GSTL

Guided Type

Electric Actuator with Motor Specification

CONTENTS

GSTL System Table

Actuator Model No.	Motor Size	Screw Lead (mm)	Max. Payload (kg)		Stroke (mm) and Max. Speed (mm/s)				Max. Pushing Force (N)
			Horizontal	Vertical	50	100	150	200	
GSTL-20	□35	6	4.4	6.4	250				100
		9	3.2	4	400	300			70
GSTL-32	□42	6	9	11.6	250		200		220
		12	4.8	4.8	500		400		90
GSTL-50	□56	6	14.8	19.6	250	200			590
		12	14.8	13.2	400	350	300		425

Electric Actuator Guided Type

GSTL-20

□35 Stepping Motor

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

Model No. Notation Method

GSTL - ❶M - ❷20 ❸G ❹E - ❺06 ❻050 ❼B ❽B N - ❾R01 - ❿F

❶Bearing type

M	Plain bearing

❷Size

20	20

❸Connected Controller*1

G	ECMG/ECG-A

❹Motor Mounting Direction

E	Inline Mount

❺Lead

06	6 mm
09	9 mm

❻Stroke

050	50 mm
100	100 mm
150	150 mm
200	200 mm

❼Brake *2

N	None
B	Yes

❽Encoder

B	Absolute Encoder
C	Incremental Encoder

❾Relay Cable *3

N00	None
R01	Flexible 1 m
R03	Flexible 3 m
R05	Flexible 5 m
R10	Flexible 10 m
S01	Fixed 1 m
S03	Fixed 3 m
S05	Fixed 5 m
S10	Fixed 10 m

❿Option

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

*1 For controllers, please refer to P. 529.
*2 Select "Yes" for vertical use.
*3 For the external dimension drawing of the relay cable, please refer to P. 576.

Specifications

Connected Controller		ECMG, ECG-A	
Motor		□35 Stepping Motor	
Encoder Type		Battery-less Absolute Encoder Incremental Encoder	
Drive Method		Sliding screw ø6	
Stroke	mm	50 to 200	
Screw lead	mm	6	9
Max. Payload kg *1	Horizontal	4.4	3.2
	Vertical	6.4	4
Operating Speed Range *2	mm/s	10 to 250	12 to 400
Max. Acceleration/ Deceleration	Horizontal	0.7	0.7
	Vertical	0.3	0.3
Max. Pushing Force	N	100	70
Pushing Operation Speed Range	mm/s	10 to 20	12 to 20
Repeatability	*3 mm	±0.01	
Lost Motion	mm	0.3 or less	
Brake	Type	Non-excitation operating type	
	Holding Force N	140	93
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 acceleration/deceleration and speed.
*2 Maximum speed may decrease depending on conditions.
*3 Since there is backlash, if stopping accuracy is required, please use an external stopper, etc., and complete positioning with a pushing motion.

Speed and Payload

[Horizontal Installation] (kg)

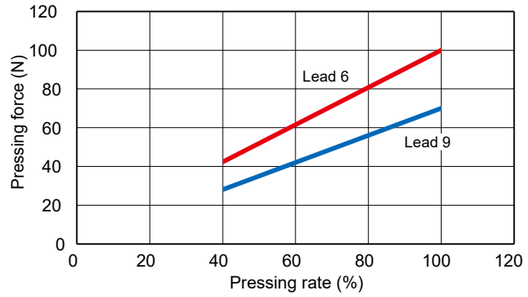
Speed (mm/s)	Acceleration/Deceleration 0.3/0.7 G			
	Screw Lead			
	6 mm		9 mm	
	Stroke (mm)			
	50 or less	200 or less	50 or less	200 or less
10	0.8	0.3		
12	0.8	0.3	1.5	1.1
50	4.4	3.9	3.2	2
70	4.4	3.9	3.2	2.7
100	4.4	3.9	3.2	2.7
150	4.4	3.9	3.2	2.7
200	2	1.5	3.2	2.7
250	2	1.5	2.4	1.9
300			0.4	1.9
350			0.4	
400			0.4	

[Vertical Installation] (kg)

Speed (mm/s)	Acceleration/deceleration 0.3G			
	Screw Lead			
	6 mm		9 mm	
	Stroke (mm)			
	50 or less	200 or less	50 or less	200 or less
10	6.4	5.9		
12	6.4	5.9	4	3.5
50	6.4	5.9	4	3.5
70	4	3.5	4	3.5
100	4	3.5	4	3.5
150	1.6	1.1	3.2	2.7
200	0.8	0.3	3	2.7
250			0.8	0.3
300			0.8	0.3
350			0.4	
400				

* 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.

