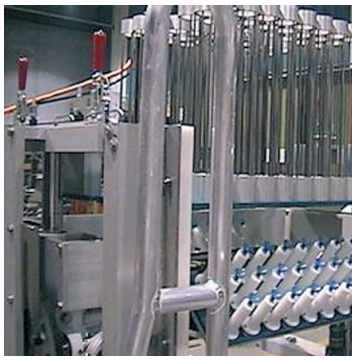
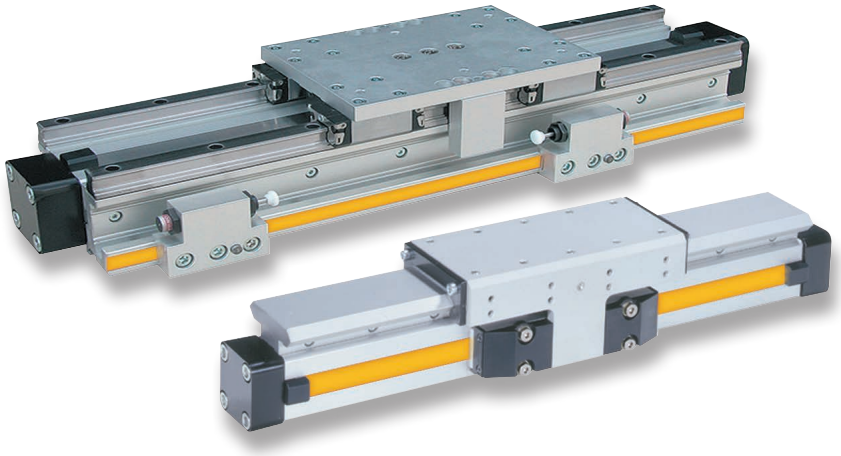
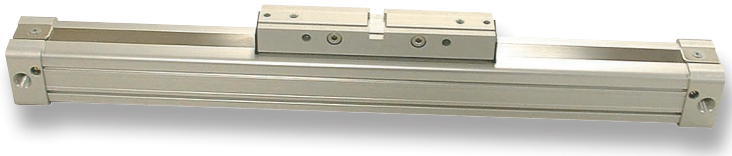
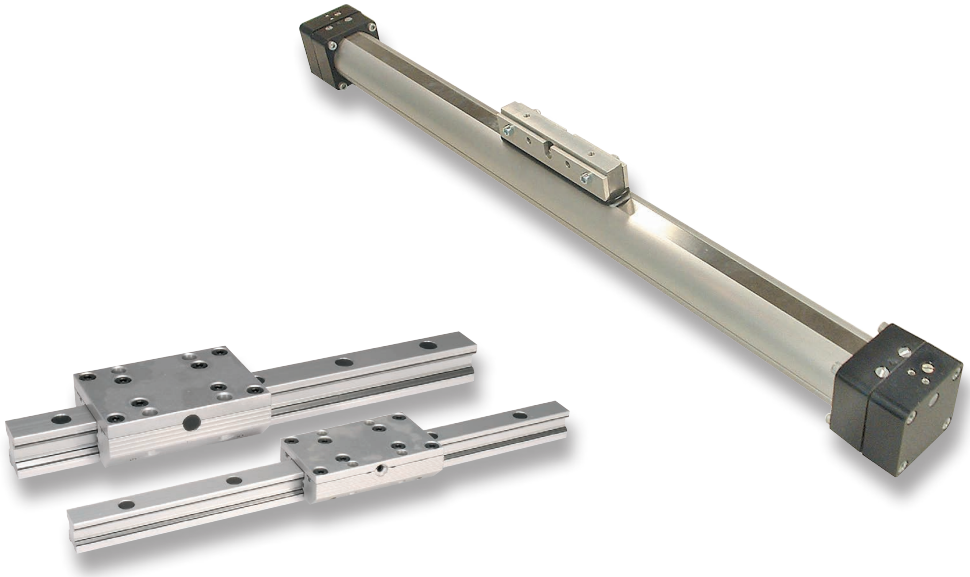


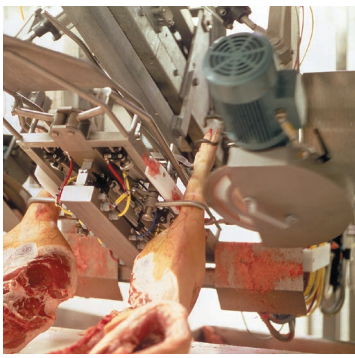




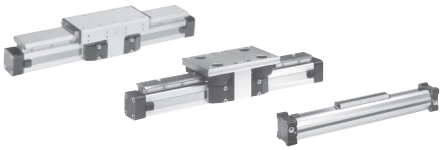
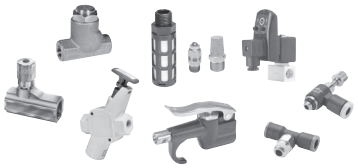


Pneumatic Rodless Cylinders & Linear Guides

Catalog 0961-1



ENGINEERING YOUR SUCCESS.

OSP-P Series	• Bore sizes 10mm through 80mm • Pressures to max. 8 bar • Temperatures -10°F to 80°F • Aluminum body construction Pages 1-89	
P1X Series	• 7 bore sizes 16mm through 63mm • Integral sensor mounting rail • Pressures 7 to 100 PSIG • Temperatures 40°F to 140°F • Aluminum body construction Pages 91-109	
GDL Rails & Cassettes	• 6 sizes available • Speed up to 10m/s (33 ft/s) • Temperatures -10°C to 80°C • Aluminum alloy rail • Aluminum body construction Pages 109-121	
2002 & P120 Series	• 2002 bore size: 16mm to 50mm • P120 bore size: 40mm to 80mm • Maximum pressure 120 PSI • Temperatures 15°F to 175°F Pages 123-153	
P8S Electronic & Reed Sensors	• NPN, PNP, Reed • NO, NC, 2 or 3 wire, LED • Flying lead or M8 connector • Continuous feedback: Analog, IO-Link Pages 155-163	
Accessories	• Mufflers, AirGuard, Check valves, Quick exhaust & shuttle valves, Threshold valves, Tank valves, Blow guns, Flow controls, Drains, Lockout valves Pages 165-208	
Safety Guide, Offer of Sale	Pages 210-215	

⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

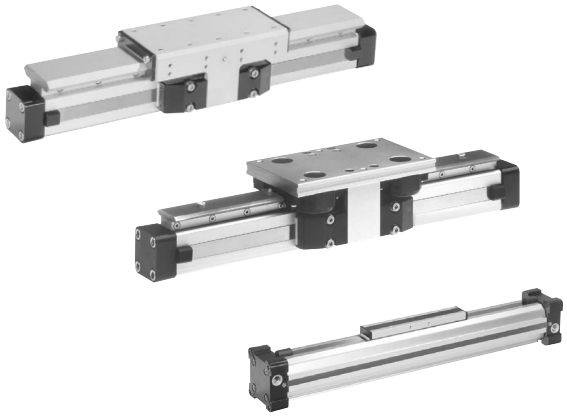
This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled “Offer of Sale”.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com



Rodless Pneumatic Cylinders OSP-P Series

OSP-P Series - Band Type Rodless

System Concept & Components	2-8
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OSP

Parker's rodless pneumatic cylinders are the first rodless cylinders that have been approved for use in potentially explosive atmospheres in Equipment Group II, Category 2 GD

The Cylinders are to the ATEX Certification 94/9/EG (ATEX 95) for Pneumatic Components.

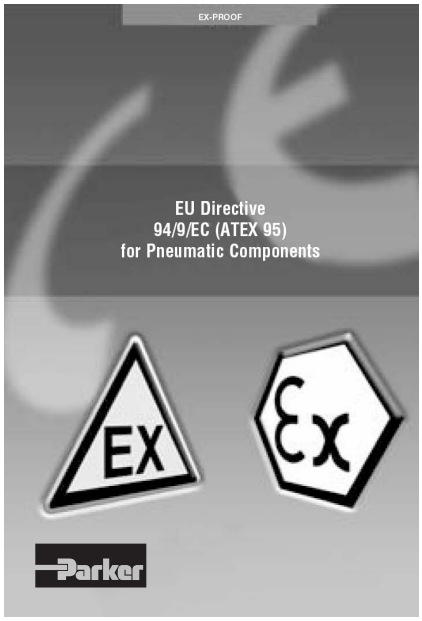
ATTENTION!

Contact Parker for sizing software and/or technical assistance 877-321-4736

All dimensions are in European-Standard. Please convert all in US-Standard.

Conversion Table

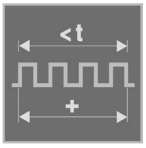
Multiply	By	To Obtain
millimeters	.03937	inches
newtons	.2248	lbs.(F)
newton-meters	8.8512	in-lbs
kilograms	2.205	lbs.
inches	25.4	millimeters
lbs.(F)	4.448	newtons
in-lbs	.113	newtons-meters
lbs.	.45359	kilograms



for use in Ex-Areas

for Clean Room Applications certified to DIN EN ISO 14644-1

Stainless steel hardware for special applications

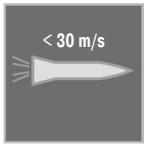


with special pneumatic cushioning system for cycle time optimization, for Ø 16 to 50 mm – on request

High Temperature Version for temperatures up to +100°C

Low Temperature Version for temperatures up to -40°C (25, 32, 40mm Ø)

Slow Speed Version v = 0.005 – 0.2 m/s



High Speed Version vmax. = 30 m/s (16, 25, 32mm Ø)

2D & 3D CAD Drawings can be downloaded from website www.parker.com/pneu/rodless

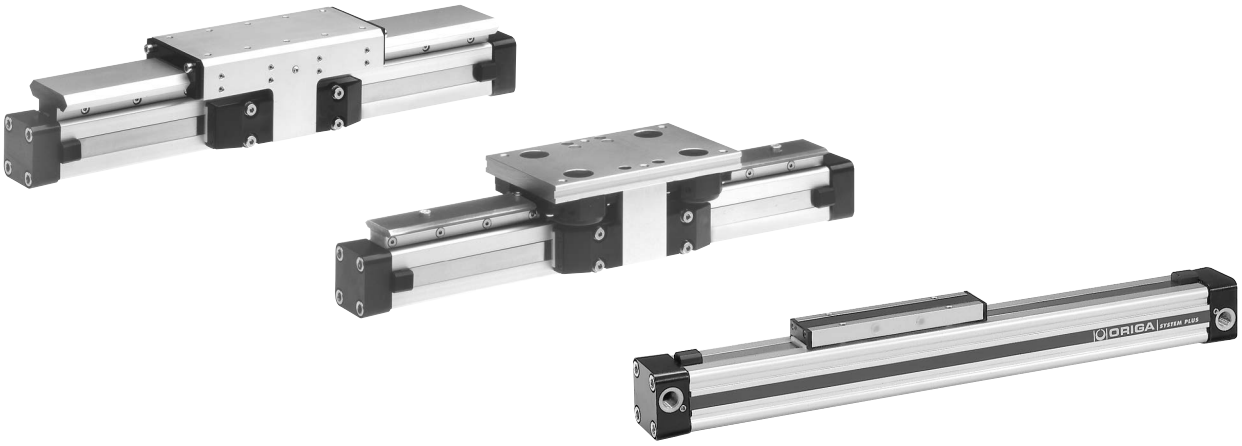
One Concept – Pneumatic

Based on the Parker's rodless cylinder, proven in world wide markets, Parker now offers the complete pneumatic solution for linear systems. Designed for absolute reliability, high performance, ease of use and optimized engineering the OSP SERIES satisfies even the most demanding applications.

OSP SERIES

is a totally modular concept which offers pneumatic actuation, with guidance options to suit the exact needs of individual installations.

The actuators at the core of the system all have a common aluminum extruded profile, with double dovetail mounting rails on three sides, these are the principle building blocks of the system to which all modular options are directly attached.



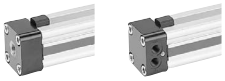
SYSTEM MODULARITY

- Pneumatic Drive
  - For all round versatility and convenience, combining ease of control and broad performance capability. Ideally suited for point-to point operations, reciprocating movements and simple traverse / transfer applications.
- Different guidance options provide the necessary level of precision, performance and duty for various applications.
- Compact solutions, which are simple to install and can be easily retrofitted.
- Valves and control options can be directly mounted to the actuator system.
- Diverse mounting options to provide total installation flexibility.

Basic Linear Drive

STANDARD VERSION
- OSP-P

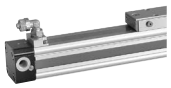
Air Connection on the End-face or both at One End



- OSP-P

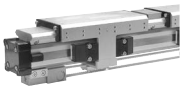
Clean Room Cylinder certified to DIN EN ISO 146644-1

- Series OSP-P



Bi-parting Version

- OSP-P



Integrated 3/2 Way Valves

- OSP-P

Clevis Mounting

- OSP-P

End Cap Mounting

- OSP-P

Mid-Section Support

- OSP-P

Inversion Mounting

- OSP-P

Linear Guides

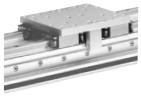
SLIDELINE
- OSP-P

POWERSLIDE
- OSP-P

PROLINE
- OSP-P

STARLINE
- OSP-P

KF - Recirculating Ball Bearing
- OSP-P



HD - Heavy Duty
- OSP-P

Intermediate Stop Module

ZSM
- OSP-P HD Guide (25 mm Bore Only)

Brakes

- Active Brakes
- Passive Brakes

Magnetic Switches

- OSP-P

Variable Stop VS

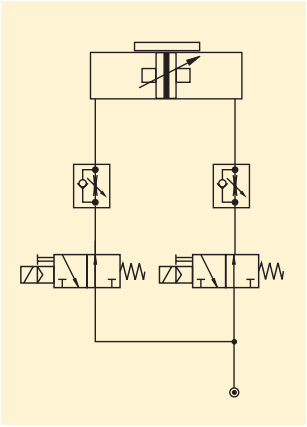
- OSP-P with Linear Guide STL, KF, HD

Linear Drives	OSP-P10	OSP-P16	OSP-P25	OSP-P32	OSP-P40	OSP-P50	OSP-P63	OSP-P80
Specifications								
Theoretical Force at 6 bar (N)	47	120	295	483	754	1178	1870	3010
Effective Force at 6 bar (N)	32	78	250	420	640	1000	1550	2600
Velocity v (m/s)	> 0.005	> 0.005	> 0.005	> 0.005	> 0.005	> 0.005	> 0.005	> 0.005
Magnetic Piston (three sides)		❑	❑	❑	❑	❑	❑	❑
Lubrication - Prelubricated	❑	❑	❑	❑	❑	❑	❑	❑
Multiple Air Ports (4 x 90°)		❑	❑	❑	❑	❑	❑	❑
Both Air Connections at End-face		❍	❍	❍	❍	❍	❍	❍
Air Connection on the End-face		❍	❍	❍	❍	❍	❍	❍
Cushioning	❑	❑	❑	❑	❑	❑	❑	❑
Cushioning Length (mm)	2,50	11	17	20	27	30	32	39
Stroke Length (mm) ▲	1 - 5500	1 - 5500	1 - 5500	1 - 5500	1 - 5500	1 - 5500	1 - 5500	1 - 5500
Pressure Range pmax (bar)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Temperature Range (°C) ❄	-10 – + 80	-10 – + 80	-10 – + 80	-10 – + 80	-10 – + 80	-10 – + 80	-10 – + 80	-10 – + 80
Fluorocarbon / Chemical Resistance	❍	❍	❍	❍	❍	❍	❍	❍
Stainless Steel Parts	❍	❍	❍	❍	❍	❍	❍	❍
Clevis Mounting	❍	❍	❍	❍	❍	❍	❍	❍
Slow Speed Lubrication	❍	❍	❍	❍	❍	❍	❍	❍
Duplex Connection / Multiplex Connection		on request	❍	❍	❍	❍	on request	on request
Tandem Piston	❍	❍	❍	❍	❍	❍	❍	❍
Basic Cylinder								
F (N)	20	120	300	450	750	1200	1650	2400
Mx (Nm)	0.2	0.45	1.5	3	6	10	12	24
My (Nm)	1	4	15	30	60	115	200	360
Mz (Nm)	0.3	0.5	3	5	8	15	24	48
SLIDELINE								
F (N)		325	675	925	1500	2000	2500	2500
Mx (Nm)		6	14	29	50	77	120	120
My (Nm)		11	34	60	110	180	260	260
Mz (Nm)		11	34	60	110	180	260	260
PROLINE								
F (N)		542	857	1171	2074	3111		
Mx (Nm)		8	16	29	57	111		
My (Nm)		12	39	73	158	249		
Mz (Nm)		12	39	73	158	249		
POWERSLIDE								
F (N)		1400	1400 - 3000	1400 - 3000	3000	3000 - 4000		
Mx (Nm)		14	14 - 65	20 - 65	65 - 90	90 - 140		
My (Nm)		45	63 - 175	70 - 175	175 - 250	250 - 350		
Mz (Nm)		45	63 - 175	70 - 175	175 - 250	250 - 350		
STARLINE								
F (N)		1000	3100	3100	4000-7500	4000-7500		
Mx (Nm)		15	50	62	150	210		
My (Nm)		30	110	160	400	580		
Mz (Nm)		30	110	160	400	580		
– Variable Stop		❍	❍	❍	❍	❍		

❑ = Standard Version
▲ = Longer Strokes on Request
❄ = Other Temperature Ranges on Request
❍ = Option
X = Not Applicable

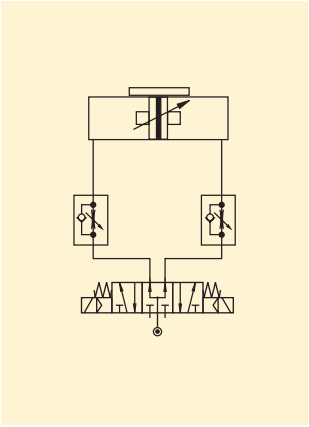
Linear Drives	OSP-P10	OSP-P16	OSP-P25	OSP-P32	OSP-P40	OSP-P50	OSP-P63	OSP-P80
KF Guide								
F (N)		1000	3100	3100	4000-7500	4000-7500		
Mx (Nm)		12	35	44	119	170		
My (Nm)		25	90	133	346	480		
Mz (Nm)		25	90	133	346	480		
– Variable Stop		❍	❍	❍	❍	❍		
HD Heavy Duty Guide								
F (N)			6000	6000	15000	18000		
Mx (Nm)			260	285	8000	1100		
My (Nm)			320	475	1100	1400		
Mz (Nm)			320	475	1100	1400		
– Variable Stop			❍	❍	❍	❍		
– Intermediate Stop Module			❍					
Active Brake								
Braking Force at 6 bar (brake surface dry) (N)								
SLIDELINE SL / PROLINE PL with Brakes								
Active Brake								
SL Braking Force at 6 bar (brake surface dry) (N)			325	545	825	1200		
PL Braking Force at 6 bar (brake surface dry) (N)			on request	on request	on request	on request		
Passive Brake Multibrake								
SL Braking Force at 6 bar (brake surface dry) (N)			470	790	1200	1870	2900	2900
PL Braking Force at 6 bar (brake surface dry) (N)			315	490	715	1100		
Magnetic Switches								
Standard Version	❍	❍	❍	❍	❍	❍	❍	❍
T-Nut Version	❍	❍	❍	❍	❍	❍	❍	❍
Integrated Valves 3/2 WV NO VOE			❍	❍	❍	❍	on request	on request
Mountings								
End Cap Mounting / Mid-Section Support	❍	❍	❍	❍	❍	❍	❍	❍
Inversion Mounting		❍	❍	❍	❍	❍	❍	❍
Shock Absorber for Intermediate Positioning			on request	on request	on request	on request		
Adaptor Profile / T-Nut Profile		❍	❍	❍	❍	❍		
Special Cylinders								
Special Pneumatical Cushioning System		on request	on request	on request	on request	on request		
Clean Room Cylinders to DIN EN ISO 14644-1		❍	❍	❍				
Bi-parting Version					❍			
High-Speed up to 30 m/s		on request	on request	on request				

❑ = Standard Version
▲ = Longer Strokes on Request
❄ = Other Temperature Ranges on Request
❍ = Option
X = Not Applicable



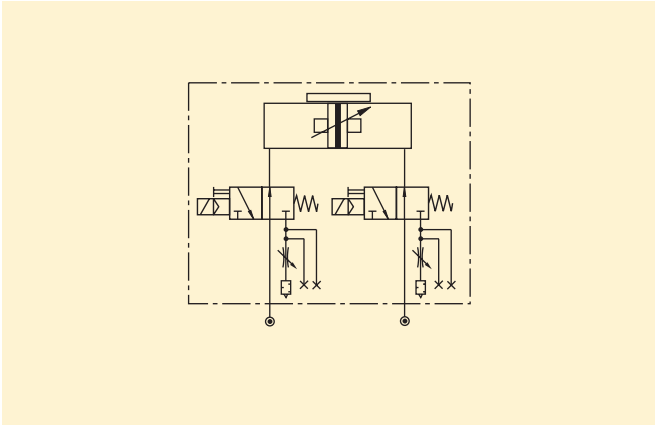
Circuit diagram for end of stroke application. Intermediate positioning is also possible.

The cylinder is controlled by two 3/2-way valves (normally open). The speed can be adjusted independently for both directions.

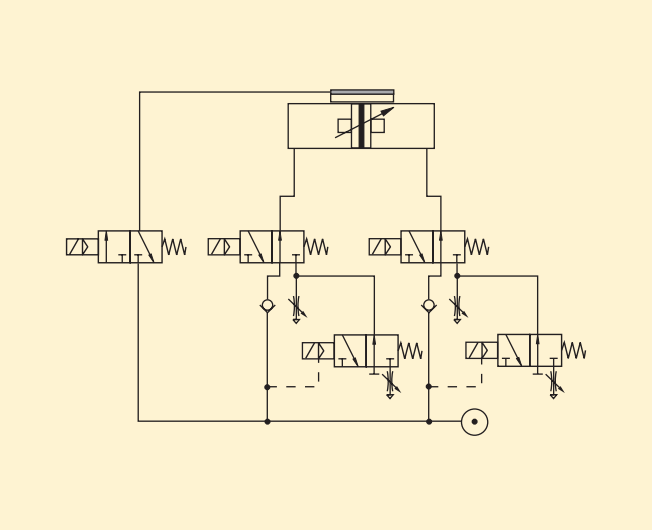


Circuit diagram for end of stroke application. Intermediate positioning is also possible.

The cylinder is controlled by a 5/3-way valve (middle position pressurized).The speed can be adjusted independently for both directions.

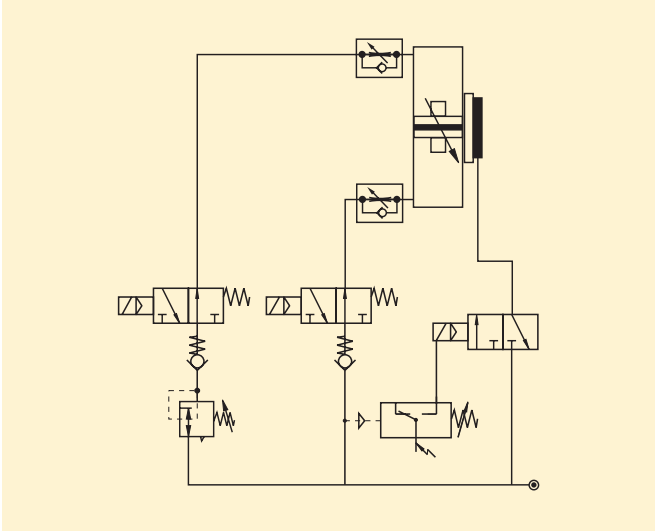


The optional integrated VOE Valves offer optimal control, and allow accurate positioning of intermediate positions and the lowest possible speeds.



Fast/Slow speed cycle control with pneumatic brake for accurate positioning at high velocities. Additional 3/2-way valves with adjustable throttle valves at the exhaust of the standard directional control valves for two displacement speeds in each direction of the piston's travel.

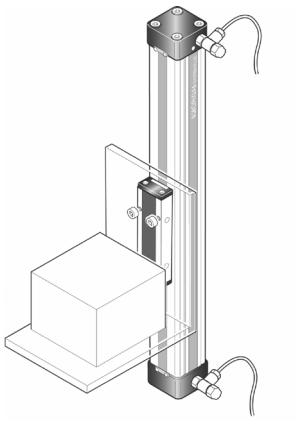
The valve controlling the brake is activated after the slow speed cycle is activated.



The combination of an OSP-cylinder with the passive MULTIBRAKE as shown here, allows accurate positioning and safety in case of loss of pneumatic air pressure.

OSP SERIES – rodless linear drives offer maximum flexibility for any application.

The high load capacity of the piston can cope with high bending moments without additional guides.



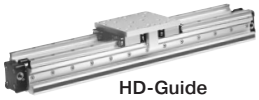
Integrated guides offer optimal guidance for applications requiring high performance, easy assembly and maintenance free operation.


SLIDELINE

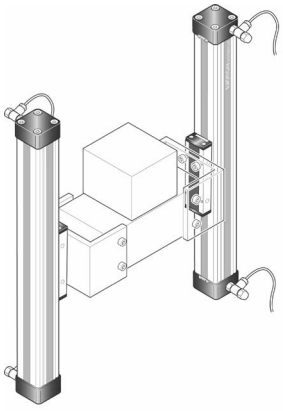

POWERSLIDE


PROLINE

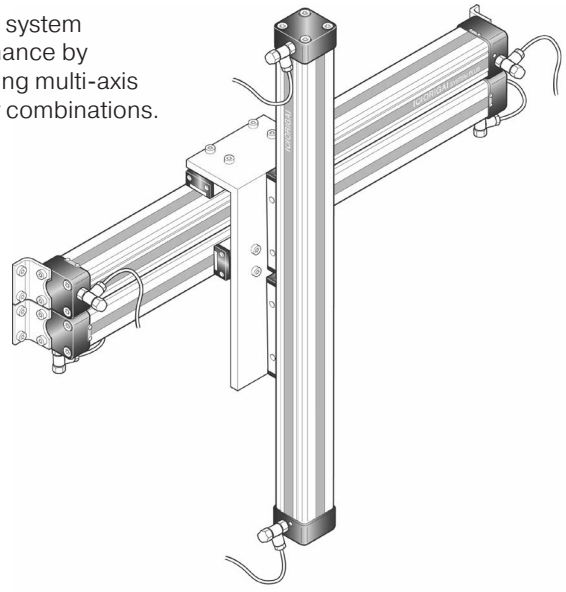

STARLINE


HD-Guide

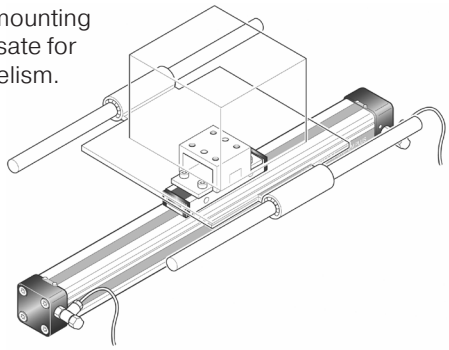
The mechanical design of the OSP-P allows synchronized movement of two cylinders.



Optimal system performance by combining multi-axis cylinder combinations.



When using external guides, the clevis mounting is used to compensate for deviations in parallelism.



For further information and assembly instructions, please contact your local Parker dealer.

OSP-P Series

A new generation of linear drives which can be simply and neatly integrated into any machine layout.

A new modular linear drive system

With this second generation linear drive the OSP-P series offers design engineers complete flexibility.

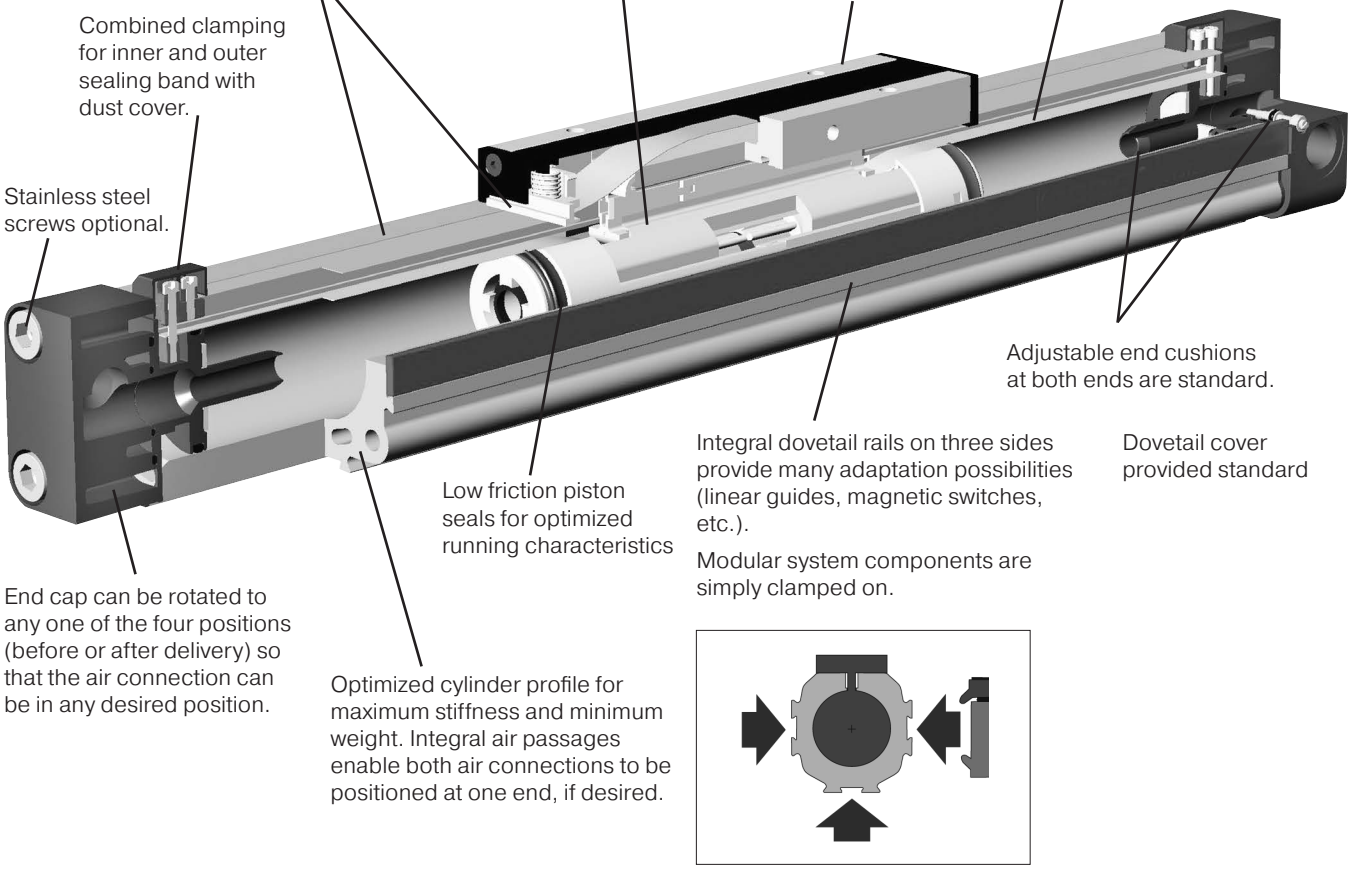
The cylinder has been further developed into a combined linear actuator, guidance and control package. It forms the basis for the OSP-P linear drive system.

All additional functions are designed into modular system components which replace the previous series of cylinders.

Mounting rails on 3 sides

Mounting rails on 3 sides of the cylinder enable modular components such as linear guides, brakes, valves, magnetic switches etc. to be fitted to the cylinder itself. This solves many installation problems, especially where space is limited.

The modular system concept forms an ideal basis for additional customer-specific functions.

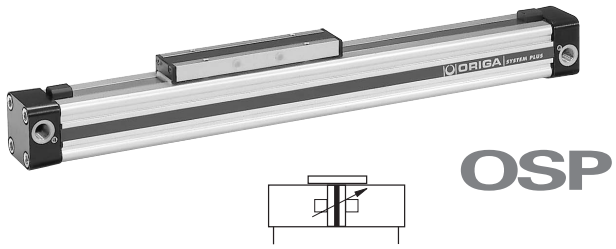


Standard Features:

- Double-acting with adjustable cushions
- With magnetic piston for position sensing
- Standard stroke lengths to 5500mm, long stroke versions available upon request
- End cap can be rotated 4 x 90° to position ports as desired

Optional Features:

- Clean room cylinders
- Stainless steel screws
- 0.005 to 0.2 M/S
- Fluorocarbon seals -14°F to 212°F (-10°C to 100°C)
- Single end porting
- Integrated valves
- Integrated bearing options



Operating Information

Operating pressure:	116 PSIG (8 bar)
Temperature range:	14°F to 176°F (-10°C to 80°C)
Filtration requirements:	Filtered, nonlubricated compressed air

Specifications

Type	Rodless cylinder
Series	OSP-P
Stroke length	5.5m (216 inches)
System	Double-acting, with cushions and magnetic piston
Mounting	See drawings
Air connection	Threaded
Weight (mass)	See table
Installation	In any position
Lubrication	Prelubricated at the factory (additional oil mist lubrication not required)
Option:	special slow speed grease

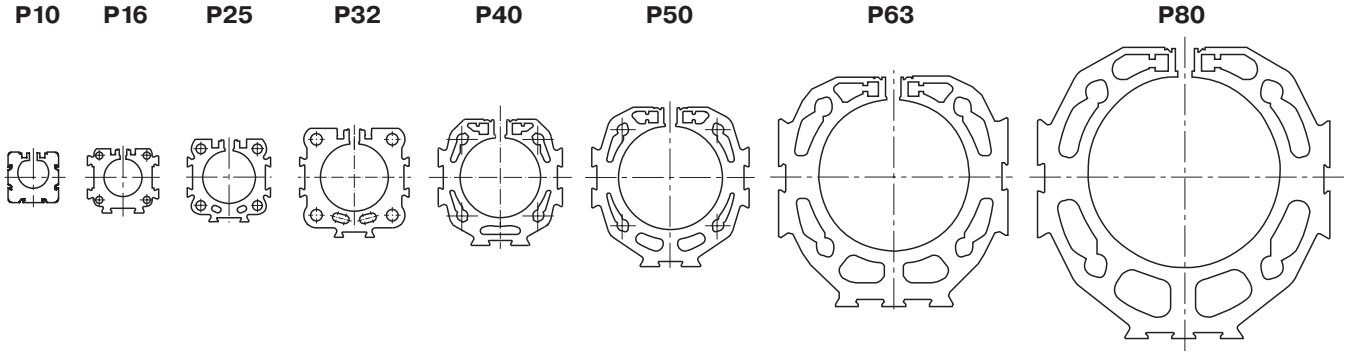
Material Specifications

Cylinder profile	Anodized aluminum
Carrier (piston)	Anodized aluminum
End caps	Aluminum, lacquered / plastic (P10)
Sealing bands	Corrosion resistant steel
Seals	NBR (Option: Fluorocarbon)
Screws	Galvanized steel Option: stainless steel
Dust covers, wipers	Composite

Weight (mass) kg

Cylinder Series (Basic Cylinder)	Weight (Mass) kg	
	at 0mm Stroke	per 100mm Stroke
OSP-P10	0.087	0.052
OSP-P16	0.22	0.1
OSP-P25	0.65	0.197
OSP-P32	1.44	0.354
OSP-P40	1.95	0.415
OSP-P50	3.53	0.566
OSP-P63	6.41	0.925
OSP-P80	12.46	1.262

Size Comparison



Ordering information for OSP-P rodless standard pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1		0	0		0	0	0	0	0	0	1	0	0

Bore

10
16
25
32
40
50
63
80

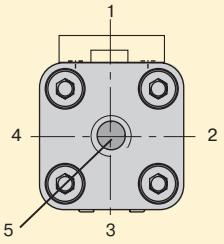
Piston Style

0	Standard
1	Tandem
C	Classic
T	Tandem Classic

Porting Configurations †

0	Standard
1	End Face (16,25,32,40,50,63,80)
2	Single End Porting (25,32,40,50,63,80)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50,63,80)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50,63,80)
6	Single End Porting at #5 (50,63,80)
8	Inner Band Temp Compensation (25,32,40,80)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Notes: 10mm bore can only have standard port locations.
Single end porting on 16mm bore, then end caps cannot be rotated.



Note: Position #2 is the standard location.

† Single end ports can not be rotated in the field

Seals

0	Standard / Buna-N
1	Fluorocarbon

Lubrication

0	Standard
1	Slow Speed
4	Food
5	Clean Room

Hardware

0	Standard / Zinc
1	Stainless Steel

Stroke

xxxxx

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Notes: 10mm bore only available on option "0".

Cushioning & Stops

0	Standard
1	Long Cushions (25,32,40)

Piston Mounting

0	Standard
1	Floating Mount

Guides / Brakes

0	None
A	Activebrake (16 thru 80)
M	Inversion (NR30) (16 thru 80mm bore only)

Additional Carriages

0	None

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
1	A1 (10,16,25,32)
2	A2 (16,25,32)
3	A3 (25,32)
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50,63,80)
A	C2 (40,50,63,80)
B	C3 (40,50,63,80)
C	C4 (40,50,63,80)

Note: Comes in pairs

Version

0	Standard

Switches ◊

0	None
1	Normally Open Reed Switch (16 thru 80)
2	Normally Closed Reed Switch (16 thru 80)
3	PNP Hall Sensor w/Extension Cables (16 thru 80)
4	NPN Hall Sensor w/Extension Cables (16 thru 80)
5	NO Reed, w/10mm Bracket (10 only)
6	PNP Hall Sensor w/Extension Cables & 10mm Brackets (10mm only)
7	NPN Hall Sensor w/Extension Cables & 10mm Brackets (10mm only)

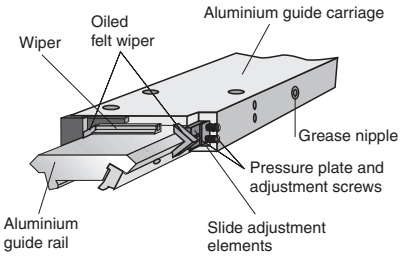
◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.

Plain Bearing Guide SLIDELINE

Available on 16 to 80mm bore

Features:

- Adjustable composite slide elements – optional integral brake
- Integrated sealing system with wiper elements to remove dirt and lubricate the slideways
- Any length of stroke up to 5500mm

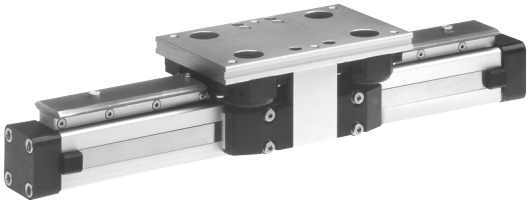


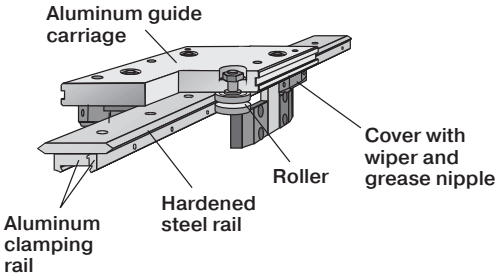
Roller Guide POWERSLIDE

Available on 16 to 50mm bore

Features:

- Anodized aluminum guide carriage with vee rollers
- Hardened steel guide rail
- Multiple guide sizes can be used on the same drive
- Max. Speed v = 3 m/s
- Integrated wiper and grease nipple
- Any length of stroke up to 3500mm

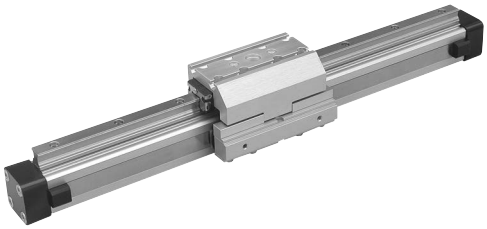




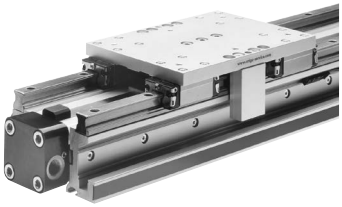
Other Options

PROLINE
The compact aluminum roller guide for high loads and velocities and utilizes the GDL Guide Bearing

STARLINE
Recirculating ball bearing guide for very high loads and precision

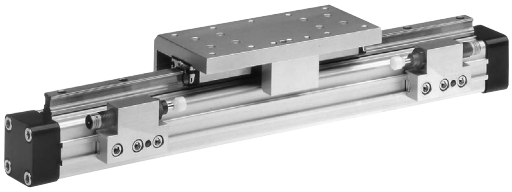


KF Guide
Recirculating ball bearing guide – the mounting dimensions correspond to FESTO Type: DGPL-KF



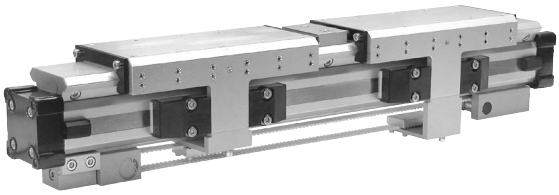
Heavy Duty Guide HD
For heavy duty applications

Integrated VOE Valves



Variable Stop VS
The variable stop provides simple stroke limitation. Available on STARLINE, KF and Heavy duty guide

Clean Room Version
Certified to DIN EN ISO 14644-1



Rodless Cylinder
For synchronized bi-parting movements. Available on SLIDELINE Guide Bearing only

Loads, Forces and Moments

When sizing an OSP cylinder, consideration must be given to:

- Loads, forces and moments
- Performance of the pneumatic end cushions. The main factors are the mass to be cushioned and the piston speed (unless external cushioning is used, e. g. hydraulic shock absorbers)

To determine the maximum values for light, shock-free operation, which must not be exceeded even in dynamic operation.

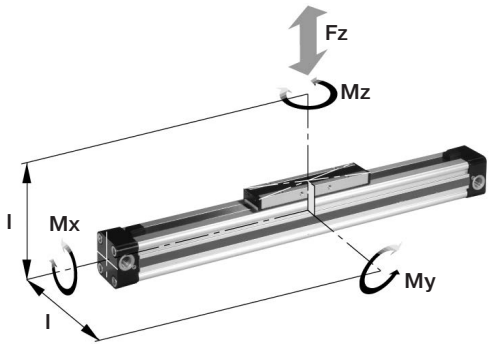
Load and moment data are based on speeds v ⩽ 0.5 m/s.

When working out the action force required, it is essential to take into account the friction forces generated by the specific application or load.

The sum total of each of these types of moments, divided by each of the maximum values, determines a Load-Moment Factor (LMF) should be equal to or less than 1.0. On horizontal mountings, the total load (L) should also be divided by the maximum load allowable and factored into the equation.

$$\frac{L}{[L]} + \frac{M}{[M]} + \frac{Ms}{[Ms]} + \frac{Mv}{[Mv]} = LMF \leq 1.0$$

$$\frac{M}{[M]} + \frac{Ms}{[Ms]} + \frac{Mv}{[Mv]} = LMF \leq 1.0$$



M = F · l

Bending moments are calculated from the center of the linear actuator

Cylinder Series (mm Ø)	Theoretical Output Force at 6 Bar N (lb)	Actual Output Force F_A at 6 Bar N (lb)	Max. Moments Mx Nm (in lb)	My Nm (in lb)	Mz Nm (in lb)	Max. Load F N (lb)	Cushion Length (mm)
OSP-P10	47 (10.6)	32 (7.2)	0.2 (1.8)	1 (8.9)	0.3 (2.7)	20 (4.5)	2.5 * (.09)
OSP-P16	120 (26.9)	78 (17.5)	0.45 (3.9)	4 (35.4)	0.5 (4.4)	120 (26.9)	11 (.43)
OSP-P25	295 (66.3)	250 (56.2)	1.5 (13.3)	15 (132.8)	3 (26.6)	300 (67.4)	17 (.67)
OSP-P32	483 (108.6)	420 (94.4)	3 (26.6)	30 (265.5)	5 (44.3)	450 (101.2)	20 (.79)
OSP-P40	754 (169.5)	640 (143.9)	6 (53.1)	60 (531)	8 (70.8)	750 (168.6)	27 (1.06)
OSP-P50	1178 (264.8)	1000 (224.8)	10 (88.5)	115 (1017.8)	15 (132.8)	1200 (269.8)	30 (1.18)
OSP-P63	1870 (420.4)	1550 (348.5)	12 (106.2)	200 (1771)	24 (212.4)	1650 (370.9)	32 (1.26)
OSP-P80	3016 (678)	2600 (584.5)	24 (212.4)	360 (3186)	48 (424.8)	2400 (539.5)	39 (1.54)

* A rubber element (non-adjustable) is used for end cushioning.
To deform the rubber element enough to reach the absolute end position would require a Δp of 4 bar!

Cushioning diagram

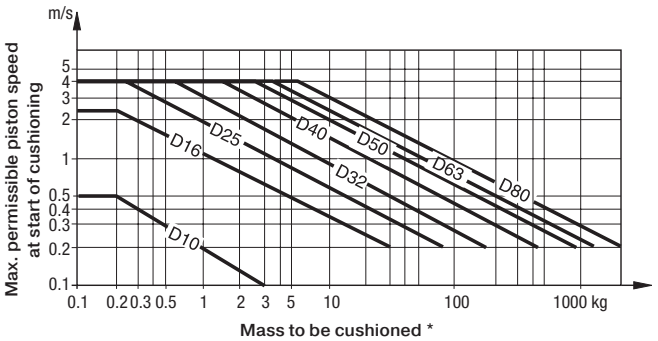
Determine the moving mass and follow the chart below to determine the maximum cylinder velocity.

Alternatively, take your desired velocity and moving mass to determine the required cylinder diameter.

If these maximum permissible values are exceeded, additional shock absorbers must be used.

For sizing a basic cylinder, use the adjacent chart. To size a cylinder with guide bearing, use the charts on the following page.

The peak piston velocity can be determined by assuming it is 50% greater than the average velocity. The peak velocity should be used in sizing the cylinder cushions.



Includes piston mass.

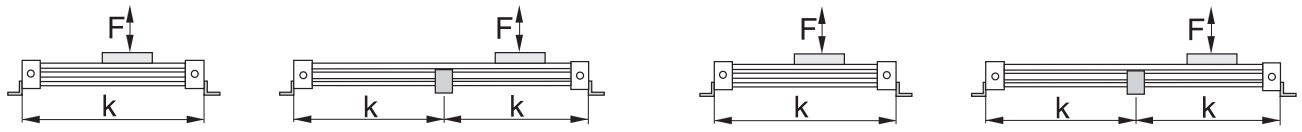
* For cylinders with linear guides or brakes, please be sure to take the mass of the carriage or the brake housing into account.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

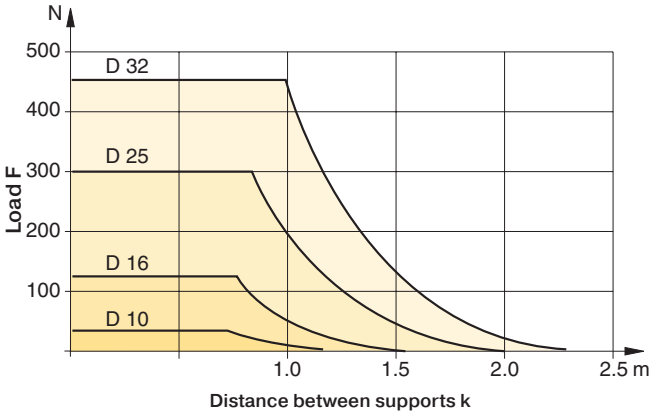
Mid-Section Supports

To avoid excessive bending and oscillation of the cylinder, intermediate supports may be required. The diagrams below show the maximum permissible support spacing based upon load.

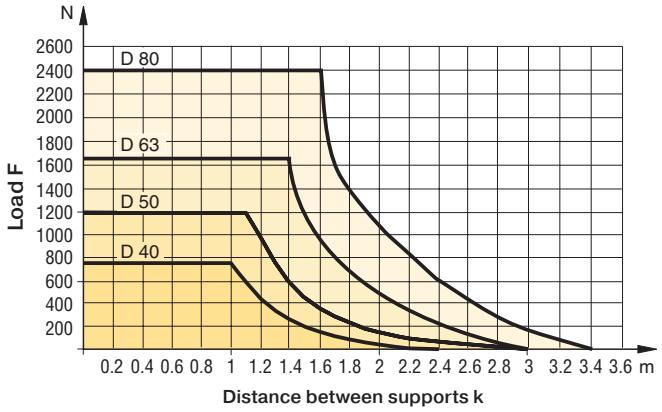
Bending up to 0.5 mm is permissible between supports. The mid-section supports are clamped on to the dovetail profile of the cylinder tube. They are also able to take the axial forces.



