-Enable zero-speed clamp Invalid-Disable zero-speed clamp
13	INHIBIT	Pulse input inhibition	Valid-Disable pulse input Invalid-Enable pulse input
14	P_OT	Positive over-travel	Use with limit switches for over-travel protections. Valid-Positive over-travel, positive drive disabled Invalid-Normal range, positive drive enabled
15	N_OT	Negative over-travel	Use with limit switches for over-travel protections. Valid-Negative over-travel, positive drive disabled Invalid-Normal range, positive drive enabled
16	P_CL	External forward torque limit	Valid-External torque limit enabled Invalid-External torque limit disabled
17	N_CL	External reverse torque limit	Valid-External torque limit enabled Invalid-External torque limit disabled
18	P_JOG	Positive JOG	Valid-Input instructions Invalid-Stop inputting instructions
19	N_JOG	Negative JOG	Valid-Reverse input instructions Invalid-Stop inputting instructions
20	GEAR_SEL1	Electronic gear selection	GEAR_SEL1 invalid, GEAR_SEL2 invalid: first electronic gear GEAR_SEL1 valid, GEAR_SEL2 invalid: second electronic gear GEAR_SEL1 invalid, GEAR_SEL2 valid: third electronic gear GEAR_SEL1 valid, GEAR_SEL2 valid: fourth electronic gear
21	GEAR_SEL2		
22	POS_DIR	Position instruction negation	Invalid-Not reverse; Valid-Reverse
23	SPD_DIR	Speed instruction negation	Invalid-Not reverse; Valid-Reverse
24	TOQ_DIR	Torque instruction negation	Invalid-Not reverse; Valid-Reverse
25	PSEC_EN	Internal multi-stage enable	Invalid-Disable internal multi-stage instruction; Valid-Enable internal multi-stage instruction
26	INTP_ULK	Interrupt positioning release	Invalid-No action; Valid-when P08.86 is set to 2 or 4
27	INTP_OFF	Interrupt positioning inhibit	Invalid-No action; Valid-When P08.86 is set to non-zero value
28	HOME_IN	Homing origin point	Can be used as home position signal or deceleration-point position signal
29	STHOME	Homing start	Start homing.
30	ESTOP	Emergency stop	Invalid-No action Valid-Emergency stop
31	STEP	Step enable	Valid-Step enable; Invalid-Instruction is 0
32	FORCE_ERR	Forced error protection	Invalid-No action Valid-Forced error protection
33	HOME_DEC	Homing deceleration point	Invalid-No action Valid-Switchover to low-speed search homing
34	INTP_TRIG	Interrupt positioning trigger	Invalid-No action; Valid-Valid: when P08.86 is set to non-zero value, can only use DI8 or DI9.
35	INPOSHALT	Internal position commands generation pause	Invalid-No action; Valid-Decelerate or pause internal multi-stage position and interruption positioning
36	ANALOG_OFF	Analog input prohibition	Invalid-No action; Valid-Prohibit analog input
37	ENC-SEN	SEN enabled absolute position data send	Invalid-No action; Valid-OAOBOZ send absolute position data, cannot enable servo at the same time

DO function description

Value	Sign	Name	Remarks
1	S_RDY	Servo ready	Valid-Servo ready Invalid-Servo not ready
2	S_ERR	Servo error	Valid when detecting error
3	S_WARN	Servo warning	Valid when warning signal output (disconnected)
4	TGON	Motor rotation	Valid-When motor speed is larger than settings of P04.43. Invalid-Invalid motor rotation signal
5	V_ZERO	Motor speed is 0	Valid-Motor speed is 0. Invalid-Motor speed is non-zero.
6	V_CMP	Speed conformity	Speed control, valid when absolute deviation of motor speed and speed instruction is less than the settings of P04.44.