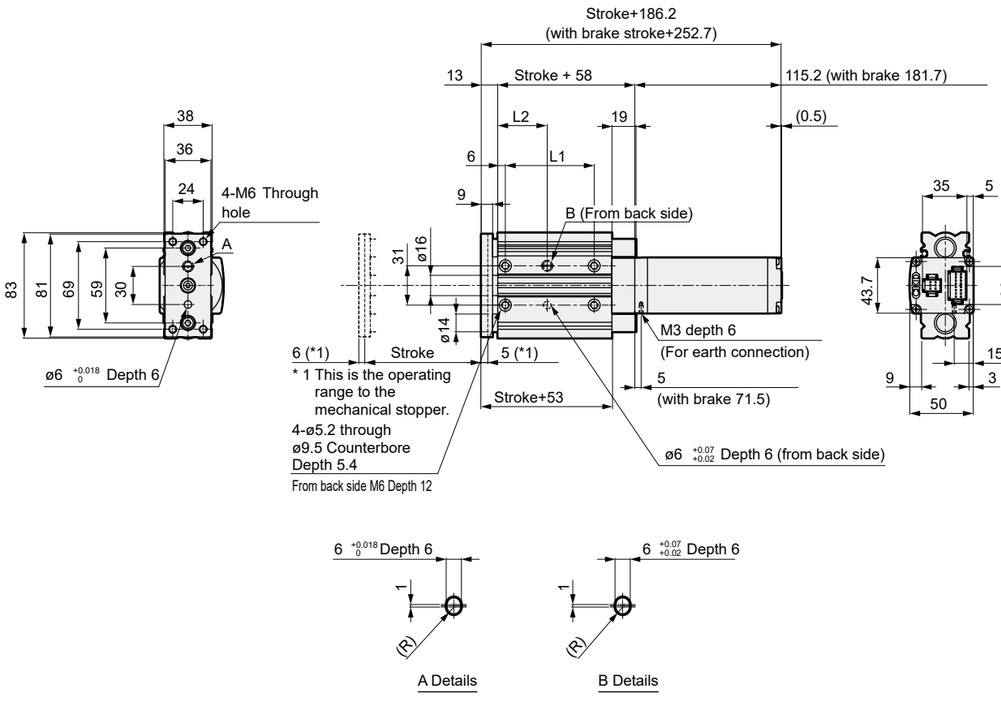
Pushing Force



* The upper pushing force is a reference value. It may vary depending on conditions such as pushing speed.

External Dimension Drawing

● GSTL-20



[Dimension Table by Stroke]

Stroke Code		050	100	150	200
Stroke (mm)		50	100	150	200
L1		70	120	170	220
L2		39	64	89	114
Weight (kg)	Without Brake	1.5	2	2.5	3
	With Brake	2	2.5	2.9	3.4

Electric Actuator Guided Type

GSTL-32

□42 Stepping Motor

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

Model No. Notation Method

GSTL - M - 32 G E - 06 050 B B N - R01 - F

❶Bearing type

M	Plain bearing

❷Size

32	32

❸Connected Controller*1

G	ECMG/ECG-A

❹Motor Mounting Direction

E	Inline Mount

❺Lead

06	6 mm
12	12 mm

❻Stroke

050	50 mm
100	100 mm
150	150 mm
200	200 mm

❼Brake *2

N	None
B	Yes

❽Encoder

B	Absolute Encoder
C	Incremental Encoder

❾Relay Cable *3

N00	None
R01	Flexible 1 m
R03	Flexible 3 m
R05	Flexible 5 m
R10	Flexible 10 m
S01	Fixed 1 m
S03	Fixed 3 m
S05	Fixed 5 m
S10	Fixed 10 m

❿Option

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

*1 For controllers, please refer to P. 529.
*2 Select "Yes" for vertical use.
*3 For the external dimension drawing of the relay cable, please refer to P. 576.