Basic cylinder 10 to 32mm bore mid-section supports



Basic cylinder 40 to 80mm bore mid-section supports



Cylinder Stroke and Dead Length A

- Free choice of stroke length up to 5500mm in 1mm steps.
- Longer strokes available on request.

Tandem Cylinder

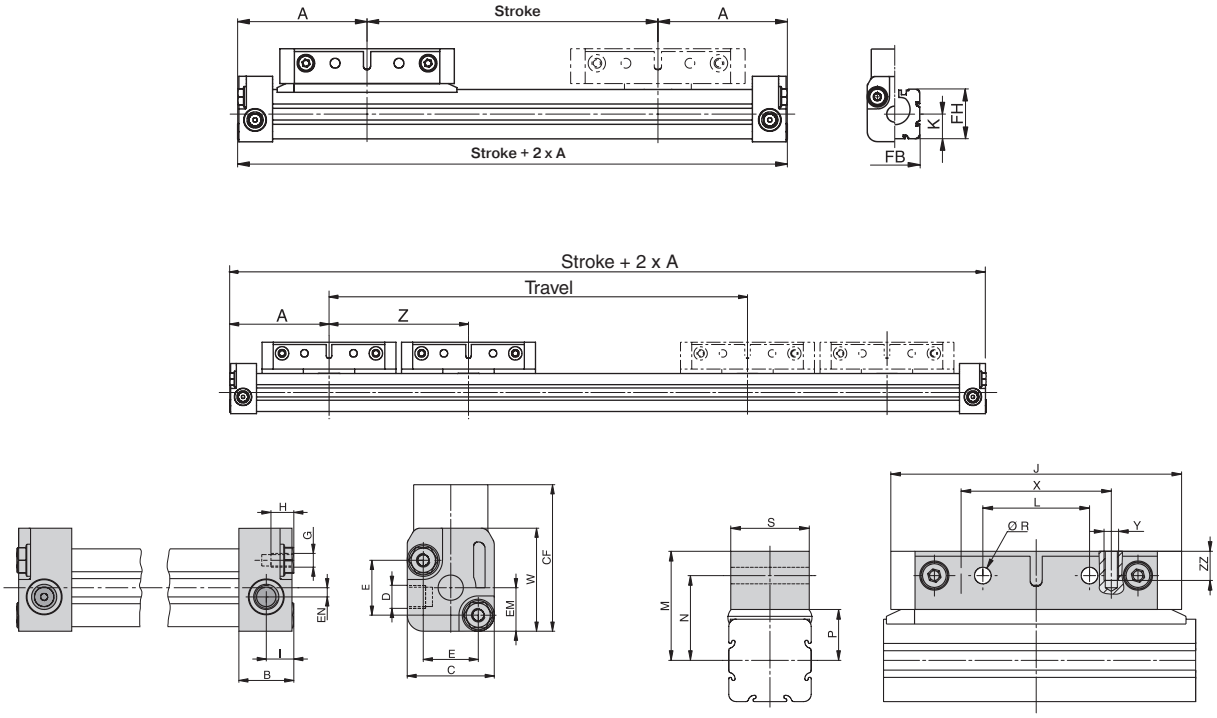
Two pistons are fitted : dimension “Z” is optional. Please note minimum distance “Zmin”.

- Free choice of stroke length up to 5500mm in 1mm steps.
- Longer strokes available on request.
- Stroke length to order is stroke + dimension “Z”.

Please note:

To avaoid multiple actuation of magmetic switches, the second piston is not equipped with magnets.

Basic cylinder – 10mm bore



Dimensions (mm)

Series	A	B	C	D	E	G	H	I	J	K	L	M	N	P	R	S	W	X	Y	Zmin	CF	EM	EN	FB	FH	ZZ
OSP-P10	44.5	12	19	M5	12	M3	5	6	60	8.5	22	22.5	17.5	10.5	3.4	16	22.5	31	M3	64	32	9.5	2	17	17	6

Cylinder Stroke and Dead Length A

- Free choice of stroke length up to 5500mm in 1mm steps.
- Longer strokes available on request.

Tandem Cylinder

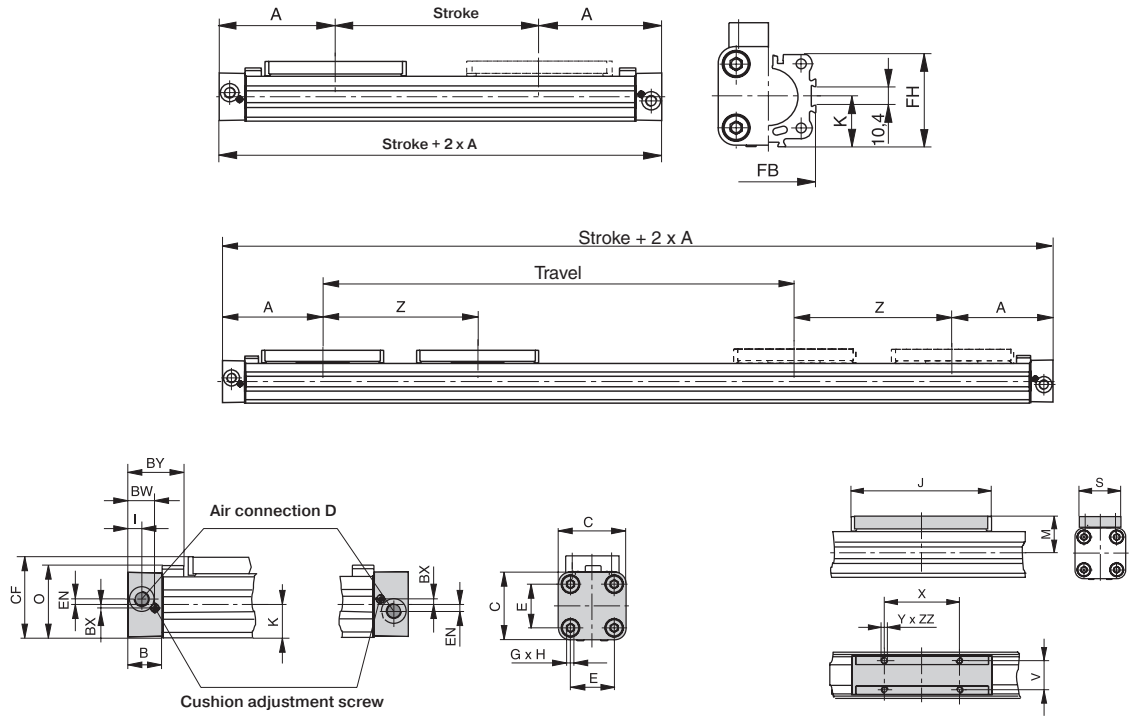
Two pistons are fitted : dimension “Z” is optional. Please note minimum distance “Zmin”.

- Free choice of stroke length up to 5500mm in 1mm steps.
- Longer strokes available on request.
- Stroke length to order is stroke + dimension “Z”.

Please note:

To avaoid multiple actuation of magmetic switches, the second piston is not equipped with magnets.

Basic cylinder – 16 to 80mm bore



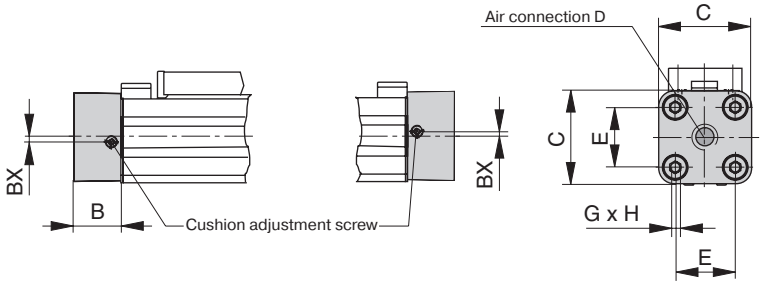
Dimensions (mm)

Series	A	B	C	D	E	G	H	I	J	K	M	O	S	V	X	Y	Z	BW	BX	BY	CF	EN	FB	FH	ZZ
OSP-P16	65	14	30	M5	18	M3	9	5.5	69	15	23	33.2	22	16.5	36	M4	81	10.8	1.8	28.4	38	3	30	27.2	7
OSP-P25	100	22	41	G1/8	27	M5	15	9	117	21.5	31	47	33	25	65	M5	128	17.5	2.2	40	52.5	3.6	40	39.5	8
OSP-P32	125	25.5	52	G1/4	36	M6	15	11.5	152	28.5	38	59	36	27	90	M6	170	20.5	2.5	44	66.5	5.5	52	51.7	1
OSP-P40	150	28	69	G1/4	54	M6	15	12	152	34	44	72	36	27	90	M6	212	21	3	54	78.5	7.5	62	63	10
OSP-P50	175	33	87	G1/4	70	M6	15	14.5	200	43	49	86	36	27	110	M6	251	27	–	59	92.5	11	76	77	10
OSP-P63	215	38	106	G3/8	78	M8	21	14.5	256	54	63	107	50	34	140	M8	313	30	–	64	117	12	96	96	16
OSP-P80	260	47	132	G1/2	96	M10	25	22	348	67	80	133	52	36	190	M10	384	37.5	–	73	147	16.5	122	122	20

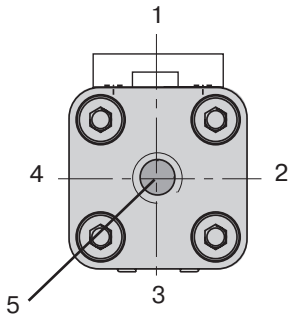
Air Connection on the End-Face #5

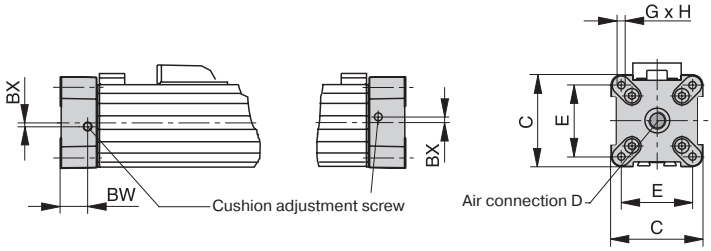
In some situations it is necessary or desirable to fit a special end cap with the air connection on the end-face instead of the standard end cap with the air connection on the side. The special end cap can also be rotated 4 x 90° to locate the cushion adjustment screw as desired.

Series OSP-P16 to P32



Series OSP-P40 to P80





Note: Position #2 is the standard location.

Dimension (mm)

Series	B	C	D	E	G	H	BX	BW
OSP-P16	14	30	M5	18	M3	9	1.8	10.8
OSP-P25	22	41	G1/8	27	M5	15	2.2	17.5
OSP-P32	25.5	52	G1/4	36	M6	15	2.5	20.5
OSP-P40	28	69	G1/4	54	M6	15	3	21
OSP-P50	33	87	G1/4	70	M6	15	–	27
OSP-P63	38	106	G3/8	78	M8	21	–	30
OSP-P80	47	132	G1/2	96	M10	25	–	37.5

Single End Porting

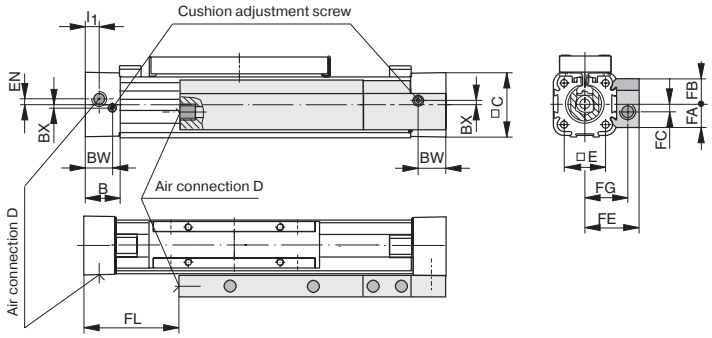
A special end cap with both air connections on one side is available for situations where shortage of space, simplicity of installation or the nature of the process make it desirable. Air supply to the other end is via internal air passages (OSP-P25 to P80) or via a hollow aluminum profile fitted externally (OSP-P16).

In this case the end caps cannot be rotated.

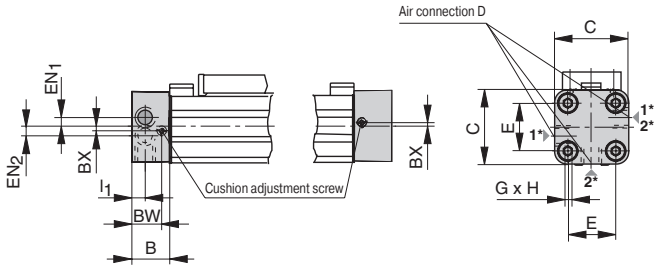
Please note:

When combining the OSP-P16 single end porting with inversion mountings, RS magnetic switches can only be mounted directly opposite to the external air-supply profile.

Series OSP-P16

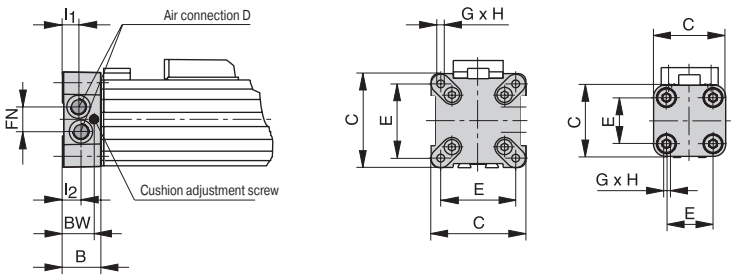


Series OSP-P25



* Versions of Air Connection Positions:
1 → 1 or
2 → 2

Series OSP-P32 to P80



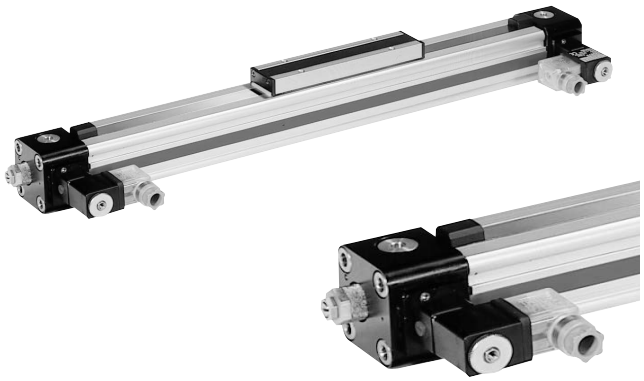
Dimension (mm)

Series	B	C	D	E	G	H	I1	I2	BX	BW	EN	EN1	EN2	FA	FB	FC	FE	FG	FL	FN
OSP-P16	14	30	M5	18	M3	9	5.5	–	1.8	10.8	3	–	–	12.6	12.6	4	27	21	36	–
OSP-P25	22	41	G1/8	27	M5	15	9	–	2.2	17.5	–	3.6	3.9	–	–	–	–	–	–	–
OSP-P32	25.5	52	G1/8	36	M6	15	12.2	10.5	–	20.5	–	–	–	–	–	–	–	–	–	15.2
OSP-P40	28	69	G1/8	54	M6	15	12	12	–	21	–	–	–	–	–	–	–	–	–	17
OSP-P50	33	87	G1/4	70	M6	15	14.5	14.5	–		–	–	–	–	–	–	–	–	–	22
OSP-P63	38	106	G3/8	78	M8	21	16.5	13.5	–	30	–	–	–	–	–	–	–	–	–	25
OSP-P80	47	132	G1/2	96	M10	25	22	17	–	37.5	–	–	–	–	–	–	–	–	–	34.5

Integrated 3/2 Way Valves VOE Series OSP-P25, P32, P40 and P50

For optimal control of the OSP-P cylinder, 3/2 way valves integrated into the cylinder's end caps can be used as a compact and complete solution.

They allow for easy positioning of the cylinder, smooth operation at the lowest speeds and fast response, making them ideally suited for the direct control of production and automation processes.

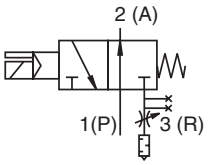


Characteristics:

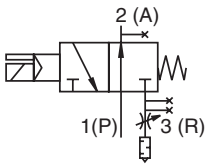
- Complete compact solution
- Various connection possibilities:
  Free choice of air connection with rotating end caps with VOE valves, Air connection can be rotated 4 x 90˚, Solenoid can be rotated 4 x 90˚, Pilot Valve can be rotated 180˚
- High piston velocities can be achieved with max. 3 exhaust ports
- Minimal installation requirements
- Requires just one air connection per valve
- Optimal control of the OSP-P cylinder
- Excellent positioning characteristics
- Integrated operation indicator
- Integrated exhaust throttle valve
- Manual override - indexed
- Adjustable end cushioning
- Easily retrofitted – please note the increase in the overall length of the cylinder!

Operating Information

Operating pressure:	116 PSIG (8 bar)
Temperature range:	-14˚F to 122˚F (10˚C to 50˚C)
Filtration requirements:	Filtered, nonlubricated compressed air



VOE-25 / VOE-32



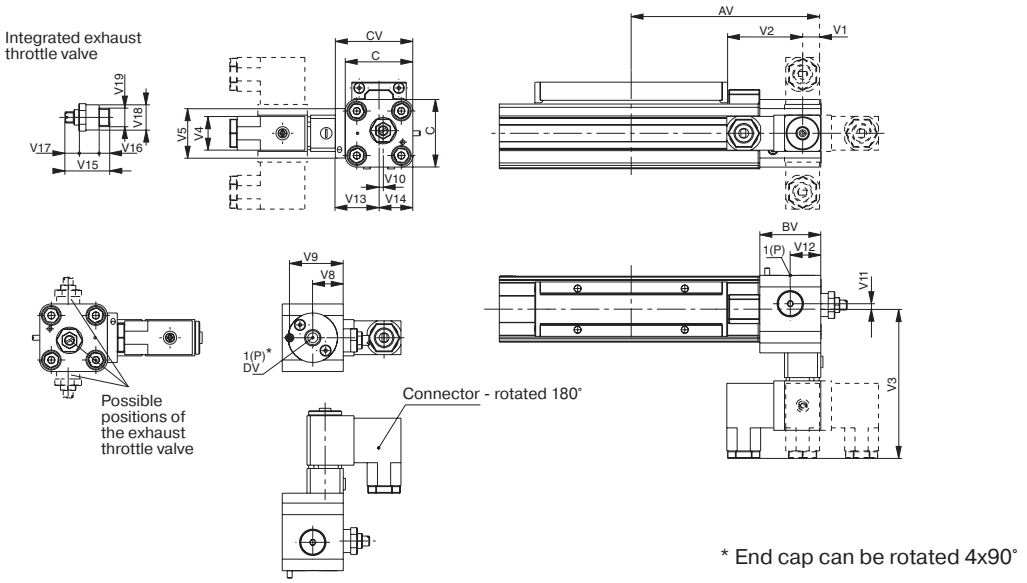
VOE-40 / VOE-50

Specifications

Characteristics	3/2 Way Valves with spring return
Actuation	electrical
Basic position	P → A open, R closed
Type	Poppet valve, non overlapping
Mounting	integrated in end cap
Installation	in any position
Port size	G 1/8 VOE-25 G 1/4 VOE-32 G 3/8 VOE-40 G 3/8 VOE-50
Temperature	-10˚C to 50˚C *
Operating pressure	2-8 bar
Nominal voltage	24 V DC / 230 V AC, 50 Hz
Power consumption	2,5 W / 6 VA
Duty cycle	100%
Electrical Protection	IP65 DIN 40050

* Other temperature ranges on request

Dimensions VOE Valves OSP-P25 and P32

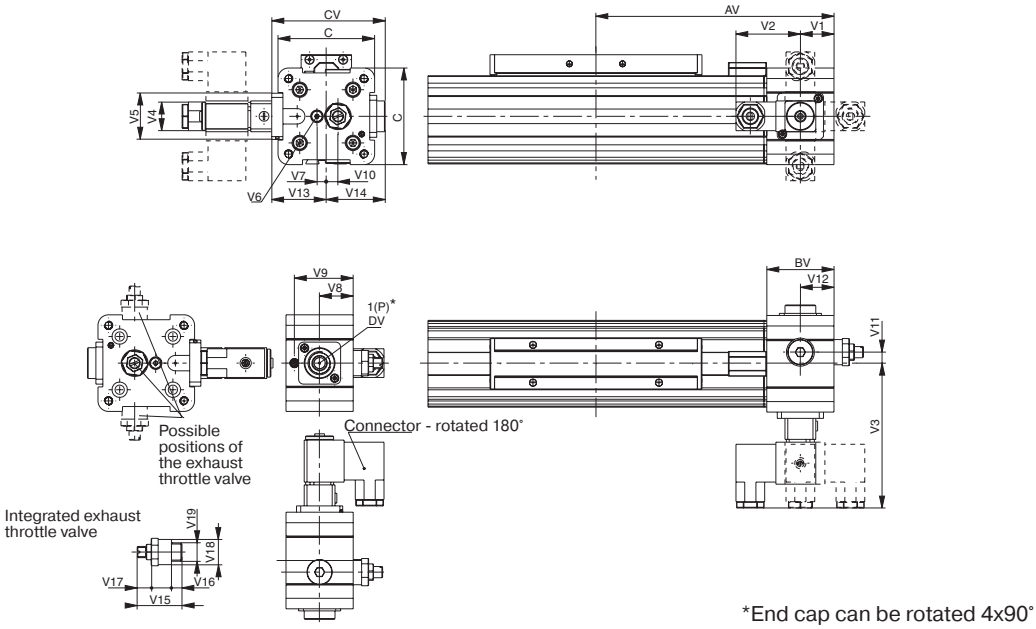


* End cap can be rotated 4x90°

Dimension (mm)

Series	AV	BV	C	CV	DV	V1	V2	V3	V4	V5	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19
OSP-P25	115	37	41	47	G1/8	11	46	90.5	22	30	18.5	32.5	2.5	3.3	18.5	26.5	20.5	24	5	4	14	G1/8
OSP-P32	139	39.5	52	58	G1/4	20.5	46	96	22	32	20.5	34.7	6	5	20.5	32	26	32	7.5	6	18	G1/4

Dimensions VOE Valves OSP-P40 and P50



*End cap can be rotated 4x90°

Dimension (mm)

Series	AV	BV	C	CV	DV	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19
OSP-P40	170	48	69	81	G3/8	24	46	103	22	33	M5	6.7	24	42	8.3	8.3	24	39	42	32	7.5	6	18	G1/4
OSP-P50	190	48	87	82	G3/8	24	46	102	22	33	M5	4.5	24	42	12.2	12.2	24	38	44	32	7.5	6	18	G1/4

Active Brake

Series AB 25 to 80 for linear drive

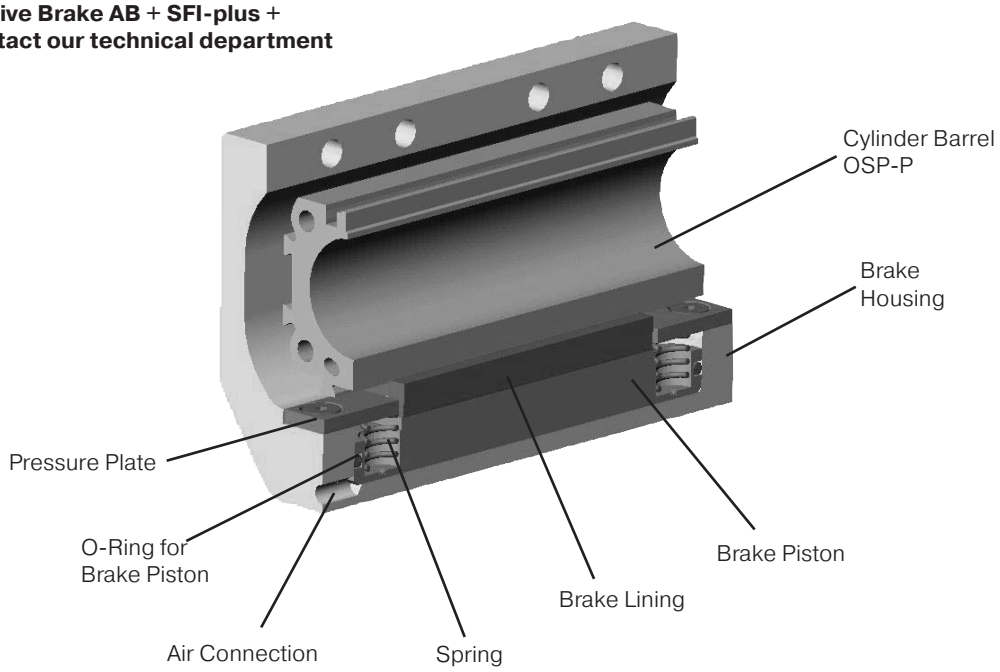
- Series OSP-P
- Can be used with Sensoflex

Features:

- Actuated by pressurization
- Released by spring actuation
- Completely stainless version
- Holds position, even under changing load conditions

For further technical data, please refer to the data sheets for linear drives OSP-P (page 77)

Note:
For combinations Active Brake AB + SFI-plus + Magnetic Switch contact our technical department please.



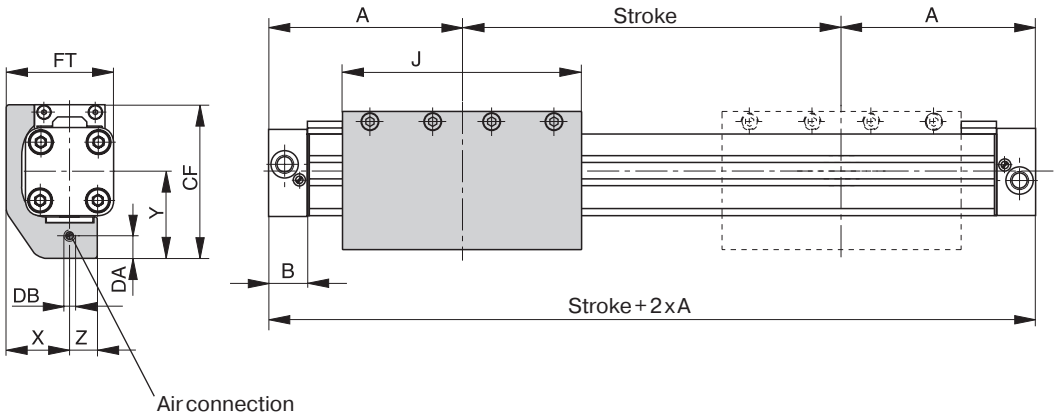
Forces and Weights

Series	For Linear Drive	Max. Braking Force (N) †	Brake Pad Way (mm)	Mass (kg) Linear Drive with Brake 0 mm Stroke	Mass (kg) Linear Drive with Brake Increase per 100mm Stroke	Mass (kg) Brake*	Part Number Active Brake (includes carriage)
AB 25	OSP-P25	350	2.5	1.0	0.197	0.35	**20806FIL**
AB 32	OSP-P32	590	2.5	2.02	0.354	0.58	**20807FIL**
AB 40	OSP-P40	900	2.5	2.83	0.415	0.88	**20808FIL**
AB 50	OSP-P50	1400	2.5	5.03	0.566	1.50	**20809FIL**
AB 63	OSP-P63	2170	3.0	9.45	0.925	3.04	**20810FIL**
AB 80	OSP-P80	4000	3.0	18.28	1.262	5.82	**20811FIL**

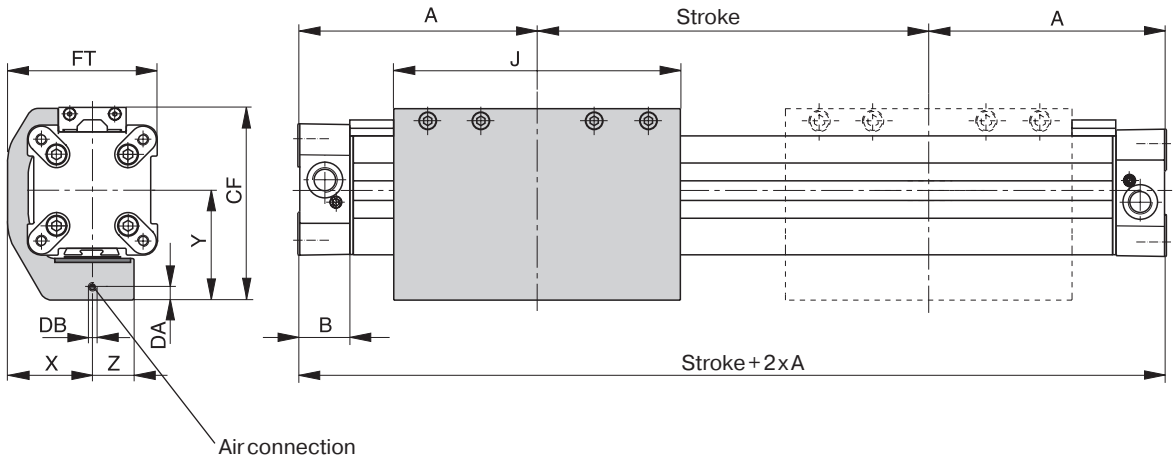
† – at 6 bar both chambers pressurized with 6 bar Braking surface dry
– oil on the braking surface will reduce the braking force

* **Please Note:**
The mass of the brake has to be added to the total moving mass when using the cushioning diagram.

Series OSP-P25 and P32 with Active Brake AB



Series OSP-P40, P50, P63, P80 with Active Brake AB



Dimension (mm)

Series	A	B	J	X	Y	Z	CF	DA	DB	FT
AB 25	100	22	117	29.5	43	13	74	4	M5	50
AB 32	125	25.5	151.4	36	50	15	88	4	M5	62
AB 40	150	28	151.4	45	58	22	102	7	M5	79.5
AB 50	175	33	200	54	69.5	23	118.5	7.5	M5	97.5
AB 63	215	38	256	67	88	28	151	9	G1/8	120
AB 80	260	47	348	83	105	32	185	10	G1/8	149

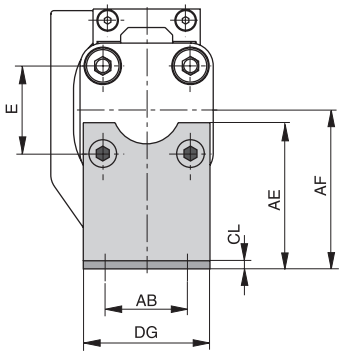
End Cap Mountings

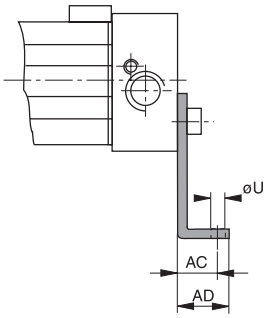
On the end-face of each cylinder end cap there are four threaded holes for mounting the cylinder. The hole layout is square, so that the mounting can be fitted to the bottom, top or either side.

Series OSP – P25 and P32 with Active Brake AB: Type A3

Material:
Galvanized steel

The mountings are supplied in pairs.



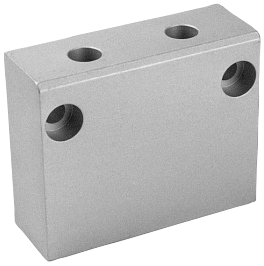


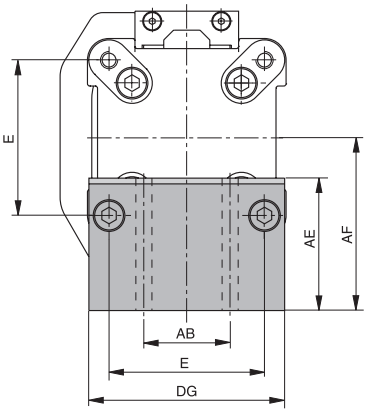
Series OSP – P40 , P50, P63, P80 with Active Brake AB: Type C3

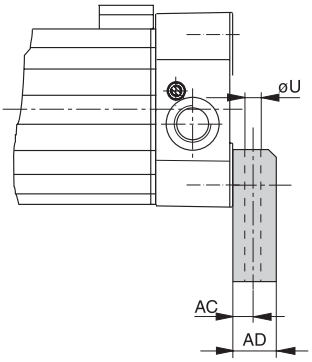
Material:
Anodized aluminum

The mountings are supplied in pairs.

Stainless steel version on request.







Dimension (mm)

Series	E	øU	AB	AC	AD	AE	AF	CL	DG	Part Number Type A3	Part Number Type C3
AB 25	27	5.8	27	16	22	45	49	2.5	39	**2060FIL**	–
AB 32	36	6.6	36	18	26	42	52	3	50	**3060FIL**	–
AB 40	54	9	30	12.5	24	46	60	–	68	–	**20339FIL**
AB 50	70	9	40	12.5	24	54	72	–	86	–	**20350FIL**
AB 63	78	11	48	15	30	76	93	–	104	–	**20821FIL**
AB 80	96	14	60	17.5	35	88	110	–	130	–	**20822FIL**

Mid-Section Supports

Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive.

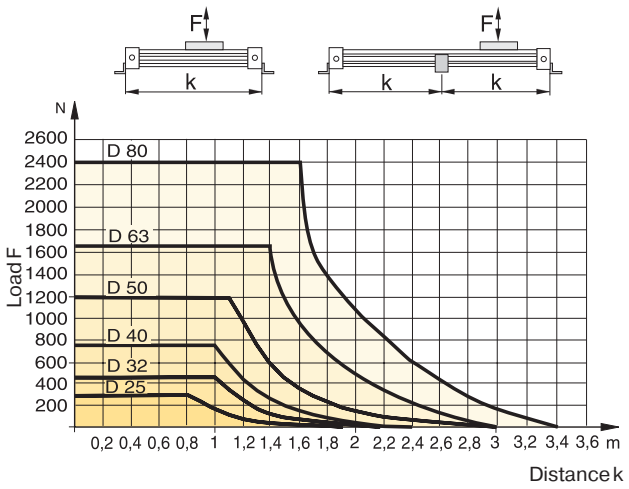
The diagrams show the maximum permissible unsupported length in relation to loading. Deflection of 0.5mm max. between supports is permissible.

The Mid-Section supports are attached to the dovetail rails, and can take axial loads.

Note to Type E3:

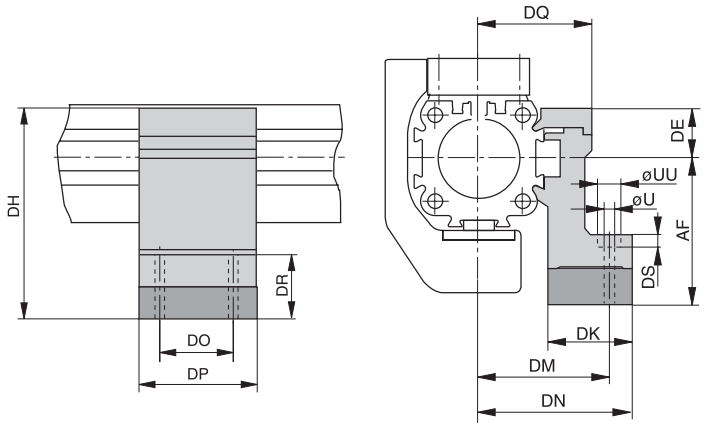
Mid-Section supports can only be mounted opposite of the brake housing.

Stainless steel version available on request.



Series OSP-P25 to P80 with Active Brake AB: Type E3

(Mounting from above / below with through-bolt)



Dimension (mm)

Series	U	UU	AF	DE	DH	DK	DM	DN	DO	DP	DQ	DR	DS	Type E3 Part Number
AB 25	5.5	10	49	16	65	26	40	47.5	36	50	34.5	35	5.7	**20353FIL**
AB 32	5.5	10	52	16	68	27	46	54.5	36	50	40.5	32	5.7	**20356FIL**
AB 40	7	–	60	23	83	34	53	60	45	60	45	32	–	**20359FIL**
AB 50	7	–	72	23	95	34	59	67	45	60	52	31	–	**20362FIL**
AB 63	9	–	93	34	127	44	73	83	45	65	63	48	–	**20453FIL**
AB 80	11	–	110	39.5	149.5	63	97	112	55	80	81	53	–	**20819FIL**

Clevis Mount ø 10mm

For Linear-drive

OSP

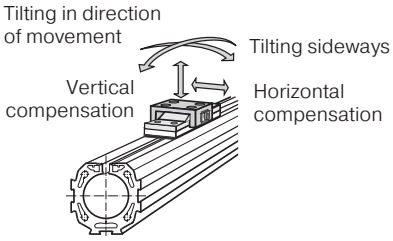
- Series OSP-P

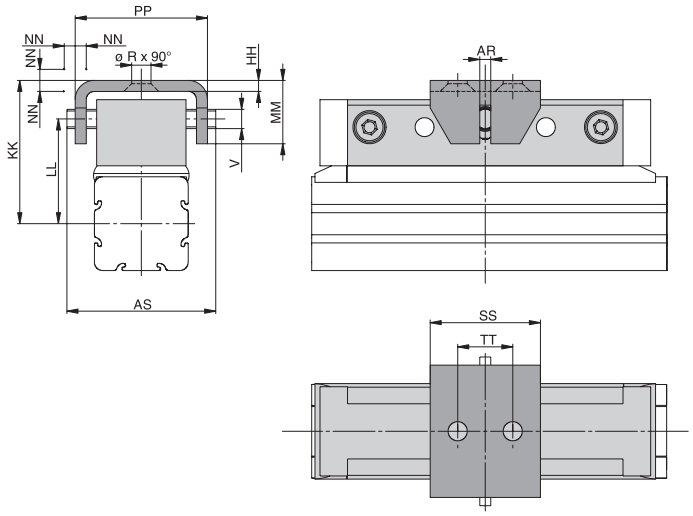
When external guides are used, parallelism deviations can lead to mechanical strain on the piston. This can be avoided by the use of a clevis mounting.

In the drive direction, the mounting has very little play.

Freedom of movement is provided as follows:

- Tilting in direction of movement
- Vertical compensation
- Tilting sideways
- Horizontal compensation





Dimension (mm)

Series	ø R	V	AR	AS	HH	KK	LL	MM	NN*	PP	SS	TT	Part Number Standard	Part Number Stainless
OSP-P10	3.4	3.5	2	27	2	26	19	11.5	1	24	20	10	**20971FIL**	–

* Dimension NN gives the possible plus and minus play in horizontal and vertical movement, which also makes tilting sideways possible.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Clevis Mount ø 16 to 80mm

For Linear-drive

OSP

- Series OSP-P

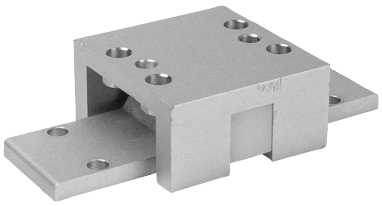
When external guides are used, parallelism deviations can lead to mechanical strain on the piston. This can be avoided by the use of a clevis mounting.

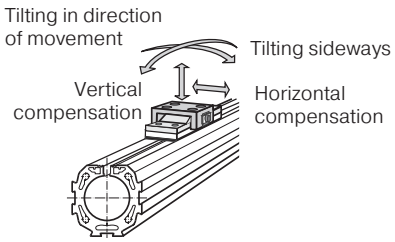
In the drive direction, the mounting has very little play.

Freedom of movement is provided as follows:

- Tilting in direction of movement
- Vertical compensation
- Tilting sideways
- Horizontal compensation

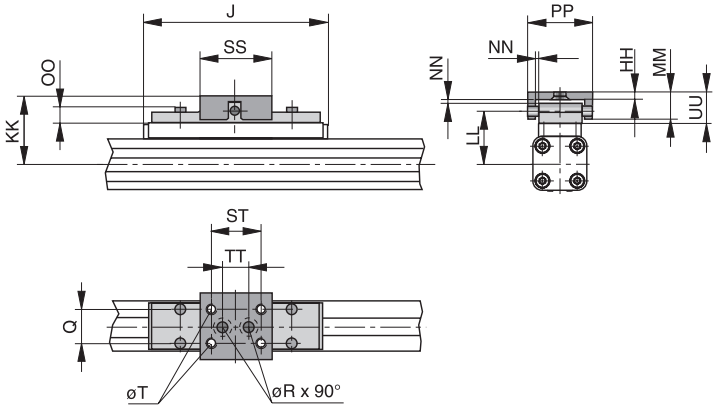
A stainless steel version is also available.



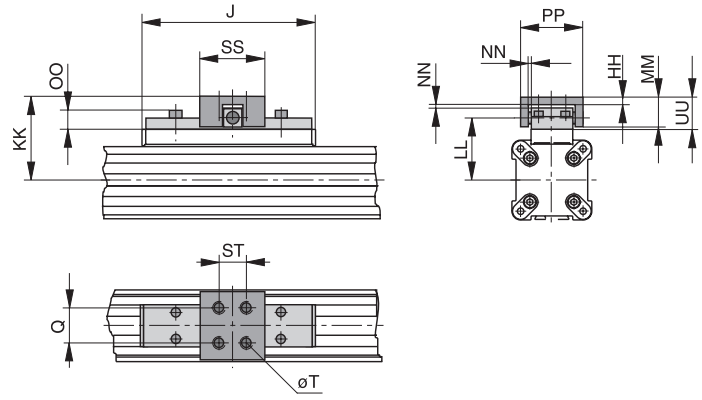


Please note:
When using additional inversion mountings, take into account the dimensions in page 28.

Series OSP-P16 to 32



Series OSP-P40 to 80



Dimension (mm)

Series	J	Q	T	ø R	HH	KK	LL	MM	NN*	OO	PP	SS	ST	TT	UU	Part Number Standard	Part Number Stainless
OSP-P16	69	10	M4	4.5	3	34	26.6	10	1	8.5	26	28	20	10	11	**20462FIL**	**20463FIL**
OSP-P25	117	16	M5	5.5	3.5	52	39	19	2	9	38	40	30	16	21	**20005FIL**	**20092FIL**
OSP-P32	152	25	M6	6.6	6	68	50	28	2	13	62	60	46	40	30	**20096FIL**	**20094FIL**
OSP-P40	152	25	M6	–	6	74	56	28	2	13	62	60	46	–	30	**20024FIL**	**20093FIL**
OSP-P50	200	25	M6	–	6	79	61	28	2	13	62	60	46	–	30	**20097FIL**	**20095FIL**
OSP-P63	256	37	M8	–	8	100	76	34	3	17	80	80	65	–	37	**20466FIL**	**20467FIL**
OSP-P80	348	38	M10	–	8	122	96	42	3	16	88	90	70	–	42	**20477FIL**	**20478FIL**

* Dimension NN gives the possible plus and minus play in horizontal and vertical movement, which also makes tilting sideways possible.

Inversion Mount ø 16 to 80mm

For Linear-drive

- Series OSP-P

In dirty environments, or where there are special space problems, inversion of the cylinder is recommended.

The inversion bracket transfers the driving force to the opposite side of the cylinder. The size and position of the mounting holes are the same as on the standard cylinder.

Please note:

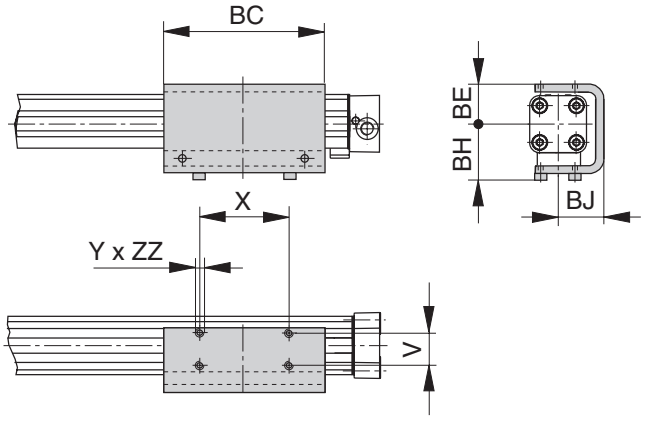
Other components of the OSP system such as mid-section supports, magnetic switches and the external air passage for the P16, can still be mounted on the free side of the cylinder.

When combining single end porting with inversion mountings, RS magnetic switches can only be mounted directly opposite to the external air-supply profile.

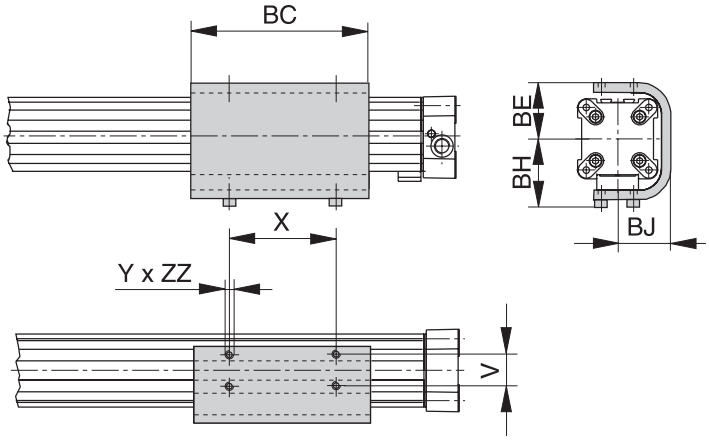
Important Note:

May be used in combination with Clevis Mounting, reference dimensions in pages G32-G33.

Series OSP-P16 to 32



Series OSP-P40 to 80



Dimension (mm)

Series	V	X	Y	BC	BE	BH	BJ	ZZ	Part Number
OSP-P16	16.5	36	M4	69	23	33	25	4	**20446FIL**
OSP-P25	25	65	M5	117	31	44	33.5	6	**20037FIL**
OSP-P32	27	90	M6	150	38	52	39.5	6	**20161FIL**
OSP-P40	27	90	M6	150	46	60	45	8	**20039FIL**
OSP-P50	27	110	M6	200	55	65	52	8	**20166FIL**
OSP-P63	34	140	M8	255	68	83.5	64	10	**20459FIL**
OSP-P80	36	190	M10	347	88	107.5	82	15	**20490FIL**

End Cap Mounting ø 10 to 80mm

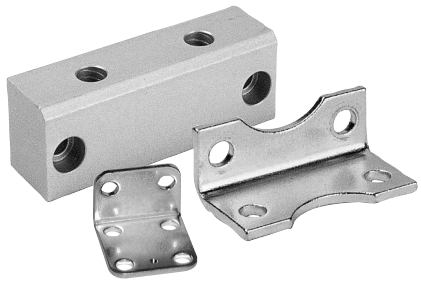
OSP

For Linear-drive

- Series OSP-P

On the end-face of each end cap there are four threaded holes for mounting the actuator.

The hole layout is square, so that the mounting can be fitted to the bottom, top or either side, regardless of the position chosen for the air connection.



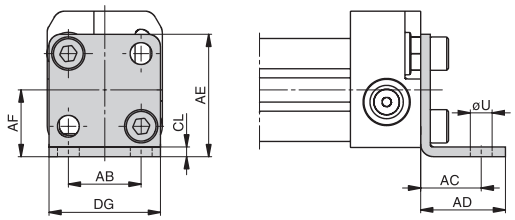
Material:

Series OSP-P10 – P32: Galvanized steel.

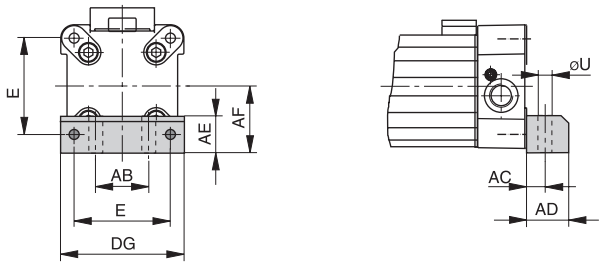
Series OSP-P40 – P80: Anodized aluminum.

The mountings are supplied in pairs.

