Ω6 AC Servo Driver

Naming conventions

ODSAP6 A 401 G B **

1-6   7   8-10   11   12   13-14

ODS	Product series	
1-6	Symbols	Type
	ODSAP6	Ω6 series single-axis pulse type
	ODSAN6	Ω6 series single-axis bus type

A	Voltage class	
7	Symbols	Type
	A	AC 220V
	B	AC 380V

401	Power specifications	
8-10	Symbols	Type
	201	200W
	401	400W
	751	750W
	102	1.0kW
	152	1.5kW
	202	2.0kW
	302	3.0kW
	......	......

G	Control type	
11	Symbols	Type
	B	Basic type
	G	General-purpose type
	F	Full-function type

B	Encoder type	
12	Symbols	Type
	B	Serial communication type

**	Special specifications	
13-14	Symbols	Type
	Vacancy	Standard motor

Powerful performance Out-of-the-box

Self-tuning, no debugging, saving 90% of the equipment debugging time

Speed loop bandwidth
3.5kHz

Current loop refresh rate
1MHz

With three-way 16-digit analog command entered, the change in 2 mv voltage can be distinguished and the control precision can be improved by 16 times

Strong power for easy handling

115%   350%

Overload rate of continuous load   Instantaneous overload

Response to IO in 1 μ s makes it easy to deal with the needs of aerial photography and probe

With two-degree-of-freedom control + pseudo-differential feedforward control, both high-speed response and strong interference are available
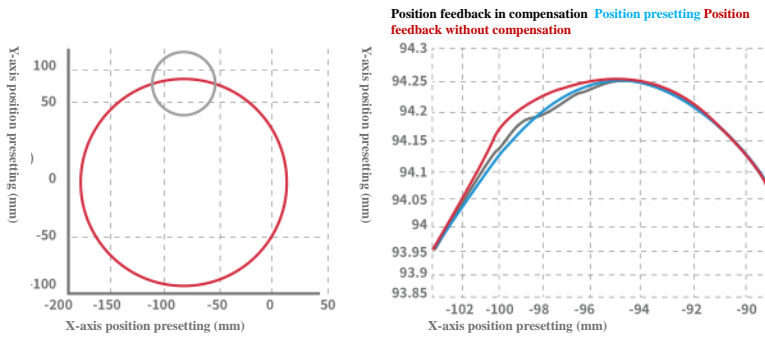
Equipped with 16 M pulse control interface, the control precision can be increased by 4 times

Friction compensation + over-quadrant bump inhibition

Easily dealing with precision machining, and improving the roundness by 85%

Position feedback in compensation **Position presetting** **Position feedback without compensation**

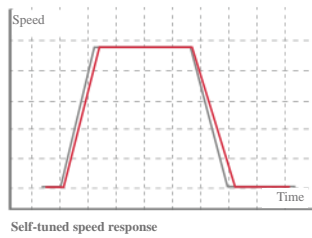## New gantry synchronization algorithm + standard RJ45 socket

Easily dealing with precision machining, and improving the roundness by 85%
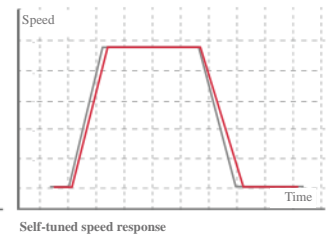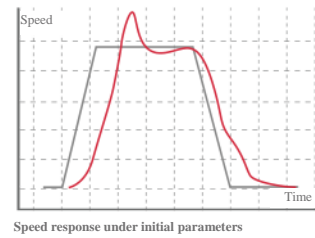

Automatic tilt correction
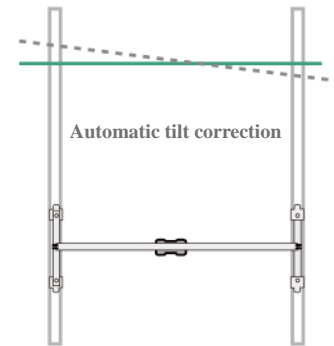
On-line inertia identification + on-line parameter self-tuning

Easily dealing with up to 30-time inertia ratio

For small inertia ratio

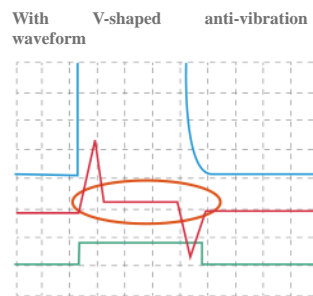

Speed response under initial parameters

Self-tuned speed response

For 30-time inertia ratio

Speed response under initial parameters

Self-tuned speed response
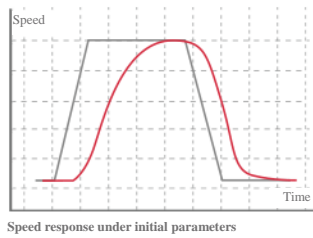
V-shaped anti-vibration control + end vibration control + self-adaptive notch filter

Sweep away the full-band vibration to cure the robot's Parkinson's disease

Without V-shaped anti-vibration waveform

With V-shaped anti-vibration waveform

Position deviation **Torque command** **Positioning completion signal**
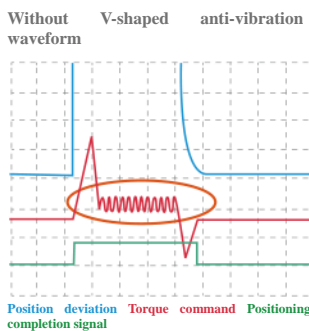
Work waveform of the device without end vibration function
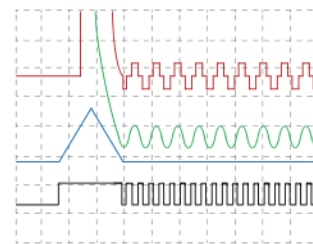
Work waveform of the device added with end vibration control algorithm