7	COIN	Positioning completed	Position control, valid when pulse deviation is less than the settings of P04.47.
8	NEAR	Positioning near	Position control, valid when pulse deviation is less than the settings of P04.50.
9	T_LT	Torque in limit	Valid-Motor torque is in limit Invalid-Motor torque is not in limit
10	V_LT	Speed in limit	Valid-Motor speed is in limit Invalid-Motor speed is not in limit
11	BKOFF	Brake release	Valid-Break release Invalid-Break recover
12	T_ARR	Torque reached	Valid when torque feedback reaches the settings of P04.55; allowable fluctuations set in P04.56.
13	V_ARR	Speed reached	Valid when speed feedback reaches the settings of P04.45; allowable fluctuations ±10rpm
15	INTP_DONE	Interrupt positioning complete	Output after interrupt positioning complete
16	BD_OUT	Dynamic brake output	Externally connecting relay or contactor and current-limiting resistor
17	HOME	Homing complete	Valid-Home return completed Invalid-Home return not completed
18	INTP_WORK	Interrupt positioning working	Interrupt positioning working
19	PCOM1	Position 1 comparison trigger signal	Output trigger signal when position 1 reaches the corresponding range
20	PCOM2	Position 2 comparison trigger signal	Output trigger signal when position 2 reaches the corresponding range
21	PCOM3	Position 3 comparison trigger signal	Output trigger signal when position 3 reaches the corresponding range
22	PCOM4	Position 4 comparison trigger signal	Output trigger signal when position 4 reaches the corresponding range

Parameter list

Control modes P: position control S: speed control T: torque control
● means applicable - means not applicable

Parameter number		Description	Control mode		
			P	S	T
P00 Group Basic Parameters	00	Motor positive direction definition	●	●	●
	01	Control mode selection	●	●	●
	02	Real time auto-tuning	●	●	●
	03	Stiffness grade setting	●	●	●
	04	Load inertia ratio	●	●	●
	05	Position instruction source	●	●	●
	07	Pulse train form	●	-	-
	08	Instruction units per motor one revolution (32-bit)	●	-	-
	10	Electronic gear numerator 1 (32-bit)	●	-	-
	12	Electronic gear denominator (32-bit)	●	-	-
	14	Pulse output counts per motor one revolution (32-bit)	●	-	-
	16	Pulse output positive direction definition	●	●	●
	17	Pulse output OUT_Z polarity	●	-	-
	18	Pulse output function selection	●	-	-
	19	Position deviation too large threshold	●	●	●
	21	Regenerative resistor setting	●	●	●
	22	External regenerative resistor capacity	●	●	●
	23	External regenerative resistor resistance value	●	●	●
	24	External regenerative resistor heating time constant	●	●	●
	25	Regenerative voltage threshold	●	●	●
	26	Step value setting	●	-	-
	27	High-speed pulse train form	●	-	-
	28	Second encoder interface	●	-	-
	31	Motor type selection	●	●	●
	32	DDL motor polar pitch (N-N)	●	●	●
	33	DDL scale resolution	●	●	●
	34	DDL motor rated current	●	●	●
	35	DDL rated thrust	●	●	●
	36	DDL maximum thrust theoretical value	●	●	●
	37	DDL max. speed	●	●	●
	39	DDL rotor mass	●	●	●
	40	DDL Stator phase resistance Rs	●	●	●
	41	DDL motor Lq (line inductance/2)	●	●	●
	42	DDL motor Ld (line inductance/2)	●	●	●
	43	DDL Back EMF Coefficient	●	●	●
	45	DDR encoder resolution (32-bit)	●	●	●
	46	DDR encoder resolution high-bit	●	●	●
	47	DDR motor rated current	●	●	●
	48	DDR rated torque	●	●	●
	49	DDR Maximum torque theoretical value	●	●	●