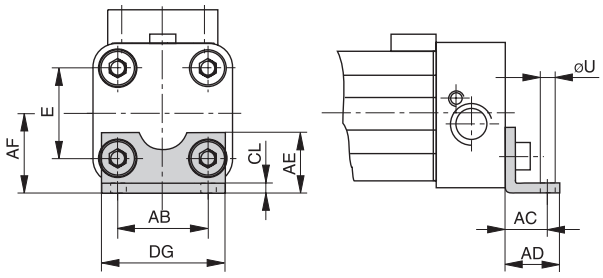
Series OSP-P10: Type A1



Series OSP-P40 to 80: Type C1



Series OSP-P16 to 32: Type A1



Dimension (mm)

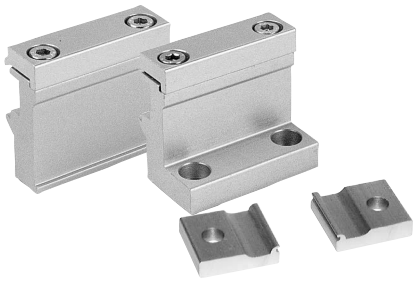
Series	E	ØU	AB	AC	AD	AE	AF	CL	DG	Part Number (pair) Type A1	Type C1
OSP-P10	-	3.6	12	10	14	20.2	11	1.6	18.4	**0240**	–
OSP-P16	18	3.6	18	10	14	12.5	15	1.6	26	**20408FIL**	–
OSP-P25	27	5.8	27	16	22	18	22	2.5	39	**2010**	–
OSP-P32	36	6.6	36	18	26	20	30	3	50	**3010**	–
OSP-P40	54	9	30	12.5	24	24	38	–	68	–	**4010FIL**
OSP-P50	70	9	40	12.5	24	30	48	–	86	–	**5010FIL**
OSP-P63	78	11	48	15	30	40	57	–	104	–	**6010FIL**
OSP-P80	96	14	60	17.5	35	50	72	–	130	–	**8010FIL**

Mid-Section Support ø 10 to 80mm

For Linear-drive

- Series OSP-P

OSP



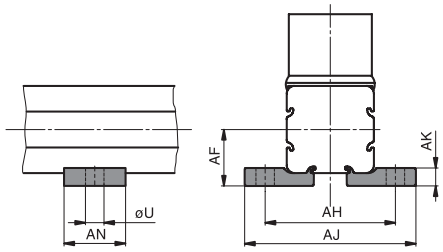
Note on Types E1 and D1 (P16 – P80):

The mid-section support can also be mounted on the underside of the actuator, in which case its distance from the center of the actuator is different.

Stainless steel version on demand.

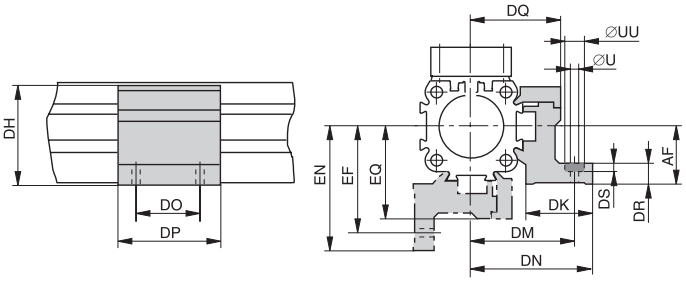
Series OSP-10, Type E1

(Mounting from above / below using a cap screw)



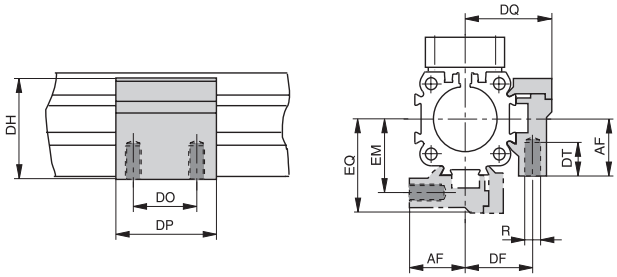
Series OSP-P16 to P80: Type E1

(Mounting from above / below using a cap screw)



Series OSP-16 to 80, Type D1

(Mountings from below with 2 screws)



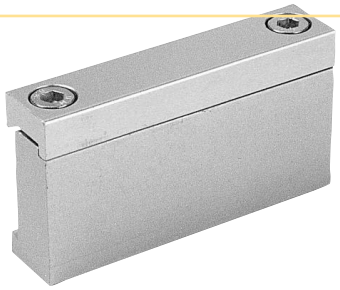
Dimension (mm)

Series	U	AF	AH	AJ	AK	AN	Part Number Type E1	Part Number Type D1
OSP-P10	3.6	11	25.4	33.4	3.5	12	0250	–

Series	R	U	UU	AF	DF	DH	DK	DM	DN	DO	DP	DQ	DR	DS	DT	EF	EM	EN	EQ	Part Number Type E1	Part Number Type D1
OSP-P16	M3	3.4	6	15	20	29.2	24	32	36.4	18	30	27	6	3.4	6.5	32	20	36.4	27	20435FIL	20434FIL
OSP-P25	M5	5.5	10	22	27	38	26	40	47.5	36	50	34.5	8	5.7	10	41.5	28.5	49	36	20009FIL	20008FIL
OSP-P32	M5	5.5	10	30	33	46	27	46	54.5	36	50	40.5	10	5.7	10	48.5	35.5	57	43	20158FIL	20157FIL
OSP-P40	M6	7	–	38	35	61	34	53	60	45	60	45	10	–	11	56	38	63	48	20028FIL	20027FIL
OSP-P50	M6	7	–	48	40	71	34	59	67	45	60	52	10	–	11	64	45	72	57	20163FIL	20162FIL
OSP-P63	M8	9	–	57	47.5	91	44	73	83	45	65	63	12	–	16	79	53.5	89	69	20452FIL	20451FIL
OSP-P80	M10	11	–	72	60	111.5	63	97	112	55	80	81	15	–	25	103	66	118	87	20482FIL	20480FIL

Adaptor Profile ø 16 to 50mm

OSP



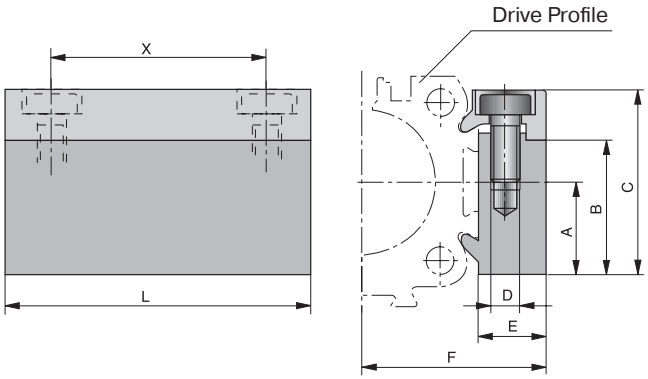
For Linear-drive

- Series OSP-P

Adaptor Profile OSP

- A universal attachment for mounting of valves etc.

Solid material



Dimension (mm)

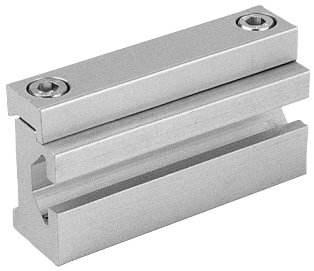
Series	A	B	C	D	E	F	L	X	Part Number Standard	Part Number Stainless
OSP-P16	14	20.5	28	M3	12	27	50	38	**20432FIL**	**20438FIL**
OSP-P25	16	23	32	M5	10.5	30.5	50	36	**20006FIL**	**20186FIL**
OSP-P32	16	23	32	M5	10.5	36.5	50	36	**20006FIL**	**20186FIL**
OSP-P40	20	33	43	M6	14	45	80	65	**20025FIL**	**20267FIL**
OSP-P50	20	33	43	M6	14	52	80	65	**20025FIL**	**20267FIL**

T-Slot Profile ø 16 to 50mm

For Linear-drive

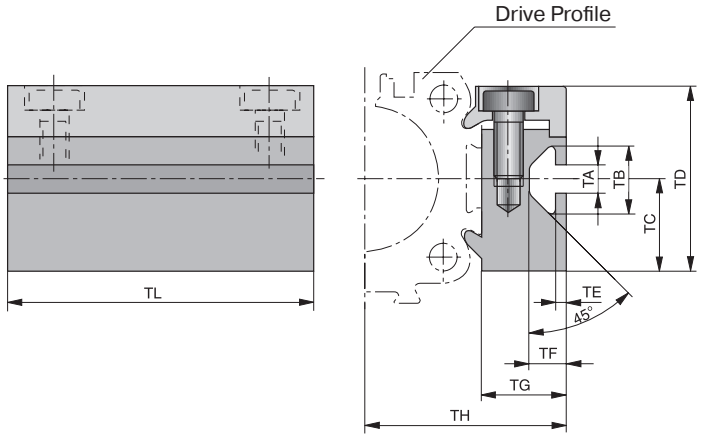
- Series OSP-P

OSP



T-Slot Profile OSP

- A universal attachment for mounting with standard T-Nuts



Dimension (mm)

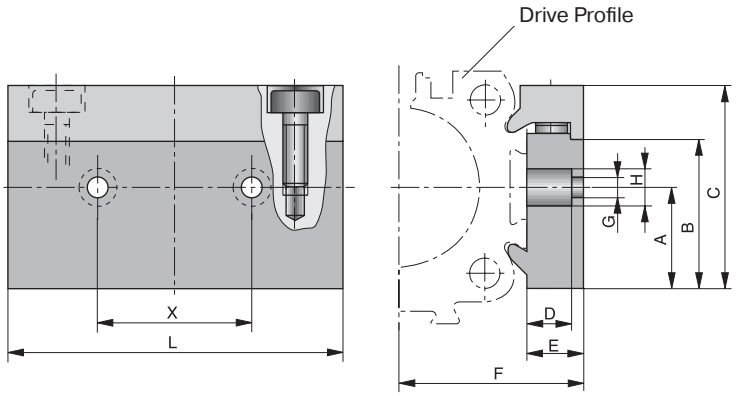
Series	TA	TB	TC	TD	TE	TF	TG	TH	TL	Part Number Standard	Part Number Stainless
OSP-P16	5	11.5	14	28	1.8	6.4	12	27	50	**20433FIL**	**20439FIL**
OSP-P25	5	11.5	16	32	1.8	6.4	14.5	34.5	50	**20007FIL**	**20187FIL**
OSP-P32	5	11.5	16	32	1.8	6.4	14.5	40.5	50	**20007FIL**	**20187FIL**
OSP-P40	8.2	20	20	43	4.5	12.3	20	51	80	**20026FIL**	**20268FIL**
OSP-P50	8.2	20	20	43	4.5	12.3	20	58	80	**20026FIL**	**20268FIL**

Connection Profile ø 16 to 50mm

For combining

- Series OSP-P with system profiles
- Series OSP-P with Series OSP-P

OSP

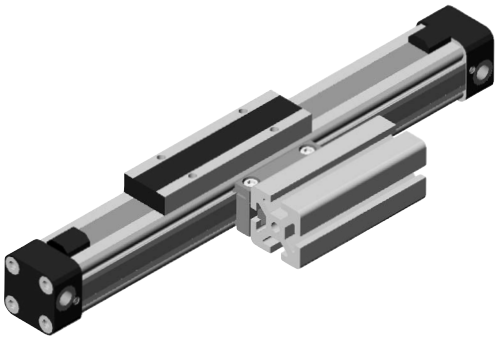


Dimension (mm)

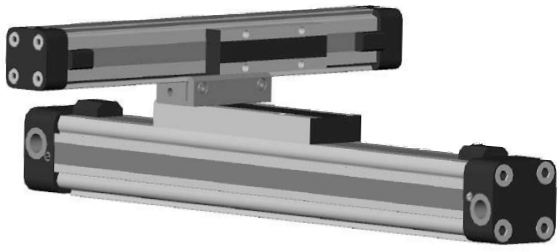
Cylinder Series	For Mounting on the Carrier of	A	B	C	D	E	F	G	H	L	X	Part Number
OSP-P16	OSP25	14	20.5	28	8.5	12	27	5.5	10	50	25	**20849FIL**
OSP-P25	OSP32-50	16	23	32	8.5	10.5	30.5	6.6	11	60	27	**20850FIL**
OSP-P32	OSP32-50	16	23	32	8.5	10.5	36.5	6.6	11	60	27	**20850FIL**
OSP-P40	OSP32-50	20	33	43	8	14	45	6.6	11	60	27	**20851FIL**
OSP-P50	OSP32-50	20	33	43	8	14	52	6.6	11	60	27	**20851FIL**

Possible Combinations

Combination of Series OSP-P with system profiles



Combination of Series OSP-P with Series OSP-P



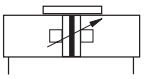
Clean Room Cylinder ø 16 – 32 mm Rodless Cylinder certified to DIN EN ISO 14644-1

Standard Features:

- Double-acting with adjustable end cushioning
- With magnetic piston for position sensing
- Clean Room classification
  ISO Class 4 at vm = 0.14 m/s
  ISO Class 5 at vm = 0.5 m/s
- Suitable for smooth slow speed operation up to vmin = 0.005 m/s
- Optional stroke length up to 1200mm (longer strokes on request)
- Low maintenance
- Compact design with equal force and velocity in both directions
- Aluminum piston with bearing rings to support high direct and cantilever loads
- Stainless steel screws

Optional Features:

- Slow speed lubrication
- Fluorocarbon (FKM) seals



OSP

Operating Information

Operating pressure:	116 PSIG (8 bar)
Temperature range:	14°F to 176°F (10°C to 80°C)
Filtration requirements:	Filtered, nonlubricated compressed air

Specifications

• Type	Rodless cylinder
• Series	OSP-P
• Stroke length	5.5m (216 inches)
• System	Double-acting, with cushioning, position sensing capability
• Mounting	See drawings
• Air connection	Threaded
• Weight (mass)	See table
• Installation	In any position
• Lubrication	Prelubricated at the factory (additional oil mist lubrication not required)
• Option:	special slow speed grease

Material specifications

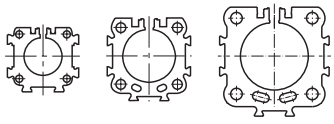
Cylinder profile	Anodized aluminum
Carrier (piston)	Anodized aluminum
End caps	Aluminum, lacquered
Sealing bands	Corrosion resistant steel
Seals	NBR (Option: Fluorocarbon)
Screws	Stainless steel
Covers	Anodized aluminum
Guide plate	Plastic

Weight (mass) kg

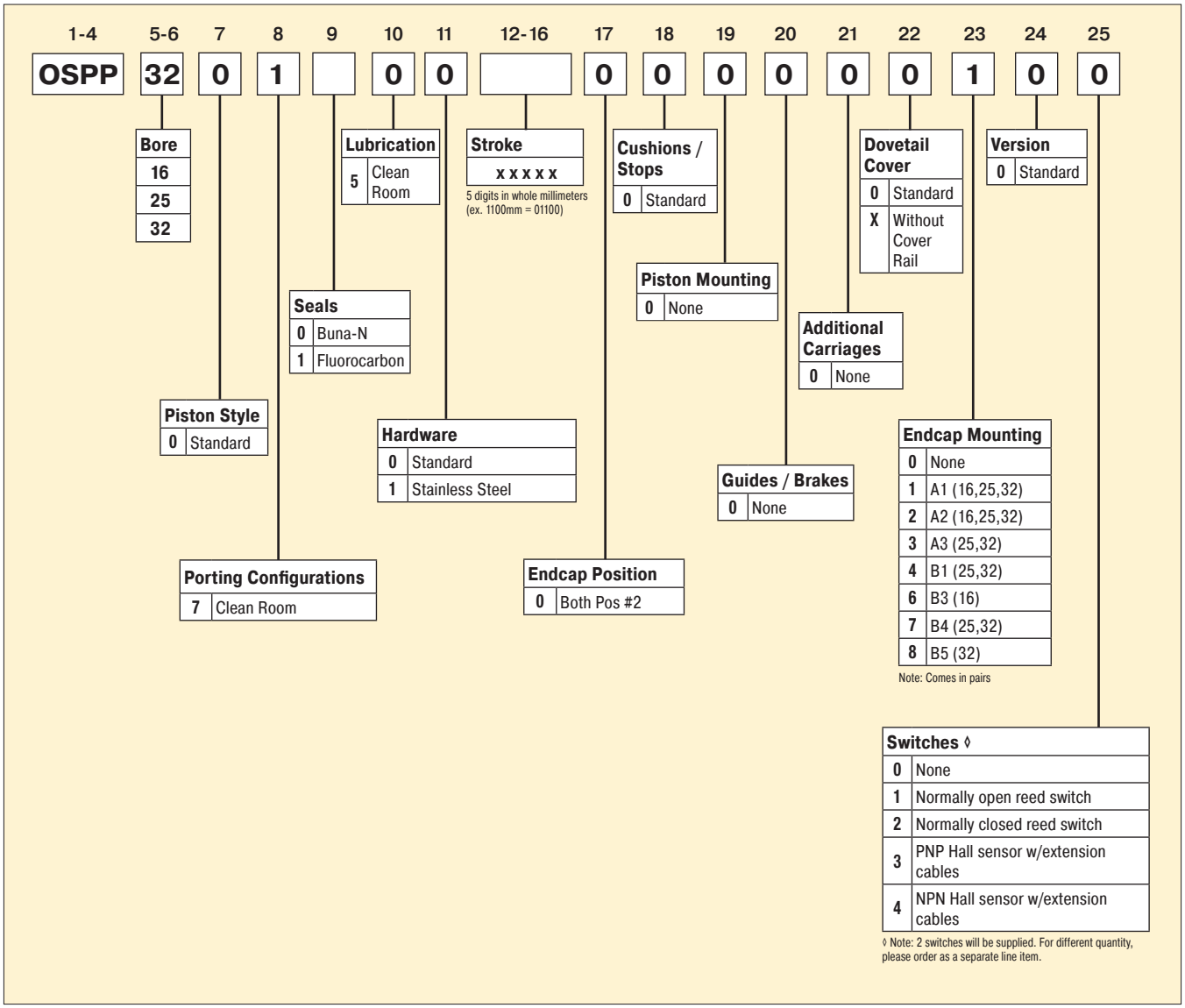
Cylinder Series (Basic cylinder)	Weight (Mass) kg	
	at 0mm Stroke	Per 100mm Stroke
OSP-P16	0.22	0.1
OSP-P25	0.65	0.197

Size Comparison

P16 P25 P32

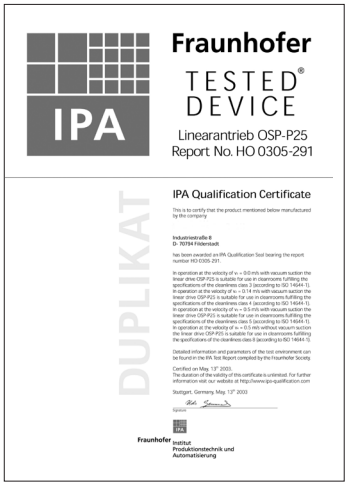


Ordering information for OSP-P rodless Clean Room pneumatic series



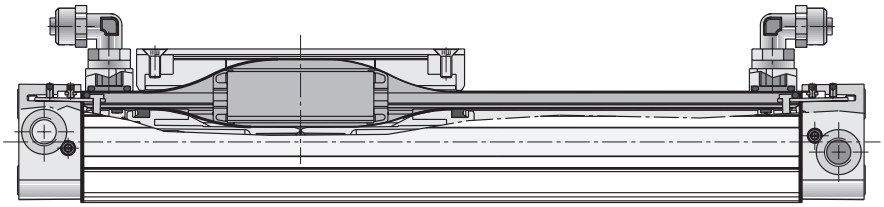
Certification

Based on the Parker's rodless cylinder, proven in world wide markets, Parker now offers the only rodless cylinder on the market with a certification from IPA Institute for the clean room specification according to DIN EN ISO 14644-1.



Function

The clean room cylinders of the OSP-P combines the efficiency of the slot seal system with vacuum protection against progressive wear and contamination from the sliding components. A partial vacuum drawn between inner and outer sealing bands prevents emission into the clean room. To achieve the necessary vacuum a suction flow of ca. 4 m^3/h is required.

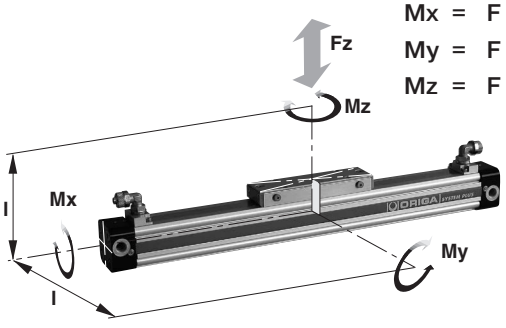


Loads, Forces and Moments

Cylinder Series (mm Ø)	Effective Force at 6 bar (N)	Max. Moment Mx (Nm)	My (Nm)	Mz (Nm)	Max. Load Fz (N)	Cushion Length (mm)
OSP-P16	78	0.45	4	0.5	120	11
OSP-P25	250	1.5	15	3.0	300	17
OSP-P32	420	3.0	30	5.0	450	20

Load and moment data are based on speeds v ⩽ 0.2 m/s.
The adjacent table shows the maximum values for light, shock-free operation which must not be exceeded even in dynamic operation.

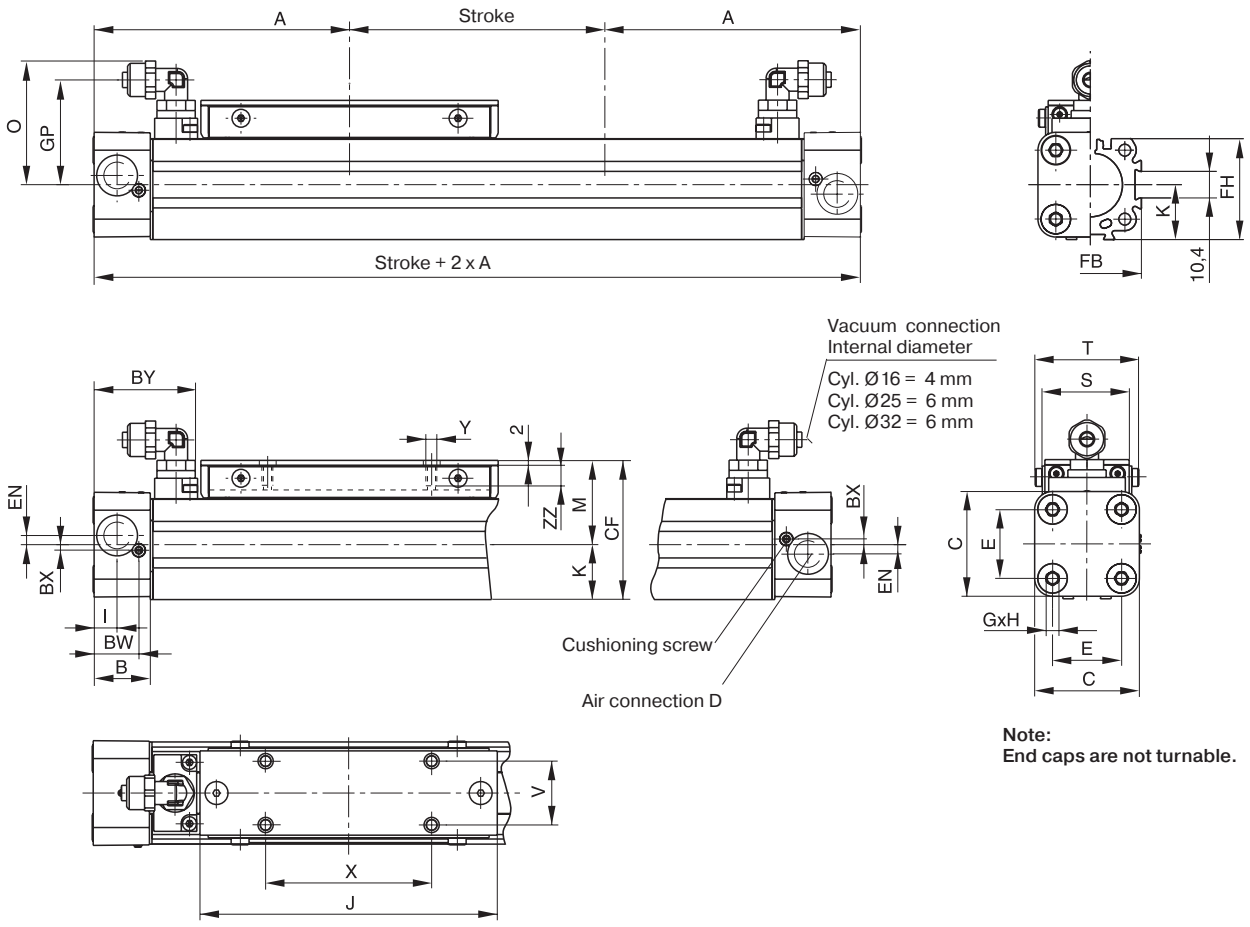
$Mx = F \cdot l$
$My = F \cdot l$
$Mz = F \cdot l$



For inventory, lead times, and kit lookup, visit www.pdnplu.com

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Clean Room Cylinders ø 16-32 mm



Note:
End caps are not turnable.

Dimension (mm)

Series	A	B	C	D	E	G	H	I	J	K	M	O	S
OSP-P16	65	14	30	M5	18	M3	9	5.5	69	15	25	31	24
OSP-P25	100	22	41	G1/8	27	M5	15	9	117	21.5	33	48.5	35
OSP-P32	125	25.5	52	G1/4	36	M6	15	11.5	152	28.5	40	53.6	38

Series	T	V	X	Y	BW	BX	BY	CF	EN	FB	FH	GP	ZZ
OSP-P16	29.6	16.5	36	M4	10.8	1.8	28.5	40	3	30	27.2	25.7	7
OSP-P25	40.6	25	65	M5	17.5	2.2	40.5	54.5	3.6	40	39.5	41	8
OSP-P32	45	27	90	M6	20.5	2.5	47.1	68.5	5.5	52	51.7	46.2	10

Synchronized Bi-Parting movements Type OSP-P40-SL-BP for Rodless Cylinder ø 40mm

Standard Features:

- Accurate bi-parting movement through toothed belt synchronization
- Optimum slow speed performance
- Increased action force
- Anodized aluminum guide rail with prism-form slideway arrangement
- Adjustable polymer slide units
- Combined sealing system with
- polymer and felt elements to remove dirt and lubricate the slideway
- Integrated grease nipples for guide lubrication
-

Applications:

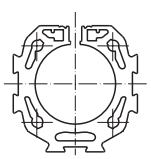
- Opening and closing operations
- Gripping of workpieces – outside
- Gripping of hollow workpieces – inside
- Gripping underneath larger objects
- Clamping force adjustable via pressure regulator

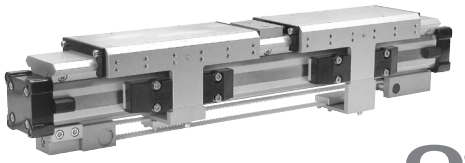
Specifications

- Type: Rodless cylinder for synchronized bi-parting movements
- Series: OSP-P
- System: Double-acting, with end cushioning, for contactless position sensing
- Guide: Slideline SL40
- Synchronization: Toothed belt
- Mounting: See drawing
- Weight (mass): See table
- Lubrication: Special slow speed grease (additional oil mist lubrication not required)
- Cushioning middle position: Elastic buffer
- Maximum speed: 0.2 m/s V_{max}
- Maximum stroke of each stroke: 500 mm
- Maximum mass per guide carrier
  - lateral moment: 25 Nm Mx_{max}
  - axial moment: 46 Nm My_{max}
  - rotating moment: 46 Nm Mz_{max}
- Option: special slow speed grease

Size

P40





OSP

Operating Information

Operating pressure:	116 PSIG (8 bar)
Temperature range:	14°F to 140°F (-10°C to 60°C)
Filtration requirements:	Filtered, nonlubricated compressed air

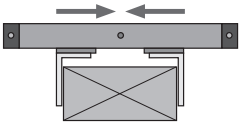
Material specifications

Belt wheel	Aluminum
Toothed belt	Steel-corded polyurethane

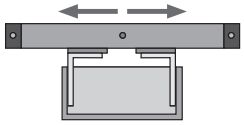
Weight (mass) kg

Cylinder Series (Basic cylinder)	Weight (Mass) kg	
	at 0mm Stroke	per 100mm Stroke
OSP-P40-SL-BP	10.334	2.134

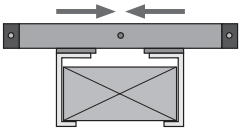
Applications



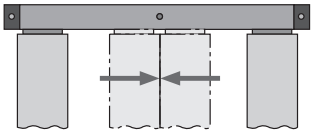
Gripping – outside



Gripping – inside



Gripping – underneath



Door opening and closing

Ordering information for OSP-P rodless Bi-Parting pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	40	0	1	0	0	0		0	0	0	0	0	0	1	0	0

Bore

40

Piston Style

N	Bi-Parting

Porting Configurations

0	Standard
1	End Face
3	Left Std Pos #2, Right Pos #5
4	Left Pos #5, Right Std Pos #2
6	Single End Porting at #5

Seals

0	Standard

Lubrication

0	Standard

Hardware

0	Standard
1	Stainless Steel

Stroke†

x x x x x

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushions / Stops

0	Standard

Piston Mounting

0	None

Guides / Brakes

0	None

Additional Carriages

0	None

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
A	C2
B	C3
C	C4

Note: Comes in pairs

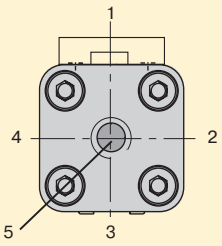
Version

0	Standard

Switches ◊

0	None
1	Normally Open Reed Switch
2	Normally Closed Reed Switch
3	Pnp Hall Sensor w/Extension Cables
4	Npn Hall Sensor w/Extension Cables

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.



Note: Position #2 is the standard location.

† Reference Cylinder Stroke and Dead Length A, pages 16-17 for stroke consideration because of the use of two pistons.

Function:

The OSP-P40-SL-BP bidirectional linear drive is based on the OSP-P40 rodless pneumatic cylinder and adapted SLIDELINE SL40 polymer plain-bearing guides.

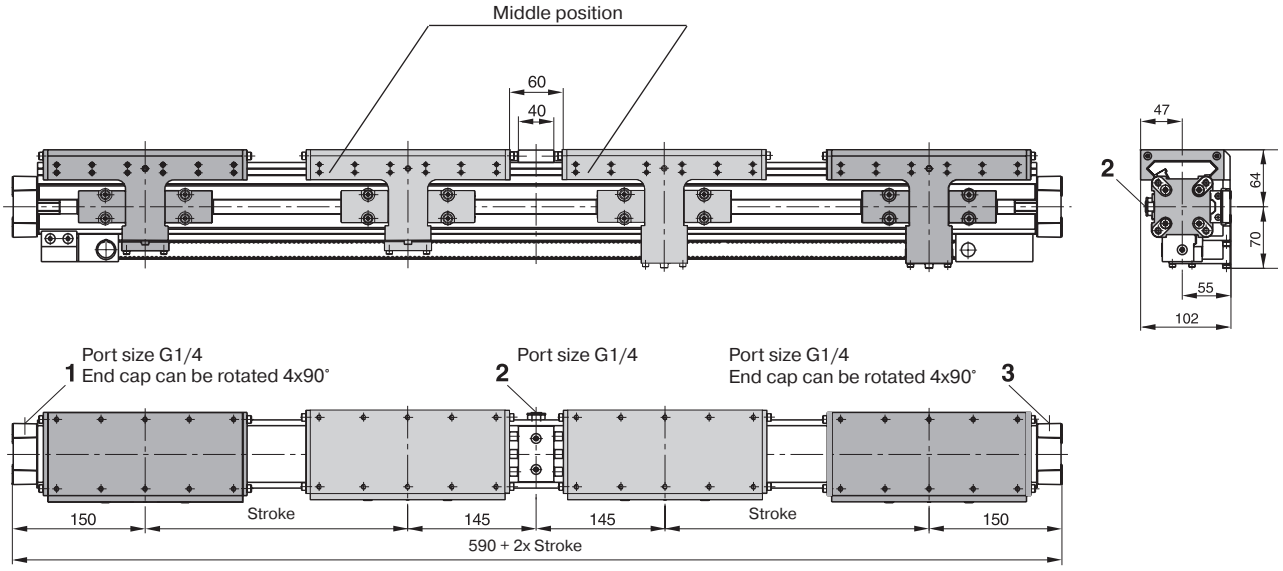
Two pistons in the cylinder bore are connected via yokes and carriers to the SLIDELINE guide carriers, which handle the forces and moments generated.

The bi-parting movements of the guide carriers are accurately synchronized by a recirculating toothed belt.

The two pistons are driven from the middle to the end positions via a common G1/4 air connection in the middle of the cylinder, and are driven from the end positions to the middle via an air connection in each end cap.

End position cushioning is provided by adjustable air cushioning in the end caps, and middle position cushioning by rubber buffers.

Dimensions (mm)



Air connections:

To drive the guide carriers to the middle position: pressurize ports 1 and 3.

To drive the guide carriers to the end positions: pressurize port 2.

For more dimensions see pages 18 and 19.

Linear Guides for OSP-P Series

OSP

Adaptive modular system

The OSP Series provides a comprehensive range of linear guides for the pneumatic OSP-P.

Advantages:

- Takes high loads and forces
- High precision
- Smooth operation
- Can be retrofitted
- Can be installed in any position

Series OSP-P - Standard

- Piston diameters 10 to 80mm

SLIDELINE

- The cost-effective plain bearing guide for medium loads.
- Active/ Passive Brake optional.
- Piston diameters 16 to 80mm

POWERSLIDE

- The roller guide for heavy loads and hard application conditions
- Piston diameters 16 to 50mm

PROLINE

- The compact aluminum oller guide for high loads and velocities.
- Active / Passive Brake optional.
- Piston diameters 16 to 50mm

STARLINE

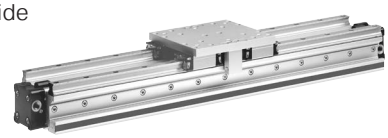
- Recirculating ball bearing guide for very high loads and precision
- Piston diameters 16 to 50mm

KF GUIDE

- Recirculating ball bearing guide for highest loads and precision.
- Correspond to FESTO dimensions (Type DGPL-KF)
- Piston diameters 16 to 50mm

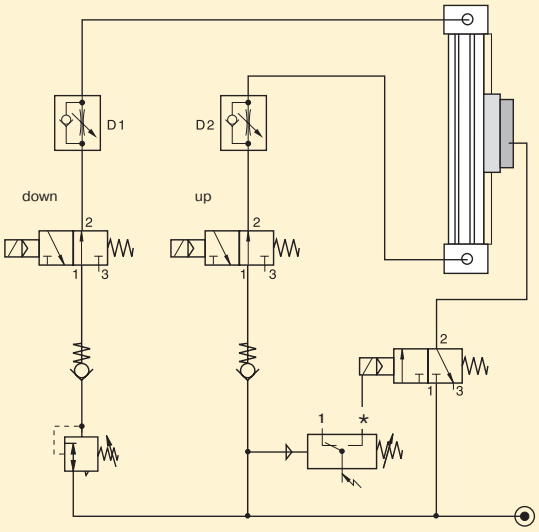
HD HEAVY DUTY GUIDE

- The ball bushing guide for the heavy loads and greatest accuracy.
- Piston diameters 25 to 50mm

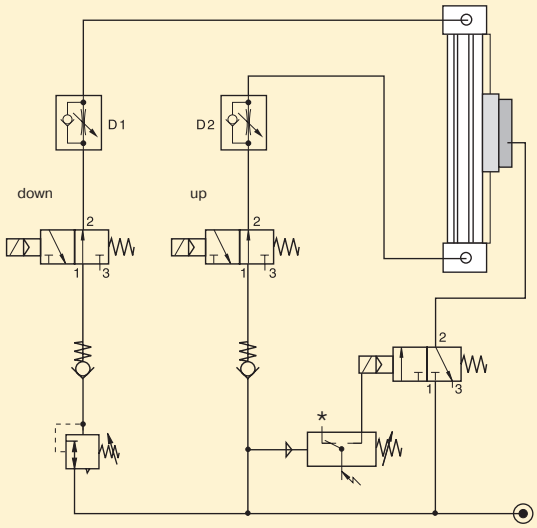


Application Example - Vertical Application

Control of a cylinder with 3/2 way valves. Basic position – exhausted



Control of a cylinder with 3/2 way valves. Basic position – pressurized



Control Examples

Under normal operating circumstances the pressure switch is closed and the air flows through the 3/2 way solenoid valves from port 1 to 2, thus lifting the brake from the rail (operating condition).

The brake is pressurized by means of a 3/2 way valve in combination with a pressure switch. When there is a pressure loss, the brake is actuated by the pressure switch.

When the air pressure is restored to both cylinder chambers, the brake is lifted and the linear drive can be moved again.

The speed regulating valves D1 and D2 control the speed of the linear drive, and have no influence on the brake. The two non-return valves give the system a higher stability.

The pressure regulating valve is used to compensate for the downward force in this vertical application.

Please note:

Before the brake is lifted, make sure that both air chambers of the linear drive are pressurized.

Small diameter tubing, fittings and valves with a nominal diameter, and tubing that is too long all change the reaction time of the brake!

* Tip:

The pressure switch actuates the brake when the pressure drops below the set value.

For accessories, such as tubing and fittings, please refer to our separate catalog.

Required Components

- Three, Three-Way Valves
- Port size
  M5, G1/8, G1/4, G1/2
- Pressure Regulator
  G1/8 - G3/8
- Pneumatic Accessories
- P/E-Switch
- Check Valves
  G1/8 - G3/8
- Flow Control Valves
  M5 - G1/4

Contact factory for literature on the above valves/accessories

SLIDELINE, Plain Bearing Guide SL ø 16 to 80mm bore

For Linear-drive

OSP

- Series OSP-P

Features

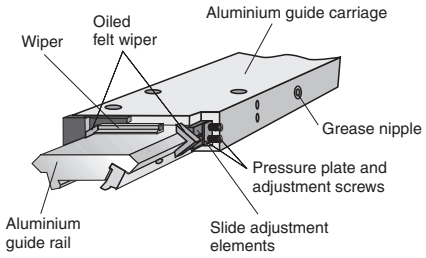
- Maximum speed < 1 m/s
- Adjustable plastic slide elements – optional with integral brake
- Composite sealing system with plastic and felt wiper elements to remove dirt and lubricate the slideways
- Corrosion resistant version available on request
- Any length of stroke up to 5500mm (longer strokes on request)

Integrated Brake (optional) for series OSP-P25 to OSP-P50:

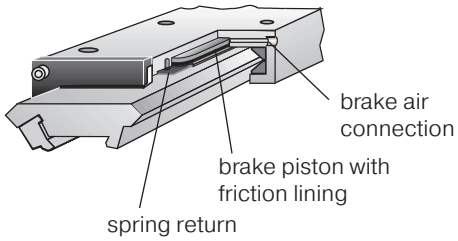
- Actuated by pressure
- Released by exhausting and spring return

For further technical data see also

- linear drives OSP-P, see page 14.



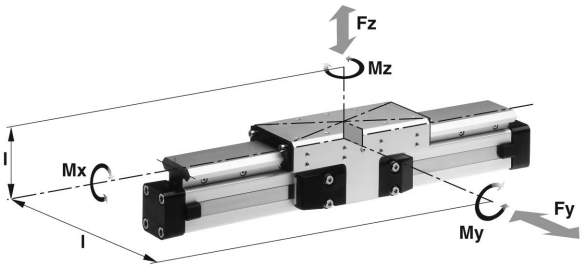
Option – Integrated Brake



Loads, Forces and Moments

The table shows the maximum permissible values for smooth operation, which should not be exceeded even under dynamic conditions.

The load and moment figures apply to speeds v < 0.2 m/s.



Series	For Linear Drive	Max. Moments (Nm)			Max. Loads (N)	Maximum Braking Force a 6 Bar (N)†	Mass of Linear Drive with Guide (kg)		
		Mx	My	Mz	Fy, Fz		With 0mm stroke	Increase per 100mm Stroke	Mass * of Guide Carriage (kg)
SL16	OSP-P16	6	11	11	325	–	0.57	0.22	0.23
SL25	OSP-P25	14	34	34	675	325	1.55	0.39	0.61
SL32	OSP-P32	29	60	60	925	545	2.98	0.65	0.95
SL40	OSP-P40	50	110	110	1500	835	4.05	0.78	1.22
SL50	OSP-P50	77	180	180	2000	1200	6.72	0.97	2.06
SL63	OSP-P63	120	260	260	2500	–	11.66	1.47	3.32
SL80	OSP-P80	120	260	260	2500	–	15.71	1.81	3.32

* Add the mass of the guide carriage to the mass to be cushioned.
† Only with integrated brake: Braking force on dry oil-free surface values are decreased for lubricated slideways.

Ordering information for OSP-P rodless SLIDELINE pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1	0	0	0		0	0	0	0	0	0	1	0	0

Bore

16
25
32
40
50
63
80

Piston Style

0	Standard
1	Tandem

Porting Configurations†

0	Standard
1	End Face (16,25,32,40,50,63,80)
2	Single End Porting (25,32,40,50,63,80)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50,63,80)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50,63,80)
6	Single End Porting at #5 (50,63,80)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard
1	Slow Speed

Hardware

0	Standard
1	Stainless Steel

Stroke

x x x x x

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushioning & Stops

0	Standard
1	Long Cushions (25,32,40)

Piston Mounting

0	None

Guides / Brakes

2	Slideline Guide
3	Slideline with Activebrake (SL-AB)
4	Slideline with Passive Multibrake (SL-MB)

Additional Carriages**

0	None
2	Slideline Guide
M	Guide Carriage without Brake Function

**Note: Available on tandem piston only

Dovetail Cover

0	Standard

Endcap Mounting

0	None
1	A1 (16,25,32)
2	A2 (16,25,32)
3	A3 (25,32)
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50,63,80)
A	C2 (40,50,63,80)
B	C3 (40,50,63,80)
C	C4 (40,50,63,80)

Note: Comes in pairs

Version

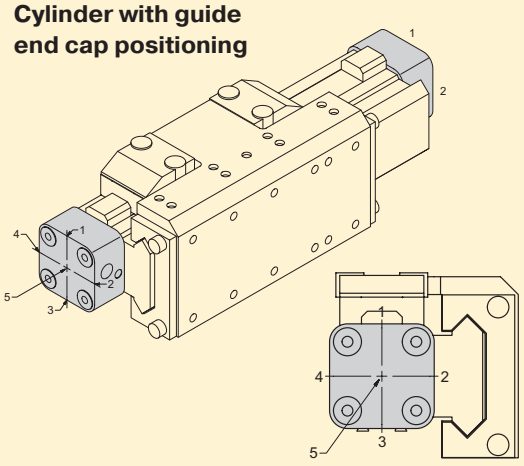
0	Standard

Switches ◊

0	None
1	Normally Open Reed Switch (16 thru 80)
2	Normally Closed Reed Switch (16 thru 80)
3	PNP Hall Sensor w/ Extension Cables (16 thru 80)
4	NPN Hall Sensor w/ Extension Cables (16 thru 80)

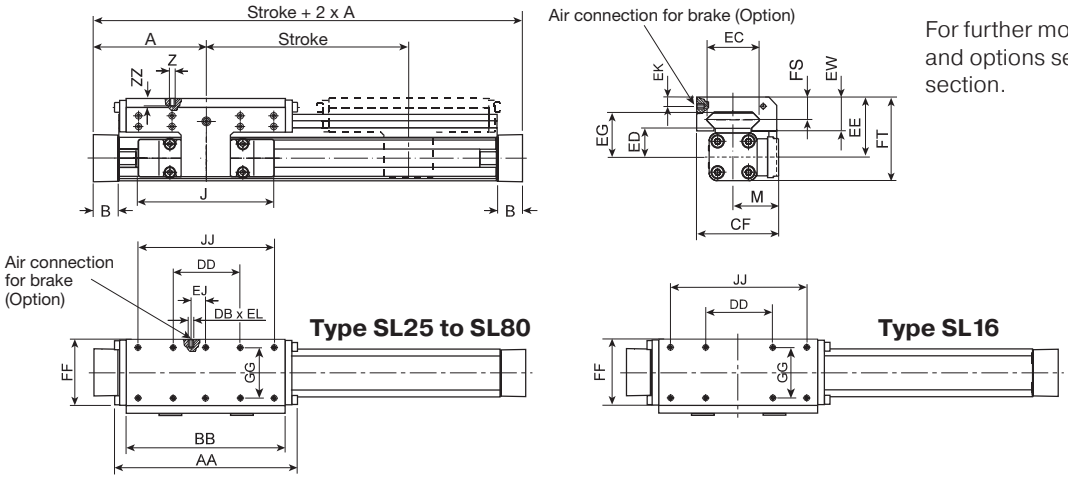
◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.

Cylinder with guide end cap positioning



Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

SLIDELINE ø 16 to 80mm



For further mounting accessories and options see accessories section.

Dimensions (mm)

Series	A	B	J	M	Z	AA	BB	DB	DD	CF	EC	ED	EE	EG	EJ	EK	EL	EW	FF	FT	FS	GG	JJ	ZZ
SL16	65	14	69	31	M4	106	88	–	30	55	36	8	40	30	–	–	–	22	48	55	14	36	70	8
SL25	100	22	117	40.5	M6	162	142	M5	60	72.5	47	12	53	39	22	6	6	30	64	73.5	20	50	120	12
SL32	125	25.5	152	49	M6	205	185	M5	80	91	67	14	62	48	32	6	6	33	84	88	21	64	160	12
SL40	150	28	152	55	M6	240	220	M5	100	102	77	14	64	50	58	6	6	34	94	98.5	21.5	78	200	12
SL50	175	33	200	62	M6	284	264	M5	120	117	94	14	75	56	81	6	6	39	110	118.5	26	90	240	16
SL63	215	38	256	79	M8	312	292	–	130	152	116	18	86	66	–	–	–	46	152	139	29	120	260	14
SL80	260	47	348	96	M8	312	292	–	130	169	116	18	99	79	–	–	–	46	152	165	29	120	260	14

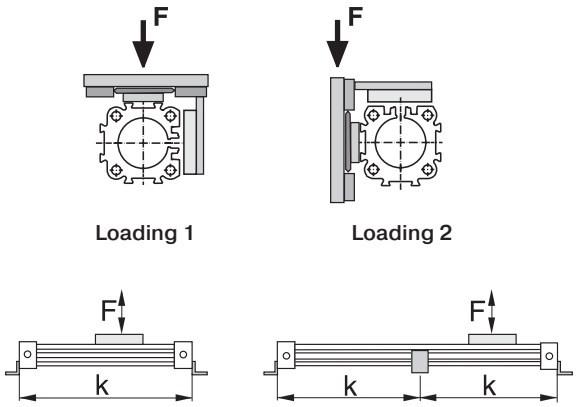
Mid-Section Support

(for versions see pages 80 to 83)

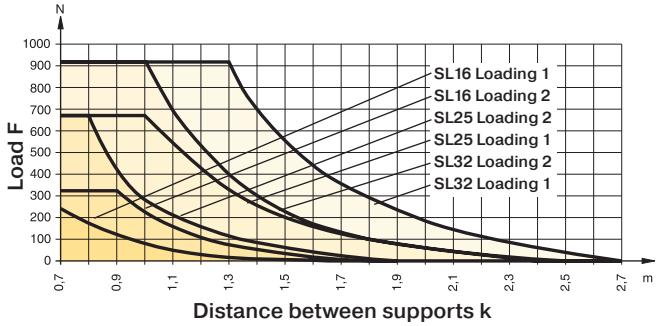
Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive. The diagrams show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2.

Deflection of 0.5 mm max. between supports is permissible.

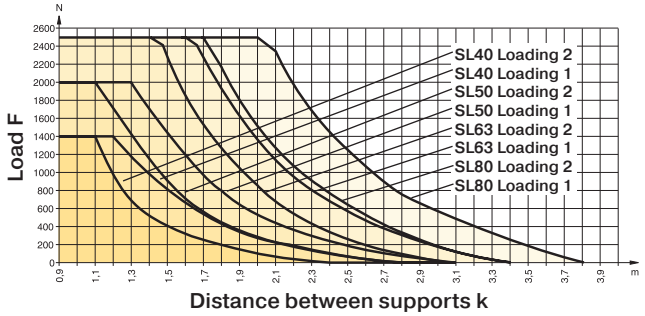
Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



SLIDELINE 16 to 32mm Bore



SLIDELINE 40 to 80mm Bore

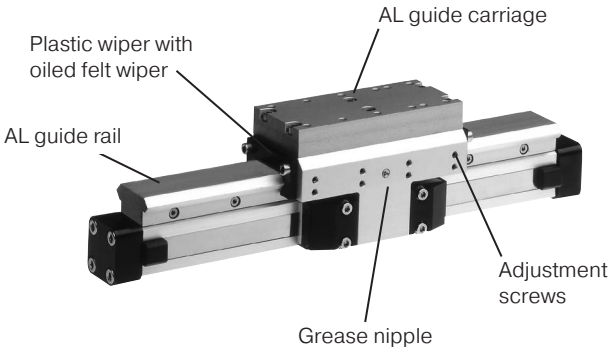


Multi-Brake Passive Brakes MB-SL ø 25 to 80mm bore

Series MB-SL 25 to 80 for Linear-drive

Series OSP-P

OSP



Features

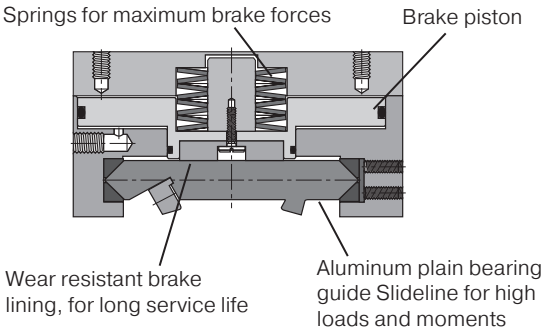
- Brake operated by spring actuation
- Brake release by pressurization
- Anodized aluminum rail, with prism shaped slide elements
- Adjustable plastic slide elements
- Composite sealing system with plastic and felt wiper elements to remove dirt and lubricate the slideway
- Replenishable guide lubrication by integrated grease nipples
- Blocking function in case of pressure loss

Intermediate stops possible

Function

The Multi-Brake is a passive device. When the air pressure is removed the brake is actuated and movement of the cylinder is blocked. The brake is released by pressurization.