Position deviation **Device end vibration** **Position command speed** **P**ositioning completion signal
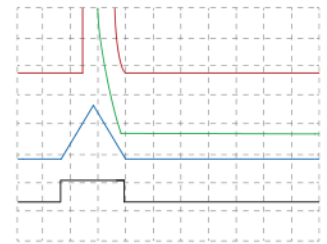
One QR code for one device

Easily confirming the product information, acquiring application data, and more assured to trace the source

WiFi wireless connection

With wireless monitoring, debugging, and upgrade, everything is close at hand

Built-in black box

Monitoring the running state in real time, diagnosing potential risks and conducting timely maintenance

Modular configuration

Cascade expansion of battery holder and band-type brake. Special interface for perfect match

Comprehensive safety protection

▸ The CE-compliant product conforms to relevant safety requirements for devices in the European and US markets.
▸ Independent cooling duct + temperature monitoring system + thickened UV coating can resist harsh environments featured by high temperature, high humidity, and dust.
▸ After passing more than 300 rigorous tests in HASS and HALT experiments, the device can still run stably in various harsh environments.

Multiple safety functions

STO   Safe torque off   SS   Safe stop

SBC   Safe brake control
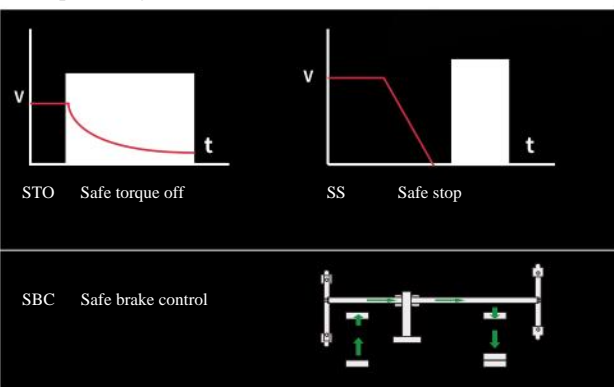
Dynamic braking effectively resolves the galloping problem

Motor stop without dynamic braking

Motor stop with dynamic braking
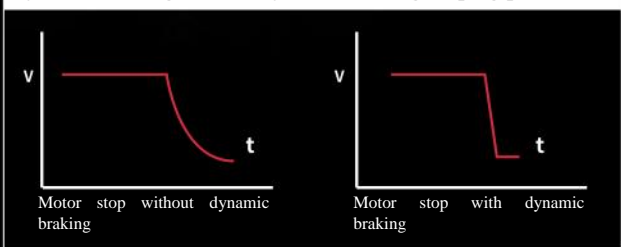
Specifications & models

Specifications & models	200V-grade driver specifications						
Driver power, kw	0.2	0.4	0.75	1.0	1.5	2.0	3.0
Rated current, Arms	2.1	2.8	5.0	6.0	8.4	12.5	18.1
Continuous running current, Arms	2.4	3.2	5.6	7.0	9.7	14.4	20.8
Maximum output current, Arms	6.3	9.8	15	18	30	37.5	54.3
Outline name	Type A	Type A	Type B	Type B	Type C	Type D	Type D
Power source of main circuit	Single-phase AC200V~240 V, -15%~10%		Single/three-phase AC200V~240V, -15%~10%		Three-phase AC200V~240V, -15%~10%		
Power source of control circuit	Single-phase AC200V~240 V, -15%~10%						

Note: 2kW and 3kW are coming soon. Please stay tuned

Technical specifications

Full-function type (F)
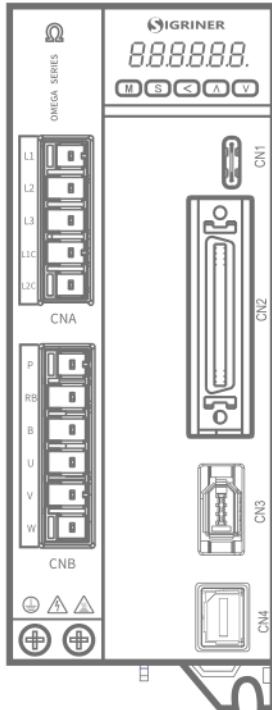
Input power			
200V series	Power source of main circuit	Type A	Single-phase AC200V~240V, -15%~10%; 50/60Hz
		Types B~C	Single/three-phase AC200V~240V, -15%~10%; 50/60Hz
	Power source of control circuit	Types A~C	Single-phase AC200V~240V, -15%~10%; 50/60Hz

Insulation and voltage resistance
Primary — to ground AC1,500 V, withstand voltage for 1 min (leakage triggered current: 20 mA) (200 V series)

Encoder feedback	
Encoder 1	17-digit, 23-digit, and 24-digit serial communication encoders
Encoder 2	16Mbps ABZ encoder

