

GSTL

Electric actuator
Motor specifications

Guided



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GSTL Series variation

Actuator model No.	Motor Size	Screw lead (mm)	Max. payload (kg)		Stroke (mm) and Max. speed (mm/s)				Max. Pressing 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

GSTL-20

☐35 Stepping motor



How to order

GSTL - M - 20 G E - 06 050 B B N - R01 - F

1 Bearing

M Metal bush bearing

2 Size

20 20

3 Applicable controller * 1

G ECG-A, ECMG

4 Motor mounting direction

E Straight mounting

5 Lead

06 6 mm

09 9 mm

6 Stroke

050 50 mm

100 100 mm

150 150 mm

200 200 mm

7 Brake *2

N None

B Available

8 Encoder

B Absolute encoder

C Incremental encoder

9 Relay cable *3

N00 None

R01 Movable 1 m

R03 Movable 3 m

R05 Movable 5 m

R10 Movable 10 m

S01 Fixed 1 m

S03 Fixed 3 m

S05 Fixed 5 m

S10 Fixed 10 m

10 Option

Blank End plate material: aluminum

F End plate material: steel

*1 Refer to page 189 for controller.
 *2 Select "Yes" for vertical use.
 *3 Refer to page 200 for relay cable dimensions.

Specifications

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	Horizontal	Vertical
	4.4	6.4
	3.2	4
Operation speed range *2 mm/s	10 to 250	12 to 400
Max. acceleration/ deceleration	Horizontal	Vertical
	0.7	0.3
	0.3	0.3
Maximum pressing force N	100	70
Pressing operation speed range mm/s	10 to 20	12 to 20
Repeatability mm	±0.01	
Lost motion mm	0.3 or less	
Brake	Models	Non-excitation operation type
	Holding force N	140 93
Insulation resistance	10MΩ, 500 VDC	
Withstand 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	
Degree of protection	IP40	

*1 Payload varies according to acceleration/deceleration and speed.
 *2 The maximum speed may decrease depending on the conditions.

Speed and payload

[When installed horizontally] (kg)

Speed (mm/s)	Acceleration/deceleration 0.3/0.7G			
	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	-

[When installed vertically] (kg)

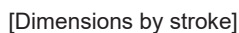
Speed (mm/s)	Acceleration/deceleration 0.3			
	Screw lead			
	6 mm		9 mm	
	Stroke (mm)			
	50 or less	200 or less	50 or less	200 or less
10	6.4	5.9	-	-
12	6.4	5.9	4	3.5
50	6.4	5.9	4	3.5
70	4	3.5	4	3.5
100	4	3.5	4	3.5
150	1.6	1.1	3.2	2.7
200	0.8	0.3	3	2.7
250	-	-	0.8	0.3
300	-	-	0.8	0.3
350	-	-	0.4	-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

* This value is for when no moment is applied to the end plate. Refer to the instruction manual for details on mounting surface flatness, etc.

Pressing rate (%)	Lead 6 Pressing force (N)	Lead 9 Pressing force (N)
40	42	28
60	60	42
80	80	55
100	100	70

Dimensions

● GSTL-20



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

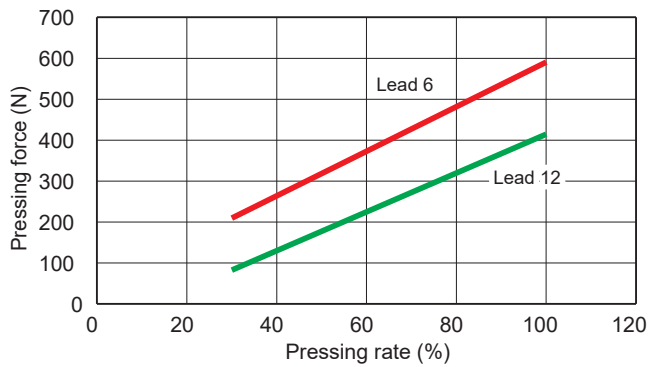
Pressing rate (%)	Pressing force (N) - Lead 6	Pressing force (N) - Lead 12
30	30	20
40	40	27
60	60	43
80	80	59
100	105	75

Dimensions

[illegible]

