

TSM SERIES

Ball Screw Actuators



Linear Intelligent Motors - Mating Ball Screws

The linear intelligent motors integrate ball screw, drive, encoder, and controller into stepper motors. This provides customers with an all-in-one solution. Compared with the ordinary linear step motors, these products run in higher efficiency and are more intelligent.

- 4 Frame Sizes: NEMA 08, 11, 17, 23
- Each size has multiple ball screw options
- Standardized product models for quick response



Part Number Components

TSM23Q-2RG – B1002 – 155 – A1P – S

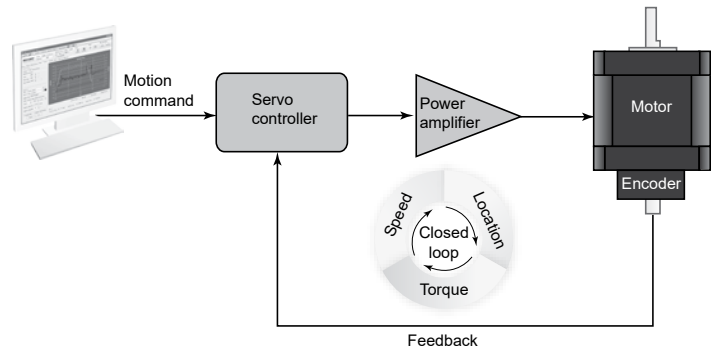
❶	❷	❸	❹	❺
Motor Type	Lead Screw Type	Screw Length (mm)	Nut Type	Customized Code
				S = Screw End Machining

Linear Intelligent Motors - Mating ball screws

■ Features

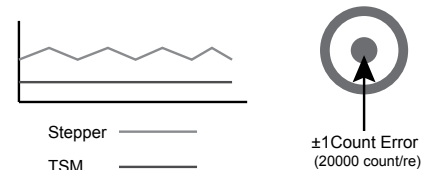
Closed-loop Step-Servo mode

- Precisely position and velocity control can match the harsh applications.
- Highly robust servo control accommodates a wide range of inertial loads and friction load changes.
- The TSM17/23 achieve precise positioning to within ± 1 count (0.018°) using a high resolution (20000 counts/rev) encoder.
- The TSM11 achieves precise positioning to within ± 1 count (0.2°) using a high resolution (4096 counts/rev) encoder.



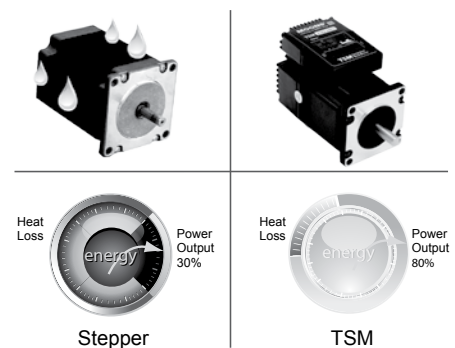
Smooth & Accurate

- Space vector current control with a high resolution encoder gives smooth and quiet operation, especially at low speeds.
- A feature not found with traditional stepper motors.
- High stiffness due to the nature of the stepping motor combined with the highly responsive servo control.
- Accurate position control both while running and static positioning.

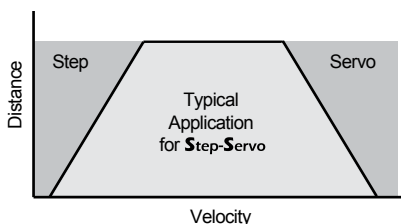


Low Heating / High Efficiency

- The TSM uses only the current required by the application, generating minimum heat output.
- When the motor is not moving, the current can be nearly zero resulting in extremely low heat output.
- Being able to use almost 100% of the available torque allows for more efficient operation and may allow a smaller motor size.



Fast Response

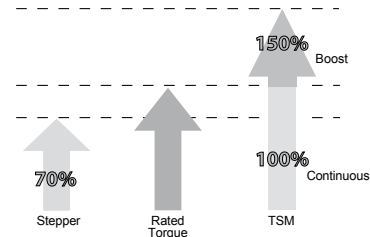


When performing fast point-to-point moves, the high torque output and advanced servo control provides a very responsive system far exceeding what can be done with a conventional stepper system.

Linear Intelligent Motors - Mating ball screws

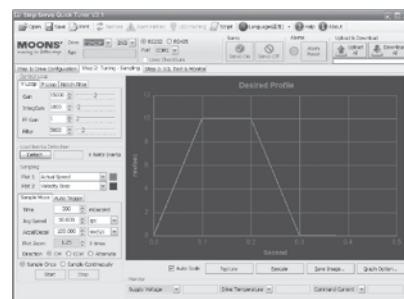
High Torque

- Because the TSM operates in full servo mode, all the available torque of the motor can be used.
- The motor can provide as much as 50% more torque in many applications. High torque capability often eliminates the need for gear reduction.
- Boost torque capability can provide as much as 50% more torque for short, quick moves.

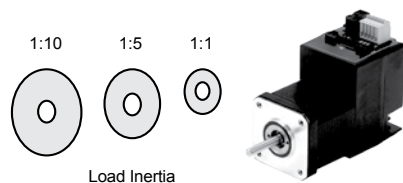


Motion Monitoring

- For applications where extreme real-time motion is critical, the Step-Servo Quick Tuner provides a simple and practical tool for monitoring actual motion trajectories.
- It can be used to monitor common metrics such as actual velocity and position error to assess the current actual performance of the system.
- An interactive monitoring and tuning interface provides the fastest possible performance output.



Easy Tuning



- Pre-defined tuning parameters quickly allow maximum control performance and stability.
- A selection list provides an easy method to achieve the desired level of control.
- In most cases NO extra manual tuning is required.

Key Enhancement

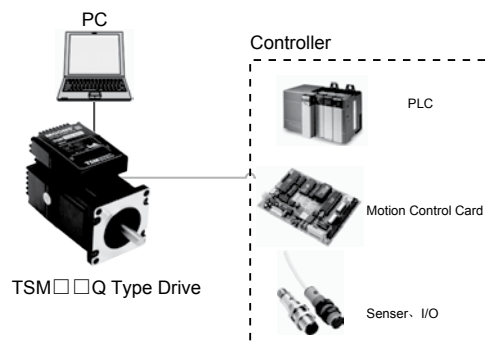
- Fieldbus products (RS-485, Modbus/RTU) with integrated daisy chain interface (TSM17/23 only)
- Automatic load inertia detection
- Multiple homing features for S/Q types
- Software limit for S/Q types

Built-in programmable motion controller(Includes Modbus/RTU Type)

Run stand-alone with sophisticated and functional programs. Commands for controlling motion, inputs & outputs, drive configuration and status, as well as math operations, register manipulation, and multi-tasking.

Main Features

- Stand-alone operation plus Serial host control
- Math operations
- Register manipulation
- Multi-tasking
- Includes all features of S type
- Modbus/RTU network, up to 32 axes per channel



Configuration Table

Nominal Diameter (mm)	Lead (mm)	Lead screw type	Motor Options			
			TSM08	TSM11	TSM17	TSM23
4	1	B0401	•			
6	1	B0601		•		
6	2	B0602		•		
6	6	B0606		•		
6	10	B0610		•		
8	1	B0801			•	
8	2	B0802			•	
8	2.5	B08025			•	
8	5	B0805			•	
8	8	B0808			•	
8	12	B0812			•	
10	2	B1002				•
10	4	B1004				•
12	2	B1202				•
12	4	B1204				•
12	5	B1205				•
12	10	B1210				•

Note: Only items marked with a • are configurable, for more matches please contact the factory. Lead screw accuracy grade: C5/C7 for TSM08, TSM11 and TSM17 (C7 only for B08025); C7 for TSM23. For surface treatment requirements, please contact the factory.

TSM Series Standard Models for Stock

Size (mm)	Motor Series		Lead Screw Options		Screw Length Options		Nut Options		End Machining Code
20 X 20	TSM08X2L-R	-	B0401	-	55, 80, 105	-	A1P	-	0, S
28 X 28	TSM11Q-2RM	-	B0601 B0602 B0606	-	55, 80, 105, 130, 155, 180, 205, 230, 255	-	A1P	-	0, S
42 X 42	TSM17Q-2RG	-	B0801 B0802 B0805 B0808	-	55, 80, 105, 130, 155, 180, 205, 230, 255	- -	A1P B1P	- -	0, S
57 X 57	TSM23Q-2RG	-	B1002 B1004	-	105, 155, 205, 255, 305, 355, 405	-	A1P	-	0, S

Note: Lead screw outer diameter < 6 mm: length < 100 mm, no end machining – length ≥ 100 mm, standard end machining.
Lead screw outer diameter ≥ 6 mm: length < 150 mm, no end machining – length ≥ 150 mm, standard end machining.
No End Machining Code “0”, Standard End Machining Code “S”

Order sample

Select configuration codes

Motor Series		Lead Screw Options		Screw Length Options		Nut Options		End Machining Code
TSM11Q-2RM	-	B0601	-	55, 80, 105, 130, 150, 155, 180, 205, 230, 255	-	A1P	-	0, S

Determine the order Models

TSM11Q-2RM - B0601 - 105 - A1P - 0

In addition to the standard order Models, we also provide a wealth of customized configuration options, for more information please contact the factory.

