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SV660ND Series Servo Drive

Selection Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code PS00005789A05

Preface

Introduction

Thank you for purchasing the SV660ND series servo drive developed by Inovance.

The SV660ND AC servo drive is a high performance multi-drive product. It comes with a capacity of 0.4 kW and 0.75 kW, as well as support for EtherCAT bus communication. It features STO (SIL3) one-key tuning and adaptive notch filters, which allow for easy use of the product. It offers quiet and stable operation and accurate position control by working with an MS1 series high-response servo motor with a 23-bit-turn absolute encoder.

Its high integration, bus support, small size, easy commissioning, and environment robustness make it a perfect match for equipment of cell phone manufacturing, robots, machine tools, lithium batteries, silicon semiconductors, touchscreens, and LEDs.

This manual provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.

- The drawings in the user guide are shown for illustration only and may be different from the product. Actual products may vary.
- The instructions are subject to changes due to product upgrade, specification modifications, and efforts to increase the accuracy and convenience of the user guide.

More information

Document name	Document code	Description
SV660ND Series Servo Drive installation Guide	PS00005790	Provides instructions on product installation, including installation steps, mechanical installation, and electrical installation.
SV660ND Series Servo Drive Hardware Guide	PS00005125	Provides electrical design guidance of the equipment, description of terminals, required certificates and standards, and solutions to common EMC problems.
SV660ND Series Servo Drive Commissioning Guide	PS00006000	Describes the parameters, troubleshooting, operating panel, commissioning software, and commissioning flow and steps.
SV660ND Series Servo Drive Function Guide	PS00005950	Introduces product functions and parameters, including function overview, basic servo functions, adjustment and parameter descriptions.
SV660ND Series Servo Drive Communication Guide	PS00006002	Introduces the functions and parameters of the servo drive, including EtherCAT communication configuration, parameter description, and communication application cases.
SV660ND Series Servo Drive Troubleshooting Guide	PS00006001	Introduces faults and fault levels, the troubleshooting process, warning codes, and fault codes.
SV660ND Series Servo Drive Maintenance Guide	PS00005791	Provides instructions on maintenance and repair of the equipment.
SV660ND Series Servo Drive Safety Guide	PS00005950	Introduces the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.

Document name	Document code	Description
SV660ND Series Servo Drive User Guide	PS00005852	Describes model selection, installation, wiring, commissioning, functions, troubleshooting, and parameters.
SV660ND Series Servo Drive Selection Guide	PS00005789	Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.

Revision history

Date	Version	Description
2024-11	A05	• Made minor corrections. • Updated parameters related to surge current • Deleted the mapping function and speed loop bandwidth from the technical specifications.
2024-09	A04	• Updated the wiring of the motor PE cable. • Updated the list of applicable cables.
2024-03	A03	• Updated the MS1 Motor Series chapter. • Updated the recommended circuit breaker models in the Circuit Breaker topic. • Updated the recommended fuse models in the Fuse topic. • Updated the Suzhou address and added the My Inovance QR code on the cover page.
2023-01	A02	Made minor corrections.
2022-12	A01	• Updated the List of Models chapter. • Updated the driver power (kW) and max. applicable motor capacity (kW) in electrical specifications. • Updated the information about MS1-R motor selection. • Added the information about the S6-C74 connector kit to the Applicable Cables topic. • Added the Service and Support topic.
2022-05	A00	First issue.

Access to the guide

This guide is not delivered with the product. You can obtain the PDF version in the following methods:

- Perform keyword searching under Service and Support at *http://www.inovance.com*.
- Scan the QR code on the equipment to acquire more information.
- Scan the QR code below to install the My Inovance app, where you can search for and download user guides.

Warranty disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance fees will be charged after the warranty expires.

Within the warranty period, maintenance fees will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see *Product Warranty Card*.

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1 Model Selection List

MS1 series servo motors

Servo drive (SV660ND****I)				Servo motor			
Model	Voltage class (V)	Size	Servo drive code	Brake-less motor model	Brake motor model	Frame (mm)	Capacity (kW)
	Ratings of MS1H1 (n_N=3000 rpm, n_{max} =6000 rpm) series motors						
S2R8	Single-phase/ Three-phase 220 V	A	00003	MS1H1-40B30CB- A331R	MS1H1-40B30CB- A334R	60	0.4
S5R5	Single-phase/ Three-phase 220 V	B	00005	MS1H1-55B30CB- A331R	-	80	0.55
S5R5	Single-phase/ Three-phase 220 V		00005	MS1H1-75B30CB- A331R	MS1H1-75B30CB- A334R	80	0.75
	MS1H4 (n_N=3000rpm, n_{max} =6000rpm) ratings						
S2R8	Single-phase/ Three-phase 220 V	A	00003	MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334R	60	0.4
S5R5	Single-phase/ Three-phase 220 V	B	00005	MS1H4-55B30CB-A331R	-	80	0.55
S5R5			00005	MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334R	80	0.75

MCS1 series reducer motors

Servo drive (SV660ND****I)				Servo gear motor					
Model	Voltage class (V)	Size	H01.10 No.	Brake-less motor model		Brake motor model	Frame (mm)	Rated power (kW)	Voltage class (V)
S2R8	Single-phase/ Three-phase 220 V	A	00003	MCS1H4-40B30CB	60F/70Y053-A331R	60F/70Y053-A334R	60	0.4	220
					60F/70Y103-A331R	60F/70Y103-A334R			
					60F/70Y255-A331R	60F/70Y255-A334R			
S5R5	Single-phase/ Three-phase 220 V	B	00005	MCS1H4-75B30CB	90F/90Y053-A331R	90F/90Y053-A334R	80	0.75	220
					90F/90Y103-A331R	90F/90Y103-A334R			
					90F/90Y255-A331R	90F/90Y255-A334R			