Service conditions	
Operating temperature	-5°C ~ 55°C (not frozen)
Storage temperature	-20°C ~85°C
Service/storage humidity	< 95%RH (no freeze or condensation)
Vibration resistance	Below 5.88 m/s^2, 10 Hz (continuous use at the resonant frequency is not allowed)
Impact resistance	19.6m/s^2
Altitude	Normal use for < 1,000m; please conduct derating service for 1,000m~2,000m

IO interface connector		
Digital signal	Input	10 channels for the general-purpose input, 3 of which are high-speed DIs Select the functions of general-purpose input according to the parameters
	Output	6 channels for the general-purpose input, 2 of which are high-speed DOs Select the functions of general-purpose output according to the parameters
Analog signal	Input	3-channel 16bit A/D, ±10V
	Output	2-channel 12bit D/A, ±10V
Pulse signal	Input	2 Input The maximum differential input is 16Mpps, and the pulse width should be no lower than 62.5ns The maximum photocoupler input is 1Mpps, and the pulse width should be no lower than 2us (5V, 12V and 24V input can be supported respectively)
	Output	4 Output Differential output of phases A, B, and Z Open-collector output of phase Z

Communication function	
USB (Type-C)	Servo debugging, parameter setting and monitoring state can be carried out with the computer connected
Modbus	For 1 of the upper controller: n Communication, Modbus-RTU and ASCII modes are supported, Baud rate of 2,400bps~230,400bps can be set
Wifi (Type-C)	The wireless communication of AP and STA modes are supported through Wifi module
Safety terminal	The terminal corresponding to the safety function
Front panel	5-digit key, 6-digit LED display
Indicator band	It is used for indication of servo state, with blue breathing light for normal servo (non-enabled) or blue indicator normally on (enabled); red breathing light for warning; and red indicator normally on for alarm
Braking resistor	Type A: without built-in brake resistor (for external use only), types B~C : with built-in brake resistor (for external use as well)
Dynamic brake	Types A~C: built-in
Control modes	①Position control ② speed control ③ torque control④ position/speed control ⑤ position/torque control ⑥ speed/torque control and ⑦ full-closed loop control The 7 control modes can be switched according to the parameters

General-purpose	
Automatic adjustment	The load inertia and the gain of automatic settings relative to the rigid settings are inferred in real time by the action command of the upper computer and that issued by the installation and debugging software Ω Master, when the motor is driving.

Frequency division function of feedback pulse	
The number of pulses can be set arbitrarily (not exceeding the number of feedback pulses of the encoder)	

Protection functions	
Hardware errors	Over-voltage, under-voltage, over-speed, overload, over-current, and abnormal encoder etc.
Software errors	Excessive position deviation, frequency division of command pulse and abnormal EEPROM parameters etc.
Built-in black box	Monitoring the running state in real time, diagnosing potential risks and conducting timely maintenance

Absolute type function of infinite rotation	
The function used to set the upper limit of multi-turn data of absolute type encoder	

Position control	
Control input	Deviation counter clear, command pulse inhibitory input, command frequency division and multiplication switching and brake vibration control switching etc.
Control output	Positioning stop etc.

Pulse input	
Maximum command pulse frequency number	1M pulse/s (photocoupler input) 16M pulse/s (differential input)
Input pulse signal form	For photocoupler input or differential input, the input type and model form can be selected according to the parameters (① forward direction/reverse direction; ② phase A/B; ③ command + direction)
Command pulse frequency division and multiplication	Command pulse frequency number × electronic gear ratio ($\frac{1\sim2^{30}}{1\sim2^{30}}$) Processed as position command input However, please use the electronic gear ratio of 1/1,000~8,000 times
Smoothing filter	For command input, delay filter or FIR filter can be selected once

Analog input (position control)	
Torque limit command input	The torque limits in all directions can be set respectively
Torque feedforward input	The torque feedforward can be inputted according to the analog voltage
Brake vibration control	At most 4 controls can be used at the same time
V-shaped brake vibration filter	At most 1 filter can be used at the same time
2-degree-of-freedom	It is available
Load change inhibition control	It is available
Position comparison output function	It is available

Speed control	
Control input	Internal command speed selection 1. internal command speed selection 2. internal command speed selection 3. zero speed clamping etc.
Control output	Speed reached, etc.

Analog input (speed control)	
Speed command input	The speed command can be inputted according to the analog voltage
Torque limit input command	The torque limits in all directions can be set respectively
Torque feedforward input	The torque feedforward can be inputted according to the analog voltage
Internal speed command	8 internal speeds can be switched according to the control input
Soft start/power-off function	0-10s/1,000r/min, speed will be otherwise set for acceleration and deceleration
Zero speed clamping	The internal speed command can be set as 0 according to the zero speed clamping input
2-degree-of-freedom	It is available
Load change inhibition control	It is available
Position comparison output function	It is not available

Torque control	
Control input	Zero speed clamping, torque command symbol input etc.
Control output	Speed reached, etc.
Torque command input	The torque command can be inputted according to the analog voltage
Speed limit function	The speed limit value can be set according to the parameters
2-degree-of-freedom	It is not available
Load change inhibition control	It is not available
Position comparison output function	It is not available

