Electric Actuator with Motor Specification

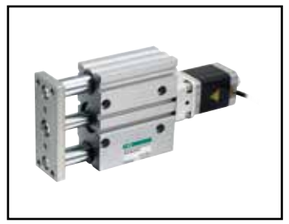
DSTS

Guided Type

CONTENTS

DSTS System Table

Actuator Model No.	Motor Size	Screw Lead (mm)	Max. Payload (kg)		Stroke (mm) and Max. Speed (mm/s)	
			Horizontal	Vertical	25	50
DSTS-20	□35	6	4.4	6.4	90	
		9	4.4	4.8	135	
DSTS-32	□42	6	10	14	90	
		12	4	4.8	180	
DSTS-50	□56	6	14.8	13.2	72	
		12	9.2	7.2	144	



Electric Actuator Guided Type

DSTS-20

□35 Stepping Motor

For compatible detailed model Nos., please see our website.

Model No. Notation Method

DSTS - ❶M - ❷20 ❸S ❹E - ❺06 ❻025 ❼T3PH ❽R1 ❾A ❿1 - ⓫F

❶Bearing type

M	Plain bearing

❷Size

20	20

❸Connected Controller *1

S	ESC4

❹Motor Mounting Direction

E	Inline Mount

❺Lead

06	6 mm
09	9 mm

❻Stroke

025	25 mm
050	50 mm

❼Switch

NNNN	None
T3PH	T-type straight type
T3PV	T-type L-shape type

❽Relay Cable *2

N0	None
R1	Flexible 1 m
R3	Flexible 3 m
R5	Flexible 5 m
RX	Flexible 10 m

❾Controller Attached

N	None
A	DIN rail mounting specification
B	Panel mounting specification

❿IO Cable Length

N	None
1	1 m
3	3 m
5	5 m
X	10 m

⓫Option

Blank	End plate material: Aluminum
F	End plate material: Steel

*1 For controllers, please refer to P. 611.
*2 For the external dimension drawing of the relay cable, please refer to P. 618.

Specifications

Connected Controller		ESC4	
Motor		□35 Stepping Motor	
Drive Method		Sliding screw ø6	
Stroke mm		25, 50	
Screw lead mm		6	9
Max. Payload kg *1	Horizontal	4.4	4.4
	Vertical	6.4	4.8
Operating Speed Range *2 mm/s		15 to 90	22 to 135
Max. Acceleration/Deceleration *3 mm/s²		1312 (Setting: 9)	2938 (Setting: 9)
Insulation Resistance		10 MΩ, 500 VDC	
Withstanding Voltage		500 VAC for 1 minute	
Operating Ambient Temperature, Humidity		0 to 40°C (no freezing) 35 to 80% RH (no condensation)	
Storage Ambient Temperature, Humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)	
Atmosphere		No corrosive gas, explosive gas, or dust	
Protection Structure		IP40	

*1 Payload varies depending on speed. For details, please refer to the speed and payload table. If the operating noise at low speed is loud, please increase the speed.
*2 Maximum speed may decrease depending on conditions.
*3 For acceleration/deceleration at other settings, please refer to the speed and payload table.
*4 Pushing operation is not supported. Colliding with the mechanical end, etc., may lead to damage to the internal parts of the actuator.

Speed and Payload

[Horizontal Installation]

Switch Setting	Screw Lead 6 mm Speed (mm/s)	6 mm Payload (kg) Stroke (mm) 50 or less	Screw Lead 9 mm Speed (mm/s)	9 mm Payload (kg) Stroke (mm) 50 or less
0	15	4.4	22	4.4
1	23	4.4	35	4.4
2	31	4.4	47	4.0
3	40	4.4	60	3.6
4	48	3.6	72	3.6
5	56	3.6	85	3.2
6	65	2.8	97	2.8
7	73	2.8	110	2.4
8	81	2	122	2.4
9	90	2	135	2

