STG

Guided cylinder

Combined functions cylinder

ø12/ø16/ø20/ø25/ø32/ø40/ø50/ø63

Overview

Lighter in weight and more effectively saves resources than conventional products. In addition, the guide rod bearing section is improved and the bearing structure is modified. This improves the lateral load proof characteristics compared to conventional products, realizing stable operation.

Features

Global environment friendly

The cylinder body and cylinder switch include no lead, hexavalent chromium and other substances that damage the global environment. RoHS compliant products are also available.

Improved maintenance performance

An Allen wrench is used for piston rod mounting. Special tools are not required. Maintenance performance such as packing replacement is improved.

CONTENTS

Global environment-friendly,

Hazardous substances are eliminated, emphasizing environmental protection and pollution prevention.

Load proof characteristics improved Guided cylinder STG Series (ø12 to ø63)

RoHS

Environment compatible products

The cylinder body and cylinder switch include no lead, hexavalent chromium and other substances that damage the global environment. This product conforms to RoHS Directive adopted by the EU.
(solder and lead wire are lead-free.)

Supports high load

The guide rod bearing section has been improved and the bearing structure changed. Resistant to lateral and eccentric loads, it has improved load proof characteristics compared to conventional products. Operation is now stabler than ever.

Standard tools can be used for maintenance.

Hexagonal wrench is used for mounting the piston rod. There is no need to use a special tool for maintenance.

Lighter weight Resource saving

Aluminum cylinder body shape has been revised and optimized. Lighter in weight and more effectively saves resources than conventional products.

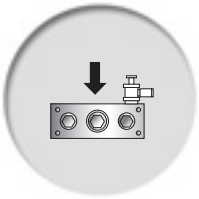
High precision/high rigidity

STG-B Series

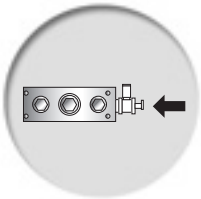
new guided cylinder

2 directions for piping, 3 types of mounting

● Piping direction

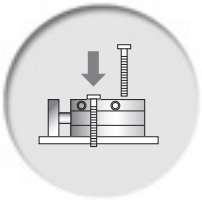


❶ Front piping

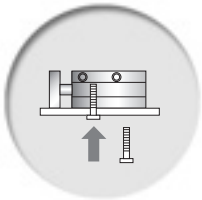


❷ Side piping

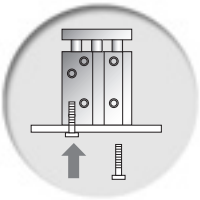
● Mounting orientation



① Front mount



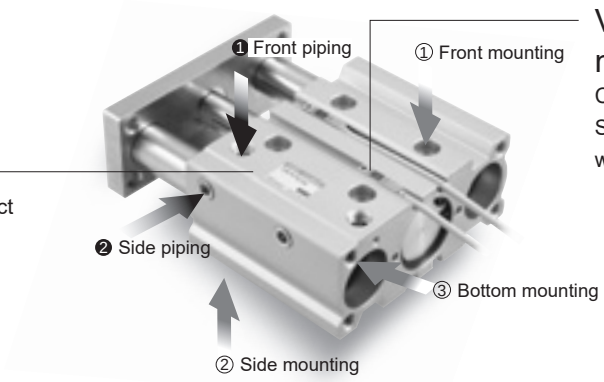
② Side mount



③ Bottom mount

Unified white system

The white system surface of the product matches various devices.



Various switches are mountable

Compact T switch is mounted.
Saves space by eliminating protrusions when mounted.

Supports a wide range of applications and environments

The lineup contains a wide range of new models intended to respond to various applications and environments. Series now offering far more! Operation is now stabler than ever.

■ STG Series variation

● Standard ○ Option

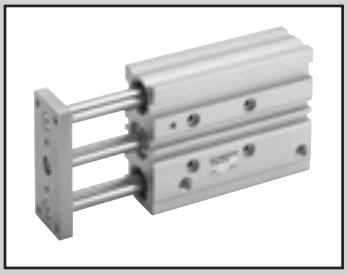
Model variations	Bore size (ø)										Max. Stroke length	Switch
	12	16	20	25	32	40	50	63	80	100	MAX	SW
Single rod clean room specifications STG-B-P7	●	●	●	●	●	●	●	●			400	○

Variation and option combination selection table

◎ : Option variation (check category 2)
○ : C5 compatible (check category 3)
△ : Available depending on conditions (Estimation)
: Not available

Category		Category	Clean room specifications	
			Clean room specifications (exhaust treatment)	Clean room specifications (vacuum treatment)
		Code	P72	P73
Variation	Double acting basic	B	◎	◎
	Position locking	Q	△	△
	With air cushion	C		
	Heat resistant (120°)	T		
	Packing seal material fluoro rubber	T2	△	△
	Low speed	O	○	○
	Powerful scraper	G		
	Coil scraper	G1		
	Coolant proof scraper (NBR)	G2		
	Coolant proof scraper (FKM)	G3		
	Spatter adherence prevention	G4		
Port thread	NPT (ø20 and over)	N	○	○
	G (ø20 and over)	G	○	○
Cushion	Rubber-air cushioned	C		
Option	Corrosion proof	M		
	Copper and PTFE free	P6		

MEMO



Guided cylinder Double acting/single rod clean room specifications

STG-B Series

● Bore size: ø12/ø16/ø20/ø25/ø32/ø40
ø50/ø63

JIS symbol 

RoHS CAD

Structure and material restriction

	Structure	Model No.
P7 Series	Exhaust treatment	P72
	Vacuum treatment	P73

Specifications

Descriptions	STG-B							
Bore size mm	ø12	ø16	ø20	ø25	ø32	ø40	ø50	ø63
Actuation	Double acting							
Working fluid	Compressed air							
Max. working pressure MPa	1.0 (≈150 psi, 10 bar)							
Min. working pressure MPa	0.2 (≈29 psi, 2 bar)		0.15 (≈22 psi, 1.5 bar)		0.1 (≈15 psi, 1 bar)			
Proof pressure MPa	1.6 (≈230 psi, 16 bar)							
Ambient temperature °C	-10 (14°F) to 60 (140°F) (no freezing)							
Port size	M5		Rc1/8				Rc1/4	
Port size (relief port)	M5							
Stroke tolerance mm	+2.0 0							
Working piston speed mm/s	50 to 500							50 to 300
Cushion	With rubber cushion							
Lubrication	Not available							
Allowable energy absorption J	0.056	0.088	0.157	0.157	0.401	0.627	0.980	1.560

Stroke length

Bore size	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length (mm)	Min. stroke with switch (mm)
ø12	10/20/30/40/50/75/100 125/150/175/200/250	250	5	5 (10)
ø16				
ø20	20/30/40/50/75/100/125 150/175/200/250/300/350/400	400		
ø25				
ø32	25/50/75/100 125/150/175 200/250/300 350/400			
ø40				
ø50				
ø63				

*1: The custom stroke length is available in 5 mm increments. However, the total dimensions are the same as the longer standard stroke length. A dedicated body with dimensions matched to the stroke length is available. Contact CKD for details. *2

*2: For types with one or two switches. The value in ( ) is the min. stroke length for switches of the 2-color display and AC magnetic field proof.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø12	Push	—	—	22.6	33.9	45.2	56.5	67.9	79.2	90.5	1.02×10^2	1.13×10^2
	Pull	—	—	17.0	25.4	33.9	42.4	50.9	59.4	67.9	76.3	84.8
ø16	Push	—	—	40.2	60.3	80.4	1.01×10^2	1.21×10^2	1.41×10^2	1.61×10^2	1.81×10^2	2.01×10^2
	Pull	—	—	30.2	45.2	60.3	75.4	90.5	1.06×10^2	1.21×10^2	1.36×10^2	1.51×10^2
ø20	Push	—	47.1	62.8	94.2	1.26×10^2	1.57×10^2	1.88×10^2	2.20×10^2	2.51×10^2	2.83×10^2	3.14×10^2
	Pull	—	35.3	47.1	70.7	94.2	1.18×10^2	1.41×10^2	1.65×10^2	1.88×10^2	2.12×10^2	2.36×10^2
ø25	Push	—	73.6	98.2	1.47×10^2	1.96×10^2	2.45×10^2	2.95×10^2	3.44×10^2	3.93×10^2	4.42×10^2	4.91×10^2
	Pull	—	56.7	75.6	1.13×10^2	1.51×10^2	1.89×10^2	2.27×10^2	2.64×10^2	3.02×10^2	3.40×10^2	3.78×10^2
ø32	Push	80.4	1.21×10^2	1.61×10^2	2.41×10^2	3.22×10^2	4.02×10^2	4.83×10^2	5.63×10^2	6.43×10^2	7.24×10^2	8.04×10^2
	Pull	60.3	90.5	1.21×10^2	1.81×10^2	2.41×10^2	3.02×10^2	3.62×10^2	4.22×10^2	4.83×10^2	5.43×10^2	6.03×10^2
ø40	Push	1.26×10^2	1.88×10^2	2.51×10^2	3.77×10^2	5.03×10^2	6.28×10^2	7.54×10^2	8.80×10^2	1.01×10^3	1.13×10^3	1.26×10^3
	Pull	1.06×10^2	1.58×10^2	2.11×10^2	3.17×10^2	4.22×10^2	5.28×10^2	6.33×10^2	7.39×10^2	8.44×10^2	9.50×10^2	1.06×10^3
ø50	Push	1.96×10^2	2.95×10^2	3.93×10^2	5.89×10^2	7.85×10^2	9.82×10^2	1.18×10^3	1.37×10^3	1.57×10^3	1.77×10^3	1.96×10^3
	Pull	1.65×10^2	2.47×10^2	3.30×10^2	4.95×10^2	6.60×10^2	8.25×10^2	9.90×10^2	1.15×10^3	1.32×10^3	1.48×10^3	1.65×10^3
ø63	Push	3.12×10^2	4.68×10^2	6.23×10^2	9.35×10^2	1.25×10^3	1.56×10^3	1.87×10^3	2.18×10^3	2.49×10^3	2.81×10^3	3.12×10^3
	Pull	2.80×10^2	4.20×10^2	5.61×10^2	8.41×10^2	1.12×10^3	1.40×10^3	1.68×10^3	1.96×10^3	2.24×10^3	2.52×10^3	2.80×10^3

