

FABCO-AIR

Magnetically Coupled Rodless Slides

FGYSR Series



Magnetically coupled rodless slides

Features

1. Lube retainers, internal & external.
2. Stainless steel barrel.
3. Anodized aluminum end covers.
4. Bores \varnothing 10, 15, 20, 25, 32, 40
5. The external slider is magnetically coupled to the piston to provide a space-saving rodless slide.
6. Slide position sensors and shock absorbers available. See pages 4 and 7.

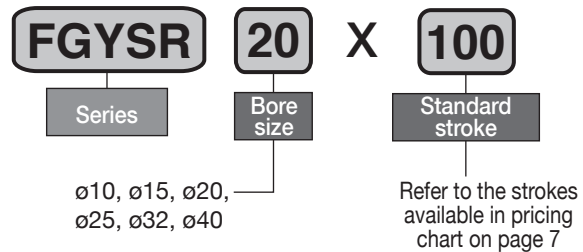


See page 3 for dimensions and page 7 for sensor selection.

Specifications – FGYSR

Bore Size	\varnothing 10	\varnothing 15	\varnothing 20	\varnothing 25	\varnothing 32	\varnothing 40
Min. operating pressure	26 psi					
Magnet holding force (N)	53.9	137	231	363	588	922
Max. operating pressure	0.7 MPa (7kgf/cm ²) 101 psi					
Temperature range	-10°C (14°F) to 60°C (140°F)					
Piston speed	50 to 400 mm/s					
Cushion	Rubber bumper or shock absorbers					
Lubrication	None required, or ISO VG32					
Stroke tolerance	0-250 st ^{+1/-0} 251-1000 st ^{+1.4/-0} mm 1001-1500 st ^{+1.8/-0} mm					
Mounting orientation	Horizontal, inclined, vertical					

How to order



Order shock absorbers separately. See page 4 for part numbers and prices.

Order sensors separately. See page 7 for part numbers and prices.

Max. holding force

(N)

Bore Size	\varnothing 10	\varnothing 15	\varnothing 20	\varnothing 25	\varnothing 32	\varnothing 40
Theoretical thrust (holding force) (N)	53.9	137	231	363	588	922

lb force = N x 0.224

Mass

(kg)

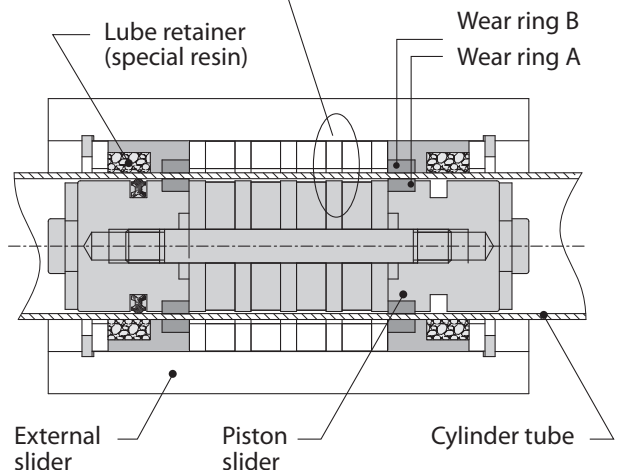
Bore Size	\varnothing 10	\varnothing 15	\varnothing 20	\varnothing 25	\varnothing 32	\varnothing 40
Basic mass (0 stroke)	0.48	0.91	1.48	1.84	3.63	4.02
Additional mass per 50 mm stroke	0.074	0.104	0.138	0.172	0.267	0.406

Calculation example: FGYSR32 X 500

Basic mass 3.63 kg
 Additional mass 0.267 per 50 stroke
 Cylinder stroke 500 stroke
 $3.63 + (0.267 \times 500 \div 50) = 6.3 \text{ kg}$

