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INOVANCE

SV660ND Double-Axis Servo for General Purpose

SM6660ND











Industrial Automation | Elevator | New-energy Vehicle | Industrial Robot | Rail Transit

FORWARD, ALWAYS PROGRESSING

COMPANY INTRODUCTION



2022

About Inovance

Established in 2003, Shenzhen Inovance Technology Co., Ltd. has been a leader in industrial automation control and drive technology in China. With a market value(stock code: SZ.300124) of about 160 billion yuan, it provides optical, mechanical, electrical, hydraulic and pneumatic solutions integrating drive, control, motor and precision machinery.

Headquartered in Shenzhen, Inovance has built production bases in Suzhou, Changzhou, Yueyang, Nanjing and other places, and has branches, resident offices and service centers in more than 20 countries and regions around the world. In 2021, the company achieved a total operating income of 17.943 billion yuan, an increase of 56% over the last year, and an operating profit of 3.573 billion yuan, an increase of 70%. Among more than 20,000 employees, 3,560 are R&D personnel and its R&D investment was 1.685 billion yuan in 2021, a R&D expense rate of 9.39%. By 2021, 2,186 patents and software copyrights have been obtained. Due to continuous large R&D investment, its core technologies have been further improved, consolidating our leading position in industrial automation.

Inovance focuses on core technologies such as motor drive and control, power electronics, industrial network communication, etc, covering not only all kinds of product technologies in information layer, control layer, drive layer, execution layer and sensing layer, but also application and process technologies. Its business includes five fields: industrial automation, elevator electrical equipment, new energy vehicles, industrial robots, and rail transit. Having a deep insight into the needs of manufacturing upgrading, it continues to provide excellent overall solutions and customized industry benchmark products to create more value for customers.

<u>△</u> 67 nationwide offices

400 authorized distributors

1020 service centers

6 inventory cente

2500 sales and service sta



SV660ND Multi-axis Servo System

Benefits





One-click commissioning



Ultra space saving



Easy networking



High precision

SV660ND series multi-axis servo is the high-performance AC servo developed by Inovance. This series of products support 0.4kW and 0.75kW power range, and EtherCAT bus communication. SV660ND has the functions of STO(SIL3), one-button commissioning and adaptive notch, making it easy to use. With MS1 series high-performance servo motor (23-bit absolute encoder), it runs in a quiet and stable manner, and provides more accurate positioning control.

Ultra Space Saving





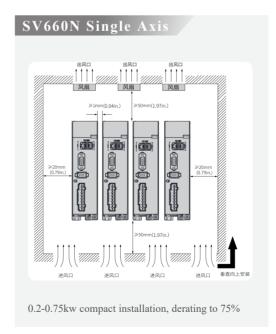
(Installation distancing as 10mm)

Before: 170mm x 90mm

Now: 170mm x 55mm



Zero-distance installation, no derating



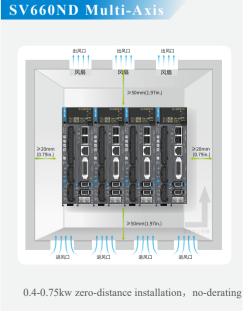




8×750w Axes installation space:

SV660N: 447 mm x 270mm

SV660ND: 340mm x 270mm



O Naming Rules for Servo Drive

<u>SV660 - N</u> <u>D</u> <u>S</u> <u>2R8 I - 7</u>

① Product Series SV660: Servo Drive Series	① Voltage Class S: 220V	⑥ Installation MethodI: substrate installation
② Product Category N: Network Communication	⑤ Rated output current	(7) Customized specifications
③ Axis Number D: Double Axes (2 in 1)	2R8:2.8A 5R5:5.5A	Vacancy: Standard model FS: STO functional safety

O Naming Rules for Motors

MS1 - H1 - 75B 30C B A3 3 1 R - *

① Product Series MS1: MS1 series servo motor MCS1: Servo reducer motor	. 4 Rated Speed (rpm) one letter and two numbers B: ×10	 Shaft connection method Solid, keyed, and threaded hole
② Inertia class	C: ×100 For exmaple: 30C: 3000rpm	Brake, oil sealing[1] 0: without oil seal + without brake
H1: low inertia, small capacity H4: medium inertia, small capacity	⑤ Voltage class (V) B: 220 D: 380	1: With oil seal + without brake 2: Without oil seal + with brake 4: With oil seal + with brake
③ Rated power (W) B: ×10 C: ×100	6 Encoder typeA3: 23bit multi-turn absolute	9 Sub-serial numberR: R series
For example: 75B: 750W	encoder T3: 18bit multi-turn absolute encoder	① Wire type and cooling method Vacancy: terminal type, natural cooling -S [2]: Lead wire type, natural cooling

Note:

[1]: H1 model with 60 stands and 80 stands is equipped without oil sealing as standard; Other models of motors are equipped with oil sealing as standard.