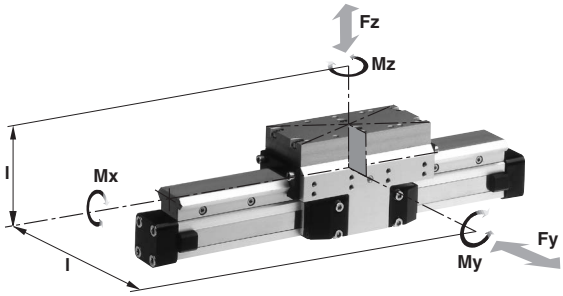
The high friction, wear resistant brake linings allow the Multi-Brake to be used as a dynamic brake to stop cylinder movement in the shortest possible time. The powerful springs also allow the Multi-Brake to be used effectively in positioning applications.



Loads, Forces and Moments

The table shows the maximum values for light, shock-free operation, which must not be exceeded even in dynamic operation.

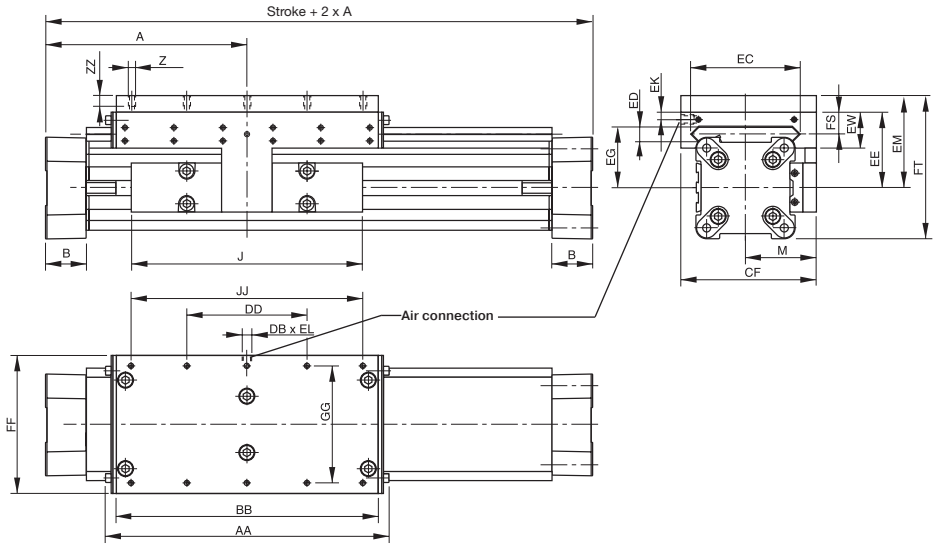
Load and moment data are based on speeds v < 0.2 m/s.



Series	For Linear Drive	Max. Moments (Nm)			Max. Loads (N)	Maximum Braking Force a 6 Bar (N) †	Mass of Linear Drive with Guide (kg)		
		Mx	My	Mz	Fy, Fz		With 0mm Stroke	Increase per 100mm Stroke	Mass * Guide Carriage (kg)
MB-SL25	OSP-P25	14	34	34	675	470	2.04	0.39	1.10
MB-SL32	OSP-P32	29	60	60	925	790	3.82	0.65	1.79
MB-SL40	OSP-P40	50	110	110	1500	1200	5.16	0.78	2.34
MB-SL50	OSP-P50	77	180	180	2000	1870	8.29	0.97	3.63
MB-SL63	OSP-P63	120	260	260	2500	2900	13.31	1.47	4.97
MB-SL80	OSP-P80	120	260	260	2500	2900	17.36	1.81	4.97

* Add the mass of the guide carriage to the mass to be cushioned.
† Braking surface dry – oil on the braking surface will reduce the raking force.

OSP-P with Passive Brake MB-SL



Dimension (mm)

Series	A	B	J	M	Z	AA	BB	DB	DD	CF	EC	ED	EE	EG	EK	EL	EM	EW	FF	FT	FS	GG	JJ	ZZ
MB-SL25	100	22	117	40,5	M6	162	142	M5	60	72.5	47	12	53	39	9	5	73	30	64	93.5	20	50	120	12
MB-SL32	125	25.5	152	49	M6	205	185	G1/8	80	91	67	14	62	48	7	10	82	33	84	108	21	64	160	12
MB-SL40	150	28	152	55	M6	240	220	G1/8	100	102	77	14	64	50	6.5	10	84	34	94	118.5	21.5	78	200	12
MB-SL50	175	33	200	62	M6	284	264	G1/8	120	117	94	14	75	56	10	12	95	39	110	138.5	26	90	240	12
MB-SL63	215	38	256	79	M8	312	292	G1/8	130	152	116	18	86	66	11	12	106	46	152	159	29	120	260	13
MB-SL80	260	47	348	96	M8	312	292	G1/8	130	169	116	18	99	79	11	12	119	46	152	185	29	120	260	13

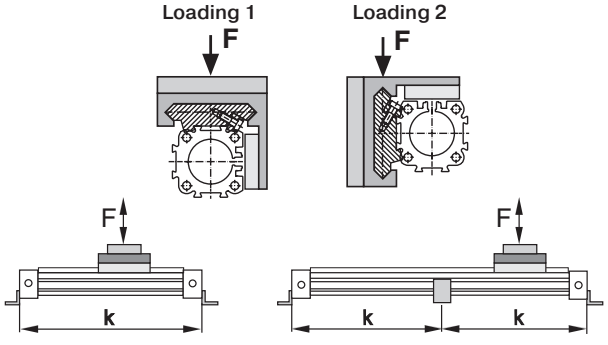
Mid-Section Support

(for versions see page 83)

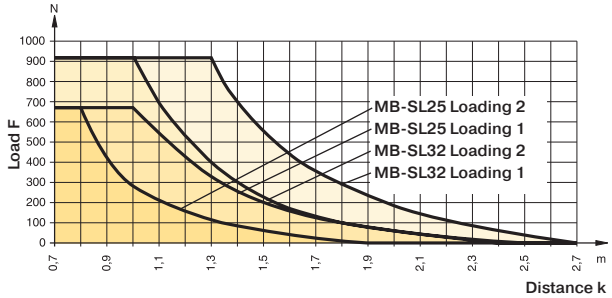
Mid-Section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive.

The diagrams show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2. Deflection of 0.5 mm max. between supports is permissible.

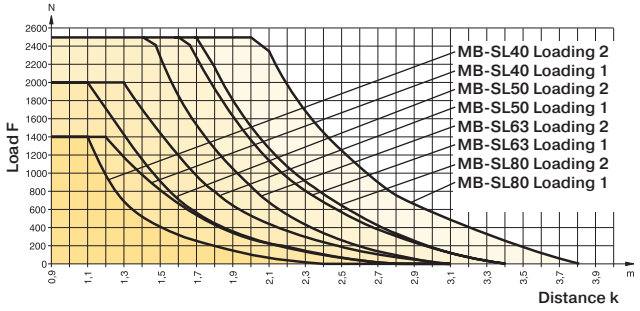
Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



Permissible Unsupported Length
MB-SL25, MB-SL32



Permissible Unsupported Length
MB-SL40, MB-SL50, MB-SL63 and MB-SL80



Multi-Brake Passive Brakes PS ø 16 to 50mm bore

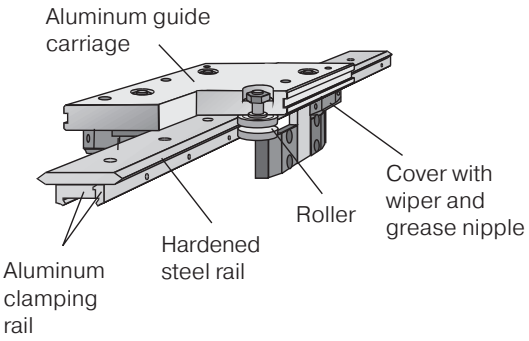
Series PS 16 to 50 for Linear-drive

OSP

- Series OSP-P

Features

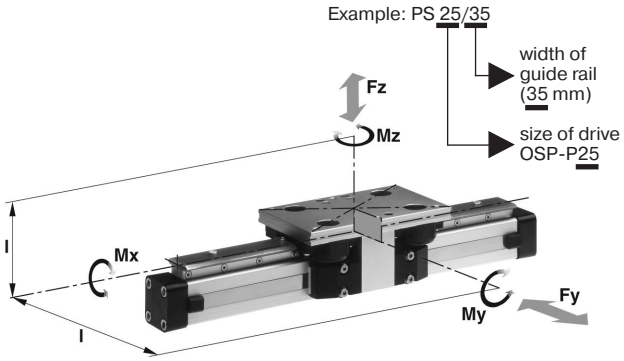
- Anodized aluminum guide carriage with vee rollers having 2 rows of ball bearings
- Hardened steel guide rail
- Several guide sizes can be used on the same drive
- Corrosion resistance version available on request
- Max. Speed v = 3 m/s
- Tough roller cover with wiper and grease nipple
- Any length of stroke up to 3500mm



Loads, Forces and Moments

The table shows the maximum permissible values for smooth operation, which should not be exceeded even under dynamic conditions.

For further information and technical data see linear drives OSP-P.



Series	For Linear Drive	Max. Moments (Nm) Mx	My	Mz	Max. Load (N) Fy, Fz	Mass of Linear Drive with Guide (kg) With 0mm Stroke	Increase per 100mm Stroke	Mass * of Guide Carriage (kg)
PS 16/25	OSP-P16	14	45	45	1400	0.93	0.24	0.7
PS 25/25	OSP-P25	14	63	63	1400	1.5	0.4	0.7
PS 25/35	OSP-P25	20	70	70	1400	1.7	0.4	0.8
PS 25/44	OSP-P25	65	175	175	3000	2.6	0.5	1.5
PS 32/35	OSP-P32	20	70	70	1400	2.6	0.6	0.8
PS 32/44	OSP-P32	65	175	175	3000	3.4	0.7	1.5
PS 40/44	OSP-P40	65	175	175	3000	4.6	1.1	1.5
PS 40/60	OSP-P40	90	250	250	3000	6	1.3	2.2
PS 50/60	OSP-P50	90	250	250	3000	7.6	1.4	2.3
PS 50/76	OSP-P50	140	350	350	4000	11.5	1.8	4.9

* Add the mass of the guide carriage to the mass to be cushioned.

Ordering information for OSP-P rodless POWERSLIDE pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1		0	0		0	0	0	0	0	0	1	0	0

Bore

16
25
32
40
50

Piston Style

0	Standard
1	Tandem

Porting Configurations

0	Standard
1	End Face (16,25,32,40,50)
2	Single End Porting (25,32,40,50)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50)
6	Single End Porting at #5 (50)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard
1	Slow Speed

Hardware

0	Standard
1	Stainless Steel

Stroke

XXXXX

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushioning & Stops

0	Standard
1	Long Cushions (25,32,40)

Piston Mounting

0	None

Guides / Brakes

E	PSXX/25 (16,25)
F	PSXX/35 (25,32)
G	PSXX/44 (25,32,40)
H	PSXX/60 (40,50)
I	PSXX/76 (50)

Additional Carriages**

0	None
E	PSXX/25 (16,25)
F	PSXX/35 (25.32)
G	PSXX/44 (25,32,40)
H	PSXX/50 (40,50)
I	PSXX/76 (50)

** Note: Available on tandem piston only

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
1	A1 (16,25,32)
2	A2 (16,25,32)
3	A3 (25,32)
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50)
A	C2 (40,50)
B	C3 (40,50)
C	C4 (40,50)

Note: Comes in pairs

Version

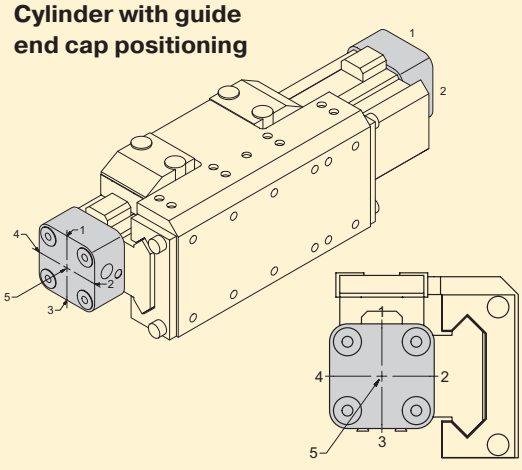
0	Standard

Switches ◊

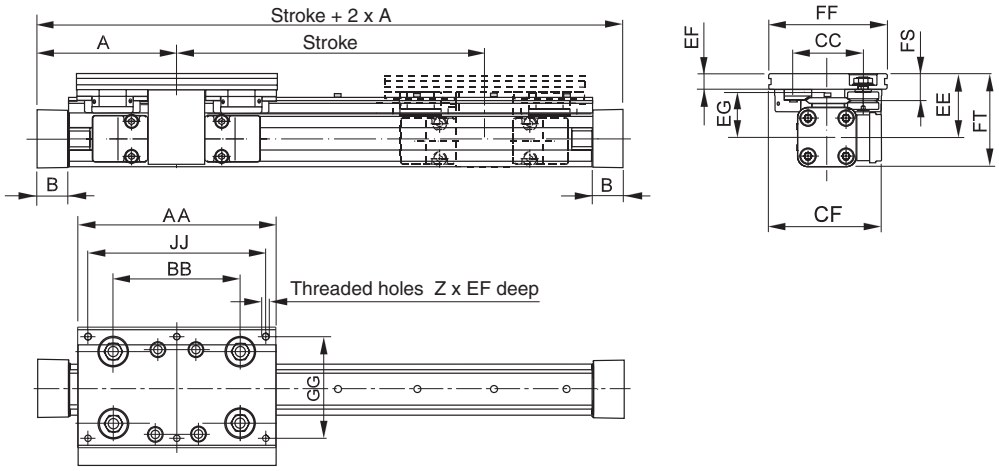
0	None
1	Normally Open Reed Switch (16 thru 50)
2	Normally Closed Reed Switch (16 thru 50)
3	PNP Hall Sensor w/Extension Cables (16 thru 50)
4	NPN Hall Sensor w/Extension cables (16 thru 50)

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.

Cylinder with guide end cap positioning



POWERSLIDE Dimensions



Dimensions (mm)

Series	A	B	Z	AA	BB	CC	CF	EE	EF	EG	FF	FS	FT	GG	JJ
PS 16/25	65	14	4xM6	120	65	47	80	49	12	35	80	21	64	64	100
PS 25/25	100	22	6xM6	145	90	47	79.5	53	11	39	80	20	73.5	64	125
PS 25/35	100	22	6xM6	156	100	57	89.5	52.5	12.5	37.5	95	21.5	73	80	140
PS 25/44	100	22	6xM8	190	118	73	100	58	15	39	116	26	78.5	96	164
PS 32/35	125	25.5	6xM6	156	100	57	95.5	58.5	12.5	43.5	95	21.5	84.5	80	140
PS 32/44	125	25.5	6xM8	190	118	73	107	64	15	45	116	26	90	96	164
PS 40/44	150	28	6xM8	190	118	73	112.5	75	15	56	116	26	109.5	96	164
PS 40/60	150	28	6xM8	240	167	89	122.5	74	17	54	135	28.5	108.5	115	216
PS 50/60	175	33	6xM8	240	167	89	130.5	81	17	61	135	28.5	123.5	115	216
PS 50/76	175	33	6xM10	280	178	119	155.5	93	20	64	185	39	135.5	160	250

Service Life

Calculation of service life is achieved in two stages:

- Determination of load factor LF from the loads to be carried
- Calculation of service life in km

1. Calculation of load factor LF

$$LF = \frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}}$$

with combined loads, LF should not exceed the value 1.

Lubrication

For maximum system life, lubrication of the rollers must be maintained at all times.

Only high quality Lithium based greases should be used.

Lubrication intervals are dependent on environmental conditions (temperature, running speed, grease quality etc.) therefore the installation should be regularly inspected.

2. Service life calculation

- For PS 16/25, PS 25/25, PS 25/35, and PS 32/35 Service life (km) = $\frac{106}{(LF + 0{,}02)^3}$
- For PS 25/44, PS 32/44, PS 40/44, PS 40/60 and PS 50/60: Service life (km) = $\frac{314}{(LF + 0{,}015)^3}$
- For PS 50/76: Service life (km) = $\frac{680}{(LF + 0{,}015)^3}$

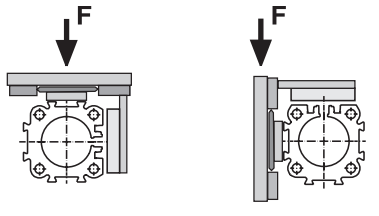
Mid-Section Support

(for versions see page 83)

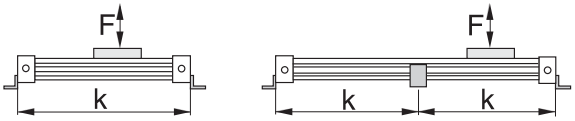
Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive. The diagrams show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2.

Deflection of 0.5 mm max. between supports is permissible.

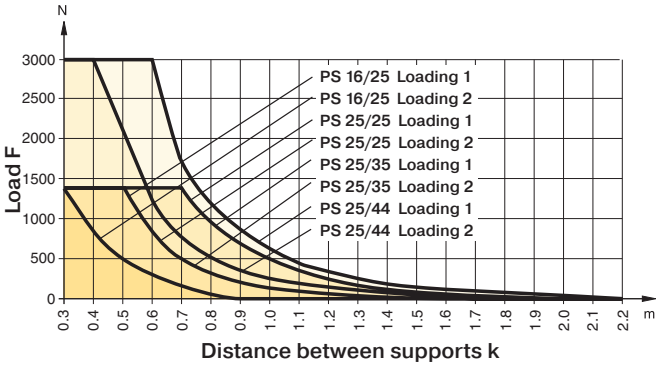
Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



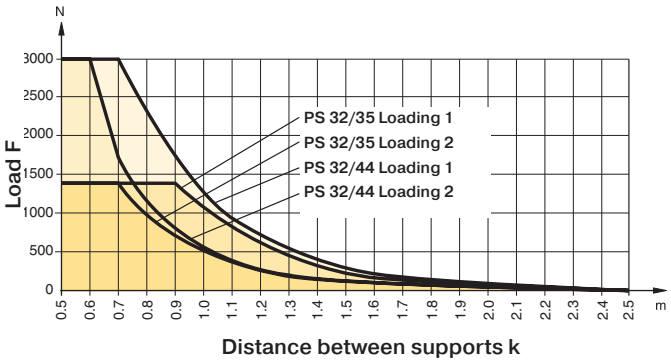
Loading 1 Loading 2



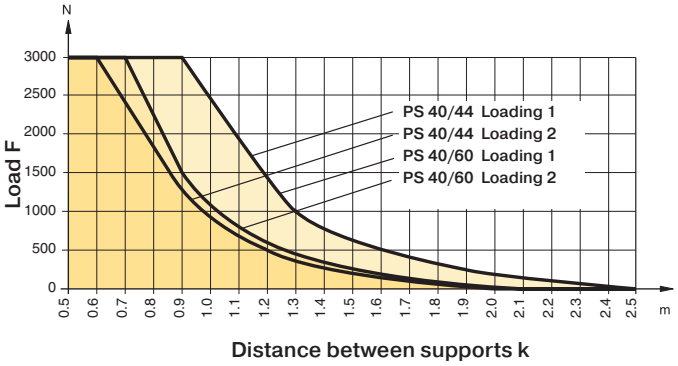
Permissible unsupported length:
POWERSLIDE 16/25, 25/25, 25/35, 25/44mm bore



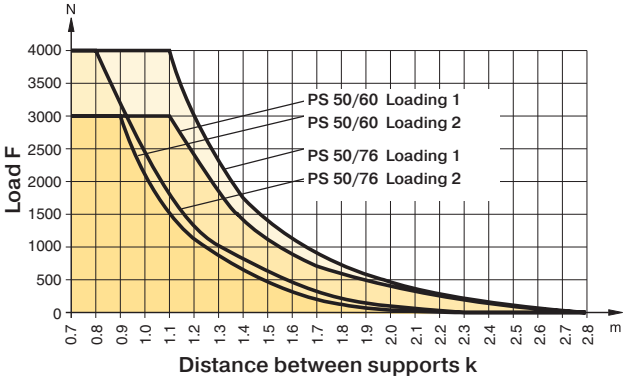
Permissible unsupported length:
POWERSLIDE 2/35, 32/44mm bore



Permissible unsupported length:
POWERSLIDE 40/44, 40/60mm bore



Permissible unsupported length:
POWERSLIDE 50/60, 50/76mm bore



Aluminum Roller Guide PROLINE PL ø 16 to 50mm bore

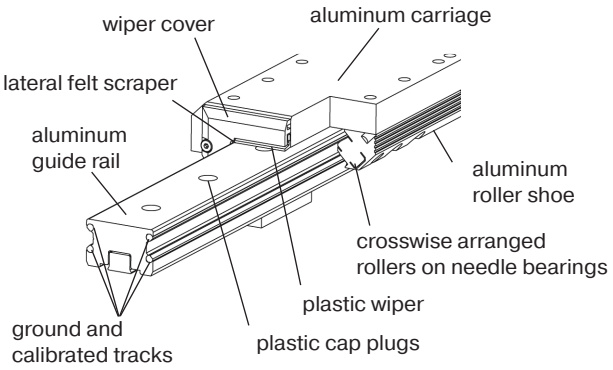
Series PL 16 to 50 for Linear-drive

OSP

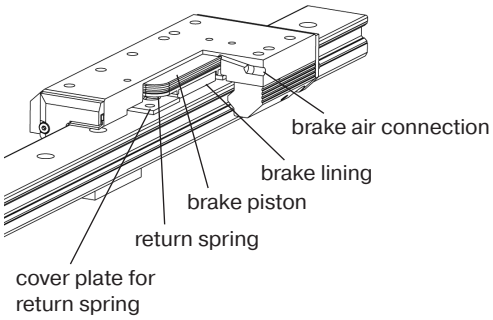
- Series OSP-P

Features

- High precision
- High velocities (10 m/s)
- Smooth operation - low noise
- Integated wiper system
- Long life lubrication
- Compact dimensions - compatible to Slideline plain bearing guide
- Any length of stroke up to 3750mm
- Integrated Brake (optional) for Series OSP-P25 to OSP-P50:
- Actuated by pressurization
- Release by depressurization and spring actuation



Option – Integrated Brake



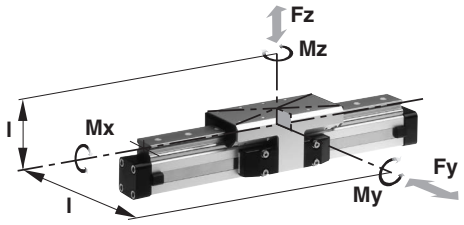
Loads, Forces and Moments

The table shows the maximal permissible loads. If multiple moments and forces act upon the cylinder simultaneously, the following equation applies:

$$\frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}} \leqslant 1$$

The sum of the loads should not exceed >1. With a load factor of less than 1, service life is 8000 km

The table shows the maximum permissible values for light, shock-free operation, which must not be exceeded even under dynamic conditions.



		Max. Moments (Nm)			Max. Loads (N)	Maximum Braking Force at 6 bar (N) †	Mass of Linear Drive with Guide (kg)		
Series	For Linear Drive	Mx	My	Mz	Fy, Fz		With 0mm Stroke	Increase per 100mm Stroke	Mass * Guide Carriage (kg)
PL16	OSP-P16	8	12	12	542	–	0.55	0.19	0.24
PL25	OSP-P25	16	39	39	857	on request	1.65	0.40	0.75
PL32	OSP-P32	29	73	73	1171	on request	3.24	0.62	1.18
PL40	OSP-P40	57	158	158	2074	on request	4.35	0.70	1.70
PL50	OSP-P50	111	249	249	3111	on request	7.03	0.95	2.50

* Add the mass of the guide carriage to the mass to be cushioned.
† Only for version with brake: Braking surface dry – oiled surface reduces the effective braking force.

Ordering information for OSP-P rodless PROLINE pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1		0	0		0	0	0	0	0	0	1	0	0

Bore

16
25
32
40
50

Piston Style

0	Standard
1	Tandem

Porting Configurations

0	Standard
1	End Face (16,25,32,40,50)
2	Single End Porting (25,32,40,50)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50)
6	Single End Porting at #5 (50)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valve (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard

Hardware

0	Standard
1	Stainless Steel

Stroke

xxxxx

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushioning & Stops

0	Standard
1	Long Cushions (25,32,40)

Piston Mounting

0	None

Guides / Brakes

6	Proline Guide (16,25,32,40,50)
7	Proline with Activebrake (25,32,40,50)
8	Proline with Multibrake (25, 32,40,50)

Additional Carriages**

0	None
6	Proline Guide
M	Guide Carriage without Brake Function

** Note: Available on tandem piston only

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
1	A1 (16,25,32)
2	A2 (16,25,32)
3	A3 (25,32)
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50)
A	C2 (40,50)
B	C3 (40,50)
C	C4 (40,50)

Note: Comes in pairs

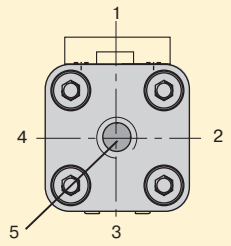
Version

0	Standard

Switches ◊

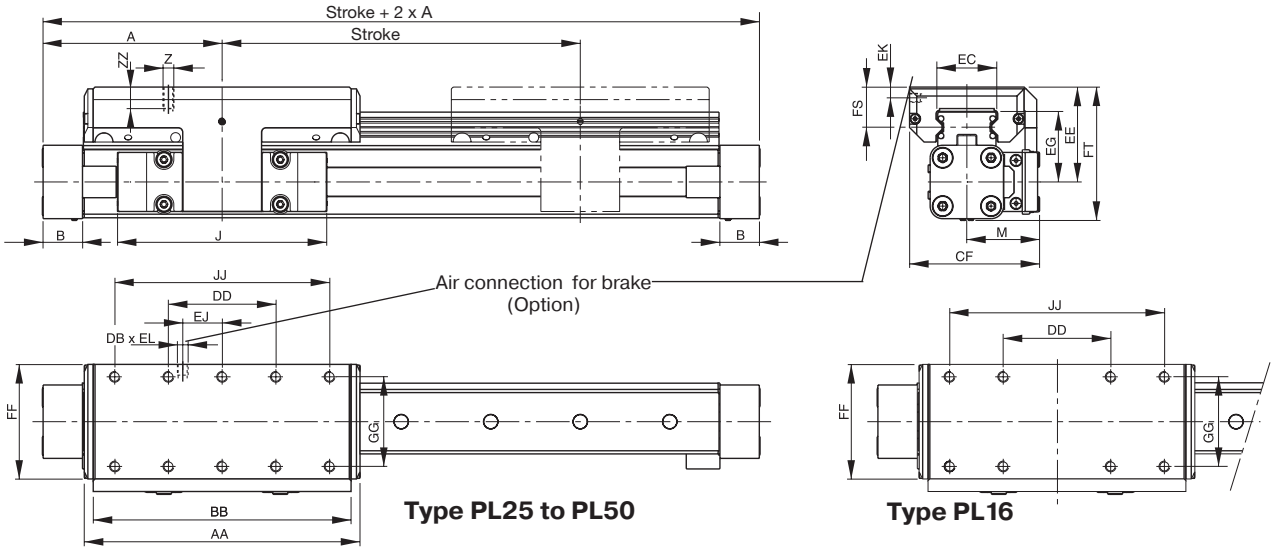
0	None
1	Normally Open Reed Switch (16 thru 50)
2	Normally Closed Reed Switch (16 thru 50)
3	PNP Hall Sensor w/ Extension Cables (16 thru 50)
4	NPN Hall Sensor w/ Extension Cables (16 thru 50)

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.



Note: Position #2 is the standard location.

OSP-P PROLINE PL16, PL25, PL32, PL40, PL50



Dimension (mm)

Series	A	B	J	M	Z	AA	BB	DB	DD	CF	EC	EE	EG	EJ	EK	EL	FF	FS	FT	GG	JJ	ZZ
PL16	65	14	69	31	M4	98	88	-	30	55	23	40	30	-	-	-	48	17	55	36	70	8
PL25	100	22	117	40.5	M6	154	144	M5	60	72.5	32.5	53	39	22	6	6	64	23	73.5	50	120	12
PL32	125	25.5	152	49	M6	197	187	M5	80	91	42	62	48	32	6	6	84	25	88	64	160	12
PL40	150	28	152	55	M6	232	222	M5	100	102	47	64	50.5	58	6	6	94	23.5	98.5	78	200	12
PL50	175	33	200	62	M6	276	266	M5	120	117	63	75	57	81	6	6	110	29	118.5	90	240	16

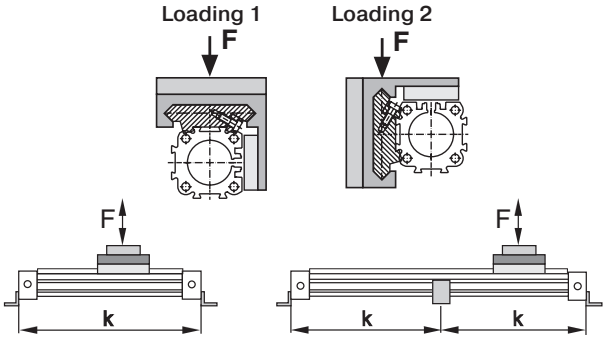
Mid-Section Support

(For versions, see page 83)

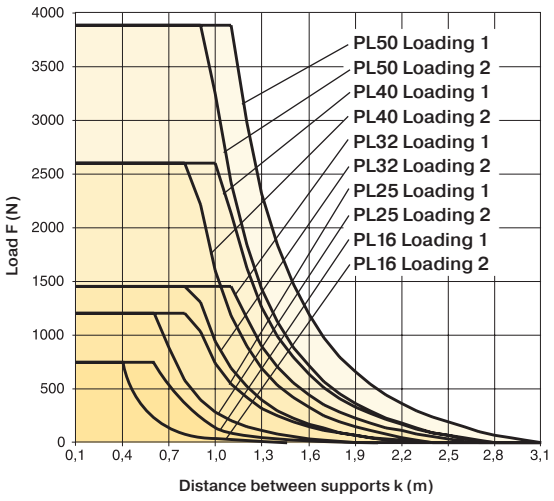
Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive. The diagrams

show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2. Deflection of 0.5 mm max. between supports is permissible.

Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



Permissible Unsupported Length
PL16, PL25, PL32, PL40 and PL50



Multi-Brake Passive Brake with Aluminum Roller Guide PROLINE PL 25 to 50mm bore

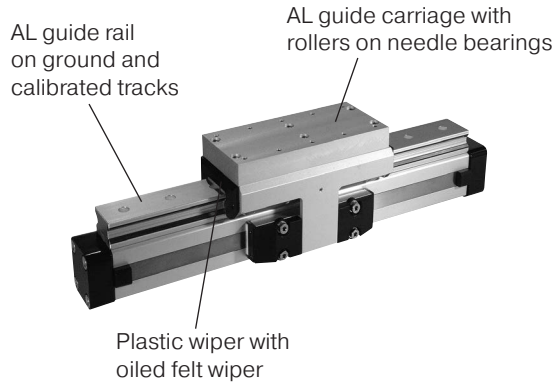
Series MB-PL 25 to 50 for Linear-drive

OSP

- Series OSP-P

Features

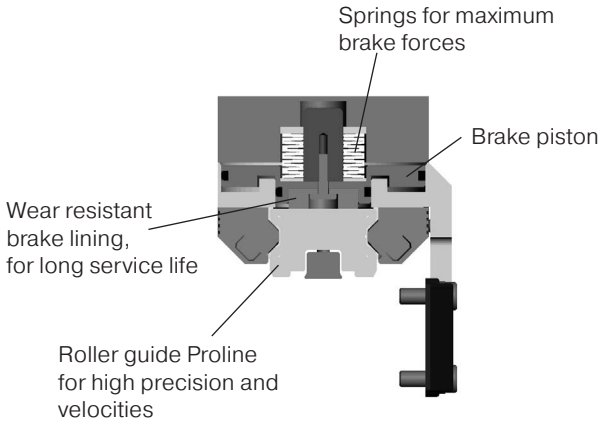
- Brake operated by spring actuation
- Brake release by pressurization
- Optional sensor to indicate brake lining wear
- Composite sealing system with plastic and felt wiper elements to remove dirt and lubricate the slideway
- Blocking function in case of pressure loss
- Intermediate stops possible



Function

The Multi-Brake is a passive device. When the air pressure is removed the brake is actuated and movement of the cylinder is blocked. The brake is released by pressurization.

The high friction, wear resistant brake linings allow the Multi-Brake to be used as a dynamic brake to stop cylinder movement in the shortest possible time. The powerful springs also allow the Multi-Brake to be used effectively in positioning applications.



Loads, Forces and Moments

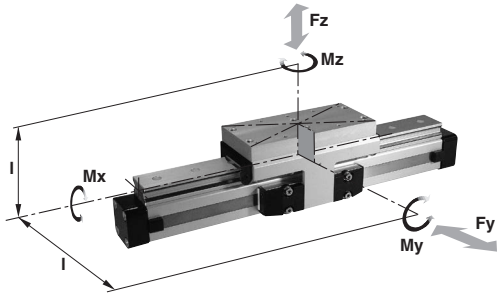
The table shows the maximal permissible loads. If multiple moments and forces act upon the cylinder simultaneously, the following equation applies:

$$\frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}} \leqslant 1$$

The sum of the loads should not exceed >1. With a load factor of less than 1, service life is 8000 km

The table shows the maximum permissible values for light, shock-free operation, which must not be exceeded even under dynamic conditions.

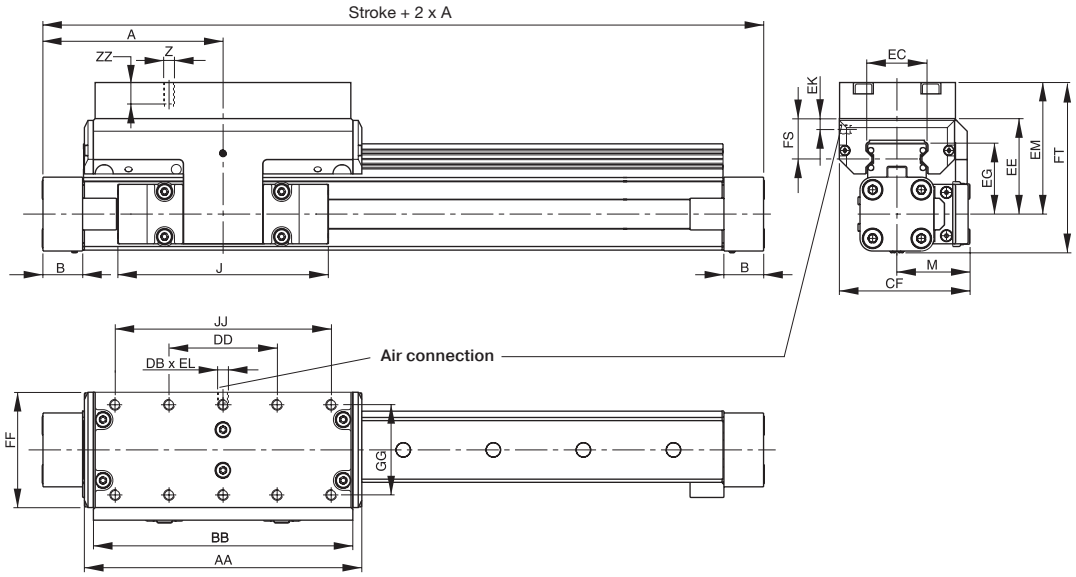
Operating Pressure 4.5 - 8 bar.
A pressure of min. 4.5 bar release the brake.



		Max. Moments (Nm)			Max. Loads (N)		Mass of Linear Drive with guide (kg)		
Series	For Linear Drive	Mx	My	Mz	Fy, Fz	Max. Braking Force (N) †	With 0mm Stroke	Increase per 100mm Stroke	Mass* Guide Carriage (kg)
MB-PL25	OSP-P25	16	39	39	857	315	2.14	0.40	1.24
MB-PL32	OSP-P32	29	73	73	1171	490	4.08	0.62	2.02
MB-PL40	OSP-P40	57	158	158	2074	715	5.46	0.70	2.82
MB-PL50	OSP-P50	111	249	249	3111	1100	8.60	0.95	4.07

* Add the mass of the guide carriage to the mass to be cushioned.
† Only for version with brake: Braking surface dry – oiled surface reduces the effective braking force.

OSP-P with PROLINE Passive Brake MB-PL25, PL32, PL40, PL50



Dimension (mm)

Series	A	B	J	M	Z	AA	BB	DB	DD	CF	EC	EE	EG	EK	EL	EM	FF	FS	FT	GG	JJ	ZZ
MB-PL25	100	22	117	40.5	M6	154	144	M5	60	72.5	32.5	53	39	9	5	73	64	23	93.5	50	120	12
MB-PL32	125	25.5	152	49	M6	197	187	G1/8	80	91	42	62	48	7	10	82	84	25	108	64	160	12
MB-PL40	150	28	152	55	M6	232	222	G1/8	100	102	47	64	50.5	6.5	10	84	94	23.5	118.5	78	200	12
MB-PL50	175	33	200	62	M6	276	266	G1/8	120	117	63	75	57	10	12	95	110	29	138.5	90	240	16

Mid-Section Support

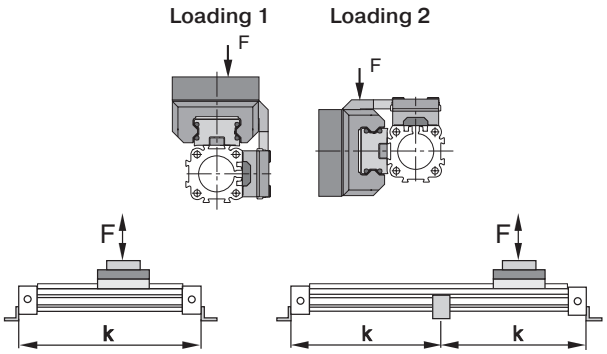
(for versions see page 83)

Mid-Section supports are required from a certain stroke length to prevent

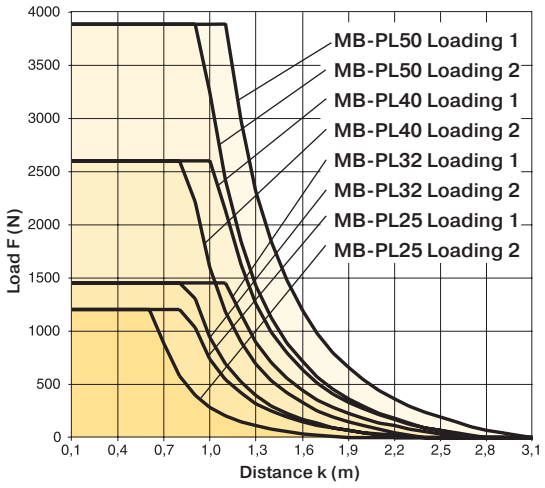
excessive deflection and vibration of the linear drive. The diagrams show the maximum permissible unsupported length in relation to loading.

A distinction must be drawn between loading 1 and loading 2. Deflection of 0.5 mm max. between supports is permissible.

Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



Permissible Unsupported Length OSP-P MB-PL25, MB-PL32, MB-PL40, MB-PL50

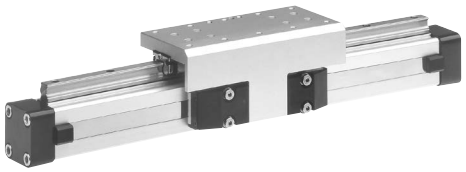


Recirculating Ball Bearing Guide STARLINE PL 16 to 50mm bore

Series PL 16 to 50 for Linear-drive

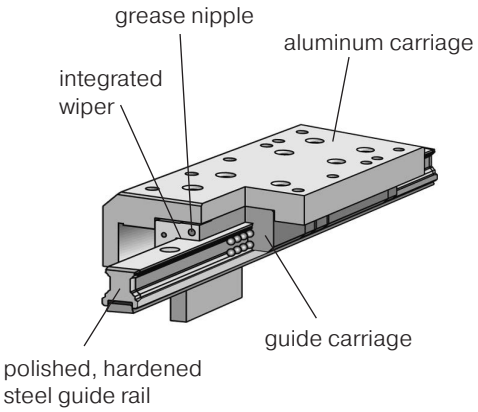
OSP

- Series OSP-P



Features

- Polished and hardened steel guide rail
- For very high loads in all directions
- High precision
- Integrated wiper system
- Integrated grease nipples
- Any length of stroke up to 3700 mm
- Anodized aluminum guide carriage
  – dimensions compatible with OSP guides SLIDELINE and PROLINE
- Installation height (STL16 - 32) compatible with OSP guides SLIDELINE and PROLINE
- Maximum speed
  STL16: v = 3 m/s
  STL25 to 50: v = 5 m/s



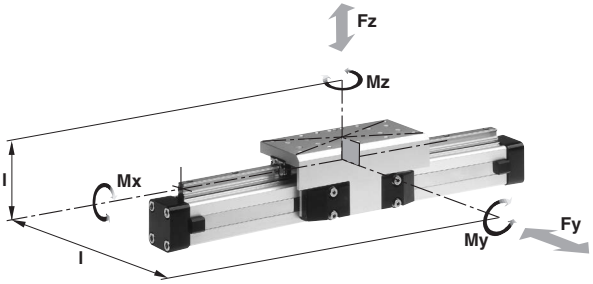
Loads, Forces and Moments

The table shows the maximum permissible loads. If multiple moments and forces act upon the cylinder simultaneously, the following equation applies:

$$\frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}} \leqslant 1$$

The sum of the loads should not exceed >1.

The table shows the maximum permissible values for light, shock-free operation, which must not be exceeded even under dynamic conditions.



Series	For Linear Drive	Max. Moments (Nm) Mx	My	Max. Loads (N) Mz	Fy	Fz	Mass of Linear Drive with Guide (kg) With 0mm Stroke	Increase per 100mm Stroke	Mass * Guide Carriage (kg)
STL16	OSP-P16	15	30	30	1000	1000	0.598	0.210	0.268
STL25	OSP-P25	50	110	110	3100	3100	1.733	0.369	0.835
STL32	OSP-P32	62	160	160	3100	3100	2.934	0.526	1.181
STL40	OSP-P40	150	400	400	4000	7500	4.452	0.701	1.901
STL50	OSP-P50	210	580	580	4000	7500	7.361	0.936	2.880

* Add the mass of the guide carriage to the mass to be cushioned.

Ordering information for OSP-P rodless STARLINE pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1		0	0		0	0	0	B	0	0	1	0	0

Bore

16
25
32
40
50

Piston Style

0	Standard
1	Tandem

Porting Configurations

0	Standard
1	End Face (16,25,32,40,50)
2	Single End Porting (25,32,40,50)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50)
6	Single End Porting at #5 (50)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard

Hardware

0	Standard

Stroke

XXXXX

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1
S	Special

Cushioning & Stops

0	Standard
1	Long Cushions (25,32,40)
2	VS Soft Left
3	VS Hard Left
4	VS Soft Right
5	VS Hard Right
6	VS Soft Both Sides
7	VS Hard Both Sides

Piston Mounting

0	None

Guides / Brakes

B	Starline Guide

Additional Carriages**

0	None
B	Starline

** Note: Available on tandem piston only

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50)
A	C2 (40,50)
B	C3 (40,50)
C	C4 (40,50)

Note: Comes in pairs

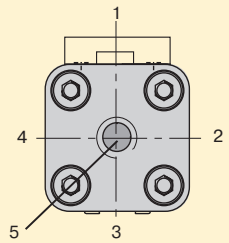
Version

0	Standard

Switches ◊

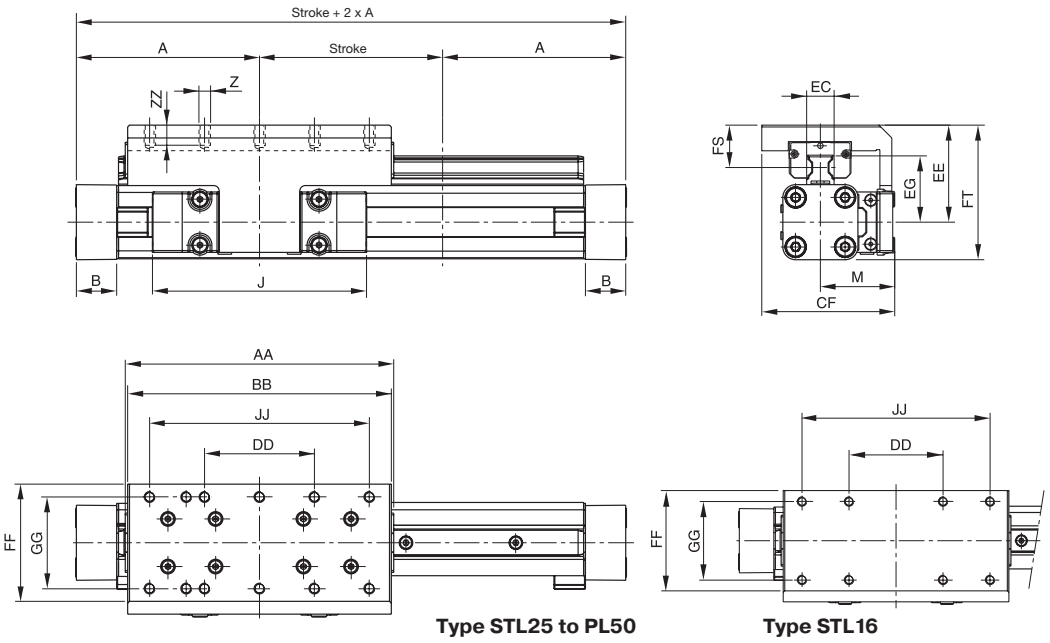
0	None
1	Normally Open Reed Switch (16 thru 50)
2	Normally Closed Reed Switch (16 thru 50)
3	PNP Hall Sensor w/ Extension Cables (16 thru 50)
4	NPN Hall Sensor w/ Extension Cables (16 thru 50)

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.



Note: Position #2 is the standard location.

OSP-P with STARLINE Recirculating Ball Bearing Guide STL16, STL25, STL32, STL40, STL50



Type STL25 to PL50 Type STL16

Dimension (mm)

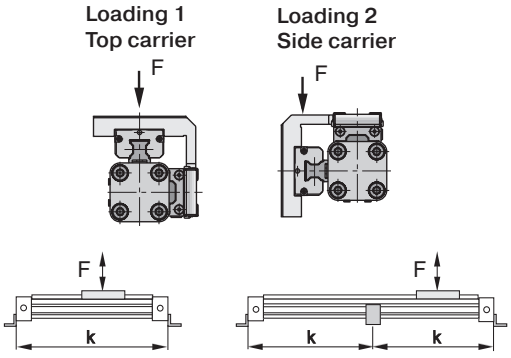
Series	A	B	J	M	Z	AA	BB	CF	DD	EC	EE	EG	FF	FS	FT	GG	JJ	ZZ
STL16	65	14	69	31	M4	93	90	55	30	15	40	24.6	48	18	55	36	70	8
STL25	100	22	117	40.5	M6	146.6	144	72.5	60	15	53	36.2	64	23.2	73.5	50	120	12
STL32	125	25.5	152	49	M6	186.6	184	91	80	15	62	42.2	84	26.2	88	64	160	12
STL40	150	28	152	55	M6	231	226	102	100	20	72	51.6	94	28.5	106.5	78	200	12
STL50	175	33	200	62	M6	270.9	266	117	120	23	85	62.3	110	32.5	128.5	90	240	16

Mid-Section Support

(For versions, see pages 83-84)

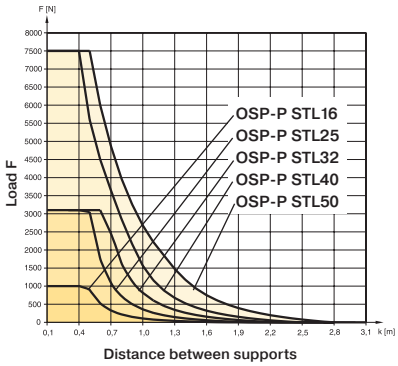
Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive. The diagrams show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2. Deflection of 0.5 mm max. between supports is permissible.

Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.



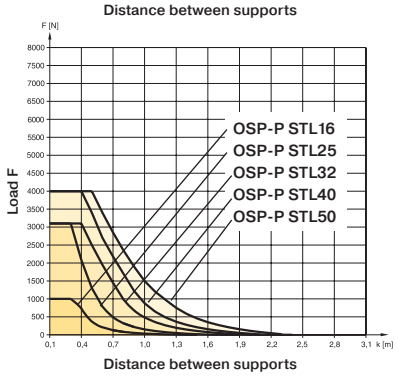
Permissible Unsupported Length STL16 to STL50

Loading 1 Top carrier



Permissible Unsupported Length STL16 to STL50

Loading 2 Side carrier



Variable Stop Type VS16 to VS50

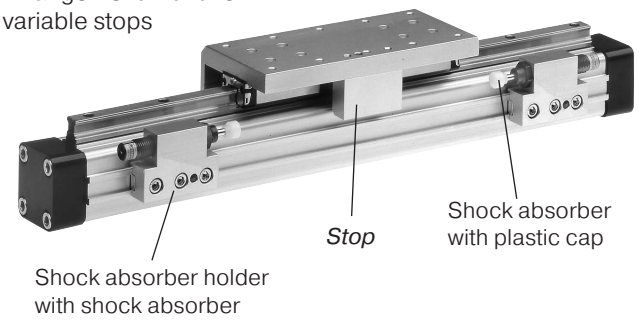
The variable stop Type VS provides simple stroke limitation. It can be retrofitted and positioned anywhere along the stroke length.

For every cylinder diameter two types of shock absorber are available – see "Shock Absorber Selection" below.

Mid-section supports and magnetic switches can still be fitted on the same side as the variable stop.

Depending on the application, two variable stops can be fitted if required.

Arrangement with two variable stops



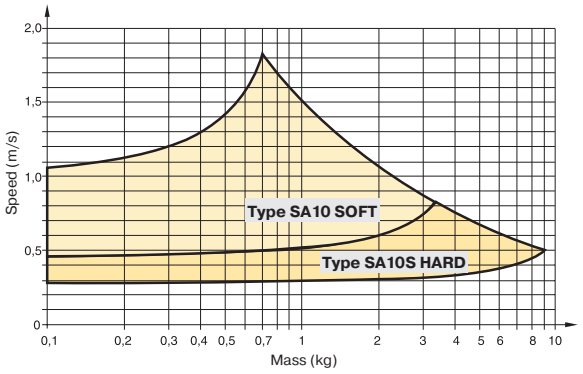
Shock Absorber Selection

The shock absorber is selected in dependence on the mass and speed.

The mass of the carrier itself must be taken into account.

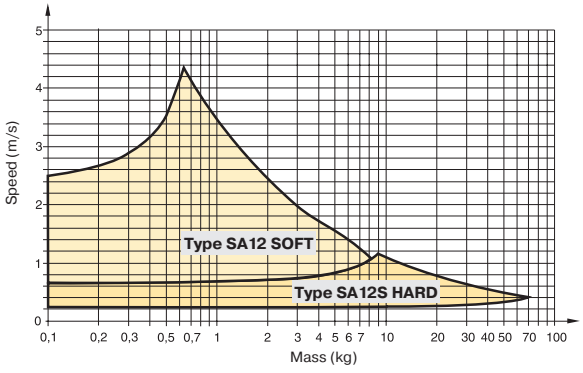
Series OSP-STL16

The values relate to an effective driving force of 78 N (6 bar)



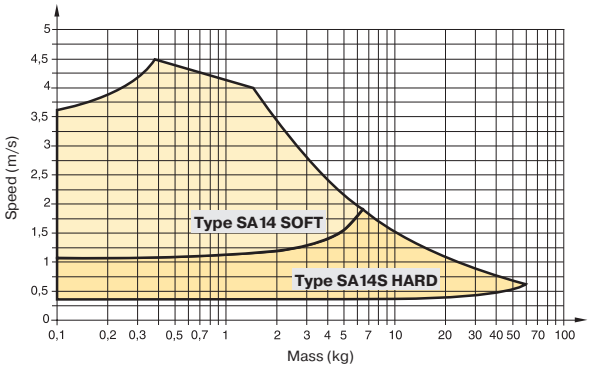
Series OSP-STL25

The values relate to an effective driving force of 250 N (6 bar)



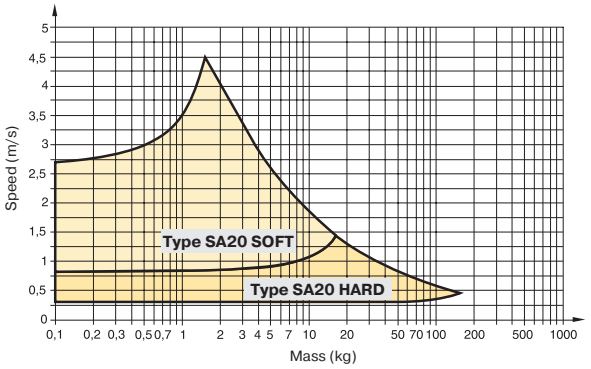
Series OSP-STL32

The values relate to an effective driving force of 420 N (6 bar)



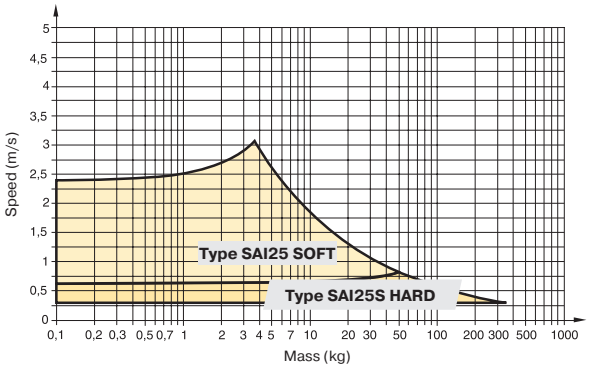
Series OSP-STL40

The values relate to an effective driving force of 640 N (6 bar)

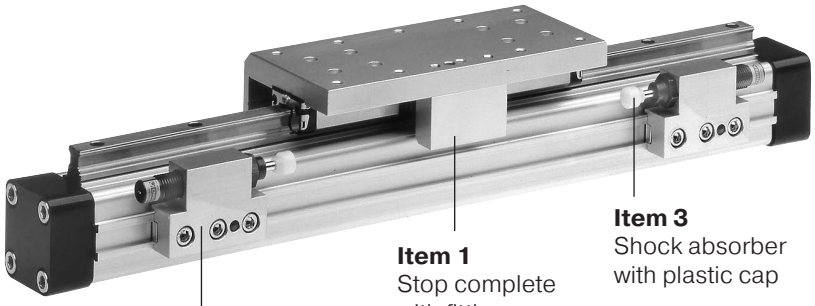


Series OSP-STL50

The values relate to an effective driving force of 1000 N (6 bar)



Ordering Information – Variable Stop Type VS16 to VS50



Item 1
Stop complete
with fittings

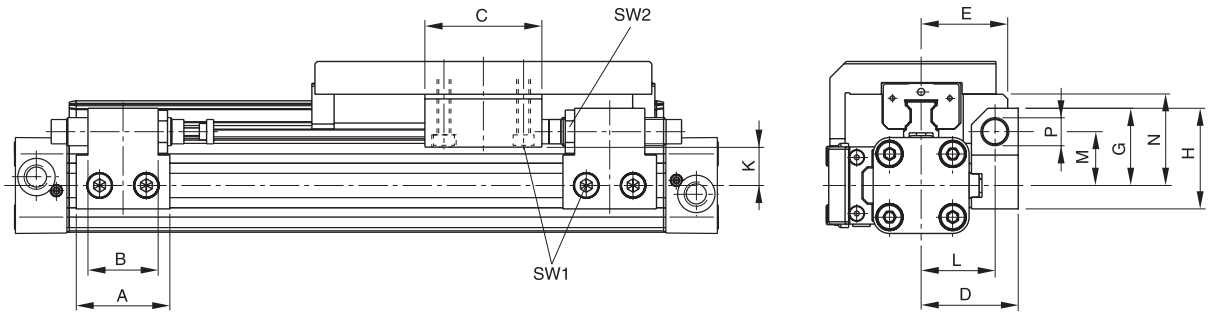
Item 2
Shock absorber holder
complete with fittings
– without shock absorber

Item 3
Shock absorber
with plastic cap

	Size	VS16		VS25		VS32		VS40		VS50	
Item	Description	Type	Part Number	Type	Part Number	Type	Part Number	Type	Part Number	Type	Part Number
1	Stop, complete	–	**21196FIL**	–	**21197FIL**	–	**21198FIL**	–	**21199FIL**	–	**21200FIL**
2	Shock absorber holder, complete	–	**21201FIL**	–	**21202FIL**	–	**21203FIL**	–	**21204FIL**	–	**21205FIL**
3 *	Shock absorber, standard	SA10	**MC25M**	SA12	**MC75M-1**	SA14	**MC150M-B**	SA20	**MC225M**	SAI25	**MC600M**
	Shock absorber, version S	SA10S	**MC25MH**	SA12S	**MC75M-2**	SA14S	**MC150MH-B**	SA20S	**MC225MH**	SAI25S	**MC600MH**

* Shock absorber with plastic cap

Dimension – Variable Stop Type VS16 to VS50



Series	Type	A	B	C	D	E	G	H	K	L	M	N	P	SW1	SW2
OSP-STL16	VS16	30	14	25	33	30	28	38	16.2	25.5	20.5	30	M10x1	4	12.5
OSP-STL25	VS25	40	30	50	41.5	37	33	43	18	31.5	23	39	M12x1	5	16
OSP-STL32	VS32	60	40	50	45.5	42	35	45	19	35.5	25	48	M14x1.5	5	17
OSP-STL40	VS40	84	52	60	64	59	48	63	25.6	50	34	58.6	M20x1.5	5	24
OSP-STL50	VS50	84	-	60	75	69	55	70	26.9	57	38	66.9	M25x1.5	5	30

Recirculating Ball Bearing Guide KF 16 to 50mm bore

Series KF16 to KF50 for Linear-drive

OSP

- Series OSP-P CLASSIC
-

Features

- Anodized aluminum guide carriage, the mounting dimensions correspond to FESTO Type: DGPL-KF
- Polished and hardened steel guide rail
- For high loads in all directions
- High precision
- Integrated wiper system
- Integrated grease nipples
- Any length of stroke up to 3700 mm
- Maximum speed
  KF16, KF40: v = 3 m/s
  KF25, KF32, KF50: v = 5 m/s

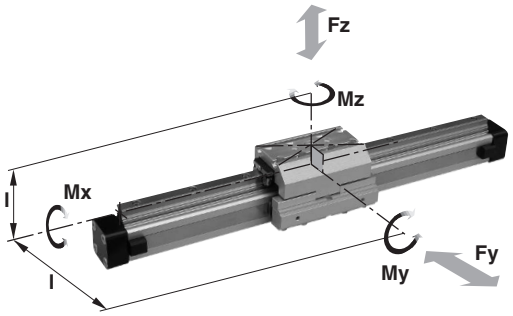
Loads, Forces and Moments

The table shows the maximum permissible loads. If multiple moments and forces act upon the cylinder simultaneously, the following equation applies:

$$\frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}} \leqslant 1$$

The sum of the loads should not exceed >1.

The table shows the maximum permissible values for light, shock-free operation, which must not be exceeded even under dynamic conditions.



Series	For Linear Drive	Max. Moments (Nm) Mx	My	Mz	Max. Load (N) Fy	Fz	Mass of Drive with Guide (kg) With 0mm Stroke	Increase per 100mm Stroke	Mass * Guide Carriage (kg)	Groove Stone Thread Size
KF16	OSP-P16	12	25	25	1000	1000	0.558	0.21	0.228	–
KF25	OSP-P25	35	90	90	3100	3100	1.522	0.369	0.607	M5
KF32	OSP-P32	44	133	133	3100	3100	2.673	0.526	0.896	M5
KF40	OSP-P40	119	346	346	4000	7100	4.167	0.701	1.531	M6
KF50	OSP-P50	170	480	480	4000	7500	7.328	0.936	2.760	M8

* Add the mass of the guide carriage to the mass to be cushioned.

Ordering information for OSP-P rodless KF pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1		0	0		0	0	0	C	0	0	1	0	0

Bore

16
25
32
40
50

Piston Style

C	Classic
T	Tandem Classic

Porting Configurations

0	Standard
1	End Face (16,25,32,40,50)
2	Single End Porting (25,32,40,50)
3	Left Std Pos #2, Right Pos #5 (16,25,32,40,50)
4	Left Pos #5, Right Std Pos #2 (16,25,32,40,50)
6	Single End Porting at #5 (50)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard

Hardware

0	Standard

Stroke

x x x x x

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushions / Stops

0	Standard
1	Long Cushions (25,32,40)
2	VS Soft Left
3	VS Hard Left
4	VS Soft Right
5	VS Hard Right
6	VS Soft Both Sides
7	VS Hard Both Sides

Piston Mounting

0	None

Guides / Brakes

C	KF Guide

Additional Carriages**

0	None
C	KF

** Note: Available on tandem piston only

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None
4	B1 (25,32)
6	B3 (16)
7	B4 (25,32)
8	B5 (32)
9	C1 (40,50)
A	C2 (40,50)
B	C3 (40,50)
C	C4 (40,50)

Note: Comes in pairs

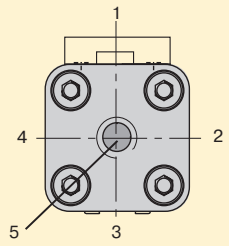
Version

0	Standard

Switches ◊

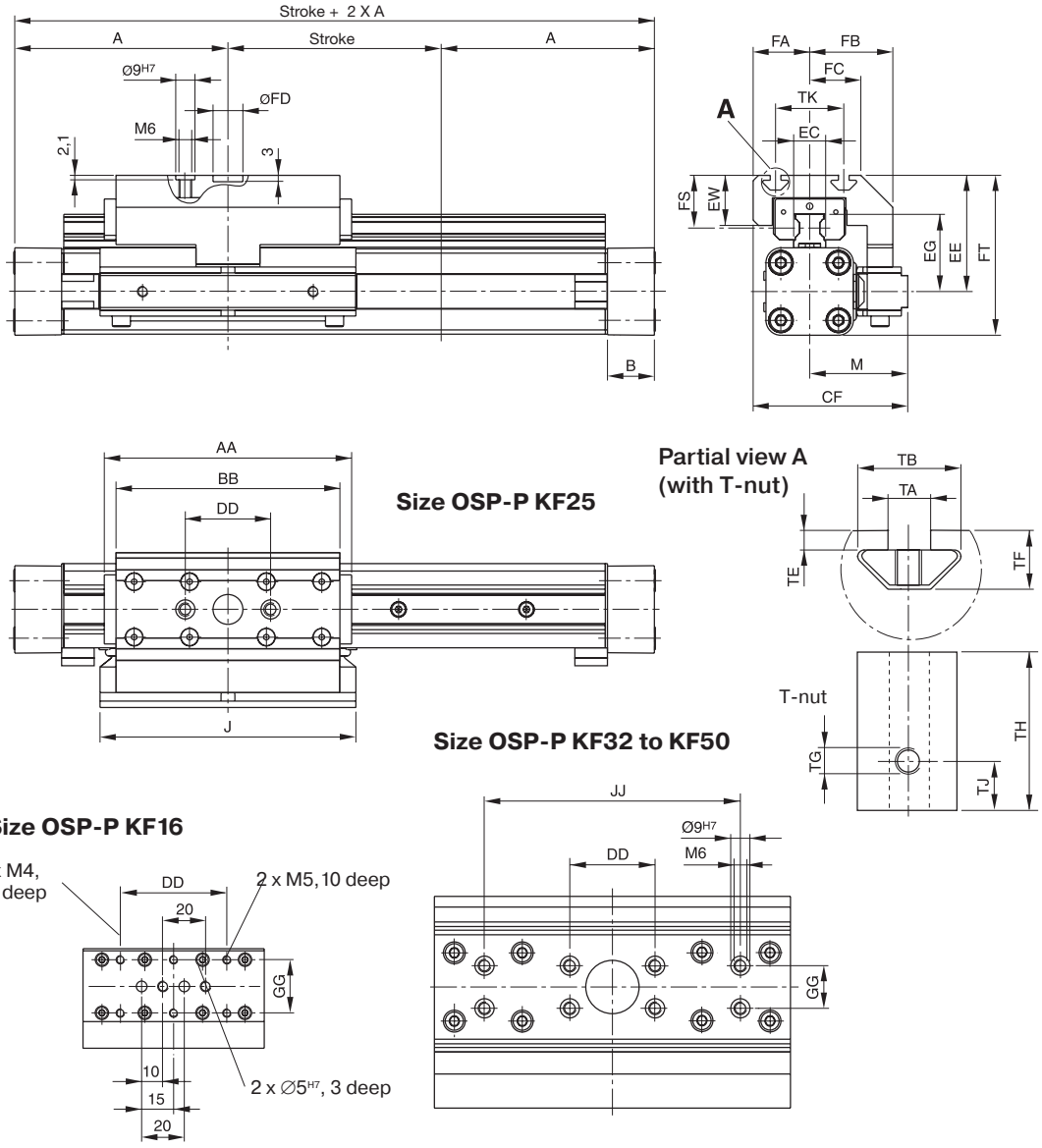
0	None
1	Normally Open Reed Switch (16 thru 50)
2	Normally Closed Reed Switch (16 thru 50)
3	PNP Hall Sensor w/ Extension Cables (16 thru 50)
4	NPN Hall Sensor w/ Extension Cables (16 thru 50)

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.



Note: Position #2 is the standard location.

Series OSP-P KF16 to KF50



Dimension (mm) Series OSP-P KF16, KF25, KF32, KF40, KF50

Series	A	B	J	AA	BB	CF	DD	EC	EE	EG	EW	JJ	GG	M
KF16	65	14	76	93	85	48	50	15	41	24.6	10	–	25	30
KF25	100	22	120	120.2	105	72.5	40	15	54.5	36.2	23.5	–	–	46
KF32	125	25.5	160	146.2	131	93.8	40	15	60.5	42.2	23.5	–	20	59.8
KF40	150	28	150	188.5	167	103.3	40	20	69.5	51.6	26.5	120	20	60.8
KF50	175	33	180	220.2	202	121	40	23	90.5	62.3	32.5	120	40	69

Series	FA	FB	FC	FD	FT	FS	TA	TB	TE	TF	TG	TH	TJ	TK
KF16	17.7	29	16.5	–	56	19	–	–	–	–	–	–	–	–
KF25	26.5	39	24	14 G7	75	24.7	5	12.1	2.3	6.9	M5	11.5	4	32
KF32	34	53.8	34	25 G7	86.5	24.7	5	12.1	1.8	6.4	M5	11.5	4	47
KF40	42.5	56.8	41	25 G7	104	26	6	12.8	1.8	8.4	M6	17	5.5	55
KF50	52	65	50	25 G7	134	38	8	21.1	4.5	12.5	M8	23	7.5	72

Mid-Section Support

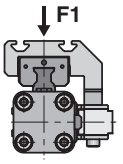
(For versions, see pages 84-85)

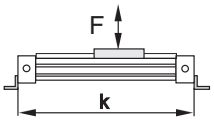
Mid-section supports are required from a certain stroke length to prevent excessive deflection and vibration of the linear drive. The diagrams show the maximum permissible unsupported length in relation to loading. A distinction must be drawn between loading 1 and loading 2.

Deflection of 0.5 mm max. between supports is permissible.

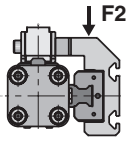
Note: For speeds v > 0.5 m/s the distance between supports should not exceed 1 m.

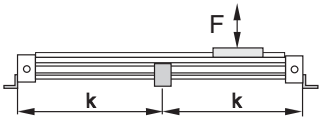
Loading 1
Top carrier



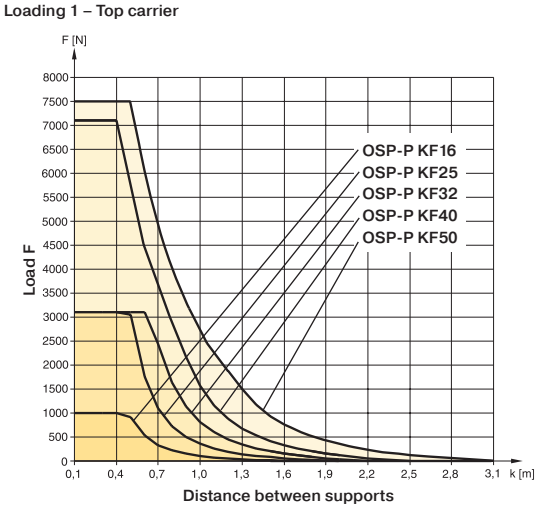


Loading 2
Side carrier

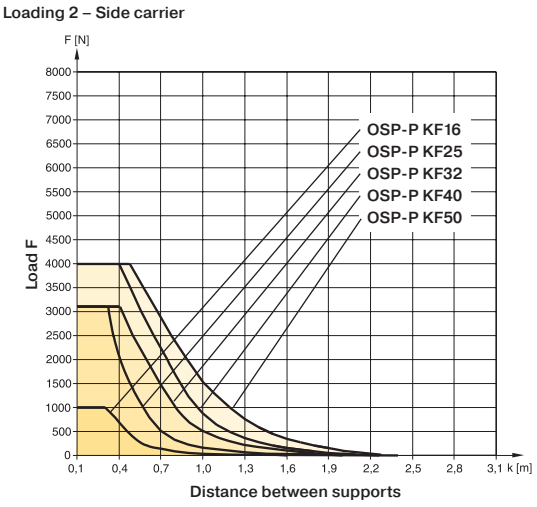




Permissible Unsupported Length OSP-P KF16 to KF50
Loading 1 – Top carrier



Permissible Unsupported Length OSP-P KF16 to KF50
Loading 2 – Side carrier



Variable Stop Type VS16 to VS50

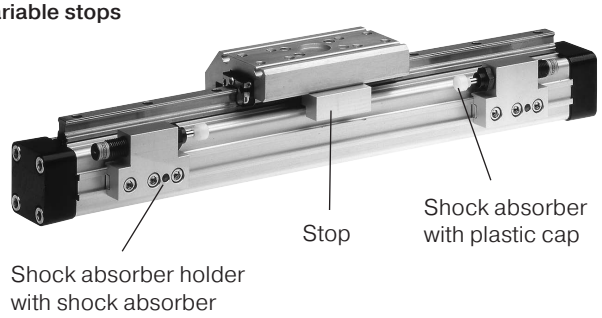
The variable stop Type VS provides simple stroke limitation.

It can be retrofitted and positioned anywhere along the stroke length. For every cylinder diameter two types of shock absorber are available – see “Shock Absorber Selection” below.

Mid-section supports and magnetic switches can still be fitted on the same side as the variable stop.

Depending on the application, two variable stops can be fitted if required.

Arrangement with two variable stops



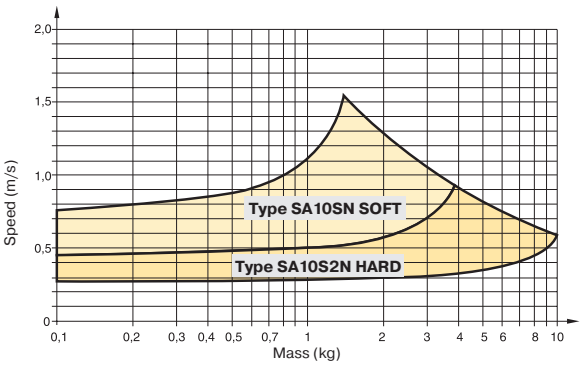
Shock Absorber Selection

The shock absorber is selected in dependence on the mass and speed.

The mass of the carrier itself must be taken into account.

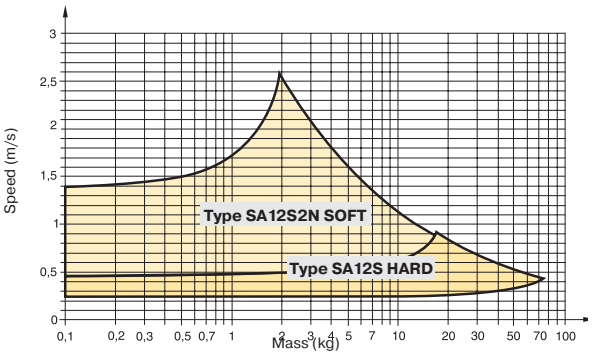
Series OSP-KF16

The values relate to an effective driving force of 78 N (6 bar)



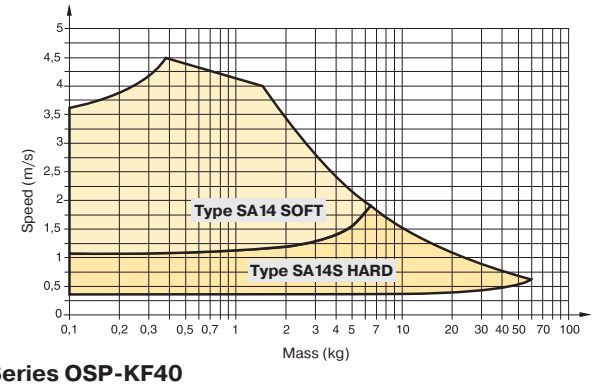
Series OSP-KF25

The values relate to an effective driving force of 250 N (6 bar)



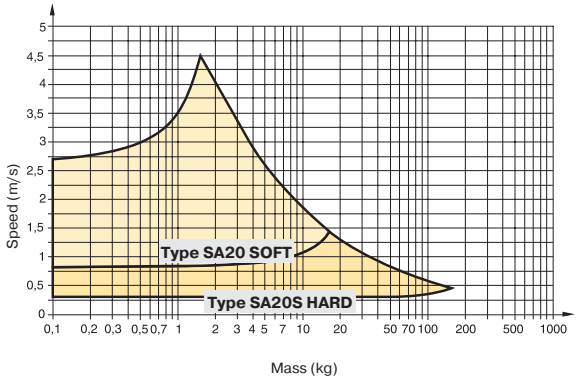
Series OSP-KF32

The values relate to an effective driving force of 420 N (6 bar)



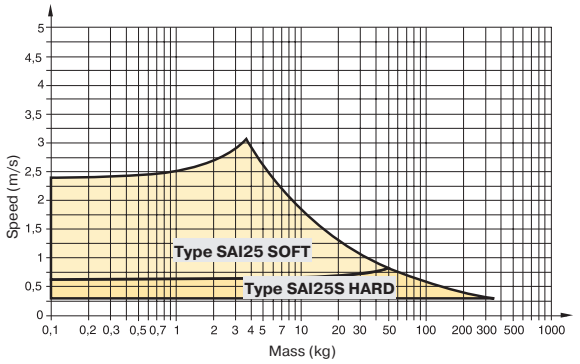
Series OSP-KF40

The values relate to an effective driving force of 640 N (6 bar)

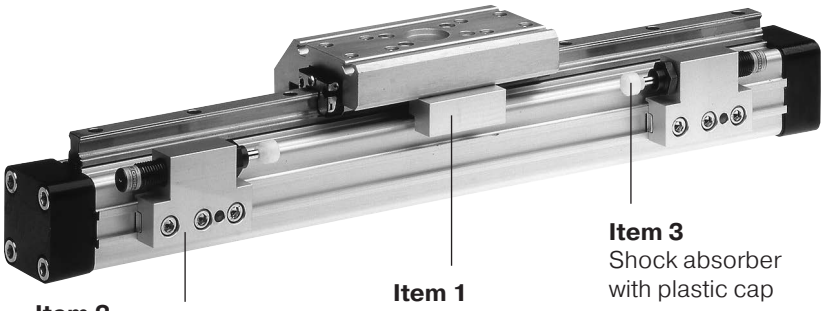


Series OSP-KF50

The values relate to an effective driving force of 1000 N (6 bar)



Ordering Information – Variable Stop Type VS16 to VS50



Item 2
Shock absorber holder complete with fittings – without shock absorber

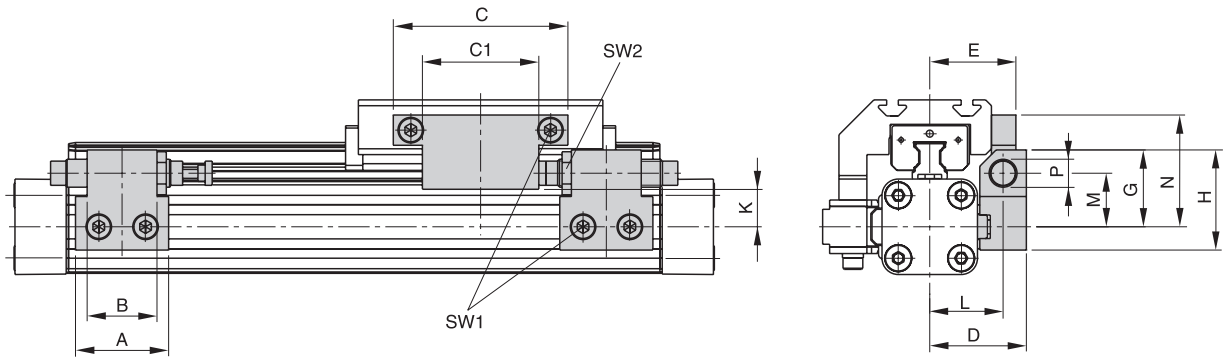
Item 1
Stop complete with fittings

Item 3
Shock absorber with plastic cap

		VS16		VS25		VS32		VS40		VS50	
Item	Description	Type	Part Number	Type	Part Number	Type	Part Number	Type	Part Number	Type	Part Number
1	Stop, complete	–	**21186FIL**	–	**21187FIL**	–	**21188FIL**	–	**21189FIL**	–	**21290FIL**
2	Shock absorber holder, complete	–	**21201FIL**	–	**21202FIL**	–	**21203FIL**	–	**21204FIL**	–	**21205FIL**
3 *	Shock absorber, standard	SA10SN	**MC25M**	SA12S2N	**MC75M-1**	SA14	**MC150M-B**	SA20	**MC225M**	SAI25	**MC600M**
	Shock absorber, version S	SA10S2N	**MC25MH**	SA12S	**MC75M-2**	SA14S	**MC150MH-B**	SA20S	**MC225MH**	SAI25S	**MC600MH**

* Shock absorber with plastic cap

Dimension – Variable Stop Type VS16 to VS50



Dimension (mm) – Variable Stop Type VS16 to VS50

Series	Type	A	B	C	C1	D	E	G	H	K	L	M	N	P	SW1	SW2
OSP-KF16	VS16	30	14	50	25	33	29.7	28	38	16.2	25.5	20.5	40.5	M10 x 1	4	12.5
OSP-KF25	VS25	40	30	75	50	41.5	37	33	43	18	31.5	23	48	M12 x 1	5	16
OSP-KF32	VS32	60	40	50	-	45.5	41.5	35	45	19	35.5	25	37	M14 x 1.5	5	17
OSP-KF40	VS40	84	52	60	-	64	59	48	63	25.5	50	34	43	M20 x 1.5	5	24
OSP-KF50	VS50	84	-	60	-	75	69	55	70	26.9	57	38	58	M25 x 1.5	5	30

End Cap Mounting – Type HP Ø 25 to 50mm (correspond to FESTO dimensions)

For Linear-drive with Recirculating Ball Bearing Guide

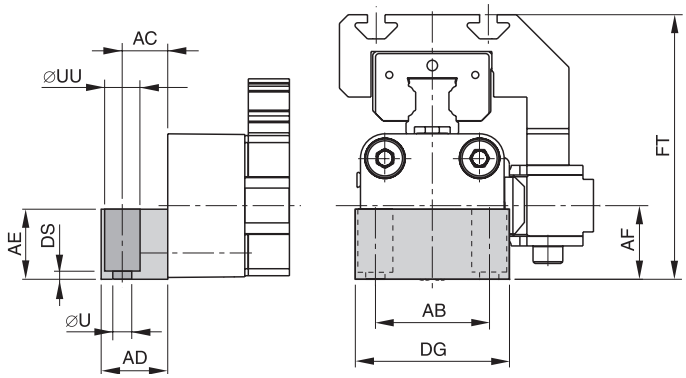
- Series OSP-P KF

On the end-face of each end cap there are four threaded holes for mounting the actuator.

Material:

- Anodized aluminum.

The mountings are supplied in pairs.



Note: Correspond to FESTO DGPL-KF, when the End Cap Mountings HP are mounted on the opposite side to the carriage (see drawing)

Dimension (mm)

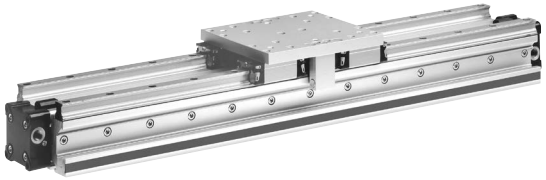
Series	ØU	AB	AC	AD	AE	AF	DG	DS	FT	ØUU	Part Number
HP25	5.5	32.5	13	19	20	21	44	2	75.5	10	**21107FIL**
HP32	6.6	38	17	24	24	27	52	3	87.5	11	**21108FIL**
HP40	6.6	45	17.5	24	24	35	68	2	104.5	11	**21109FIL**
HP50	9	65	25	35	35	48	86	6	138.5	15	**21110FIL**

Heavy Duty Guide HD 25 to 50mm bore

Series HD 25 to 50 for Linear-drive

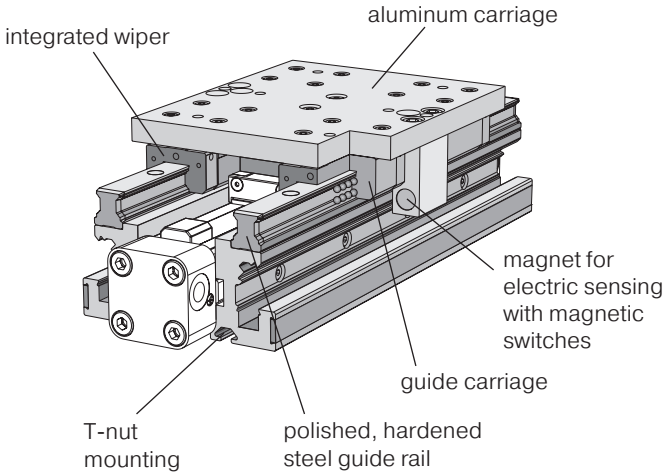
OSP

- Series OSP-P



Features

- Guide system:
  4-row recirculating ball bearing guide
- Polished and hardened steel guide rail
- For highest loads in all directions
- Highest precision
- Integrated wiper system
- Integrated grease nipples
- Any lengths of stroke up to 3700 mm
  (longer strokes on request)
- Anodized aluminum guide carriage
  – dimensions compatible with OSP guide GUIDELINE
- Maximum speed v = 5 m/s

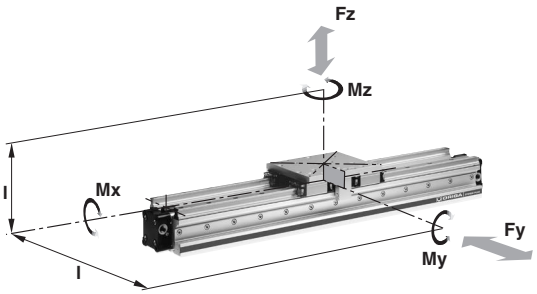


Loads, Forces and Moments

The table shows the maximum permissible loads. If multiple moments and forces act upon the cylinder simultaneously, the following equation applies:

$$\frac{Mx}{Mx_{max}} + \frac{My}{My_{max}} + \frac{Mz}{Mz_{max}} + \frac{Fy}{Fy_{max}} + \frac{Fz}{Fz_{max}} \leqslant 1$$

The sum of the loads should not exceed >1.
The table shows the maximum permissible values for light, shock-free operation which must not be exeeded even under dynamic conditions.



		Max. Moments (Nm)			Max. Loads (N)		Mass of the Linear Drive with Guide (kg)		
Series	For Linear Drive	Mx	My	Mz	Fz	Fy	With 0mm Stroke	Increase per 100mm Stroke	Mass * Guide Carriage (kg)
HD25	OSP-P25	260	320	320	6000	6000	3.065	0.924	1.289
HD32	OSP-P32	285	475	475	6000	6000	4.308	1.112	1.367
HD40	OSP-P40	800	1100	1100	15000	15000	7.901	1.748	2.712
HD50	OSP-P50	1100	1400	1400	18000	18000	11.648	2.180	3.551

* Add the mass of the guide carriage to the mass to be cushioned.

Ordering information for OSP-P rodless HD pneumatic series

1-4	5-6	7	8	9	10	11	12-16	17	18	19	20	21	22	23	24	25
OSPP	25	0	1	0	0	0	01100	0	0	0	D	0	0	1	0	0

Bore

25	
32	
40	
50	

Piston Style

0	Standard
1	Tandem

Porting Configurations

0	Standard
1	End Face (25,32,40,50)
2	Single End Porting (25,32,40,50)
3	Left Std Pos #2, Right Pos #5 (25,32,40,50)
4	Left Pos #5, Right Std Pos #2 (25,32,40,50)
6	Single End Porting at #5 (50)
A	24VDC VOE Valves (25,32,40,50)
B	220VAC VOE Valves (25,32,40,50)
C	48VDC VOE Valves (25,32,40,50)
E	110VAC VOE Valves (25,32,40,50)

Note: Single end porting on 16mm bore, then end caps cannot be rotated.

Seals

0	Standard
1	Fluorocarbon

Lubrication

0	Standard

Hardware

0	Standard

Stroke

x x x x x

5 digits in whole millimeters (ex. 1100mm = 01100)

Endcap Position

0	Both Pos #2
1	Both Pos #3
2	Both Pos #4
3	Both Pos #1
4	Left #3 / Right #2
5	Left #4 / Right #2
6	Left #1 / Right #2
7	Left #2 / Right #3
8	Left #4 / Right #3
9	Left #1 / Right #3
A	Left #2 / Right #4
B	Left #3 / Right #4
C	Left #1 / Right #4
D	Left #2 / Right #1
E	Left #3 / Right #1
F	Left #4 / Right #1

Cushions / Stops

0	Standard
1	Long Cushions (25,32,40)
2	VS Soft Left
3	VS Hard Left
4	VS Soft Right
5	VS Hard Right
6	VS Soft Both Sides
7	VS Hard Both Sides

Piston Mounting

0	None

Guides / Brakes

D	Heavy Duty

Additional Carriages**

0	None
D	Heavy Duty Guide

** Note: Available on tandem piston only

Dovetail Cover

0	Standard
X	Without Cover Rail

Endcap Mounting

0	None

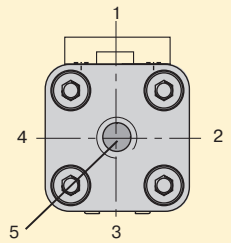
Version

0	Standard

Switches ◊

0	None
1	Normally Open Reed Switch (25 thru 50)
2	Normally Closed Reed Switch (25 thru 50)
3	PNP Hall Sensor w/ Extension Cables (25 thru 50)
4	NPN Hall Sensor w/ Extension Cables (25 thru 50)

◊ Note: 2 switches will be supplied. For different quantity, please order as a separate line item.



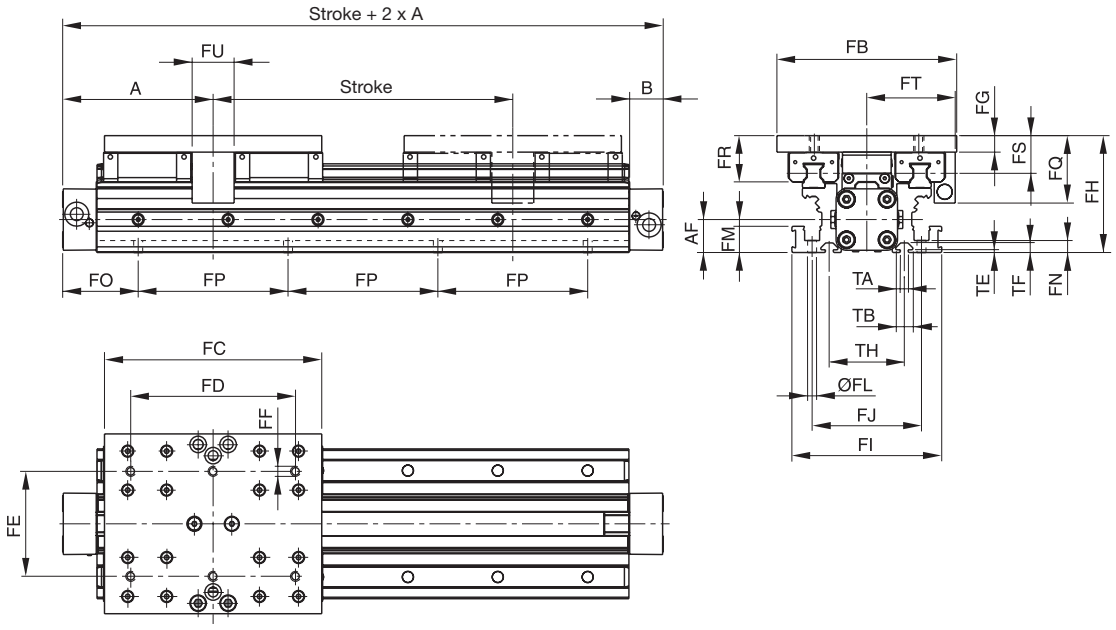
Note: Position #2 is the standard location.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Series OSP-P HD 25 to 50mm

Note: The HD heavy duty guide must be mounted on a flat surface for its entire length.

If T-grooves or T-bolts are used, the distance between them should not exceed 100 mm.



Variable Stop
Type VS25 to VS50
The variable stop provides simple stroke limitation and can be supplied mounted on the right or left, as required.

For further information see Variable Stop page 75.

For shock absorber selection see page 62.

Incremental displacement measuring system Sensoflex
Series SFI-plus can be supplied mounted on the right or left, as required.

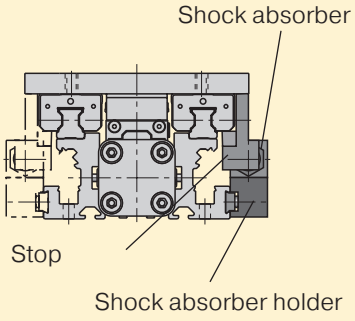
For further information see page 87.

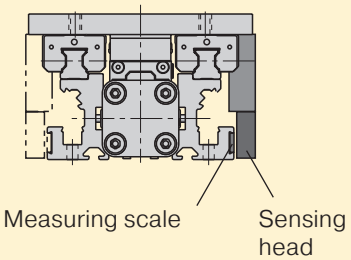
Arrangement of magnetic switches:
Magnetic switches can be fitted anywhere on either side.

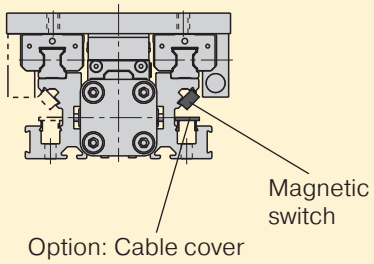
For further information see following data sheets:

Magnetic Switches see pages 161-170.

Dovetail Cover see page 85.