Specifications

Connected Controller		ECMG, ECG-A	
Motor		□42 Stepping Motor	
Encoder Type		Battery-less Absolute Encoder Incremental Encoder	
Drive Method		Sliding screw ø8	
Stroke	mm	50 to 200	
Screw lead	mm	6	12
Max. Payload kg *1	Horizontal	9	4.8
	Vertical	11.6	4.8
Operating Speed Range *2	mm/s	10 to 250	15 to 500
Max. Acceleration/ Deceleration	Horizontal	0.7	0.7
	Vertical	0.3	0.3
Max. Pushing Force	N	220	90
Pushing Operation Speed Range	mm/s	10 to 20	15 to 20
Repeatability	*3 mm	±0.01	
Lost Motion	mm	0.3 or less	
Brake	Type	Non-excitation operating type	
	Holding Force N	140	70
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 acceleration/deceleration and speed.
*2 Maximum speed may decrease depending on conditions.
*3 Since there is backlash, if stopping accuracy is required, please use an external stopper, etc., and complete positioning with a pushing motion.

Speed and Payload

[Horizontal Installation] (kg)

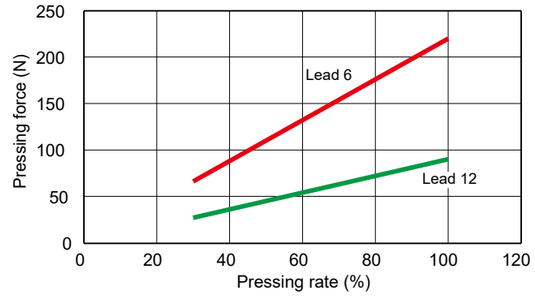
Speed (mm/s)	Acceleration/deceleration 0.3G/0.7G					
	Screw Lead					
	6 mm			12 mm		
	Stroke (mm)					
	50 or less	100 or less	200 or less	50 or less	100 or less	200 or less
10	1.6	1.1	0.6			
15	1.6	1.1	0.6	1.2	0.7	0.2
50	6.8	6.3	5.8	4.8	4.3	3.8
70	6.8	6.3	5.8	4.8	4.3	3.8
100	9	8.7	8.2	4.8	4.3	3.8
150	6.8	6.3	5.8	3.6	3.1	2.6
200	2.8	2.3	1.8	3.6	3.1	2.6
250	0.8	0.3		3.6	3.1	2.6
300				3.6	3.1	2.6
350				1.6	1.1	0.6
400				1.6	1.1	0.6
500				0.8	0.3	

[Vertical Installation] (kg)

Speed (mm/s)	Acceleration/deceleration 0.3G					
	Screw Lead					
	6 mm			12 mm		
	Stroke (mm)					
	50 or less	100 or less	200 or less	50 or less	100 or less	200 or less
10	8.8	8.3	7.8			
15	8.8	8.3	7.8	4.4	3.9	3.4
50	11.6	11.1	10.6	4.8	4.3	3.8
70	5.2	4.7	4.2	4.8	4.3	3.8
100	5.2	4.7	4.2	4.8	4.3	3.8
150	2	1.5	1	4.8	4.3	3.8
200	0.8	0.3		4.5	4.3	3.8
250				1.2	0.7	0.2
300				1.2	0.7	0.2
350						
400						
500						

* 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.