	50	DDR motor max. speed	●	●	●
	51	Reserved	-	-	-
	52	DDR motor rotor inertia	●	●	●
	53	DDR stator resistance Rs	●	●	●
	54	DDR motor Lq	●	●	●
	55	DDR motor Ld	●	●	●
	56	DDR Back EMF Coefficient	●	●	●
	57	Reserved	●	●	●
	58	Reserved	●	●	●
	59	Current response fine-tuning coefficient	●	●	●
	60	Magnetic pole seeking method	●	●	●
	61	Magnetic pole seeking current	●	●	●
	62	Magnetic pole seeking action threshold value	●	●	●
	63	Magnetic pole seeking static threshold value	●	●	●
	64	DDL/DDR Feedback source	-	-	-
	66	DDL/DDR Motor Z- electrical angle	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P01 Group Gain Tuning Parameters	00	Position loop gain 1	●	-	-
	01	Speed loop gain 1	●	●	-
	02	Speed loop integral time 1	●	●	-
	03	Speed detection filter 1	●	●	●
	04	Torque instruction filter 1	●	●	●
	05	Position loop gain 2	●	-	-
	06	Speed loop gain 2	●	●	-
	07	Speed loop integral time 2	●	●	-
	08	Speed detection filter 2	●	●	●
	09	Torque instruction filter 2	●	●	●
	10	Speed regulator PDFF coefficient	●	●	-
	11	Speed feedforward control selection	●	-	-
	12	Speed feedforward gain	●	-	-
	13	Speed feedforward filtering time	●	-	-
	14	Torque feedforward control selection	●	●	-
	15	Torque feedforward gain	●	●	-
	16	Torque feedforward filtering time	●	●	-
	17	Digital input GAIN_SWITCH function selection	●	●	-
	18	Position control gain switchover mode	●	-	-
	19	Position control gain switchover delay	●	-	-
	20	Position control gain switchover class	●	-	-
	21	Position control gain switchover hysteresis	●	-	-
	22	Position control gain switchover time	●	-	-
	23	Speed control gain switchover mode	-	●	-
	24	Speed control gain switchover delay	-	●	-
	25	Speed control gain switchover class	-	●	-
	26	Speed control gain switchover hysteresis	-	●	-
	27	Torque control gain switchover mode	-	-	●
	28	Torque control gain switchover delay	-	-	●
	29	Torque control gain switchover class	-	-	●
	30	Torque control gain switchover hysteresis	-	-	●
	31	Observer enabled	●	●	●
	32	Observer cut-off frequency	●	●	●
	33	Observer phase compensation time	●	●	●
	34	Observer inertia coefficient	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P02 Group Vibration Suppression Parameters	00	Position instruction smoothing filter	●	-	-
	01	Position instruction FIR filter	●	-	-
	02	Adaptive filtering mode	●	●	●
	03	Adaptive filtering load mode	●	●	●
	04	First notch filter frequency	●	●	●
	05	First notch filter width	●	●	●
	06	First notch filter depth	●	●	●
	07	Second notch filter frequency	●	●	●
	08	Second notch filter width	●	●	●
	09	Second notch filter depth	●	●	●
	10	Third notch filter frequency	●	●	●
	11	Third notch filter width	●	●	●
	12	Third notch filter depth	●	●	●
	13	Fourth notch filter frequency	●	●	●
	14	Fourth notch filter width	●	●	●
	15	Fourth notch filter depth	●	●	●
	19	Position instruction FIR filter 2	●	-	-
	20	First vibration attenuation frequency	●	●	-
	21	First vibration attenuation filter setting	●	●	-
	22	Second vibration attenuation frequency	●	●	-
	23	Second vibration attenuation filter setting	●	●	●
	31	Resonance point 1 frequency	●	●	●
	32	Resonance point 1 bandwidth	●	●	●
	33	Resonance point 1 amplitude	●	●	●
	34	Resonance point 2 frequency	●	●	●
	35	Resonance point 2 bandwidth	●	●	●
