

**NEW  
PRODUCT**



# Magnetically Coupled Rodless Cylinders

## FGYB & FGYP Series



Series FGYB

**Basic cylinder mounting**



See pages 6 & 7 for dimensions and ordering information.

Series FGYP

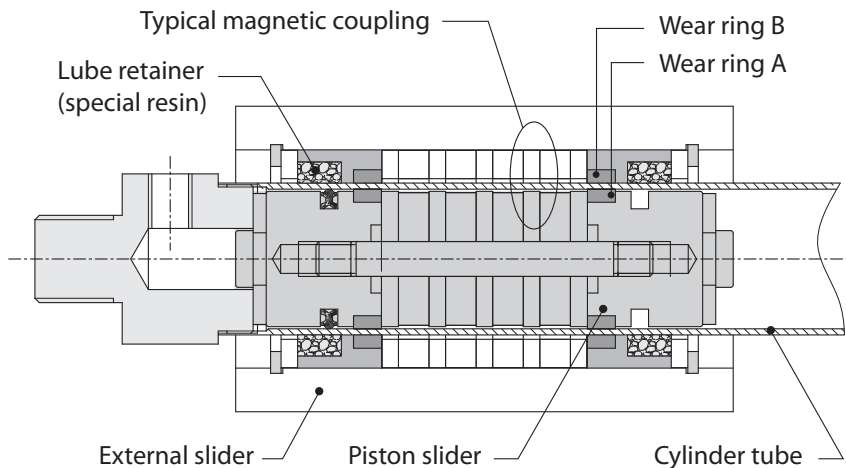
**Through hole & tapped mounting with magnetic position sensing**



See pages 8 - 10 for dimensions and ordering information.

**Features**

The external slider is magnetically coupled to the piston to provide a space-saving rodless cylinder.

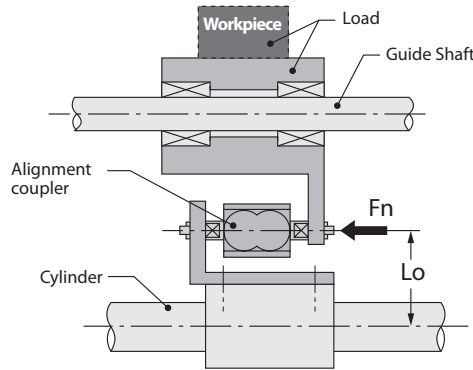


**Magnetically coupled air cylinders**

**Selection procedure**

**Selection procedure**

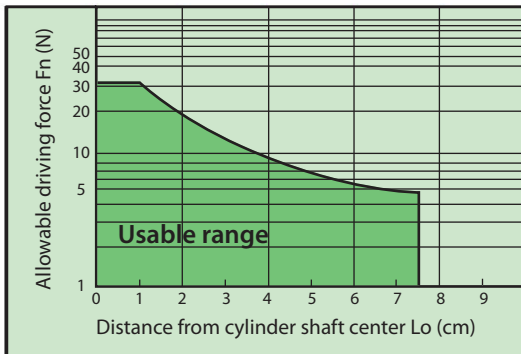
1. Find the drive force  $F_n$  (N) when moving the load horizontally.
2. Find the distance  $L_o$  (cm) from the point of the load where the driving force is applied, to the center of the cylinder shaft.
3. Select the bore size from  $L_o$  and  $F_n$ , based on the graphs below.



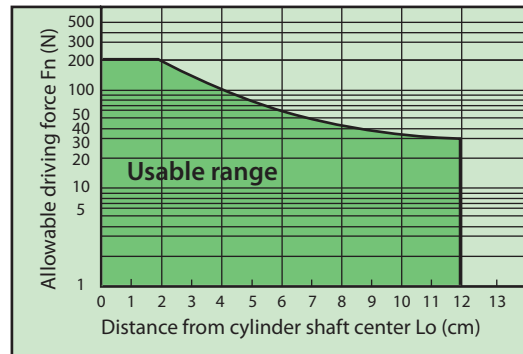
**Selection example**

Given a load drive force of  $F_n = 100$  (N) and a distance from the cylinder shaft center to the load application point of  $L_o = 8$  cm, find the intersection point by extending upward from the horizontal axis in the graph where the distance from the shaft center is 8 cm, and then extending to the side, find the allowable driving force on the vertical axis. Suitable models for the force of 100 (N) are FGYB-32 and FGYB-40. See dotted white lines in the charts below. (The  $L_o$  point from the cylinder shaft center is the moment working point between the cylinder and the load section.)