Switch specifications

● 1-color/2-color display for AC magnetic field

Descriptions	Proximity 2-wire				Proximity 3-wire				Reed 2-wire								Proximity 2-wire
	T1H/ T1V	T2H/T2V/ T2JH/T2JV	T2YH/ T2YV	T2WH/ T2WV	T3H/ T3V	T3PH/ T3PV	T3YH/ T3YV	T3WH/ T3WV	T0H/T0V		T5H/T5V		T8H/T8V				T2YD
Applications	Programmable controller relay, small solenoid valve	Programmable controller			Programmable controller, relay				Programmable controller, relay		Programmable controller, relay IC circuit (without indicator lamp), serial connection		Programmable controller, relay				Programmable controller
Output method	-				NPN output	PNP output	NPN output	NPN output	-								
Power supply voltage	-				10 to 28 VDC				-								
Load voltage	85 to 265 VAC	10 to 30 VDC		24 VDC ±10%	30 VDC or less				12/24 VDC	100/110 VAC	5/12/24 VDC	100/110 VAC	12/24 VDC	110 VAC	220 VAC		24 VDC ±10%
Load current	5 to 100 mA	5 to 20 mA (*2)			100 mA or less		50 mA or less		5 to 50 mA	7 to 20 mA	50 mA or less	20 mA or less	5 to 50 mA	7 to 20 mA	7 to 10 mA		5 to 20 mA
Indicator lamp	LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)		Without indicator lamp		LED (Lit when ON)				Red/green LED (Lit when ON)
Leakage current	1 mA or less with 100 VAC 2 mA or less with 200 VAC	1 mA or less			10 μA or less				0 mA								1 mA or less
Weight g	1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	1 m: 18 3 m: 49 5 m: 80		1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	1 m: 18 3 m: 49 5 m: 80				1 m: 33 3 m: 87 5 m: 142				1 m: 61 3 m: 166 5 m: 272

*1: Refer to page 309 for detailed switch specifications and dimensions.
*2: Max. load current: 20mA at 25°C.The current is lower than 25 mA if the operating ambient temperature around the switch is higher than 20˚C. (60 to 5 mA at 10°C)
*3: Switch for AC magnetic field (T2YD/T2YDT) cannot be used in DC magnetic fields.

Cylinder weight

● STG-B-P7

Unit: kg

Descriptions / Bore size (mm)	Stroke length 10	20	25	30	40	50	75	100	125	150	175	200	250	300	350	400	Switch weight
ø12	0.27	0.30		0.33	0.38	0.42	0.50	0.58	0.68	0.76	0.84	0.92	1.09				Refer to the weight in the switch specifications.
ø16	0.38	0.43		0.47	0.54	0.59	0.70	0.82	0.95	1.06	1.17	1.29	1.50				
ø20		0.76		0.83	0.94	1.02	1.18	1.35	1.55	1.72	1.89	2.06	2.43	2.77	3.10	3.44	
ø25		1.06		1.14	1.32	1.41	1.63	1.86	2.12	2.35	2.57	2.79	3.28	3.73	4.18	4.63	
ø32			1.62			1.92	2.36	2.67	3.03	3.34	3.64	3.95	4.62	5.23	5.84	6.45	
ø40			1.90			2.25	2.72	3.07	3.48	3.83	4.18	4.53	5.28	5.98	6.68	7.38	
ø50			3.24			3.78	4.50	5.04	5.66	6.19	6.73	7.26	8.45	9.51	10.61	11.67	
ø63			4.12			4.76	5.61	6.25	6.98	7.62	8.27	8.91	10.30	11.66	12.92	14.18	

How to order

Without switch

STG - B - 32 - 25 ——— P72

With switch

STG - B - 32 - 25 - T2H - R - P72

Model No.

Ⓐ Bearing

Ⓑ Bore size

Ⓒ Stroke length

Ⓓ Switch model No. *1 *2 *3

Ⓔ Switch quantity

Ⓕ Clean room specifications

Code	Content
Ⓐ Bearing	
B	Ball bearing
Ⓑ Bore size (mm)	
12	ø12
16	ø16
20	ø20
25	ø25
32	ø32
40	ø40
50	ø50
63	ø63
Ⓒ Stroke length (mm)	
Refer to the stroke length table on following page.	

Ⓓ Switch model No.

Lead wire straight	Lead wire L-shaped	Contact	Voltage AC	Voltage DC	Display	Lead wire
T0H*	**T0V***	Reed	●	●	1-color display	2 wires
T5H*	**T5V***		●	●	Without indicator lamp	
T8H*	**T8V***		●	●	1-color display	
T1H*	**T1V***	Proximity	●		1-color display	2 wires
T2H*	**T2V***			●		
T3H*	**T3V***			●		3 wires
T3PH*	**T3PV***			●	1-color display	3 wires
T2WH*	**T2WV***			●	2-color display	2 wires
T2YH*	**T2YV***			●		
T3WH*	**T3WV***			●		3 wires
T3YH*	**T3YV***			●		
T2JH*	**T2JV***			●	1-color display off-delay	2 wires
T2YD*	**-**			●	2-color display for AC magnetic field	2 wires
T2YDT*	**-**			●		

*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

Ⓔ Switch quantity	
R	1 (on rod end)
H	1 (on head end)
D	2
T	3

Ⓕ Clean room specifications	
P72	Exhaust treatment
P73	Vacuum treatment

⚠ Precautions for model No. selection

*1: Switches other than Ⓔ Switch model No. are also available. (Custom order product)
Refer to page 309 for details.
*2: T8H/V switch cannot be installed on STG-12 or 16.
*3: Switches are shipped with the product. Contact CKD if assembling before shipment is necessary.

[Example of model No.]

STG-B-40-75-T0H-D-P72

Model: Guided cylinder Double acting/single rod
Ⓐ Bearing : Ball bearing
Ⓑ Bore size : ø40 mm
Ⓒ Stroke length : 75 mm
Ⓓ Switch model No. : Reed T0H switch, lead wire length 1 m
Ⓔ Switch quantity : 2
Ⓕ Clean room specifications : Exhaust treatment

Ⓒ Stroke length

Stroke length (mm)		Applicable bore size							
		ø12	ø16	ø20	ø25	ø32	ø40	ø50	ø63
Standard stroke length	10	●	●						
	20	●	●	●	●				
	25					●	●	●	●
	30	●	●	●	●				
	40	●	●	●	●				
	50	●	●	●	●	●	●	●	●
	75	●	●	●	●	●	●	●	●
	100	●	●	●	●	●	●	●	●
	125	●	●	●	●	●	●	●	●
	150	●	●	●	●	●	●	●	●
	175	●	●	●	●	●	●	●	●
	200	●	●	●	●	●	●	●	●
	250	●	●	●	●	●	●	●	●
	300			●	●	●	●	●	●
	350			●	●	●	●	●	●
	400			●	●	●	●	●	●
Min. stroke length *2		5 (10)							
Custom stroke length *1		By 5 mm increments							

*1: The total dimensions are the same as the longer standard stroke length.
*2: The value in ( ) is the min. stroke length for switches of the 2-color display and AC magnetic field proof.

How to order switch

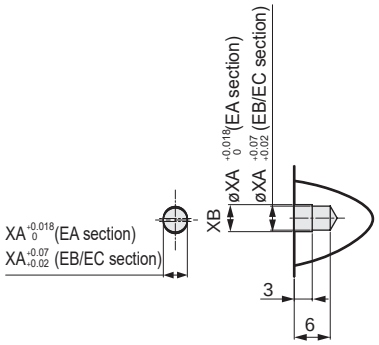
SW - T0V

Switch model No.
(Item Ⓓ on the previous page)

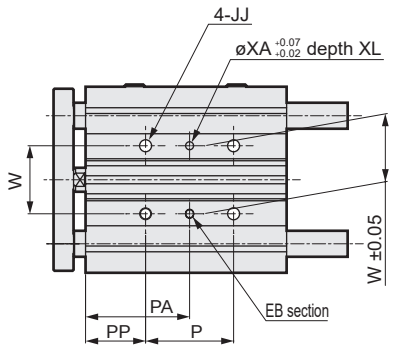
Note: Contact CKD if you use environment-friendly T switch.