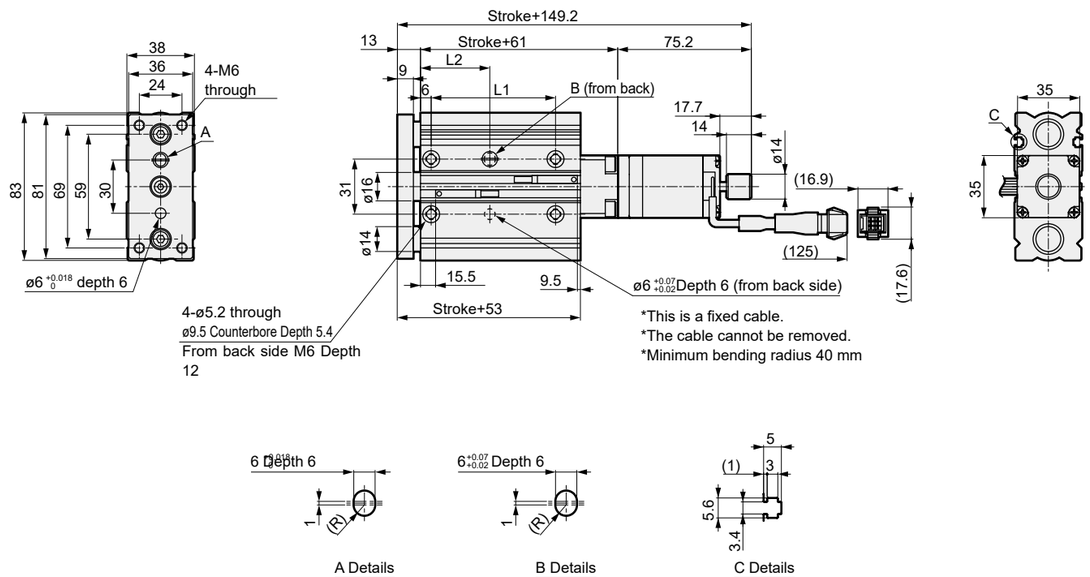
[Vertical Installation]

Switch Setting	Screw Lead 6 mm Speed (mm/s)	6 mm Payload (kg) Stroke (mm) 50 or less	Screw Lead 9 mm Speed (mm/s)	9 mm Payload (kg) Stroke (mm) 50 or less
0	15	6.4	22	4.8
1	23	6.4	35	4.8
2	31	6.4	47	4.8
3	40	6.4	60	4.8
4	48	6.4	72	4.4
5	56	6.4	85	4.4
6	65	6.4	97	4
7	73	4.8	110	3.6
8	81	4.8	122	3.3
9	90	4.8	135	3

* The speed setting is a guideline. A discrepancy from the actual values may occur due to switch adjustment, power supply voltage, individual differences among motors, variations in mechanical efficiency, and temperature.
* Value when no moment is applied to the end plate section. For details such as flatness of the mounting surface, please refer to the instruction manual.

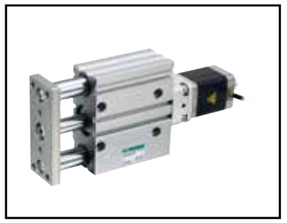
External Dimension Drawing

● DSTS-20



[Dimension Table by Stroke]

Stroke Code	025	050
Stroke (mm)	25	50
L1	45	70
L2	26.5	39
Weight (kg)	1.1	1.3



Electric Actuator Guided Type

DSTS-32

□42 Stepping Motor

For compatible detailed model Nos., please see our website.