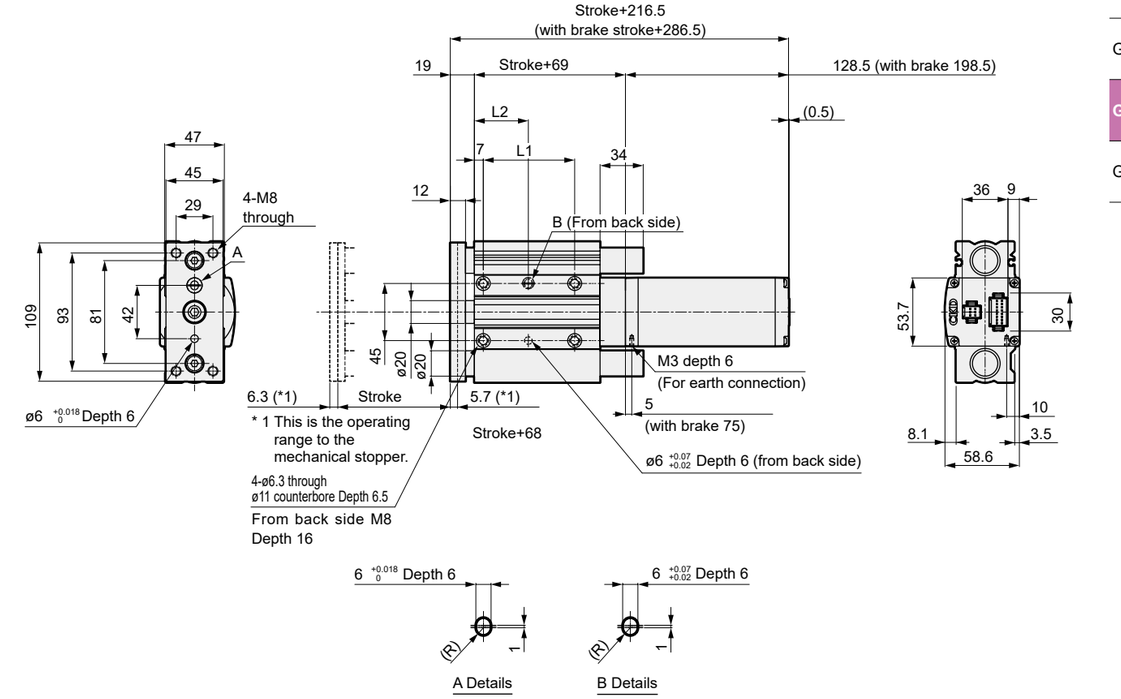
Pushing Force



* The upper pushing force is a reference value. It may vary depending on conditions such as pushing speed.

External Dimension Drawing

● GSTL-32



[Dimension Table by Stroke]

Stroke Code		050	100	150	200
Stroke (mm)		50	100	150	200
L1		72	122	172	222
L2		42.5	67.5	92.5	117.5
Weight (kg)	Without Brake	3	3.8	4.4	5.5
	With Brake	3.6	4.4	5	6.1

Electric Actuator Guided Type

GSTL-50

□56 Stepping Motor

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

Model No. Notation Method

GSTL - M - 50 G E - 06 050 B B N - R01 - F

❶Bearing type

M	Plain bearing

❷Size

50	50

❸Connected Controller*1

G	ECMG/ECG-A

❹Motor Mounting Direction

E	Inline Mount

❺Lead

06	6 mm
12	12 mm

❻Stroke

050	50 mm
100	100 mm
150	150 mm
200	200 mm

❼Brake *2

N	None
B	Yes

❽Encoder

B	Absolute Encoder
C	Incremental Encoder

❾Relay Cable *3

N00	None
R01	Flexible 1 m
R03	Flexible 3 m
R05	Flexible 5 m
R10	Flexible 10 m
S01	Fixed 1 m
S03	Fixed 3 m
S05	Fixed 5 m
S10	Fixed 10 m

❿Option

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

*1 For controllers, please refer to P. 529.
*2 Select "Yes" for vertical use.
*3 For the external dimension drawing of the relay cable, please refer to P. 576.

Specifications

Connected Controller		ECMG, ECG-A	
Motor		□56 Stepping Motor	
Encoder Type		Battery-less Absolute Encoder Incremental Encoder	
Drive Method		Sliding screw ø12	
Stroke	mm	50 to 200	
Screw lead	mm	6	12
Max. Payload kg *1	Horizontal	14.8	14.8
	Vertical	19.6	13.2
Operating Speed Range *2	mm/s	20 to 250	20 to 400
Max. Acceleration/ Deceleration	Horizontal	0.7	0.7
	Vertical	0.3	0.3
Max. Pushing Force	N	590	425
Pushing Operation Speed Range	mm/s	20	20
Repeatability	*3 mm	±0.01	
Lost Motion	mm	0.3 or less	
Brake	Type	Non-excitation operating type	
	Holding Force N	640	320
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 acceleration/deceleration and speed.
*2 Maximum speed may decrease depending on conditions.
*3 Since there is backlash, if stopping accuracy is required, please use an external stopper, etc., and complete positioning with a pushing motion.