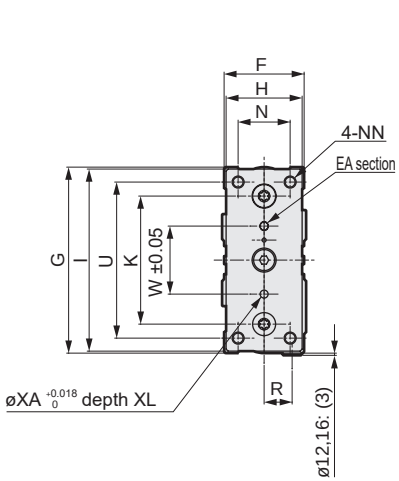
Dimensions (ø12/ø16/ø20/ø25) CAD

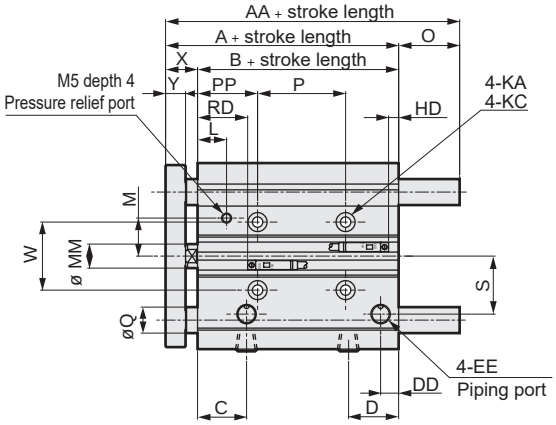
● STG-B-12, 16, 20, 25

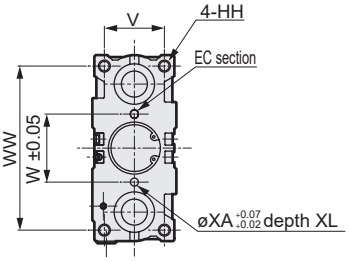


EA/EB/EC section long hole dimensions









Code / Bore size (mm)	Standard stroke length (mm)	A	B	C	D	DD	EE	F	G	H	HH	I	JJ
ø12	10, 20, 30, 40, 50, 75, 100, 125	55	42	25	16	7	M5	26	58	22	M4 depth 10	56	M5 depth 10
ø16	150, 175, 200, 250	59	46	25	18	7.5	M5	30	64	25	M5 depth 12	62	M5 depth 10
ø20	20, 30, 40, 50, 75, 100, 125, 150	66	50	23.5	24.5	8.5	Rc1/8	36	83	30	M5 depth 13	81	M6 depth 12
ø25	175, 200, 250, 300, 350, 400	66.5	50.5	24.5	25	9	Rc1/8	42	93	38	M6 depth 15	91	M6 depth 12

Code / Bore size (mm)	K	KA	MM	N	NN	KC	P					L	M
							30 or less	Over 30 to 100	Over 100 to 200	Over 200 to 300	Over 300		
ø12	41	4.3 penetrating	6	14	M4 penetrating	7.5 spot face depth 4.5	20	40	110	200	—	9	12.5
ø16	46	4.3 penetrating	8	16	M5 penetrating	8 spot face depth 4.5	24	44	110	200	—	8.5	13
ø20	54	5.2 penetrating	10	18	M5 penetrating	9.5 spot face depth 5.5	24	44	120	200	300	13.5	14
ø25	64	5.2 penetrating	12	26	M6 penetrating	9.5 spot face depth 5.5	24	44	120	200	300	14.5	17

Code / Bore size (mm)	PA					PP	R	S	U	V	W	WW	X	Y
	30 or less	Over 30 to 100	Over 100 to 200	Over 200 to 300	Over 300									
ø12	28	38	73	118	—	18	8	17	48	18	23	50	13 $^{0}_{-1.5}$	7.5
ø16	30	40	73	118	—	18	10	18	54	22	24	56	13 $^{0}_{-1.5}$	7.5
ø20	42	52	90	130	180	30	11	25	70	24	28	72	16 $^{0}_{-2}$	9.5
ø25	42	52	90	130	180	30	14	29	78	30	34	82	16 $^{0}_{-2}$	9.5

Code / Bore size (mm)	RD		HD		XA	XB
	T0H/V, T5H/V T2H/V, T3H/V	T2WH/V T3WH/V	T0H/V, T5H/V T2H/V, T3H/V	T2WH/V T3WH/V		
ø12	18	20	5	7	3	3.5
ø16	17	19	10	12	3	3.5
ø20	22.5	24.5	8.5	10.5	3	3.5
ø25	23	25	8.5	10.5	4	4.5

*1: When using a custom stroke length, the total dimensions are the same as the longer standard stroke length.
*2: Refer to page 222 for RD, HD and protruding dimensions of the 2-color display (except for T2WH/V and T3WH/V), off-delay, AC magnetic field proof, T1H/V and T8H/V switches.

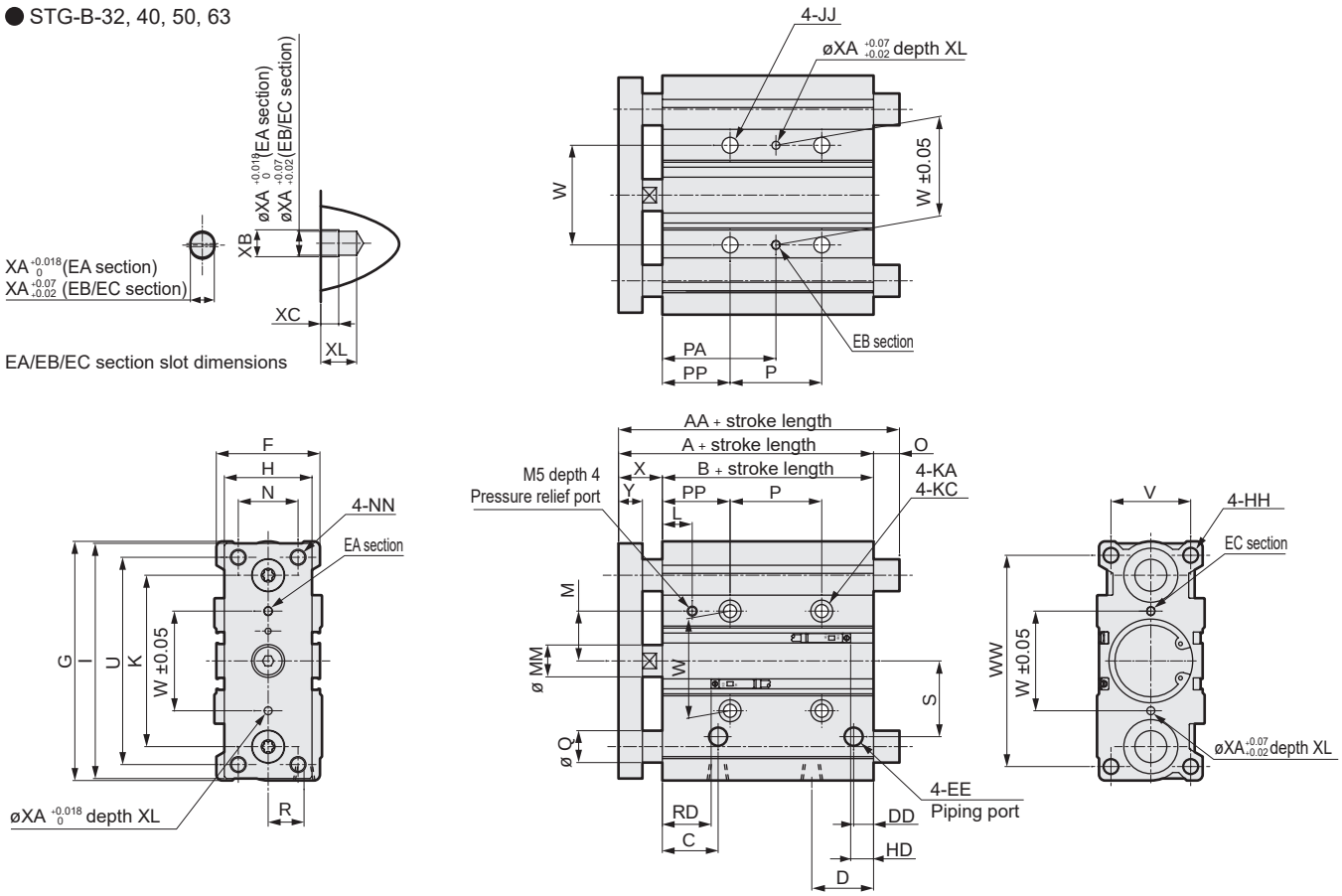
Code / Bore size (mm)	AA			Q	O		
	30 or less	Over 30 to 100	Over 100		30 or less	Over 30 to 100	Over 100
ø12	55	55	85	6	0	0	30
ø16	59	65	95	8	0	6	36

Code / Bore size (mm)	AA				Q	O			
	30 or less	Over 30 to 100	Over 100 to 200	Over 200		30 or less	Over 30 to 100	Over 100 to 200	Over 200
ø20	66	78	100	122	10	0	12	34	56
ø25	66.5	84	103	122	13	0	17.5	36.5	55.5

Dimensions (ø32/ø40/ø50/ø63)

CAD

● STG-B-32, 40, 50, 63



Code / Bore size (mm)	Standard stroke length (mm)	A	B	C	D	DD	EE	F	G	H	HH	I	JJ
ø32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400	71.5	49.5	24.5	30.5	9	Rc1/8	48	112	44	M8 depth 20	110	M8 depth 16
ø40		78	56	26	31	10	Rc1/8	54	120	44	M8 depth 20	118	M8 depth 16
ø50		83	55	25	35	11	Rc1/4	64	148	60	M10 depth 22	146	M10 depth 20
ø63		88	60	27.5	35	15	Rc1/4	78	162	70	M10 depth 22	158	M10 depth 20

Code / Bore size (mm)	K	KA	KC	MM	N	NN	P: 25 or less	P: Over 25 to 100	P: Over 100 to 200	P: Over 200 to 300	P: Over 300	L	M
ø32	78	6.3 penetrating	11 spot face depth 7.5	16	30	M8 penetrating	24	48	124	200	300	14.5	21
ø40	86	6.3 penetrating	11 spot face depth 7.5	16	30	M8 penetrating	24	48	124	200	300	15	25
ø50	110	8.6 penetrating	14 spot face depth 9	20	40	M10 penetrating	24	48	124	200	300	14	33
ø63	124	8.6 penetrating	14 spot face depth 9	20	50	M10 penetrating	28	52	128	200	300	14.5	40