Model No. Notation Method

DSTS - M - 32 S E - 06 025 T3PH R1 A 1 - F

❶ Bearing type

M	Plain bearing

❷ Size

32	32

❸ Connected Controller *1

S	ESC4

❹ Motor Mounting Direction

E	Inline Mount

❺ Lead

06	6 mm
12	12 mm

❻ Stroke

025	25 mm
050	50 mm

❼ Switch

NNNN	None
T3PH	T-type straight type
T3PV	T-type L-shape type

❽ Relay Cable *2

N0	None
R1	Flexible 1 m
R3	Flexible 3 m
R5	Flexible 5 m
RX	Flexible 10 m

❾ Controller Attached

N	None
A	DIN rail mounting specification
B	Panel mounting specification

❿ IO Cable Length

N	None
1	1 m
3	3 m
5	5 m
X	10 m

⓫ Option

Blank	End plate material: Aluminum
F	End plate material: Steel

*1 For controllers, please refer to P. 611.
*2 For the external dimension drawing of the relay cable, please refer to P. 618.

Specifications

Connected Controller		ESC4	
Motor		□42 Stepping Motor	
Drive Method		Sliding screw ø8	
Stroke	mm	25, 50	
Screw lead	mm	6	12
Max. Payload kg *1	Horizontal	10	4
	Vertical	14	4.8
Operating Speed Range *2	mm/s	15 to 90	30 to 180
Max. Acceleration/Deceleration *3	mm/s²	1312 (Setting: 9)	5250 (Setting: 9)
Insulation Resistance		10 MΩ, 500 VDC	
Withstanding Voltage		500 VAC for 1 minute	
Operating Ambient Temperature, Humidity		0 to 40°C (no freezing) 35 to 80% RH (no condensation)	
Storage Ambient Temperature, Humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)	
Atmosphere		No corrosive gas, explosive gas, or dust	
Protection Structure		IP40	

*1 Payload varies depending on speed. For details, please refer to the speed and payload table. If the operating noise at low speed is loud, please increase the speed.
*2 Maximum speed may decrease depending on conditions.
*3 For acceleration/deceleration at other settings, please refer to the speed and payload table.
*4 Pushing operation is not supported. Colliding with the mechanical end, etc., may lead to damage to the internal parts of the actuator.

Speed and Payload

[Horizontal Installation]

Switch Setting	Screw Lead 6 mm Speed (mm/s)	6 mm Payload (kg) Stroke (mm) 50 or less	Screw Lead 12 mm Speed (mm/s)	12 mm Payload (kg) Stroke (mm) 50 or less
0	15	10.0	30	4.0
1	23	9.2	46	3.2
2	31	6.0	63	2.8
3	40	6.0	80	2.4
4	48	4.0	96	2.4
5	56	3.6	113	2.4
6	65	3.6	130	2.4
7	73	3.2	146	2.0
8	81	2.4	163	1.6
9	90	2.0	180	1.2

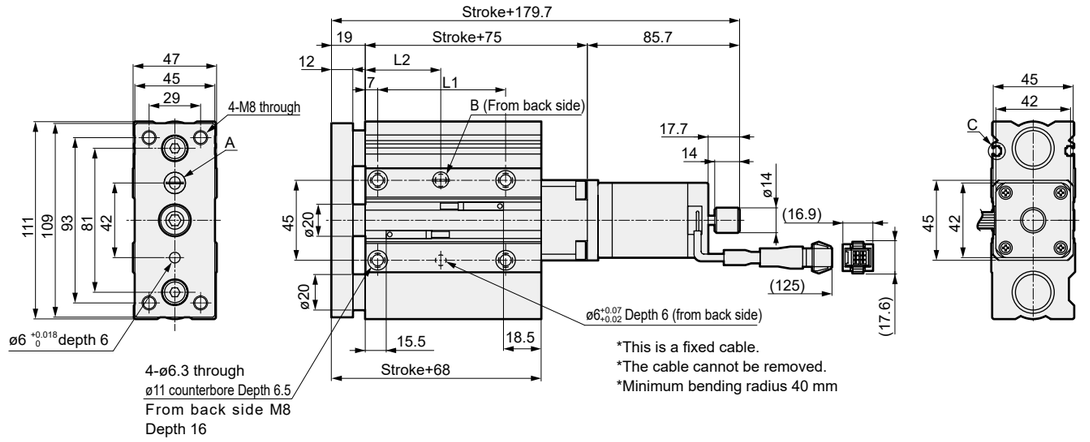
[Vertical Installation]