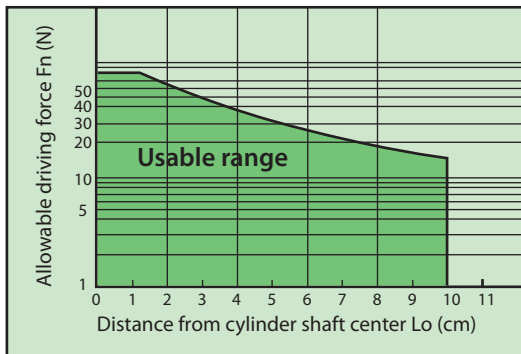
**FGYB/FGYP 10**



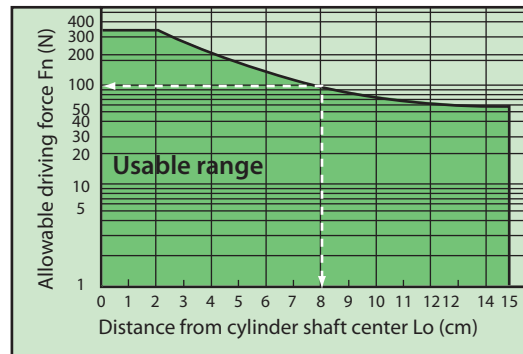
**FGYB/FGYP 25**



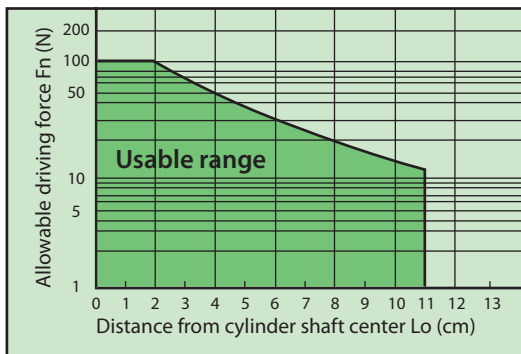
**FGYB/FGYP 15**



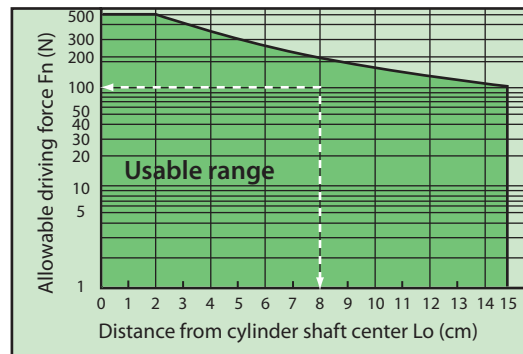
**FGYB/FGYP 32**



**FGYB/FGYP 20**

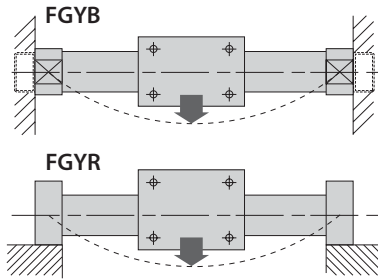


**FGYB/FGYP 40**

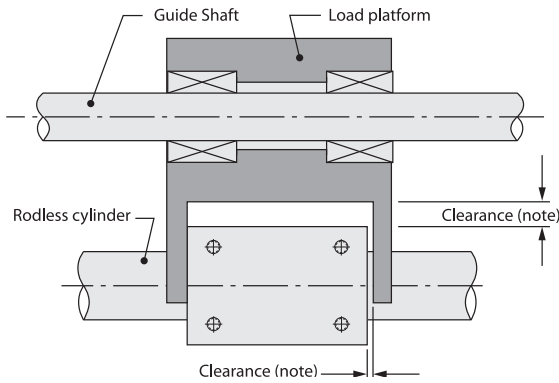
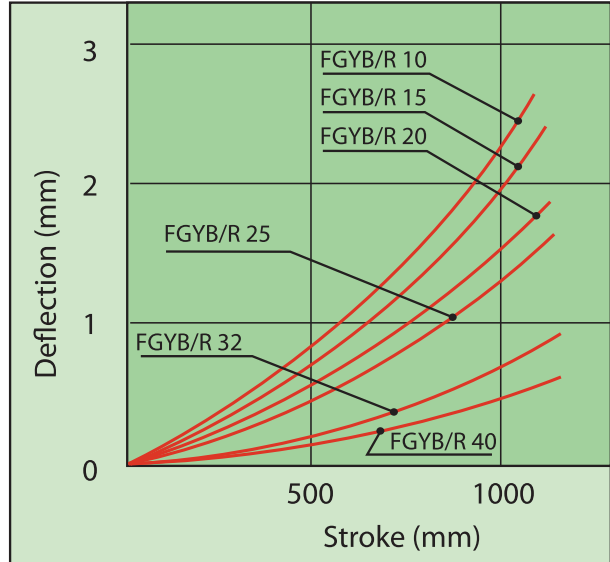


**Magnetically coupled air cylinders**

**Cylinder dead weight deflection**



When the cylinder is mounted horizontally, deflection occurs by virtue of its own weight. (See the deflection data shown in the graph at right.) The longer the stroke, the more the amount of variation in the shaft center. Therefore, a connection method should be considered which can accommodate this deflection.



Note 1) The above clearance values are to be determined by the user.

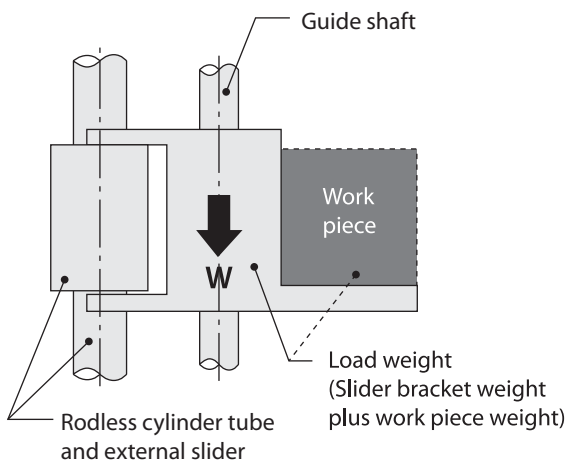
Note 2) According to the dead weight deflection in the graph above, provide clearance so that the cylinder does not touch the mounting surface or the load, etc., and is able to operate smoothly within the minimum operating pressure range for a full stroke.

Note 3) In case of the FGYP, install a shim, etc., to reduce clearance between the body and the switch rail. Carefully consider the mounting bracket and clearance values.

**Vertical operation**

It is recommended that the load be guided by a ball type bearing (linear guide, etc.). If a sleeve bearing is used, sliding resistance increases due to the load mass and moment, which could cause malfunctions.

When the cylinder is mounted vertically, a slider may move downwards because of its own weight or workpiece mass. If an accurate stopping position is required at the stroke end, or mid-stroke, use an external stop for precise results.



Bore	Model	Allowable load mass (kg)	Max operating pressure MPa (psi)
Ø10	FGYB/FGYP10	2.7	0.55 (80)
Ø15	FGYB/FGYP15	7.0	0.65 (94)
Ø20	FGYB/FGYP20	11.0	
Ø25	FGYB/FGYP25	18.5	
Ø32	FGYB/FGYP32	30.0	
Ø40	FGYB/FGYP40	47.0	

Use caution, as there is danger of breaking the magnetic coupling if operated above the maximum operating pressure.

# Magnetically coupled air cylinders

## Intermediate stop

1) Stopping with an external stopper, etc.