Code / Bore size (mm)	PA: 25 or less	PA: Over 25 to 100	PA: Over 100 to 200	PA: Over 200 to 300	PA: Over 300	PP	R	S	U	V	W	WW	X	Y
ø32	45	57	95	133	183	33	15	34	96	34	42	98	22 -2 0	11.5
ø40	46	58	96	134	184	34	18	38	104	40	50	106	22 -2 0	11.5
ø50	47	59	97	135	185	35	21.5	47	130	46	66	130	28 -2 0	15.5
ø63	49	61	99	135	185	35	28	55	130	58	80	142	28 -2 0	15.5

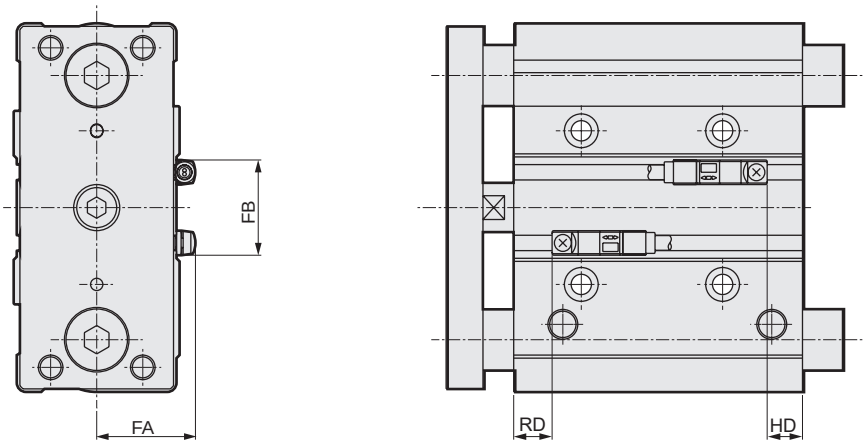
Code / Bore size (mm)	RD: T0H/V, T5H/V T2H/V, T3H/V	RD: T2WH/V T3WH/V	HD: T0H/V, T5H/V T2H/V, T3H/V	HD: T2WH/V T3WH/V	XA	XB	XC	XL
ø32	22	24	8.5	10.5	4	4.5	3	6
ø40	25	27	12	14	4	4.5	3	6
ø50	24.5	26.5	11.5	13.5	5	6	4	8
ø63	25	27	16	18	5	6	4	8

*1: When using a custom stroke length, the total dimensions are the same as the longer standard stroke length.
*2: Refer to page 222 for RD, HD and protruding dimensions of the 2-color display (except for T2WH/V and T3WH/V) , off-delay, AC magnetic field proof, T1H/V and T8H/V switches.

Code / Bore size (mm)	AA: 50 or less	AA: Over 50 to 100	AA: Over 100 to 200	AA: Over 200	Q	O: 50 or less	O: Over 50 to 100	O: Over 100 to 200	O: Over 200
ø32	79	98	118	140	16	7.5	26.5	46.5	68.5
ø40	79	98	118	140	16	1	20	40	62
ø50	91	114	134	161	20	8	31	51	78
ø63	91	114	134	161	20	3	26	46	73

Common dimensions (Switches of 2-color display, off-delay, AC magnetic field, T8H/V and T1H/V)

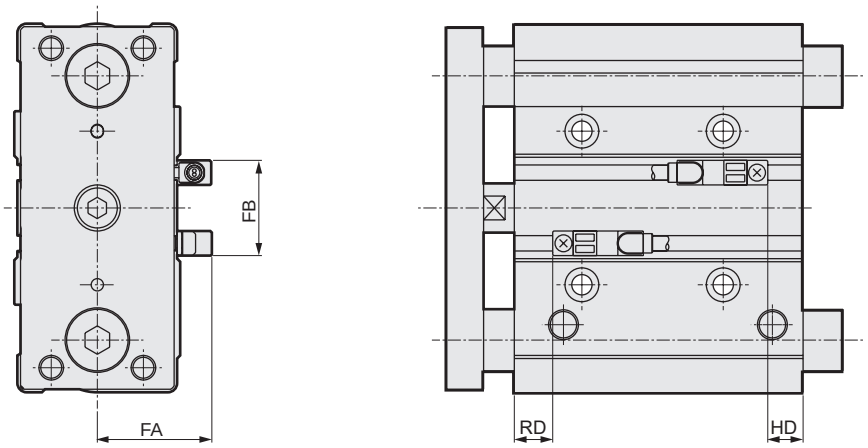
● STG-B-**-**-T$^{2}_{3}$YH/V, T2JH/V, T8H/V



Code / Bore size (mm)	FA	FB	RD		HD	
			T*YH/V, T2JH/V	T8H/V	T*YH/V, T2JH/V	T8H/V
ø12	19	16	17	- (*1)	4	- (*1)
ø16	21	16	16	- (*1)	9	- (*1)
ø20	24	16	21.5	16.5	7.5	2.5
ø25	27	17	22	17	7.5	2.5
ø32	30	24	21	16	8	2.5
ø40	33	31	24	19	11	6
ø50	38	32	23.5	18.5	10.5	5.5
ø63	45	32	24	19	15	10

*1: T8H/V switch cannot be installed on STG-B-12, 16-P7..

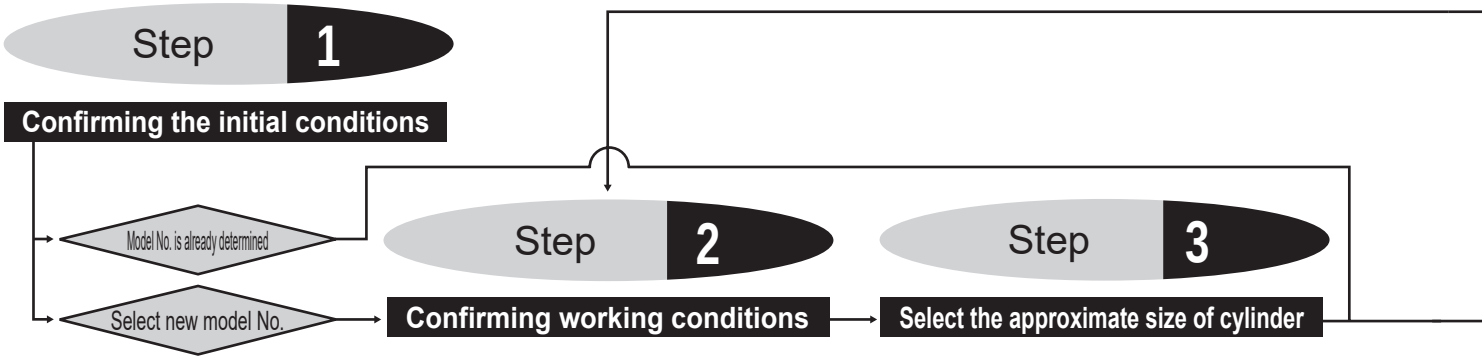
● STG-B-**-**-T2YD*, T1H/V



Code / Bore size (mm)	FA	FB	RD	HD
			STG-P7*	STG STG-P7*
ø12	24	16	17	4
ø16	26	16	16	9
ø20	29	16	21.5	7.5
ø25	32	17	22	7.5
ø32	35	24	21	8
ø40	38	31	24	11
ø50	43	32	23.5	10.5
ø63	50	32	24	15

MEMO

As the selection conditions are different from those of general air cylinders, confirm whether the model is adequate or not according to selection guide.



Step 2 Confirming working conditions

1. Working pressure P (MPa)
2. Total applied load W (N)

[Total applied load]

When determining the total applied load, take into account the weight of the movable part weight of the cylinder body.

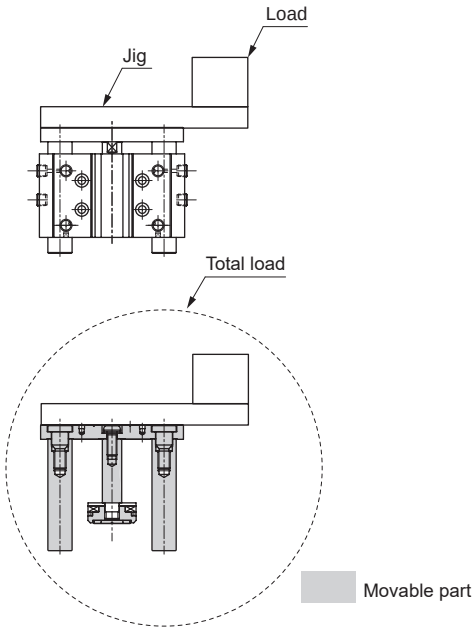
W = (Applied load) + (Jig load) + (weight of movable part: Fa).

Calculate the weight of the movable part by using the value in movable part weight table on page 230.

Fa = Ma × 10

Ma: Movable part weight (kg)

Fa: Weight of movable part (N)



3. Mounting orientation

[Actuation]

Horizontal, vertical-rise, vertical-decline

4. Stroke length L (mm)
5. Operation time t (s)
6. Operation speed V (mm/s)

Formula of the cylinder's average operation speed Va

Va = L /t (mm/s)

Step 3 Select the approximate size of cylinder

● Formula for calculating cylinder size (bore size)

$F = \pi/4 \times D^2 \times P$

$\therefore D = \sqrt{4F/\pi P}$

D: Cylinder bore size (mm)

P: Working pressure (MPa)

F: Cylinder theoretical thrust (N)

● When calculating from the theoretical thrust value in Table 1

Approximate required thrust ≥ Applied load × 2

("× 2" in "Applied load × 2" is for when the load factor is approx. 50% as a safety coefficient)

[Example] Working pressure = 0.5 (MPa)

Applied load 25 (N)

Required thrust is 25 (N) x 2 = 50 (N)

When selecting the tube bore size with theoretical thrust of 50 N and over at working pressure of 0.5 MPa from Table 1, it will be ø 12 and over.