Series	A	B	AF	FB	FC	FD	FE	FF	FG	FH	FI	FJ	ØFL
HD25	100	22	22	120	145	110	70	M6	11	78	100	73	6
HD32	125	25.5	30	120	170	140	80	M6	11	86	112	85	6
HD40	150	28	38	160	180	140	110	M8	14	108	132	104	7.5
HD50	175	33	48	180	200	160	120	M8	14	118	150	118	7.5

Series	FM	FN	FP	FQ	FR	FS	FT	FU	TA	TB	TE	TF	TH
HD25	17.5	8	100	45	31	25	59	28	5.2	11.5	1.8	6.4	50
HD32	17.5	8	100	45	31	25	63	30	5.2	11.5	1.8	6.4	60
HD40	22	10	100	58	40	31.5	76	30	8.2	20	4.5	12.3	66
HD50	22	10	100	58	44	35.5	89	30	8.2	20	4.5	12.3	76

Note:

The dimension FO is derived from the last two digits of the stroke:

Example:

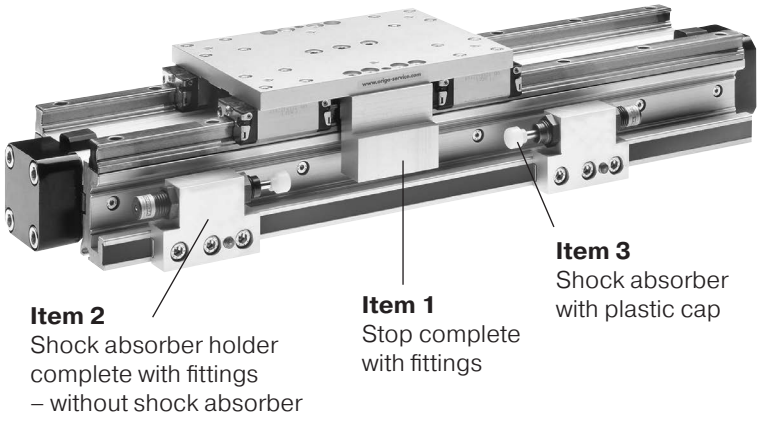
Stroke 15**25** mm

For a cylinder OSP-P25 the adjacent table indicates that for x = 25 mm:

FO = 62.5 mm

X	FO OSP-P HD25	HD32	HD40	HD50	X	FO OSP-P HD25	HD32	HD40	HD50	X	FO OSP-P HD25	HD32	HD40	HD50
00	50.0	75.0	50.0	75.0	34	67.0	42.0	67.0	92.0	68	34.0	59.0	84.0	59.0
01	50.5	75.5	50.5	75.5	35	67.5	42.5	67.5	92.5	69	34.5	59.5	84.5	59.5
02	51.0	76.0	51.0	76.0	36	68.0	43.0	68.0	93.0	70	35.0	60.0	85.0	60.0
03	51.5	76.5	51.5	76.5	37	68.5	43.5	68.5	43.5	71	35.5	60.5	85.5	60.5
04	52.0	77.0	52.0	77.0	38	69.0	44.0	69.0	44.0	72	36.0	61.0	86.0	61.0
05	52.5	77.5	52.5	77.5	39	69.5	44.5	69.5	44.5	73	36.5	61.5	86.5	61.5
06	53.0	78.0	53.0	78.0	40	70.0	45.0	70.0	45.0	74	37.0	62.0	87.0	62.0
07	53.5	78.5	53.5	78.5	41	70.5	45.5	70.5	45.5	75	37.5	62.5	87.5	62.5
08	54.0	79.0	54.0	79.0	42	71.0	46.0	71.0	46.0	76	38.0	63.0	88.0	63.0
09	54.5	79.5	54.5	79.5	43	71.5	46.5	71.5	46.5	77	38.5	63.5	38.5	63.5
10	55.0	80.0	55.0	80.0	44	72.0	47.0	72.0	47.0	78	39.0	64.0	39.0	64.0
11	55.5	80.5	55.5	80.5	45	72.5	47.5	72.5	47.5	79	39.5	64.5	39.5	64.5
12	56.0	81.0	56.0	81.0	46	73.0	48.0	73.0	48.0	80	40.0	65.0	40.0	65.0
13	56.5	81.5	56.5	81.5	47	73.5	48.5	73.5	48.5	81	40.5	65.5	40.5	65.5
14	57.0	82.0	57.0	82.0	48	74.0	49.0	74.0	49.0	82	41.0	66.0	41.0	66.0
15	57.5	82.5	57.5	82.5	49	74.5	49.5	74.5	49.5	83	41.5	66.5	41.5	66.5
16	58.0	83.0	58.0	83.0	50	75.0	50.0	75.0	50.0	84	42.0	67.0	42.0	67.0
17	58.5	83.5	58.5	83.5	51	75.5	50.5	75.5	50.5	85	42.5	67.5	42.5	67.5
18	59.0	84.0	59.0	84.0	52	76.0	51.0	76.0	51.0	86	43.0	68.0	43.0	68.0
19	59.5	84.5	59.5	84.5	53	76.5	51.5	76.5	51.5	87	43.5	68.5	43.5	68.5
20	60.0	85.0	60.0	85.0	54	77.0	52.0	77.0	52.0	88	44.0	69.0	44.0	69.0
21	60.5	85.5	60.5	85.5	55	77.5	52.5	77.5	52.5	89	44.5	69.5	44.5	69.5
22	61.0	36.0	61.0	86.0	56	78.0	53.0	78.0	53.0	90	45.0	70.0	45.0	70.0
23	61.5	36.5	61.5	86.5	57	78.5	53.5	78.5	53.5	91	45.5	70.5	45.5	70.5
24	62.0	37.0	62.0	87.0	58	79.0	54.0	79.0	54.0	92	46.0	71.0	46.0	71.0
25	62.5	37.5	62.5	87.5	59	79.5	54.5	79.5	54.5	93	46.5	71.5	46.5	71.5
26	63.0	38.0	63.0	88.0	60	80.0	55.0	80.5	55.0	94	47.0	72.0	47.0	72.0
27	63.5	38.5	63.5	88.5	61	80.5	55.5	80.5	55.5	95	47.5	72.5	47.5	72.5
28	64.0	39.0	64.0	89.0	62	81.0	56.0	81.0	56.0	96	48.0	73.0	48.0	73.0
29	64.5	39.5	64.5	89.5	63	81.5	56.5	81.5	56.5	97	48.5	73.5	48.5	73.5
30	65.0	40.0	65.0	90.0	64	82.0	57.0	82.0	57.0	98	49.0	74.0	49.0	74.0
31	65.5	40.5	65.5	90.5	65	32.5	57.5	82.5	57.5	99	49.5	74.5	49.5	74.5
32	66.0	41.0	66.0	91.0	66	33.0	58.0	83.0	58.0					
33	66.5	41.5	66.5	91.5	67	33.5	58.5	83.5	58.5					

Ordering Information – Variable Stop Type VS25 to VS50



Item 2
Shock absorber holder complete with fittings – without shock absorber

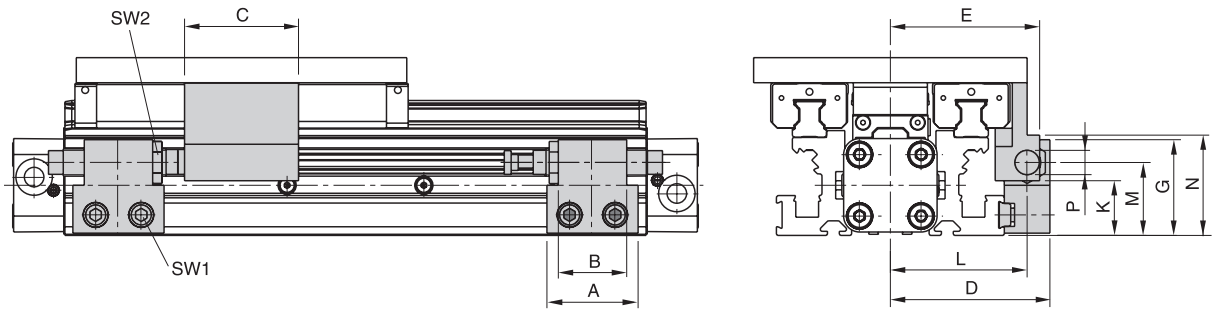
Item 1
Stop complete with fittings

Item 3
Shock absorber with plastic cap

	Size	VS25		VS32		VS40		VS50	
Item	Description	Type	Part Number	Type	Part Number	Type	Part Number	Type	Part Number
1	Stop, complete	–	**21257FIL**	–	**21158FIL**	–	**21159FIL**	–	**21260FIL**
2	Shock absorber holder, complete	–	**21202FIL**	–	**21203FIL**	–	**21204FIL**	–	**21205FIL**
3 *	Shock absorber, standard	SA12	**MC75M-1**	SA14	**MC150M-B**	SA20	**MC225M**	SAI25	**MC600M**
	Shock absorber, version S	SA12S	**MC75M-2**	SA14S	**MC150MH-B**	SA20S	**MC225MH**	SAI25S	**MC600MH**

* Shock absorber with plastic cap

Dimension – Variable Stop Type VS16 to VS50



Series	Type	A	B	C	D	E	G	K	L	M	N	P	SW1	SW2
OSP-HD25	VS25	40	30	50	70	65.5	42	26	60	32	42	M12 x 1	5	16
OSP-HD32	VS32	60	40	54	73	71	44	28	63	34	53	M14 x 1.5	5	17
OSP-HD40	VS40	84	52	55	96	92	59	35	82	45	61	M20 x 1.5	5	24
OSP-HD50	VS50	84	-	60	107	105	66	37	89	49	66	M25 x 1.5	5	30

Shock Absorber Selection

For shock absorber selection in dependence on mass and speed see page 68.

Intermediate Stop Module – 25mm only

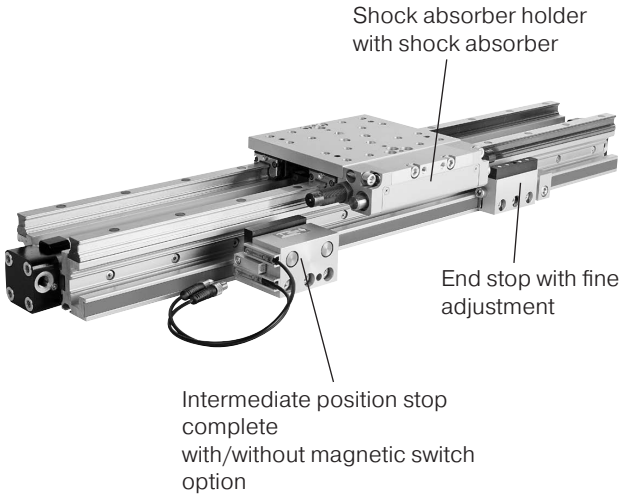
The intermediate stop module ZSM allows the guide carriage to stop at any desired intermediate positions with high accuracy. It can be retrofitted. Depending on the application, i.e. the number of intermediate stops, one or more intermediate position stops can be used.

The intermediate position stops can be retracted and extended without the need for the guide carriage to be moved back out of position.

Therefore the guide carriage can be made to stop at the defined intermediate positions in any order.

Intermediate stop module ZSM:

- Allows stopping at any intermediate positions
- Intermediate position stops can be located steplessly anywhere along the whole stroke length
- Movement to the next position without reverse stroke
- Compact unit
- Cost-effective positioning module without electrical or electronic components
- Option: end stop with fine adjustment



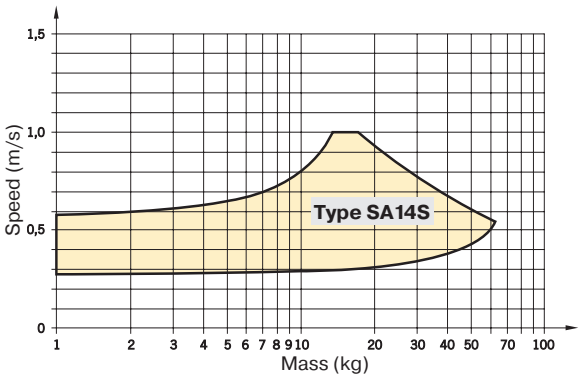
Operating Information

Operating pressure:	87 to 116 PSIG (4 to 8 bar)
Temperature range:	14°F to 158°F (-10°C to 70°C)
Intermediate position grid:	85mm

Shock Absorber

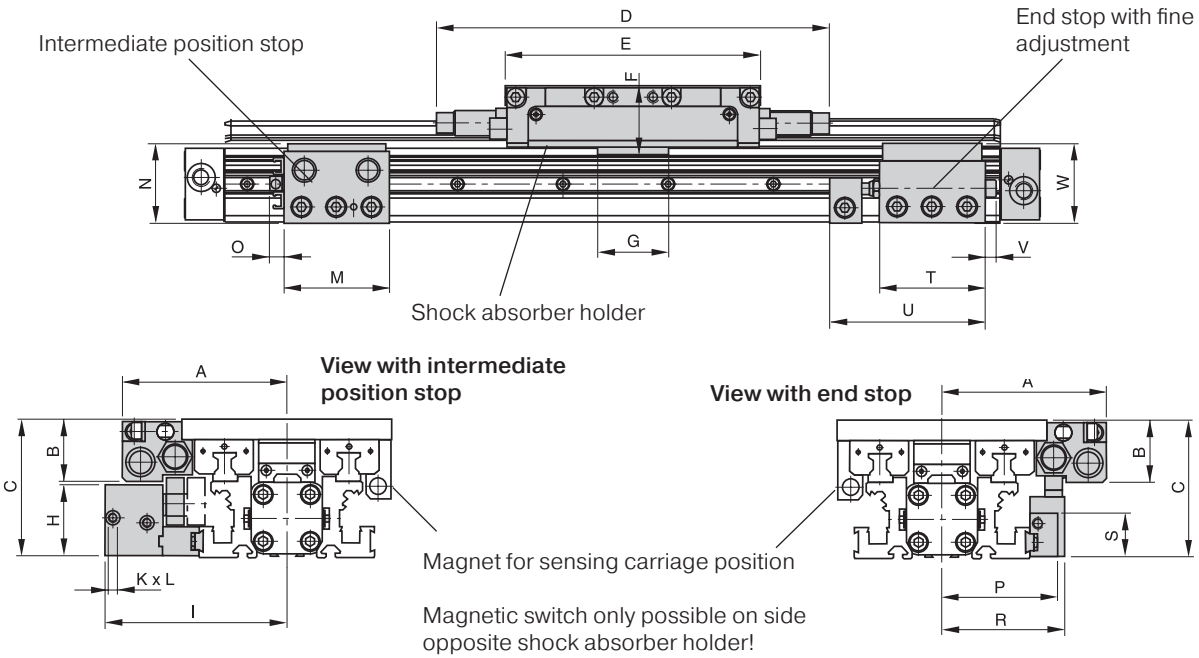
Type SA14S

The values relate to an effective driving force of 250 N (6 bar)



Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Intermediate Stop Module – Type ZSM..HD

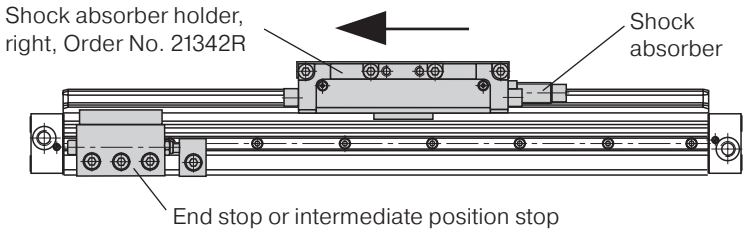


Dimension (mm)

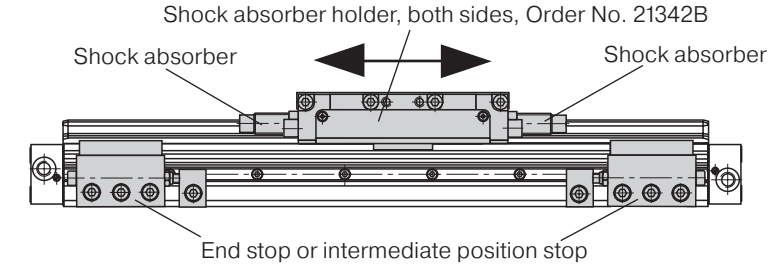
Series	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S	T	U	V	W
ZSM25	94	35	78	224	145	39	40	41	104	M5	5	60	45	8	66	70	26	60	93	6	45

Shock Absorber Arrangement in Dependence on Direction of Movement

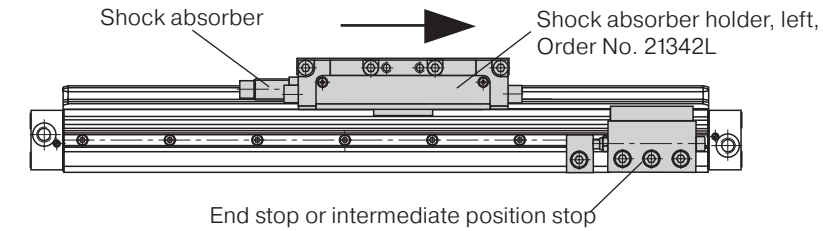
From right to left



In both directions



From left to right

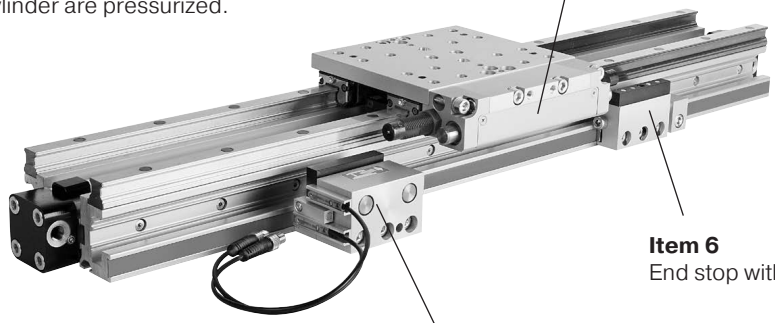


Order Instructions – intermediate Stop Module Type ZSM..HD

Illustration shows version with shock absorber holder for movement in both directions and magnetic switch option with T-slot switches.

Note: For movement onwards from the intermediate position, the intermediate position stop must advance.

The intermediate position stop can only advance if both cylinder chambers of the OSP-P cylinder are pressurized.



Item 1, 2, 3
Shock absorber holder with shock absorber SA14S optionally for movements to the left or right or in both directions

Item 6
End stop with fine adjustment

Item 4, 5
Intermediate position stop, complete, with/without magnetic switch option

Order instructions – intermediate stop module Type ZSM..HD 25mm Only

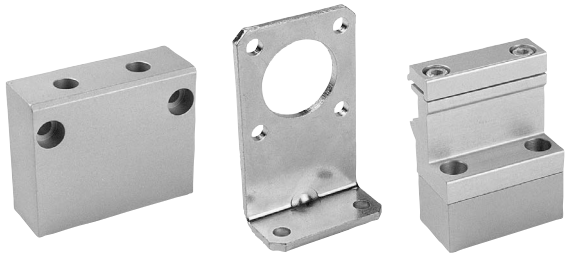
For Intermediate Stop Module	Item	Description	Part Number
ZSM25HD	1*	Shock absorber holder with shock absorber SA14S, both sides	**21342BFIL**
ZSM25HD	2*	Shock absorber holder with shock absorber SA14S, left	**21342LFIL**
ZSM25HD	3*	Shock absorber holder with shock absorber SA14S, right	**21342RFIL**
ZSM25HD	4	Intermediate position stop complete, without magnetic switch option	**21343FIL**
ZSM25HD	5	Intermediate position stop complete, with magnetic switch option	**21344FIL**
ZSM25HD	6	End stop with fine adjustment	**21346FIL**

* The shock absorbers are installed in the shock absorber holder and adjusted in our workshop.

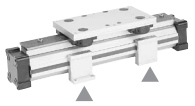
Mountings for Linear Drives fitted with OSP-Guides

For Linear-drive
Series OSP-P

OSP



Type – OSP Guides

Mounting Type	Type	SLIDELINE PROLINE MULTIBRAKE							POWERSLIDE									
		16 †	25	32	40	50	63 †	80 †	16/ 25	25/ 25	25/ 35	25/ 44	32/ 35	32/ 44	40/ 44	40/ 60	50/ 60	50/ 76
End cap mounting	Type A1	X							X									
	Type A2	O	O	O														
	Type A3									O	O		O					
End cap mounting, reinforced	Type B1		X	X						X	X	X	X	X				
	Type B3								O									
	Type B4											O		O				
	Type B5																	
End cap mounting	Type C1				X	X	X	X							X	X	X	X
	Type C2				O	O												
	Type C3						O	O							O		O	
	Type C4															O		O
Mid-Section support, small	Type D1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mid-Section support, wide	Type E1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Type E2	O	O	O	O	O												
	Type E3						O	O	O	O	O		O		O		O	
	Type E4											O		O		O		O
	Type E5																	

X = carriage mounted in top (12 o'clock position)
O = carriage mounted in lateral (3 or 9 o'clock position)
= available components
† = not available for all sizes

End Cap Mountings

Four internal screw threads are located in the end faces of all OSP actuators for mounting the drive unit. End cap mountings may be secured across any two adjacent screws.

Material:

- Series OSP-16, 25, 32: Galvanized steel
- Series OSP-40, 50, 63, 80: Anodized aluminum

The mountings are supplied in pairs.

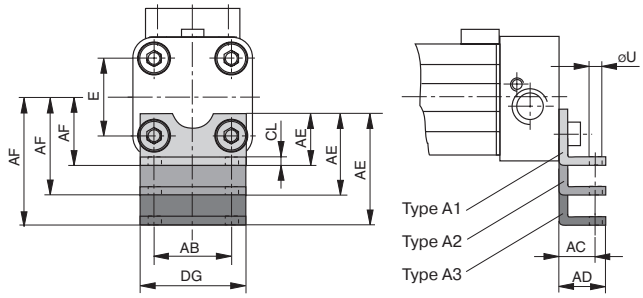
Dimension (mm)

AE and AF (Dependent on the mounting type)

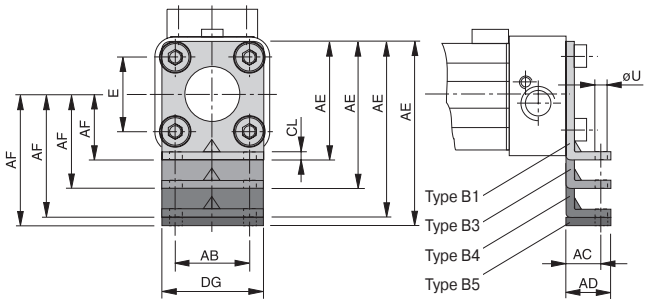
Mount. type	Dimensions AE for Size							AF for Size						
	16	25	32	40	50	63	80	16	25	32	40	50	63	80
A1	12.5	18	20	–	–	–	–	15	22	30	–	–	–	–
A2	27.5	33	34	–	–	–	–	30	37	44	–	–	–	–
A3	–	45	42	–	–	–	–	–	49	52	–	–	–	–
B1	–	42	55	–	–	–	–	–	22	30	–	–	–	–
B3	55	–	–	–	–	–	–	42	–	–	–	–	–	–
B4	–	80	85	–	–	–	–	–	60	60	–	–	–	–
B5	–	–	90	–	–	–	–	–	–	65	–	–	–	–
C1	–	–	–	24	30	40	50	–	–	–	38	48	57	72
C2	–	–	–	37	39	–	–	–	–	–	51	57	–	–
C3	–	–	–	46	54	76	88	–	–	–	60	72	93	110
C4	–	–	–	56	77	–	–	–	–	–	70	95	–	–

Series	E	øU	AB	AC	AD	CL	DG
OSP-P16	18	3.6	18	10	14	1.6	26
OSP-P25	27	5.8	27	16	22	2.5	39
OSP-P32	36	6.6	36	18	26	3	50
OSP-P40	54	9	30	12.5	24	-	68
OSP-P50	70	9	40	12.5	24	-	86
OSP-P63	78	11	48	15	30	-	104
OSP-P80	96	14	60	17.5	35	-	130

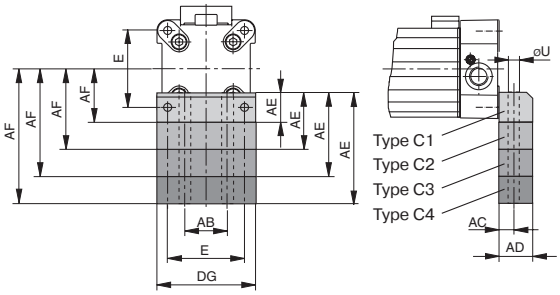
Series OSP-P16, 25, 32: Type A



Series OSP-P16, 25, 32: Type B



Series OSP-P40, 50, 63, 80: Type C



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Pneumatic Division
Wadsworth, OH
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End Cap Mountings – Type B Ø 16 to 32mm

For Linear-drive with Recirculating Ball Bearing Guide
- Series OSP-P STL
- Series OSP-P KF

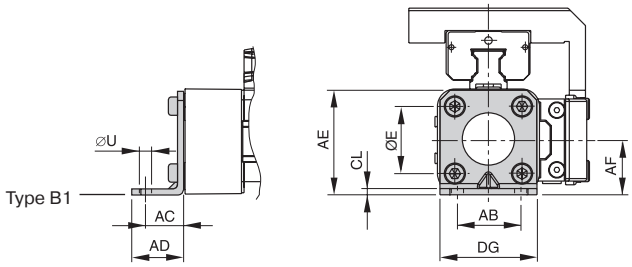
Material:
- Galvanized steel
- Anodized aluminum

The mountings are supplied in pairs.

Drawing shows: Mounting with Guide Type STL

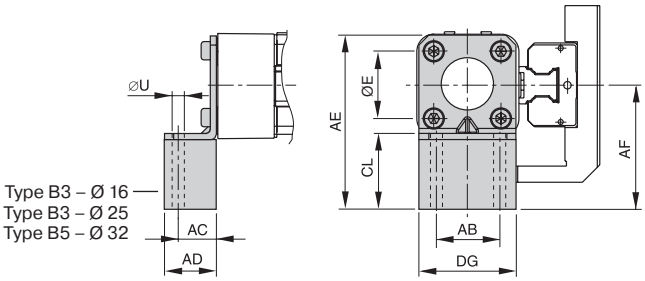
Type B1: 16, 25, 32mm
Series OSP-P STL and KF

Installation: Top carrier
Side piston



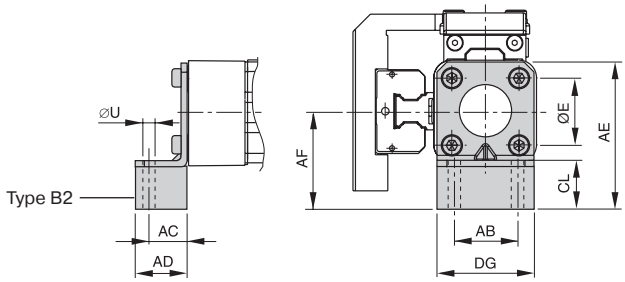
Type B3: 16, 25mm
Type B5: 32mm
Series OSP-P STL and KF

Installation: Side carrier
Piston below



Type B2: 16, 25, 32mm
Series OSP-P STL and KF

Installation: Side carrier
Top piston



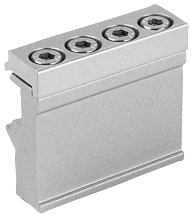
Dimension (mm), Type B

Series Type	Mounting	E	ØU	AB	AC	AD	AE	AF	CL	DG	Part Number (pair)
OSP-P STL16 OSP-P KF16	B1	18	3.6	18	10	14	28	15	2	26	**21135FIL**
	B2	18	3.6	18	10	14	43	30	17	26	**21136FIL**
	B3	18	3.6	18	10	14	55	42	29	26	**21137FIL**
OSP-P STL25 OSP-P KF25	B1	27	5.8	27	16	22	42	22	2.5	39	**20311FIL**
	B2	27	5.8	27	16	22	57	37	17.5	39	**21138FIL**
	B3	27	5.8	27	16	22	69	49	29.5	39	**21139FIL**
OSP-P STL32 OSP-P KF32	B1	36	6.6	36	18	26	55	30	3	50	**20313FIL**
	B2	36	6.6	36	18	26	69	44	17	50	**21140FIL**
	B5	36	6.6	36	18	26	90	65	9	50	**21141FIL**

Mid-Section Support – Type D1ST Ø 16 to 50mm

For Linear-drive with Recirculating Ball Bearing Guide

- Series OSP-P STL
- Series OSP-P KF



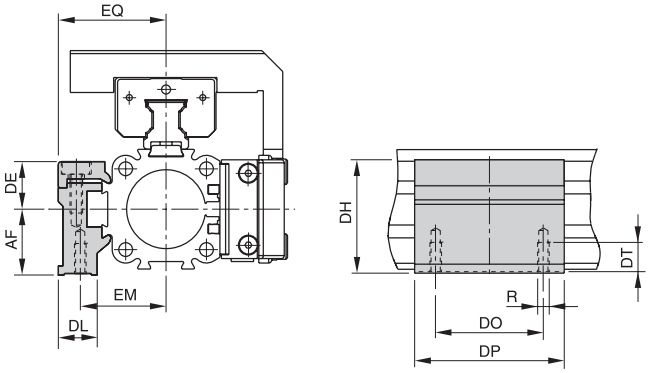
Note: on Types D1ST

The mid-section support can also be mounted on the underside of the actuator, in which case its distance from the center of the actuator is different.

Drawing shows: Mounting with Guide Type STL

Mountings from below with 2 screws

Type D1ST: 16 to 50mm
Series OSP-P STL and KF



Dimension (mm), Type D1ST

Series OSP-P ...	Mounting	R	AF	DE	DH	DL	DO	DP	DT	EM	EQ	Part Number
STL/KF16	D1ST	M3	15	14.2	29.2	14.6	18	30	6.5	20	27	**21125FIL**
STL/KF25	D1ST	M5	22	16	38	13	36	50	10	28.5	36	**21126FIL**
STL/KF32	D1ST	M5	30	16	46	13	36	60	10	35.5	43	**21127FIL**
STL/KF40	D1ST	M6	38	23	61	19	45	60	11	38	48	**21128FIL**
STL/KF50	D1ST	M6	48	23	71	19	45	60	11	45	57	**21129FIL**

Order example: Type D1ST16 Part number: 21125FIL

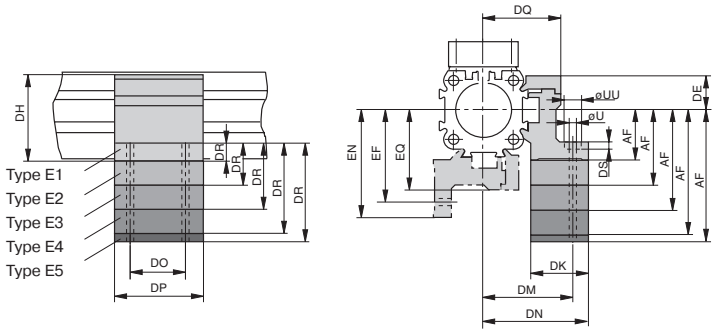
Mid-Section Support

Information regarding type E1 and D1:

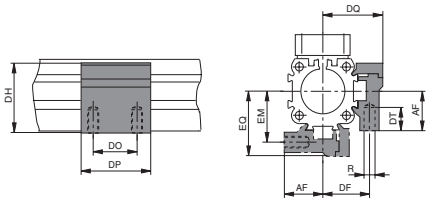
Mounting of the Mid-Section supports is also possible on the lower side of the drive. In this case, please note the new center line dimensions.

Stainless steel version on request.

Series OSP-P16 to 80: Type E
(Mounting from above / below using a cap screw)



Series OSP-P16 to 80: Type D1
(Mounting from below with thread screw)



Dimension (mm) - AF and DR (Dependent on the mounting type)

Mount. type	DR for Size 16	25	32	40	50	63	80	AF for Size 16	25	32	40	50	63	80
D1	–	–	–	–	–	–	–	15	22	30	38	48	57	72
E1	6	8	10	10	10	12	15	15	22	30	38	48	57	72
E2	21	23	24	23	19	–	–	30	37	44	51	57	–	–
E3	33	35	32	32	34	48	53	42	49	52	60	72	93	110
E4	–	46	40	42	57	–	–	–	60	60	70	95	–	–
E5	–	–	45	–	–	–	–	–	–	65	–	–	–	–

Dimension Table (mm)

Series	R	U	UU	DE	DF	DH	DK	DM	DN	DO	DP	DQ	DS	DT	EF	EM	EN	EQ
OSP-P16	M3	3.4	6	14.2	20	29.2	24	32	36.4	18	30	27	3.4	6.5	32	20	36.4	27
OSP-P25	M5	5.5	10	16	27	38	26	40	47.5	36	50	34.5	5.7	10	41.5	28.5	49	36
OSP-P32	M5	5.5	10	16	33	46	27	46	54.5	36	50	40.5	5.7	10	48.5	35.5	57	43
OSP-P40	M6	7	–	23	35	61	34	53	60	45	60	45	–	11	56	38	63	48
OSP-P50	M6	7	–	23	40	71	34	59	67	45	60	52	–	11	64	45	72	57
OSP-P63	M8	9	–	34	47.5	91	44	73	83	45	65	63	–	16	79	53.5	89	69
OSP-P80	M10	11	–	39.5	60	111.5	63	97	112	55	80	81	–	25	103	66	118	87

Ordering information for mountings – Type A, Type B, Type C, Type D, Type E

Mounting Type (versions)	Part Number 16	25	32	40	50	63	80
A1†	**20408FIL**	**2010**	**3010**	–	–	–	–
A2†	**20464FIL**	**2040**	**3040FIL**	–	–	–	–
A3†	–	**2060FIL**	**3060FIL**	–	–	–	–
B1†	–	**20311FIL**	**20313FIL**	–	–	–	–
B3†	**20465FIL**	–	–	–	–	–	–
B4†	–	**20312FIL**	**20314FIL**	–	–	–	–
B5†	–	–	**20976FIL**	–	–	–	–
C1†	–	–	–	**4010FIL**	**5010FIL**	**6010FIL**	**8010FIL**
C2†	–	–	–	**20338FIL**	**20349FIL**	–	–
C3†	–	–	–	**20339FIL**	**20350FIL**	**20821FIL**	**20822FIL**
C4†	–	–	–	**20340FIL**	**20351FIL**	–	–
D1	**20434FIL**	**20008FIL**	**20157FIL**	**20027FIL**	**20162FIL**	**20451FIL**	**20480FIL**
E1	**20435FIL**	**20009FIL**	**20158FIL**	**20028FIL**	**20163FIL**	**20452FIL**	**20482FIL**
E2	**20436FIL**	**20352FIL**	**20355FIL**	**20358FIL**	**20361FIL**	–	–
E3	**20437FIL**	**20353FIL**	**20356FIL**	**20359FIL**	**20362FIL**	**20453FIL**	**20819FIL**
E4	–	**20354FIL**	**20357FIL**	**20360FIL**	**20363FIL**	–	–
E5	–	–	**20977FIL**	–	–	–	–

† Pair

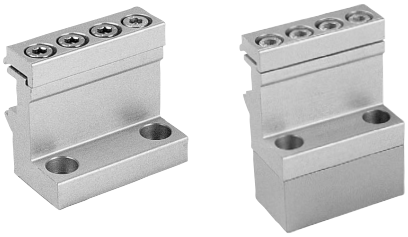
Mid-Section Support – Type E1ST to E5ST Ø 16 to 50mm

For Linear-drive with Recirculating Ball Bearing Guide

- Series OSP-P STL
- Series OSP-P KF

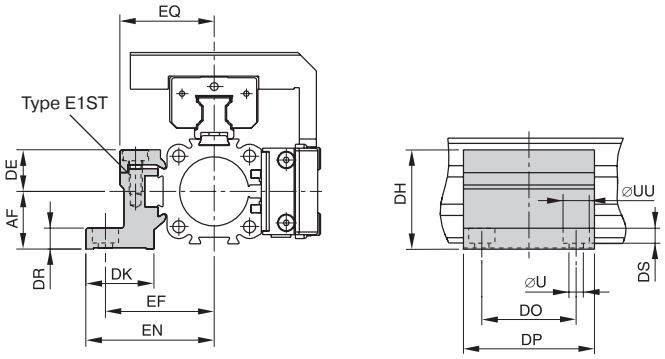
Drawing shows: Mounting with Guide Type STL

Mountings from below with 2 screws



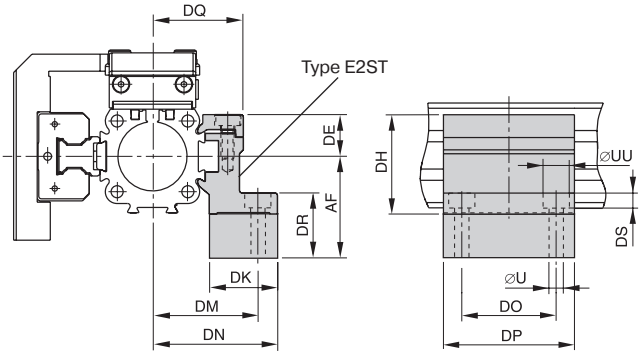
Type E1ST: 16 to 50mm
Series OSP-P STL and KF

Installation: Top carrier
Side position



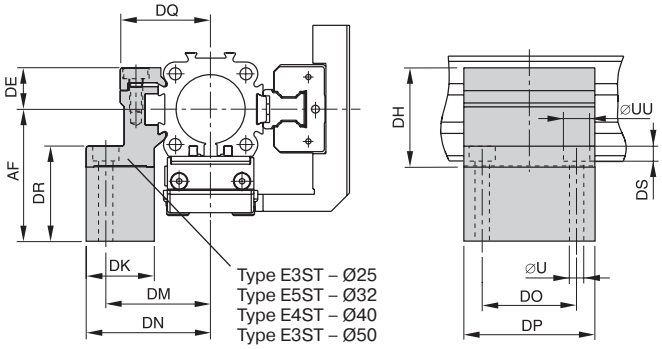
Type E2ST: 16 to 50mm
Series OSP-P STL and KF

Installation: Side carrier
Top piston



Type E3ST, E4ST, E5ST: 25 to 50mm
Series OSP-P STL and KF

Installation: Side carrier
Piston below



Dimension (mm), Type E1ST to E5ST

Series OSP-P ...	Mounting	ØU	ØUU	AF	DE	DH	DK	DM	DN	DO	DP	DR	DQ	DS	EF	EN	EQ	Part Number
STL/KF16	E1ST	3.4	6	15	14.2	29.2	24	32	36.4	18	30	6	27	3.4	32	36.4	27	**21130FIL**
STL/KF16	E2ST	3.4	6	30	14.2	29.2	24	32	36.4	18	30	21	27	3.4	32	36.4	27	**21142FIL**
STL/KF25	E1ST	5.5	10	22	16	38	26	40	47.5	36	50	8	34.5	5.7	41.5	49	36	**21131FIL**
STL/KF25	E2ST	5.5	10	37	16	38	26	40	47.5	36	50	23	34.5	5.7	41.5	49	36	**21143FIL**
STL/KF25	E3ST	5.5	10	49	16	38	26	40	47.5	36	50	35	34.5	5.7	41.5	49	36	**21148FIL**
STL/KF32	E1ST	5.5	10	30	16	46	27	46	54.5	36	60	10	40.5	5.7	48.5	57	43	**21132FIL**
STL/KF32	E2ST	5.5	10	44	16	46	27	46	54.5	36	60	24	40.5	5.7	48.5	57	43	**21144FIL**
STL/KF32	E5ST	5.5	10	65	16	46	27	46	54.5	36	60	45	40.5	5.7	48.5	57	43	**21151FIL**
STL/KF40	E1ST	7	-	38	23	61	34	53	60	45	60	10	45	-	56	63	48	**21133FIL**
STL/KF40	E2ST	7	-	51	23	61	34	53	60	45	60	23	45	-	56	63	48	**21145FIL**
STL/KF40	E4ST	7	-	70	23	61	34	53	60	45	60	42	45	-	56	63	48	**21150FIL**
STL/KF50	E1ST	7	-	48	23	71	34	59	67	45	60	10	52	-	64	72	57	**21134FIL**
STL/KF50	E2ST	7	-	57	23	71	34	59	67	45	60	19	52	-	64	72	57	**21146FIL**
STL/KF50	E3ST	7	-	72	23	71	34	59	67	45	60	34	52	-	64	72	57	**21149FIL**

Order example: Type E1ST16 **Part number: 21130FIL**

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
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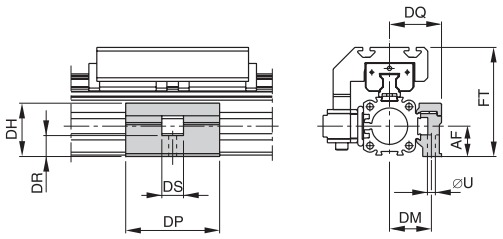
Mid-Section Support – Type MUP Ø 25 to 50mm (correspond to FESTO dimensions)

For Linear-drive with Recirculating Ball Bearing Guide

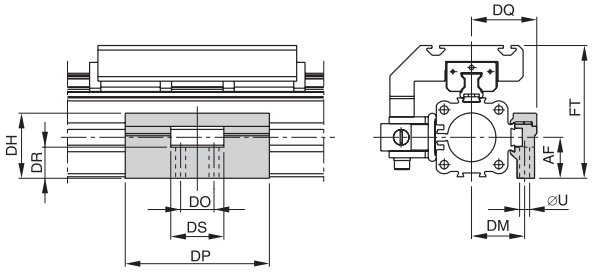
- Series OSP-P KF

Note: Correspond to FESTO DGPL-KF, when the Mid-Section Support MUP are mounted on the 90˚ side to the carriage (see drawings).

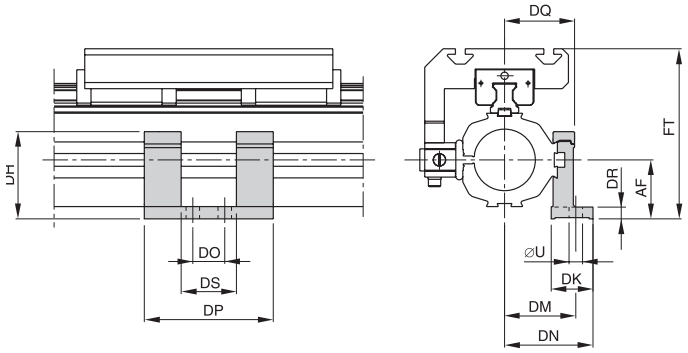
Series OSP-P KF25: Type MUP
(Mounting over through holes)



Series OSP-P KF32 to KF40: Type MUP
(Mounting over through holes)



Series OSP-P KF50: Type MUP
(Mounting over through holes)



Dimension (mm)

Series	ØU	AF	DH	DK	DM	DN	DO	DP	DQ	DR	DS	FT	Part Number
MUP25	5.5	21	36.9	–	29	–	–	65	36	14.5	15	75.5	**21119FIL**
MUP32	6.6	27	42.9	–	35	–	22	95	43	20.5	35	87.5	**21120FIL**
MUP40	6.6	35	58	–	40	–	22	95	48	28.5	35	104.5	**21121FIL**
MUP50	11	48	71	34	58	72	26	105	57	10	45	138.5	**21122FIL**

End Cap Mountings – Type C Ø 40 to 50mm

For Linear-drive with Recirculating Ball Bearing Guide

- Series OSP-P STL
- Series OSP-P KF

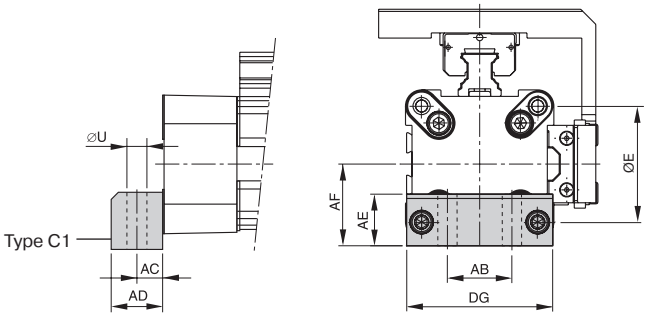
Material:

Anodized aluminum

The mountings are supplied in pairs.
Drawing shows: Mounting with Guide Type STL

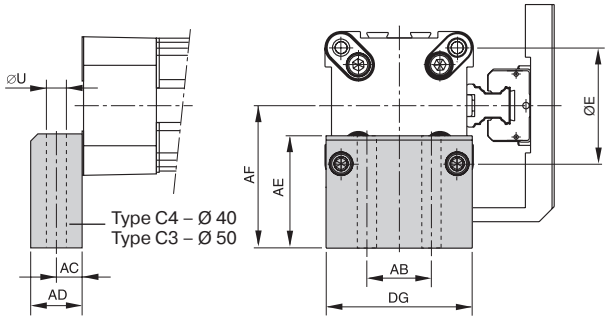
Type C1: 40, 50mm
Series OSP-P STL and KF

Installation Top carrier
Side piston



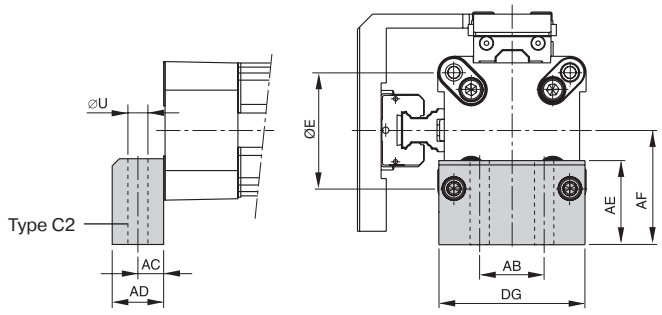
Type C4: 40mm
Type C3: 50mm
Series OSP-P STL and KF

Installation: Side carrier
Piston below



Type C2: 40, 50mm
Series OSP-P STL and KF

Installation: Side carrier
Top piston

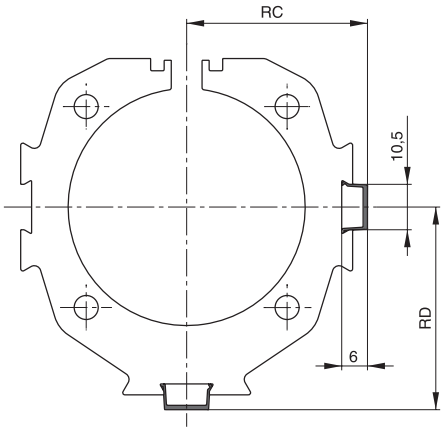


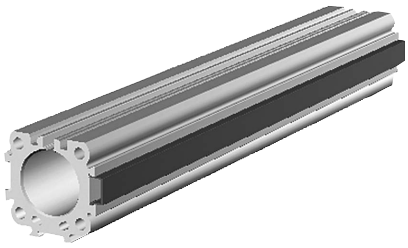
Dimension (mm), Type C

Series Type	Mounting	E	ØU	AB	AC	AD	AE	AF	DG	Part Number (pair)
OSP-P STL40 OSP-P KF40	C1	54	9	30	12.5	24	24	38	68	**4010FIL**
	C2	54	9	30	12.5	24	37	51	68	**20338FIL**
	C4	54	9	30	12.5	24	56	70	68	**20340FIL**
OSP-P STL50 OSP-P KF50	C1	70	9	40	12.5	24	30	48	86	**5010FIL**
	C2	70	9	40	12.5	24	39	57	86	**20349FIL**
	C3	70	9	40	12.5	24	54	72	86	**20350FIL**

Dovetail Cover, Ø16 to 80mm

- For clean guidance of magnetic switch cables along the cylinder body.
- Contains a maximum of 3 cables with diameter 3 mm.
- Material: Plastic
- Color: Red
- Temperature Range: –10 to 80°C





Dimension (mm) and Order Instructions

	Dimensions (mm)		
Series	**RC**	**RD**	**Part Number**
OSP-P16	18.5	19	**13039FIL**
OSP-P25	23.5	25.5	
OSP-P32	29.5	32	Minimal length: 1m Max. profile length: 2m
OSP-P40	34.5	37.5	
OSP-P50	41.5	46.5	Multiple profiles can be used.
OSP-P63	51.5	57.5	
OSP-P80	64.5	70.5	

Metric Conversion Fittings

Bore Size	Port Size	Part Number
P25	G1/8 to 1/8" NPT	**2521-1/8-02**
P32, P40, P50	G1/4 to 1/4" NPT	**2521-1/4-04**
P63	G3/8 to 3/8" NPT	**2521-3/8-06**
P80	G1/2 to 1/2" NPT	**2521-1/2-08**

Service Packs

	Bore Sizes							
	10mm	**16mm**	**25mm**	**32mm**	**40mm**	**50mm**	**63mm**	**80mm**
BUNA service pack single piston	3085x(stroke)	11111x(stroke)	11112x(stroke)	11113x(stroke)	11114x(stroke)	11115x(stroke)	11116x(stroke)	11118x(stroke)
Fluorocarbon service pack, single piston	3086x(stroke)	11121x(stroke)	11122x(stroke)	11123x(stroke)	11124x(stroke)	11125x(stroke)	11126x(stroke)	11128x(stroke)
BUNA service pack single piston - slow speed grease	—	11131x(stroke)	11132x(stroke)	11133x(stroke)	11134x(stroke)	11135x(stroke)	11136x(stroke)	11138x(stroke)
Fluorocarbon service pack, single piston - slow speed grease	—	11141x(stroke)	11142x(stroke)	11143x(stroke)	11144x(stroke)	11145x(stroke)	11146x(stroke)	11148x(stroke)

Note: (stroke) = stroke of cylinder in mm

Service Pack Information

Service Packs contain all the components necessary to completely rebuild a Parker rodless cylinder, are available. Each pack contains a complete seal kit, inner and outer bands, Parker grease tube, cleaning tool and repair instructions. It's all packaged in an easy-to-ship, easy-to-store box clearly labeled to indicate the cylinder type, bore and stroke for which it is intended. Contact your local Parker distributor for more information.

Seal & Service Kits

	Bore sizes						
	16mm	**25mm**	**32mm**	**40mm**	**50mm**	**63mm**	**80mm**
BUNA seal kit - standard cylinder	**11052**	**11053**	**11054**	**11055**	**11056**	**11057**	**11058**
Fluorocarbon seal kit - standard cylinder	**11059**	**11060**	**11061**	**11062**	**11063**	**11064**	**11065**
Service kit active brake - sideline carriage	—	**11095**	**11096**	**11097FIL**	**11098FIL**	—	—
Service kit active brake - standard cylinder	—	**11822FIL**	**11823FIL**	**11824FIL**	**11825FIL**	**11826FIL**	**11827FIL**
Service kit - multibrake	—	**11089FIL**	**11090FIL**	**11091FIL**	**11092FIL**	**11093FIL**	—

Seal Kit Information

Seal Kits include all seals, a tube of grease, bearing shoe, scraper and cleaning tool.

Rodless Pneumatic Cylinders
P1X Series

P1X Series - Band Type Rodless

Features	89
Ordering Information	90
Specifications / Technical Data	91-95
Dimensional Data	96-98
Accessories	99-107

P1X Series

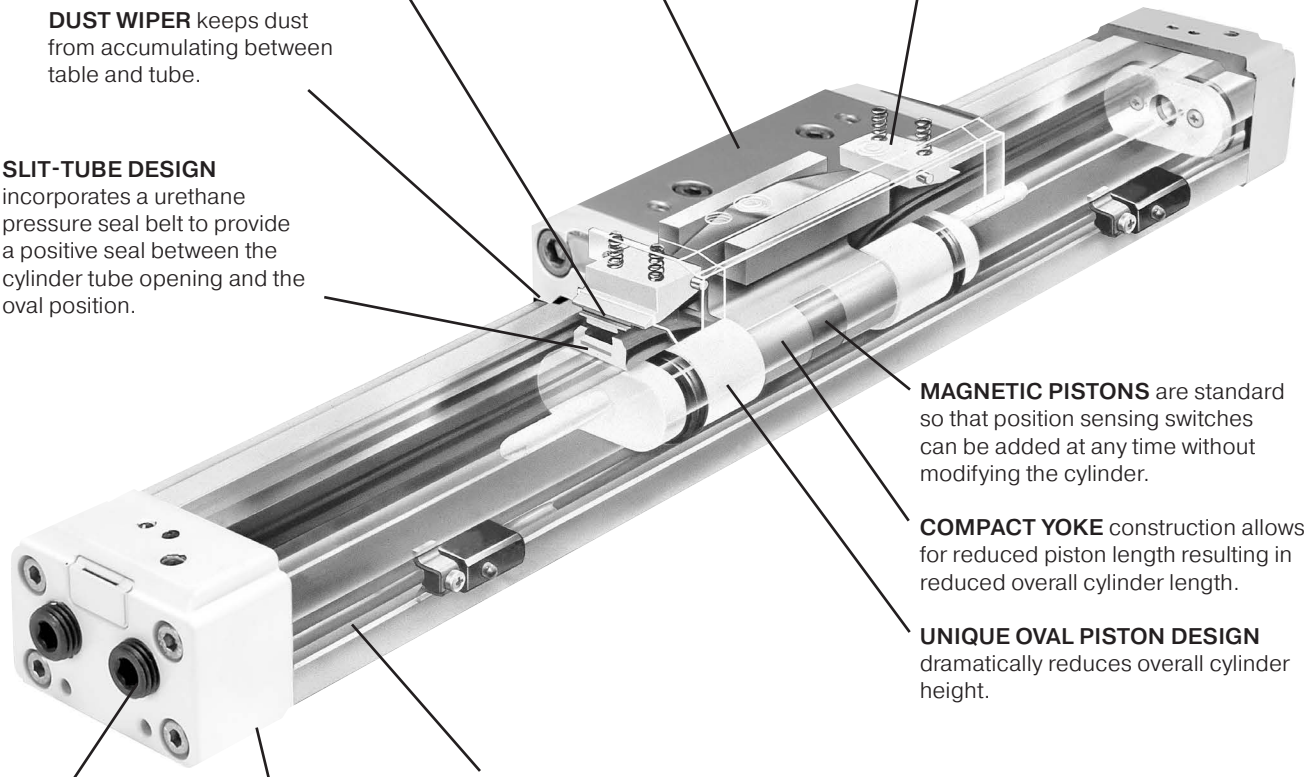
LARGE CARRIAGE with four strategically placed mounting holes ensures a high degree of stability and flexibility.