When stopping a load in mid-stroke, use less than the operating pressure limits shown in the table at the right.

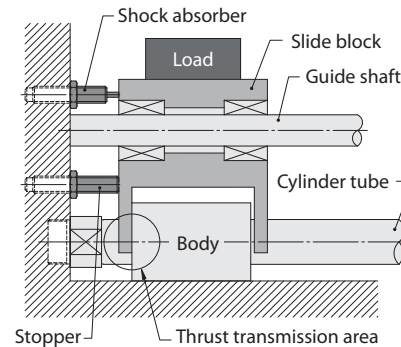
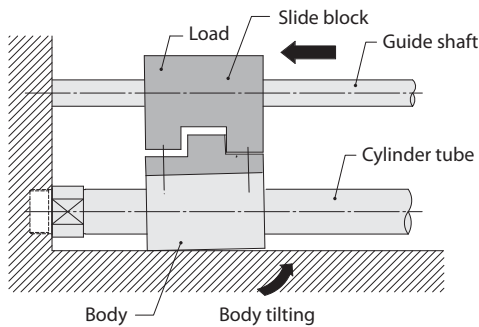
2) When stopping using an air pressure circuit, operate at or below the kinetic energy shown in the table at the right.

**CAUTION:** In either case, operation when exceeding these limits can result in breaking the magnetic coupling. When vertically mounting, intermediate stops are not possible with a pneumatic circuit.

Bore	Model	Operating pressure limit for intermediate stop MPa (psi)	Allowable kinetic energy for intermediate stop J (kgf-cm)
Ø10	FGYB/FGYP10	0.5 (72)	0.03 (0.30)
Ø15	FGYB/FGYP15	0.6 (87)	0.15 (1.32)
Ø20	FGYB/FGYP20	0.6 (87)	0.25 (2.44)
Ø25	FGYB/FGYP25	0.6 (87)	0.46 (4.58)
Ø32	FGYB/FGYP32	0.6 (87)	0.86 (8.77)
Ø40	FGYB/FGYP40	0.6 (87)	1.55 (15.8)

## Stroke end stopping method

When stopping a load having a large inertial force at the stroke end, tilting of the body and damage to the bearings and cylinder tube may occur. (Refer to the drawing below left.) As shown in the drawing below right, a shock absorber should be used together with the stop. Thrust should also be transmitted from the center of the body to avoid tilting.



## Body non-rotating Accuracy and

### Maximum allowable Moment (with sensor rail)

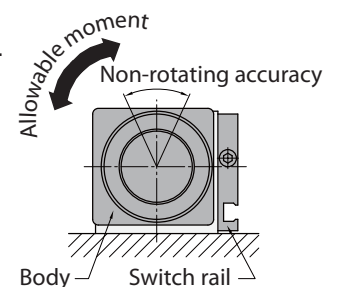
Reference values for non-rotating accuracy and maximum allowable moment at stroke end are indicated below.

Model	Non-rotating accuracy (°)	Max allowable moment (N.m)	Allowable stroke (mm) See note 2
FGYP10	6.0	0.05	100
FGYP15	4.5	0.15	200
FGYP20	3.7	0.20	300
FGYP25	3.7	0.25	300
FGYP32	3.1	0.40	400
FGYP40	2.8	0.62	400

Note 1) Avoid operations where rotational torque (moment) is applied. In such cases, the use of an external guide is recommended.

Note 2) The reference values in the table at the left will be satisfied within allowable stroke ranges, but caution is necessary, because as the stroke becomes longer, the inclination (rotation angle) within the stroke can be expected to increase.

Note 3) When a load is applied directly to the body, the loaded weight should be no greater than the allowable load mass shown below.

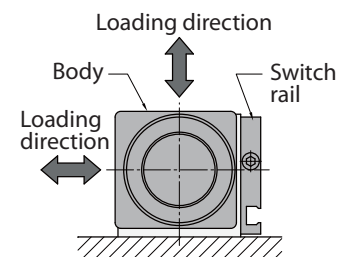


## Maximum mass of connection to body

Model	Max. load weight (kg)
FGYP10	0.4
FGYP15	1.0
FGYP20	1.1
FGYP25	1.2
FGYP32	1.5
FGYP40	2.0

1) When FGYB and FGYP cylinders are guided by an external axis (linear slide, etc.) the metal bracket connecting the load should not weigh more than the value shown in the table at the left.

2) When the load is applied directly to the cylinder body, it should also be no greater than the maximum values in the table.



**Magnetically coupled air cylinders**



**Basic cylinder mounting**

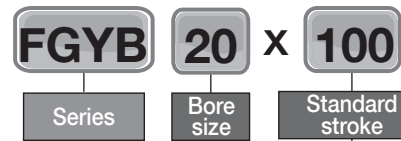


Mounting threads and nuts at both ends

**Specifications – FGYB**

Bore Size	ø10	ø15	ø20	ø25	ø32	ø40
Min. operating pressure (psi)	25	25	25	22	21	18
Magnet holding force (N)	53.9	137	231	363	588	922
Max. operating pressure	0.7 MPa (7kgf/cm <sup>2</sup> ) 101 psi					
Temperature range	-10°C(14°F) to 60°C(140F)					
Piston speed	50 to 500 mm/s					
Cushion	Rubber bumper					
Lubrication	None required, or ISO VG32					
Stroke tolerance	0-250 st <sup>+1/-0</sup> 251-1000 st <sup>+1.4/-0</sup> mm 1001-1500 st <sup>+1.8/-0</sup> mm					
Mounting orientation	Horizontal, inclined, vertical					
Mounting nut (2 pcs)	Standard					

**How to order**



ø10, ø15, ø20, ø25, ø32, ø40

Refer to the standard strokes available in pricing chart on page 7.