Speed and Payload

[Horizontal Installation] (kg)

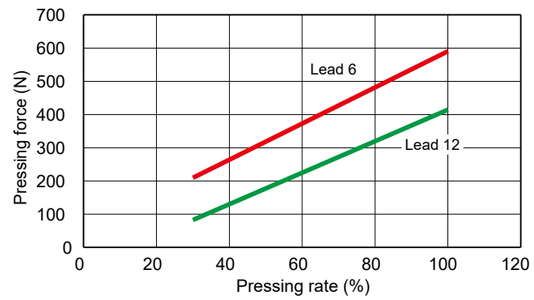
Speed (mm/s)	Acceleration/deceleration 0.3G/0.7G					
	Screw Lead					
	6 mm			12 mm		
	Stroke (mm)					
	50 or less	100 or less	200 or less	50 or less	100 or less	200 or less
20	14.8	12.8	11.8	4.4	2.4	1.4
50	9.6	7.6	6.6	9.6	7.6	6.6
70	9.6	7.6	6.6	9.6	7.6	6.6
100	9.6	7.6	6.6	14.8	12.8	11.8
150	6	4	3	10.8	8.8	7.8
200	4	2	1	10.8	8.8	7.5
250	0.4			6	4	3
300				6	4	3
350				2.8	0.8	
400				0.7		

[Vertical Installation] (kg)

Speed (mm/s)	Acceleration/deceleration 0.3G					
	Screw Lead					
	6 mm			12 mm		
	Stroke (mm)					
	50 or less	100 or less	200 or less	50 or less	100 or less	200 or less
20	19.6	18.6	15	3.6	2.6	1.6
50	14	13	12	13.2	12.2	11.2
70	4.8	3.8	2.8	12	11	10
100	4.8	3.8	2.8	10.5	11	8.5
150	0.8			4	3	2
200				4	3	2
250				2	1.5	1
300				0.7		
400						

* 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.

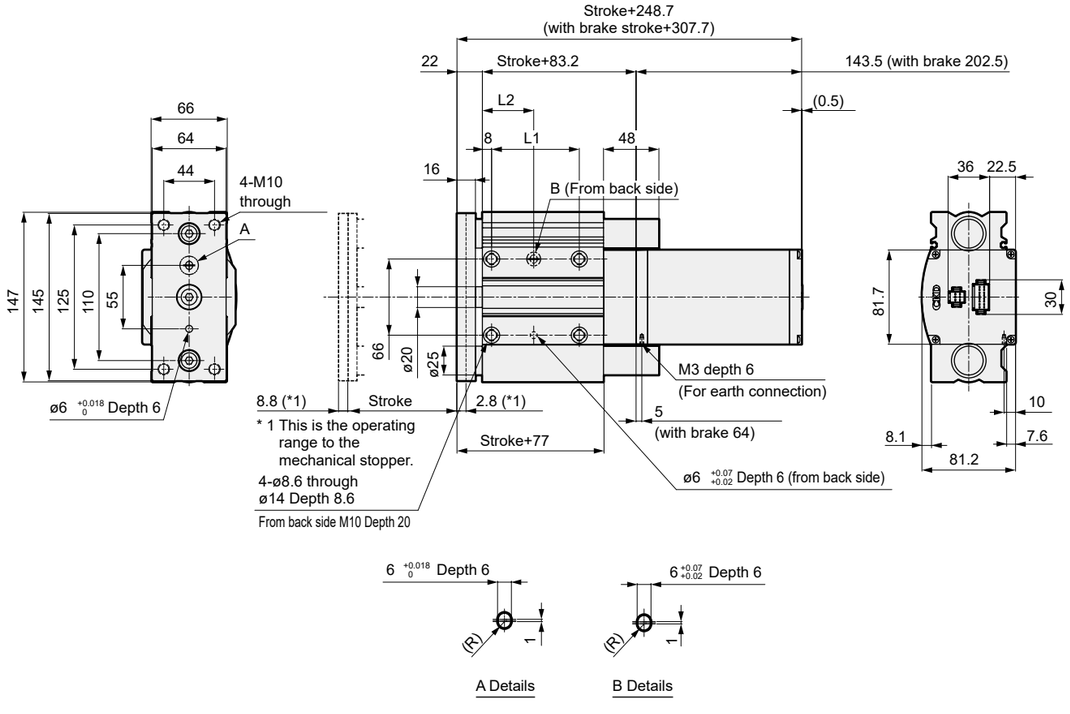
Pushing Force



* The upper pushing force is a reference value. It may vary depending on conditions such as pushing speed.