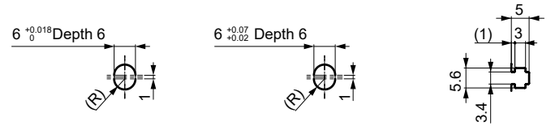
Switch Setting	Screw Lead 6 mm Speed (mm/s)	6 mm Payload (kg) Stroke (mm) 50 or less	Screw Lead 12 mm Speed (mm/s)	12 mm Payload (kg) Stroke (mm) 50 or less
0	15	14	30	4.8
1	23	13.2	46	4
2	31	12.4	63	4
3	40	11.6	80	4
4	48	11.6	96	3.6
5	56	11.6	113	3.2
6	65	10.8	130	2.8
7	73	10.8	146	2.4
8	81	10	163	2.0
9	90	9.2	180	1.6

* The speed setting is a guideline. A discrepancy from the actual values may occur due to switch adjustment, power supply voltage, individual differences among motors, variations in mechanical efficiency, and temperature.
* Value when no moment is applied to the end plate section. For details such as flatness of the mounting surface, please refer to the instruction manual.

External Dimension Drawing

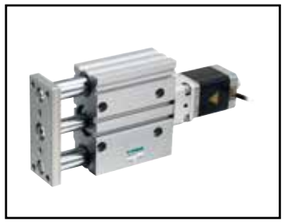
● DSTS-32





[Dimension Table by Stroke]

Stroke Code	025	050
Stroke (mm)	25	50
L1	47	72
L2	30	42.5
Weight (kg)	2.2	2.6



Electric Actuator Guided Type

DSTS-50

□56 Stepping Motor

For compatible detailed model Nos., please see our website.

Model No. Notation Method

DSTS - M - 50 S E - 06 025 T3PH R1 A 1 - F

❶Bearing type

M	Plain bearing

❷Size

50	50

❸Connected Controller *1

S	ESC4

❹Motor Mounting Direction

E	Inline Mount

❺Lead

06	6 mm
12	12 mm

❻Stroke

025	25 mm
050	50 mm

❼Switch

NNNN	None
T3PH	T-type straight type
T3PV	T-type L-shape type

❽Relay Cable *2

N0	None
R1	Flexible 1 m
R3	Flexible 3 m
R5	Flexible 5 m
RX	Flexible 10 m

❾Controller Attached

N	None
A	DIN rail mounting specification
B	Panel mounting specification

❿IO Cable Length

N	None
1	1 m
3	3 m
5	5 m
X	10 m

⓫Option

Blank	End plate material: Aluminum
F	End plate material: Steel

*1 For controllers, please refer to P. 611.
*2 For the external dimension drawing of the relay cable, please refer to P. 618.

Specifications

Connected Controller		ESC4	
Motor		□56 Stepping Motor	
Drive Method		Sliding screw ø12	
Stroke	mm	25, 50	
Screw lead	mm	6	12
Max. Payload kg *1	Horizontal	14.8	9.2
	Vertical	13.2	7.2
Operating Speed Range *2	mm/s	15 to 72	30 to 144
Max. Acceleration/ Deceleration	*3 mm/s²	827 (Setting: 9)	3306 (Setting: 9)
Insulation Resistance		10 MΩ, 500 VDC	
Withstanding Voltage		500 VAC for 1 minute	
Operating Ambient Temperature, Humidity		0 to 40°C (no freezing) 35 to 80% RH (no condensation)	
Storage Ambient Temperature, Humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)	
Atmosphere		No corrosive gas, explosive gas, or dust	
Protection Structure		IP40	

*1 Payload varies depending on speed. For details, please refer to the speed and payload table. If the operating noise at low speed is loud, please increase the speed.
*2 Maximum speed may decrease depending on conditions.
*3 For acceleration/deceleration at other settings, please refer to the speed and payload table.
*4 Pushing operation is not supported. Colliding with the mechanical end, etc., may lead to damage to the internal parts of the actuator.