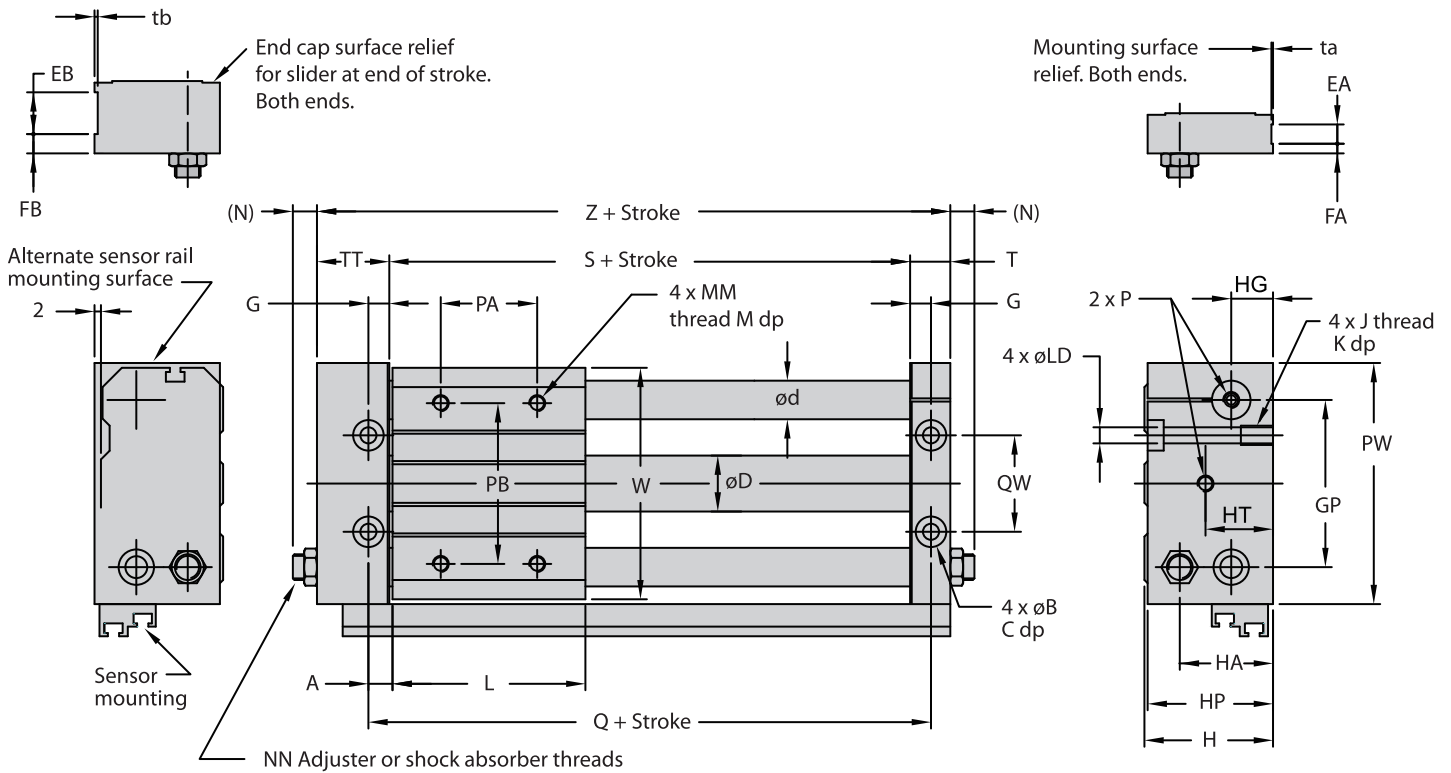
Magnetic coupling

High strength magnetic coupling is standard



Magnetically coupled rodless slides

FGYSR Series



FGYSR Series Dimensions (mm)

Bore	A	B	C	D	d	EA	EB	FA	FB	G	GP	H	HA	HG	HP	HT	J	K	L	LD
Ø10	7.5	8	4	12	10	6	12	3	5	6.5	40	34	25.5	12	33	18	M5x0.8	10.5	45	4.3
Ø15	7.5	9.5	5	17.4	12	6	13	3	6	6.5	52	40	29	13	39	21	M6x1.0	10	60	5.5
Ø20	10	9.5	5.2	21.4	16	-	-	-	-	8.5	62	46	36	17	45	20	M6x1.0	9.5	70	5
Ø25	10	11	6.5	26.4	16	8	14	4	7	8.5	70	54	40	20	53	20	M8x1.25	11	70	6.8
Ø32	12.5	14	8	33.6	20	8	16	5	7	9.5	86	66	46	24	64	24	M10x1.5	15.5	85	8.7
Ø40	12.5	15	9	41.6	25	10	20	5	10	10.5	104	76	57	25	74	25	M10x1.5	16	95	8.7