Full-closed loop control	
Control input	Deviation counter clear, command pulse inhibitory input, command frequency division and multiplication switching and brake vibration control switching etc.
Control output	Positioning stop etc.
Pulse input	1M pulse/s (photocoupler input)
Maximum command pulse frequency number	16M pulse/s (differential input)
Input pulse signal form	For photocoupler input or differential input, the input type and model form can be selected according to the parameters (① forward direction/reverse direction; ② phase A/B; ③ command + direction)
Command pulse frequency division and multiplication	Command pulse frequency number × electronic gear ratio ($\frac{1\sim2^{30}}{1\sim2^{30}}$) Processed as position command input However, please use the electronic gear ratio of 1/1,000~8,000 times
Smoothing filter	For command input, delay filter or FIR filter can be selected once
Torque limit command input	The torque limits in all directions can be set respectively
Frequency division and multiplication of encoder 2	1/40 ~ 1,280 times
Setting range	The ratio of encoder feedback pulse (numerator) to external displacement sensor pulse (denominator) can be arbitrarily set when the numerator = 1 ~ 2^{23} and denominator = 1 ~ 2^{23}, but please use it within the above range
Brake vibration control	At most 4 controls can be used at the same time
V-shaped brake vibration filter	It is not available
2-degree-of-freedom	It is not available
Load change inhibition control	It is available
Position comparison output function	It is available

Specifications configuration

Function	Basic type (B)	General-purpose type (G)	Full-function type (F)
USB communication	✓	✓	✓
Modbus	✓	✓	✓
Wifi		✓	✓
Safety functions			✓
Command pulse input	✓	✓	✓
Analog voltage input		✓	✓
Encoder 2			✓
High speed DI (3 channels)		✓	✓
High speed DO (2 channels)		✓	✓
High speed probe		✓	✓
Aerial photography		✓	✓
Gantry function			✓
Black box		✓	✓
Brake module		✓	✓

Interface	Basic type (B)	General-purpose type (G)	Full-function type (F)
CN1	✓	✓	✓
CN2	✓	✓	✓
CN3	✓	✓	✓
CN4			✓
CN5		✓	✓
CN6	✓	✓	✓
CN7	✓	✓	✓
CN8			✓

Note: the Ω6 series servo system is divided into full-function type (F), general-purpose type (G) and basic type (B). For functions not covered, please refer to the full-function type.

Wiring diagram

Wiring diagram of type A driver

STO connector

CN8

CN6

CN7

Upper controller

Communication interface

Multiple servo drivers in parallel

Single-phase power supply

AC220V

Wiring circuit breaker
It is used to protect the power line and cut off the power in case of overcurrent.

EMI filter
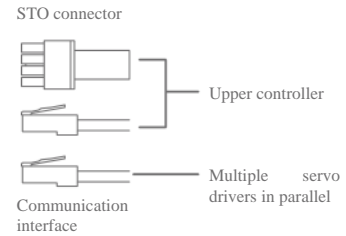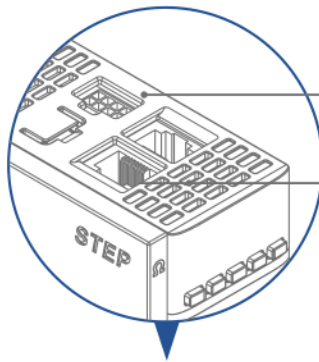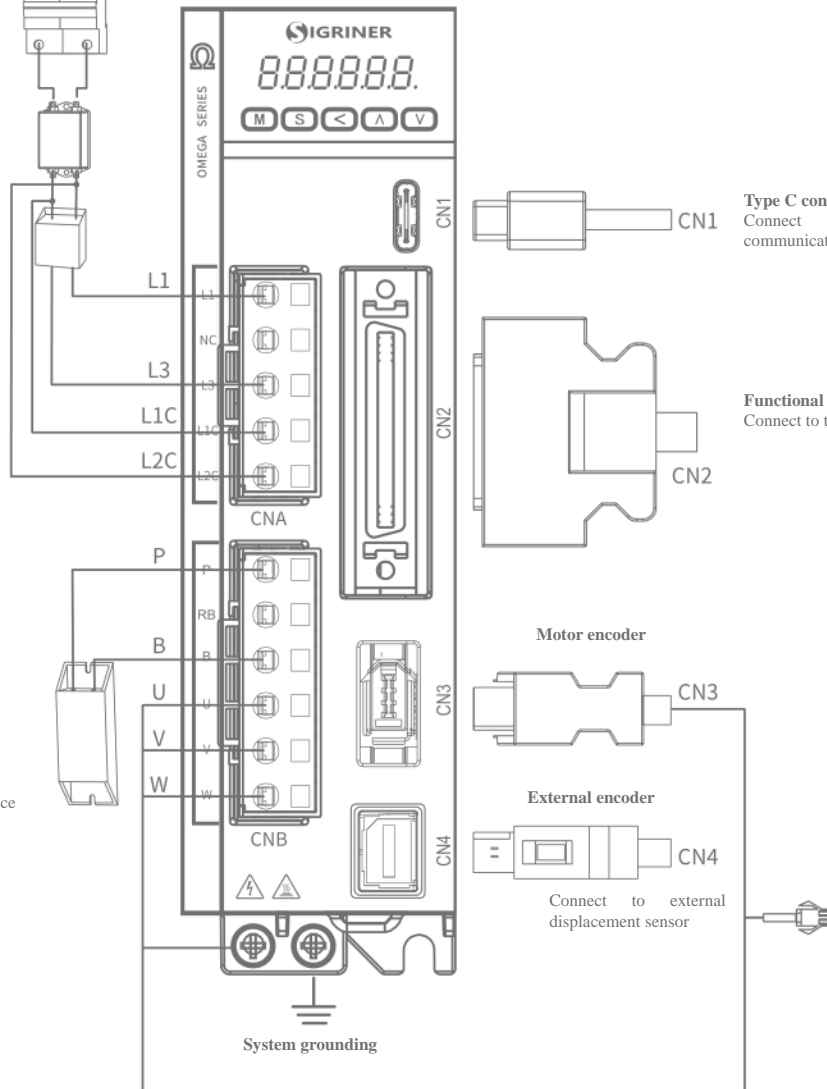Install a noise filter to prevent noise outside the power cord.