Speed and Payload

[Horizontal Installation]

Switch Setting	Screw Lead 6 mm Speed (mm/s)	Payload (kg) Stroke (mm) 50 or less	Screw Lead 12 mm Speed (mm/s)	Payload (kg) Stroke (mm) 50 or less
0	15	14.8	30	9.2
1	21	11.6	42	9.2
2	27	10.0	55	9.2
3	34	8.4	68	9.2
4	40	8.4	80	8.8
5	46	8.4	93	8.8
6	53	8.4	106	8.4
7	59	6.8	118	7.6
8	65	6.8	131	6.0
9	72	6.8	144	4.4

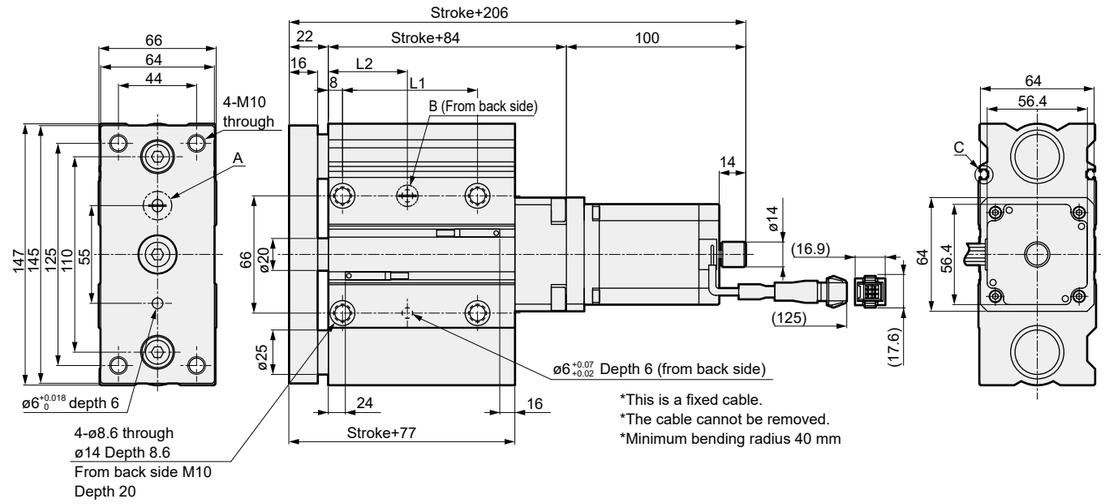
[Vertical Installation]

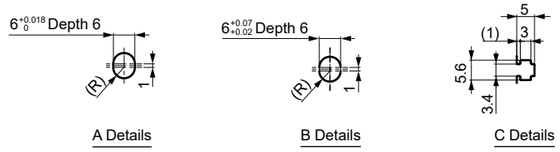
Switch Setting	Screw Lead 6 mm Speed (mm/s)	Payload (kg) Stroke (mm) 50 or less	Screw Lead 12 mm Speed (mm/s)	Payload (kg) Stroke (mm) 50 or less
0	15	13.2	30	7.2
1	21	13.2	42	7.2
2	27	13.2	55	7.2
3	34	13.2	68	7.2
4	40	12.8	80	7.2
5	46	12.4	93	6.8
6	53	12	106	6.4
7	59	9.6	118	6
8	65	7.6	131	4.4
9	72	6	144	2.4

* The speed setting is a guideline. A discrepancy from the actual values may occur due to switch adjustment, power supply voltage, individual differences among motors, variations in mechanical efficiency, and temperature.
* Value when no moment is applied to the end plate section. For details such as flatness of the mounting surface, please refer to the instruction manual.