TSM08

Phases	2
Step Accuracy	±5%
Approvals	RoHS
Operating Temp.	0°C~+50°C
Insulation Class	B(130°C)



Ordering Information

TSM08X2L-R - B0401 - 80 - A1P - 0

Motor Series

Code	Motor Type Code
TSM08X2L-R	Drive integrated

Lead Screw Type Code

Code	Nominal Diameter (mm)	Lead (mm)	Travel(mm) Travel Per1.8°
B0401	4	1	0.005

The length of the screw Lx

###	Provided in 1 mm increments (MAX 150 mm)
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Special Custom Type Code

Code	Custom Type
0	No end machining
S	Ball Screw End Machining
XX	Other Special Custom Type

Mating Nut Code

Code	Mating Ball Screw
A1	B0401 G0401

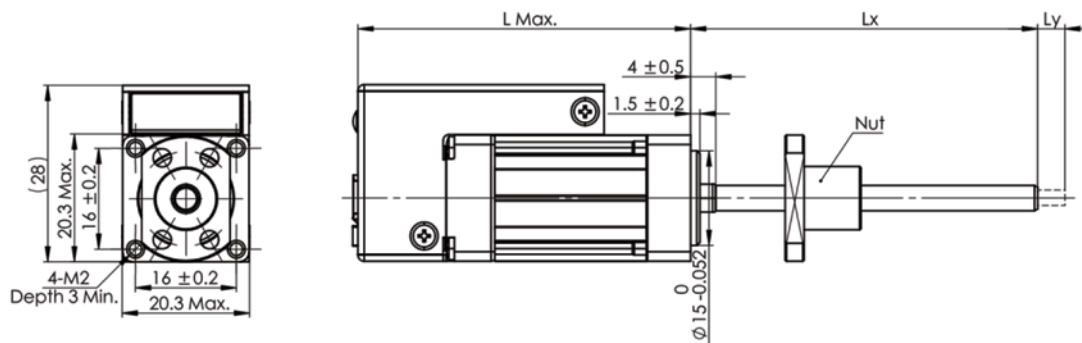
Electrical Specifications

TSM08Q-2RM	Control Command	Pulse Command Type	Max. pulse input frequency	Digital Input Number	Digital Output Number	Analog Input Number	Encoder Feedback Output	Digital Input Specifications	Digital Output Specifications
	Pulse Command, Q Program, Modbus/RTU Communication Control	Pulse+Direction CW/CCW Double-pulse	1MHz, Min.Pulse Width=100ns	3	2	-	-	5-24VDC	30VDC /100mA
	Input Power			Protect Power			Communication Interface	Communication Protocol	
	Rated voltage 24VDC, Min/Max voltage 15-30VDC			Overvoltage, Undervoltage, Overheated, Motor Winding Short Circuit (phase to phase and ground)			RS-485/422	Modbus/RTU	

TSM08

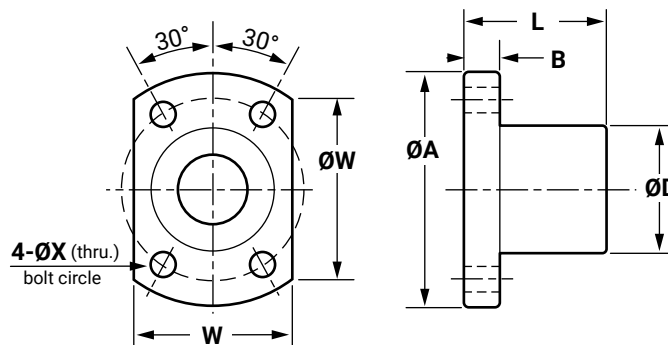
Dimensional Information

UNIT:mm



Motor Type	Dimension"L"
TSM08X2L-R	55.5

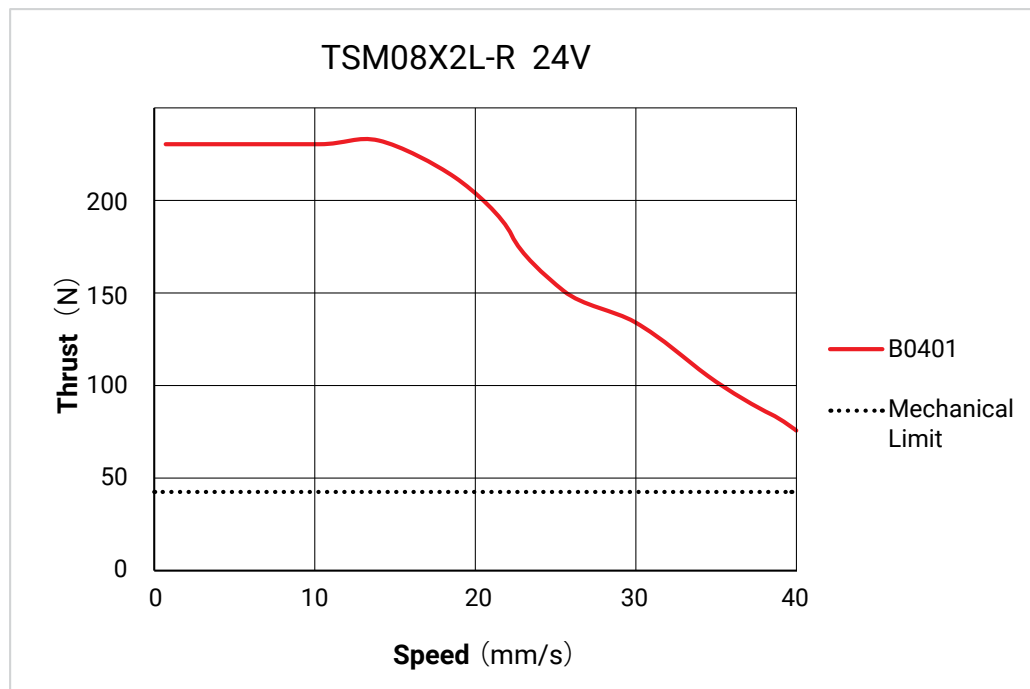
Nut Type



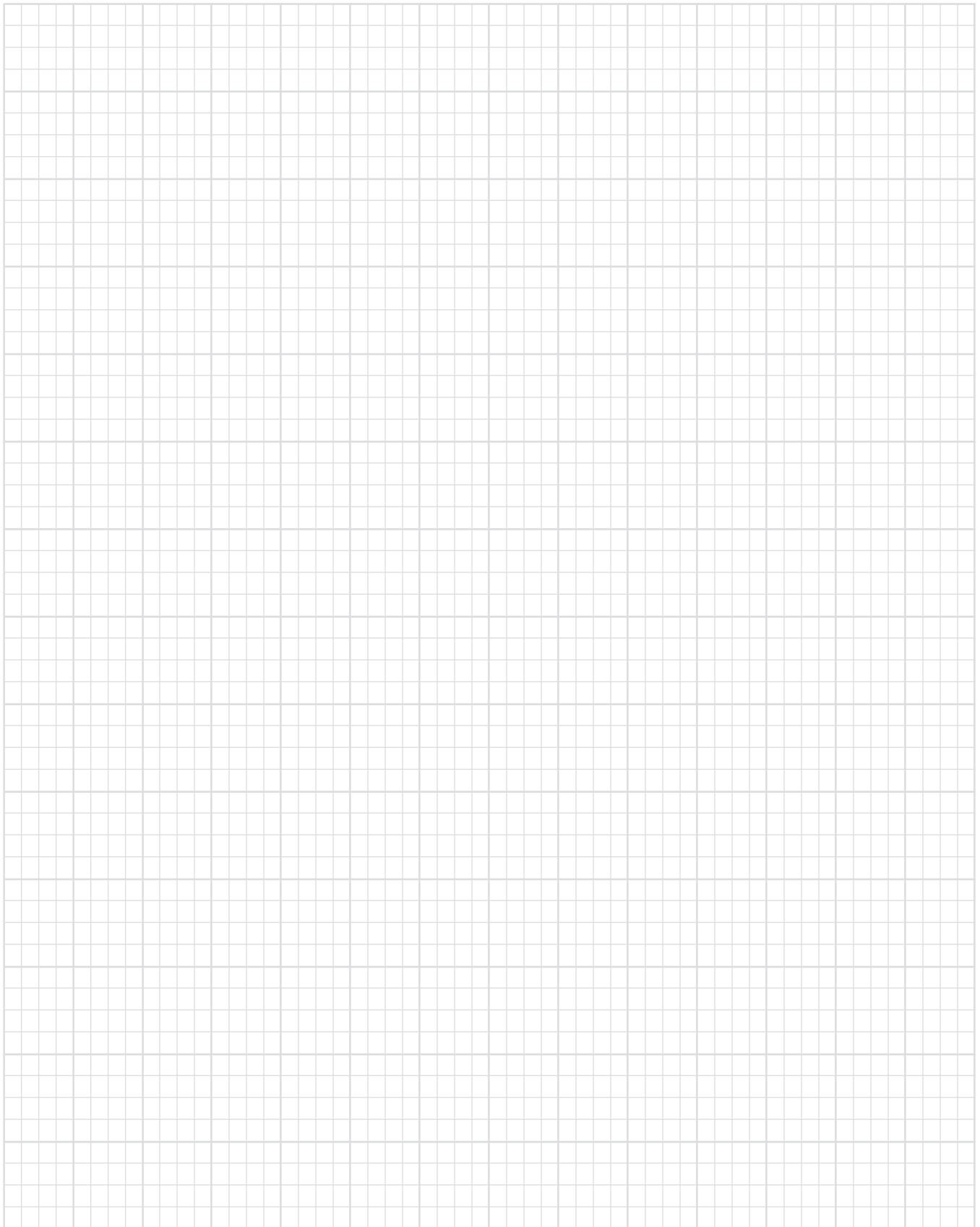
Lead Screw Code	Nut Code	D	A	B	L	W	H	X
B0401	A1	10	20	3	12	15	14	2.9
G0401	A1	10	20	3	12	15	14	2.9

TSM08 Series

Speed - Force Reference Curve



- Note:**
1. Mechanical Limit Definition: Since the motor output may exceed the force which the bearing can bear, so we take the motor bearing limit as the mechanical limit. However, linear motor fatigue and resultant life are determined by each customer's unique application. Load, speed, frequency, temperature, stability of guidance mechanism, etc., should all be considered before choosing a linear motor.
 2. The curves are reference values obtained by calculation. The actual output should consider the customer's unique application, including speed, acceleration and deceleration, frequency, stability of guidance mechanism, etc. Curves are based on theoretical calculations; actual applications may be affected by calculation deviations, machining tolerances, load inertia, friction losses and installation concentricity, so a 50% allowance is generally recommended.