Electromagnetic contactor
Turn on/off the servo power. Install a surge suppressor before use.

Upon delivery, L1 and L2C, and L3 and L1C have been short circuited. If the wiring mode recommended by the diagram is adopted, the two short circuited lines above should be removed.

Braking resistor
When using internal brake resistor, short circuit RB and B (RB and B have been short circuited upon delivery); when braking capacity is insufficient, connect external brake resistor between P and B, and remove the short circuited line between RB and B

Servo motor
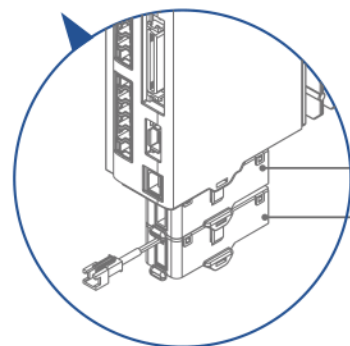It must have a one-to-one correspondence with the motor UWW terminals.

SIGRINER

OMEGA SERIES

M S < ∧ V

L1
NC
L3
L1C
L2C

CNA

P
RB
B
U
V
W

CNB

CN1

CN1

Type C connector
Connect to the PC communication

CN2

CN2

Functional IO terminal
Connect to the upper controller

Motor encoder

CN3

CN3

External encoder

CN4

CN4

Connect to external displacement sensor

System grounding

CN5

Brake module

Battery holder

Wiring diagram

Wiring diagram of types B~C drivers

Three-phase power supply

AC220V

STO connector

CN8

CN6

CN7

Upper controller

Multiple servo drivers in parallel

Communication interface

Wiring circuit breaker
It is used to protect the power line and cut off the power in case of overcurrent.

EMI filter
Install a noise filter to prevent noise outside the power cord.

Electromagnetic contactor
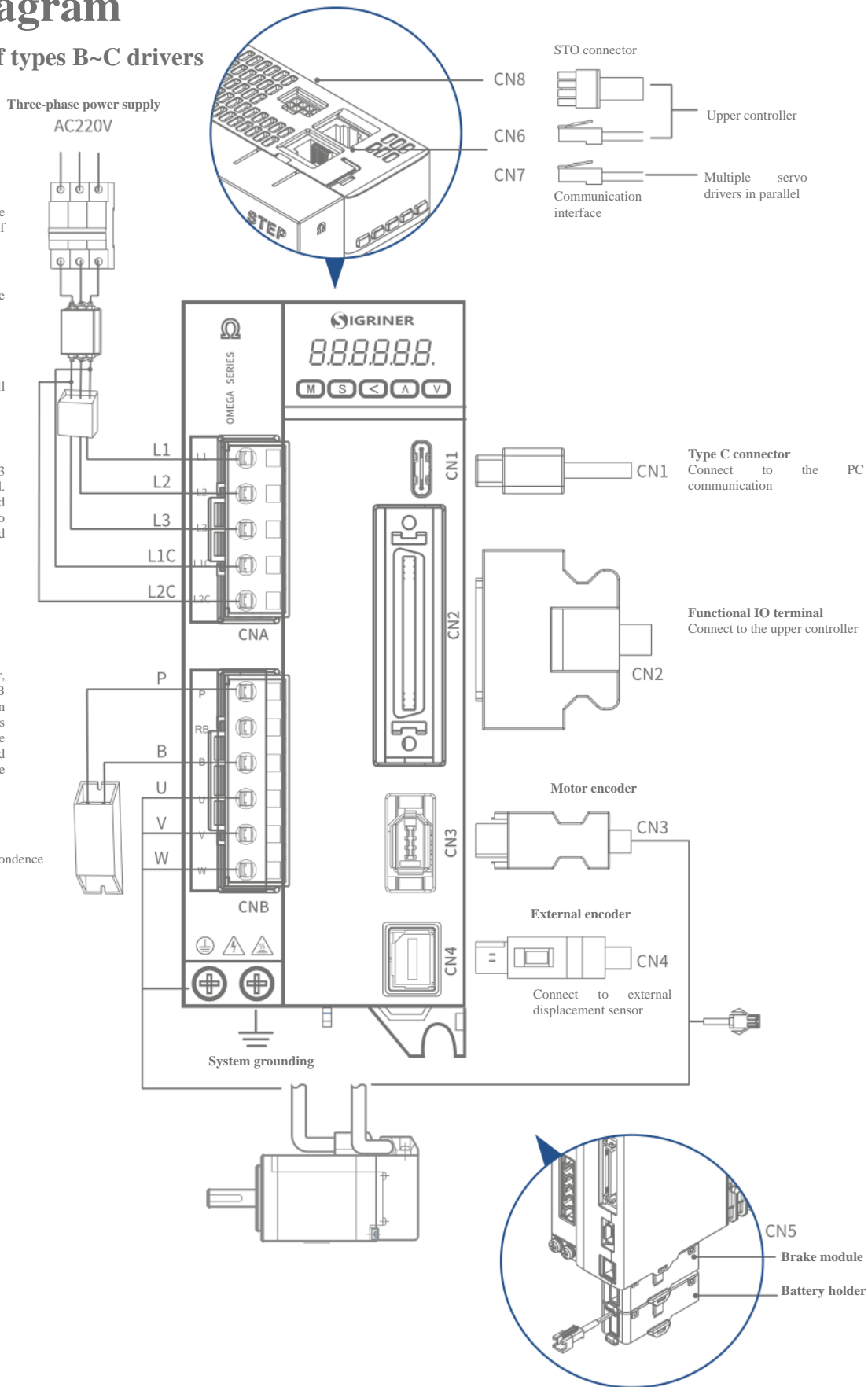Turn on/off the servo power. Install a surge suppressor before use.