D = ø12

[Cylinder theoretical thrust]

Table 1. Cylinder theoretical thrust table

Theoretical thrust table ø12, ø16 Unit: N

Actuation direction	Pressure MPa	Bore size mm	
		ø12	ø16
Push	0.15	17	22.6
	0.2	22.6	30.2
	0.3	33.9	45.2
	0.4	45.2	60.3
	0.5	56.6	75.4
	0.6	67.8	90.5
	0.7	79.1	106
	0.8	90.4	121
	0.9	101.8	136

* Refer to page 216 for theoretical thrust table.

Step 4

Calculate the total applied load (W) and each moment

To the next page

Step 4 Calculate the total applied load (W) and each moment

● Calculate the static load (Wo) and the moment (m) of the load, which is dependent on how the cylinder is mounted.

W_0 = (Applied load) + (Jig load) (N)

$M_1 = F_1 \times \ell_1$ (N·m)

$M_2 = F_2 \times \ell_2$ (N·m)

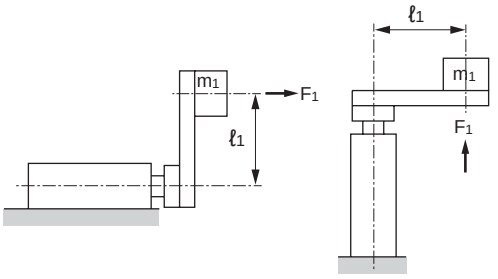
$M_3 = F_3 \times \ell_3$ (N·m)

For values of F_1, F_2 and F_3, use those shown in Fig. 2.

Fig. 2. Formula for calculating each moment
Calculate each moment from total applied load, inertia force coefficient and eccentric distance.

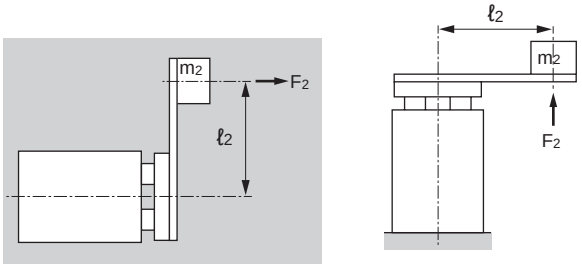
[Bending moment]

$M_1 = F_1 \times \ell_1 = 10 \times m_1 \times G \times \ell_1$



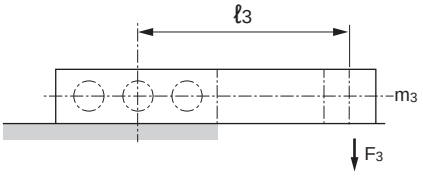
[Radial moment]

$M_2 = F_2 \times \ell_2 = 10 \times m_2 \times G \times \ell_2$



[Torsion moment]

$M_3 = F_3 \times \ell_3 = 10 \times m_3 \times \ell_3$

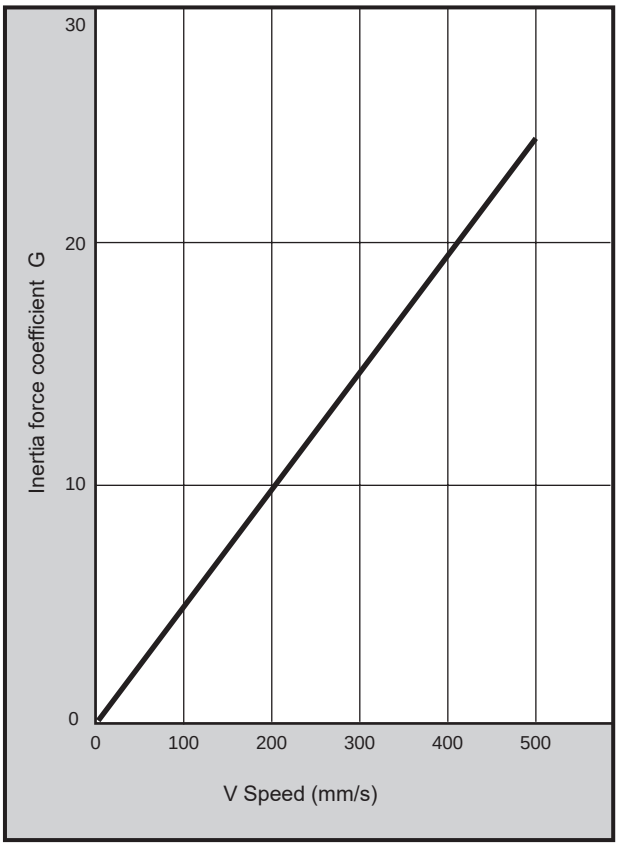


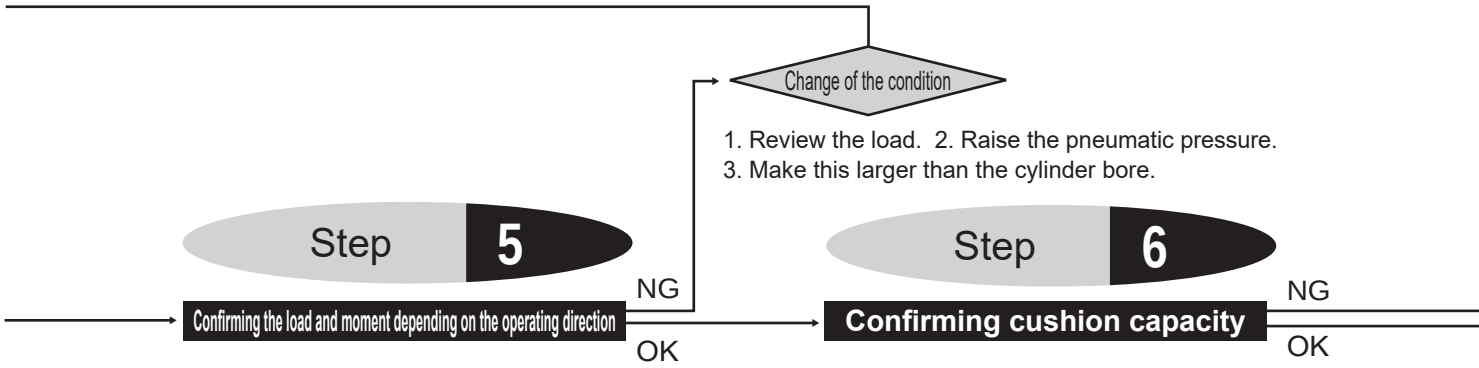
m_1:
m_2: } Load weight (kg)
m_3:

ℓ_1:
ℓ_2: } Eccentric distance (m)
ℓ_3:

G: Inertia force coefficient (Fig. 3)

Fig. 3. Trend of inertia force coefficient for guided cylinder





Step 5 Confirming the load and moment depending on the operating direction

5−1 Confirming applied load

❶ For horizontal operation

The value of applied static load must be the allowable load or less.

Applied static load W_0 — Value obtained in Step 4

Allowable lateral load Wmax — Select from Table 2 or graph according to the stroke length

(when using custom stroke length, select the longer standard stroke length)

$W_0 \leq Wmax$

Table 2. Allowable lateral load — Unit: N

Bore size (mm)	Stroke length (mm)			
	10	20	25	30
ø12	38	27		22
ø16	49	35		29
ø20		52		42
ø25		81		66
ø32			171	

* Refer to page 230 for allowable lateral load. When using an eccentric load, refer to the graph on page 232.

❷ For vertical operation

The total applied load value must be the value obtained by applying the load factor to the theoretical thrust

● Calculation of load factor

Total applied load W — Value obtained in Step 2

Theoretical thrust of cylinder F — Select from the theoretical thrust table on page 216 depending on the pressure

$\alpha = W/F \times 100$ (%)

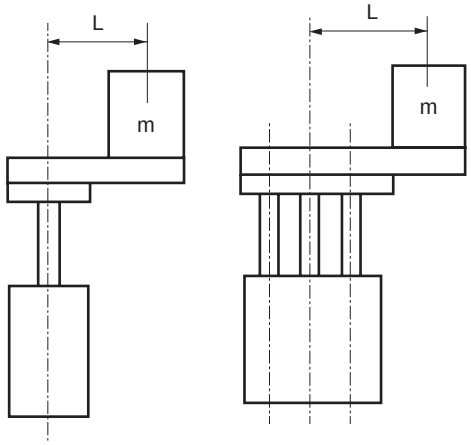
● Determine the load factor by taking into account the status of utilization such as stability margin and service life of the cylinder. For general use, the value within the range in Table 3 is desirable.

Table 3. Appropriate range of load factor (reference value)

Working pressure (MPa)	Load factor (%)
0.1 to 0.3	$\alpha \leqq 40$
0.3 to 0.6	$\alpha \leqq 50$
0.6 to 1.0	$\alpha \leqq 60$

● Confirm the following when eccentric load is applied

The value must be the allowable load value or less from the graph of eccentric distance and load weight on pages 228 and 229



5-2 Confirming the static moment

❶ Divide the value of bending moment and radial moment by the value in Table 4 to obtain the moment ratio and check that the total value of the moment ratio is 1.0 or less.