	36	Resonance point 2 amplitude	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P03 Group Speed & Torque Control Parameters	00	Speed instruction source selection	-	●	-
	03	Speed instruction digital setting	-	●	-
	04	JOG speed setting	-	●	-
	08	Torque limit source	●	●	-
	09	Internal forward torque limit	●	●	-
	10	Internal reverse torque limit	●	●	-
	11	External forward torque limit	●	●	-
	12	External reverse torque limit	●	●	-
	14	Acceleration time 1	-	●	●
	15	Deceleration time 1	-	●	●
	16	Acceleration time 2	-	●	-
	17	Deceleration time 2	-	●	-
	19	Zero-speed clamp function	-	●	●
	20	Zero-speed clamp threshold value	-	●	●
	22	Torque instruction source	-	-	●
	25	Torque instruction digital setting value	-	-	●
	26	Speed limit source in torque control	-	-	●
	27	Internal positive speed limit	-	-	●
	28	Internal negative speed limit	-	-	●
	29	Hard limit torque limit	●	●	●
	30	Hard limit torque limit detection time	●	●	●
	31	Internal speed instruction segment number selection mode	-	●	-
	32	Acceleration time selection for internal speed segment 1-8	-	●	-
	33	Deceleration time selection for internal speed segment 1-8	-	●	-
	34	Acceleration time selection for internal speed segment 9-16	-	●	-
	35	Deceleration time selection for internal speed segment 9-16	-	●	-
	36~51	Segment 1-16 speed	-	●	-

Parameter number		Description	Control mode		
			P	S	T
P04 Group Digital Input/output Parameters	00	Normal DI filter selection	●	●	●
	01~09	DI1 ~9 terminal function selection	●	●	●
	11~19	DI1 ~9 terminal logic selection	●	●	●
	21~29	DO1~9 terminal function selection	●	●	●
	31~39	DO1 ~9 terminal logic selection	●	●	●
	41	FUNINL signal unassigned state (Hex)	●	●	●
	42	FUNINH signal unassigned state (Hex)	●	●	●
	43	Motor rotational signal threshold	●	●	●
	44	Speed conformity signal width	-	●	-
	45	Speed reached	●	●	●
	47	Positioning completion range	●	-	-
	48	Positioning completion output setting	●	-	-
	49	Positioning completion holding time	●	-	-
	50	Positioning near threshold	●	-	-
	51	Servo OFF delay time after holding brake taking action when speed is 0	●	●	●
	52	Speed setting for holding brake to take action in motion	●	●	●
	53	Waiting time for holding brake to take action in motion	●	●	●
	54	Special output function setting	●	●	●
	55	Torque reached (T_ARR) threshold	●	●	●
	56	Torque reached signal width	●	●	●
	57	Z-pulse width adjustment	●	●	●
	58	Zero-speed signal output threshold	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P05 Group Analog Input/output Parameters	00	AI1 minimum input	●	●	●
	01	Corresponding value of AI1 minimum input	●	●	●
	02	AI1 maximum input	●	●	●
	03	Corresponding value of AI1 maximum input	●	●	●
	04	AI1 zero offset	●	●	●
	05	AI1 dead-zone setting	●	●	●
	06	AI1 input filtering time	●	●	●
	07	AI2 minimum input	●	●	●
	08	Corresponding value of AI2 minimum input	●	●	●
	09	AI2 maximum input	●	●	●
	10	Corresponding value of AI2 maximum input	●	●	●
	11	AI2 zero offset	●	●	●
	12	AI2 dead-zone setting	●	●	●
	13	AI2 input filtering time	●	●	●
	14	AI setting 100% speed	●	●	●
	15	AI setting 100% torque	●	●	●
	16	AI1 function selection	●	●	●
	17	AI2 function selection	●	●	●
	28	AO1 signal selection (need optional card)	●	●	●
	29	AO1 voltage offset	●	●	●
	30	AO1 multiplier	●	●	●
	31	AO2 signal selection (need optional card)	●	●	●
	32	AO2 voltage offset	●	●	●
	33	AO2 multiplier	●	●	●