**Max. holding force (N)**

Bore Size	ø10	ø15	ø20	ø25	ø32	ø40
Theoretical thrust (holding force) (N)	53.9	137	231	363	588	922

lb force = N x 0.22

**Mass (kg)**

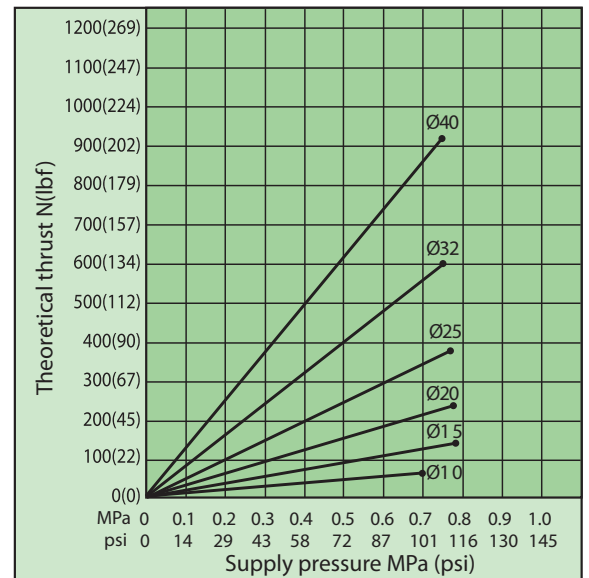
Bore Size	ø10	ø15	ø20	ø25	ø32	ø40
Basic mass (0 stroke)	0.08	0.275	0.351	0.672	1.287	2.07
Additional mass per 50mm stroke	0.014	0.015	0.02	0.023	0.033	0.04

lb mass = kg x 2.2

**Calculation example: FGYB 32x500**

Basic mass ..... 1.287 kg  
 Additional mass .... 0.033/50 stroke  
 Cylinder stroke ..... 500 stroke  
**1.287 + (0.033 x 500 ÷ 50) = 1.617 kg**

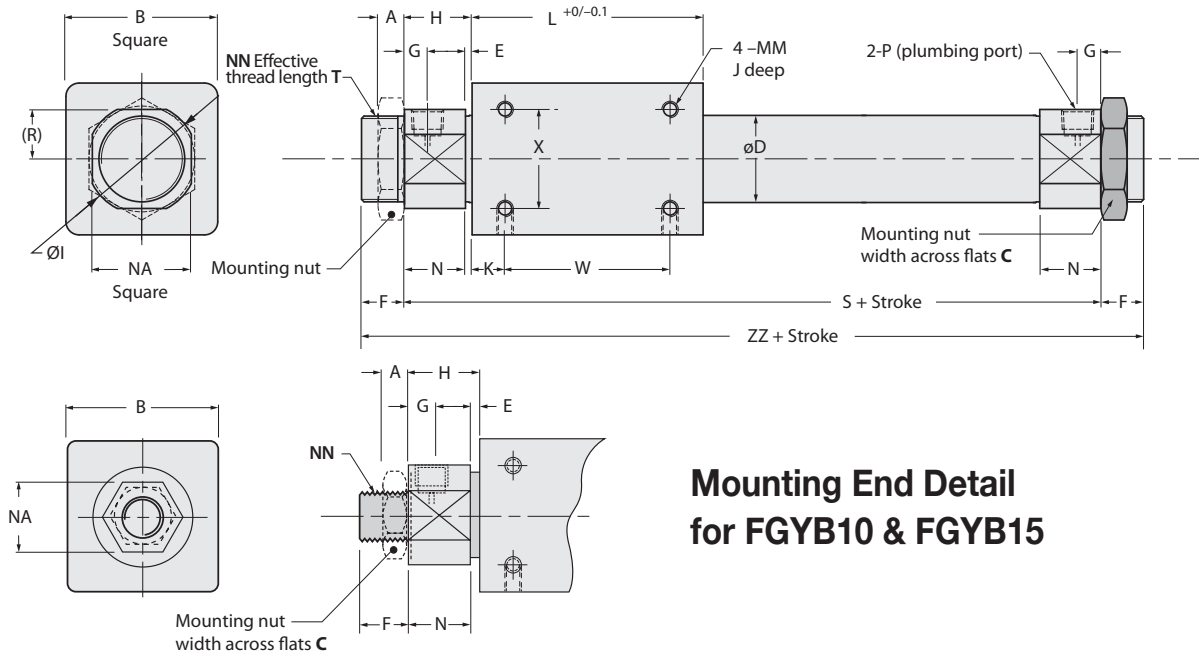
**Size selection guide**





**Magnetically coupled air cylinders**

**FGYB Series**



**Mounting End Detail  
for FGYB10 & FGYB15**

**FGYB Series Dimensions (mm)**

Bore	A	B	C	D	E	F	G	H	I	J	K	L	MM	N	NA	NN	R
Ø10	4	25	14	12	1.5	9	5	12.5	-	4.5	4	38	M3x0.5	11	14	M10x1.0	-
Ø15	4	35	14	17.4	2	10	5.5	13	-	6	11	57	M4x0.7	11	17	M10x1.0	-
Ø20	8	36	27	21.4	2	13	7.5	20	28	6	8	66	M4x0.7	18	24	M20x1.5	12
Ø25	8	46	32	26.4	2	13	7.5	20.5	33.5	8	10	70	M5x0.8	18.5	30	M26x1.5	15
Ø32	8	60	32	33.6	2	16	8	22	40	8	15	80	M6x1.0	20	37	M26x1.5	18.5
Ø40	10	70	41	41.6	3	16	11	29	50	10	16	92	M6x1.0	26	46	M32x2.0	23

Bore	S	T	W	X	ZZ	P
Ø10	63	8	30	16	81	M5x0.8
Ø15	83	9	35	19	103	M5x0.8
Ø20	106	11	50	25	132	Rc(PT)1/8"
Ø25	111	11	50	30	137	Rc(PT)1/8"
Ø32	124	14	50	40	156	Rc(PT)1/8"
Ø40	150	14	60	40	182	Rc(PT)1/4"