2 SV660ND Series

2.1 Product Information

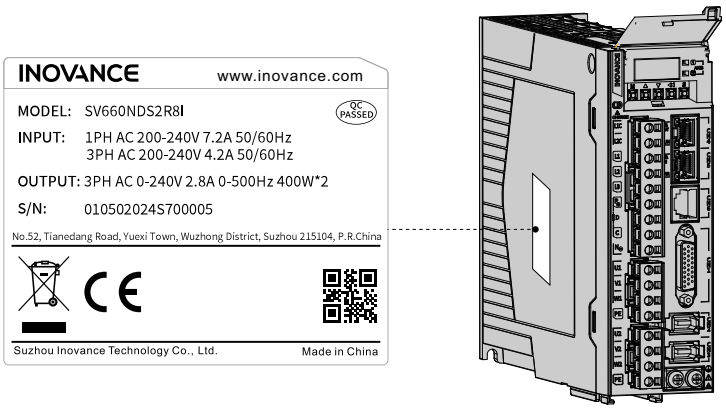
2.1.1 Model and Nameplate

Model description

SV660 ① N ② D ③ S ④ 2R8 ⑤ I ⑥ - * ⑦

① **Product series** SV660: SV660 series servo drive	④ **Voltage class** S: 220 V	⑥ **Installation method** I: Installed on a base plate
② **Product type** N: Network type	⑤ **Rated output current** 2R8: 2.8 A 5R5: 5.5 A	⑦ **Non-standard functions** Blank: Standard FS: STO
③ **Number of axes** D: Dual-axis (two-in-one)		

Nameplate description



Encryption of the production serial number

01050202 4 S 7 00001
① ② ③ ④ ⑤

① **Internal code** Product material code	③ **Year** A: 2010 ... R: 2023 S: 2024 ... Note: I, L, O, and Q are skipped.	⑤ **Lot number** 00001: 1st in current month 00002: 2nd in current month 00003: 3rd in current month ... Range: 00001 to 99999
② **Manufacturer code** 4: Suzhou Inovance	④ **Month** 1: January 2: February ... A: October B: November C: December	

Example: S/N 010502024S700001 indicates the drive is manufactured in July, 2024.

2.1.2 Components

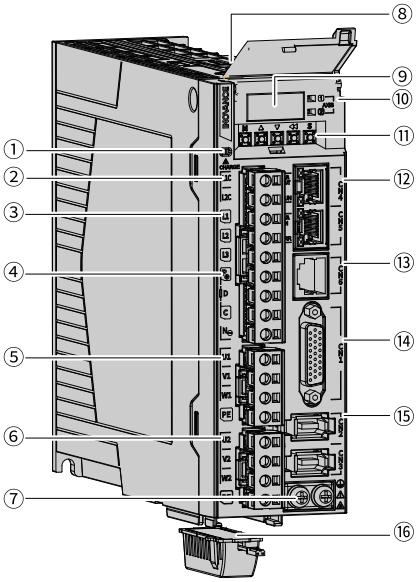


Figure 2-1 Servo drive components

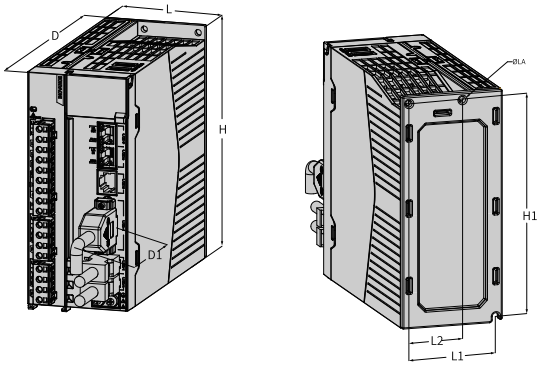
Table 2–1 Description of servo drive components

No.	Component	Description
①	CHARGE (bus voltage indicator)	Indicates that electric charges are present in the bus capacitor. When the indicator lights up, residual voltage may still be present in the internal capacitor of the servo unit, even if the power supply of the main circuit is switched off. To prevent electric shocks, do not touch the power supply terminals when this indicator lights up.
②	L1C, L2C (control circuit power input terminals)	Input the control circuit power supply according to the rated voltage class on the nameplate.
③	L1, L2, L3 (main circuit power input terminals)	The power input terminals for a three-phase 220 V servo drive. Input the main circuit power supply according to the rated voltage class on the nameplate.
④	P⊕, D, and C (terminals for connecting an external braking resistor)[1]	Remove the jumper bar between terminals P⊕ and D before connecting an external braking resistor between terminals P⊕ and C.
	P ⊕ , N ⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
⑤	U1, V1, W1 (terminals for connecting to the servo motor)	Connected to the U, V, and W phases of motor 1.
⑥	U2, V2, W2 (terminals for connecting to the servo motor)	Connected to the U, V, and W phases of motor 2.
⑦	Grounding terminal	Connected to the grounding terminal of the motor or power supply for grounding purpose.
⑧	CN7 (STO terminal[2])	Connected to external functional safety signals for functional safety purpose.
⑨	LED display	A 5-digit 8-segment LED display that shows the operation state and parameter setting of the servo system.
⑩	Axis status indicator	Flashing: Axis is faulty. On: The panel is in operation. Off: The panel is idle.
⑪	Keys	M: Press: Switches parameter numbers in sequence. Press and hold: Switches axes. ▲: Increases the value of the blinking bit. ▲: Decreases the value of the blinking bit. ◀◀ : Shifts the blinking bit leftwards (Press and hold: Move to the next page when the displayed number exceeds five digits). S: Saves modifications and enters the next menu.
⑫	CN4, CN5 (EtherCAT communication terminals)	CN5 (IN): Connected to the master or the last slave. CN4 (OUT): Connected to the next slave.
⑬	CN6 (communication terminal)	Connected to the RS232 communication instruction device.
⑭	CN1 (control terminal)	Used by reference input signals and other I/O signals.
⑮	CN2, CN3 (encoder connection terminals)	CN2: Connected to the encoder terminal of motor 1. CN3: Connected to the encoder terminal of motor 2.
⑯	Battery box location	Holds the battery box of the absolute encoder.

Note

- [1]: The built-in braking resistor or jumper bar is not available in model S2R8. If an external braking resistor is required, connect it between terminals P ⊕ and C.
- [2]: The STO terminal is applicable only to non-standard models (-FS).