	34	AO monitoring value type setting	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P06 Group Expansion Parameters	00	Electronic gear numerator 2(32-bit)	●	-	-
	02	Electronic gear numerator 3(32-bit)	●	-	-
	04	Electronic gear numerator 4(32-bit)	●	-	-
	06	Position deviation clearance function	●	-	-
	09	Electronic gear ratio switchover delay	●	-	-
	10	Potential energy load torque compensation	●	●	-
	11	P06.10 memory selections	●	●	-
	19	Parameter identification rate	●	●	-
	20	Parameter identification acceleration time	●	●	-
	21	Parameter identification deceleration time	●	●	-
	22	Parameter identification mode selection	●	●	-
	23	Initial angle identification current limit	●	●	●
	24	Instantaneous power failure protection	●	●	●
	25	Instantaneous power failure deceleration time	●	●	●
	26	Servo OFF stop mode selection	●	●	●
	27	Second category fault stop mode selection	●	●	●
	28	Over-travel input setting	●	●	●
	29	Over-travel stop mode selection	●	●	●
	30	Input power phase loss protection	●	●	●
	31	Output power phase loss protection	●	●	●
	32	Emergency stop torque	●	●	●
	33	Tripping protection function	●	●	●
	34	Overload warning value	●	●	●
	35	Motor overload protection coefficient	●	●	●
	36	Undervoltage protection point	●	●	●
	37	Over-speed error point	●	●	●
	38	Maximum input pulse frequency	●	-	-
	39	Short circuit to ground detection protection selection	●	●	●
	40	Encoder interference detection delay	●	●	●
	41	Input pulse filtering setting	●	-	-
	42	Input pulse inhibition setting	●	-	-
	43	Deviation clearance input setting	●	-	-
	44	High speed DI filtering setting	●	●	●
	45	Speed deviation too large threshold	●	●	-
	46	Torque saturation overtime setting	●	●	●
	47	Absolute system setting	●	●	●
	48	Encoder battery undervoltage threshold	●	●	●
	49	High-speed pulse input filter	●	●	●
	50	Stop mode for emergency stop	●	●	●
	51	Stop mode for pause	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P07 Group Auxiliary function Parameters	00	User password	●	●	●
	01~05	Panel monitoring parameter setting 1~5	●	●	●
	08~09	Function selection 1~2	●	●	●
	09	Panel monitoring parameter setting 9	●	●	●
	10	User password	●	●	-
	11	Instant power failure immediate memory function	●	-	-
	12	User password screen-lock time	●	-	-
	14	Fast deceleration time	-	-	-
	16	Function selection 3	●	●	●
	17	Maximum division number pre motor one revolution	●	●	●
	19~22	Function selection 5~8	●	●	●
	23	Fault reset time	●	●	●
	24	Positive soft limit(32-bit)	●	●	●
	26	Negative soft limit(32-bit)	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P08 Group Gain Adjustment Parameters	00	Multi-stage preset position execution pattern selection	●	-	-
	01	Starting stage number	●	-	-
	02	Ending stage number	●	-	-
	03	Restarting pattern of residual stages after pausing	●	-	-
	04	Position instruction type selection	●	-	-
	05	Unit for waiting time	●	-	-
	06	1st stage length (32-bit)	●	-	-
	08	1st stage max speed	●	-	-
	09	1st stage acceleration/deceleration time	●	-	-
	10	Waiting time after 1st stage completed	●	-	-
	11	2nd stage length (32-bit)	●	-	-
	13	2nd stage max speed	●	-	-
	14	2nd stage acceleration/deceleration time	●	-	-
	15	Waiting time after 2nd stage completed	●	-	-
	16	3rd stage length (32-bit)	●	-	-
	18	3rd stage max speed	●	-	-
	19	3rd stage acceleration/deceleration time	●	-	-
	20	Waiting time after 3rd stage completed	●	-	-