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

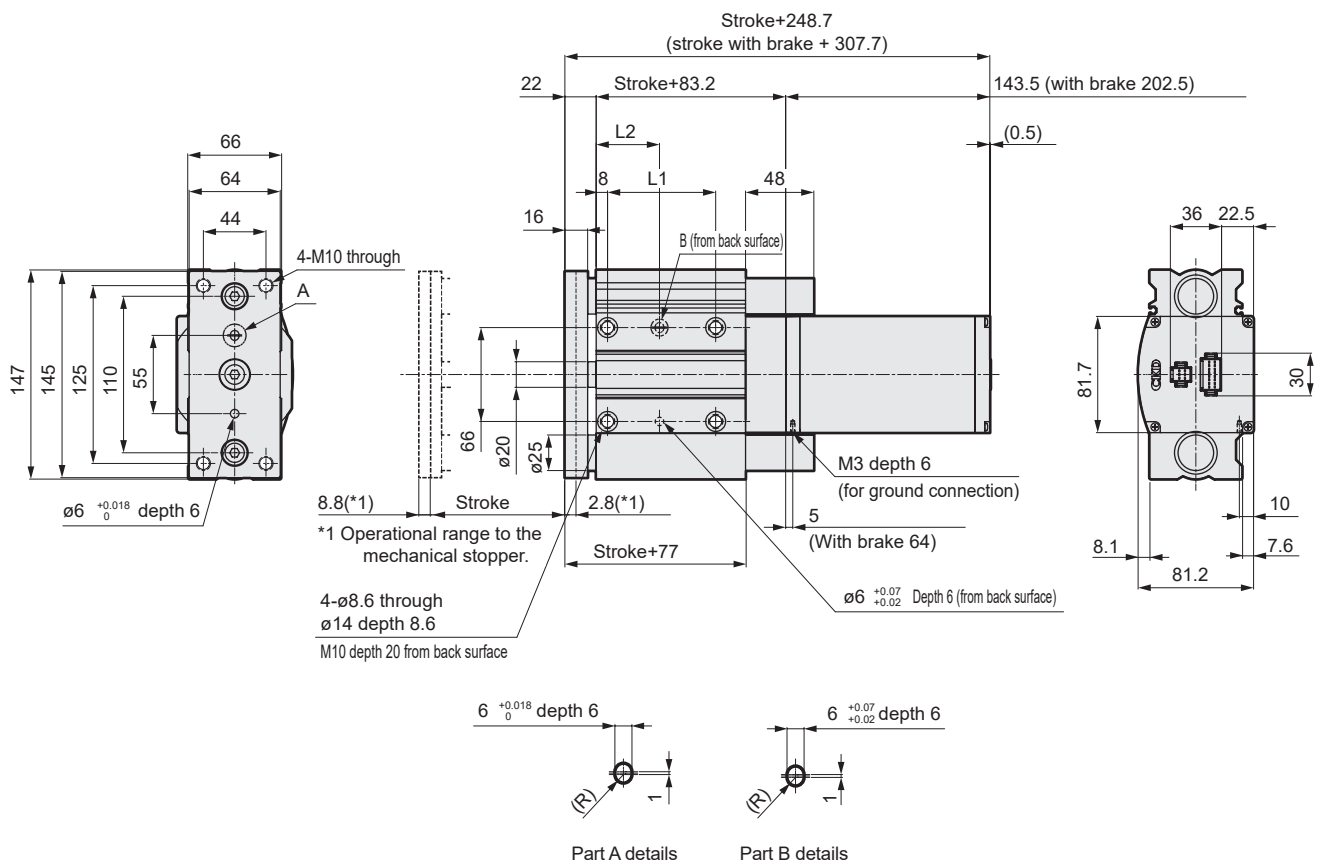
Pressing force



* The pressing force at the top is a reference value. Variation may occur according to conditions such as pressing speed.