2.1.3 Product Dimensions



Size	L	H	D	L1	L2	H1	D1	Φ LA	Recommended tightening torque	Weight
	Unit: mm (in.)								Unit: N·m	Unit: kg
A	55 (2.17)	170 (6.69)	183 (7.20)	45 (1.77)	-	160 (6.30)	75 (2.95)	2 x M4	1.2	1.4
B	75 (2.95)	170 (6.69)	183 (7.20)	65 (2.56)	40 (1.57)	160 (6.30)	75 (2.95)	3 x M4	1.2	1.8

2.2 Specifications

2.2.1 Electrical Specifications

Single-phase 220 V drive

Item	Size A	Size B
Drive model SV660ND***I	S2R8	S5R5
Power of the drive (kW)	0.4 x 2	0.75 x 2
Max. applicable motor capacity (kW)	0.4 x 2	0.75 x 2
Power supply equipment capacity (kVA)	6.0	8.0
Continuous output current (A)	2.8	5.5
Maximum output current (A)	10.1	16.9

Item		Size A	Size B
Main circuit	Continuous input current (A)	7.2	12.4
	Main circuit power supply	Single-phase 200 VAC–240 VAC, -10 to +10%, 50 Hz/60Hz	
	Energy Loss (W)[1]	21.26	46.52
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10 to +10%, 50 Hz/60Hz	
	Energy loss (W)	7	
Braking resistor	Resistance (Ω)	-	25
	Resistor power (W)	-	80
	Minimum resistance of external resistor (Ω)	20	20
	Maximum braking energy absorbed by capacitor (J)	54.6	80.3
	Braking resistor	No support for built-in resistor	Built-in and external resistor is supported
Cooling method		Air cooling	
Overvoltage category		III	
Maximum input surge current (A)		18.65	9.325
3 τ (ms) (3 x RC time constant)		46.8	163.2

Three-phase 220 V drives

Item		Size A	Size B
Drive model SV660ND***I		S2R8	S5R5
Power of the drive (kW)		0.4 x 2	0.75 x 2
Max. applicable motor capacity (kW)		0.4 x 2	0.75 x 2
Power supply equipment capacity (kVA)		6.0	8.0
Continuous output current (A)		2.8	5.5
Maximum output current (A)		10.1	16.9
Main circuit	Continuous input current (A)	4.2	7.5
	Main circuit power supply	Three-phase 200 VAC–240 VAC, -10 to +10%, 50 Hz/60 Hz	
	Energy loss (W)[1]	21.26	46.52
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10 to +10%, 50 Hz/60Hz	
	Energy loss (W)	7	

Item		Size A	Size B
Braking resistor	Resistance (Ω)	-	25
	Resistor power (W)	-	80
	Minimum resistance of external resistor (Ω)	20	20
	Maximum braking energy absorbed by capacitor (J)	54.6	80.3
	Braking resistor	No support for built-in resistor	Built-in and external resistor is supported
Cooling method		Air cooling	
Overvoltage category		III	
Maximum input surge current (A)		18.65	9.325
3 τ (ms) (3 x RC time constant)		46.8	163.2

Note

- [1]: Main circuit energy loss refers to the energy loss under rated output current of the servo drive.
- Select the external regenerative resistor according to actual operating conditions.

2.2.2 Technical Specifications

Item			Description
Basic specifications	Control mode		IGBT PWM control, sine wave current drive mode 220 V, 380 V: Single-phase/Three-phase full bridge rectification
	Encoder feedback		23-bit multi-turn absolute encoder, which can be used as an incremental encoder in absence of the battery
	Conditions for use	Ambient/Storage temperature [1]	0℃ to +55℃ (If the ambient temperature exceeds 45℃, derate by 10% for every additional 5℃)/-20℃ to +70℃
		Operating/Storage humidity	< 90% RH (without condensation)
		Vibration resistance	4.9m/s ^{2}
		Impact resistance	19.6m/s ^{2}
		IP rating	IP20 Note: Terminals are excluded, which have an IP rating of IP00.
		Pollution degree	PD2
		Altitude	The maximum altitude is 2000 m. • 1,000 m and below: Derating is not required. • For altitudes above 1,000 m, derate 1% for every additional 100 m. • If the altitude exceeds 2,000 m, contact Inovance
Speed/ Torque control mode	Performance	Speed control range	1:6000 (Under the rated torque load, the servo drive keeps running as long as the lower limit of the speed control range is not exceeded.)
		Torque control accuracy (repeatability)	±2%
		Soft startup time	0s to 65s (Acceleration and deceleration can be set separately.)
	Input signal	Speed reference input	Source of network-type references: EtherCAT communication
		Torque reference	Local mode and local multi-speed supported
Position control mode	Performance	Positioning time	1 ms to 10 ms
	Input signal	Position demand value	Source of network-type references: EtherCAT communication Local mode supported
Position control mode	DI signal	DI signal function assignment	8 DIs DI1-DI8: fast DI (rising edge (24 V input high to low) input delay: 30 us, falling edge (24 V input low to high) input delay: 5 us, voltage range: 12 V-24 V
			P-OT (positive limit switch) N-OT (negative limit switch) HomeSwitch (home switch) TouchProbe1 (touch probe 1) TouchProbe2 (touch probe 2)
	Digital output signal	DI signal function assignment	4 DOs With-load capacity: 50 mA Voltage range: 5 V to 30 V
			S-RDY: Servo ready Brake output

Item			Description
Built-in functions	Overtravel (OT) prevention		The servo drive stops immediately when the P-OT or N-OT signal is active.
	Protection functions		Protection against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, overspeed, encoder error, CPU error, and parameter error
	LED display		Main circuit CHARGE indicator, 5-digit LED display
	Vibration suppression		5 notches (including two adaptive notches) available, 50 Hz to 5,000 Hz
	Communication function	Software tool commissioning	RS-232
		Communication protocol	EtherCAT
		Multi-station communication	Maximum number of slaves: 255
		Axis address setting	No physical knob, set to 0 to 255 through the software
		Description	Status display, user parameter setting, monitored value display, fault tracing display, and jogging and auto-tuning observation
	Others		Gain tuning, alarm recording, and jogging

Note

[1] Install the servo drive within the allowable ambient temperature range. When it is installed inside a control cabinet, the temperature inside the cabinet must also be within this range.