	21	4th stage length (32-bit)	●	-	-
	23	4th stage max speed	●	-	-
	24	4th stage acceleration/deceleration time	●	-	-
	25	Waiting time after 4th stage completed	●	-	-
	26	5th stage length (32-bit)	●	-	-
	28	5th stage max speed	●	-	-
	29	5th stage acceleration/deceleration time	●	-	-
	30	Waiting time after 5th stage completed	●	-	-
	31	6th stage length (32-bit)	●	-	-
	33	6th stage max speed	●	-	-
	34	6th stage acceleration/deceleration time	●	-	-
	35	Waiting time after 6th stage completed	●	-	-
	36	7th stage length (32-bit)	●	-	-
	38	7th stage max speed	●	-	-
	39	7th stage acceleration/deceleration time	●	-	-
	40	Waiting time after 7th stage completed	●	-	-
	41	8th stage length (32-bit)	●	-	-
	43	8th stage max speed	●	-	-
	44	8th stage acceleration/deceleration time	●	-	-
	45	Waiting time after 8th stage completed	●	-	-
	46	9th stage length (32-bit)	●	-	-
	48	9th stage max speed	●	-	-
	49	9th stage acceleration/deceleration time	●	-	-
	50	Waiting time after 9th stage completed	●	-	-
	51	10th stage length (32-bit)	●	-	-
	53	10th stage max speed	●	-	-
	54	10th stage acceleration/deceleration time	●	-	-
	55	Waiting time after 10th stage completed	●	-	-
	56	11th stage length (32-bit)	●	-	-
	58	11th stage max speed	●	-	-
	59	11th stage acceleration/deceleration time	●	-	-
	60	Waiting time after 11th stage completed	●	-	-
	61	12th stage length (32-bit)	●	-	-
	63	12th stage max speed	●	-	-
	64	12th stage acceleration/deceleration time	●	-	-
	65	Waiting time after 12th stage completed	●	-	-
	66	13th stage length (32-bit)	●	-	-
	68	13th stage max speed	●	-	-
	69	13th stage acceleration/deceleration time	●	-	-
	70	Waiting time after 13th stage completed	●	-	-
	71	14th stage length (32-bit)	●	-	-
	73	14th stage max speed	●	-	-
	74	14th stage acceleration/deceleration time	●	-	-
	75	Waiting time after 14th stage completed	●	-	-
	76	15th stage length (32-bit)	●	-	-
	78	15th stage max speed	●	-	-
	79	15th stage acceleration/deceleration time	●	-	-
	80	Waiting time after 15th stage completed	●	-	-
	81	16th stage length (32-bit)	●	-	-
	83	16th stage max speed	●	-	-
	84	16th stage acceleration/deceleration time	●	-	-
	85	Waiting time after 16th stage completed	●	-	-
	86	Interrupt positioning setting	●	-	-
	88	Homing start modes	●	-	-
	89	Homing modes	●	-	-
	90	Limit switch and Z-phase signal setting at homing	●	-	-
	92	Origin search high speed	●	-	-
	93	Origin search low speed	●	-	-
	94	Acceleration/deceleration time at origin search	●	-	-
	95	Homing time limit	●	-	-
	96	Origin point coordinate offset (32-bit)	●	-	-
	98	Mechanical origin point offset (32-bit)	●	-	-

Parameter number		Description	Control mode		
			P	S	T
P09 Group Communication Setting Parameters	00	Modbus axis address	●	●	●
	01	Modbus baud rate	●	●	●
	02	Modbus data format	●	●	●
	03	Communication overtime	●	●	●
	04	Communication response delay	●	●	●
	05~08	Communication DI enabling setting 1~4	●	●	●
	09~10	Communication DO enabling setting 1~2	●	●	●
	11	Communication instruction holding time	●	●	●
	12	AO function or CAN communication enabled	●	●	●
	13~15	CAN communication setting 1~3	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P17 Group Extension position Control Parameters	00	External encoder using method	●	-	-
	01	External encoder pitch (32-bit)	●	-	-