SPRING-LOADED TENSION ARMS located on the work table maintain constant pressure on the dust seal belt to ensure external sealing protection.

DUST-SEAL BELT located above the pressure seal belt, prevents contamination from entering the cylinder tube.

DUST WIPER keeps dust from accumulating between table and tube.

SLIT-TUBE DESIGN incorporates a urethane pressure seal belt to provide a positive seal between the cylinder tube opening and the oval position.



MAGNETIC PISTONS are standard so that position sensing switches can be added at any time without modifying the cylinder.

COMPACT YOKE construction allows for reduced piston length resulting in reduced overall cylinder length.

UNIQUE OVAL PISTON DESIGN dramatically reduces overall cylinder height.

ADDITIONAL PORTS IN ONE END CAP for optional piping location.

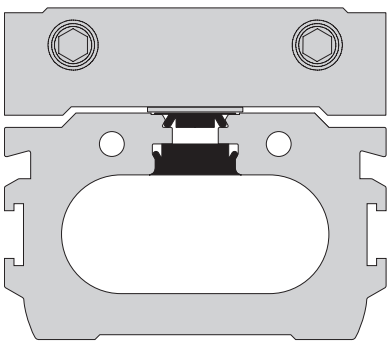
Note: End cap ports shown on this view are for representation only. Actual end ports are at other end of cylinder in relation to standard side ports and end ports are normally furnished plugged.

INTEGRAL SWITCH MOUNTING RAIL provides convenient mounting location for position sensing switches. Switches available include Solid State and Reed, AC or DC, with or without indicator lights. Bi-Color switches are available with 2 indicators to identify when maximum efficiency of contact is made.

ADJUSTABLE CUSHIONS for deceleration at end of stroke are standard.

Oval Piston Design

Oval piston design provides greater load carrying capacity than typical Rodless Pneumatic Cylinders with round pistons.



Features

- 7 bore sizes – 16mm through 63mm
- Two port locations standard
- Large carriage for stability
- Integral sensor mounting rail
- Optional adjustable stroke and shock absorbers
- Stroke: maximum 5000mm, minimum 25mm

Operating Information

Maximum pressure:	100 PSIG (7 bar)
Minimum pressure:	Ø16, Ø20 bores 29 PSI (2 bar) Ø25, Ø32, Ø40 bores 14.5 PSI (1 bar) Ø50, Ø63 bores 7 PSI (0.5 bar)
Proof pressure:	152 PSI (10.5 bar)
Temperature range:	40°F to 140°F (5°C to 60°C)
Filtration requirements:	Filtered, nonlubricated compressed air

Ordering Information

P1X	N	032	D	A	N	0500	W	D	N	N	N	-B

Series

P1X	Global Rodless

Construction

N	Inch
M	Metric

Bore Size

016	16mm
020	20mm
025	25mm
032	32mm
040	40mm
050	50mm
063	63mm

Carriage

D	Double Acting

Piston / Shock Style

A	Cushions Both Ends (standard)
R	Cushion Right End Only*
L	Cushion Left End Only*
N	No Cushions or Shock Absorbers
H	Shock Absorber Both Ends
B	Shock Absorber Right End Only
C	Shock Absorber Left End Only

* As viewed from port side of cylinder

Seal Material

N	Standard

Stroke Length*

Basic or Options

B†	Standard
W†	With Options
/	Special (for factory use only)

Carriage Mounting Style

D	Basic Mount
A	Swivel Mount

Porting Options

N	NPTF (Std)
G	BSPP
Q	BSPT*

* Not available with N construction

Mounting Options

No Foot Mount	End Mount Foot Bracket	Bottom Mount Foot Bracket	Intermediate Supports
N (std)	F	A††	No support
H	M	B††	One support
K	P	C††	Two supports
T	R	D††	Three supports

Fastener Type

N	Standard - Zinc-Plated
S	Stainless Steel

* Stroke is ALWAYS in mm.
† When "B" is specified, the remaining digits in the part number are not necessary. If "W" is used, the remaining digits in the part number must be filled out.
†† Not available on 40, 50 and 63mm bore sizes.

Essential Information
Optional Features

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Specifications - P1X (standard with switch)

- Operating Medium: Compressed Air
- Bore Size mm (inch nominal): 16 (5/8) | 20 (3/4), 25 (1) | 32 (1-1/4), 40 (1-1/2) | 50 (2), 63 (2-1/2)
- Port Size – N Series: M5 (10-32) | 1/8 NPT | 1/4 NPT | 3/8 NPT
- Port Size – M Series: M5 (10-32) | 1/8 Rc | 1/4 Rc | 3/8 Rc
- Stroke Tolerance in.: ±0.080 to 39" ±0.100 to 118" ±0.120 to 196"
- Piston Speed, *in./sec.: 2-80 IPS with side ports on each end
  (Ø16 & Ø20 bores 2-40 IPS with single end porting with 39" stroke)
  (Ø25, Ø32, Ø40, Ø50 & Ø63 bores 2-40 IPS with single end porting with 78" stroke)
- Cushion: Air Cushion Standard
- Lubrication: Not Required (if you choose to lubricate your system, continuing lubrication will be required.)

***Note:** Actual piston speed with one end ports will vary depending on stroke length.

Weight & Theoretical Force Characteristics

		Weights								Theoretical Force (lbs)				
		Weight at Zero Stroke						Weight per 1" (25.4mm) Stroke		at Pressure (PSI)				
		M00		MLB		MLB1								
Bore	Area In2	lbs	kg	lbs	kg	lbs	kg	lbs	kg	30	40	60	80	100
16	0.31	0.70	0.3	0.73	0.3	0.77	0.4	0.07	0.03	9	12	19	25	31
20	0.49	1.15	0.5	1.19	0.5	1.28	0.6	0.10	0.04	15	20	29	39	49
25	0.84	2.21	1.0	2.43	1.1	2.43	1.1	0.15	0.07	23	30	46	61	76
32	1.26	3.31	1.5	3.53	1.6	3.75	1.7	0.20	0.09	38	50	69	100	125
40	1.96	5.29	2.4	5.51	2.5	—	—	0.27	0.12	59	78	117	156	195
50	3.08	7.94	3.6	8.16	3.7	—	—	0.40	0.18	91	122	182	243	304
63	4.86	13.67	6.2	14.33	6.5	—	—	0.63	0.28	145	193	290	386	483

Replacement Seal Kits
(includes inner & outer bands)

Bore (mm)	Part Number
16	L079020016-(stroke)
20	L079020020-(stroke)
25	L080100025-(stroke)
32	L080100032-(stroke)
40	L080100040-(stroke)
50	L080100050-(stroke)
63	L080100063-(stroke)

Moments

Figure 1 shows the maximum allowable moments for each of the three types of loading: pitch, roll and yaw.

The sum total of each of these types of moments, divided by each of the maximum values, determines a Load-Moment Factor (LMF) should be equal to or less than 1.0. On horizontal mountings, the total load (L) should also be divided by the maximum load allowable (Figure 2) and factored into the equation.

Horizontal mountings:

$$\frac{L}{[L]} + \frac{M}{[M]} + \frac{Ms}{[Ms]} + \frac{Mv}{[Mv]} = LMF \leq 1.0$$

Vertical mountings:

$$\frac{M}{[M]} + \frac{Ms}{[Ms]} + \frac{Mv}{[Mv]} = LMF \leq 1.0$$

Figure 1

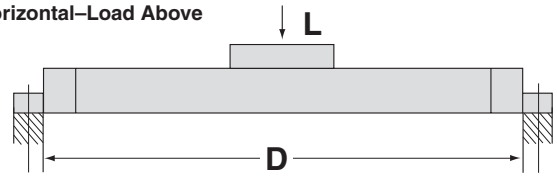
Maximum allowable moments n-m (lb-in)

Bore size	[M] Pitch Moment Std.	[M] Pitch Moment Inverted	[Ms] Roll Moment Std.	[Ms] Roll Moment Inverted	[Mv] Yaw Moment Std.	[Mv] Yaw Moment Inverted
16	5 (44)	3.5 (31)	1 (9)	0.5 (4)	1 (9)	1 (9)
20	10 (89)	7 (62)	1.5 (13)	0.7 (6)	3 (27)	3 (27)
25	17 (150)	12 (106)	5 (44)	2.5 (22)	10 (89)	10 (89)
32	36 (319)	25 (221)	10 (89)	5 (44)	21 (186)	21 (186)
40	77 (682)	54 (478)	23 (204)	11.5 (102)	26 (230)	26 (230)
50	154 (1363)	108 (956)	32 (283)	16 (142)	42 (372)	42 (372)
63	275 (2434)	193 (1708)	52 (460)	26 (230)	76 (673)	76 (673)

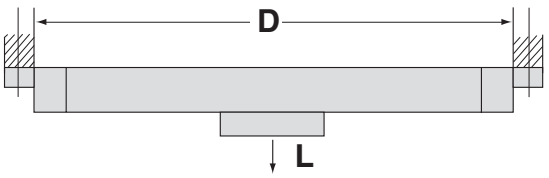
Load and Deflection

Figure 2 shows the maximum load [L] that the cylinder can accept, as well as the maximum length [D] between supports at the maximum load.

Horizontal–Load Above



Horizontal–Load Below



Horizontal–Tube Support

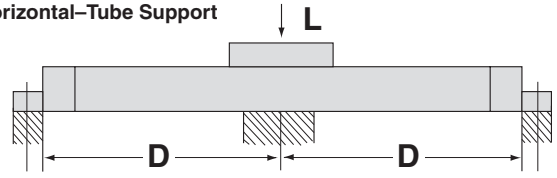
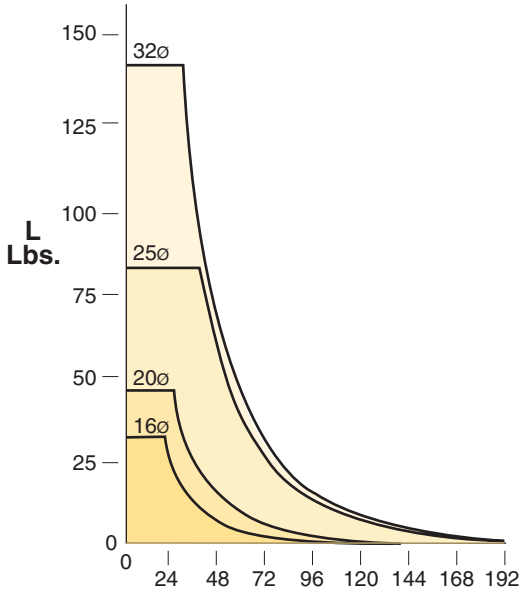


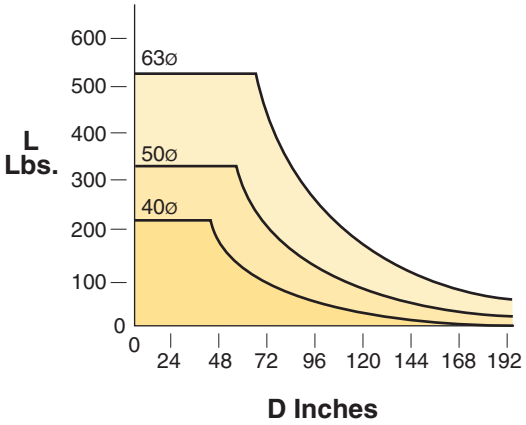
Figure 2

Bore Size	Max. Allowable load [L] N (lbs) Std.	Max. Allowable load [L] N (lbs) Inverted	Max. Unsupported Length mm (in) at Max. load
16	141 (32)	70 (16)	450 (17.7)
20	198 (45)	101 (23)	551 (21.7)
25	356 (81)	180 (41)	899 (35.4)
32	616 (140)	308 (70)	749 (29.5)
40	959 (218)	480 (109)	1000 (39.4)
50	1456 (331)	726 (165)	1300 (51.2)
63	2297 (522)	1148 (261)	1600 (63.0)

Acceptable length and load combinations for various bore sizes can be determined from the charts in Figure 3.

Figure 3





To determine cylinder deflections under the load (or resistive force perpendicular to the piston table) without mid-support, see the graphs on page 107.

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Inertia Moment Consideration

When the weight is stopped at the end of the stroke by the cylinder cushion, inertial force is created. This inertial force (Fi) can be determined by using the formula:

Fi = **LG**

L = Load attached to the cylinder carriage (lbs.)

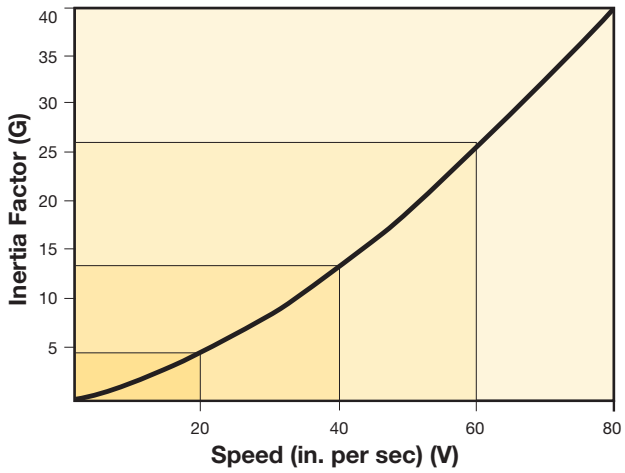
G = Inertia factor (Figure 1)

Example:
A speed of 40 in/sec corresponds to an inertia factor G of 13.

The inertial force calculated would then be multiplied by the distance from the center of gravity of the load to the centerline of the cylinder, and added to the previously calculated M and Mv moments. This will give an M Total and Mv Total. Ensure that the M Total and the Mv Total do not exceed the [M] and [Mv] values shown in Figure 5 (previous page). If they exceed these values, consult the factory.

See pages 106-107 for additional information on shock absorbers.

Figure 1

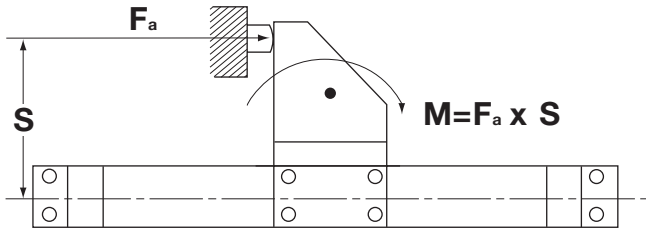


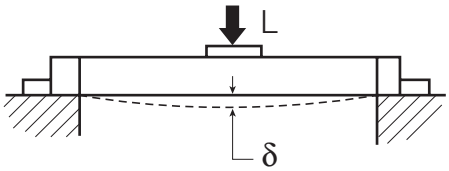
External Stops

When the load attached to the cylinder is stopped externally, it creates an additional moment equal to the cylinder force (Fa) times the distance (S). This additional moment, plus the previously calculated Load-Moment factor, should not exceed the allowable values. See previous page.

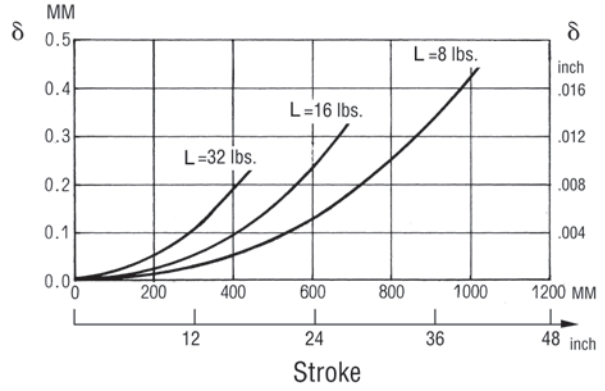
When reducing the stroke with external stops, remember that the cushion length and the energy absorption capacity are not directly proportional. Reducing the cushioning distance by 50% corresponds to a reduction of 60-70% in cushion effectiveness.

Figure 9

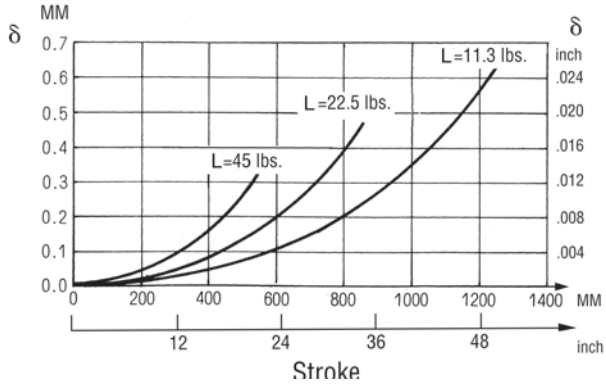




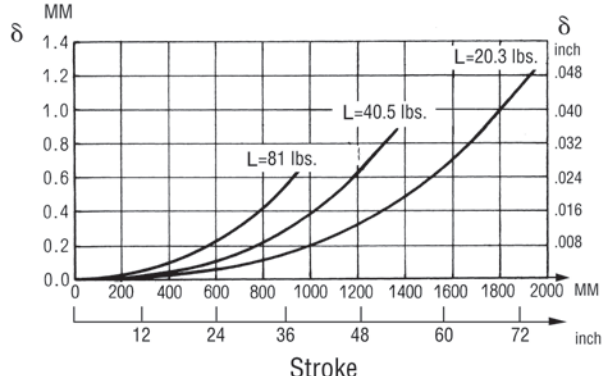
16 mm Bore



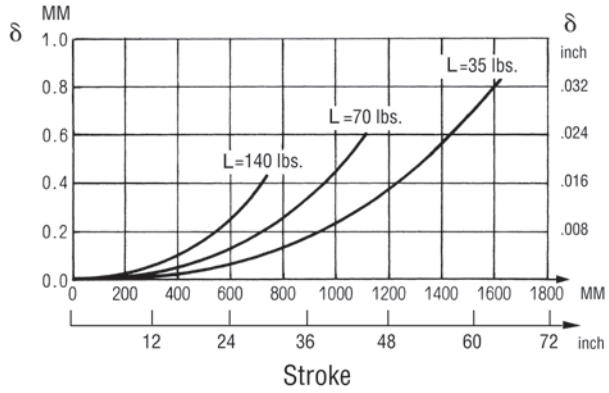
20 mm Bore



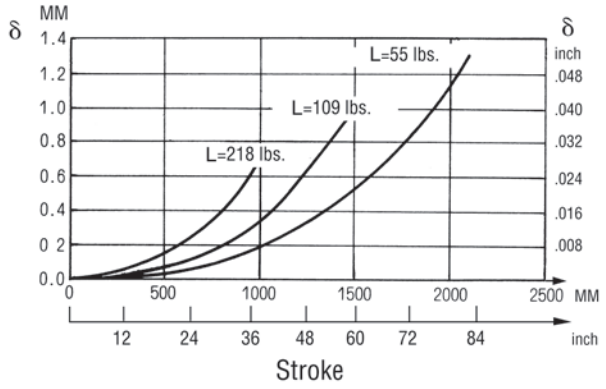
25 mm Bore



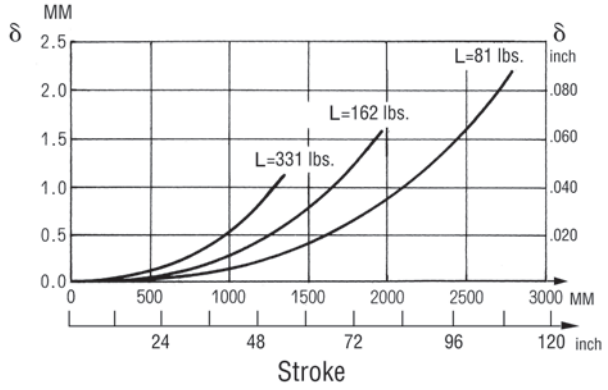
32 mm Bore



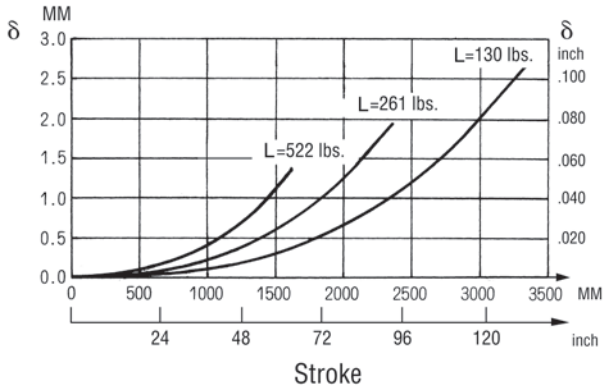
40 mm Bore



50 mm Bore



63 mm Bore



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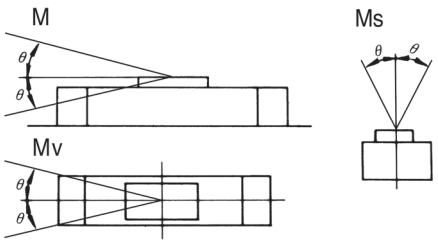
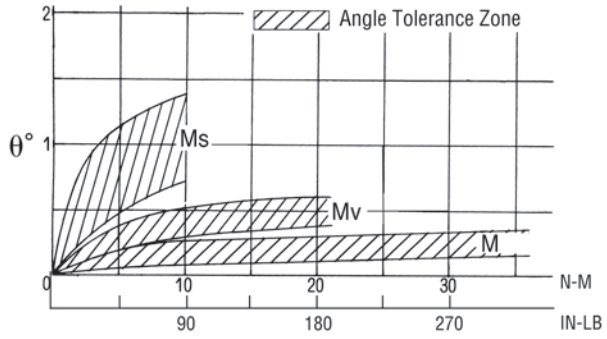
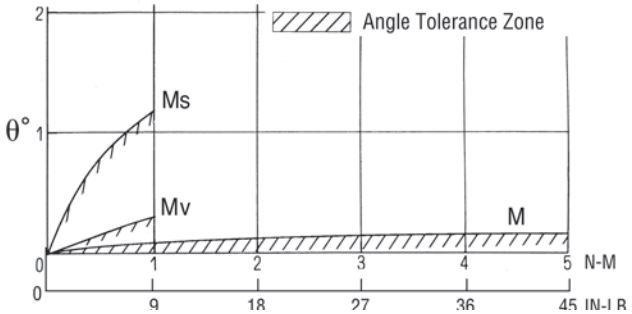
Piston Table Angular Deflection Due To Load Moments Applied



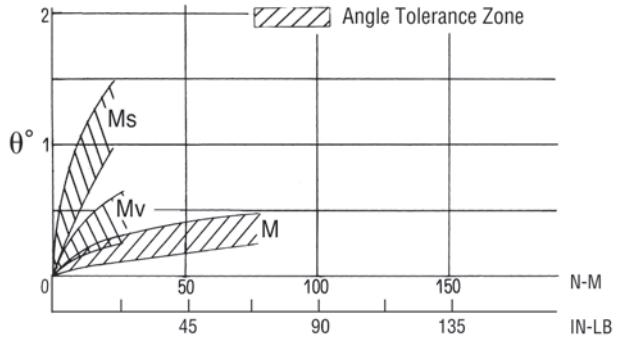
32 mm Bore



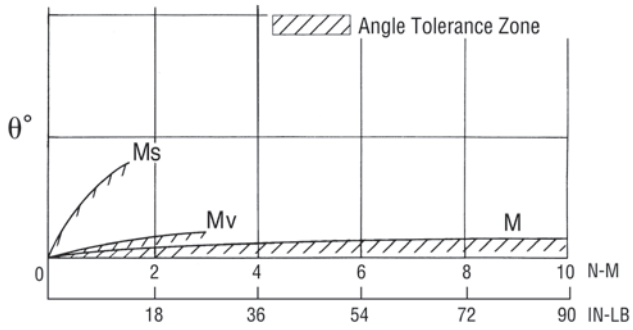
16 mm Bore



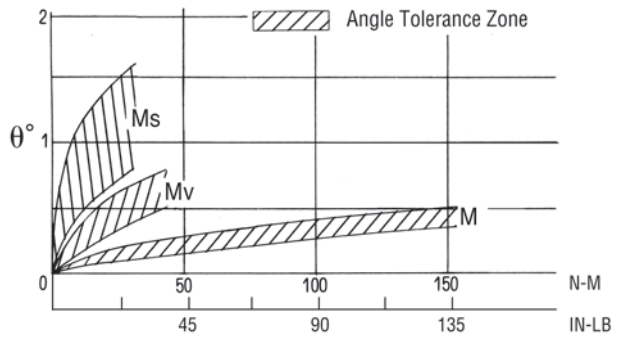
40 mm Bore



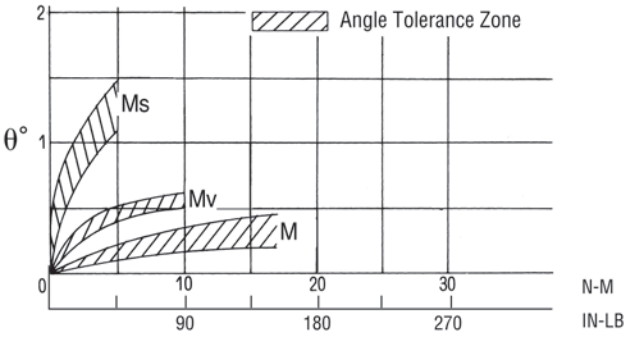
20 mm Bore



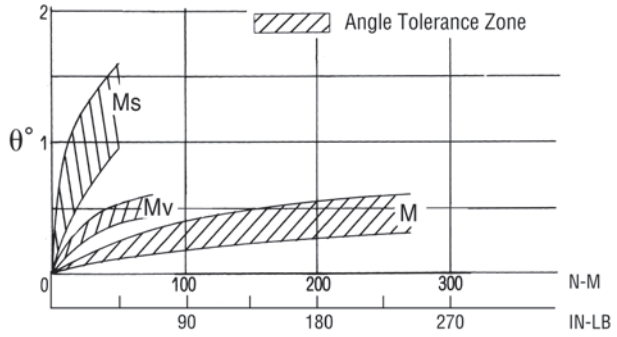
50 mm Bore



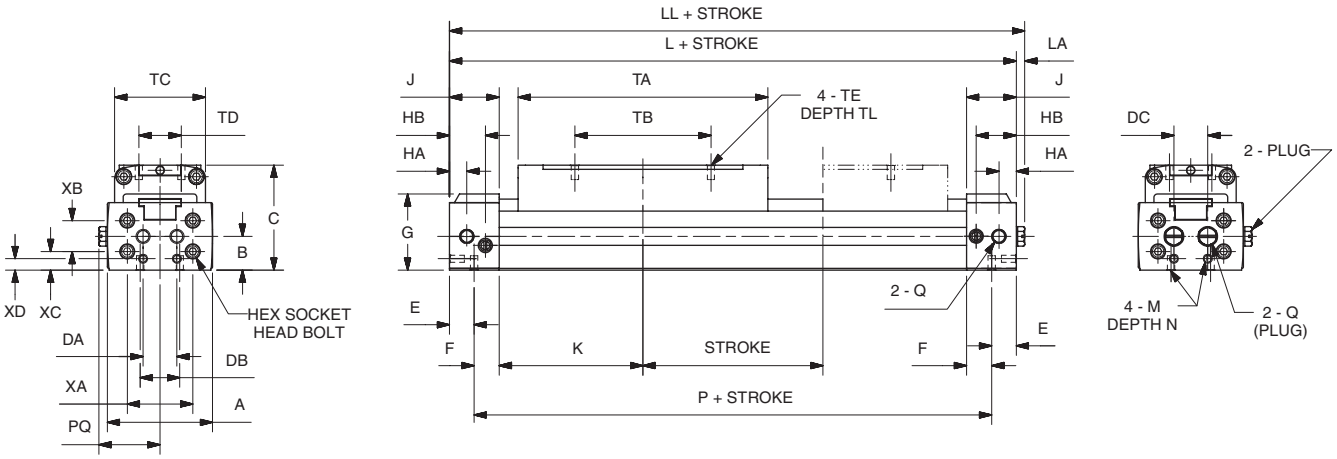
25 mm Bore



63 mm Bore



Basic Cylinder

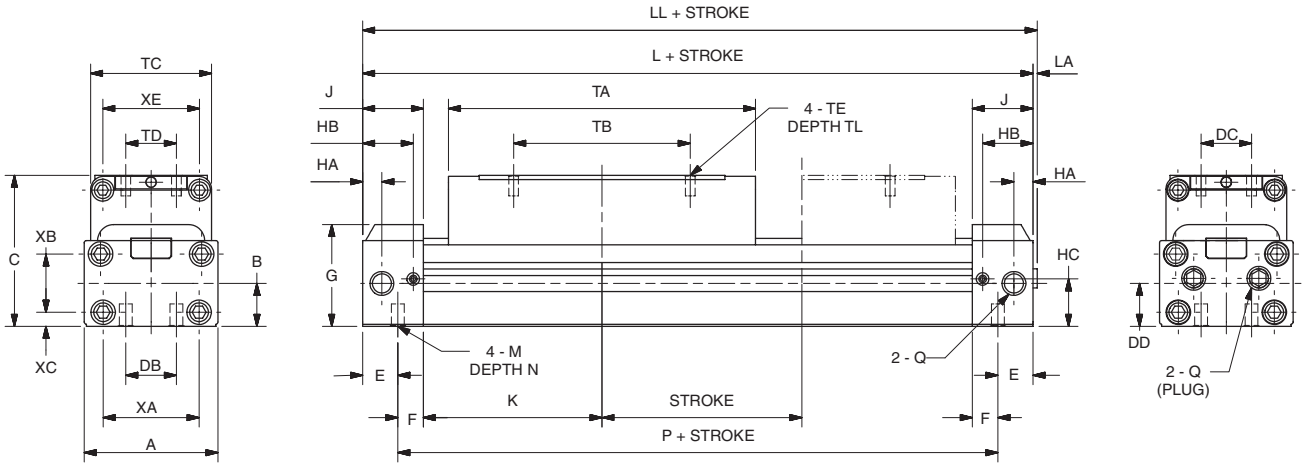


Bore (mm)	A	B	C	DA	DB	DC	E	F	G	HA	HB	J	K	L	LL	LA	M	N
16	1.46 (37)	0.47 (12)	1.46 (37)	0.47 (12)	0.55 (14)	0.47 (12)	0.34 (8.5)	0.35 (9)	1.06 (27)	0.24 (6)	0.55 (14)	0.69 (17.5)	2.24 (57)	5.87 (149)	5.98 (152)	0.12 (3)	5-40 (M3)	0.20 (5)
20	1.73 (44)	0.55 (14)	1.65 (42)	0.55 (14)	0.63 (16)	0.63 (16)	0.41 (10.5)	0.45 (11.5)	1.22 (31)	0.34 (8.5)	0.73 (18.5)	0.87 (22)	2.46 (62.5)	6.65 (169)	6.75 (171.5)	0.10 (2.5)	8-32 (M4)	0.26 (6.5)

Bore (mm)	P	PQ	Q	TA	TB	TC	TD	TE	TL	XA	XB	XC	XD
16	5.20 (132)	0.83 (21)	10-32 NPT (M5)	3.47 (88)	1.89 (48)	1.26 (32)	0.59 (15)	5-40 (M3)	0.20 (5)	0.91 (23)	0.43 (11)	0.26 (6.5)	0.16 (4)
20	5.83 (148)	0.97 (24.5)	1/8 NPT (1/8 Rc)	3.94 (100)	2.36 (60)	1.50 (38)	0.71 (18)	8-32 (M4)	0.24 (6)	1.10 (28)	0.63 (16)	0.24 (6)	0.20 (5)

inches (mm)

Basic Cylinder



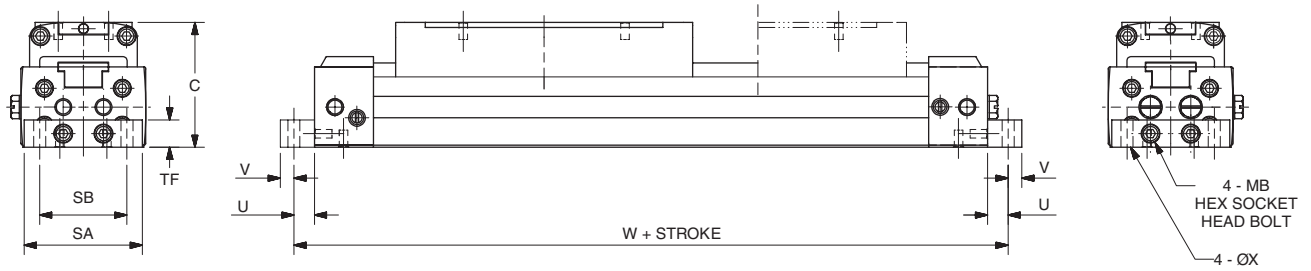
Bore (mm)	A	B	C	DB	DC	DD	E	F	G	HA	HB	HC	J	K	L	LL	LA	M	N
25	2.09 (53)	0.67 (17)	2.09 (53)	0.79 (20)	1.02 (26)	0.75 (19)	0.55 (14)	0.39 (10)	1.59 (40.5)	0.30 (7.5)	0.79 (20)	0.74 (18.9)	0.95 (24)	2.80 (71)	7.48 (190)	7.56 (192)	0.08 (2)	1/4-20 (M6)	0.35 (9)
32	2.60 (66)	0.73 (18.5)	2.24 (57)	1.26 (32)	1.06 (27)	0.83 (21)	0.59 (15)	0.51 (13)	1.71 (43.5)	0.39 (10)	0.93 (23.5)	0.85 (21.5)	1.10 (28)	3.35 (85)	8.90 (226)	9.00 (228.5)	0.10 (2.5)	1/4-20 (M6)	0.35 (9)
40	3.15 (80)	0.87 (22)	2.64 (67)	1.42 (36)	1.38 (35)	1.10 (28)	0.67 (17)	0.55 (14)	2.03 (51.5)	0.51 (13)	1.02 (26)	1.06 (27)	1.22 (31)	3.58 (91)	9.61 (244)	9.71 (246.5)	0.10 (2.5)	5/16-18 (M8)	0.47 (12)
50	3.78 (96)	1.10 (28)	3.23 (82)	1.77 (45)	1.38 (35)	1.38 (35)	0.91 (23)	0.63 (16)	2.40 (61)	0.59 (15)	1.30 (33)	1.39 (35.3)	1.54 (39)	3.54 (90)	10.16 (258)	10.26 (260.5)	0.10 (2.5)	5/16-18 (M8)	0.47 (12)
63	4.65 (118)	1.38 (35)	3.74 (95)	1.97 (50)	1.54 (39)	1.65 (42)	0.75 (19)	0.79 (20)	2.91 (74)	0.59 (15)	1.26 (32)	1.69 (43)	1.54 (39)	4.29 (109)	11.65 (296)	11.75 (298.5)	0.10 (2.5)	3/8-16 (M10)	0.59 (15)

Bore (mm)	P	Q	TA	TB	TC	TD	TE	TL	XA	XB	XC	XE
25	6.38 (162)	1/8 NPT (1/8 Rc)	4.80 (122)	2.76 (70)	1.89 (48)	0.79 (20)	10-24 (M5)	0.32 (8)	1.50 (38)	0.91 (23)	0.22 (5.5)	1.58 (40)
32	7.72 (196)	1/4 NPT (1/4 Rc)	5.28 (134)	3.15 (80)	2.21 (56)	0.79 (20)	1/4-20 (M6)	0.35 (9)	1.89 (48)	0.98 (25)	0.24 (6)	1.85 (47)
40	8.27 (210)	1/4 NPT (1/4 Rc)	5.83 (148)	3.54 (90)	2.68 (68)	1.18 (30)	1/4-20 (M6)	0.43 (11)	2.36 (60)	1.18 (30)	0.28 (7)	2.28 (58)
50	8.35 (212)	3/8 NPT (3/8 Rc)	5.98 (152)	3.94 (100)	3.15 (80)	1.18 (30)	5/16-18 (M8)	0.51 (13)	2.91 (74)	1.42 (36)	0.39 (10)	2.76 (70)
63	10.16 (258)	3/8 NPT (3/8 Rc)	6.61 (168)	4.33 (110)	4.02 (102)	1.58 (40)	5/16-18 (M8)	0.51 (13)	3.78 (96)	1.65 (42)	0.55 (14)	3.54 (90)

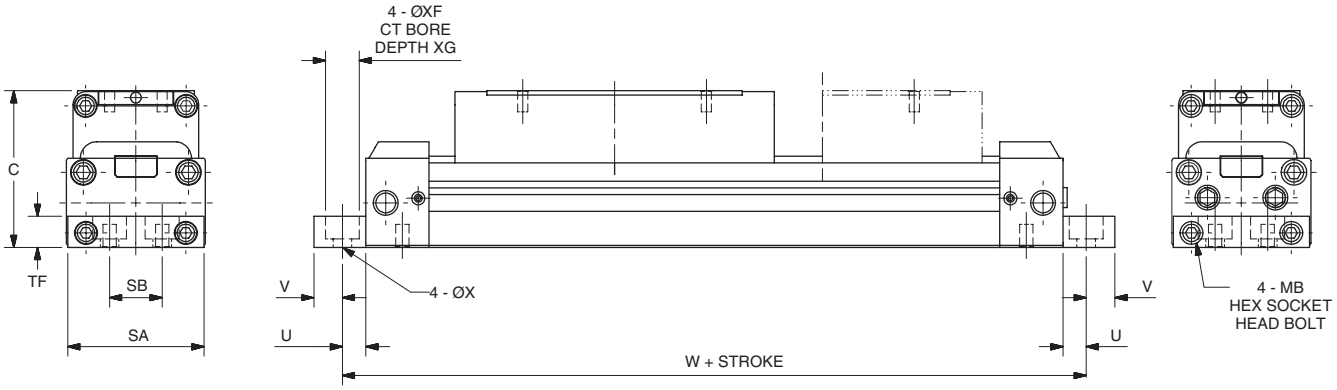
inches (mm)

End Mount Foot Bracket

16 to 32 mm bore sizes



40 to 63 mm bore sizes

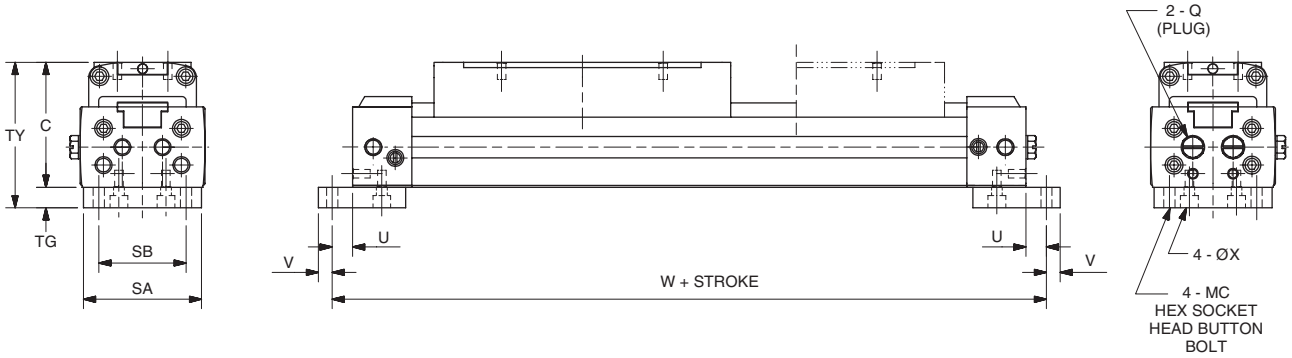


Bore (mm)	C	SA	SB	TF	U	V	W	X	XF	XG	MB
16	1.46 (37)	1.38 (35)	1.02 (26)	0.32 (8)	0.24 (6)	0.16 (4)	6.34 (161)	0.14 (3.6)	—	—	M3x10
20	1.65 (42)	1.69 (43)	1.30 (33)	0.39 (10)	0.24 (6)	0.24 (6)	7.13 (181)	0.19 (4.7)	—	—	M4x12
25	2.09 (53)	2.05 (52)	0.79 (20)	0.47 (12)	0.35 (9)	0.43 (11)	8.19 (208)	0.28 (7)	—	—	M5x50
32	2.24 (57)	2.52 (64)	1.26 (32)	0.47 (12)	0.35 (9)	0.43 (11)	9.61 (244)	0.28 (7)	—	—	M5x50
40	2.64 (67)	3.15 (80)	1.42 (36)	0.59 (15)	0.49 (12.5)	0.45 (11.5)	10.60 (269)	0.35 (9)	0.51 (13)	0.34 (8.7)	M6x55
50	3.23 (82)	3.70 (94)	1.77 (45)	0.79 (20)	0.49 (12.5)	0.45 (11.5)	11.10 (283)	0.35 (9)	0.51 (13)	0.34 (8.7_	M8x65
63	3.74 (95)	4.57 (116)	1.97 (50)	0.98 (25)	0.59 (15)	0.59 (15)	12.80 (326)	0.43 (11)	0.61 (15.5)	0.41 (10.5)	M8x70

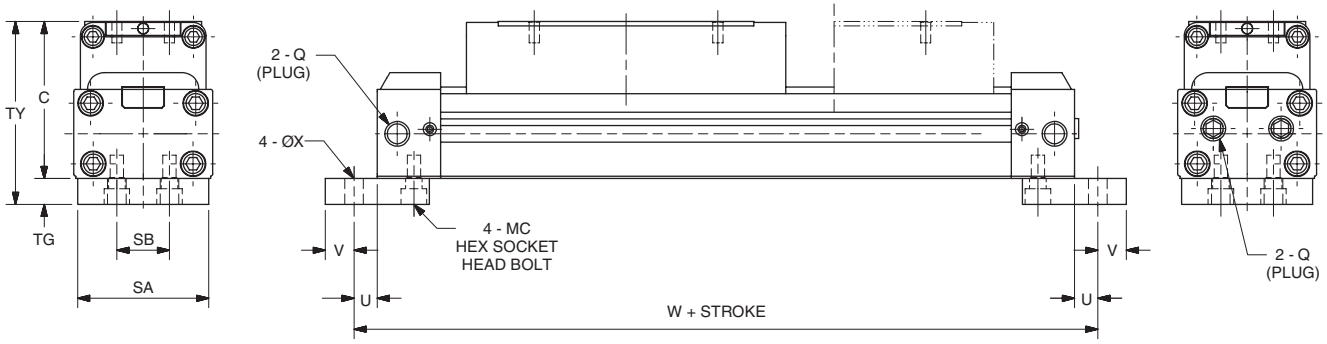
inches (mm)

Bottom Mount Foot Bracket

16 to 20 mm bore sizes



25 to 32 mm bore sizes

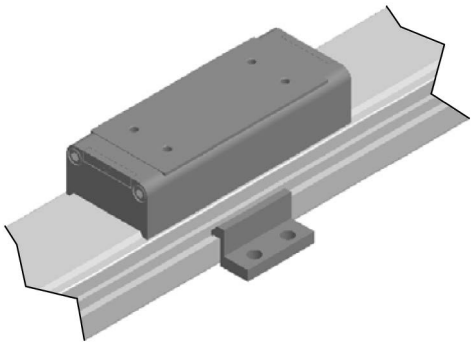


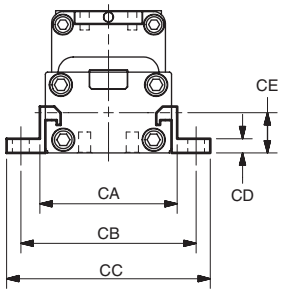
Bore (mm)	C	Q	SA	SB	TG	TY	U	V	W	X	MC
16	1.46 (37)	10-32 (M5)	1.38 (35)	1.02 (26)	0.24 (6)	1.69 (43)	0.24 (6)	0.16 (4)	6.34 (161)	0.13 (3.4)	5-40, 1/4 LG
20	1.65 (42)	1/8 NPT (1/8 Rc)	1.69 (43)	1.30 (33)	0.32 (8)	1.97 (50)	0.24 (6)	0.24 (6)	7.13 (181)	0.18 (4.5)	8-32, 3/8 LG
25	2.09 (53)	1/8 NPT (1/8 Rc)	1.97 (50)	0.79 (20)	0.39 (10)	2.48 (63)	0.35 (9)	0.43 (11)	8.19 (208)	0.28 (7)	1/4-20 x 1/2 LG
32	2.24 (57)	1/4 NPT (1/4 Rc)	2.52 (64)	1.26 (32)	0.39 (10)	2.64 (67)	0.35 (9)	0.43 (11)	9.61 (244)	0.28 (7)	1/4-20 x 1/2 LG
40	2.64 (67)	1/4 NPT (1/4 Rc)	—	—	—	—	—	—	—	—	—
50	3.23 (82)	3/8 NPT (3/8 Rc)	—	—	—	—	—	—	—	—	—
63	3.74 (95)	3/8 NPT (3/8 Rc)	—	—	—	—	—	—	—	—	—

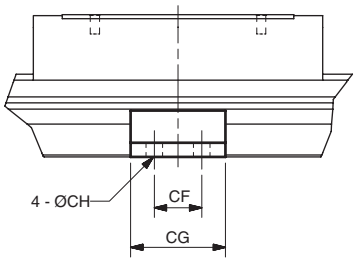
inches (mm)

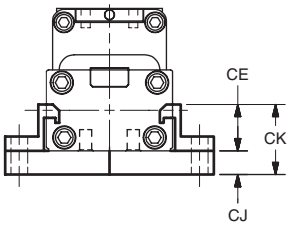
Intermediate support brackets (2 per kit)

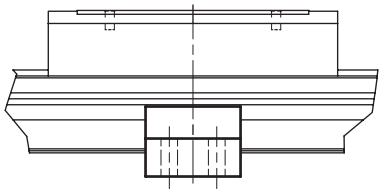
End mount











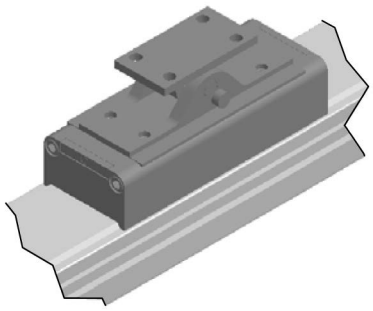
Bore (mm)	CA	CB	CC	CD	CE	CF	CG	CH
16	1.654 (42)	2.205 (56)	2.52 (64)	0.118 (3)	0.472 (12)	0.787 (20)	1.378 (35)	0.157 (4)
20	1.929 (49)	2.52 (64)	2.953 (75)	0.157 (4)	0.551 (14)	0.787 (20)	1.496 (38)	0.197 (5)
25	2.362 (60)	2.992 (76)	3.465 (88)	0.236 (6)	0.768 (19.5)	0.787 (20)	1.575 (40)	0.276 (7)
32	2.913 (74)	3.465 (88)	3.937 (100)	0.236 (6)	0.846 (21.5)	0.787 (20)	1.575 (40)	0.276 (7)
40	3.543 (90)	4.252 (108)	4.882 (124)	0.236 (6)	0.965 (24.5)	1.181 (30)	2.362 (60)	0.354 (9)
50	4.173 (106)	4.882 (124)	5.512 (140)	0.315 (8)	1.201 (30.5)	1.181 (30)	2.362 (60)	0.354 (9)
63	5.118 (130)	5.984 (152)	6.772 (172)	0.394 (10)	1.516 (38.5)	1.969 (50)	3.543 (90)	0.433 (11)

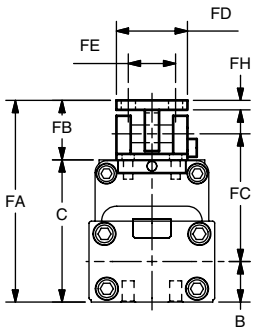
Bore (mm)	CJ	CK	Kit Part Number	
			End Mount or No Mount	Bottom Mount
16	0.236 (6)	0.709 (18)	**L080180016**	**L080190016**
20	0.315 (8)	0.866 (22)	**L080180020**	**L080190020**
25	0.394 (10)	1.161 (29.5)	**L080180025**	**L080190025**
32	0.394 (10)	1.24 (31.5)	**L080180032**	**L080190032**
40	—	—	**L080180040**	
50	—	—	**L080180050**	
63	—	—	**L080180063**	

inches (mm)

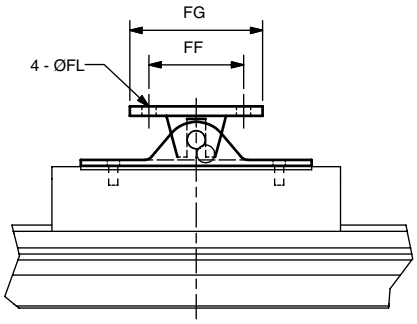
Swivel mount

Absorbs misalignment between cylinder and load





FJ dimension is the maximum horizontal float



FK dimension is the maximum vertical float

Bore (mm)	FA	FB	FC	FD	FE	FF	FG	FH
16	2.238 (58)	0.827 (21)	1.339 (34)	0.945 (24)	0.673 (16)	1.181 (30)	1.575 (40)	0.118 (3)
20	2.638 (67)	0.984 (25)	1.535 (39)	1.181 (30)	0.787 (20)	1.575 (40)	2.205 (56)	0.157 (4)
25	3.071 (78)	0.984 (25)	1.85 (47)	1.181 (30)	0.787 (20)	1.575 (40)	2.205 (56)	0.157 (4)
32	3.74 (95)	1.496 (38)	2.185 (55.5)	1.772 (45)	1.181 (30)	1.969 (50)	2.756 (70)	0.236 (6)
40	4.134 (105)	1.496 (38)	2.441 (62)	1.772 (45)	1.181 (30)	1.969 (50)	2.756 (70)	0.236 (6)
50	4.961 (126)	1.732 (44)	2.874 (73)	2.362 (60)	1.575 (40)	2.756 (70)	3.543 (90)	0.315 (8)
63	5.472 (139)	1.732 (44)	3.11 (79)	2.362 (60)	1.575 (40)	2.756 (70)	3.543 (90)	0.315 (8)

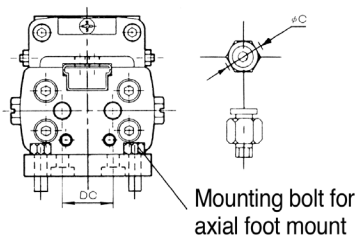
Bore (mm)		FJ	FK	FL	B	C	Part Number
16	inches	0.118	0.118	0.134	0.472	1.457	**L078930016**
	mm	3	3	3.4	12	37	**L078930016**
20	inches	0.118	0.118	0.177	0.551	1.654	**L080160020**
	mm	3	3	4.5	14	42	**L08016M020**
25	inches	0.118	0.118	0.236	0.669	2.087	**L080160025**
	mm	3	3	6	17	53	**L08016M025**
32	inches	0.197	0.197	0.276	0.728	2.244	**L080160032**
	mm	5	5	7	18.5	57	**L08016M032**
40	inches	0.197	0.197	0.276	0.866	2.638	**L080160040**
	mm	5	5	7	22	67	**L08016M040**
50	inches	0.197	0.197	0.354	1.102	3.228	**L080160050**
	mm	5	5	9	28	82	**L08016M050**
63	inches	0.197	0.197	0.354	1.378	3.74	**L080160063**
	mm	5	5	9	35	95	**L08016M063**

inches (mm)

End Port Piping

Refer to chart below to determine when end port piping can be used with various types of mountings relative to fitting clearance.