Bore	MM	M	(N)	NN	P	PA	PB	PW	Q	QW	S	T	TT	ta	tb	W	Z
Ø10	M4x0.7	8	9.5	M8x1.0	M5x0.8	25	38	60	60	24	47	12.5	20.5	0.5	1	58	80
Ø15	M5x0.8	8	7.5	M8x1.0	M5x0.8	30	50	75	75	30	62	12.5	22.5	1	1	72	97
Ø20	M6x1.0	10	9.5	M10x1.0	Rc)PT1/8"	40	70	90	90	38	73	16.5	25.5	-	-	87	115
Ø25	M6x1.0	10	11	M14x1.5	Rc)PT1/8"	40	70	100	90	42	73	16.5	25.5	0.5	1	97	115
Ø32	M8x1.25	12	11.5	M20x1.5	Rc)PT1/8"	40	75	122	110	50	91	18.5	28.5	0.5	1	119	138
Ø40	M8x1.25	12	10.5	M20x1.5	Rc)PT1/4"	65	105	145	120	64	99	20.5	35.5	1	1	142	155

Magnetically coupled rodless slides

Vertical Operation

When operating a load vertically, it should be operated within the allowable load mass and maximum operating pressures shown in the table below. Use caution, as operating above the prescribed values may lead to dropping the load. Also see mounting orientation Example 3 on page 5.

When the cylinder is mounted vertically or at an angle from horizontal, sliders may move downward due to their own weight or workpiece mass. If an accurate stopping position is required at the stroke end or mid-stroke, use an external stopper for precise positioning.

Bore size (mm)	Model	Max. Allowable load mass (Wv) (kg) Note 2	Max. operating pressure (Pv) (MPa) psi
ø10	FGYSR10	2.7	(0.55) 80
ø15	FGYSR15	7.0	(0.65) 94
ø20	FGYSR20	11.0	(0.65) 94
ø25	FGYSR25	18.5	(0.65) 94
ø32	FGYSR32	30.0	(0.65) 94
ø40	FGYSR40	47.0	(0.65) 94

- Note 1) Use caution, since the magnetic coupling may disengage if it is used over the maximum operating pressure.
 Note 2) Allowable load mass above indicates the maximum load mass when loaded. The actual loadable mass must be determined referring to the calculations on pages 5 and 6.

Intermediate Stopping

- 1) **Intermediate stopping of load using an external stopper.**
 When stopping a load in mid-stroke using an external stopper (adjusting bolt, etc.), operate within the operating pressure limits shown in the table below. Use caution, as operation exceeding these limits can break the magnetic connection.

Bore size (mm)	Model	Operating pressure limit for intermediate stop (MPa) psi
ø10	FGYSR10	(0.55) 80
ø15	FGYSR15	(0.65) 94
ø20	FGYSR20	(0.65) 94
ø25	FGYSR25	(0.65) 94
ø32	FGYSR32	(0.65) 94
ø40	FGYSR40	(0.65) 94

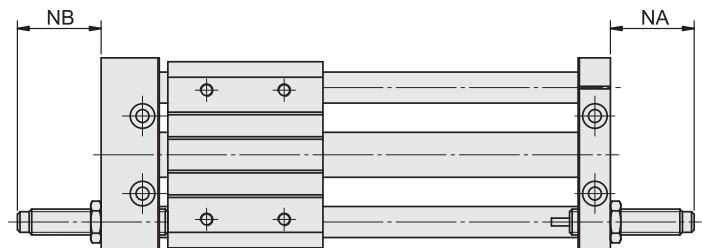
- 2) **Intermediate stopping of load using an air pressure circuit.**
 When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can result in breaking the magnetic coupling connection.

Bore size (mm)	Model	Allowable kinetic energy for intermediate stop (Es) (J)
ø10	FGYSR10	0.03
ø15	FGYSR15	0.13
ø20	FGYSR20	0.24
ø25	FGYSR25	0.45
ø32	FGYSR32	0.88
ø40	FGYSR40	1.53

Shock absorber specifications & Prices

Rodless slide size	FGYSR10/15	FGYSR20	FGYSR25	FGYSR32/40
Shock absorber model	FSA0806-AN	FSA1007-AN	FSA1412-AN	FSA2015-AN
Energy per cycle (Nm)	3	6	20	59
Stroke (mm)	6	7	12	15
Impact speed (m/s)	0.3~2.5	0.3~3.5	0.3~5.0	0.3~5.0
Ambient temperature range	-10° to 80° C (14° to 176° F) - See pg. 2 for slide temperature			

Model	Applicable Shock Absorber	NA	NB	Price
FGYSR10	FSA0806-AN	27	19	-
FGYSR15	FSA0806-AN	27	17	-
FGYSR20	FSA1007-AN	29	20	-
FGYSR25	FSA1412-AN	49	40	-
FGYSR32	FSA2015-AN	52	42	-
FGYSR40	FSA2015-AN	51	36	-



Magnetically coupled rodless slides

Allowable load mass calculation based on cylinder mounting orientation

Load Sizing

Maximum load mass centered on the slide block when used on strokes less than or equal to the stroke values shown in Table 1.