TSM11

Phases	2
Step Accuracy	±5%
Approvals	RoHS
Operating Temp.	0°C~+50°C
Insulation Class	B(130°C)



Note: Choosing the standard order models can get the sample quickly, please

Ordering Information

TSM11Q-2RM - B0601 - 105 - A1P - 0

Motor Series

Code	Motor Type Code
TSM11Q-2RM	Drive integrated

Ball Screw Type Code

Code	Nominal Diameter (mm)	Lead (mm)	Travel(mm) Travel Per 1.8°
B0601	6	1	0.005
B0602	6	2	0.010
B0606	6	6	0.030
B0610	6	10	0.050

The length of the screw Lx

###	Provided in 1 mm increments (MAX 260 mm)
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Special Custom Type Code

Code	Custom Type
0	No end machining
S	Ball Screw End Machining
XX	Other Special Custom Type

Mating Nut Code

Code	Mating Lead Screw
B1	B0610
A1	B0601
A1	B0602
A1	B0606

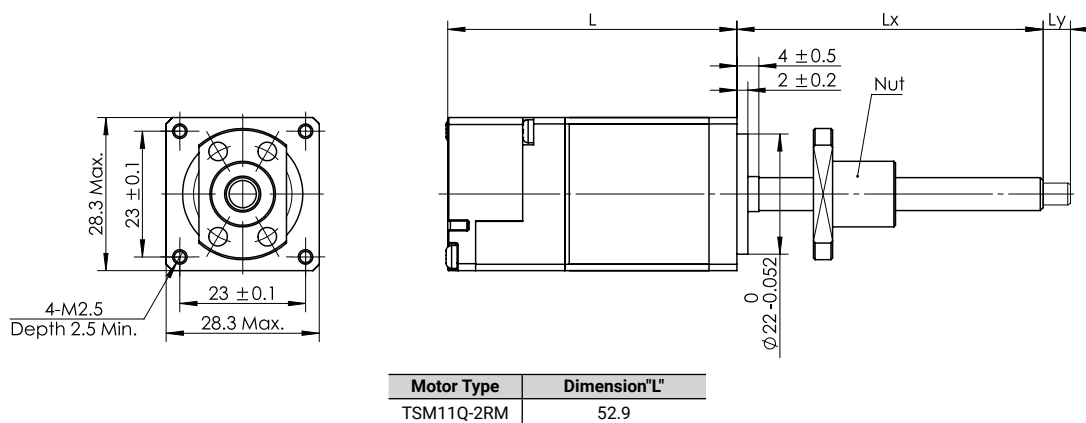
Electrical Specifications

TSM11Q-2RM	Control Command	Pulse Command Type	Max. pulse input frequency	Digital Input Number	Digital Output Number	Analog Input Number	Encoder Feedback Output	Digital Input Specifications	Digital Output Specifications
	Pulse Command, Q Program, Modbus/RTU Communication Control	Pulse+Direction CW/CCW Double-pulse	2MHz, Min.Pulse Width=250ns	4	2	-	-	5-24VDC	30VDC /100mA
	Input Power			Protect Power			Communication Interface	Communication Protocol	
	Rated voltage 24VDC, Min/Max voltage 15-30VDC			Overvoltage, Undervoltage, Overheated, Motor Winding Short Circuit (phase to phase and ground)			RS-485 4-wire	Modbus/RTU	

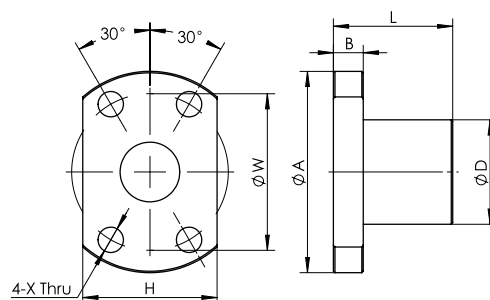
TSM11

Dimensional Information

UNIT:mm



Nut Type

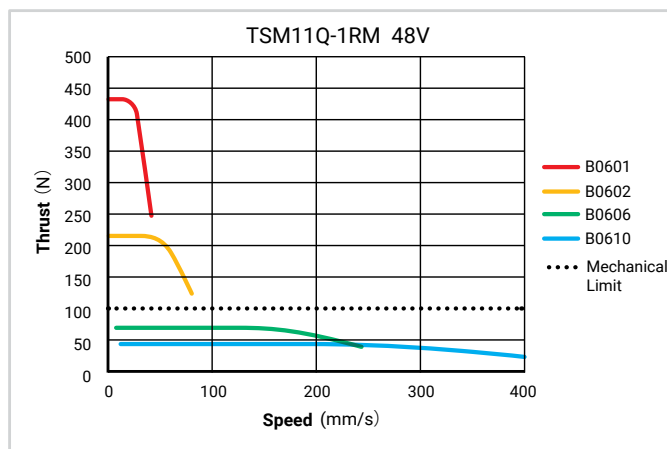
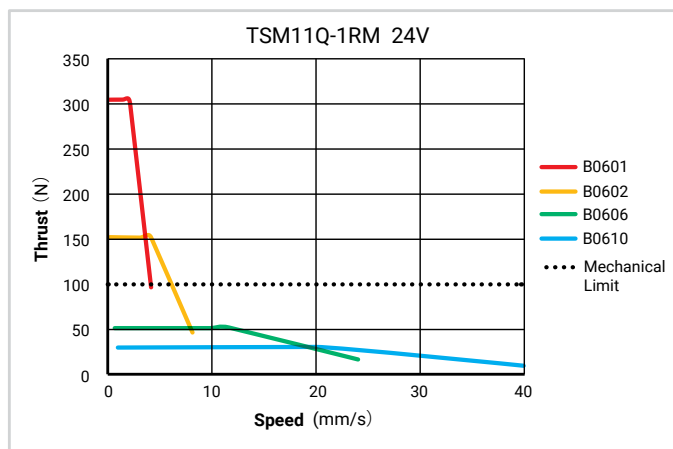


AK1/FF1

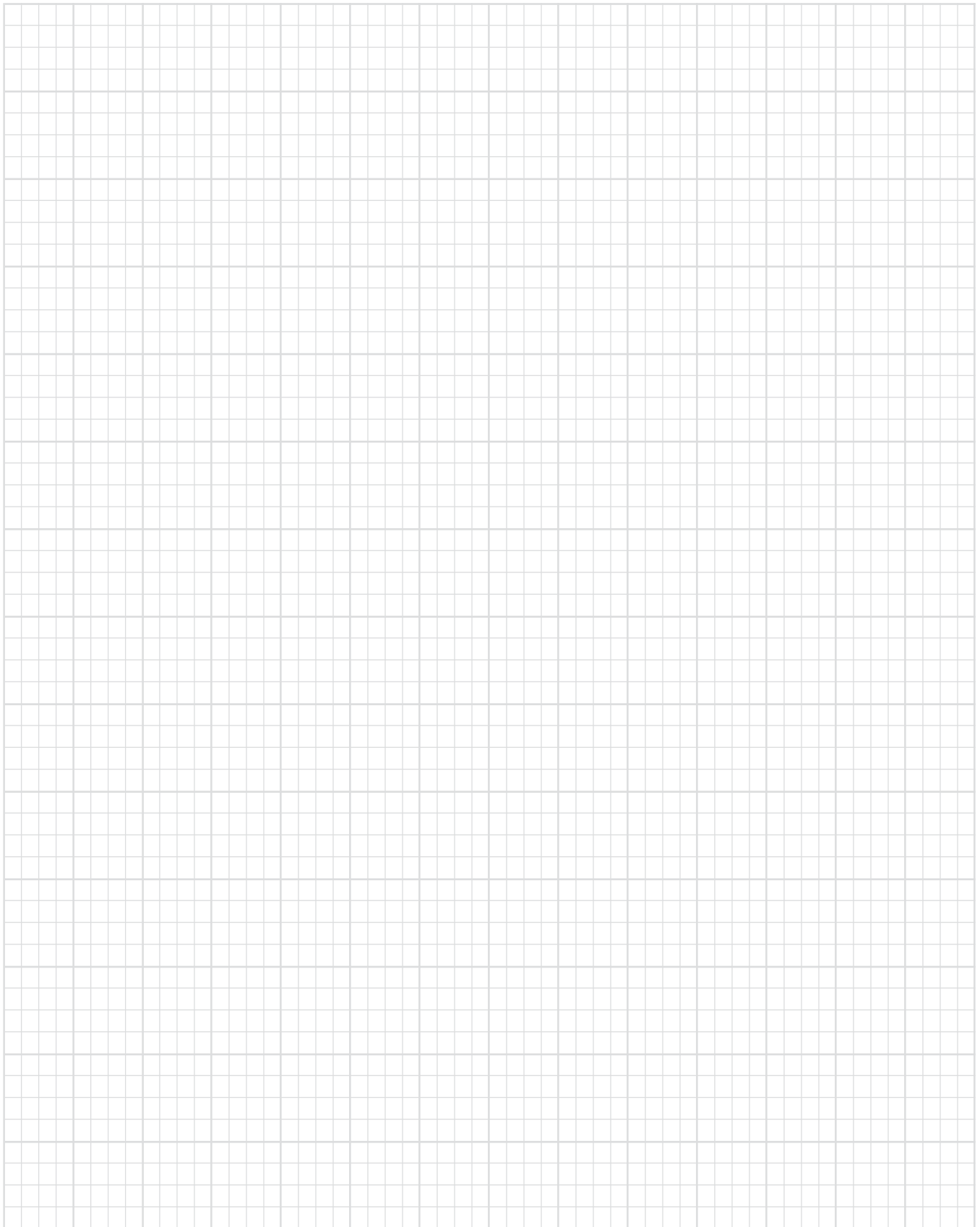
Lead Screw Code	Nut Code		D	A	E	B	L	W	H	X
B0602	A	1	12	24	—	3.5	16	18	16	3.4
B0606	A	1	12	24	—	4	22	18	14	3.4
B0610	B	2	14	27	4	4	20	21	16	3.4
G0601	A	1	12	24	—	3.5	15	18	16	3.4
G0602	A	1	12	24	—	3.5	16	18	16	3.4
G0606	B	1	14	27	3.5	4	17	21	16	3.4
G0610	B	1	14	27	4	4	20	21	16	3.4