[2]:-S model is limited to 40/60/80 stands.

C Electrical Specifications for Servo Drive

	Sing	gle-phase 220 V servo drive			
	Item	SIZE-A	SIZE-B		
Drive model SV660N	D***I	S2R8	S5R5		
Drive power (kW)		0.4*2	0.75*2		
Maximum applicable	motor capacity (kW)	0.4*2	0.75*2		
Power supply equipm	ent capacity (kVA)	6.0	8.0		
Continuous output cu	rrent (Arms)	2.8	5.5		
Maximum output curr	rent (Arms)	10.1	16.9		
	Continuous input current (Arms)	7.2	12.4		
Main Circuit	Main circuit power supply	Single phase 200V AC~240V AC, -10~+10%, 50Hz/60Hz			
	Electricity loss (W) [1]	21.26	46.52		
Control Circuit	Power Supply	Single phase 200V AC~240V AC, -10~+10%, 50Hz/60Hz			
Control Circuit	Electricity loss (W) [1]		7		
	Resistance value (Ω)	-	25		
	Power (W)	-	80		
Braking Resistor	Minimum external allowable resistance	e (Ω) 20	20		
	Absorbable (J)	54.6	80.3		
	Braking resistance	No internal resistor	Internal and external braking resistor		
Cooling	Air cooling				
Over voltage class	III				

Note: [1]: This refers to the drive loss under rated output current. Please select external braking resistor according to working conditions.

		Three-phase 220 V Servo Drive		
Item		SIZE A	SIZE B	
Drive model SV660NE)***I	S2R8	S5R5	
Drive power (kW)		0.4*2	0.75*2	
Maximum applicable n	notor capacity (kW)	0.4*2	0.75*2	
Power supply equipme	nt capacity (kVA)	6.0	8.0	
Continuous output curr	ent (Arms)	2.8	5.5	
Maximum output curre	nt (Arms)	10.1	16.9	
	Continuous input current (Arms)	4.2 7.5		
	Main circuit power supply	Three phase 200V AC~240V AC, -10~+10%, 50Hz/60Hz		
	Electricity loss (W) [1]	21.26 46.52		
Control circuit	Power supply	Single phase 200V AC~	240V AC,-10~+10%,50Hz/60Hz	
Control circuit	Electricity loss (W) [1]		7	
	Resistance value (Ω)	-	25	
	Power (W)	-	80	
Braking resistor	Minimum external allowable resistance	ee (Ω) 20	20	
	Absorbable (J)	54.6	80.3	
	Brake release function	No internal resistor	Internal and external braking resistor	
Cooling		Air cooling		
Over voltage class		III		

Note: [1]: This refers to the drive loss under rated output current. Please select external braking resistor according to working conditions.