Table 1

Bore Size	ø10	ø15	ø20	ø25	ø32	ø40
Max. load mass (kg)	3	7	12	20	30	50
Max. stroke (mm)	to 300	to 500	to 500	to 500	to 600	to 600

Two factors: Stroke Length & Mounting Orientation

The maximum load mass values shown above will change with the two factors: stroke length and mounting orientation for each cylinder size due to limitation from bending of the guide shafts. (Take note of the δ coefficient.) Additionally, depending on the mounting orientation, the allowable load mass may be different from the maximum load mass.

Since the maximum load mass with respect to the cylinder stroke changes as shown in the graph below, the stroke coefficient δ should be considered for each stroke. The value of δ is used in formula for all mounting orientations.

Calculating the stroke coefficient δ

Use $\delta = 1$ for all applications with strokes up to:
 ø10 – 300mm stroke, ø15 – 500mm stroke,
 ø20 – 500mm stroke, ø25 – 500mm stroke,
 ø32 – 600mm stroke, and ø40 – 600mm stroke

For longer strokes, rough values for allowable loads can be obtained from the logarithmic graph, however, a calculation using the formula for each bore size in Table 2 will provide the accurate results needed for each mounting orientation.

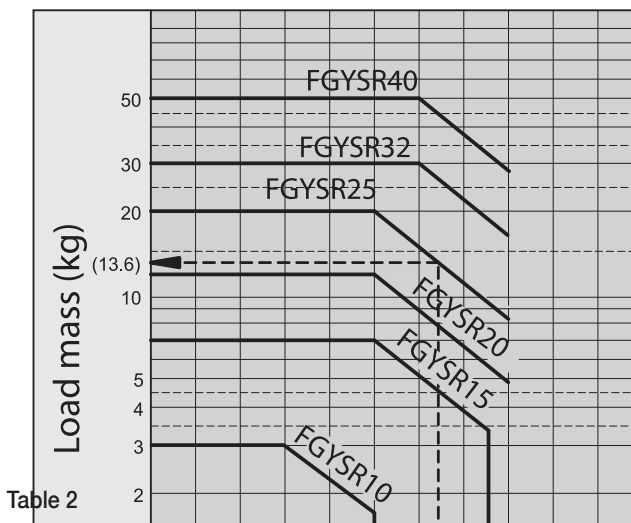


Table 2

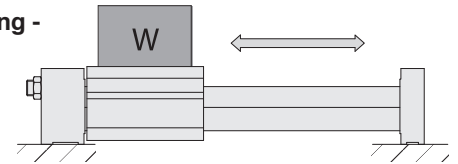
Model	FGYSR10	FGYSR15	FGYSR20
$\delta =$	$\frac{10^{(0.86-1.3 \times 10^{-3} \times ST)}}{3}$	$\frac{10^{(1.5-1.3 \times 10^{-3} \times ST)}}{7}$	$\frac{10^{(1.71-1.3 \times 10^{-3} \times ST)}}{12}$
Model	FGYSR25	FGYSR32	FGYSR40
$\delta =$	$\frac{10^{(1.98-1.3 \times 10^{-3} \times ST)}}{20}$	$\frac{10^{(2.26-1.3 \times 10^{-3} \times ST)}}{30}$	$\frac{10^{(2.48-1.3 \times 10^{-3} \times ST)}}{50}$

Example δ Calculation (see Table 2 below left):

FGYSR25 X 650 (ø25 bore, 650mm stroke)

$$\delta = \frac{10^{(1.98-1.3 \times 10^{-3} \times \text{Stroke})}}{20} = \frac{10^{1.135}}{20} = \frac{13.6}{20} = 0.68$$

1) Horizontal mounting - (floor mounting)

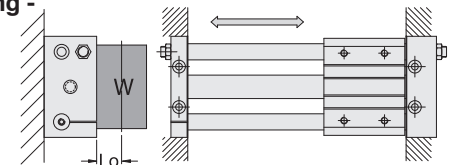


Allowable load mass $W = \delta \times \text{Max. load mass}$

Example 1- allowable load calculation for FGYSR25 X 650

Given: Load centered; $\delta=0.68$ (from stroke coefficient calculation)
 Allowable load = $0.68 \times 20 = 13.6 \text{ Kg max}$

2) Horizontal mounting - (wall mounting)