Upon delivery, L1 and L2C, and L3 and L1C have been short circuited. If the wiring mode recommended by the diagram is adopted, the two short circuited lines above should

SIGRINER

8.8.8.8.8.8.

M S < ∧ V

OMEGA SERIES

L1

L2

L3

L1C

L2C

CNA

CN1

Type C connector
Connect to the PC communication

CN2

Functional IO terminal
Connect to the upper controller

CN2

Braking resistor
When using internal brake resistor, short circuit RB and B (RB and B have been short circuited upon delivery); when braking capacity is insufficient, connect external brake resistor between P and B, and remove the short circuited line between RB and B

P

RB

B

U

V

W

CNB

Motor encoder

CN3

CN3

External encoder

CN4

Connect to external displacement sensor

Servo motor
It must have a one-to-one correspondence with the motor UWW terminals.
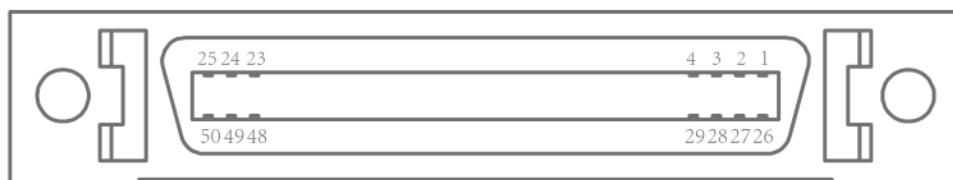
System grounding

CN5

Brake module

Battery holder

Definition of servo system terminal

CN2 wiring:

The CN2 interface on the controller panel is the connection interface for the digital and analog input and output of the driver and communication signal. CN2 is SM50J pin socket. The following is the schematic diagram of panel interface:

| Terminal No.	Definition	Manual Naming	Signal Name	Function Description
1	OPC1	OPC1	Low-speed pulse input signal (The level is 12~24V)	Photocoupler input, pulse (≤ 500KHz) input signal, the external level can be connected is 12~24V
2	OPC2	OPC2	Low-speed pulse direction control (The level is 12~24V)	Photocoupler input, pulse (≤ 500KHz) input signal, the external level can be connected is 12~24V
3	PULS1	PULS1	Low-speed pulse input signal (The level is 5V)	Photocoupler input, pulse (≤ 500KHz) input signal, the external level can be connected is 5V for this pin
4	PULS2	PULS2	Low-speed pulse input circuit signal (The level is GND)	This pin can be connected to the GND signal of external PLC
5	SIGN1	SIGN1	Low-speed pulse direction control (The level is 5V)	Photocoupler input, pulse (≤ 500KHz) input signal, the external level can be connected is 12~24V
6	SIGN2	SIGN2	Low-speed pulse direction control circuit (The level is GND)	This pin can be connected to the GND signal of external PLC
7	COM+	COM+	Photocoupler input common terminal	Analog monitor input, photocoupler input common terminal
8	NOT	NOT	Reverse direction drive inhibitory input	Digital input, reverse direction drive inhibitory input
9	POT	POT	Forward direction drive inhibitory input	Digital input, forward direction drive inhibitory input
10	BRKOFF-	BRKOFF-	External brake release signal -	Digital output, external brake release negative signal
11	BRKOFF+	BRKOFF+	External brake release signal+	Digital output, external brake release positive signal
12	ZSP	ZSP	Zero speed detection signal	Digital output, zero speed detection signal. This pin supports up to 1Mhz high-speed digital signal output
13	GND	GND	GND signal	High-speed pulse input and analog GND signal