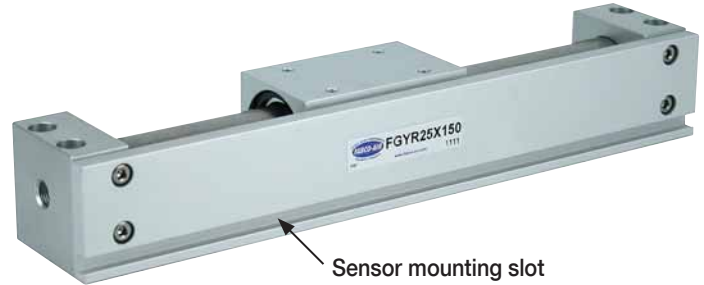
**Cylinder Prices (FGYB □ X □) Consult factory for models where price is not shown.**

Bore size (mm)	Price by standard stroke																			
	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Ø10	\$102.30	\$106.40	\$109.10	\$113.20	\$117.30	\$120.00	\$124.10	\$128.20	\$130.95	\$135.00	-	-	-	-	-	-	-	-	-	-
Ø15	133.65	137.75	140.50	144.55	147.30	151.40	155.50	158.20	162.30	166.40	\$168.75	\$175.00	\$182.50	\$188.75	\$196.25	-	-	-	-	-
Ø20	-	185.50	189.55	195.00	199.10	204.55	208.65	212.75	218.20	222.30	231.85	241.40	249.55	251.30	260.05	\$270.05	\$278.80	\$287.55	\$296.30	\$305.05
Ø25	-	220.95	226.40	231.85	235.95	241.40	246.85	252.30	257.75	263.20	274.10	285.00	295.95	298.80	310.05	320.05	331.30	341.30	352.55	362.55
Ø32	-	317.75	325.95	332.75	340.95	349.10	355.95	364.10	370.95	379.10	394.10	409.10	424.10	427.55	442.55	456.30	471.30	486.30	501.30	515.05
Ø40	-	433.50	442.50	453.00	462.00	472.50	481.50	492.00	501.00	511.15	531.00	550.50	570.00	589.50	609.00	667.50	688.50	708.00	729.00	750.00

**Magnetically coupled air cylinders**



**Through hole & tapped mounting with magnetic position sensing**

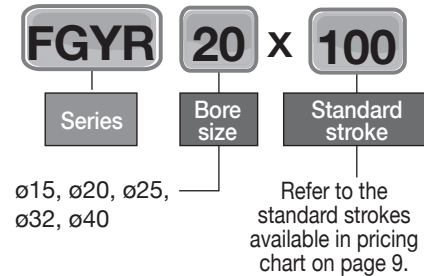


Sensor mounting slot

**Specifications – FGYR**

Bore Size	ø15	ø20	ø25	ø32	ø40
Min. operating pressure	25	25	22	21	18
Magnet holding force (N)	137	231	363	588	922
Max. operating pressure	0.7 MPa (7kgf/cm <sup>2</sup> ) 101psi				
Temperature range	-10°(14°F) to 60°C(140°F)				
Piston speed	50 to 500 mm/s				
Cushion	Rubber bumper				
Lubrication	None required, or ISO VG32				
Stroke tolerance	0-250 st <sup>+1/-0</sup> 251-1000 st <sup>+1.4/-0</sup> mm 1001-1500 st <sup>+1.8/-0</sup> mm				
Mounting orientation	Horizontal, inclined, vertical (note 2 )				

**How to order**



Note 1) When sensor is installed at an intermediate position, keep the maximum piston speed at or below 300mm/s to ensure sensor operation.

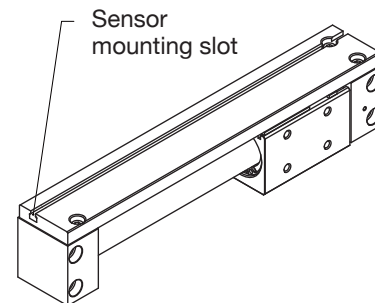
Note 2) When vertically mounting, intermediate stops are not possible with a pneumatic circuit.

**Max. holding force (N)**

Bore Size	ø15	ø20	ø25	ø32	ø40
Theoretical thrust (holding force) (N)	137	231	363	588	922

lbf = N x 0.22

**Position sensors**



**Mass (kg)**

Bore Size	ø15	ø20	ø25	ø32	ø40
Basic mass (0 stroke) with sensor rail	0.272	0.421	0.622	1.217	1.98
Additional mass per 50mm st. with sensor rail	0.040	0.051	0.056	0.076	0.093

lb mass = kg x 2.2

Position sensors can be mounted in the slots of FGYR Series cylinders. They can be located anywhere along the slot and securely locked in place with a screwdriver.

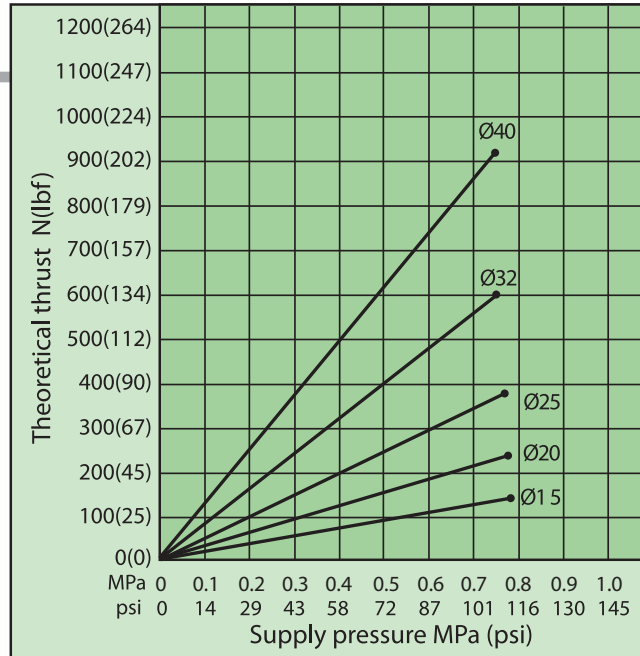
**PLEASE ORDER SENSORS SEPARATELY** from the price charts on page 9.