● Calculation of moment ratio

Bending moment M_1 } Value obtained in Step 4

Radial moment M_2 }

$M_1 / M_1max + M_2 / M_2max \leq 1.0$

Condition changes

1. Install an external shock absorber.
2. Decrease the operation speed.
3. Use a cylinder with larger bore size

Selection complete

Table 4. Allowable moment (N·m)

Bore size (mm)	Allowable bending moment M1, M2 (N·m)
ø12	7.0
ø16	11.2
ø20	19.2
ø25	35.3
ø32	51.9
ø40	51.9
ø50	171.5
ø63	171.5

2 The torsion moment must be the allowable torque value or less.

Torsion moment M3 Value obtained in Step 4

Allowable torque

M3max Select from Table 5 according to the stroke (When using a custom stroke length, select the longer standard stroke length)

$M_3 \leq M_{3max}$

Table 5. Allowable torque (N·m)

Bore size (mm)	Stroke length (mm)		
	10	20	25
ø12	0.39	0.28	
ø16	0.56	0.41	
ø20		0.70	
ø25		1.29	
ø32			3.33
ø40			3.68
ø50			4.99
ø63			5.63

* Refer to page 230 for allowable torque.

Step 6 CONFIRMING CUSHION FACULTY

Calculate the kinetic energy of the load that is actually to be used, and confirm whether it can be absorbed by the allowable absorbed energy of cylinder or not.

- To obtain the allowable absorbed energy of cylinder (E), use the value in the graphs below.
- Formula for calculating the kinetic energy of load

$$E = \frac{1}{2} \times (W1 + W2) \times V^2$$

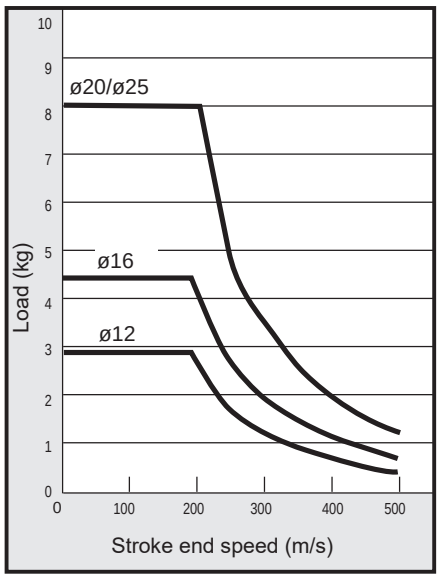
W1: Applied load (kg) W2: Movable part weight of cylinder (kg)

V: Cylinder speed (m/s)

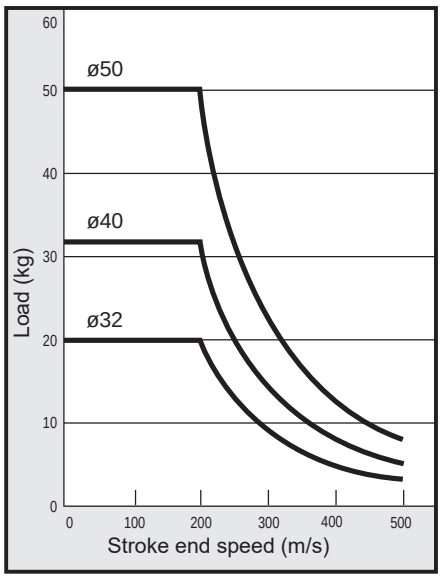
Allowable absorbed energy value

Use the product in the range of the lower-left side of the curve. For use in the upper right range, provide an external shock absorber.

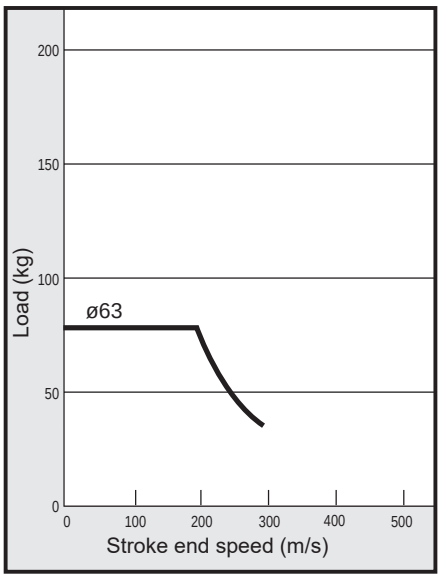
● STG-12 to 25



● STG-32 to 50



● STG-63

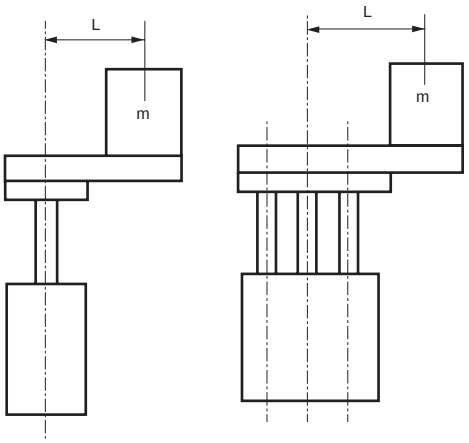


Selection guide

In case of vertical installation

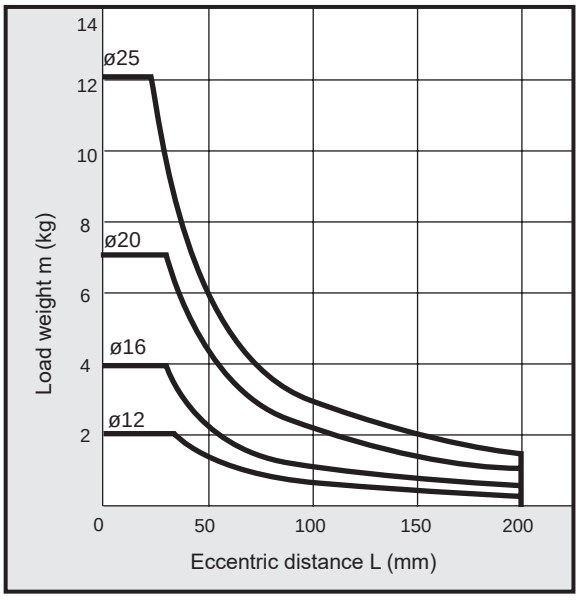
- As for the total load weight, select the tube inner diameter so that the ratio of the load to the theoretical thrust is within the values in the table below.

Bore size	Load factor for the theoretical thrust
12, 16	40% or less
20, 25	50% or less
32 to 80	60% or less
100	60% or less