External Dimension Drawing

● GSTL-50



[Dimension Table by Stroke]

Stroke Code		050	100	150	200
Stroke (mm)		50	100	150	200
L1		76	126	176	226
L2		44.5	69.5	94.5	119.5
Weight (kg)	Without Brake	5.4	6.8	7.9	9.3
	With Brake	6.7	8.1	9.2	10.6

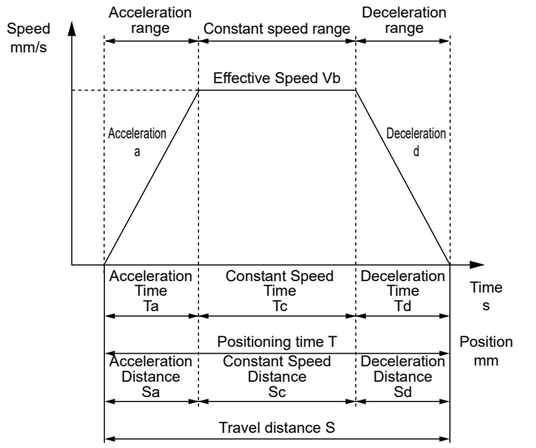
STEP1 Confirmation of Payload

The payload varies depending on the mounting orientation, screw lead, transport speed, and acceleration/deceleration. Select the size and screw lead by referring to the system table (P. 381), the specification table for each model, and the payload table by speed and acceleration/deceleration.

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.

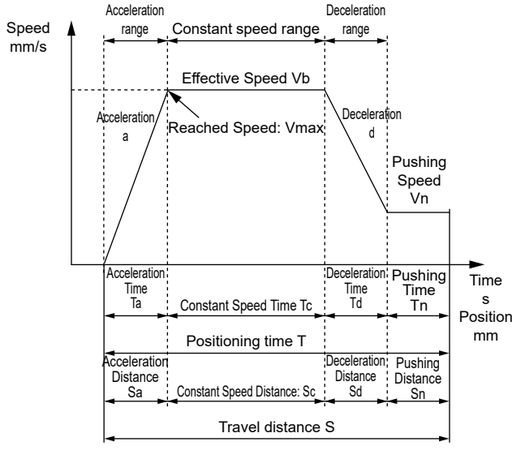
Positioning time for general transfer operations



	Content	Code	Unit	Remarks
Setting Value	Set Speed	V	mm/s	
	Set Acceleration	a	mm/s²	
	Set Deceleration	d	mm/s²	
	Travel Distance	S	mm	
Calculated Value	Reached Speed	Vmax	mm/s	= $[2\times a\times d\times S / (a+d)]^{1/2}$
	Effective Speed	Vb	mm/s	The smaller of V and Vmax
	Acceleration Time	Ta	s	= Vb / a
	Deceleration Time	Td	s	= Vb / d
	Constant Speed Time	Tc	s	= Sc / Vb
	Acceleration Distance	Sa	mm	= $(a\times Ta^2) / 2$
	Deceleration Distance	Sd	mm	= $(d\times Td^2) / 2$
	Constant Speed Distance	Sc	mm	= S - (Sa+Sd)
	Positioning Time	T	s	= Ta+Tc+Td

* Do not use at speeds exceeding the specifications.
* Depending on the acceleration/deceleration 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 and deceleration vary depending on the product and usage conditions. Refer to P. 382, 384 and 386 for details.
* Settling time varies depending on the usage conditions, but it may take about 0.2 s.
* 1G ≈ 9.8 m/s².

Positioning time for pushing operations



	Content	Code	Unit	Remarks
Setting Value	Set Speed	V	mm/s	
	Set Acceleration	a	mm/s²	
	Set Deceleration	d	mm/s²	
	Travel Distance	S	mm	
	Pushing Speed	Vn	mm/s	
	Pushing Distance	Sn	mm	
Calculated Value	Reached Speed	Vmax	mm/s	= $[2\times a\times d\times(S - Sn+Vn^2 / 2 / d) / (a+d)]^{1/2}$
	Effective Speed	Vb	mm/s	The smaller of V and Vmax
	Acceleration Time	Ta	s	= Vb / a
	Deceleration Time	Td	s	= (Vb - Vn) / d
	Constant Speed Time	Tc	s	= Sc / Vb
	Pushing Time	Tn	s	= Sn / Vn
	Acceleration Distance	Sa	mm	= $(a\times Ta^2) / 2$
	Deceleration Distance	Sd	mm	= $((Vb+Vn)\times Td) / 2$
	Constant Speed Distance	Sc	mm	= S - (Sa+Sd+Sn)
	Positioning Time	T	s	= Ta+Tc+Td+Tn