O General Specifications for SV660ND

	It	em	Description		
	Control mode		IIGBT PWM control, sine wave current drive mode 220V, 380V: single-phase or three-phase full-wave rectification		
	Encoder feedbac	k	23-bit multi-turn absolute encoder (the variant without battery can be used as an incremental encoder)		
		Use / storage temperature [1]	$0{\sim}55^{\circ}{\rm C}$ (Derate 10% for every 5°C increase when the ambient temperature is above 45°C./ -20°C \sim +70°C		
Ва		Use/storage humidity	Below 90% RH (no condensation)		
ısic sı		Vibration resistance	4.9 m/s 2		
pecifi		Impact resistance	19.6m/s ²		
Basic specifications	Conditions for	Protection rating	IP20 Note: except for terminal(IP00)		
ns	use	Pollution Degree	PD2		
		Altitude	Max. at 2000m •1000m and below: no need of derated use •1000m-2000m: derating 1% for every 100m rise •Above 2000m: contact Inovance		
		Speed range	1:6000 (The lower limit of the speed range is the condition that the system does not shut down when running at the rated torque load)		
G 1	Performance	Speed loop bandwidth	3kHz		
Speed torque	remonnance	Torque control accuracy(repeatability)	±2%		
control mode		Soft startup time setting	0~65s (acceleration and deceleration can be set)		
	T 1	Speed command input	Network commands come from EtherCAT communication given		
	Input signal Torque command input		Support local mode, local multi-speed		
D '.'	performance	Positioning time	1ms~10ms		
Position control mode	Input signal	Position command	Network commands come from EtherCAT communication given Support local mode		
	Digital input	Input signal function	Eight DIs DI1~DI8: fast DI (rising edge (24V input from low to high) input delay time: 30us, falling edge (24V input from high to low) input delay time: 5us, voltage range:12V~24V).		
Input and output signals	signal	selection	P-OT N-OT HomeSwitch TouchProbe1 TouchProbe2		
	Digital output	Output signal function	Five DOs DO load capacity: 50 mA, voltage range: 5 V to 30 V.		
	signal	selection	S-RDY: servo readyBrake output		
	Over	travel (OT) prevention	Stop instantly at P-OT, N-OT		
		Protections	Overcurrent, overvoltage, undervoltage, overload, main circuit detection abnormal, heatsink overheat, overspeed, encoder abnormal, CPU abnormal, and parameter abnormal.		
	LI	ED monitor	Main power CHARGE indicator, 5-digit LED monitor		
	Vibratio	n suppression	Four notches, 50 Hz to 4000 Hz, two of which are self-adaptive.		
Built-in functions		Background commissioning	g RS232		
		Communication protocol	EtherCAT		
		Multi-slave communication	The maximum number of slave stations is 255		
	function	Axis address setting	No physical knob, set 0-255 by software		
		Function	Status display, user parameter setting, monitor display, alarm tracing display, JOG running and auto-tuning operation, speed, and torque command signal observation		
		Other	Gain adjustment, alarm record, JOG running		

C EtherCAT Communication Specifications

	Item	Specifications
	Communication protocol	EtherCAT protocol
	Service supported	CoE (PDO, SDO)
	Synchronization mode	DC- distributed clock
	Physical layer	100BASE-TX
	Baud rate	100 Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topological structure	Ring topology and linear topology
Basic performance	Transmission medium	Cat5e LAN cable or better
of slave station	Transmission distance	Less than 100 m between two nodes (good environment, good quality of cables)
	Number of slaves	65535 slaves are supported as defined in the protocol, but no more than 100 slaves are supported in actual use.
	EtherCAT frame length	44 to 1498 bytes
	Process data	Single Ethernet frame up to 1486 bytes.
	Synchronization jitter of two slaves	< lus
	Refresh time	About 30 μs for 1000 on-off inputs & outputs. About 100 μs for 100 servo drive shafts. The refresh time varies with the interface
	Bit error rate	10 ⁻¹⁰ Ethernet standard
	FMMU	8
	Storage synchronization management unit	8
Configuration unit	Process data RAM	8KB
	distributed clock	64 bit
	e2prom capacity	32kbit

O Selection List for MS1 Servo Motors

Servo Drive (SV660ND****I)			****I)		Servo Motor		
Model	Voltage class(V)	Size	H01.10 number	Motor model without brake	Motor model with brake	Frame	Capacity(kW)
			MS1H1(n _N =	3000rpm,n _{max} =6000rpm) series	rating specifications		
S2R8	Single/three phase 220	Α	00003	MS1H1-40B30CB- A331R	MS1H1-40B30CB- A334R	60	0.4
S5R5	Single/three phase 220	D	00005	MS1H1-55B30CB- A331R		80	0.55
S5R5	Single/three phase 220	В	00005	MS1H1-75B30CB- A331R	MS1H1-75B30CB- A334R	80	0.75
			MS1H4(n _N =	=3000rpm,n _{max} =6000rpm) series	s rating specifications		
S2R8	Single/three phase 220	Α	00003	MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334R	60	0.4
S5R5	Single/three phase 220	D	00005	MS1H4-55B30CB-A331R		80	0.55
S5R5	Single/three phase	В	00005	MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334R	80	0.75