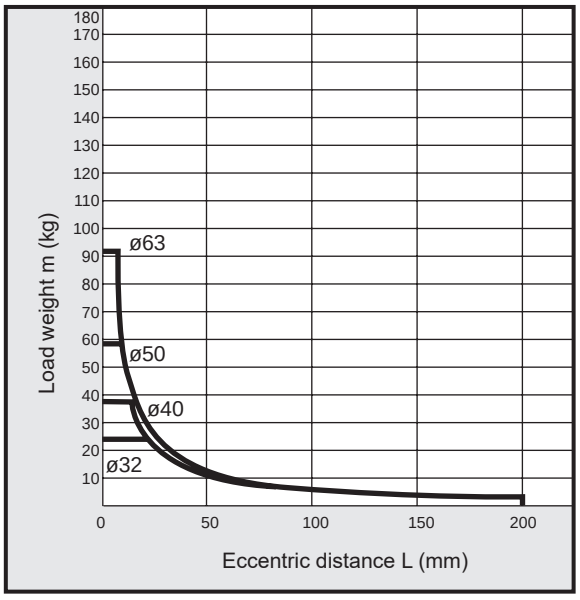
● STG-B-12 to 25

• Stroke length of 30 mm or less



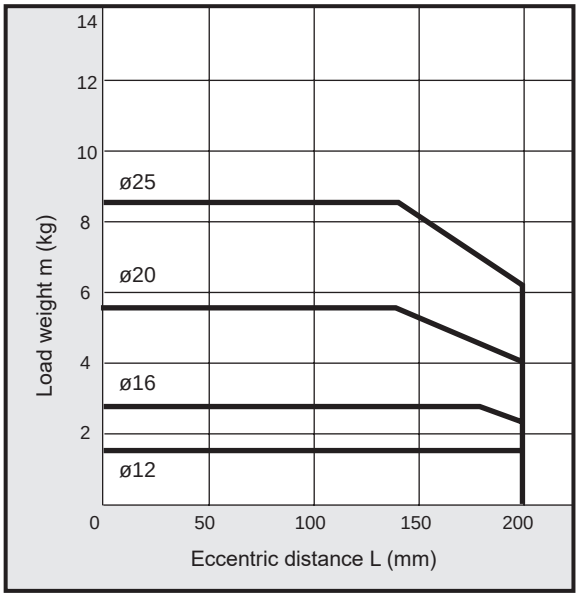
● STG-B-32 to 63

• Stroke length of 50 mm or less



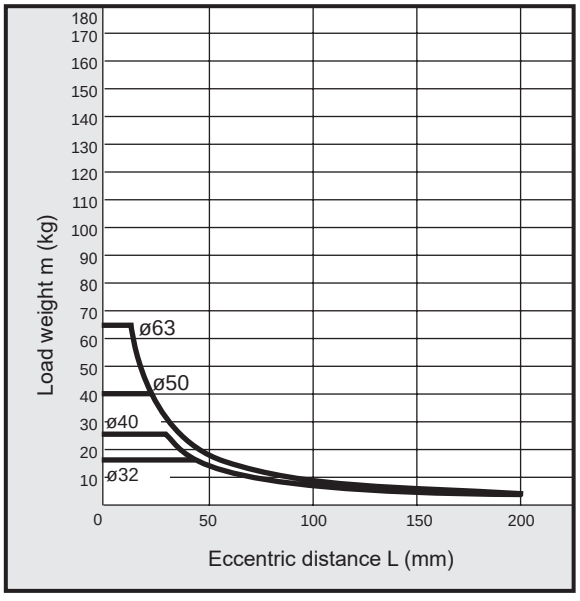
● STG-B-12 to 25

• Over 30 mm to 100 mm stroke length

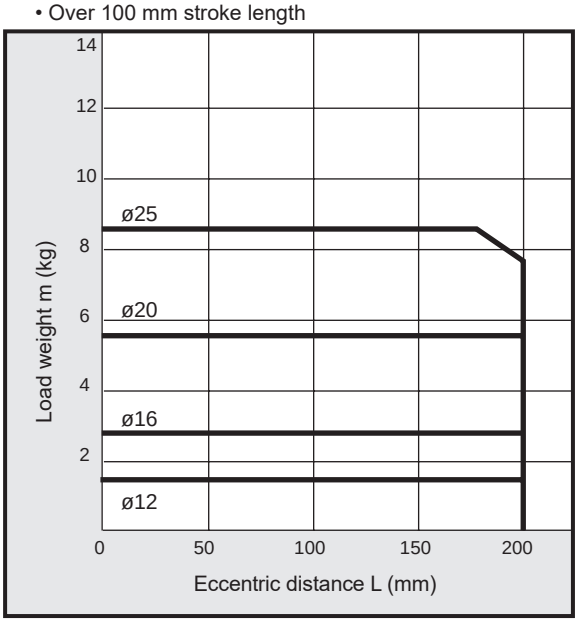


● STG-B-32 to 63

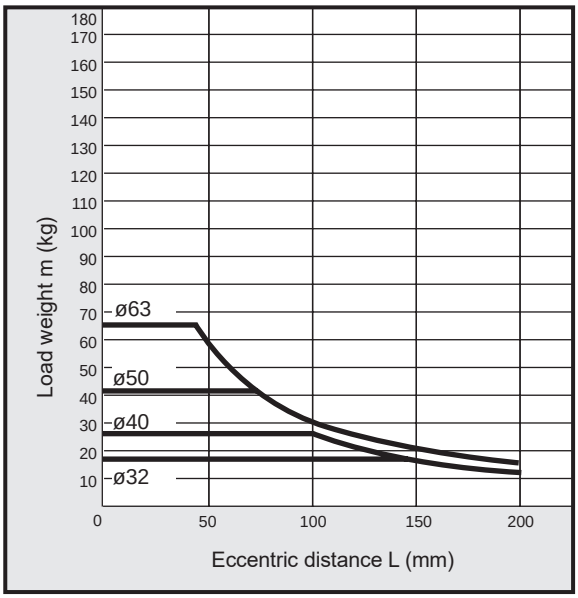
• Over 50 mm to 100 mm stroke length • Over 50 mm to 200 mm stroke length



● STG-B-12 to 25
• Over 100 mm stroke length

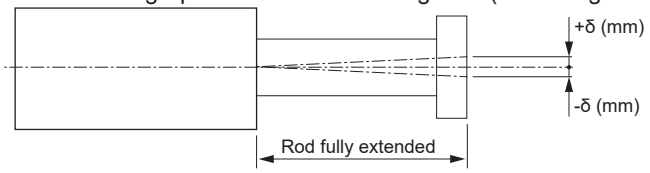


● STG-B-32 to 63
• Over 100 mm stroke length • Over 200 mm stroke length

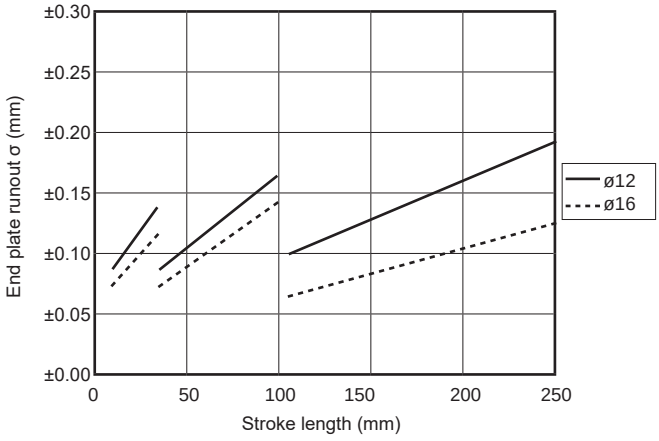


Deflection

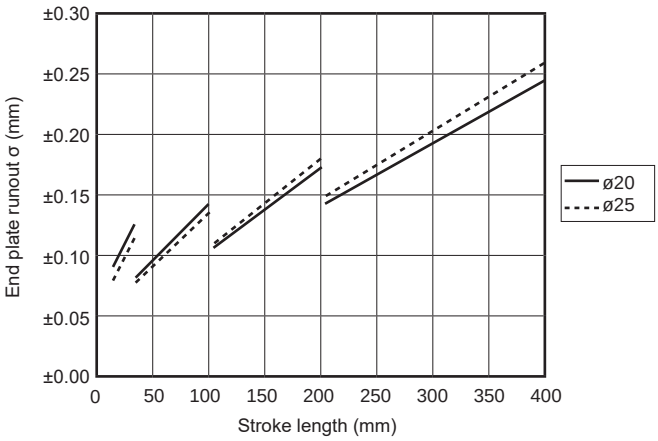
For the runout amount δ that is produced at the end of the end plate when no load is applied, the value in the graph below is used as a guide. (Excluding deflection of guide rod)



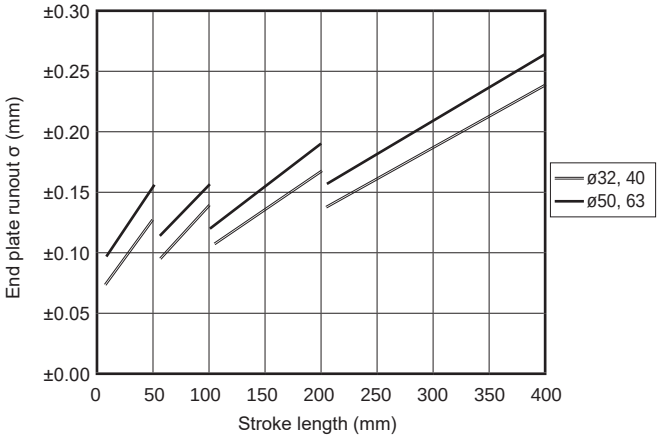
● ø12, ø16



● ø20 to ø40

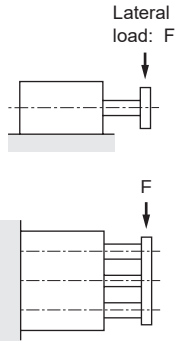


● ø50 to ø63



Selection guide

Allowable lateral load

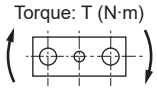


Unit: N

Bore size (mm)	Stroke length (mm)							
	10	20	25	30	40	50	75	
ø12	38	27		22	34	29	21	
ø16	49	35		29	50	43	31	
ø20		52		42	76	65	49	
ø25		81		66	108	94	70	
ø32			171			120	190	
ø40			171			120	190	
ø50			181			129	215	
ø63			181			129	215	

*1: For copper and PTFE free, only for M: metal bush bearing, design the cylinder with the allowable value in the table above × 0.7.

Allowable torque

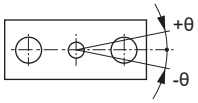


Unit: N·m

Bore size (mm)	Stroke length (mm)							
	10	20	25	30	40	50	75	
ø12	0.39	0.28		0.23	0.35	0.30	0.21	
ø16	0.56	0.41		0.33	0.58	0.50	0.36	
ø20		0.70		0.57	1.02	0.88	0.66	
ø25		1.29		1.06	1.74	1.50	1.13	
ø32			3.33			2.34	3.70	
ø40			3.68			2.58	4.08	
ø50			4.99			3.56	5.90	
ø63			5.63			4.01	6.66	

Non-rotating accuracy

(reference value)



Movable part weight table

Unit: kg

Bore size (mm)	Stroke length (mm)															
	10	20	25	30	40	50	75	100	125	150	175	200	250	300	350	400
ø12	0.11	0.11		0.12	0.13	0.14	0.16	0.17	0.20	0.22	0.23	0.25	0.29			
ø16	0.15	0.16		0.17	0.20	0.21	0.24	0.27	0.32	0.35	0.38	0.41	0.47			
ø20		0.31		0.33	0.37	0.39	0.44	0.48	0.56	0.60	0.65	0.70	0.80	0.90	1.00	1.09
ø25		0.49		0.52	0.58	0.61	0.69	0.76	0.88	0.95	1.02	1.10	1.28	1.44	1.58	1.72
ø32			0.82			0.94	1.11	1.23	1.40	1.53	1.65	1.77	2.07	2.30	2.54	2.78
ø40			0.89			1.01	1.18	1.30	1.48	1.60	1.72	1.83	2.14	2.38	2.61	2.84
ø50			1.77			1.95	2.24	2.45	2.71	1.89	3.08	3.27	3.76	4.13	4.50	4.87
ø63			2.11			2.30	2.59	2.77	3.05	3.25	3.43	3.61	4.11	4.48	4.84	5.21

Unit: N

	Stroke length (mm)								
	100	125	150	175	200	250	300	350	400
	16	12	11	9	8	6			
	25	20	17	15	13	10			
	38	60	51	44	39	32	27	23	20
	56	81	69	60	53	42	36	30	27
	159	123	106	93	83	66	56	48	42
	159	123	106	93	83	66	56	48	42
	181	139	121	106	95	78	67	58	50
	181	139	121	106	95	78	67	58	50