Calculation example: **FGYR 25x500 with sensor rail**  
 Basic mass . . . . . 0.622 kg  
 Additional mass . . . . . 0.056 kg/50 stroke  
 Cylinder stroke . . . . . 500 stroke  
**0.622 + (0.056 x 500 ÷ 50 = 1.182 kg**



**Magnetically coupled air cylinders**

**Size selection guide**



**Cylinder Prices (FGYR □ X □)**

Consult factory for models where price is not shown.

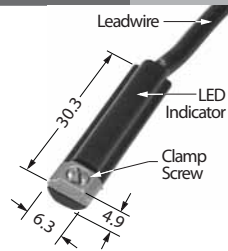
Bore size (mm)	Price by standard stroke																			
	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Ø15	\$175.00	\$178.75	\$183.75	\$187.50	\$191.25	\$196.25	\$200.00	\$203.75	\$208.75	\$212.50	\$216.95	\$225.05	\$233.10	\$241.20	\$249.25	-	-	-	-	-
Ø20	-	206.25	211.25	216.25	221.25	226.25	231.25	237.50	242.50	247.50	257.55	268.80	278.80	288.80	293.10	\$302.35	\$312.70	\$323.10	\$333.50	\$343.85
Ø25	-	250.05	255.05	261.30	267.55	272.55	278.80	283.80	290.05	296.30	307.55	318.80	331.30	334.65	346.20	356.55	368.10	379.65	391.20	402.70
Ø32	-	368.20	376.40	385.95	394.10	403.65	411.85	421.40	429.55	439.10	456.85	474.55	490.95	508.65	543.80	561.30	580.05	597.55	616.30	635.05
Ø40	-	505.50	517.50	529.50	540.00	552.00	564.00	574.50	586.50	598.50	621.00	643.50	667.50	690.00	729.55	752.75	777.30	800.50	823.65	846.85

**Position sensor specifications & prices**

**9Q49 Sensors**

Specifications are shown in the sensor selection guides below.

Please order sensors and female cord sets separately from these charts.

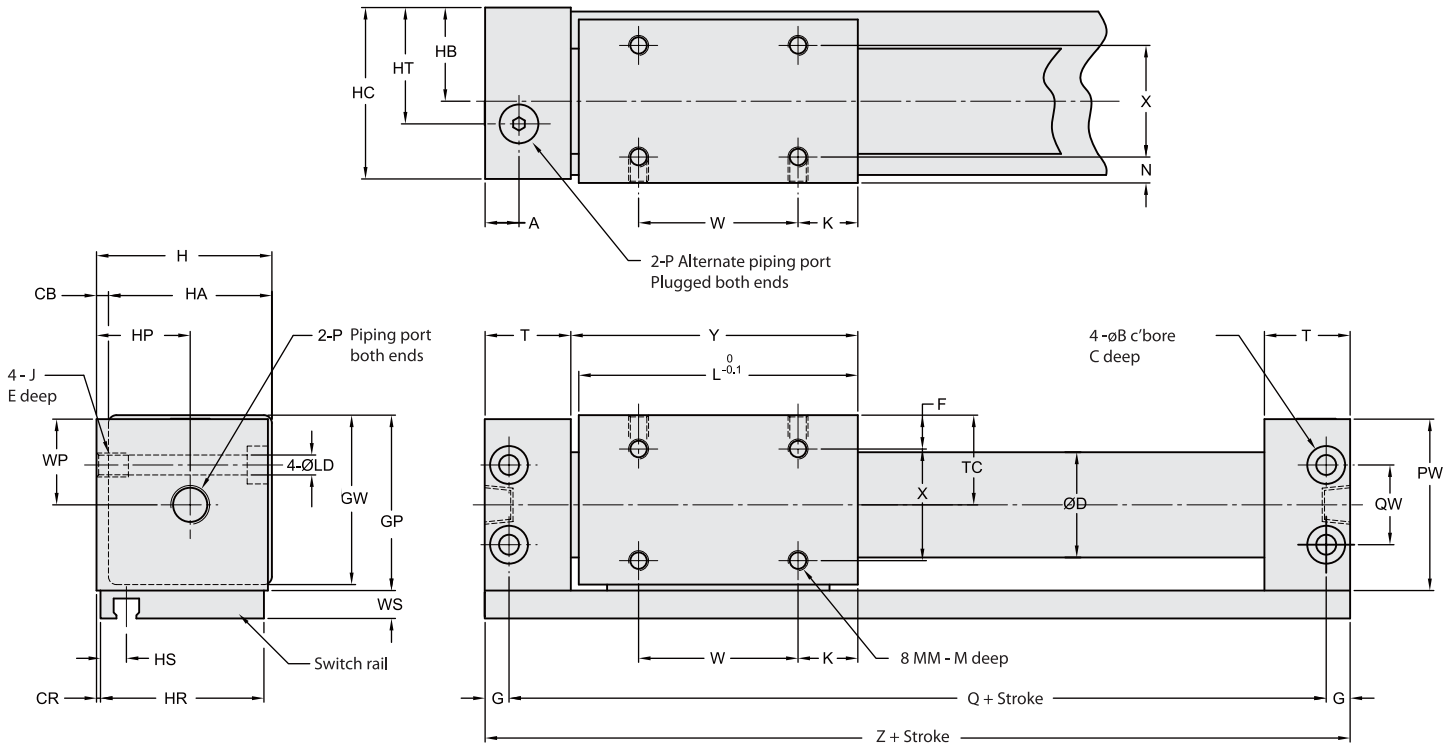


Female Cord Sets	Part No.	Price
1 Meter	CFC-1M	\$15.05
2 Meters	CFC-2M	16.85
5 Meters	CFC-5M	21.30