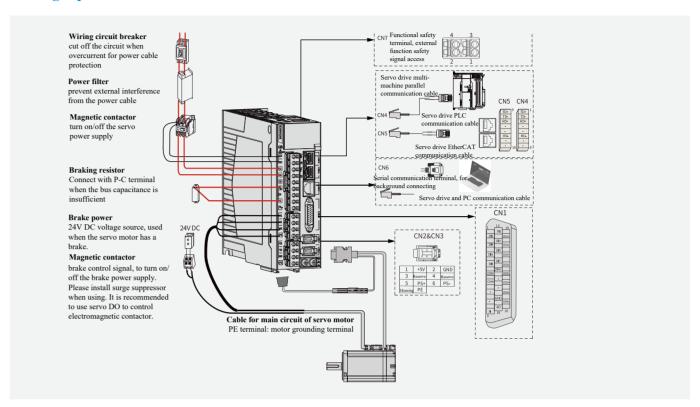
O Selection List for MCS1 Servo Reducer Motors

	Servo Drive (SV	660ND*	***I)			Servo Reducer Motor				
Model	Voltage class(V)	SIZE	H01.10	Non-brake motor model		Braking motor	Frame	Rated power(kW)	Voltage(V)	
					60F/70Y053-A331R	60F/70Y053-A334R		0.4	220	
S2R8	Single/three	A	00003	MCS1H4- 40B30CB	60F/70Y103-A331R	60F/70Y103-A334R	60			
	phase 220				60F/70Y255-A331R 60F/70Y255-A334R					
					90F/90Y053-A331R	90F/90Y053-A334R				
S5R5	Single/three	В	00005	00005	MCS1H4- 7530CB	90F/90Y103-A331R	90F/90Y103-A334R	80	0.75	220
	phase 220				90F/90Y255-A331R	90F/90Y255-A334R				

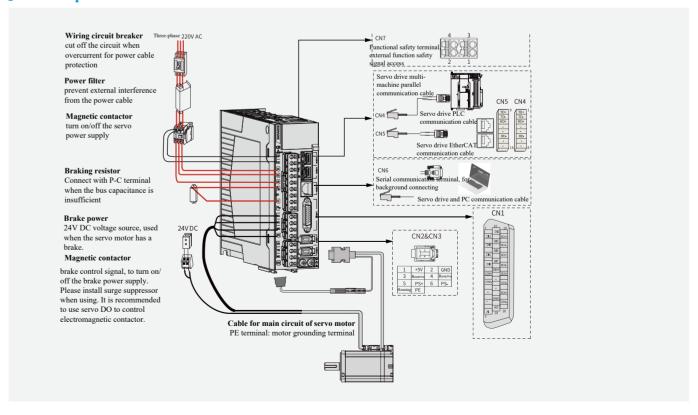
	Servo Drive		Servo Motor	S	ervo Reducer Motor	
	Events and			Non-braking mo	tor model:	
	Description of the second		Non-braking motor model:	Magazza	60F/70Y053-A331R	
			MS1H1-40B30CB- A331R	MCS1H4- 40B30CB	60F/70Y103-A331R	
SI				40D30CD	60F/70Y255-A331R	
ZE A	SV660NDS2R8	400W	Braking model: MS1H1-40B30CB- A334R	Braking model: 60F/70Y053-A334R 60F/70Y103-A334R 60F/70Y255-A334R		
	avecovo			Non-braking motor model:		
		0	Non-braking motor model:	MCS1H4- 7530CB	90F/90Y053-A331R	
			MS1H1-55B30CB- A331R MS1H1-75B30CB- A331R		90F/90Y103-A331R	
				/330CB	90F/90Y255-A331R	
SIZE B	SV660NDS5R5	550W, 750W	Braking model: MS1H4-75B30CB-A334R	Braking model: 90F/90Y053-A3 90F/90Y103-A3 90F/90Y255-A3	34R 34R	