TSM11/AM11 Series

Speed - Force Reference Curve

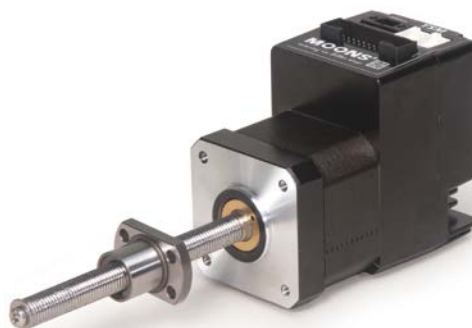


- Note:**
1. Mechanical Limit Definition: Since the motor output may exceed the force which the bearing can bear, so we take the motor bearing limit as the mechanical limit. However, linear motor fatigue and resultant life are determined by each customer's unique application. Load, speed, frequency, temperature, stability of guidance mechanism, etc., should all be considered before choosing a linear motor.
 2. The curves are reference values obtained by calculation. The actual output should consider the customer's unique application, including speed, acceleration and deceleration, frequency, stability of guidance mechanism, etc. Curves are based on theoretical calculations; actual applications may be affected by calculation deviations, machining tolerances, load inertia, friction losses and installation concentricity, so a 50% allowance is generally recommended.



TSM17 Series

Phases	2
Step Accuracy	±5%
Approvals	RoHS
Operating Temp.	0°C~+50°C
Insulation Class	B(130°C)



Ordering Information

TSM17Q-2RG - B0801 - 105 - A1P - 0

Motor Series

Code	Motor Type Code
TSM17Q-2RG	Drive integrated

Ball Screw Type Code

Code	Nominal Diameter (mm)	Lead (mm)	Travel(mm) Travel Per1.8°
B0801	8	1	0.0050
B0802	8	2	0.0100
B08025	8	2.5	0.0125
B0805	8	5	0.0250
B0808	8	8	0.0400
B0812	10	2	0.0600

The length of the screw Lx

###	Provided in 1 mm increments (MAX 360 mm)
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Special Custom Type Code

Code	Custom Type
0	No end machining
S	Ball Screw End Machining
XX	Other Special Custom Type

Mating Nut Code

Code	Mating Lead Screw
A1	B0801
	B0802
	B08025
	B1002
B1	B0805
	B0808
	B1012

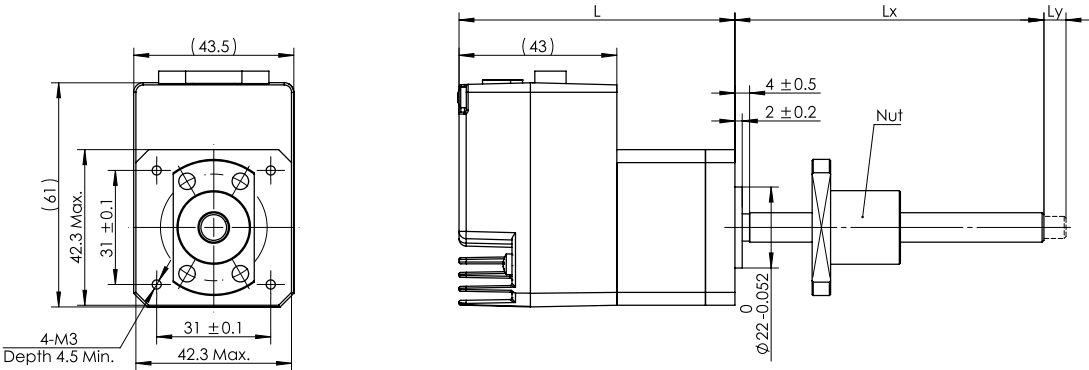
Electrical Specifications

TSM17Q-2RG	Control Command	Pulse Command Type	Max. pulse input frequency	Digital Input Number	Digital Output Number	Analog Input Number	Encoder Feedback Output	Digital Input Specifications	Digital Output Specifications
	Pulse Command Analog Command, SCL Motion control Command, Q program, Modbus/RTU Communication Control	Pulse+Direction CW/CCW Double-pulse, A/B differential pulse	2MHz, Min.Pulse Width=250ns	8	4	1	-	5-24VDC	30VDC /100mA
	Analog input specification	Input Power		Protect Power		Communication Interface		Communication Protocol	
	0-5VDC, Analog input resolution:12bits	12-48VDC		Overvoltage, Undervoltage, Overheated, Motor Winding Short Circuit (phase to phase and ground)		RS-485		Modbus/RTU or SCL	

TSM17 Series

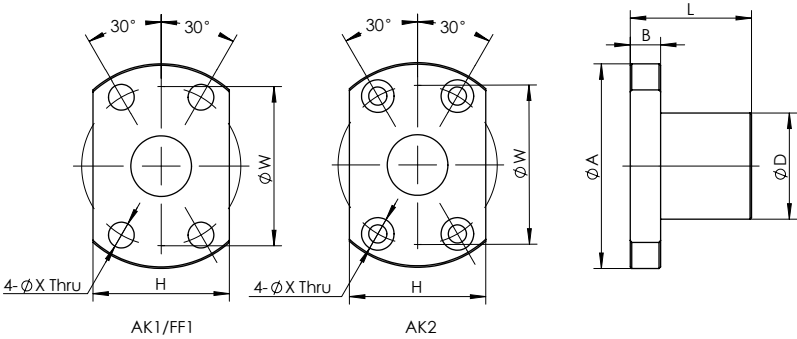
Dimensional Information

UNIT:mm



Motor Type	Dimension"L"
TSM17Q-2RG	75

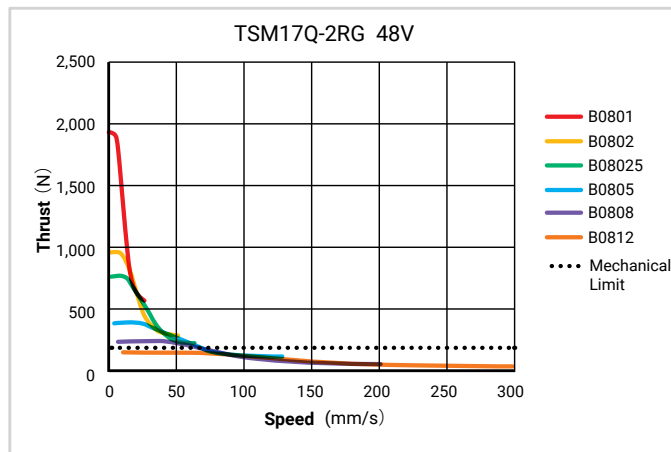
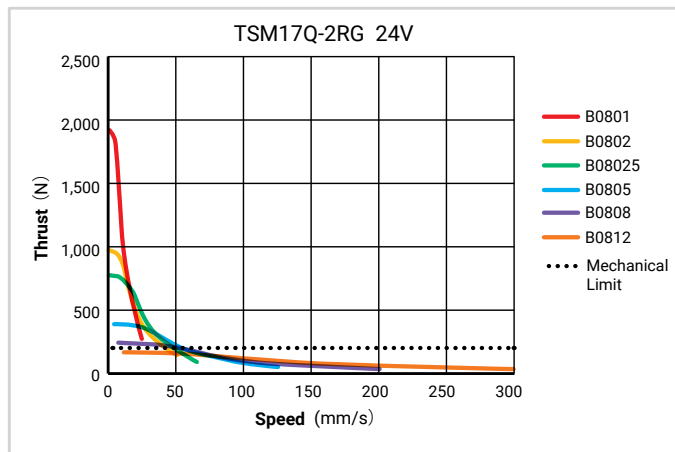
Nut Type