Dimensions

● GSTL-50



[Dimensions 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

Model selection

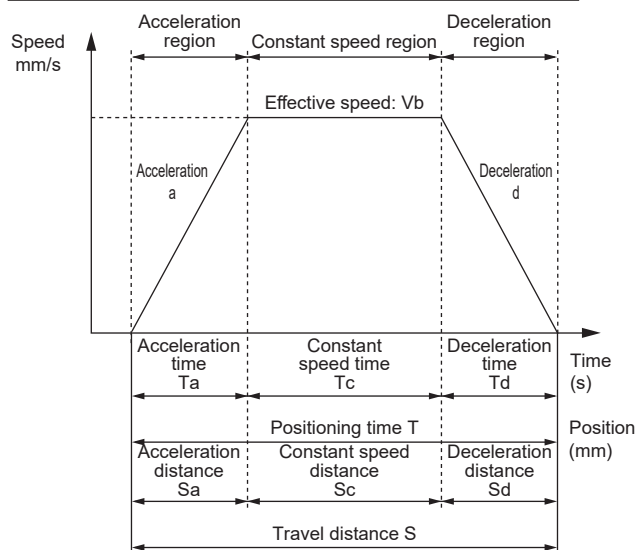
STEP 1 Confirming payload

Payload varies with mounting orientation, screw lead, transport speed, acceleration/deceleration and power supply voltage. Refer to the Series Variation (page 165), the specification table for each model and the Table of Load Capacity by Speed and Acceleration/Deceleration to select the size and screw lead.

STEP 2 Confirming positioning time

Calculate the positioning time with the selected product according to the following example and confirm that the required tact is achievable.

Positioning time for general transport operation



	Description	Code	Unit	Remarks
Set value	Set speed	V	mm/s	
	Set acceleration	a	mm/s ²	
	Set deceleration	d	mm/s ²	
	Travel distance	S	mm	
Calculated value	Achieved speed	Vmax	mm/s	$= [2 \times a \times d \times S / (a + d)]^{1/2}$
	Effective speed	Vb	mm/s	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 that exceed the specifications.

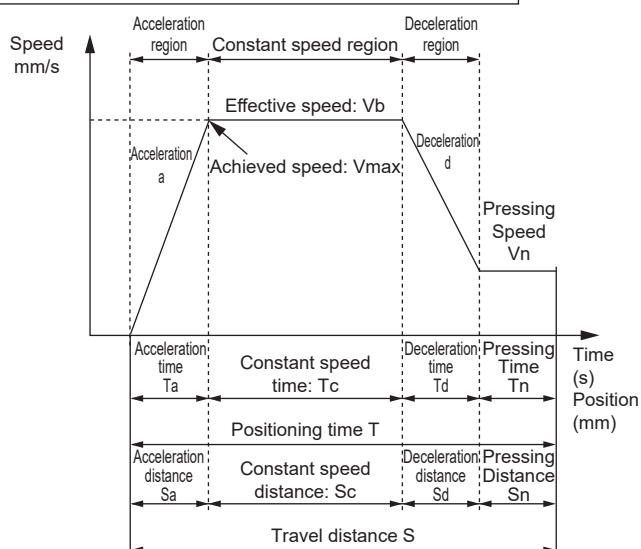
* Depending on acceleration/deceleration and stroke, the trapezoid speed waveform may not be formed (the set speed may not be achieved). In this case, select the effective speed (Vb) from the set speed (V) and the achieved speed (Vmax), whichever is smaller.

* Acceleration and deceleration differ depending on the product and working conditions. Refer to pages 166, 168 and 170 for details.

* While settling time depends on working conditions, it may take 0.2 seconds or so.

* 1 G $\approx 9.8 \text{ m/s}^2$.

Positioning time for pressing operation



	Description	Code	Unit	Remarks
Set value	Set speed	V	mm/s	
	Set acceleration	a	mm/s ²	
	Set deceleration	d	mm/s ²	
	Travel distance	S	mm	
	Pressing speed	Vn	mm/s	
	Pressing distance	Sn	mm	
Calculated value	Achieved 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 lesser value of V and Vmax
	Acceleration time	Ta	s	$= Vb / a$
	Deceleration time	Td	s	$= (Vb - Vn) / d$
	Constant speed time	Tc	s	$= Sc / Vb$
	Pressing 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 that exceed the specifications.

* Pressing speed differs depending on the product.

* Depending on the acceleration/deceleration and stroke, the trapezoidal velocity waveform may not form (the set speed may not be reached). In this case, select the effective speed (Vb) from the set speed (V) and the achieved speed (Vmax), whichever is smaller.

* Acceleration and deceleration differ depending on the product and working conditions. Refer to pages 166, 168 and 170 for details.

* While settling time depends on working conditions, it may take 0.2 seconds or so.

* 1 G $\approx 9.8 \text{ m/s}^2$.

STEP 3 Confirming static allowable load and moment

Calculate the load and moment that are generated when the end plate is stopped. Confirm that the lateral load (W) and torsion moment (MY) are as follows. Make sure that the resultant moment (MT) satisfies the following formula according to the formula below.