2.2.3 Technical Data of EtherCAT Communication

Item		Specification
Basic performance of slave	Communication protocol	EtherCAT protocol
	Service supported	CoE (PDO, SDO)
	Synchronization mode	DC - Distributed clock FreeRun
	Physical layer	100Base-TX
	Baud rate	100 Mbit/s (100Base-TX)
	Duplex mode	Full duplex
	Topology	Ring, linear, star, and tree
	Transmission medium	Shielded cables of Cat 5e or higher
	Transmission distance	Less than 100 m between two nodes (with a proper environment and cables)
	Number of slaves	Up to 65535 by protocol
	EtherCAT frame length	44 bytes to 1498 bytes
	Process data	Max. 1,486 bytes per Ethernet frame
	Synchronous jitter of two slaves	< 1 μs
	Bit error rate	10^{-10} Ethernet standard
	Min. sync period	250 μs
Configuration unit	Number of FMMU units	8
	Number of storage synchronization management units	8
	Process data RAM	8 kB
	Distributed clock	64-bit
	EEPROM capacity	32-kbit

2.2.4 Dynamic Brake Characteristics

Calculation of the approximation of dynamic braking distance

According to the motor model, initial speed and load inertia, the dynamic braking distance of the servo motor can be estimated. The approximate value of the dynamic braking distance can be calculated by the following formula.

Maximum braking distance s (turn) is:

$$s = \frac{V_0}{60}\left(t_e + (\tau_1 + \tau_2 V_0^2)\left(1 + \frac{J_L}{J_M}\right)\right)$$

The coefficient is as follows:

$$\tau_1 = \frac{2R_s J}{3p_n^2 \Psi_f^2} = \frac{10000\pi^2 R_s J}{9K_e^2}$$

$$\tau_2 = \frac{\pi^2 L_d^2 J}{4050 R_s \Psi_f^2} = \frac{100 L_d^2 \pi^4 P_n^2 J}{243 R_s K_e^2}$$

$$\Psi_f = \frac{\sqrt{6} K_e}{100 \pi P_n}$$

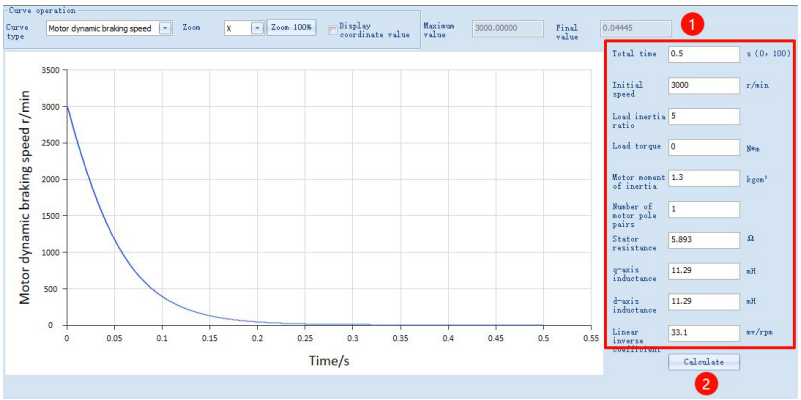
- V_0: Maximum feedback speed
- t_e: Dynamic brake program and relay delay
- J_L: Load moment of inertia
- J_M: Motor moment of inertia
- P_n: Number of motor pole pairs
- R_s: Stator resistance (Ω)
- K_e: Kelvin, thermodynamic temperature unit
- L_q, L_d: q-axis inductance (mH), d-axis inductance (mH).

Calculation of the accurate value of dynamic braking distance

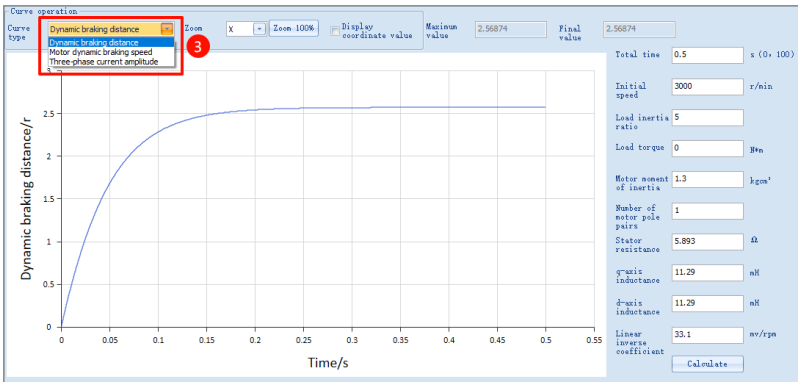
Use the dynamic braking distance measurement function of InoDriverShop to calculate the accurate value.

The steps are as follows:

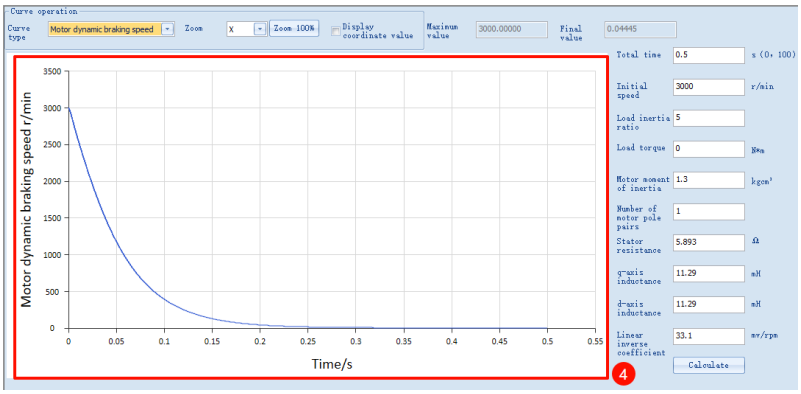
1. Set the parameters according to actual conditions (1). You can adjust the time range on the X axis by setting the total time.
2. Click **Calculate** (2).



3. There are three types of dynamic braking curves: dynamic braking distance - time curve (the relationship of the braking distance and the time), dynamic braking speed - time curve (the relationship of the motor speed and the time), three-phase current amplitude - time cure (the relationship of the three-phase current amplitude and the time). You can select the curve type (3) as needed.