Bore (mm)	ø10	ø15	ø20
Allowable load mass (W_A) (kg)	$\frac{\delta \cdot 12.0}{8.4 + 2Lo}$	$\frac{\delta \cdot 36.4}{10.6 + 2Lo}$	$\frac{\delta \cdot 74.4}{12 + 2Lo}$
Bore (mm)	ø25	ø32	ø40
Allowable load mass (W_A) (kg)	$\frac{\delta \cdot 140}{13.8 + 2Lo}$	$\frac{\delta \cdot 258}{17 + 2Lo}$	$\frac{\delta \cdot 520}{20.6 + 2Lo}$

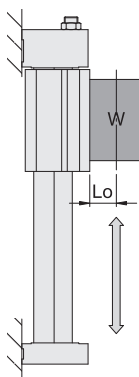
$Lo =$ Distance from mounting surface to load center of gravity (cm)

Example 2- allowable load calculation for FGYSR25 X 650

Given: $Lo = 20 \text{ mm} = 2.0 \text{ cm}$; $\delta = 0.68$

$$\text{Allowable load} = \frac{\delta \cdot 140}{13.8 + 2Lo} = \frac{(0.68)(140)}{13.8 + 2(2.0)} = \frac{95.2}{17.8} = 5.3 \text{ Kg max}$$

3) Vertical operation (wall mounting)



Bore (mm)	ø10	ø15	ø20
Allowable load mass (W_A) (kg)	$\frac{\delta \cdot 4.16}{2.2 + Lo}$	$\frac{\delta \cdot 13.23}{2.7 + Lo}$	$\frac{\delta \cdot 26.8}{2.9 + Lo}$
Bore (mm)	ø25	ø32	ø40
Allowable load mass (W_A) (kg)	$\frac{\delta \cdot 44.0}{3.4 + Lo}$	$\frac{\delta \cdot 88.2}{4.2 + Lo}$	$\frac{\delta \cdot 167.8}{5.1 + Lo}$

$Lo =$ Distance from mounting surface to load center of gravity (cm)

Note: Operating pressure should be equal to or less than the maximum operating pressure shown in "Vertical Operation" information on page 4.

Example 3- allowable load calculation for FGYSR25 X 650

Given: $Lo = 20 \text{ mm} = 2.0 \text{ cm}$; $\delta = 0.68$

$$\text{Allowable load} = \frac{\delta \cdot 44}{3.4 + Lo} = \frac{(0.68)(44)}{3.4 + 2.0} = \frac{29.92}{5.4} = 5.5 \text{ Kg max}$$

Magnetically coupled rodless slides

Allowable load mass calculation based on cylinder mounting orientation

4) Inclined operation (In operating direction)

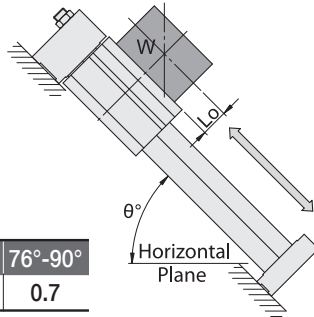


Table K (K=Angle coefficient)

Angle θ	0°-45°	46°-60°	61°-75°	76°-90°
K	1	0.9	0.8	0.7

Bore (mm)	$\phi 10$	$\phi 15$	$\phi 20$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 10.5K}{3.5 \cos \theta + 2(2.2 + Lo) \sin \theta}$	$\frac{\delta \cdot 35K}{5.5 \cos \theta + 2(2.7 + Lo) \sin \theta}$	$\frac{\delta \cdot 72K}{6 \cos \theta + 2(2.9 + Lo) \sin \theta}$
Bore (mm)	$\phi 25$	$\phi 32$	$\phi 40$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 120K}{6 \cos \theta + 2(3.4 + Lo) \sin \theta}$	$\frac{\delta \cdot 210K}{7 \cos \theta + 2(4.2 + Lo) \sin \theta}$	$\frac{\delta \cdot 400K}{8 \cos \theta + 2(5.1 + Lo) \sin \theta}$

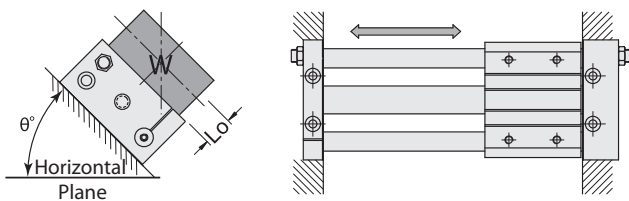
Lo = Distance from mounting surface to load center of gravity (cm)