O System Connection Diagram

Single-phrase Connection for Double-axis Servo



Three-phase Connection



O Terminal Definition for Double-Axis Servo

CN1 terminal pin signal

Sig	gnal	Default function	Pin No.	Terminal function
	DI1	II P-OT		Axis 1 positive limit switch
	DI2	P-OT	1	Axis 2 positive limit switch
	DI3	N-OT	11	Axis 1 negative limit switch
	DI4	N-OT	2	Axis 2 negative limit switch
	DI5	HomeSwitch	12	Axis 1 home switch
	DI6	HomeSwitch	3	Axis 2 home switch
	DI7	TouchProbe2	13	Axis 1 Probe 1
	DI8	TouchProbe1	4	Axis 2 Probe 1
		+24V	14	Internal 24 V power supply, voltage range
	COM-		6	+20-28V, max. output current 150mA
G		COM+	5	DI input common terminal
General	DO1+	S-RDY+	19	Axis 1 Servo drive ready
al	DO1-	S-RDY-	20	Axis i Servo drive ready
	DO2+	ALM+	21	Axis 2 Servo drive ready
	DO2-	ALM-	22	Axis 2 Servo drive ready
	DO3+	BK+	23	Axis 1 Brake output
	DO3-	BK-	24	Axis 1 brake output
	DO4+	BK+	25	Axis 2 Brake output
	DO4- BK-		26	Axis 2 Diake output
	AI		9	Analog input (voltage type)
		AO	18	Analog output
		GND	17	Analog input or output common terminal

CN2, CN3 encoder terminal

Pin No.	Definition	Description
1	+5V	F\/ 1
2	GND	5V power supply
3	Reserved	-
4	Reserved	-
5	PS+	n 1 · 1
6	PS-	Encoder signal
Housing	PE	Screening

Main circuit terminal definition (SIZE A/SIZE B)

Terminal symbol	Terminal description
L1C,	Control circuit power input terminals
L2C L1, L2, L3	Main circuit power input terminals
$P\oplus,D,C^{[1]}$	Terminals for external regenerative resistor (connect the braking resistor between P^{\oplus} and C after removing th short tab between P^{\oplus} and D)
P⊕, NΘ	Bus terminals of servo drive
U, V, W	Servo motor connection terminals
PE	Motor grounding terminal



CN4&CN5 EtherCAT terminal

Pin No.	Name	Description
1	TD+	data sending+
2	TD-	data sending-
3	RD+	data received +
4,5	-	-
6	RD-	data received -
7,8	-	-
9	TD+	data sending+
10	TD-	data sending-
11	RD+	data received +
12,13	-	-
14	RD-	data received -
15, 16	-	-

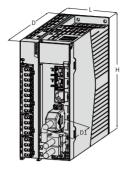
CN6 terminal

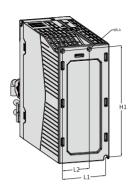
Pin No.	Description
1~5	-
6	RS232-TXD
7	RS232-RXD
8	GND

CN7 STO terminal

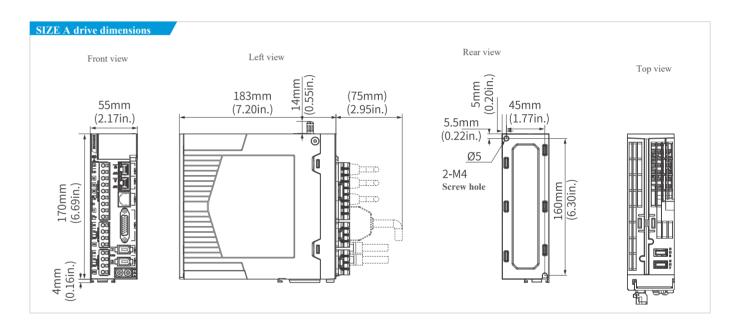
Pin No.	Definition	Description
1	COM-	STO reference ground
2	24V	24V power supply
3	STO1	STO1 control input
4	STO2	STO2 control input

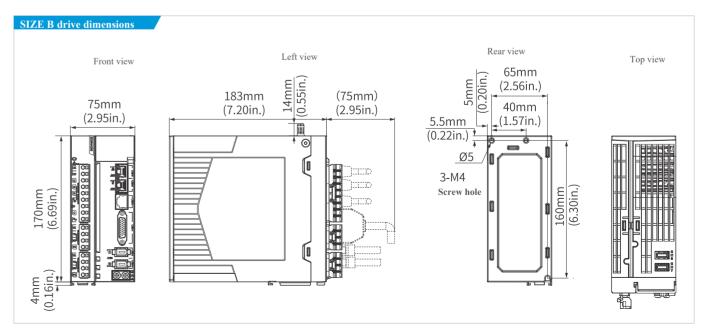
O Wiring Diagram for Double-Axis Control





Structur	re L (mm)	H (mm)	D (mm)	L1 (mm)	L2 (mm)	H1 (mm)	D1 (mm)		Tightening torque(Nm)	
SIZE A	55 (2.17)	170 (6.69)	183 (7.20)	45 (1.77)	-	160 (6.30)	75 (2.95)	2-M4	1.2	1.4
SIZE B	75 (2.95)	170 (6.69)	183 (7.20)	65 (2.56)	40 (1.57)	160 (6.30)	75 (2.95)	3-M4	1.2	1.8