Terminal No.	Definition	Manual Naming	Signal Name	Function Description
14	SPR/TRQR/SPL	SPR/TRQR/SPL	Analog input	Analog input 1
15	GND	GND	GND signal	High-speed pulse input and analog GND signal
16	P-ATL/TFQR	P-ATL/TFQR	Analog input	Analog input 2
17	GND	GND	GND signal	High-speed command input and analog GND signal
18	N-ATL	N-ATL	Analog input	Analog input 3
19	CZ	CZ	Phase Z signal of encoder	Open-collector output, phase Z signal of encoder
20	NC	NC	-	Do not connect
21	OA+	OA+	Phase A positive terminal	Phase A positive terminal of pulse frequency division output
22	OA-	OA-	Phase A negative terminal	Phase A negative terminal of pulse frequency division output
23	OZ+	OZ+	Phase Z positive terminal	Phase Z positive terminal of pulse frequency division output
24	OZ-	OZ-	Phase Z negative terminal	Phase Z negative terminal of pulse frequency division output
25	GND	GND	GND signal	High-speed pulse input and analog GND signal
26	VS-SEL1	VS-SEL1	Brake vibration control switching input 1	Digital input, brake vibration control switching input 1
27	GAIN	GAIN	Gain switching input	Digital input, gain switching input
28	DIV1	DIV1	Command frequency division and multiplication switching input 1	Digital input, command frequency division and multiplication switching input 1 This pin supports up to 1MHz high-speed digital signal input
29	SRV-ON	SRV-ON	Servo start input	Digital input, servo start input
30	CL	CL	Deviation counter clear input	Digital input, deviation counter clear input
31	A-CLR	A-CLR	Alarm clear	Digital input, alarm clear
32	C-MODE	C-MODE	Control mode switching input	Digital input, control mode switching input
33	INH	INH	Command pulse inhibitory input	Digital input, command pulse inhibitory input This pin supports up to 1MHz high-speed digital signal input
34	S-RDY-	S-RDY-	Negative terminal of servo preparation output	Digital output, negative terminal of servo preparation output
35	S-RDY+	S-RDY+	Positive terminal of servo preparation output	Digital output, positive terminal of servo preparation output
36	ALM-	ALM-	Alarm output negative terminal	Digital output, alarm output negative terminal
37	ALM+	ALM+	Alarm output positive terminal	Digital output, alarm output positive terminal
38	INP-	INP-	Positioning completion negative terminal	Digital output, positioning completion negative terminal
39	INP+	INP+	Positioning completion positive terminal	Digital output, positioning completion positive terminal
40	TLC	TLC	Signal output in torque limit	Digital output, signal output in torque limit This pin supports up to 1MHz high-speed digital signal output
41	COM-	COM-	Photocoupler input common terminal	Analog monitor input, photocoupler input common terminal
42	IM	IM	Torque analog signal output	Analog monitor output, torque analog signal output
43	SP	SP	Speed analog signal output	Analog monitor output, speed analog signal output
44	PULSH1	PULSH1	Command pulse input 1	Position command pulse input, maximum frequency of 16Mpulses/s (differential input). Special pulse train interface of long-distance driver (when the frequency is 500 k pulse/s ～ 4M pulse/s, please use this interface)
45	PULSH2	PULSH2	Command pulse input 2	
46	SIGNH1	SIGNH1	Command symbol input 1	
47	SIGNH2	SIGNH2	Command symbol input 2	
48	OB+	OB+	Phase B positive terminal	Phase B positive terminal of pulse frequency division output
49	OB-	OB-	Phase B negative terminal	Phase B negative terminal of pulse frequency division output
50	FG	FG	Housing grounding	Connect to the ground terminal inside the servo driver

CN3 wiring:
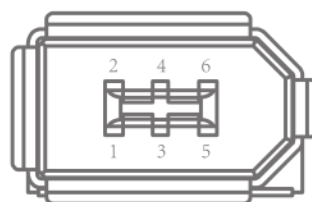
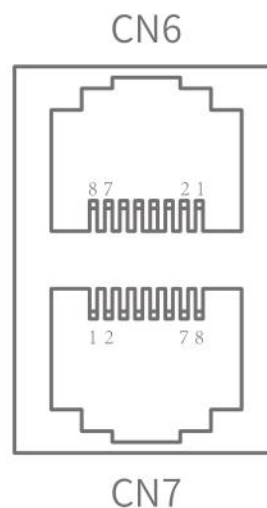| Name	Symbols	Connector pin No.	Contents
Encoder power supply	E5V	1	Encoder power source +5V
	E0V	2	Encoder power source 0V
	NC	3	Do not connect any device
	NC	4	Do not connect any device
Encoder RS485	~~PS~~	5	Encoder communication signal+
	PS	6	Encoder communication signal-
Encoder RS485	FG	Housing	Connect to the ground terminal inside the servo driver

CN4 wiring:
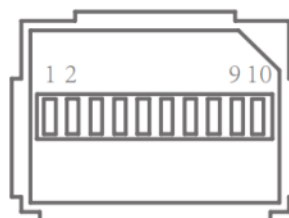
Name	Symbols	Connector pin No.	Contents
Power output	EX5V	1	Encoder power source +5V
	EX0V	2	Encoder power source 0V
	NC	3	Do not connect any device
	NC	4	Do not connect any device
Encoder signal input of phases A, B, and Z	EXA	5	Phase A input signal
	~~EXA~~	6	
	EXB	7	Phase B input signal
	~~EXB~~	8	
	EXZ	9	Phase Z (origin) input signal
	EXZ	10	
Housing grounding	FG	Housing	Connect to the ground terminal inside the servo driver

Note: please be sure to use shielded cables for wiring of CN3 and CN4, and have the terminal shielded layer grounded, so as to improve the interference rejection
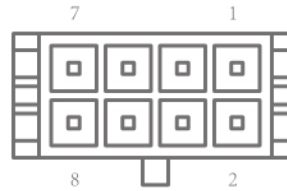
Wiring of CN6 and CN7:

Function definition of pin CN6

Name	Symbols	Connector pin No.	Contents
Synchronous signal input	SYNC_RX+ SYNC_RX-	1 2	Differential signal of gantry synchronization functional input
	NC	3	Do not connect any device
RS485 signal	RS485-	4	RS485 signal data +
	RS485+	5	RS485 signal data -
	NC	6	Do not connect any device
	NC	7	Do not connect any device
Signal grounding	485_GND	8	RS485 signal GND