Example 4- allowable load calculation for FGYSR25 X 650

Given: Lo = 2 cm; $\delta = 0.68$; angle = 60°; K = 0.9 (from Table "K" above)

$$\text{Allowable Load} = \frac{\delta \cdot 120K}{6 \cos \theta + 2(3.4 + Lo) \sin \theta} = \frac{0.68 \times 120 \times 0.9}{6(0.500) + 2(3.4 + 2)(0.866)} = 5.9 \text{ Kg max}$$

5) Inclined operation (At right angle to operating direction)



Bore (mm)	$\phi 10$	$\phi 15$	$\phi 20$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 12.0}{4 + 2(2.2 + Lo) \sin \theta}$	$\frac{\delta \cdot 36.4}{5.2 + 2(2.7 + Lo) \sin \theta}$	$\frac{\delta \cdot 74.4}{6.2 + 2(2.9 + Lo) \sin \theta}$
Bore (mm)	$\phi 25$	$\phi 32$	$\phi 40$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 140}{7 + 2(3.4 + Lo) \sin \theta}$	$\frac{\delta \cdot 258}{8.6 + 2(4.2 + Lo) \sin \theta}$	$\frac{\delta \cdot 520}{10.4 + 2(5.1 + Lo) \sin \theta}$

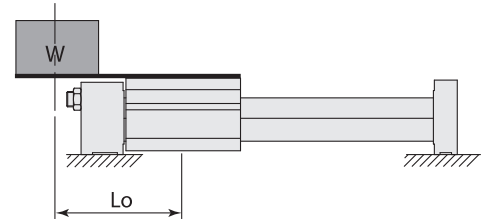
Lo = Distance from mounting surface to load center of gravity (cm)

Example 5- allowable load calculation for FGYSR25 X 650

Given: Lo = 2 cm; $\delta = 0.68$; angle = 60°

$$\text{Allowable Load} = \frac{\delta \cdot 140}{7 + 2(3.4 + Lo) \sin \theta} = \frac{0.68 \times 140}{7 + 2(3.4 + 2)(0.866)} = 5.8 \text{ Kg max}$$

6) Load center offset in operating direction (Lo)



Bore (mm)	$\phi 10$	$\phi 15$	$\phi 20$	$\phi 25$	$\phi 32$	$\phi 40$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 5.25}{3.5 + Lo}$	$\frac{\delta \cdot 17.5}{5.0 + Lo}$	$\frac{\delta \cdot 36}{6.0 + Lo}$	$\frac{\delta \cdot 60}{6.0 + Lo}$	$\frac{\delta \cdot 105}{7.0 + Lo}$	$\frac{\delta \cdot 200}{8.0 + Lo}$

Lo = Distance from center of slide block to load center of gravity (cm)

Example 6- allowable load calculation for FGYSR25 X 650

Given: Lo = 2 cm; $\delta = 0.68$

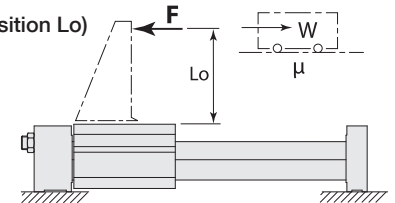
$$\text{Allowable Load} = \frac{\delta \cdot 60}{6.0 + Lo} = \frac{0.68 \times 60}{2.0 + 6.0} = 5.1 \text{ Kg max}$$

7) Horizontal operation (Pushing load, Pusher)

F: Drive (from slide block to position Lo)
resistance force W x μ (kg)

Lo: Distance (cm) from mounting surface to load center of gravity

μ : Friction coefficient



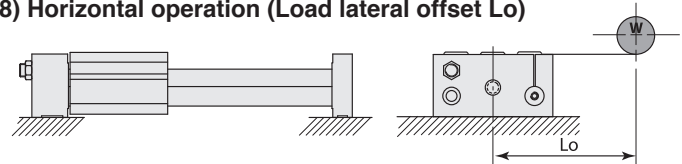
Bore (mm)	$\phi 10$	$\phi 15$	$\phi 20$	$\phi 25$	$\phi 32$	$\phi 40$
Allowable drive force (F _A) (kg)	$\frac{\delta \cdot 5.25}{2.2 + Lo}$	$\frac{\delta \cdot 17.5}{2.7 + Lo}$	$\frac{\delta \cdot 36}{2.9 + Lo}$	$\frac{\delta \cdot 60}{3.4 + Lo}$	$\frac{\delta \cdot 105}{4.2 + Lo}$	$\frac{\delta \cdot 200}{5.1 + Lo}$