External Dimension Drawing

● DSTS-50





[Dimension Table by Stroke]

Stroke Code	025	050
Stroke (mm)	25	50
L1	51	76
L2	32	44.5
Weight (kg)	4.2	4.8

Model Selection

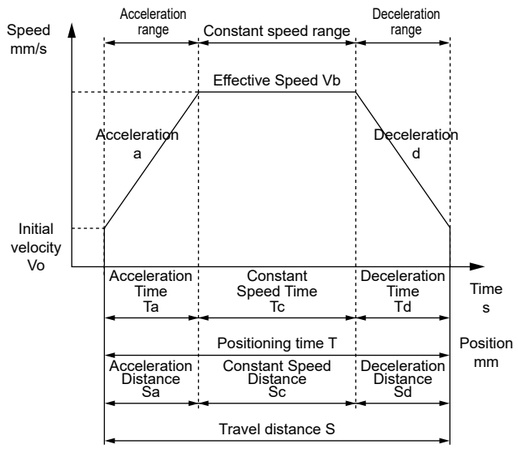
STEP1 Confirmation of Payload

Payload changes depending on mounting orientation, screw lead, and transport speed. Select the size and screw lead by referring to the system table (P. 453), the specification table for each model, and the payload table by speed setting.

STEP2 Confirmation of Positioning Time

Calculate the positioning time for the selected product according to the example below and check if it meets the required tact time.

Positioning time for general transfer operations



	Content	Code	Unit	Formula
Setting Value	Initial velocity	V0	mm/s	According to the table below (= value of switch setting 0)
	Speed Setting	V	mm/s	According to the table below
	Acceleration	a	mm/s²	According to the table below (fixed value)
	Deceleration			
	Travel Distance	S	mm	*
Calculated Value	Reached Speed	Vmax	mm/s	$= (S \times a + V0^2)^{1/2}$
	Effective Speed	Vb	mm/s	The smaller of V and Vmax
	Acceleration Time	Ta	s	= (Vb-V0)/a
	Deceleration Time			
	Constant Speed Time	Tc	s	= Sc / Vb
	Acceleration Distance	Sa	mm	$= V0 \times Ta + (a \times Ta^2) / 2$
	Deceleration Distance			
	Constant Speed Distance	Sc	mm	=S-2×Sa
	Positioning Time	T	s	=2×Ta+Tc

* Depending on the speed setting and stroke, a trapezoidal velocity waveform may not be formed (the set speed may not be reached). In that case, select the smaller of the set speed (V) and the reached speed (Vmax) as the effective speed (Vb).
* Acceleration/deceleration is determined by the speed setting.
* The speed is determined by the settings of rotary switches 1 and 2.
* Settling time varies depending on the usage conditions, but it may take about 0.2 s.

[Speed Setting] (mm/s)

Switch Setting	Size 20		Size 32		Size 50	
	L6	L9	L6	L12	L6	L12
0	15	22	15	30	15	30
1	23	35	23	46	21	42
2	31	47	31	63	27	55
3	40	60	40	80	34	68
4	48	72	48	96	40	80
5	56	85	56	113	46	93
6	65	97	65	130	53	106
7	73	110	73	146	59	118
8	81	122	81	163	65	131
9	90	135	90	180	72	144

[Acceleration, Deceleration] (mm/s²)

Switch Setting	Size 20		Size 32		Size 50	
	L6	L9	L6	L12	L6	L12
0	0	0	0	0	0	0
1	53	119	53	212	38	153
2	129	290	129	518	90	360
3	229	513	229	916	155	620
4	351	787	351	1407	234	934
5	497	1114	497	1990	325	1301
6	666	1492	666	2666	431	1722
7	858	1922	858	3435	549	2196
8	1074	2404	1074	4296	681	2724
9	1312	2938	1312	5250	827	3306

STEP3 Confirmation of Static Allowable Load and Static Allowable Moment

Calculate the load and moment that occur when the end plate stops. Confirm that the lateral load (W) and torsional moment (MY) are as follows. Following the formula below, confirm that the resultant moment (MT) satisfies the following expression.