Function definition of pin CN7

Name	Symbols	Connector pin No.	Contents
Synchronous signal output	SYNC_TX+ SYNC_TX-	1 2	Differential signal of gantry synchronization functional output
Impedance adaptation	RS485_X-	3	It is used to connect the built-in terminal resistor of the driver
RS485 signal	RS485-	4	RS485 signal data +
	RS485+	5	RS485 signal data -
Impedance adaptation	RS485_X+	6	It is used to connect the built-in terminal resistor of the driver
	NC	7	Do not connect any device
Signal grounding	RS485_GND	8	RS485 signal GND

CN8 wiring:

Name	Symbols	Connector pin No.	Contents
-12V	—	1	STO safety bypass power supply from inside the driver
+12V	—	2	
Safety input 1	SF1-	3	STO safety bypass power supply from inside the driver
	SF1+	4	STO request input signal data 1+
Safety input 2	SF2-	5	STO request input signal data 2-
	SF2+	6	STO request input signal data 2+
EDM output	EDM-	7	Monitoring output signal data - of STO safety function failure
	EDM+	8	Monitoring output signal data + of STO safety function failure

That is, the wiring of standard security bypass plug (internal wiring) of the driver upon delivery when no safety function is used and no safety circuit is formed:

Pin No.

CNA wiring:

CNA provides interfaces for the electric power supply and control power supply of the driver.

Name	Symbols	Connector pin No.	Contents
L1	L1	1	L1 connection interface of single-phase/three-phase power supply
L2/NC	L2/NC	2	L2 connection interface of three-phase power supply (NC for type A driver)
L3	L3	3	L3 connection interface of single-phase/three-phase power supply
L1C	L1C	4	Single-phase input of control power supply
L2C	L2C	5	Single-phase input of control power supply

CNB wiring:

CNB provides interfaces for the electric power supply and control power supply of the driver.
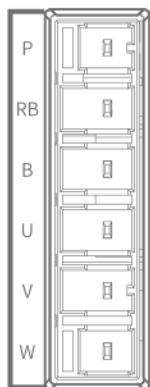
Name	Symbols	Connector pin No.	Contents
P	P	1	Braking resistor+
RB	RB	2	Internal braking resistor. If internal braking resistor is required, B and RB should be short circuited
B	B	3	Interface for external braking resistor
U	U	4	Motor phase U output
V	V	5	Motor phase V output
W	W	6	Motor phase W output

Installation dimension drawing

Outline dimension of type A driver	Unit: mm
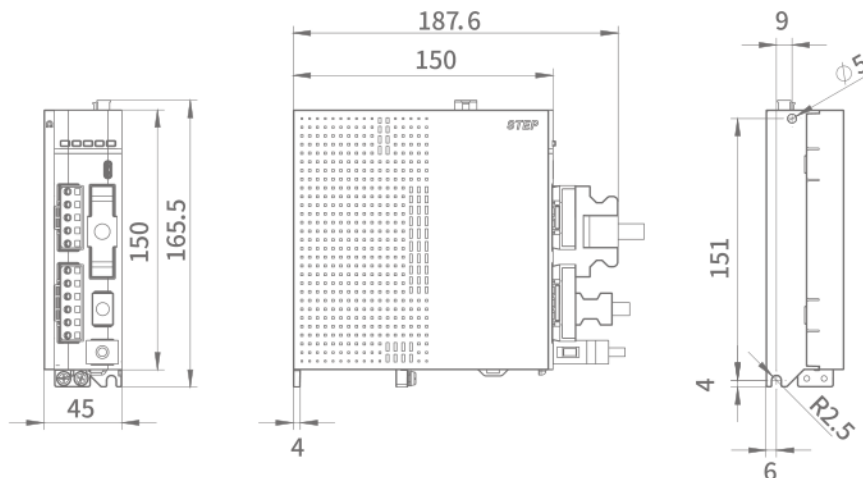
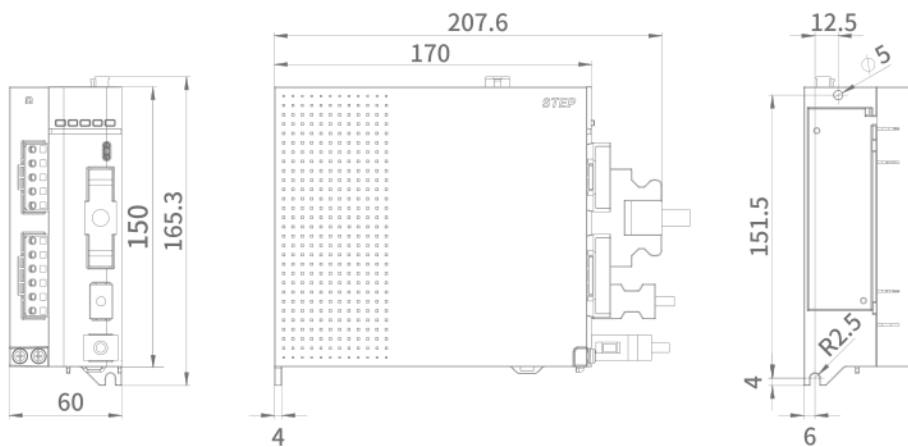| Outline dimension of type B driver	Unit: mm

Outline dimension of type C driver	Unit: mm