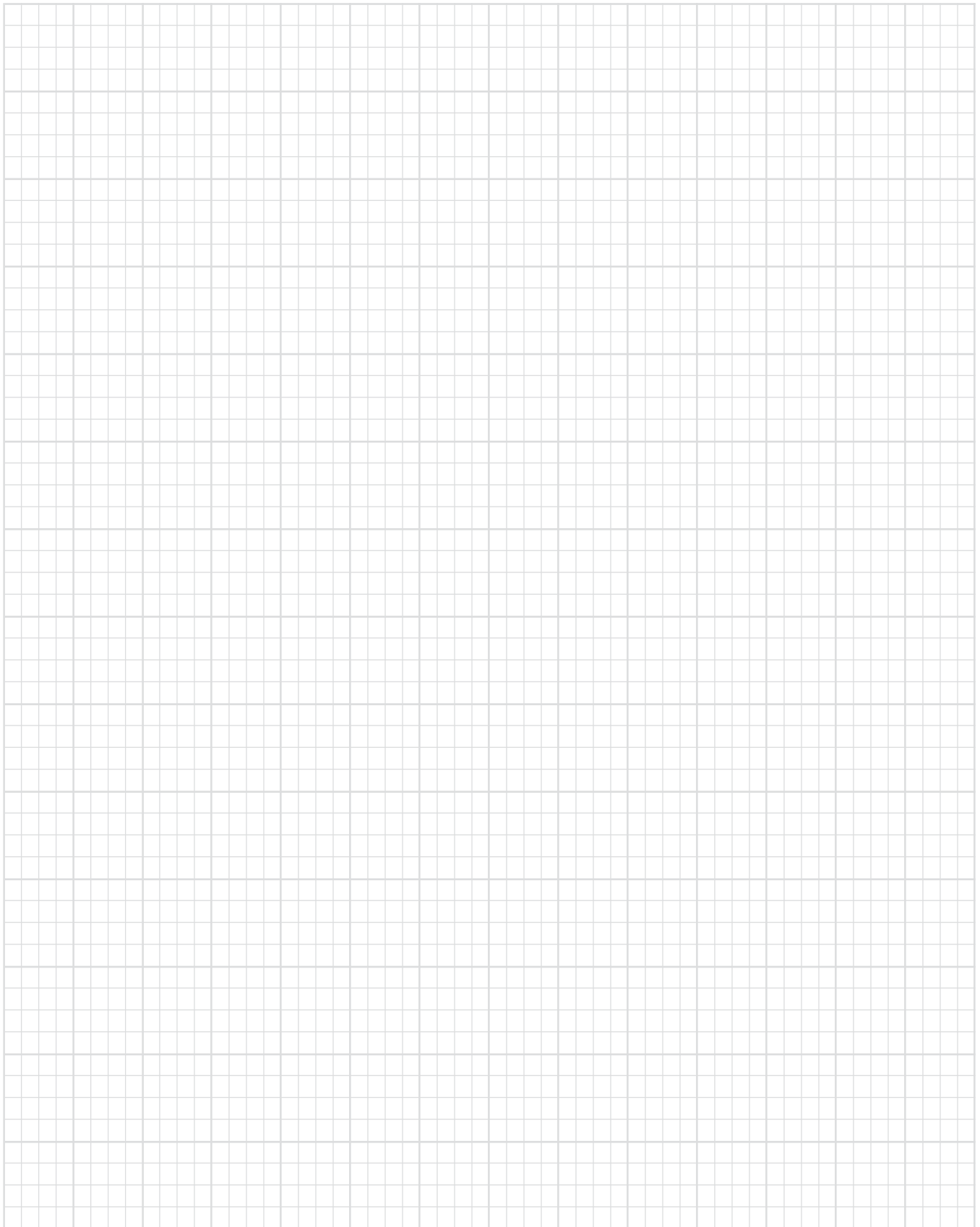
Lead Screw Code	Nut Code		D	A	B	L	W	H	X	Y	Z
B0801	A	1	14	27	4	16	21	18	3.4	—	—
B0802	A	1	14	27	4	16	21	18	3.4	—	—
B08025	A	1	16	29	4	26	23	20	3.4	—	—
B0805	B	1	18	31	4	24	25	20	3.4	—	—
B0808	B	1	18	31	4	23	25	20	3.4	—	—
B0812	B	1	18	31	4	29	25	20	3.4	—	—
G0801	A	1	14	27	4	16	21	18	3.4	—	—
G0802	A	1	14	27	4	16	21	18	3.4	—	—
G0805	A	1	18	31	4	28	25	20	3.4	—	—
G0808	B	1	18	31	4	20	25	20	3.4	—	—
G0812	B	1	18	31	4	29	25	20	3.4	—	—

TSM17 Series

Speed - Force Reference Curve



- Note:**
1. Mechanical Limit Definition: Since the motor output may exceed the force which the bearing can bear, so we take the motor bearing limit as the mechanical limit. However, linear motor fatigue and resultant life are determined by each customer's unique application. Load, speed, frequency, temperature, stability of guidance mechanism, etc., should all be considered before choosing a linear motor.
 2. The curves are reference values obtained by calculation. The actual output should consider the customer's unique application, including speed, acceleration and deceleration, frequency, stability of guidance mechanism, etc. Curves are based on theoretical calculations; actual applications may be affected by calculation deviations, machining tolerances, load inertia, friction losses and installation concentricity, so a 50% allowance is generally recommended.



TSM23 Series

Phases	2
Step Accuracy	±5%
Approvals	RoHS
Operating Temp.	0°C~+50°C
Insulation Class	B(130°C)



Ordering Information

TSM23Q-2RG - B1002 - 165 - AK1 - 0

Motor Series

Code	Motor Type Code
TSM23Q-2RG	Drive integrated

Ball Screw Type Code

Code	Nominal Diameter (mm)	Lead (mm)	Travel(mm) Travel Per1.8°
B1002	10	2	0.010
B1004	10	4	0.020
B1202	12	2	0.010
B1204	12	4	0.020
B1205	12	5	0.025
B1210	12	10	0.050

The length of the screw Lx

###	Provided in 1 mm increments (MAX 400 mm for dia. 10 and 480 mm for dia. 12)
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Special Custom Type Code

Code	Custom Type
0	No end machining
S	Ball Screw End Machining
XX	Other Special Custom Type

Mating Nut Code

Code	Mating Lead Screw
A1	B1002
A1	B1202
A1	B1004
A1	B1204
A1	B1205
A1	B1210

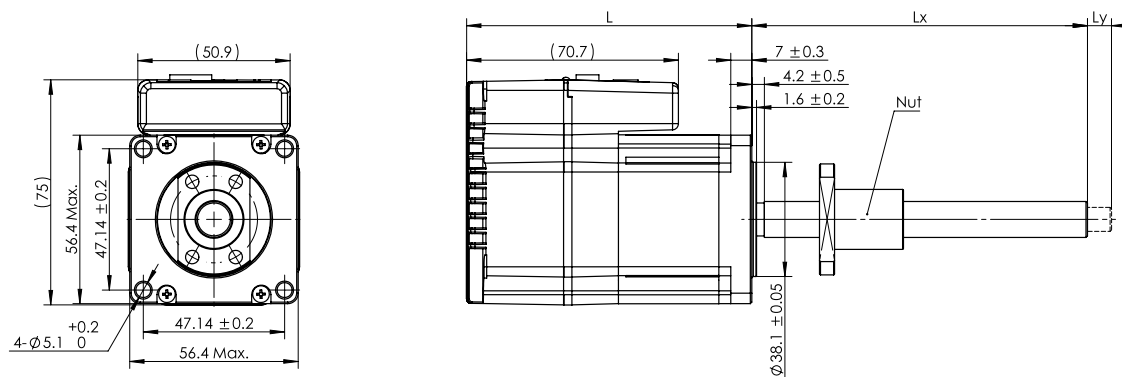
Electrical Specifications

TSM23Q-2RG	Control Command	Pulse Command Type	Max. pulse input frequency	Digital Input Number	Digital Output Number	Analog Input Number	Encoder Feedback Output	Digital Input Specifications	Digital Output Specifications
	Pulse Command Analog command, SCL Motion control Command, Q program, Modbus/RTU Communication Control	Pulse+Direction CW/CCW Double-pulse, A/B differential pulse	2MHz, Min.Pulse Width=250ns	8	4	1	20000 pulse/cycle A/B/Z differential signal	5-24VDC	30VDC /100mA
	Analog input specification	Input Power		Protect Power		Communication Interface		Communication Protocol	
	0-5VDC, Analog input resolution:12bits	12-70VDC		Overvoltage, Undervoltage, Overheated, Motor Winding Short Circuit (phase to phase and ground)		RS-485		Modbus/RTU or SCL	

TSM23 Series

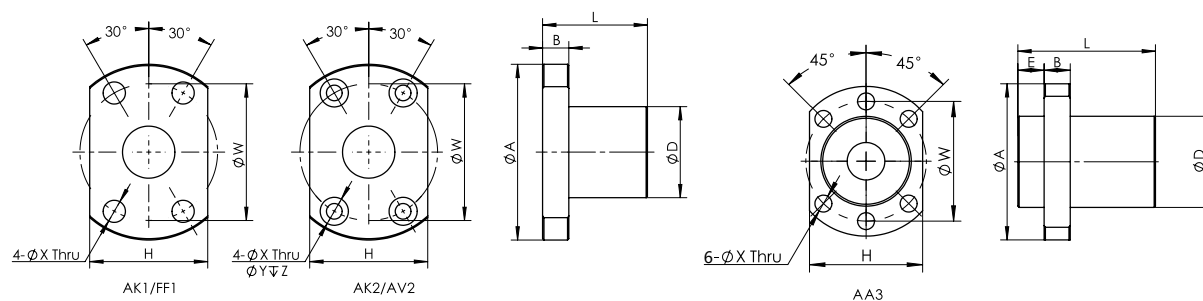
Dimensional Information

UNIT:mm



Motor Type	Dimension "L"
TSM23Q-2RG	95.2

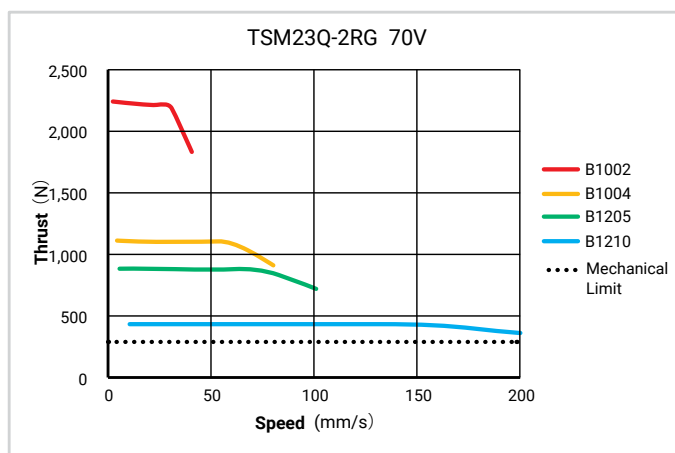
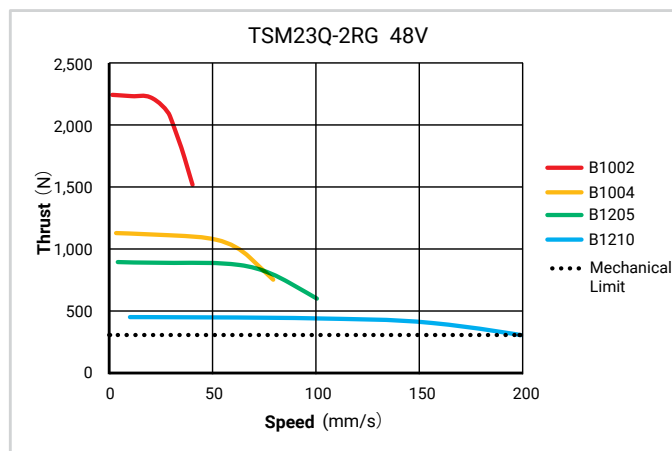
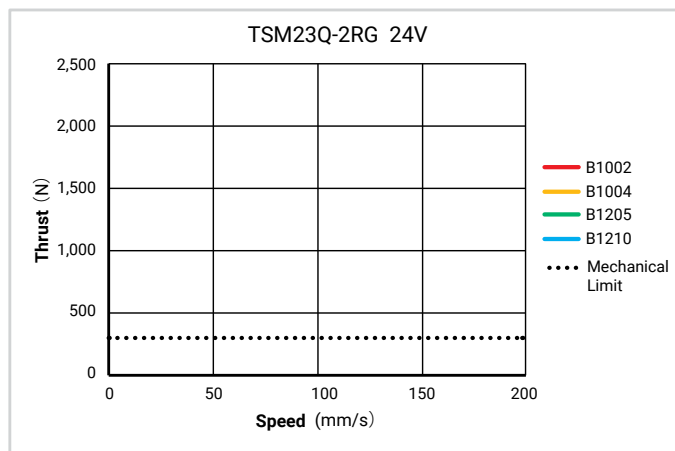
Nut Type