9Q49 Sensor Selection Guide for all bore sizes ø15 ~ ø40		Prewired 9 ft. Leadwire Part No.	Price	Quick Disconnect* Part No.	Price		
6.3 mm oval	Sensor Type	Electrical Characteristics					
	Reed (LED)	5-120 VDC/VAC, 0.03 Amp max current, 4 Watt max., 2.0 voltage drop		9Q49-000-002 .....	\$20.20	9Q49-000-302 .....	\$22.85
	Electronic (LED)	Sourcing PNP 5-28 VDC, 0.20 Amp max current, 1.0 voltage drop		9Q49-000-031 .....	33.90	9Q49-000-331 .....	36.55
	Electronic (LED)	Sinking NPN 5-28 VDC, 0.20 Amp max current, 1.0 voltage drop		9Q49-000-032 .....	33.90	9Q49-000-332 .....	36.55

**Magnetically coupled air cylinders**

**FGYR Series**



**FGYR Series Dimensions (mm)**

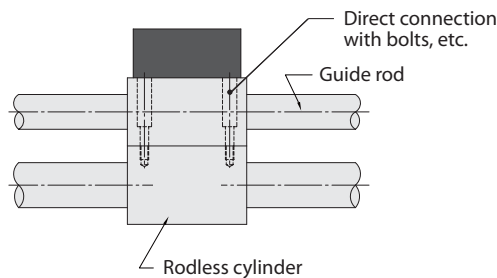
Bore	A	B	C	CB	CR	D	F	G	GP	GW	H	HA	HB	HC	HP	HR	HS	HT	J	E
Ø15	10.5	8	4.2	2	0.5	16.6	8	5	33	31.5	32	30	17	31	17	30	8.5	17	M5x0.8	7
Ø20	9	9.5	5.2	3	1	21.6	9	6	39	37.5	39	36	21	38	24	36	7.5	24	M6x1.0	8
Ø25	8.5	9.5	5.2	3	1	26.4	8.5	6	44	42.5	44	41	23.5	43	23.5	41	6.5	23.5	M6x1.0	8
Ø32	10.5	11	6.5	3	1.5	33.6	10.5	7	55	53.5	55	52	29	54	29	51	7	29	M8x1.25	10
Ø40	10	11	6.5	5	2	41.6	13	7	65	63.5	67	62	36	66	36	62	8	36	M8x1.25	10

Bore	K	L	LD	M	MM	N	PW	Q	QW	T	TC	W	WP	WS	X	Y	Z	P
Ø15	14	53	4.3	5	M4x0.7	6	32	84	18	19	17	25	16	9	18	54.5	94	M5x0.8
Ø20	11	62	5.6	5	M4x0.7	7	38	95	17	20.5	20	40	19	9	22	64	107	Rc(PT)1/8"
Ø25	15	70	5	6	M5x0.8	6.5	43	105	20	21.5	22.5	40	21.5	9	28	72	117	Rc(PT)1/8"
Ø32	13	76	7	7	M6x1.0	8.5	54	116	26	24	28	50	27	9	35	79	130	Rc(PT)1/8"
Ø40	15	90	7	8	M6x1.0	11	64	134	34	26	33	60	32	9	40	93	148	Rc(PT)1/4"

### Mounting

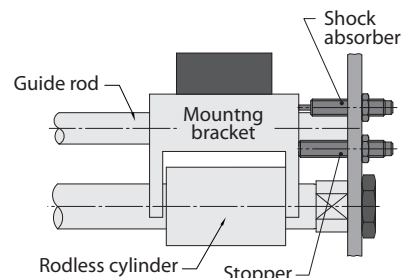
#### ⚠ Caution

- 1) Take care to avoid nicks or other damage to the outside surface of the cylinder tube. This can lead to damage of the wear ring and lube retainer which in turn can cause malfunction.
- 2) Take care regarding rotation of the external slider. Rotation should be controlled by connecting it to another shaft (linear guide, etc.).
- 3) Do not operate with the magnetic coupling out of position. If the magnetic coupling gets out of position, push the external slider back into position by hand at the end of stroke, or correct the piston slider with air pressure.
- 4) For FGYR series, the cylinder is mounted with bolts through mounting holes in the end covers. Be sure they are tightened securely.
- 5) If gaps occur between the mounting surface and the end covers when mounting, use shims to avoid unreasonable stress on the cylinder.
- 6) Be sure that both end covers are secured to the mounting surface before operating the cylinder. Avoid operation with the external slider secured to the surface of the machine.
- 7) Do not apply a lateral load to the slider. When a load is mounted directly to the cylinder, variations in the alignment of each shaft center cannot be accommodated, which results in the generation of lateral load that can cause malfunction. (Figure 1) The cylinder should be operated using a connection method which allows for accommodation of shaft alignment variations and deflections due to cylinder's mass. (See figure 2.)
- 8) Use caution regarding the allowable load mass when operating in a vertical direction. Do not exceed the values in the model information. If a load greater than the allowable values is applied, the magnetic coupling may break and possibly drop the load. Contact the factory for this type of application regarding operating conditions (pressure, load, speed, stroke, cycle rates, etc.).
- 9) Careful alignment is necessary when connecting to a load having an external guide mechanism. As the stroke becomes longer, variations in the center axis become magnified. Consider using a floating connector mechanism that is able to absorb these variations.



**Figure 1** – Closely guided loads should not be directly mounted to the external slider of the rodless cylinder. Doing so may result in malfunction or damage as a result of binding in mid-stroke as loads and deflections cause variations in alignment of the cylinder center and the guiding surfaces.

Direct mounting of loads to the slider is acceptable for some applications of light loads, short strokes or designs where loads will not bind the external slider to the rodless cylinder or adjacent parts.

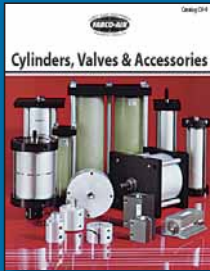


**Figure 2** – Load attachment example. Shaft alignment variations are assimilated by providing clearance for the mounting bracket and cylinder. Additionally, the mounting bracket is extended above the cylinder shaft center so that the cylinder is not subject to moment.