* Do not use at speeds exceeding the specifications.
* Pushing speed varies depending on the product.
* Depending on the acceleration/deceleration 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 and deceleration vary depending on the product and usage conditions. Refer to P. 382, 384 and 386 for details.
* Settling time varies depending on the usage conditions, but it may take about 0.2 s.
* 1G ≈ 9.8 m/s².

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

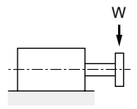
$$M_T = \frac{MP}{MP\ max} + \frac{MR}{MR\ max} \leq 1.0$$

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)
GSTL-M-20	50	54	32.6	0.80	32.6
	100	38		0.56	
	150	30		0.44	
	200	24		0.35	
GSTL-M-32	50	161	107.4	3.26	107.4
	100	121		2.45	
	150	97		1.96	
	200	81		1.64	
GSTL-M-50	50	243	201.7	6.68	201.7
	100	189		5.20	
	150	155		4.26	
	200	131		3.60	

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

● Lateral load W (N) *Vertical Installation

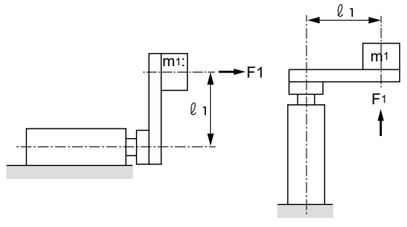


$$\frac{m_1\times\ell_1\times 10}{L} \leq W$$

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

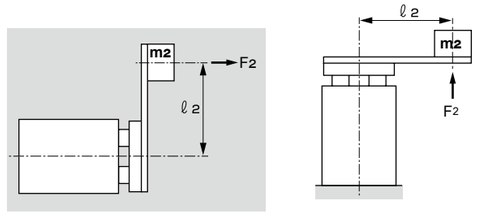
● Bending moment MP (N·m)

$MP=F_1\times\ell_1=10\times m_1\times G\times\ell_1$



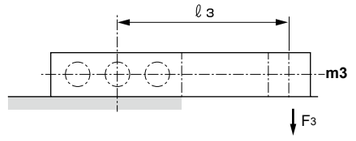
● Lateral bending moment MR (N·m)

$MR=F_2\times\ell_2=10\times m_2\times G\times\ell_2$



● Torsional moment MY (N·m)

$MY= F_3\times\ell_3 =10\times m_3\times\ell_3$

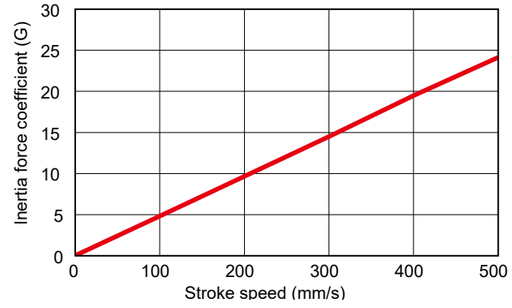


m_1: m_2: m_3: } Load weight (kg)

ℓ_1: ℓ_2: ℓ_3: } Eccentricity (m)

G: Inertial force coefficient

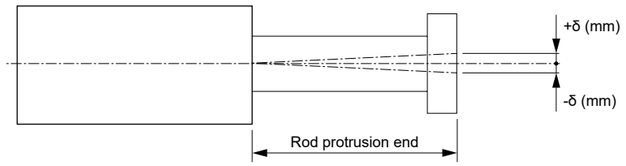
Figure 1 Trend of inertial force coefficient for guided type