Example 7- allowable load calculation for FGYSR25 X 650

Given: Lo = 2 cm; $\delta = 0.68$

$$\text{Allowable Force} = \frac{\delta \cdot 60}{3.4 + Lo} = \frac{0.68 \times 60}{3.4 + 2} = 7.5 \text{ Kg max}$$

8) Horizontal operation (Load lateral offset Lo)



Bore (mm)	$\phi 10$	$\phi 15$	$\phi 20$	$\phi 25$	$\phi 32$	$\phi 40$
Allowable load mass (W _A) (kg)	$\frac{\delta \cdot 8.4}{4 + Lo}$	$\frac{\delta \cdot 25.48}{5.2 + Lo}$	$\frac{\delta \cdot 52.1}{6.2 + Lo}$	$\frac{\delta \cdot 98}{7.0 + Lo}$	$\frac{\delta \cdot 180}{8.6 + Lo}$	$\frac{\delta \cdot 364}{10.4 + Lo}$

Lo = Distance from center of slide block to load center of gravity (cm)

Example 8- allowable load calculation for FGYSR25 X 650

Given: Lo = 2 cm; $\delta = 0.68$

$$\text{Allowable Load} = \frac{\delta \cdot 98}{7 + Lo} = \frac{0.68 \times 98}{7 + 2} = 7.4 \text{ Kg max}$$

Magnetically coupled rodless slides



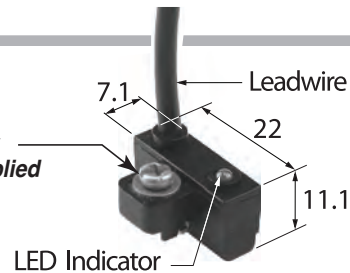
Shock absorber prices – See table on page 4

Position sensor specifications & prices

Please order sensors and female cordsets separately from charts here.

Female Cord Sets	Part No.	Price
1 Meter	CFC-1M	-
2 Meters	CFC-2M	-
5 Meters	CFC-5M	-

Remove this clamp screw and use the fastener supplied with the slide unit.



Sensor Selection Guide		Prewired 9 ft. Leadwire Part No.	Quick Disconnect* Part No.
Sensor Type	Electrical Characteristics	Price	Price
Reed (LED)	5-120 VDC/VAC, 0.03 Amp Max current, 4 Watt Max., 2.0 voltage drop	9P49-000-002.	9P49-000-302-
Electronic (LED)	Sourcing PNP 5-28 VDC, 0.20 Amp Max current, 0.5 voltage drop	9P49-000-031.	9P49-000-331.....-
Electronic (LED)	Sinking NPN 5-28 VDC, 0.20 Amp Max current, 0.5 voltage drop	9P49-000-032.	9P49-000-332.....-

*Note: Quick disconnect styles are supplied with 6 inch pigtail with male connector.

Operation

Warning

- 1) Be aware of the space between the plates and the side block. Take sufficient care to avoid getting your hands or fingers caught when the cylinder is operated.
- 2) Do not apply a load to the cylinder which is greater than the allowable value calculated from formulae in mounting orientation vs. load mass tables. This may cause malfunctions.
- 3) When a cylinder is used in a place where water or cutting oil may splash, or lubricity of the cylinder sliding parts may deteriorate, please consult the factory.

Disassembly & Maintenance

Warning

- 1) Use caution as the attractive power of the magnet is very strong. When removing the external slider and piston slider from the cylinder tube for maintenance, etc., handle with caution because the magnets installed in each slider have a very strong attractive force.

Mounting

Caution

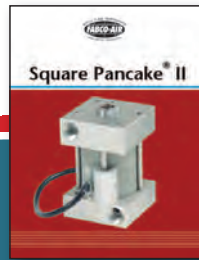
- 1) Avoid operation with the external slider fixed to the mounting surface. The cylinder should be operated with the plates fixed to the mounting surface.
- 2) Make sure that the cylinder mounting surface has a flatness of 0.2 mm or less. If the flatness of the cylinder mounting surface is not appropriate, the two guide shafts may be twisted. This may adversely affect the operating conditions and shorten the service life due to increased sliding resistance and the early abrasion of the bearings. The cylinder mounting surface must have a flatness of 0.2 mm or less, and the cylinder must be mounted so it operates smoothly through the full stroke at the minimum operating pressure.