Resultant moment

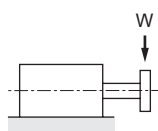
$$M_T = \frac{MP}{MP_{\max}} + \frac{MR}{MR_{\max}} \leq 1.0$$

Static allowable load and moment

Model No.	Stroke (mm)	Lateral load W (N)	Bending moment MP max (N·m)	Torsion moment MY max (N·m)	Radial moment MR max (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	

When operating the unit under a load, calculate the allowable load using the following formula.
Catalog allowable lateral load × 0.9

● Lateral load W (N) *When installed vertically

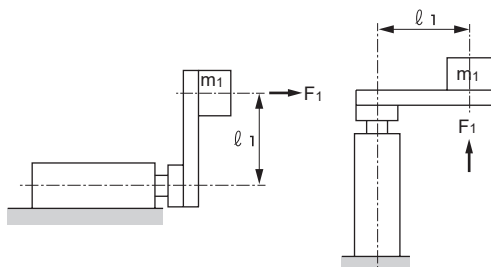


$$\frac{m_1 \times l_1 \times 10}{L} \leq W$$

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

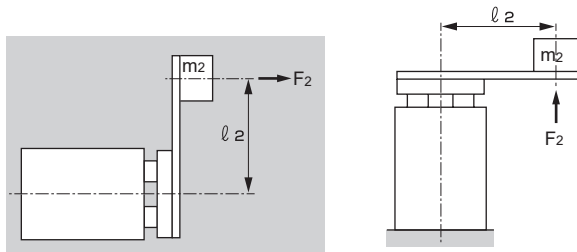
● Bending moment MP (N·m)

$$MP = F_1 \times l_1 = 10 \times m_1 \times G \times l_1$$



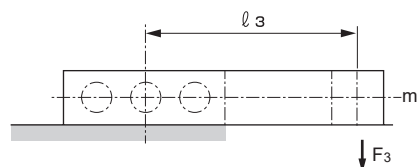
● Radial moment MR. (N·m)

$$MR = F_2 \times l_2 = 10 \times m_2 \times G \times l_2$$



● Torsion moment MY (N·m)

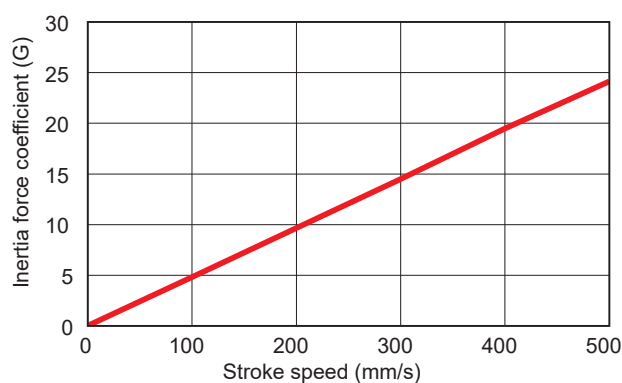
$$MY = F_3 \times l_3 = 10 \times m_3 \times l_3$$



$\left. \begin{matrix} m_1: \\ m_2: \\ m_3: \end{matrix} \right\} \text{Load (kg)}$
 $\left. \begin{matrix} l_1: \\ l_2: \\ l_3: \end{matrix} \right\} \text{Eccentric distance (m)}$

G: Inertia force coefficient

Fig. 1 Trend of inertia force coefficient for guided type



D Series (Screw drive)

D Series (Spring drive)

ESC3 (Controller)

G Series

ECG-A (Controller)

ECG-B (Controller)

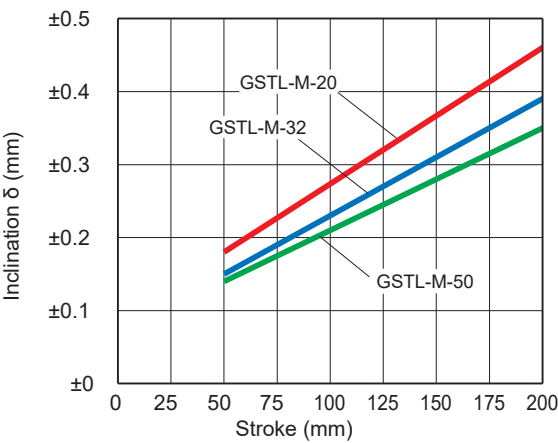
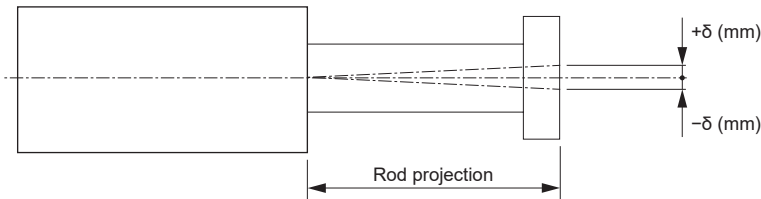
Safety Caution