Resultant moment

$$MT = \frac{MP}{MP\ max} + \frac{MR}{MR\ max} \leq 1.0$$

Static Allowable Load and Static Allowable Moment

Model No.	Stroke (mm)	Lateral Load W (N)	Bending moment MPmax (N·m)	Torsional moment MYmax (N·m)	Lateral bending moment MRmax (N·m)
DSTS-M-20	25	48	32.6	0.71	32.6
	50	35		0.52	
DSTS-M-32	25	141	107.4	2.86	107.4
	50	109		2.21	
DSTS-M-50	25	213	201.7	5.86	201.7
	50	170		4.68	

Calculate the allowable load when operating under load using the formula below.
Catalog allowable lateral load×0.9

● Lateral load W (N) [Vertical Installation]

$$\frac{m1 \times \ell 1 \times 10}{L} \leq W$$

Size	L
20	0.016+st
32	0.022+st
50	0.025+st

● Torsional moment MY (N·m)

MY= F3×ℓ3 =10×m3×ℓ3

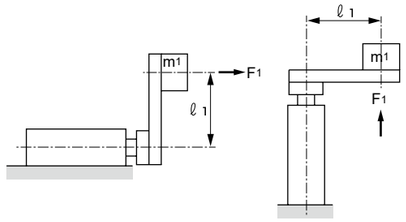
m1: **m2**: **m3**: } Load weight (kg)

ℓ1: **ℓ2**: **ℓ3**: } Eccentricity (m)

G: Inertial force coefficient

● Bending moment MP (N·m)

MP=F1×ℓ1=10×m1×G×ℓ1



● Lateral bending moment MR (N·m)

MR=F2×ℓ2=10×m2×G×ℓ2

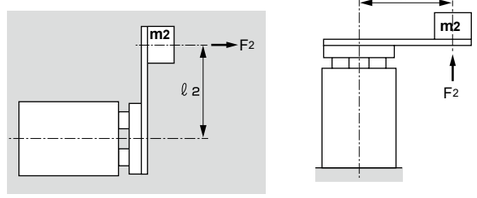
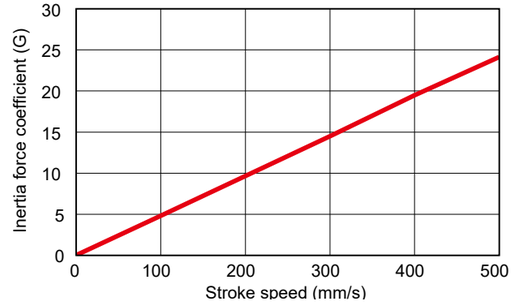


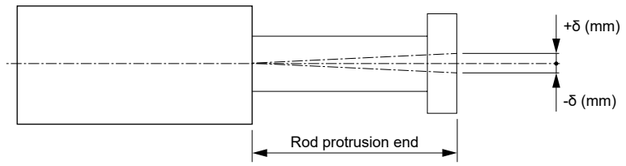
Figure 1 Trend of inertial force coefficient for guided type

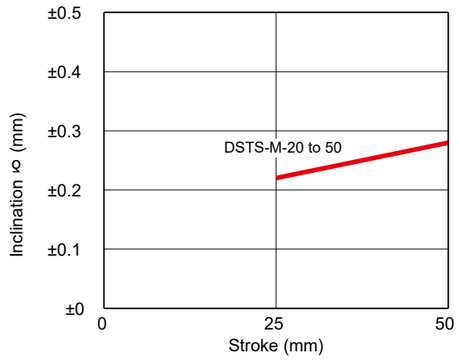


Model Selection

Runout accuracy

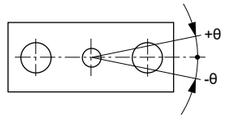
The amount of tilt that occurs at the tip of the end plate when there is no load is estimated by the values in the graph below. (Excluding the amount of deflection of the guide rod)





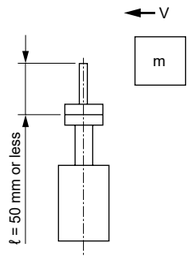
Non-rotation accuracy

(Reference value)