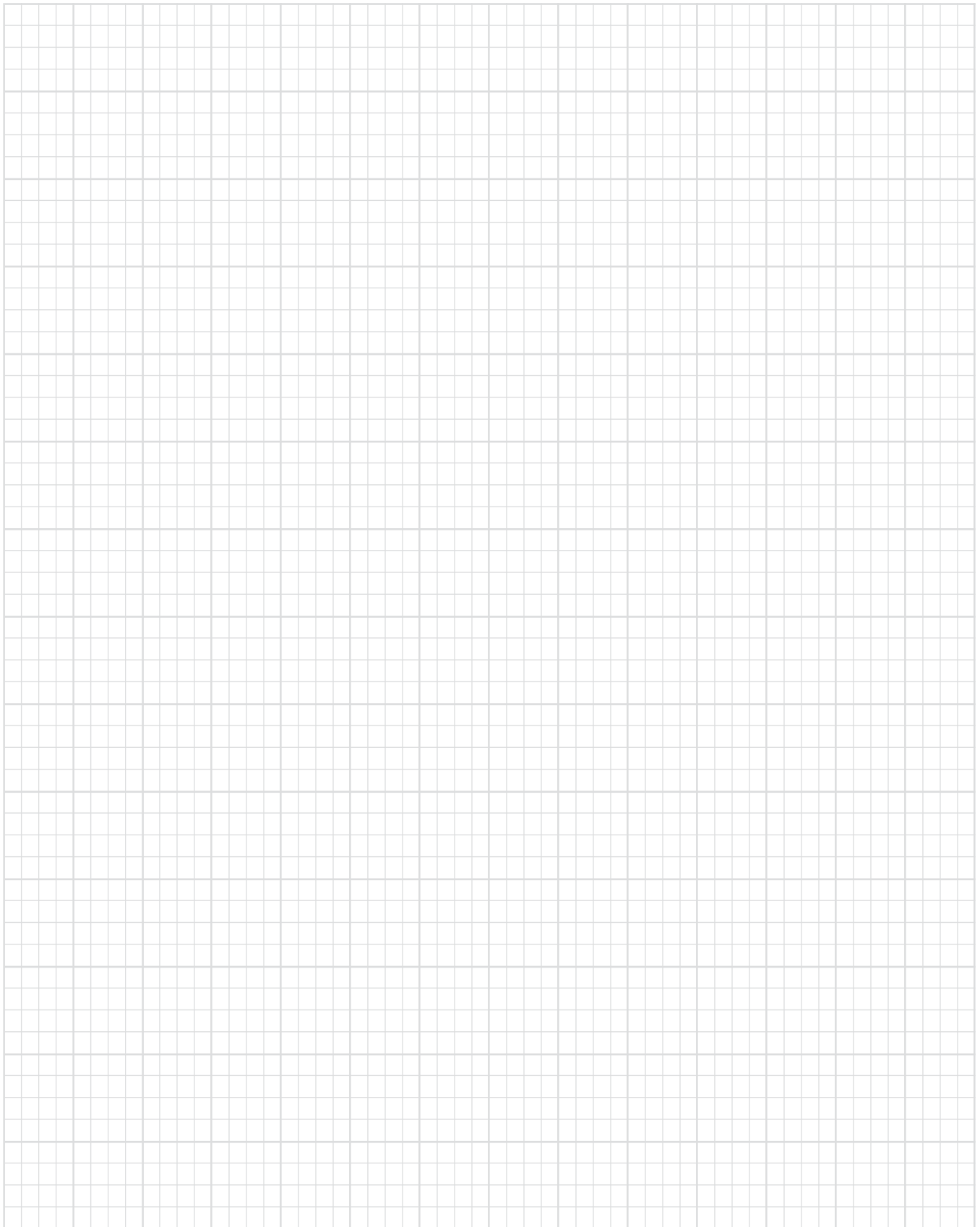
Lead Screw Code	Nut Code		D	A	E	B	L	W	H	X	Y	Z
B1002	A	1	18	35	—	5	28	27	22	4.5	—	—
B1004	A	1	26	46	—	10	34	36	28	4.5	8	4.5
B1202	A	1	20	37	—	5	28	29	24	4.5	—	—
B1204	A	1	24	40	—	8	35	32	30	4.5	—	—
B1205	A	1	24	40	—	10	31	32	30	4.5	—	—
B1210	A	1	24	40	—	10	48.5	32	30	4.5	—	—

TSM23 Series

Speed - Force Reference Curve



- Note:**
1. Mechanical Limit Definition: Since the motor output may exceed the force which the bearing can bear, so we take the motor bearing limit as the mechanical limit. However, linear motor fatigue and resultant life are determined by each customer's unique application. Load, speed, frequency, temperature, stability of guidance mechanism, etc., should all be considered before choosing a linear motor.
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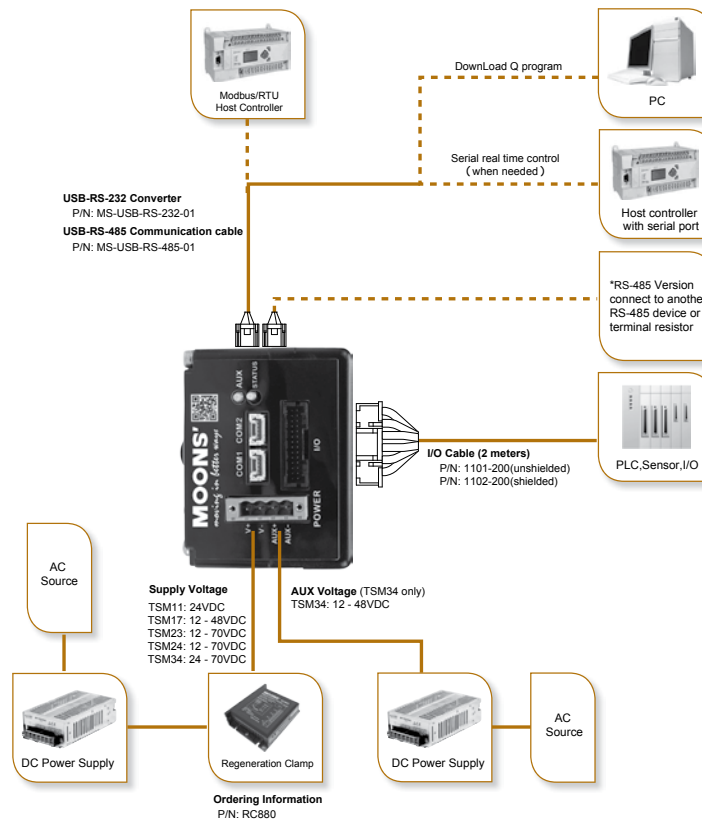


TSM Series Motors Operation And Control

Control Model

Interface	RS-485 or Modbus/RTU
Baud Rate(bps)	9600/19200/38400/57600/115200
Maximum Distance	Due to transmission baud rate
Maximum Connections	32 axes per channel
Communication Cable	Twisted Shielded Cable
Address Setting	Via Step-Servo Quick Tuner

System Configuration Diagram



Optional Accessories

P/N	Category	Technical Specification
RC880	Regeneration Clamp	80VDC Max. 50W
MS-USB-RS-232-01	USB Converter	USB to RS-232
MS-USB-RS-485-01	USB Converter	USB to RS-485
MS-USB-CAN-01	USB Converter	USB to CAN
1101- _ _ _	Cable	I/O cable, unshielded
1116- _ _ _	Cable	I/O cable, shielded
2101-150	Cable	RS-232 communication cable (P/Q type)
2113-150	Cable	RS-232 communication cable (C type)
2111- _ _ _	Cable	RS-485 Daisy Chain
2112- _ _ _	Cable	CANopen Daisy Chain
2012-030	Cable	CAT5e UTP 0.3m
2012-300	Cable	CAT5e UTP 3m
2013-030	Cable	CAT5e STP 0.3m
2013-300	Cable	CAT5e STP 3m

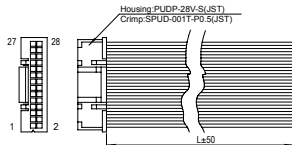
* (_ _ _) stands for length, unit: cm, ex.100 stands for 100 cm.