O Power Cable

Motor model			Cable model	Length (mm)	Tolerance (mm)	Cable Appearance Diagram
			S6-L-M107-3.0	3000	(-30,30)	55±5mm
			S6-L-M107-5.0	5000	(-30,50)	100±10mm
	Front		S6-L-M107-10.0	10000	(-30,80)	L±T
	outlet		S6-L-B107-3.0	3000	(-30,30)	
		Braking	S6-L-B107-5.0	5000	(-30,50)	55±5mm 200±10mm
MS1H1/ MS1H4			S6-L-B107-10.0	10000	(-30,80)	L±T
terminal motor			S6-L-M108-3.0	3000	(-30,30)	55±5mm
		Non- braking	S6-L-M108-5.0	5000	(-30,50)	100±10mm
	Рази		S6-L-M108-10.0	10000	(-30,80)	L±T
	outlet	Rear putlet Braking	S6-L-B108-3.0	3000	(-30,30)	55±5mm
			S6-L-B108-5.0	5000	(-30,50)	200±10mm
			S6-L-B108-10.0	10000	(-30,80)	L±Τ
			S6-L-M100-3.0	3000	(-30,30)	<u>→</u> 55±5mm
		Non- braking	S6-L-M100-5.0	5000	(-30,50)	30mm 100±10mm
MS1H1/ MS1H4 lead	/		S6-L-M100-10.0	10000	(-30,80)	L±T
wire (- S) motor	/	Braking	S6-L-B100-3.0	3000	(-30,30)	→ + + 55±5mm
			S6-L-B100-5.0	5000	(-30,50)	30mm 200±10mm
			S6-L-B100-10.0	10000	(-30,80)	L±T

C Encoder Cable

Motor model	Cabl	e category	Cable model	Length (mm)	Tolerance (mm)	Cable Appearance Diagram
			S6-L-P114-3.0	3000	(-30,30)	55±5mm - -
		Single-turn absolute encoder	S6-L-P114-5.0	5000	(-30,50)	A port B port
	Front		S6-L-P114-5.0	10000	(-30,80)	L±Τ
	outlet		S6-L-P124-3.0	3000	(-30,30)	55±5mm
MS1H1/		Multi-turn absolute encoder	S6-L-P124-5.0	5000	(-30,50)	Cport A port - 200±10mm B port
MS1H4 terminal motor			S6-L-P124-10.0	10000	(-30,80)	L±T
			S6-L-P115-3.0	3000	(-30,30)	55±5mm +++
	Rear outlet		S6-L-P115-5.0	5000	(-30,50)	A port B port
			S6-L-P115-10.0	10000	(-30,80)	L±T
		Multi-turn absolute encoder	S6-L-P125-3.0	3000	(-30,30)	55±5mm -+
			S6-L-P125-5.0	5000	(-30,50)	A port 200±10mm B port
			S6-L-P125-10.0	10000	(-30,80)	L±T
		Single-turn absolute encoder	S6-L-P110-3.0	3000	(-30,30)	
			S6-L-P110-5.0	5000	(-30,50)	L±T
MS1H1/ MS1H4 lead wire (- S) motor	/		S6-L-P110-10.0	10000	(-30,80)	
	/		S6-L-P120-3.0	3000	(-30,30)	
		Multi-turn absolute encoder	S6-L-P120-5.0	5000	(-30,50)	200±10mm
			S6-L-P120-10.0	10000	(-30,80)	L±T

C Communication Cable

Cable category	Cable model	Length (mm)	Tolerance (mm)	Appearance diagram of cable
PC Communication cable for servo drive	S6-L-T00-3.0	3000	(-30,30)	L+T
Servo drive multi- machine parallel communication cable	S6-L-T01-0.3	300	(-10,10)	L±T
Communication cable between servo drive and upper computer	S6-L-T02-2.0	2000	(-20,20)	L±T

C Connector Kit

Category	Model	Appearance diagram
Battery kit	S6-C9A	Appearance diagram of connector kit
CN1 terminal (DB26)	S6-C74	1 — 19
Connector kit for MS1H1 leadwire (-S) motor	S6-C26	6Pin Stand 9Pin Pin stand Insulated Crimping terminal tubing