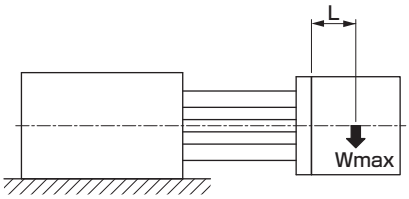
Unit: N·m

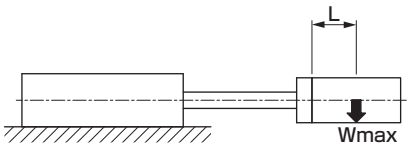
	Stroke length (mm)								
	100	125	150	175	200	250	300	350	400
	0.17	0.13	0.11	0.09	0.08	0.07			
	0.28	0.23	0.19	0.17	0.15	0.12			
	0.52	0.80	0.69	0.60	0.53	0.43	0.36	0.31	0.27
	0.90	1.29	1.11	0.96	0.85	0.68	0.57	0.49	0.42
	3.10	2.40	2.07	1.82	1.61	1.29	1.09	0.94	0.82
	3.42	2.65	2.28	2.00	1.78	1.43	1.20	1.03	0.90
	4.99	3.83	3.32	2.93	2.61	2.16	1.83	1.58	1.39
	5.62	4.32	3.75	3.30	2.94	2.43	2.06	1.78	1.57

Descriptions / Bore size (mm)	Non-rotating accuracy θ (degree)
ø12	±0.06
ø16	
ø20	±0.05
ø25	
ø32	±0.04
ø40	
ø50	±0.03
ø63	

(Default at PULL) Note: Excluding deflection of guide rod

Allowable lateral load

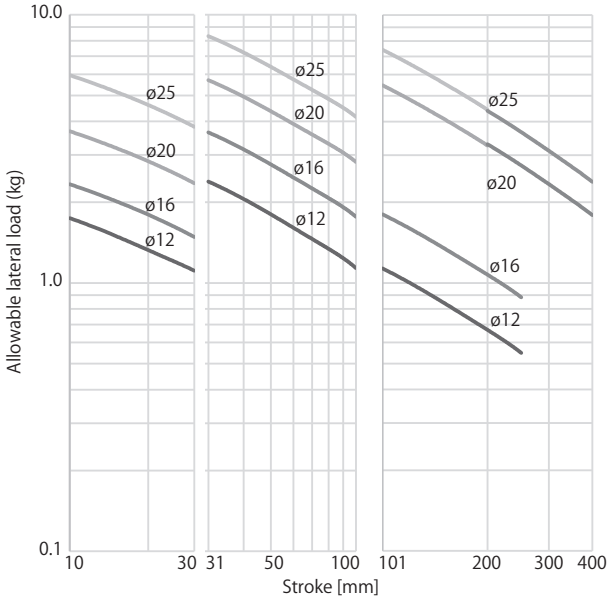




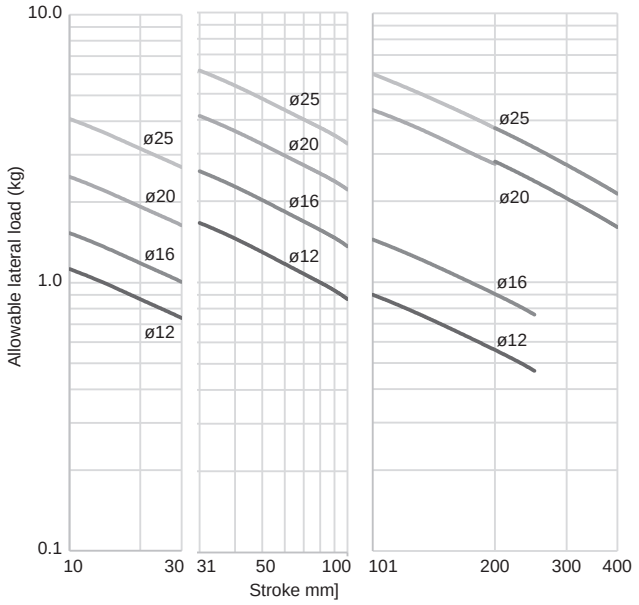
Wmax: Lateral load (kg)
L: Position of center of gravity of load (mm)

STG-B-12 to 25

● For L=50mm

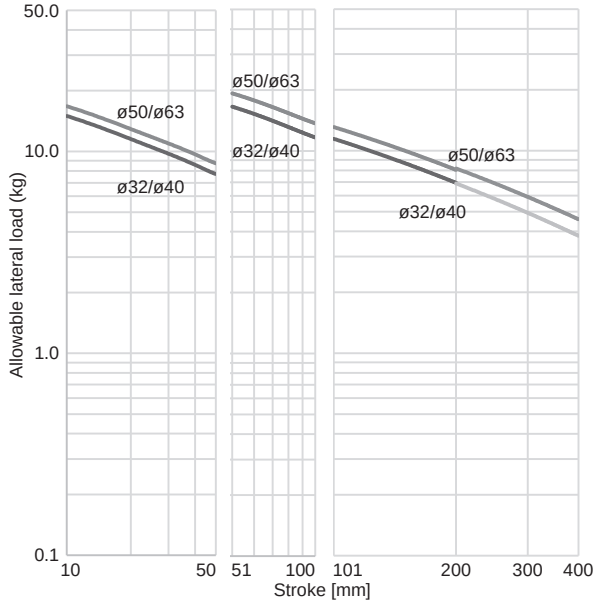


● For L=100mm

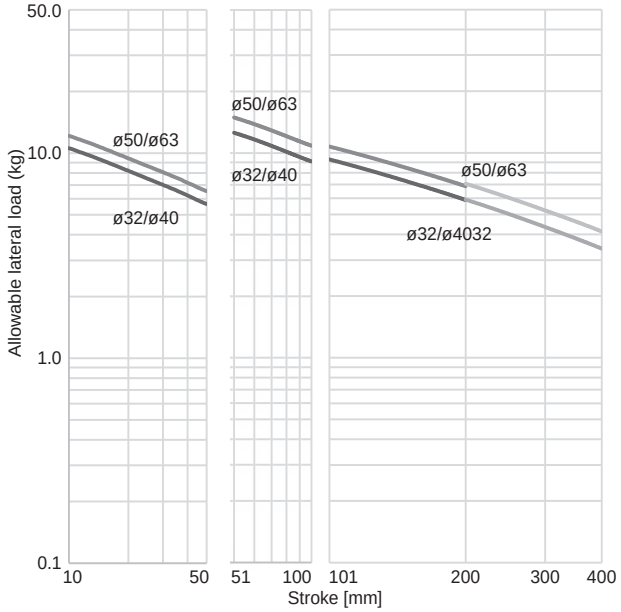


STG-B-32 to 63

● For L=50mm



● For L=100mm



Safety Precautions

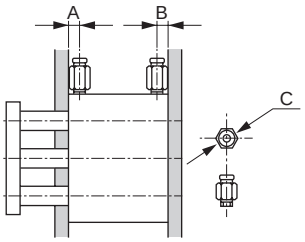
Be sure to read this section before use.
Refer to page 2 for general information on the cylinder, and to page 320 for general information on the cylinder switch.

Guided cylinder STG-B Series

Mounting, installation & adjustment

CAUTION

■ Be sure to attach a speed controller during piping before use. The applicable fittings are as below.



Item / Bore size (mm)	Port size	Port position dimensions A	Port position dimensions B	Applicable fittings	Fitting O.D. øC
ø12	M5×0.8	12	7	SC3W-M5-4-P7* SC3W-M5-6-P7* GWS4-M5-S-P7* GWS4-M5-P7* GWL4-M5-P7* GWL6-M5-P7* GWS6-M5-P7*	ø12 or less
ø16		12	7.5		
ø20	Rc1/8	10.5	8.5	SC3W-6-4/6/8-P7* GWS4-6-P7* GWS6-6-P7* GWS8-6-P7* GWL4-6-P7* GWL6-6-P7*	ø15 or less
ø25		11.5	9		
ø32		12.5	9		
ø40		14	10		
ø50	Rc1/4	14	11	SC3W-8-6/8/10-P7* GWS4-8-P7* GWS6-8-P7* GWS10-8-P7* GWS12-8-P7* GWL4 to 12-8-P7*	ø21 or less
ø63		16.5	15		

■ Do not damage surface flatness by denting or scratching the body (tube) mounting surface or the end plate surface. Make sure that the flatness of the mating surface where the end plate will be attached is, as a guideline, 0.03mm or below.

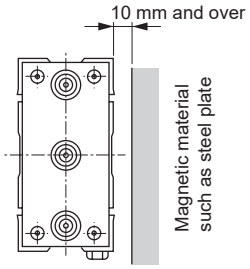
■ When mounting the body with the through bolt, tighten with tightening torque as shown in the table below.

ø12	1.5 to 2.7N·m
ø16	
ø20/ø25	3 to 5.4N·m
ø32/ø40	5.2 to 9.2N·m
ø50/ø63	12.5 to 22N·m

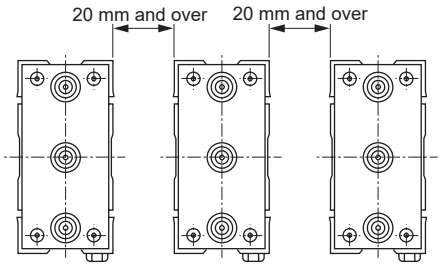
■ Allowable absorbed energy value

Use this cushion within the range of the allowable absorbed energy.When the unit will be used where the allowable absorbed energy will be exceeded, provide a separate external shock absorber. For details on the allowable absorbed energy value, refer to the specification field or selection guide.

■ Be sure to attach a speed controller during piping before use. The available fittings are as below.



■ The cylinder switch may malfunction if cylinders are installed adjacently. Check that the following distances are provided between cylinders.(Same clearance for all bore sizes)



■ Do not rotate the piston rod unless you disassemble the product for maintenance, etc. Do not rotate the piston rod because misalignment may occur, which may cause unstable operation.