TSM Series Motors Operation And Control

Leads spec

General Purpose I/O Cable(unshielded) (TSM17/23)

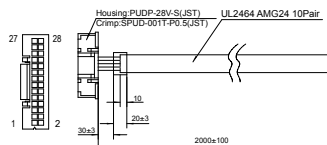
P/N	Length (L)
1101-100	1m
1101-200	2m
1101-500	5m



Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLU
2	X1-		BLU/WHT
3	X2+	High Speed Digital Input	YEL
4	X2-		YEL/WHT
5	X3	X3 Digital Input	GRN
6	X4	X4 Digital Input	ORG
7	X5	X5 Digital Input	GRY
8	X6	X6 Digital Input	PUR
9	XCOM	X Digital Input COM	WHT
10	+5V	+5V Analog Voltage	RED
11	AIN	Analog Input	BLU
12	GND	Analog Input Ground	BLK
13	X7+	X7 Digital Input	ORG
14	X7-		ORG/WHT
15	X8+	X8 Digital Input	GRN
16	X8-		GRN/WHT
17	Y1	Y1 Digital Output	BLU
18	Y2	Y2 Digital Output	YEL
19	Y3	Y3 Digital Output	BRN
20	YCOM	Y Output COM	BLK
21	Y4+	Y4 Digital Output	RED
22	Y4-		RED/WHT
23	Z+	Encoder Output Z (if applicable)	BLK
24	Z-		BLK/WHT
25	B+	Encoder Output B (if applicable)	GRN
26	B-		GRN/WHT
27	A+	Encoder Output A (if applicable)	ORG
28	A-		ORG/WHT

General Purpose I/O Cable(shielded) (TSM17/23)

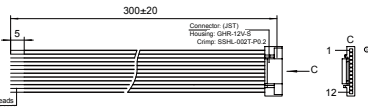
P/N	Length (L)
1116-100	1m
1116-200	2m
1116-300	3m
1116-500	5m



Pin No.	Assignment	Description	Color
1	X1+	High Speed Digital Input	BLU/WHT
2	X1-		BLU/BLK
3	X2+	High Speed Digital Input	GRN/WHT
4	X2-		GRN/BLK
5	X3	X3 Digital Input	BLU
6	X4	X4 Digital Input	PUR
7	X5	X5 Digital Input	YEL
8	X6	X6 Digital Input	GRN
9	XCOM	X Digital Input COM	ORG
10	+5V	+5V Analog Voltage	RED
11	AIN	Analog Input	WHT
12	GND	Analog Input Ground	BLK
13	X7+	X7 Digital Input	BRN/WHT
14	X7-		BRN/BLK
15	X8+	X8 Digital Input	GRY/WHT
16	X8-		GRY/BLK
17	Y1	Y1 Digital Output	BRN
18	Y2	Y2 Digital Output	GRY
19	Y3	Y3 Digital Output	PNK
20	YCOM	Y Output COM	YEL/GRN
21	Y4+	Y4 Digital Output	PUR/WHT
22	Y4-		PUR/BLK
23	Z+	Encoder Output Z (if applicable)	YEL/WHT
24	Z-		YEL/BLK
25	B+	Encoder Output B (if applicable)	ORG/WHT
26	B-		ORG/BLK
27	A+	Encoder Output A (if applicable)	RED/WHT
28	A-		RED/BLK

Power + Comm + I/O Cable (Flying leads,TSM11 only)

P/N	Length (L)
1109-030	0.3m

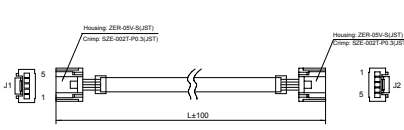


Pin No.	Assignment	Description	Color
1	Y2	Y2 Digital Output	PUR
2	Y1	Y1 Digital Output	ORN
3	X4	X4 Digital Input	WHT

Pin No.	Assignment	Description	Color
4	X3	X3 Digital Input	BRN
5	X2	High Speed Digital Input	YEL
6	X1	High Speed Digital Input	GRY
7	RXD-	RS-422/485 Data Receive-	GRN/WHT
8	RXD+	RS-422/485 Data Receive+	GRN
9	TXD-	RS-422/485 Data Transmit-	BLU/WHT
10	TXD+	RS-422/485 Data Transmit+	BLU
11	V+	Power Supply +	RED
12	V-	Power GND	BLK

RS-485 Daisy Chain Communication Cable (TSM17/23)

P/N	Length (L)
2111-025	0.25m
2111-050	0.5m
2111-100	1m
2111-300	3m



TSM Series Motors Operation And Control

Regeneration Clamp

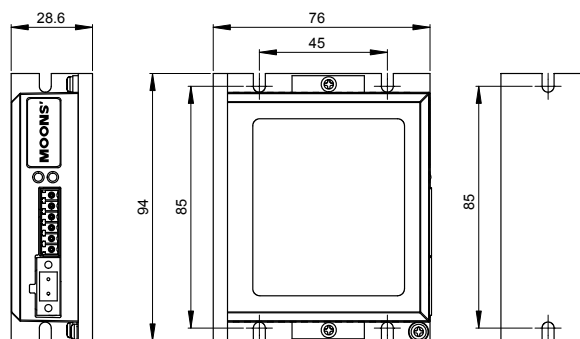
P/N: RC880

When using regulated power supply you may encounter a problem with regeneration. The kinetic energy caused by regeneration is transferred back to the power supply. This can trip the over-voltage protection of a switching power supply, causing it to shut down.

The RC880 regeneration clamp solves this problem. If in doubt, use an RC880 for your first installation. If the "regen" LED on the RC880 never flashes, you do not need the clamp.



Dimensions(Unit: mm)



USB Converter

Model
MS-USB-RS-232-01



Model
MS-USB-RS-485-01



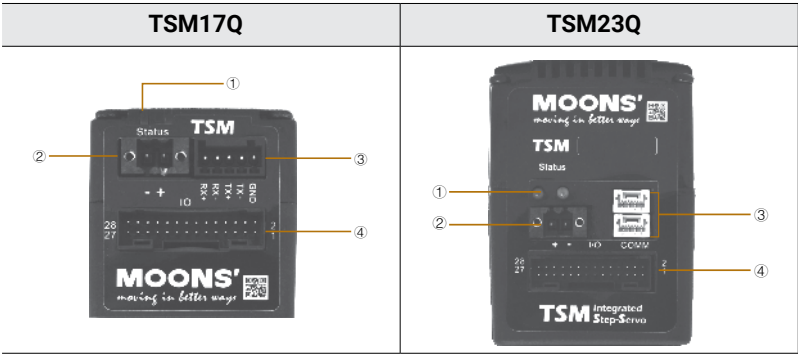
Model
MS-USB-CAN-01



TSM Series Motors Operation And Control

Connection and Operation (Q Controller Type)

Names and Functions of Parts



① LED Displays

Indication	Color	Function	When Activated
Operation	Green	Power on indication	When driver is powered up
Alarm	Red	Alarm indication	Flashes when in protection
Operation	Yellow	Auxiliary Power on indication	When AUX powered up

LED Error Codes

TSM uses red and green LEDs to indicate status. When the motor is enabled, the green LED flashes slowly. When the green LED is solid, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown in Page of Alarm information.

Apart from the main power supply, TSM34 also has an auxiliary power input (AUX power) for keep alive function of the drive. When the main power supply is off, the AUX power will keep the logic power on, allowing the drive to remember its state data (motor position, etc.). This allows the motor to resume operation from its previous position without a homing routine when the main power is switched back on.

② Power Connector

TSM17/23

P/N: Weidmuller 1615780000

	Description
+	Power Supply +
-	Power Supply -

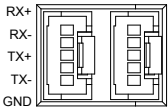
③ Communication Connector

TSM17/23Q(RS-485)

Housing P/N: JST ZER-05V-S

Crimp P/N: JST SZE-002T-P0.3

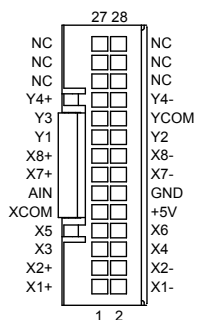
RS-485



Connector	Assignment
RX+	Receive+
RX-	Receive-
TX+	Transmit+
TX-	Transmit-
GND	GND

TSM Series Motors Operation And Control

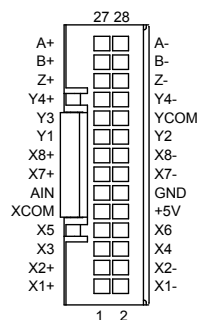
TSM17Q I/O Signal Connector



Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input
2	X1-/STEP-	
3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	NC	N/C
24	NC	
25	NC	
26	NC	
27	NC	
28	NC	

TSM23Q I/O Signal Connector



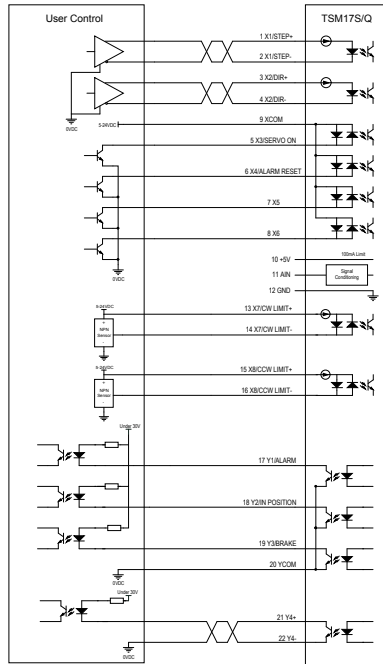
Housing P/N: JST PUDP-28V-S
Crimp P/N: JST SPUD-001T-P0.5

Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input
2	X1-/STEP-	
3	X2+/DIR+	High Speed Digital Input
4	X2-/DIR-	
5	X3	X3 Digital Input
6	X4	X4 Digital Input
7	X5	X5 Digital Input
8	X6	X6 Digital Input
9	XCOM	Digital Input COM
10	+5	+5V OUT 100mA max.
11	AIN	Analog Input
12	GND	Aanlog Ground
13	X7+	X7 Digital Input
14	X7-	
15	X8+	X8 Digital Input
16	X8-	
17	Y1	Y1 Digital Output
18	Y2	Y2 Digital Output
19	Y3	Y3 Digital Output
20	YCOM	Digital Output COM
21	Y4+	Y4 Digital Output
22	Y4-	
23	Z+	Encoder Output Z
24	Z-	
25	B+	Encoder Output B
26	B-	
27	A+	Encoder Output A
28	A-	