Model selection Check sheet

Model selection

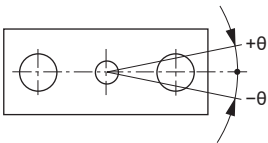
Deflection

For the inclination that is produced at the end of the end plate when no load is applied, the value in the graph below is used as a guide. (Excluding sag of guide rod)



Non-rotating accuracy

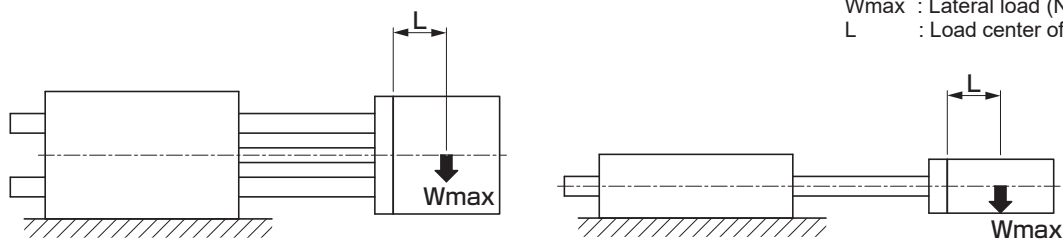
(reference value)



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

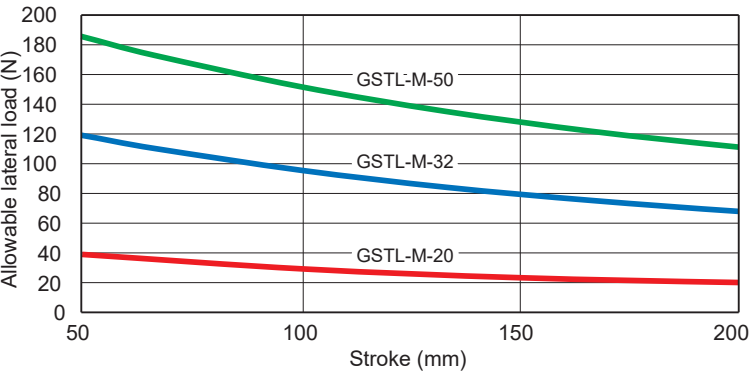
D Series (Screw drive)	DSSD2
	DSTK
	DSTG
	DSTS
	DSTL
D Series (Spring drive)	DMSDG
	DLSH
	DCKW
ESC3 (Controller)	
G Series	GSSD2
	GSTK
	GSTG
	GSTS
	GSTL
ECG-A (Controller)	GCKW
	ECG-B (Controller)
Safety Caution	
Model selection Check sheet	

Allowable lateral load Metal bush bearing

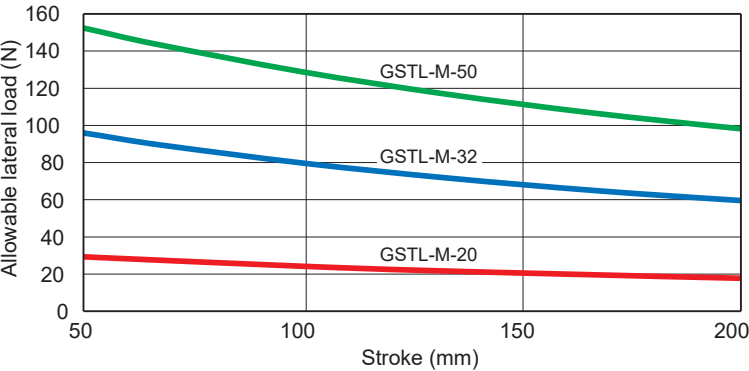


Wmax : Lateral load (N)
L : Load center of gravity position (mm)

● For L=50mm



● For L=100mm



*1 When operating the unit under a load, calculate the allowable lateral load using the following formula.
Catalog allowable lateral load value × 0.9
*2 When designing, be sure to consider the safety factor according to the operating conditions.