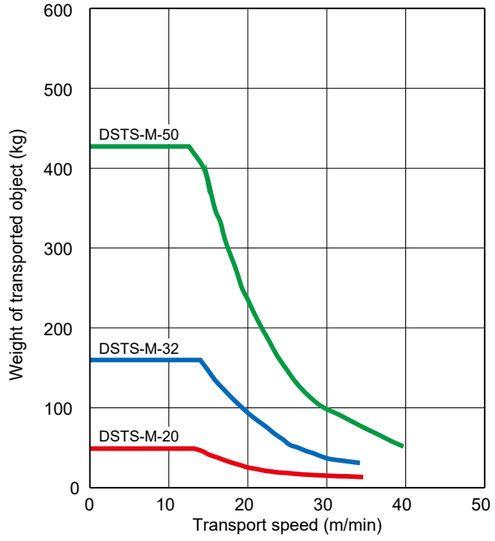
Size	Non-rotation accuracy θ (degrees)
DSTS-M-20	±0.10
DSTS-M-32	±0.08
DSTS-M-50	±0.07

Operating range when used as a stopper



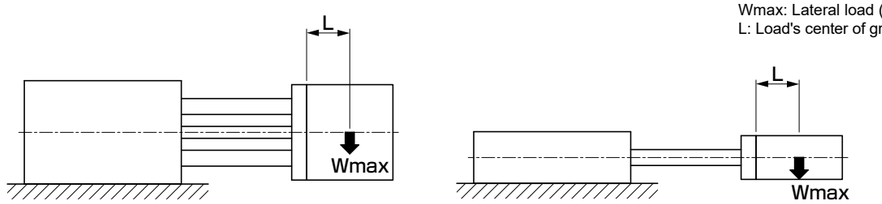
*1 The total length of the stopper part should be ℓ = 50 mm or less.
*2 When fixing the actuator, ensure the bolt screwing Depth is 2d or more and consider measures to prevent loosening (adhesive, spring washer, etc.).
*3 For calculation of required operating thrust, please refer to P. 436.
*4 Please calculate the actuator thrust using the formula below.
Thrust = Vertical payload×10 (N)

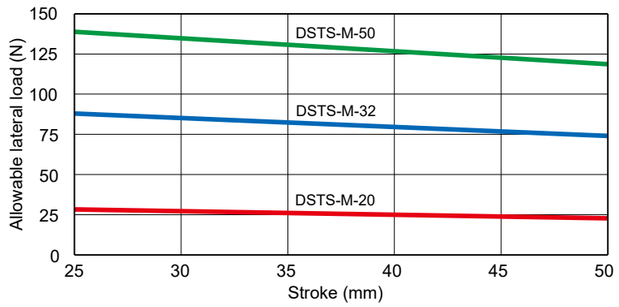
Impact load



Allowable Lateral Load　Plain bearing

Wmax: Lateral load (N)
L: Load's center of gravity position (mm)



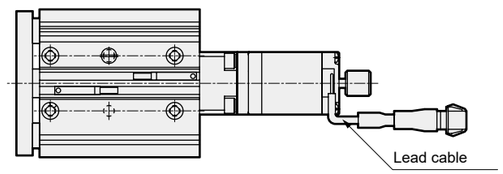


*1: Calculate the allowable lateral load when operating under load using the formula below.
Catalog allowable lateral load value×0.9
*2: When designing, please consider the safety factor according to the operating conditions.

Special Order Product*

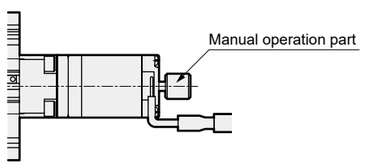
● Change of cable outlet direction

It is possible to change the outlet direction of the lead cable coming out of the motor.



● Add cover to manual operation part

A rubber cover can be included to the manual operation part at the rear of the motor.



*For details on special order products, please contact our sales office.

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