Cylinders, Valves and Accessories
Catalog #CV9



Pancake® II Air Cylinders
Catalog #Pan2-2



Square Pancake® II Air Cylinders
Catalog #SqPan2



ISO 6431 Cylinders
Catalog #FAQR-09



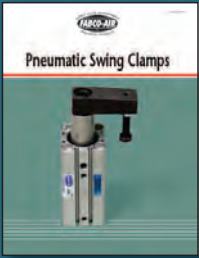
Twin Rod, Non-Rotating Air Cylinders - Catalogs #FDF-09 & #FDXS-09



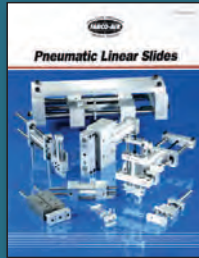
High Closing Force Angular Grippers
Catalog #FKHC-10



Multi-Power® Air Presses
Catalog #FP16



Swing Clamps
Catalog #SC-DB04



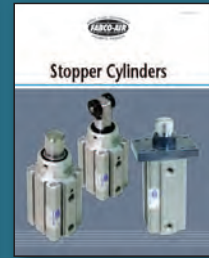
Linear Slides - 6 Families
Catalog #LS-03



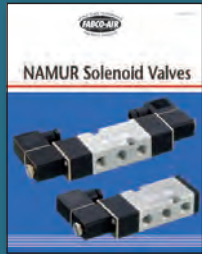
Compact Finger Slides
Catalog #FDH-10



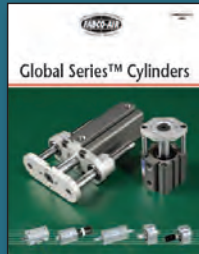
ISO 6432 Cylinders
Catalog #FAE-09



Stopper Cylinders
Catalog #ST-SC



NAMUR Solenoid Valves
Catalog #FVEN-10



Global Series™ Metric Air Cylinders
Catalog #GC-15



NFPA Air Cylinders
Catalog #NF-6



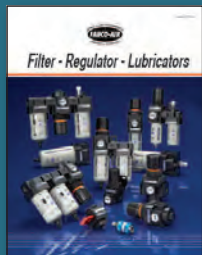
Air Table Slides
Catalog #FGXS-10



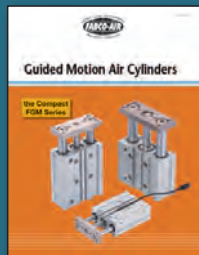
Wide & Narrow Parallel Grippers - Catalogs #FKHZ-10 & #FKHQ-10



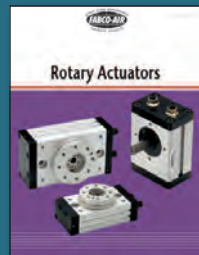
Toggle Type Angular Grippers
Catalog #FKHT-10



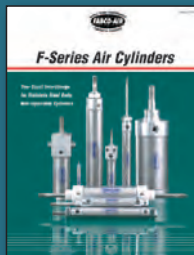
Modular Air Preparation System - FRLs
Catalog #FRL-06



Guided Motion Air Cylinders
Catalog #FGM-10



Pneumatic Rotary Actuators
Catalog #FRA.C-09



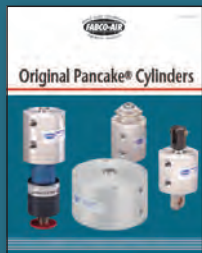
Stainless Steel Body Air Cylinders
Catalog #SSB-03



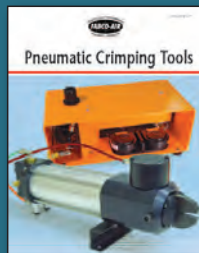
Pneumatic & Hydraulic Swing Clamps
Catalog #FML.H



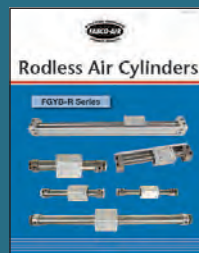
Wide Opening Parallel Grippers
Catalog #FKHL-10



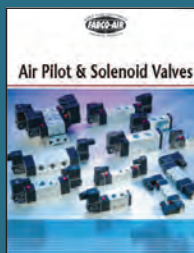
Original Pancake® Air Cylinders
Catalog #CV9



Pneumatic Crimping Tools
Catalog #FCT-JY07



Magnetically Coupled Rodless Air Cylinders
Catalog #FGYBR-11



Pneumatic Valves FVA & FVEC Series
Catalog #FVA.E-09



Angular Grippers
Catalog #FKA-09



3 Series of Angular & Parallel Motion Grippers
Catalog #GR8