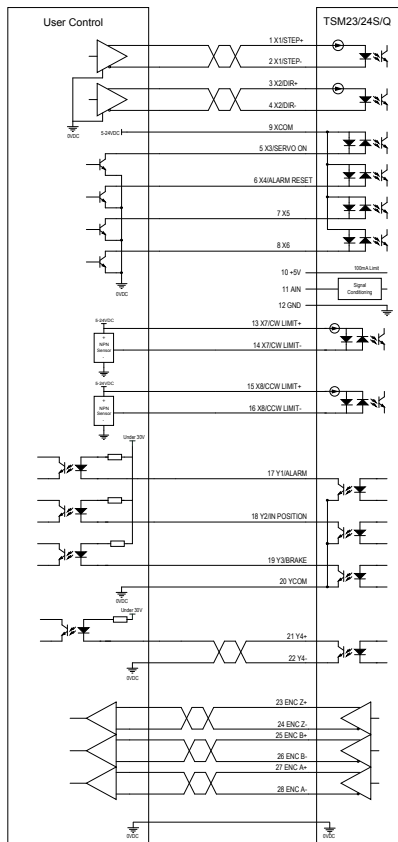
TSM Series Motors Operation And Control

Wiring Diagram

TSM17Q



TSM23Q



Description of Input/Output Signals

Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

Circuit above shows when pulse input is line driver type

Pulse signal input range 5-24VDC

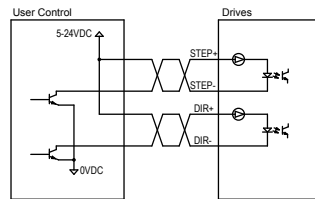
Digital signal input range 5-24VDC

Use a multi-core, twisted-pair shielded wire of AWG28 to 24 for the control input/output signal line, and keep wiring as short as possible

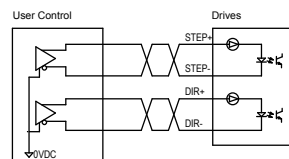
Provide safety distance between the control I/O signal lines and power lines

Pulse Input Circuit and Sample Connection

With Open Collector Output



With Line Driver Output



Pulse Input Mode

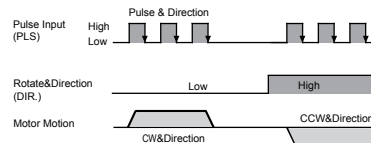
Pulse & Direction

When the Pulse input is turned ON while the DIR input is ON, the motor will rotate by one step in one direction.

When the Pulse input is turned ON while the DIR input is OFF, the motor will rotate by one step the other direction.

*Direction definition of DIR input can be configured via Step-Servo Quick Tuner.

By default, on the falling edge of the pulse input with the DIR input low (or open), the motor rotates one step CW; with the DIR input high, it rotates one step CCW.

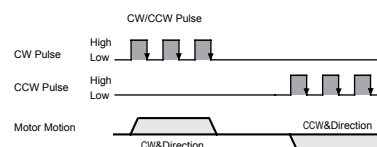


CW/CCW Pulse

When the X1 input is turned ON, the motor will rotate by one step in One direction. When the X2 input is turned ON, the motor will rotate by one step in the other direction.

*Direction definition can be configured via Step-Servo Quick Tuner.

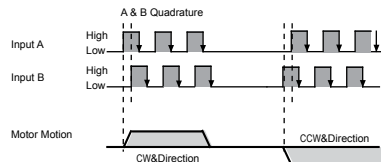
The chart below shows motor configured as while the X1 input is ON, the motor will rotate by one step in CW direction.



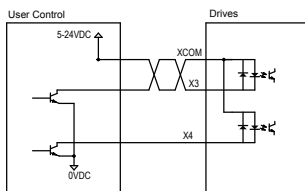
TSM Series Motors Operation And Control

A & B Quadrature

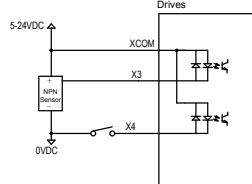
The motor will move according to signals that are fed to the drive from a two channel incremental master encoder. Direction definition can be configured Step-Servo Quick Tuner. Direction is determined via which channel leads the other. The chart below shows motor configured as while X1 Leads X2, the motor will rotate by CW direction.



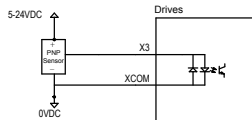
Digital Input Circuit and Sample Connection With Open Collector Output



With NPN type Sensor



With PNP type Sensor



Servo ON Input

X3 can be configured as Enable signal to excite the motor.

Alarm Reset Input

X4 can be configured as Reset signal to clear the alarm and turns to normal status as Servo OFF.

Caution: Please make sure there's no error in system before you clear an Alarm.

CW/CCW Limit Input

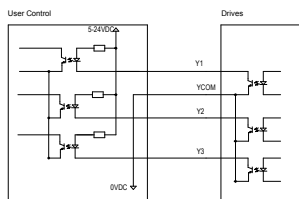
X7 can be configured as CW limit signal input, X8 can be configured as CCW limit signal input.

When either limit signal activates, motor will stop immediately and indicate an Alarm. (Unless motors works in Homing mode and defined otherwise)

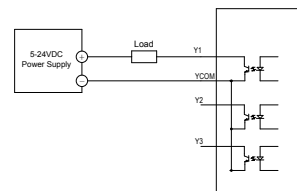
Connecting using Digital Outputs

Output Circuit and Sample Connection

Open Collector Output



Driving external load



Alarm Output

Y1 can be configured as signal output if a fault occurs, meanwhile the red LED will flash.

In Position Output

Y2 can be configured as signal output when position error less than a user-defined count value.

Moving Output

Y2 can be configured as signal output when motor is moving.

Brake Output

Y3 can be configured as signal output to release brake.

Timing Output

Y4 can be configured as Timing signal output, it will turn ON every time the motor output shaft rotates by 7.2°. 50 pulses output with one rotation.

Tach Output

Y4 can be configured as Tach signal output, tach output produces pulses relative to the motor position with configurable resolution on: 100, 200, 400, 800, 1600.

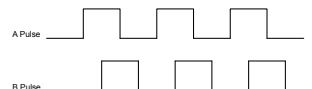
Encoder Output

Differential pulse output with channel A/B/Z

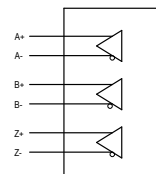
While motor rotates one revolution, A-Phase/B Phase generate total 20,000 counts, Z-Phase generates one signal.

The B-Phase output has a 90° phase difference with respect to the A-Phase output. Phase A Leads B 90° while motor rotates by CW direction, phase B leads A 90° while motor rotates by CCW direction.

Pulse Output Signal Chart

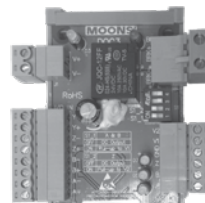


Encoder Output Circuit

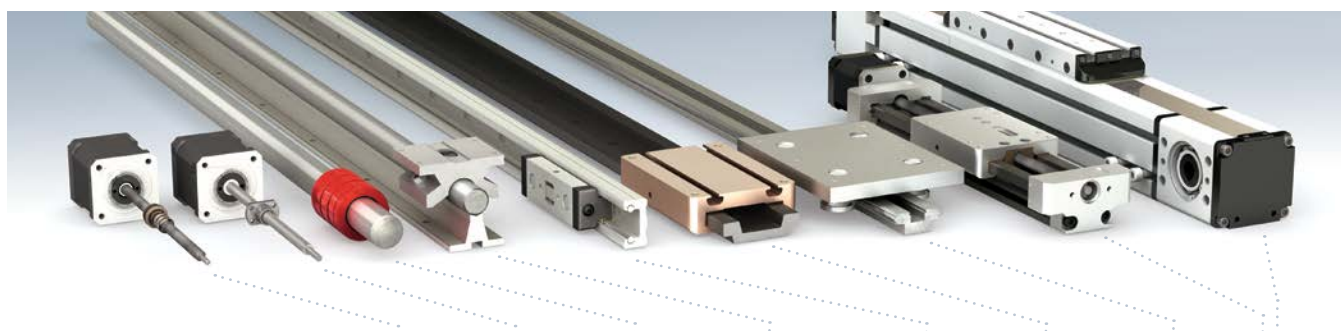


Note: If the controller cannot support differential signal input, you can choose the module that it can convert the differential signal into open-collector output.

Module part number: DOC3



Available Linear Solutions to Fit Your Application



	Lead Screw	Ball Screw	Simplicity Bearings	Roller Pillow Block	Cam Roller	Gliding Surface	Integral-V	Mechatronics Systems
Inexpensive	●	●	●	●	●	●	●	●
Low Maintenance	●	●	●	●		●		●
Compact Size	●	●				●		●
Low Noise	●		●					●
Multiple Configurations	●	●	●	●	●	●	●	●
Washdown Applications	●		●			●		●
Custom Design Support	●	●	●	●	●	●	●	●
Moderate to High Speed	●	●	●	●	●	●	●	●
Vacuum & Cleanroom Applications	●	●**	●			●		●
Food Processing	●	●**	●	●		●		
Ease of Installation	●	●			●		●	●

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**PBC Linear
Worldwide Headquarters**

6402 E. Rockton Road
Roscoe, Illinois 61073
USA
Tel: +1.815.389.5600
Toll-Free: +1.800.962.8979
Fax: +1.815.389.5790

sales@pbclinear.com
pbclinear.com

**PBC Linear Europe GmbH
European Headquarters**

Bonner Straße 363
40589 Duesseldorf
Germany
Tel: +49 211 545590 20
Fax: +49 211 545590 39

info@pbclinear.eu
pbclinear.eu

**PBC-MOONS
China Headquarters**

168 Mingjia Road, Minhang
District, Shanghai 201107,
P.R. China
Tel: +86 21 52634688
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