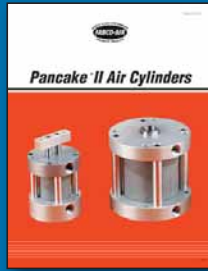
### Handling

#### ⚠ Warning

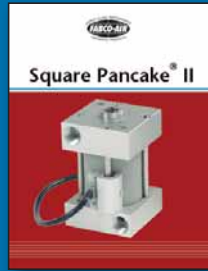
- 1) The space between the head cover and the body is a dangerous pinch point. Take care to avoid getting your fingers or hands caught when cylinder is operating.
- 2) Do not apply cylinder loads which are greater than the allowable values stated in the model information.



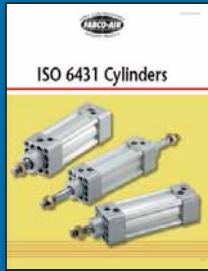
Cylinders, Valves and Accessories Catalog #CV9



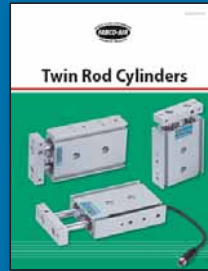
Pancake® II Air Cylinders Catalog #Pan2-2



Square Pancake® II Air Cylinders Catalog #SqPan2



ISO 6431 Cylinders Catalog #FAQR-09



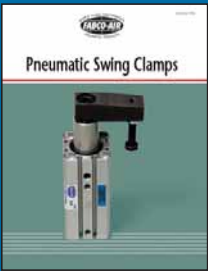
Twin Rod, Non-Rotating Air Cylinders - Catalogs #FDF-09 & #FDXS-09



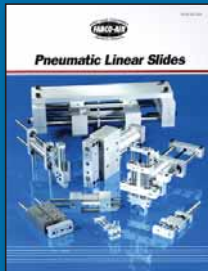
High Closing Force Angular Grippers Catalog #FKHC-10



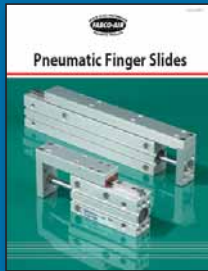
Multi-Power® Air Presses Catalog #FP16



Swing Clamps Catalog #SC-DB04



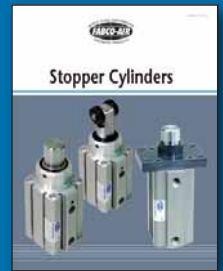
Linear Slides - 6 Families Catalog #LS-03



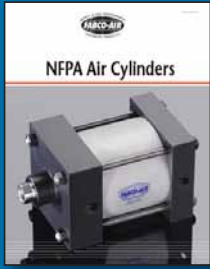
Compact Finger Slides Catalog #FDH-10



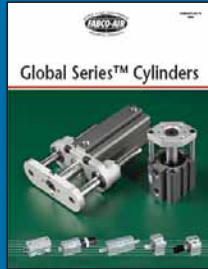
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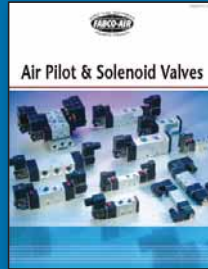
Stopper Cylinders Catalog #ST-SC



NFPA Interchangeable Air Cylinders Catalog #NF-6



Global Series™ Metric Air Cylinders Catalog #GC-15



Air Pilot and Solenoid Valves Catalog #FVA.E-09



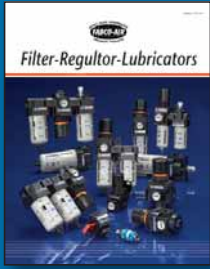
Air Table Slides Catalog #FGXS-10



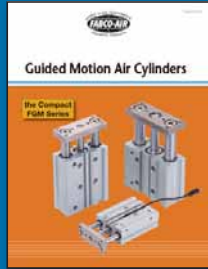
Wide & Narrow Parallel Grippers - Catalogs #FKHZ-10 & #FKHQ-10



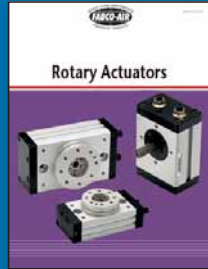
Toggle Type Angular Grippers Catalog #FKHT-10



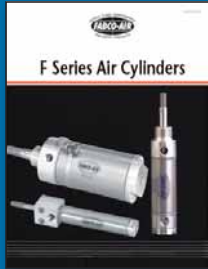
Modular Air Preparation System - FRLs Catalog #FRL-06



Guided Motion Air Cylinders Catalog #FGM-10



Pneumatic Rotary Actuators Catalog #FRA.C-09



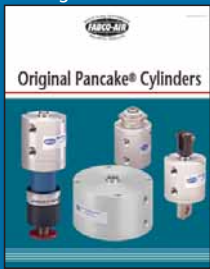
Stainless Steel Body Air Cylinders Catalog #SSB-03



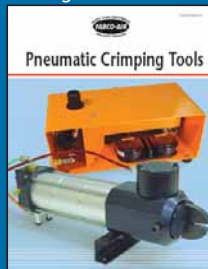
Pneumatic & Hydraulic Swing Clamps Catalog #FML.H



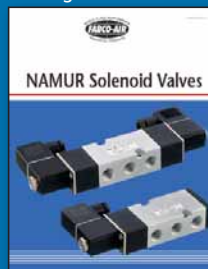
Wide Opening Parallel Grippers Catalog #FKHL-10



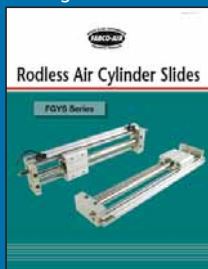
Original Pancake® Air Cylinders Catalog #CV9



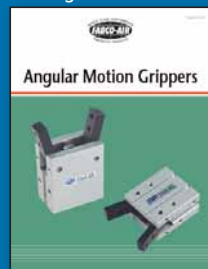
Pneumatic Crimping Tools Catalog #FCT-JY07



NAMUR Solenoid Valves Catalog #FVEN-10



Magnetically Coupled Rodless Slides Catalog #FGYS-11



Angular Grippers Catalog #FKA-09



3 Series of Angular & Parallel Motion Grippers Catalog #GR8