4. After you select the curve type, the corresponding curve will be generated automatically (4).



Application example:

When the motor triggers dynamic braking at 3000 rpm, you need to estimate how long the motor takes to stop (speed is 0 rpm). You set the motor parameters (1) and click **calculate** (2) and select **Motor dynamic braking speed** (3). The dynamic braking speed-time curve will be generated automatically (4).

3 MS1 Motor Series

For details about MS1-R series motors, see *MS1-R Series Servo Motor Selection Guide* and *MS1-R Series Servo Motor Installation Guide*.

To obtain the guides, perform keyword search under **Service and Support** at *http://www.inovance.com* and download the guides. Alternatively, install the My Inovance app and search for guides in the app.

4 Accessories

4.1 List of Options

Component type	Component	Installation position	Applicable model	Function description
Peripheral electrical component	Fuse and circuit breaker	Input side of the drive	All models	To comply with EN 61800-5-1 standards, install a fuse or a circuit breaker on the input side of the servo drive to prevent accidents caused by short circuit in the internal circuit.
	AC input reactor	Input side of the drive		Eliminates high harmonics and improves the power factor on the input side.
	EMC filter	Input side of the drive		Reduces the conducted and radiated interference generated by the drive to external devices.
	Magnetic ring and ferrite clamp	Output side of the drive		Reduces interferences to the outside and the bearing current.
		Signal cable		Improves the anti-interference performance of signals.

4.2 Cables

4.2.1 Model Description

Power cable model

$$\underset{①}{\text{S6-L-M}}\ \underset{②}{0}\ \underset{③}{0}\ \underset{④}{0}\ \underset{⑤}{\text{-}3.0}\ \underset{⑥}{\text{–}\ T}\ \underset{⑦}{\text{-}\ X}$$

① **Cable type** S6-L-B/M: motion control power cable B: with a brake M: without a brake	③ **Frame size (mm)** 0: Flange sizes 25/40/60/80 1: Flange sizes 100/130/180 2: Flange size 180 (motors of 4.4 kW and above)	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: U-shaped cable lug 1: Pin-shaped cable lug	④ **Connector type at motor side** 0: 6-core plastic connector 1: 9-core aviation connector 2: 6-core military-spec connector 7: SDC-06T series aviation connector (front outlet) 8: SDC-06T series aviation connector (rear outlet)	⑥ **Special requirements** Blank: Fixed cables T: Cable in the drag chain ≥ 10 million times S: Shielded cables TS: Shielded cable in the drag chain ≥ 20 million times OR: Oil-resistant cables

Encoder cable model

S6-L-P ① 0 ② 1 ③ 0 ④ - 3.0 ⑤ - T ⑥

① **Cable type** S6-L-P: Motion control encoder cable	③ **Encoder** 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder 6: Resolver	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: DB9 1: USB 3: SCSI	④ **Connector type at motor side** 0: 9-core plastic connector 1: 9-core aviation connector 4: SDC-06T series aviation connector (front outlet) 5: SDC-06T series aviation connector (rear outlet) V: 180608-2701 & thousands of forests	⑥ **Special requirements** Blank: Fixed cables T: Cable in the drag chain ≥ 10 million times

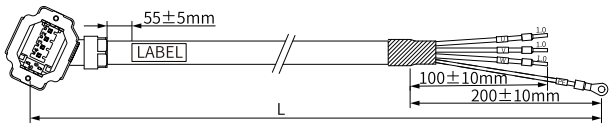
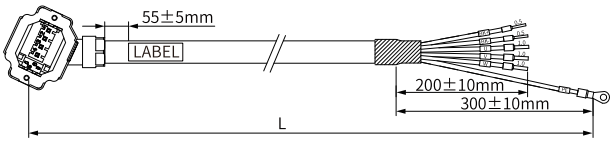
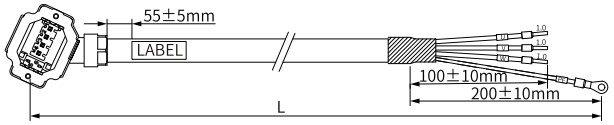
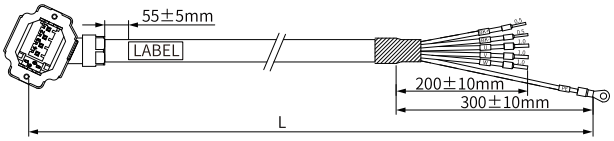
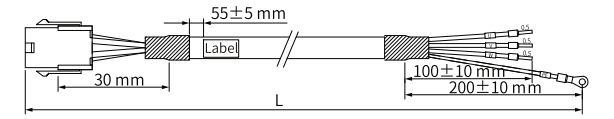
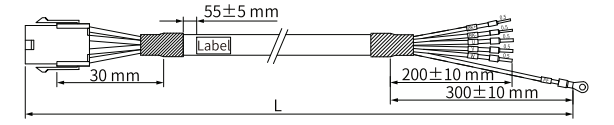
Communication cable model