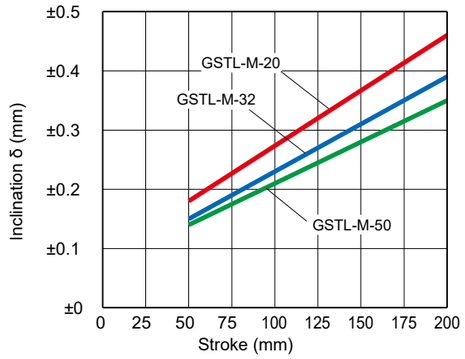


Model Selection

Runout accuracy

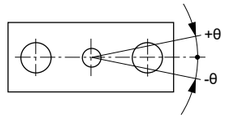
The amount of tilt that occurs at the tip of the end plate when there is no load is estimated by the values in the graph below. (Excluding the amount of deflection of the guide rod)





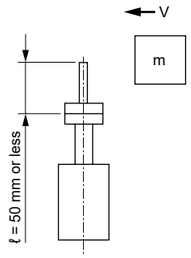
Non-rotation accuracy

(Reference value)



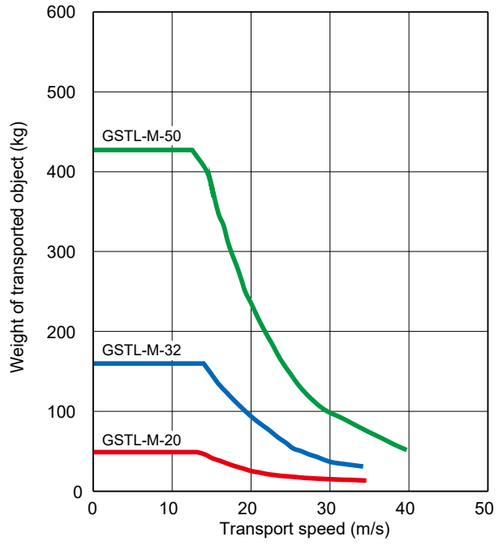
Size	Non-rotation Accuracy θ (degrees)
GSTL-M-20	±0.10
GSTL-M-32	±0.08
GSTL-M-50	±0.07

Operating range when used as a stopper



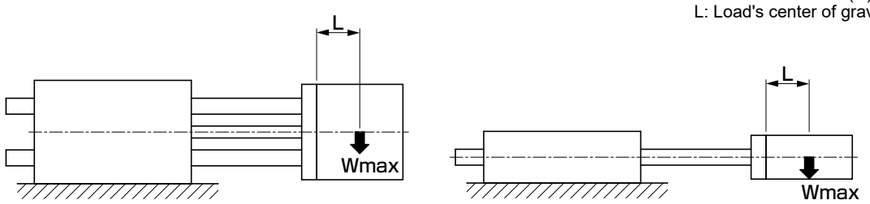
*1 When using as a stopper, please select a model with a stroke of 50 or less.
*2 The total length of the stopper part should be ℓ = 50 mm or less.
*3 When fixing the actuator body, ensure the bolt screwing depth is 2d or more and consider measures to prevent loosening (adhesive, spring washer, etc.).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

Impact load

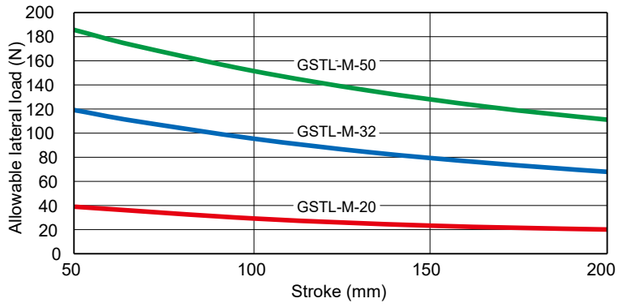


Allowable Lateral Load　Plain bearing

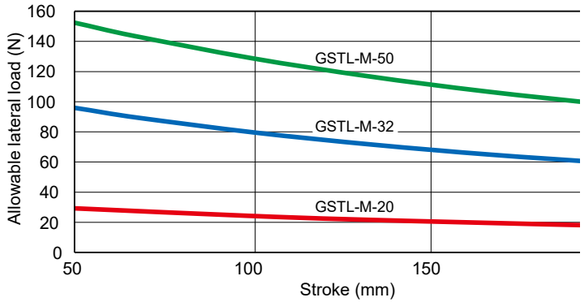
Wmax: Lateral load (N)
L: Load's center of gravity position (mm)



● When L=50 mm



● When L=100 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.

MEMO

G Series
GSSD2
GSTK
GSTG
GSTS
GSTL
GCKW
Ending