	03	Full-closed excessive hybrid deviation threshold (32-bit)	●	-	-
	05	Hybrid deviation counting setting	●	-	-
	06	Hybrid vibration suppression gain	●	-	-
	07	Hybrid vibration suppression time constant	●	-	-
	09	Unit for full-closed hybrid deviation (32-bit)	●	-	-
	11	Unit for internal encoder counting (32-bit)	●	-	-
	13	External encoder counting value (32-bit)	●	-	-
	16	Position comparison output mode	●	-	-
	17	1st position	●	-	-
	19	2nd position	●	-	-
	21	3rd position	●	-	-
	23	4th position	●	-	-
	25	Signal effective time 1	●	-	-
	26	Signal effective time 2	●	-	-
	27	Signal effective time 3	●	-	-
	28	Signal effective time 4	●	-	-
	29	Display delay	●	-	-

Parameter number		Description	Control mode		
			P	S	T
P18 Group Motor Parameters	00	Motor model code	●	●	●

Parameter number		Description	Control mode		
			P	S	T
P20 Group Panel and Communication Interface Parameters	00	Panel JOG	●	●	●
	01	Fault reset	●	●	●
	03	Parameter identification function	●	●	●
	05	Analog input automatic offset adjustment	●	●	●
	06	System initialization function	●	●	●
	08	Communication operation instruction input	●	●	●
	09	Communication operation status output	●	●	●
	11	Multi-stage operation selection by communication	●	●	-
	12	Homing start by communication	●	-	-

Parameter number		Description	Control mode		
			P	S	T
P21 Group Monitoring Parameters	00	Servo status	●	●	●
	01	Motor speed feedback (32-bit)	●	●	●
	03	Speed instruction	●	●	●
	04	Internal torque instruction (relative to rated torque)	●	●	●
	05	Phase current effective value	●	●	●
	06	DC bus voltage	●	●	●
	07	Absolute position counter (32-bit)	●	●	●
	09	Electrical angle	●	●	●
	10	Mechanical angle (relative to encoder zero point)	●	●	●
	11	Load inertia identification value	●	●	●
	12	Speed value relative to input instruction	●	●	●
	13	Position deviation counter (32-bit)	●	●	●
	15	Input pulse counter (32-bit)	●	●	●
	17	Feedback pulse counter (32-bit)	●	●	●
	19	Position instruction deviation counter unit (32-bit)	●	●	●
	21	Digital input signal monitoring	●	●	●
	23	Digital output signal monitoring	●	●	●
	24	Encoder status	●	●	●
	25	Total power-on time	●	●	●
	27	AI 1 voltage after adjustment	●	●	●
	28	AI 2 voltage after adjustment	●	●	●
	29	AI 1 voltage before adjustment	●	●	●
	30	AI 2 voltage before adjustment	●	●	●
	31	Module temperature	●	●	●
	32	Number of turns of absolute encoder (32-bit)	●	●	●
	34	Single turn position of absolute encoder (32-bit)	●	●	●
	36	Version code 1	●	●	●
	37	Version code 2	●	●	●
	38	Version code 3	●	●	●
	39	Product series code	●	●	●
	40	Fault record display	●	●	●
	41	Fault code	●	●	●
	42	Time stamp upon selected fault (32-bit)	●	●	●
	44	Motor speed upon selected fault	●	●	●
	45	U-phase current upon selected fault	●	●	●
	46	V-phase current upon selected fault	●	●	●
	47	DC bus voltage upon selected fault	●	●	●
	48	Input terminal status upon selected fault	●	●	●
	49	Output terminal status upon selected fault	●	●	●
	50	Customized software version number	●	●	●
	51	Accumulative load ratio	●	●	●
	52	Regenerative load ratio	●	●	●
	53	Internal warning code	●	●	●
	54	Internal instruction present stage code	●	●	●
	55	Customized serial code	●	●	●
	56	High 32 place of absolute position counter (32-bit)	●	●	●
	58	High 32 place of feedback pulse counter (32-bit)	●	●	●

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