S6-L-T ① 00 ② - 3.0 ③

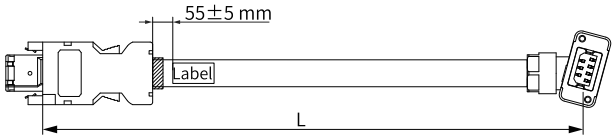
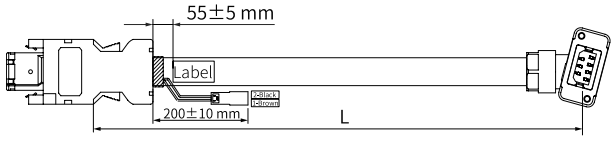
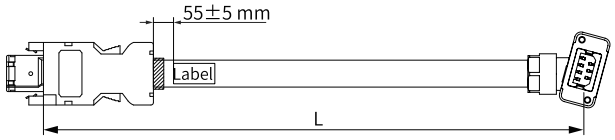
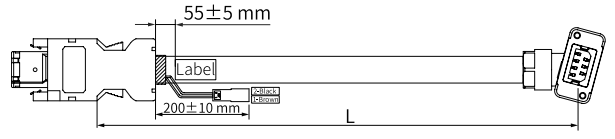
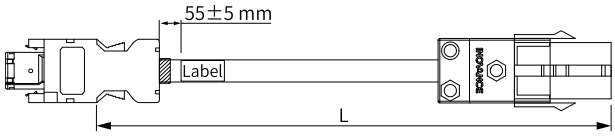
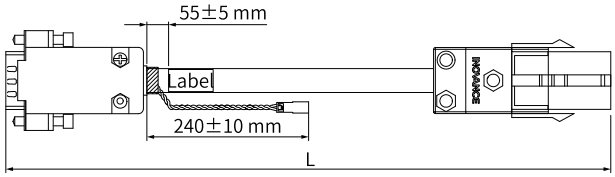
① **Cable type** S6-L-T: Motion control communication cable S6N-L-T: IS620F motion control encoder cable (only for communication cable between the drive and PC)	② **Communication cable connection type** 00: Servo drive PC communication cable 01: Multi-drive communication cable (CAN&485) 02: Servo drive to PLC communication cable 03: Servo drive communication termination resistor cable (CAN&485) 04: Servo drive network communication cable (EtherCAT)	③ **Cable Length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m

4.2.2 List of Cables

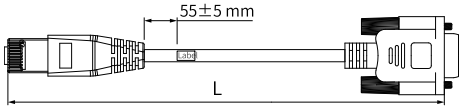
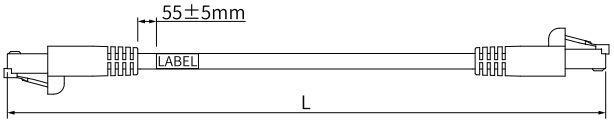
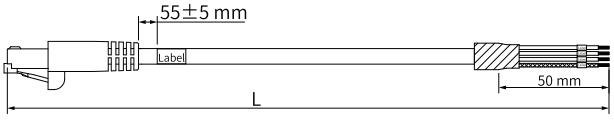
Power cables

Motor model	Name		Cable model	Cable length (mm)	Drawing
MS1H1/ MS1H4 terminal-type motors	Front outlet	Without brake	S6-L-M107-3.0	3100	
			S6-L-M107-5.0	5100	
			S6-L-M107-10.0	10100	
		With bake	S6-L-B107-3.0	3100	
			S6-L-B107-5.0	5100	
			S6-L-B107-10.0	10100	
	Rear outlet	Without brake	S6-L-M108-3.0	3100	
			S6-L-M108-5.0	5100	
			S6-L-M108-10.0	10100	
		With bake	S6-L-B108-3.0	3100	
			S6-L-B108-5.0	5100	
			S6-L-B108-10.0	10100	
MS1H1/ MS1H4 lead-type (-S) motor	Without brake		S6-L-M100-3.0	3100	
			S6-L-M100-5.0	5100	
			S6-L-M100-10.0	10100	
	With bake		S6-L-B100-3.0	3100	
			S6-L-B100-5.0	5100	
			S6-L-B100-10.0	10100	

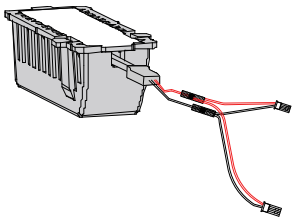
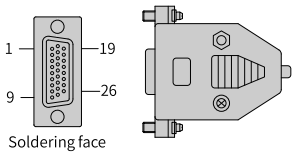
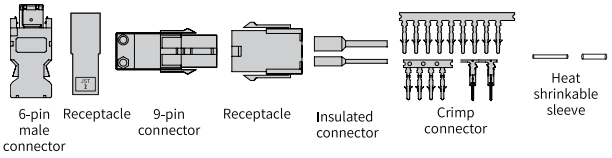
Encoder cables

Motor model	Name		Cable model	Cable length (mm)	Drawing
MS1H1/ MS1H4 terminal-type motors	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0	3000	
			S6-L-P114-5.0	5000	
			S6-L-P114-10.0	10000	
		Multi-turn absolute encoder cable	S6-L-P124-3.0	3000	
			S6-L-P124-5.0	5000	
			S6-L-P124-10.0	10000	
	Rear outlet	Single-turn absolute encoder cable	S6-L-P115-3.0	3000	
			S6-L-P115-5.0	5000	
			S6-L-P115-10.0	10000	
		Multi-turn absolute encoder cable	S6-L-P125-3.0	3000	
			S6-L-P125-5.0	5000	
			S6-L-P125-10.0	10000	
MS1H1/MS1H4 lead-type (-S) motor		Single-turn absolute encoder cable	S6-L-P110-3.0	3000	
			S6-L-P110-5.0	5000	
			S6-L-P110-10.0	10000	
		Multi-turn absolute encoder cable	S6-L-P120-3.0	3000	
			S6-L-P120-5.0	5000	
			S6-L-P120-10.0	10000	

Communication cables

Name	Cable model	Cable length (mm)	Drawing
Drive-PC communication cable	S6-L-T00-3.0	3000	
Multi-drive communication cable	S6-L-T01-0.3	300	
Servo drive to host controller communication cable	S6-L-T02-2.0	2000	

Connector kit

Name	Model	Outline drawing
Battery kit	S6-C9A	
CN1 terminal (DB26)	S6-C74	
MS1H1/MS1H1 flying leads type motor connector	S6-C26	

4.3 Peripheral Electrical Component

4.3.1 Circuit Breaker

Table 4–1 Recommended circuit breaker models

Servo drive SV660ND****I			Recommended circuit breaker		
Size	Model	Rated input current (A)	Manufacturer	Current (A)	Model
Single-phase 220 V					
Size A	S2R8	7.2	Schneider	16	OSMC32N2D16
Size B	S5R5	12.4		20	OSMC32N2D20
Three-phase 220 V					
Size A	S2R8	4.2	Schneider	6	OSMC32N3D6
Size B	S5R5	7.5		16	OSMC32N3D16

If a residual current device (RCD) is needed, select the RCD according to the following requirements:

- Use a B-type RCD because the drive may generate DC leakage current in the protective conductor.
- For each drive, use an RCD whose tripping current is not lower than 150 mA to prevent RCD malfunction due to high-frequency leakage current generated by the drive.
- When multiple drives are connected in parallel and share one RCD, select an RCD whose tripping current is not lower than 300 mA.
- It is recommended to use Chint or Schneider RCDs.

4.3.2 Fuse

To prevent accidents caused by short circuit, install a fuse on the input side of the drive.

Table 4–2 List of recommended fuses

Servo drive SV660ND****I			Recommended fuse		
Size	Model	Rated input current (A)	Manufacturer	Rated current (A)	Model
Single-phase 220 V					
Size A	S2R8	7.2	Bussmann	20	FWP-20B
Size B	S5R5	12.4		35	FWP-35B
Three-phase 220 V					
Size A	S2R8	4.2	Bussmann	20	FWP-20B
Size B	S5R5	7.5		35	FWP-35B

4.3.3 Electromagnetic Contactor

Table 4–3 Recommended electromagnetic contactor models

Servo drive SV660ND****I			Recommended contactor		
Size	Model	Rated input current (A)	Manufacturer	Current (A)	Model
Single-phase 220 V					
Size A	S2R8	7.2	Schneider	9	LC1 D09
Size B	S5R5	12.4		18	LC1 D18
Three-phase 220 V					
Size A	S2R8	4.2	Schneider	9	LC1 D09
Size B	S5R5	7.5		9	LC1 D09

4.3.4 AC Input Reactor

Model selection

An AC input reactor is optional and mainly used to reduce harmonic waves in the input current. In scenarios where harmonic waves need to be suppressed, install an external reactor. The following table lists the recommended manufacturers and models of input reactors.

Table 4–4 AC input reactor model selection

Servo drive SV660ND****I			Applicable reactor	Inductance (mH)
Size	Model	Rated input current (A)		
Three-phase 220 V				
Size A	S2R8	4.2	MD-ACL-10-5-4T	5
Size B	S5R5	7.5	MD-ACL-10-5-4T	5

Dimensions

- Inovance input reactors

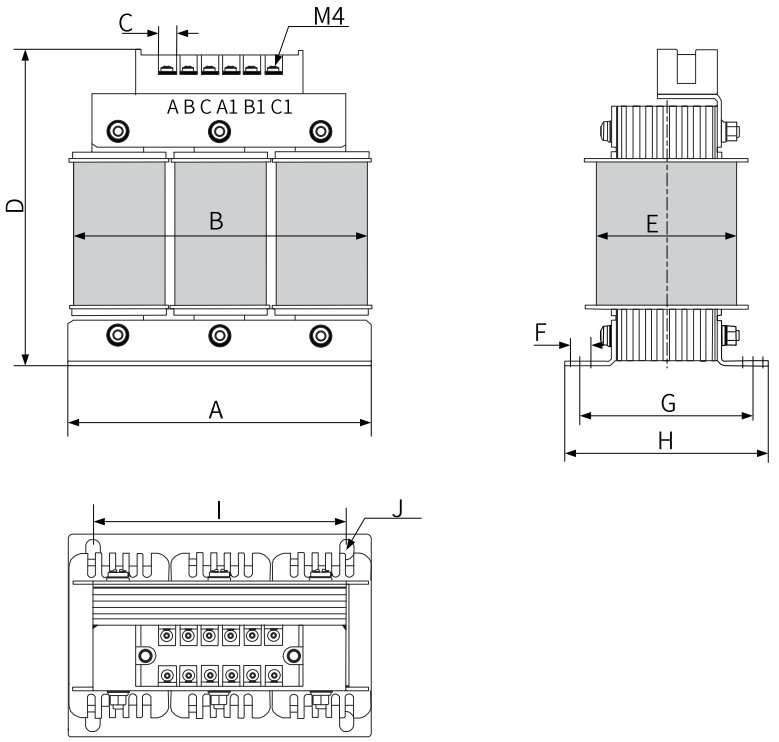


Figure 4-1 Dimensions of AC input reactors (10 A to 15 A)

Table 4–5 Dimensions of Inovance AC input reactors (unit: mm)

Model	A	B	C	D	E	F	G	H	I	J
MD-ACL-10-5-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10

4.3.5 EMC Filter

Model selection

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the EMC filter listed in the following table. You can only use the FN3287 series EMC filters manufactured by Schaffner. Select the EMC filter according to the rated input current of the drive, as shown in the following table.

Table 4–6 Standard EMC filter model and appearance

Filter model	
Schaffner	FN3287 series

Table 4–7 Filter model selection (Schaffner)

Servo drive SV660ND****I			Applicable filter
Size	Model	Rated input current (A)	
Single-phase 220 V			
Size A	S2R8	7.2	FN 3287-16-44-C33-R65
Size B	S5R5	12.4	FN 3287-16-44-C33-R65
Three-phase 220 V			

Servo drive SV660ND****I			Applicable filter
Size	Model	Rated input current (A)	
Size A	S2R8	4.2	FN 3287-10-44-C33-R65
Size B	S5R5	7.5	FN 3287-10-44-C33-R65

Dimensions

Dimensions of Schaffner FN 3287 series filters

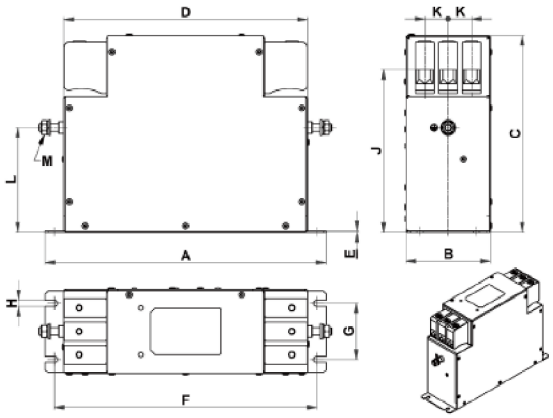


Figure 4-2 Dimension drawing of FN 3287 series filters (unit: mm)

Table 4–8 Dimensions of FN 3287 series filters (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	J±2	K	L±1	M
10	180	40	112	153	0.8	170	20	4.5	94	11	68	M5
16	200	45	112	170	0.8	185	25	5.4	102	11	76	M5

4.3.6 Magnetic Ring and Ferrite Clamp

The magnetic ring can be installed on the input or output side of the drive. Install the magnetic ring as close to the drive as possible. Installing the magnetic ring on the input side can suppress the noise in the input power supply system of the drive. When the magnetic ring is installed on the output side, it can reduce the interference generated by the drive to external devices and can reduce the bearing current.

In scenarios with leakage current and signal cable interference, install a magnetic ring or a ferrite clamp.

Model selection

- Amorphous magnetic ring: supports high permeability when the frequency is within 1 MHz and excellent anti-interference performance, but is not as low-cost as the ferrite clamp. For details, see the "Dimensions" section of this topic. *“ Dimensions” on page 26*
- Ferrite clamp: supports good interference suppression performance within a frequency band above 1 MHz, and is applicable to low-power servo drives and signal cables. It is low-cost and easy to install

Magnetic ring and ferrite clamp		Appearance
Magnetic ring	DY644020H	
	DY805020H	
Ferrite clamp	7427122S	

Dimensions

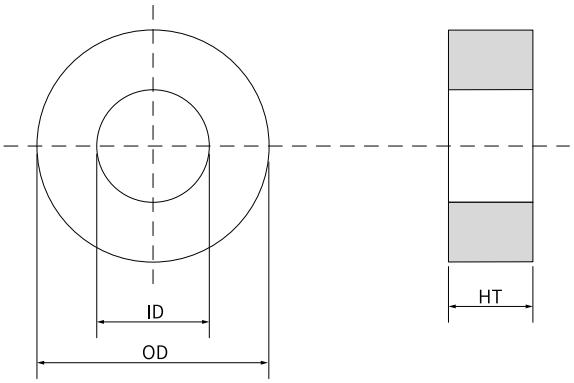


Figure 4-3 Dimensions of the magnetic ring

Table 4–9 Dimensions of the magnetic ring

Model	Size (OD×ID×HT) (mm)
DY644020H	64 × 40× 20
DY805020H	80 × 50× 20

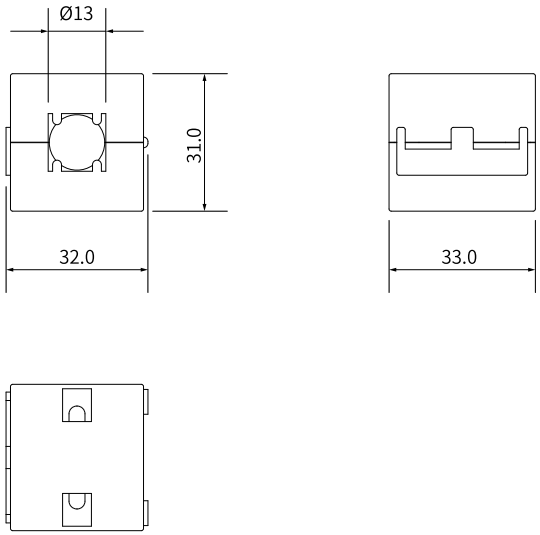


Figure 4-4 Dimensions of the ferrite clamp

Table 4–10 Dimensions of the ferrite clamp

Model	Size (Length × OD × ID) (mm)
7427122S	32.0 × 31× 13

4.4 Braking Resistor

Servo drive SV660ND****I	Resistance (Ω)	Resistor power (W)	Min. resistance of external resistor (Ω)	Max. braking energy absorbed by capacitors (J)	Braking resistor
S2R8	-	25	20	54.6	No support for built-in resistor
S5R5	-	80	20	80.3	Built-in and external resistors are supported

4.5 Absolute Encoder Batteries

Model selection

Select an appropriate battery according to the following table.

Table 4–11 Description of the absolute encoder battery

Battery specification	Item	Rated value			Condition
		Min. value	Typical value	Max. value	
Output: 3.6 V, 2500 mAh	External battery voltage (V)	3.2	3.6	5	In standby state[1]
	Circuit fault voltage (V)	-	2.6	-	In standby state
	Battery alarm voltage (V)	2.85	3	3.15	-
	Current consumed by the circuit (uA)	-	2	-	In normal operation[2]
		-	10	-	In standby state, shaft at standstill
		-	80	-	In standby state, shaft rotating
	Ambient temperature (℃)	0	-	40	Same as the motor.
	Storage temperature (℃)	-20	-	60	

The preceding values are obtained under an ambient temperature of 20℃.

Note

- [1]: The "standby state" means the encoder counts the multi-turn data by using the power from the external battery when the servo drive power supply is not switched on. In this case, data transceiving stops.
- [2]: During normal operation, the absolute encoder supports one-turn or multi-turn data counting and transceiving. Power on the servo drive after connecting the absolute encoder properly. The encoder starts data transceiving after a short delay of about 5s upon power-on. The motor speed must be lower than or equal to 10 rpm during transition from the standby state to the normal operation state (upon power-on). Otherwise, Er.740 (Encoder fault) may occur. In this case, you need to power off and on the servo drive again.

Design life of the battery

The following formula considers only the current consumed by the encoder and does not cover the current consumed by the battery itself.

Assume that the drive works normally for T1 in a day, the motor rotates for T2 after the drive is powered off, and the motor stops rotating for T3 after power-off [unit: hour (H)].

Example:

Table 4–12 Design life of the absolute encoder battery

Item	Schedule 1	Schedule 2
Working days in different operating conditions within one year	313	52
T1 (h)	8	0
T2 (h)	0.1	0
T3 (h)	15.9	24

Capacity consumed within 1 year = (8 h x 2 uA + 0.1 h x 80 uA + 15.9 h x 10 uA) x 313 + (0 h x 2 uA + 0 h x 80 uA +24 h x 10 uA) x 52 ≈ 70 mAh

Design life = Battery capacity/Capacity consumed within 1 year = 2,600 mAh/70 mAh = 37.1 years

Note

The life is calculated based on single-axis conditions. When a battery supplies power to two axes, you must calculate the life accordingly.

5 Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

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