On all bore sizes with foot mounting, the end port pipe fittings will obstruct the mounting holes. To avoid this problem, mount the cylinder first and tighten the mounting bolts and then attach the pipe fittings to the cylinder ports.



Bore (mm)	øC [O.D. of Fittings - mm (in.)]		
	No Mount	End Mount	Bottom Mount
16	12 (0.472)	End Port Piping Not Available	12 (0.472)
20	16 (0.630)		16 (0.630)
25	26 (1.024)		26 (1.024)
32	27 (1.065)		27 (1.063)
40	35 (1.378)	26 (1.024)	
50	35 (1.378)	30 (1.181)	
63	39 (1.535)	34 (1.339)	

Shock Absorbers Selection Criteria

The Shock Absorber Advantage

- Increase equipment throughput
- Smoother deceleration of loads
- Adjustable end of stroke positioning
- Prevents impact damage
- Minimize shock loads on equipment
- Improves product performance

Four Steps to Great Performance

Step 1. Gather the Application Parameters

- Total load weight (pounds)
- Final velocity at impact (inches/second)*
- Cycle rate (cycles per hour)

Step 2. Verify Shock Absorber Performance

- See charts on the following pages
- Determine that shock absorber will do the job

Step 3. Verify the Cycle Rate

- See shock specifications below and verify application is within cycle rate

Step 4. Choose the Appropriate Option in Model Code

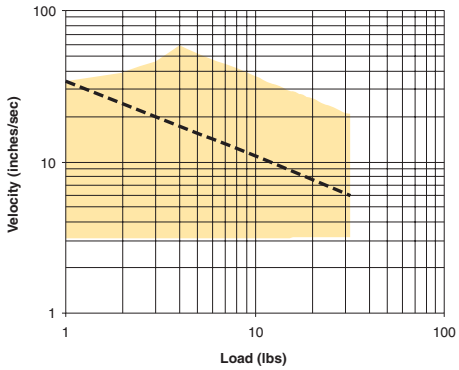
*If final velocity cannot be easily calculated, double the average velocity.

Shock absorber specifications

Cylinder	16mm	20mm	25mm	32mm	40mm	50, 63mm
Shock Absorber Number	**109556**	**109559**	**109560**	**109561**	**109562**	**MC600MH**
Max. energy absorption - in-lbs (kgf·m)	26.0 (0.3)	60.8 (0.7)	104.2 (1.2)	226 (2.6)	608 (7.0)	1042 (12)
Stroke - inches	0.236	0.315	0.394	0.590	0.787	0.984
Energy absorption / hour - in.-lbs / hour	54,700	109,380	187,510	338,560	729,200	750,000
Max. impact velocity - in. / sec.	59	59	78.7	78.7	98.4	118.1
Max. cycle rate per hour	2100	1800	1800	1500	1200	720
Ambient temperature - °F (°C)	41-140 (5-60)					
Spring return force - lb. Extended Compressed	0.65 1.01	0.45 0.97	0.65 1.33	1.33 2.65	2.20 4.86	3.60 7.49
Return time - Sec.	0.3	0.3	0.3	0.3	0.4	0.4

Performance data (16 to 32mm bores)

16 mm Bore

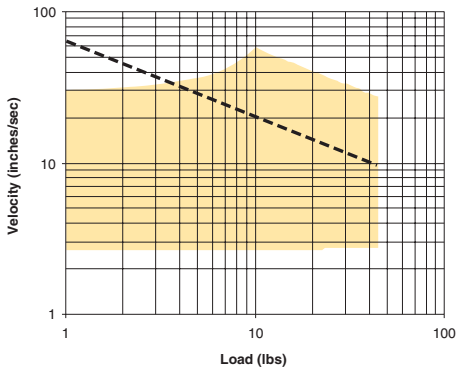


– – – – Air Cushion w/back pressure (flow controls or other meter out device)

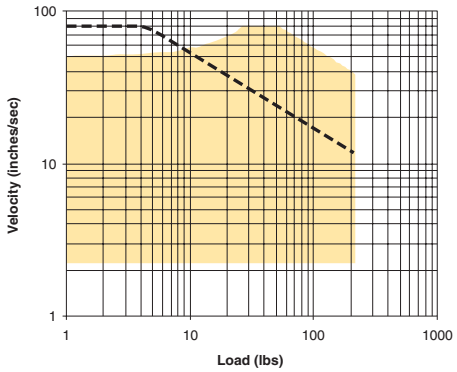
Shock Absorber

Notes:
1. If the cylinder is vertical in orientation, double the total load for bottom shock absorber.
2. Use the total load that is being moved by shock absorber. If a weight transfer application, this would include La.
3. If final velocity cannot be easily determined, use two times the stroke divided by the stroke time.

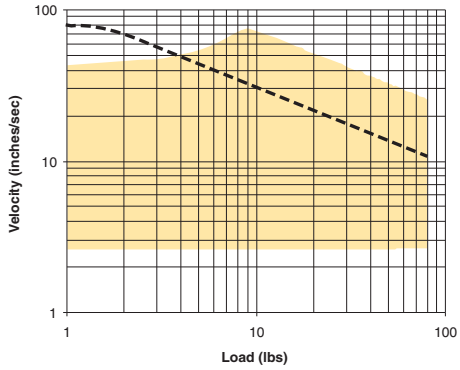
20 mm Bore



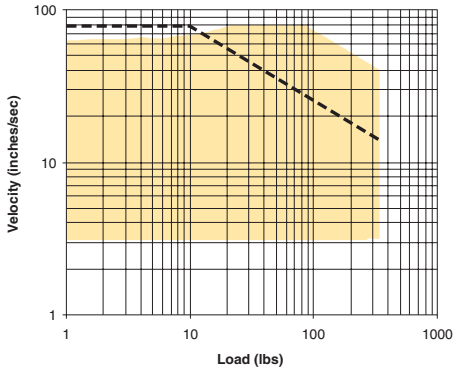
40 mm Bore



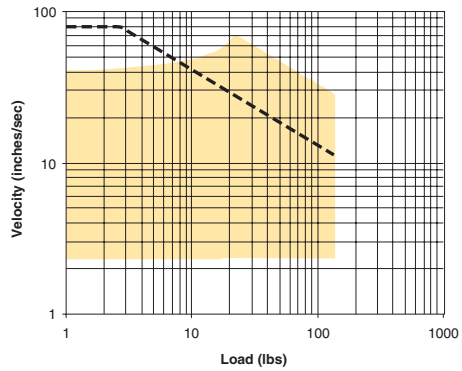
25 mm Bore



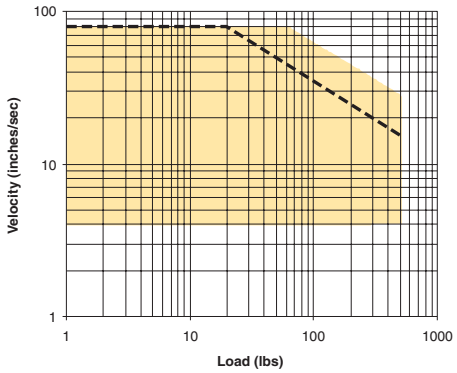
50 mm Bore



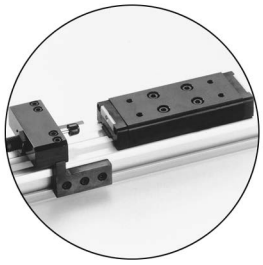
32 mm Bore



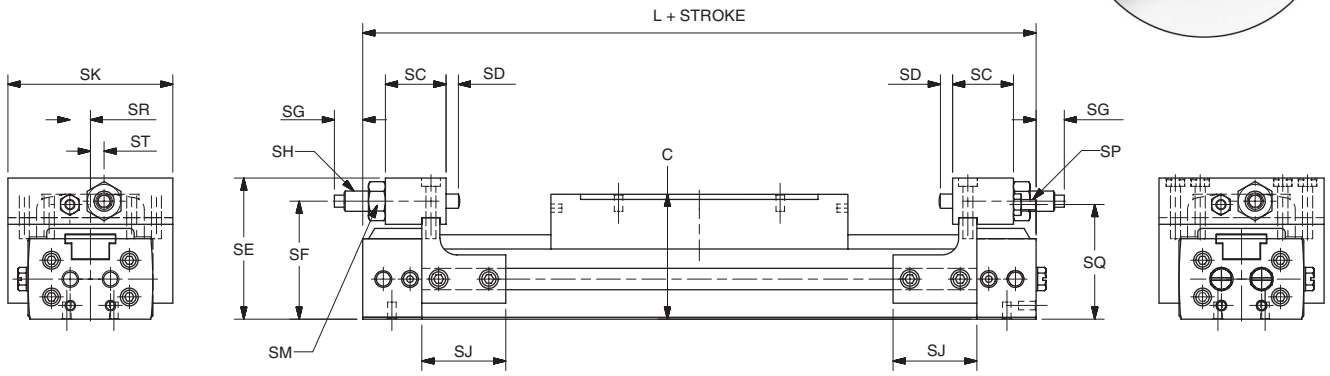
63 mm Bore



Stroke Adjustments and Shock Absorber Dimensions



16 to 25mm bore sizes

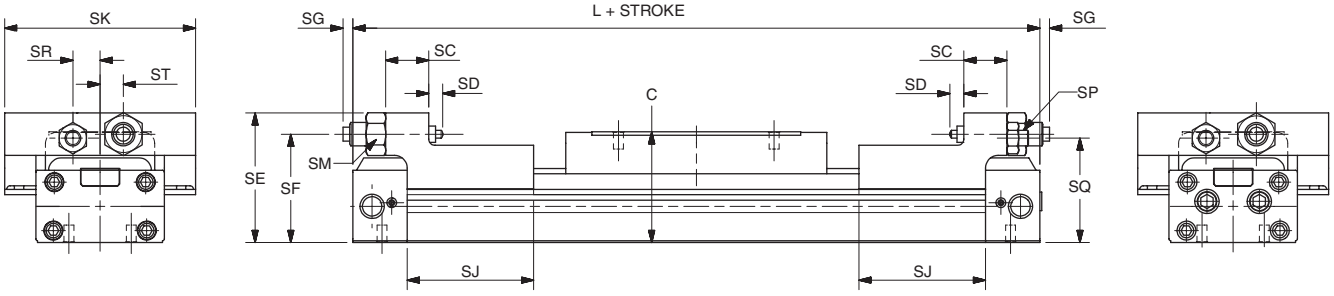


Bore (mm)	SC	SD	SE	SF	SG Max	SG Min	SH in-lbs	SJ	SK	SP	SQ	SR	ST	C	L
16	0.71 (18)	0.16 (4)	1.65 (42)	1.38 (35)	0.57 (14.5)	0.18 (4.5)	26	0.98 (25)	1.93 (49)	M3	1.34 (34)	0.24 (6)	0.16 (4)	1.46 (37)	5.87 (149)
20	0.89 (22.5)	0.14 (3.5)	1.89 (48)	1.57 (40)	0.57 (14.5)	0.18 (4.5)	61	1.54 (39)	2.24 (57)	M4	1.50 (38)	0.32 (8)	0.20 (5)	1.65 (42)	6.65 (169)
25	0.79 (20)	0.10 (2.5)	2.46 (62.5)	2.03 (51.5)	0.57 (14.5)	0.18 (4.5)	104	1.97 (50)	3.03 (77)	M6	1.97 (50)	0.47 (12)	0.39 (10)	2.09 (53)	7.48 (190)

inches (mm)

SH = max. energy absorption

32 to 63mm bore sizes

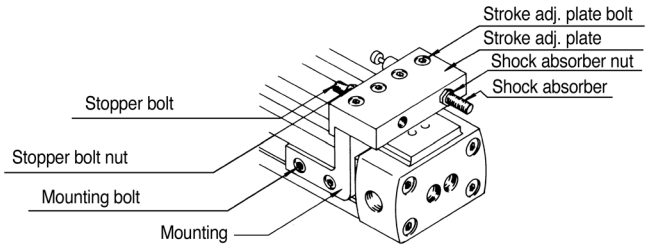


Bore (mm)	SC	SD	SE	SF	SG Max	SG Min	SH in-lbs	SJ	SK	SP	SQ	SR	ST	C	L
32	0.87 (22)	0.28 (7)	2.62 (66.5)	2.19 (55.5)	1.06 (27)	0.67 (17)	226	2.56 (65)	3.86 (98)	M8	2.11 (53.5)	0.55 (14)	0.47 (12)	2.24 (57)	8.90 (226)
40	1.26 (32)	0.28 (7)	3.09 (78.5)	2.58 (65.5)	1.34 (34)	0.94 (24)	608	2.56 (65)	4.41 (112)	M10	2.50 (63.5)	0.67 (17)	0.47 (12)	2.64 (67)	9.61 (244)
50	1.50 (38)	0.32 (8)	3.90 (99)	3.15 (80)	2.17 (55)	1.77 (45)	1042	2.76 (70)	5.35 (136)	M12	3.05 (77.5)	0.87 (22)	0.67 (17)	3.23 (82)	10.16 (258)
63	1.50 (38)	0.32 (8)	4.41 (112)	3.68 (93.5)	1.73 (44)	1.34 (34)	1042	2.76 (70)	6.22 (158)	M16	3.50 (89)	0.98 (25)	0.79 (20)	3.74 (95)	11.65 (296)

inches (mm)

SH = max. energy absorption

Positioning of stroke adjustment unit



ø16~ø25

(1) Moving the stroke adjustment unit.
The stroke adjustment unit can be moved by loosening the mounting bolts.

(2) Locking of stroke adjustment unit.
After moving the stroke adjustment unit to the appropriate position, lock it there by tightening the mounting bolts to the torque values shown in Figure 1. Insufficient torque may cause the stroke adjustment unit to slip out of position.

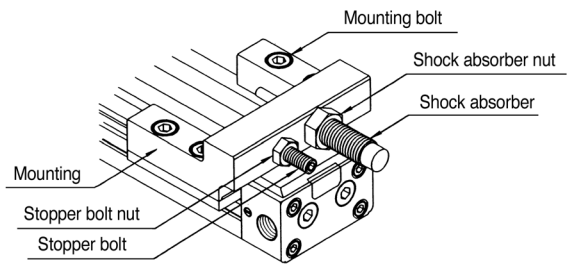
Figure 1
Torque values for tightening stroke adjustment unit.

Bore Size	Tightening Torque Mounting Bolt (lb-in)	Tightening Torque Stroke adj. Plate Bolt (lb-in)
16mm	9-11	4-6
20mm	22-24	
25mm	46-50	22-24
32mm	195-213	–
40mm	390-415	–
50, 63mm	682-735	–

(3) Stroke adjustment using the stopper bolt.
Adjust the stroke by loosening the stopper bolt nut and turning the stopper bolt. After adjusting the stroke, tighten the stopper bolt nut to the torque values shown in Figure 2. When adjusting the 16-25 mm cylinders, due to the small amount of clearance between the table and the stroke adjustment plate, adjust the stroke by moving the complete stroke adjustment unit.

Figure 2
Torque values for tightening stopper bolt nut and shock absorber nut.

Bore Size	Tightening Torque Stopper Bolt nut (lb-in)	Tightening Torque Shock Absorber Nut (lb-in)
16mm	10-11	12-16
20mm	22-24	26-35
25mm	73-84	40-53
32mm	195-213	66-89
40mm	390-425	195-266
50mm	682-735	487-620
63mm	1772-1914	487-620

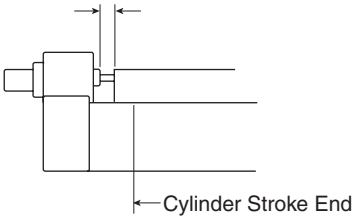


ø32~ø63

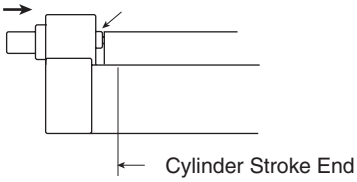
(4) Adjustment of shock absorber.
Adjust the absorption energy of the shock absorber by changing the operating stroke of the shock absorber. This is done by loosening the shock absorber nut and turning the unit. When adjustment is complete, tighten the shock absorber nut to the torque values shown in Figure 2.

(5) Notes on usage.
The shock absorber absorbs rated energy with rated stroke. The factory setting allows a small amount of shock absorber stroke before it bottoms out. Readjust the location of the shock absorber so that the complete stroke of the absorber is utilized.

Absorption energy as set at factory:
Small margin with stroke of shock absorber.



Adjust the position of the shock absorber until the plunger of the shock absorber is fully depressed.



Rodless Pneumatic Cylinders
GDL Series

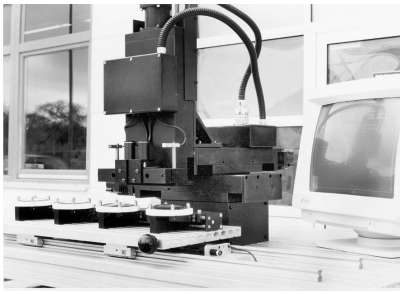
GDL Series - Rails & Cassettes

Features	109-110
Ordering Information / Stroke Lengths	111
Specifications	112
Dimensional Data	113
Accessories	114-115
Technical	116-120
Application Sheet	121

GDL Series

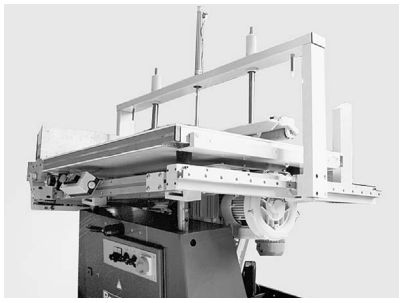
Light, Smooth and FAST

Aluminum roller guides in a cutting machine for spectacle lenses. Both the work piece carriers and the motorized X - Y table axis are equipped with roller guides. The smooth operation and precision of the equipment ensures a fine cutting action.



Aluminum roller guides in an automatic vibrator for flattening printed sheets of paper. To guarantee even pressure on the sheets of paper, the roller bridge is supported by precision roller guides.

(Baumann company photo)



Handling units for medical equipment. Smooth, easy movement with guideline roller guides.

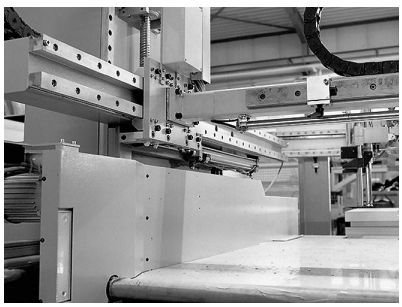
(Dräger company photo)

Aluminum roller guides in the sliding carriage of a machine for producing cables. The projecting arm of the carriage is guided by two double rails each with two roller cassettes and can be moved manually with minimal force because of the low friction properties.

(Kabelmat company photo)

Single rail and roller shoe versions of the aluminum roller guide in a handling arrangement for stacks of paper. Various fittings and limit stops for stacking are moved on two axes horizontally and vertically. The robustness and reliability of the roller guides allows for continuous operation under high load conditions.

(Solms company photo)



- Light weight (anodized aluminum)
- Smooth and quiet operation
- Speeds up to 10 m/s
- Acceleration/deceleration up to 40 m/s^2
- Loading from any direction
- Permanently lubricated guidance system
- Broad product range in various series high performance, standard and stainless steel versions
- High load and moment capacities
- Very cost effective
- Flexible mounting dimensions

GDL Linear Guides Offer a Variety of Series and Options — High Performance... "Smooth Guidance"

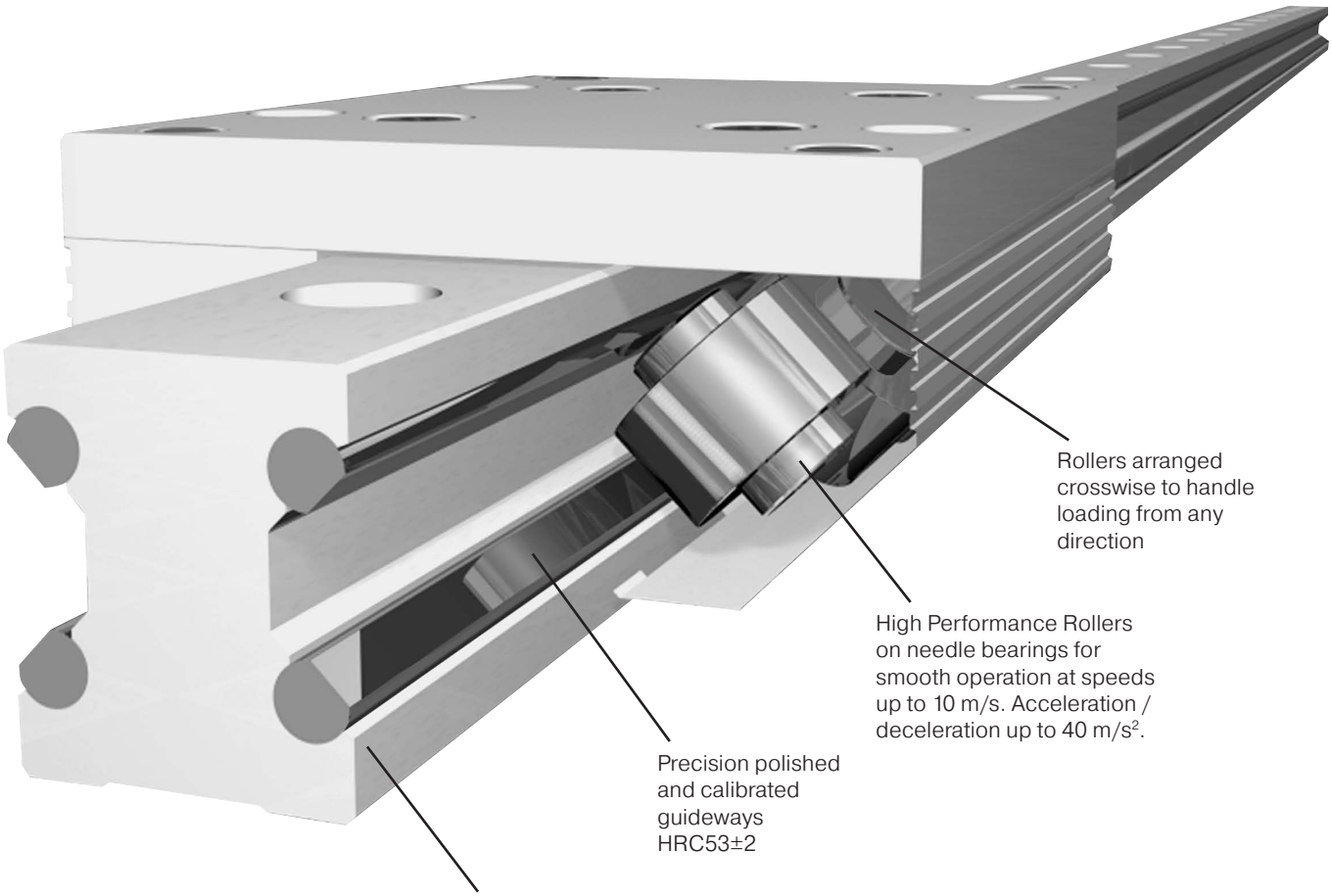
Aluminum roller guides provide smooth operation and high load carrying capacity for industrial automation.

By the use of lightweight aluminum components the moving masses are minimized, travel speeds are increased and actuation energy is saved.

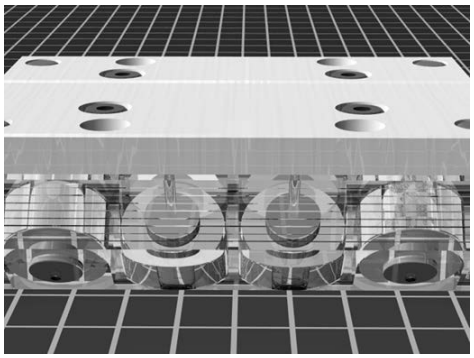
Aluminum roller guides are designed to carry medium weight loads economically. Their smooth action and speeds up to 10 m/s make them ideal for widespread use in many areas of application.

Aside from a main featured High Performance guide, others such as the Standard, Corrosion Resistant, High Dynamics and Grease-free versions are also available.

Aluminum roller guides are available in sizes 12, 15, 20, 25, 35 and 45mm. Rail lengths are from 200 mm to 4000 mm. For longer travel lengths, guide rails can be butt-jointed together.



Axial needle roller bearings of High Performance roller cassette.



Ordering Information

High Performance Series:
(Sizes FDC12HP-… thru FDC45HP-…)

The High Performance series is the basis for GDL's development, which is used in the majority of applications. High Performance guides consist of 8 axial needle roller bearings, running on precision polished and hardened alloy spring steel guideways. These guide bearings are grease packed and shielded, while offering the highest load and moment rating capacities within the GDL product line.

Standard Performance Series:
(Sizes FDC12SP-… thru FDC45SP-…)

The Standard Performance series is intended for minor loads and moments for particularly economical guidance solutions. Standard Performance guides consist of 8 radial ball roller bearings, running on precision polished and hardened alloy spring steel guideways. These guide bearings are grease packed and sealed, while offering the lowest load and moment ratings available within the GDL product line, with the exception of the Grease-Free and the Anti-Friction / Corrosion Resistant series. Standard Performance series is the second most commonly used GDL guides for various applications and also provides excellent running behavior.

Ordering Information for GDL Rails

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
F	D	R	1	2	H	0	0	0	0	0	0	–	0	0	0	0	0

Series

FD	Double Sided Rail Guide* (standard)

Rail

R	Standard

Rail Size

1	2*
1	5*
2	0*
2	5*
3	5*
4	5*

Guideway Material

H	High Performance Alloy Steel* (standard)
S †	Stainless Steel

† Not available on rail size 12.

Coatings

0	Anodized Aluminum* (standard)

Mounting Holes

0	Topside Thru Hole* (standard)
Z	Custom (consult factory)

"L11" Dimension

00	Equal on Both Sides* (standard)
??	Actual Dimension (mm)**

** As measured from left side while viewing the depth groove line.

Long Rail Joining Option

0	None* (standard)
1	Keyed Butt Joint (size 25-45 only)
2	Unkeyed Butt Joint

Screw Covers

0	None* (standard)
1	Yes*

Note: Quantity supplied to cover all rail holes.

Length (mm)

–	0	0	0	0	0

Note: Maximum length is 4 meters on Size 12.

*Stocked Item

Ordering Information for GDL Cassettes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
F	D	C	1		H	P	–	0	0	0	0	0	0	0	0

Series

FD	Double Sided Rail Cassette* (standard

Cassette

C	Standard

Rail Size

1	2*
1	5*
2	0*
2	5*
3	5*
4	5*

Bearing Options

AM	Non-Magnetic (bearing only)
HC	Axial Needle - High Performance Alloy Steel, Non-Corrosive*
HP	Axial Needle - High Performance Alloy Steel* (standard)
SP	Single Row Radial Ball - Standard Performance - Alloy Steel* (standard)
ZZ	Factory** (consult factory)
GF	Grease Free

Grease

0	High Performance* (standard)
Z	Custom (consult factory)

Lubrication Options

0	None* (standard)
1	Central Lube
2	Central Lube (no nipple)
Z	Custom (consult factory)**

Coatings

0	Anodized and Standard Hardware* (standard)
1	Anodized and Stainless Steel Hardware*
Z	Custom (consult factory)

Mounting Holes

0	Topside Threaded Thru* (standard)
1	Underside Hole Thru (unthreaded)
2	Underside Hole Thru (threaded)

Locking Mechanism

0	None* (standard)
1	"L" Ratchet Handle*
2	Star Grip Handle*

* Locking mechanism only available on FD Series size 15 thru 45 with Axial Needle Bearing - High Performance - Alloy Steel.

Wiper Options

0	With Felt Wipers* (standard)
1	Without*
2	With Felt Wipers and Scrapers*

Cassette Length

0	Normal Length* (standard)
Z	Custom (consult factory)**

Adjustment

0	None* (standard)
1	Adjusted to Specific Rail*

**Stocked Item
**Minimum Order Quantity Required

Product Line Overview

Characteristic	Unit	Description
Full profile wipers		Rollershoes and cassette are provided with snap-on full profile wipers. The snap-on full profile wipers are easily replaceable with available wipers kits.
Acceleration and deceleration	m/s^2 (ft/sec^2)	40 m/s^2 maximum (131 ft/s^2 maximum)
Guide installation		Possible in any position.
Drag adjustment set screw		Cassettes can be adjusted at the factory or by the customer.
		Rollershoes can be set-up by the customer to incorporate the drag adjustment set screw feature. The drag adjustment set screw components are supplied with each pair of rollershoes.
Standard lubrication		Lifetime lubrication with standard grease-packed roller bearings.
Speed	m/s (ft/s)	Up to 10 m/s (or up to 33 ft/s)
Bearing types		Steel axial needle, Specials on request (ex: anti-magnetic, grease free, high dynamics) - consult factory
Operating temperature	C (F)	-10°C to 80°C (14°F to 176°F) temperature range
Specials available		Custom length cassettes and rollershoes for 100 piece lots minimum.
		Keyed butt-jointed rail sections for continuous rail lengths of 3900mm and above.
		Solid continuous length rails up to 3900mm.
		Offset or non-standard "L11" dimensions on opposite ends of cut rails.
		Integrated metal scraper with standard full profile wiper currently available.
		Rail underside blind mounting holes.

Material specifications

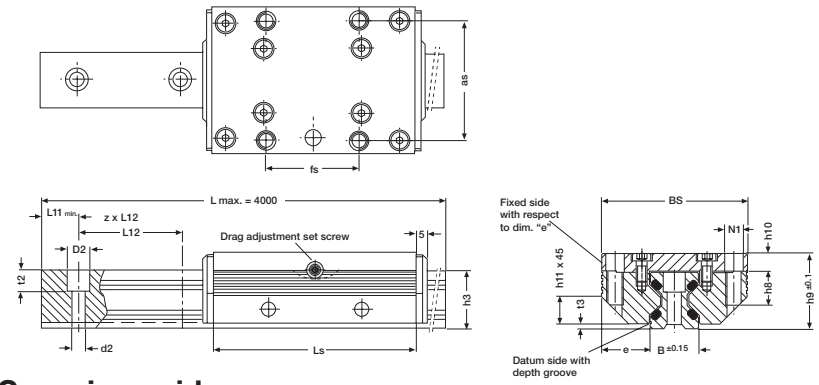
Rail	Aluminum alloy	
Guideways	Standard	High alloy spring steel HRC 53 +/– 2
	Corrosive resistant	Stainless steel guidewayl 46 HRC
Cassettes / rollershoes / top plates		Aluminum alloy
Rollers	Bearing steel / Stainless steel bearing steel	

General Facts Pertaining to All Series:

Snap-on full profile wipers:	Rollershoes and cassettes can be provided with snap-on full profile wipers. The snap-on full profile wipers are easily replaceable with available wiper kits. See page 118 for respective wiper kit part numbers.
Cassette adjustment:	Cassettes can be adjusted at the factory or by the customer.
Fasteners:	Rollershoes and cassettes use ISO screw quality 8.8 and DIN 433 washers. ISO screw quality 8.8 is recommended for mounting the rails also. Special stainless steel fasteners can be requested as necessary.
Carrying Capacity:	See load and moment rating tables on next page for your guide series of interest.
Guide mounting position:	Optional.
Lengths:	For longer than standard rail lengths, see keyed butt-jointed rail option on page 118.
Lubrication:	GDL Aluminum Roller Guides are permanently lubricated with contained roller bearings grease.

See ordering information on previous page to define your desired GDL guide features for ordering.

Cassette with double sided rail



Both standard FDC version guides

Size	Length Ls	B	BS	h3	h9	as	d2	D2	e	fs	h8	h10	h11	L11 min.	L12	t2	t3	N1
12	64	12.0	37	14.7	19	30	3.4	6	12.50	25	8	4.0	6	10	40	5.5	1.4	M4
15	78	15.5	47	18.7	24	38	4.5	8	15.75	30	10	5.0	8	10	60	6.0	2.0	M5
20	92	21.0	63	22.6	30	53	5.5	10	21.00	40	12	7.0	11	10	60	7.0	2.0	M6
25	98	23.0	70	27.0	36	57	6.6	11	23.50	45	16	8.5	13	10	60	10.0	2.5	M8
35	135	32.0	100	37.0	48	82	9.0	15	34.00	62	20	10.5	20	12	80	11.5	3.5	M10
45	165	45.0	120	46.0	60	100	11.0	18	37.50	80	24	13.5	22	16	105	14.5	4.0	M12

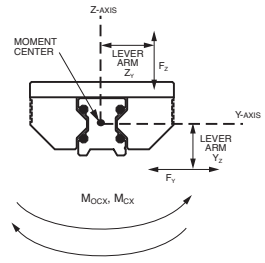
Dimensions (mm)

Both underside mounting hole FDC version guides (Ref. ordering instructions)

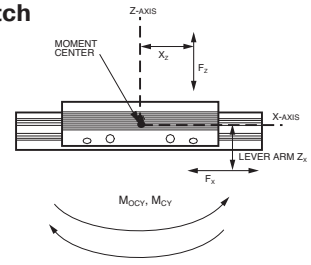
Size	Length Ls	B	BS	h3	h9	as	d2	D2	e	fs	h8	h10	h11	L11 min.	L12	t2	t3	N1
12	64	12.0	37	14.7	19	30	3.4	6	12.50	29	8	4.0	6	10	40	5.5	1.4	M4
15	78	15.5	47	18.7	24	38	4.5	8	15.75	34	10	5.0	8	10	60	6.0	2.0	M5
20	92	21.0	63	22.6	30	53	5.5	10	21.00	40	12	7.0	11	10	60	7.0	2.0	M6
25	98	23.0	70	27.0	36	57	6.6	11	23.50	45	16	8.5	13	10	60	10.0	2.5	M8
35	135	32.0	100	37.0	48	82	9.0	15	34.00	62	20	10.5	20	12	80	11.5	3.5	M10
45	165	45.0	120	46.0	60	100	11.0	18	37.50	90	24	13.5	22	16	105	14.5	4.0	M12

Dimensions (mm)

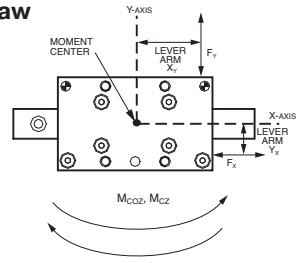
Roll



Pitch



Yaw



Load & moment rating capacities (for cassettes on double sided rail)

Dynamic Load Rating C (N)	Static Load Rating Co (N)	Static Moment Rating Capacities: Roll Mocx (Nm)	Pitch Mocy (Nm)	Yaw Mocz (Nm)	Dynamic Moment Rating Capacities: Roll Mcx (Nm)	Pitch Mcy (Nm)	Yaw Mcz (Nm)	Cassette Weight (kg)	Rail Weight (kg) per "M"	Cassette Series
High Performance Series										
2800	3000	27	43	43	25	40	40	0.1	0.4	**FDC12HP-...**
4200	3400	37	58	58	45	72	72	0.3	0.8	**FDC15HP-...**
5400	5400	76	111	111	76	111	111	0.4	0.9	**FDC20HP-...**
9000	10100	158	222	222	142	198	198	0.6	1.8	**FDC25HP-...**
12500	18000	423	559	559	294	388	388	1.5	3.2	**FDC35HP-...**
21200	25900	827	983	983	678	806	806	2.9	5.5	**FDC45HP-...**

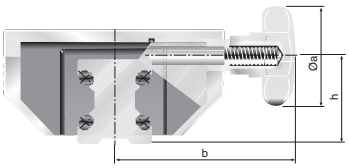
GDL Aluminum Roller Guides

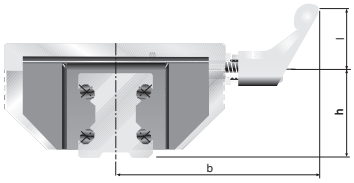
High performance cassettes with lock device

The locking cassette with star grip handle can be stopped at any desired location on the rail. The clamping device does not exert forces on the rail guideways.

The clamping device is used in fixtures which are movable manually, clamping and stop ledgers, feeding of tools and work pieces. Also available with L-ratchet handle.

Special cassette types





Star grip handle dimensions

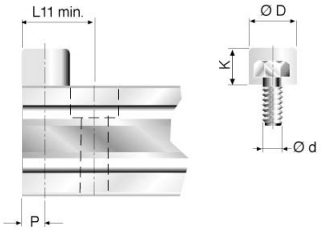
Size	Øa	b	h	Clamp force	Part numbers star grip knob
12	N/A				
15	25	41	19.0	200	**FDC15HP-00020000**
20	25	49	23.0	250	**FDC20HP-00020000**
25	32	56	28.0	250	**FDC25HP-00020000**
35	50	83	38.5	350	**FDC35HP-00020000**
45	63	101	48.0	750	**FDC45HP-00020000**

Dimensions (mm), Force (N) with normal manual tightening.

L-ratchet handle dimensions

Size	l	b	h	Clamp force	Part numbers L-ratchet handle
12	N/A				
15	45	59.5	19.0	200	**FDC15HP-00010000**
20	45	67.5	23.0	250	**FDC20HP-00010000**
25	45	71	28.0	250	**FDC25HP-00010000**
35	63	96	38.5	350	**FDC35HP-00010000**
45	78	116	48.0	750	**FDC45HP-00010000**

End of stroke stop screws



The stop screws are screwed into threads (option) on the guide rails. The end of stroke stopping energy is reduced by a rubber cap. With guide rails where the L11 is less than the standard minimum, we offset the mounting hole by half of its diameter.

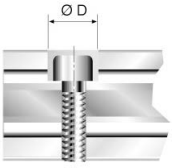
Note: Customer must drill and tap the holes for the stop screws.

Size	Ød	ØD	K	L11 min.	P	Part number
12	M5	12	8	15.0	6.0	**63504A**
15	M5	12	8	16.0	6.0	**63504A**
20	M5	12	8	17.0	6.0	**63504A**
25	M6	15	10	20.5	7.5	**63505A**
35	M8	19	13	26.5	9.5	**63506A**
45	M10	24	16	33.0	12.0	**63507A**

Dimensions (mm)

GDL Accessories

Rail mounting screw covers



Material: Wear resistant plastic, resistant to oil and aging.

Mounting: Put a plastic plate on top and pound in uniformly. Remove residual burrs with a soft brush or fingernail.

Note: Use respective part numbers for ordering separately or include in rail part number.

Size	Cylindrical screw DIN912	Ø D	Part Number
12	M3	6	**87752A**
15	M4	8	**42074FIL**
20	M5	10	**87754A**
25	M6	11	**87755A**
35	M8	15	**6973**
45	M10	18	**87757A**

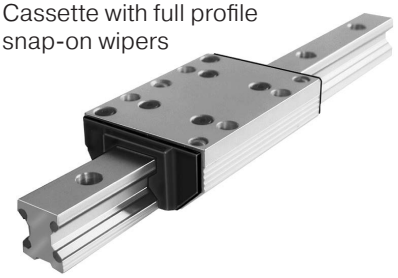
Dimensions (mm)

GDL Aluminum roller guides with wipers

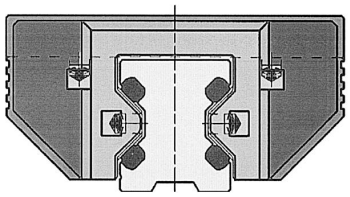
Version with wipers
Integrated into an additional cover, a felt wiper is saturated with oil. Although dependent on the degree of contaminants, these wipers last for some 6000km, after which the felt wipers can either be washed or replaced.

For optimal cassette rolling performance, all holes in the guide rails should be filled with the plastic rail mounting screw covers.

Cassette with full profile snap-on wipers



Full profile snap-on wiper



Part numbers for replacement wiper kits

FDC Series and Size	Respective Part Number
12	FDC12-WIPER-KIT
15	FDC15-WIPER-KIT
20	FDC20-WIPER-KIT
25	FDC25-WIPER-KIT
35	FDC35-WIPER-KIT
45	FDC45-WIPER-KIT

GDL's keyed butt-jointed rail option

GUIDELINE rails can be precisely fastened together using a factory offered keyed butt-joint option for continuous rail lengths, as shown in Figures 1 & 2.

Two rail sections are clamped together with mating round bar stock pieces that seat tangent to both rail section guideways on each side of the rail. While the rail sections are clamped together, a keyway slot is machined in the top and bottom sides of the rail, across the butt- joint. Screw holes are then drilled through the rail inside the keyway slot, so the opposing keyways can be drawn together tightly with screws. The round bar stock clamp is then removed, providing a rigid and well aligned keyed butt-joint.

The keyed butt-joint option provides optimum alignment of all guideways from one rail section to the next. This allows for optimum "smooth" guidance of the cassette bearings, while crossing rail butt-joints.

The keyed butt-jointed rail option is currently available in the FDR version 25, 35, & 45 mm rail sizes. For a keyed butt-joint on rail sizes 25, 35 or 45 mm, specify P/N:# GDL-BJK

Consult factory for other size possibilities.

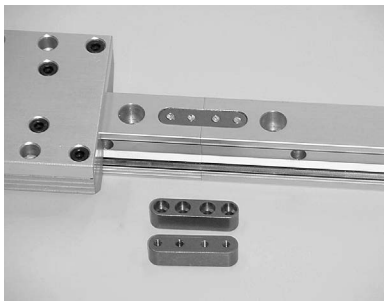


Figure 1

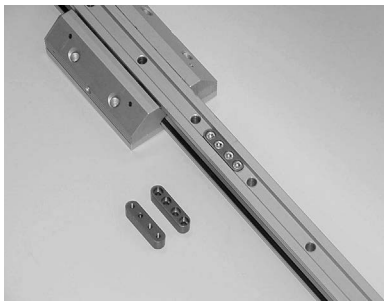


Figure 2

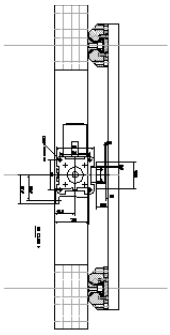


Figure 3

GDL linear guides couple well with various structural aluminum extrusions and Parker OSP-P actuators. Mounting can be easily accomplished using standard fasteners and mounting brackets. See Figure 3 above.

1. Features of the Guide System

Aluminum roller guides consist of a double sided rail and a roller cassette or two single sided rails and two roller shoes. Aluminum roller guide rails and cassettes are made of aluminum alloy. The rollers are very smooth running on precision polished guideways made of high alloy spring steel. The special cross pattern orientation of the running rollers provides high load and moment capacity in all directions.

Their special features are: light weight, small dimensions, and high speed of displacement. Aluminum roller guides are economical and universal handling components, which are mostly or all corrosion-resistant and available at a favorable price.

2. Size of the Guide System

To select the right guide size, first the moments and forces acting on the bearing have to be determined.

Recommended safety factors (with ISO screws quality 8.8):

Thrust load S > 1.3

Tensile load S > 4.0

Moment load S > 6.0

3. Material

The basic body of GDL aluminum roller guides is made of aluminum alloy. The guideways consist of hardened, high alloy spring steel or of stainless steel. By using basic bodies of aluminum, the moved masses are reduced which allows light-weight construction requiring lower moving forces and reduced energy consumption. Still the integrated GDL system sustains high load and moment ratings.

4. Operating Temperature

GDL linear guides can be operated within a temperature range from -10° C up to 80°C. For other temperatures, please consult factory.

5. Screwed Connections

GDL linear guides are fixed to the mating structure by the mounting holes in the rails and the cassettes. ISO screw quality 8.8 should be used with DIN 433 washers.

To secure the screwed connections, we recommend that suitable locking means be utilized as necessary.

Mounting screw torque specifications:

Screw	Quality 8.8 [Nm]
M3	1.1
M4	2.5
M5	5.0
M6	8.5
M8	21.0
M10	41.0
M12	71.0

6. Wipers

The guideways of aluminum roller guides are equipped with wipers to protect against coarse environmental contamination.

7. Slide Resistance / Adjustment

Follow the steps on how to adjust GDL cassettes to the rail.

The new GDL catalog has many changes due to an expanded product line. The change to feature descriptive part numbering was done to accommodate all current and future offerings of the GDL product. The goal is to have standard features and options available, for a perfect fit into your application.

Included in the chart below are hex sizes, drag resistance and torque ratings for adjusting the cassette.

GDL Chart

	FDC 12	FDC 15	FDC 20	FDC 25	FDC 35	FDC 45
Top plate hex (mm)	2	3	4	4	5	6
Top plate torque (in lbs)	n/a	22.1	44.3	44.3	75.2	186
Adjustment hex (mm)	1	3	3	4	4	4
Drag resistance (oz) HP, HC, GF, VA	1.8-7.9	3.6-10.8	5.4-16.2	7.2-21.6	10.8-32.4	12.6-37.7
Drag resistance (oz) SP & SC	.7-1.8	1.8-3.6	3.6-7.2	5.4-10.8	7.2-14.4	9-18
Drag resistance (oz) HD	n/a	n/a	n/a	9-18	14.4-25	18-28.7

7.1 GDL Adjustment Procedure

Do not measure sliding resistance with wipers on.

1) Lay the rail out on the flat surface with the **datum** line facing away from you. Anchor the rail to keep it from shifting when sliding resistance is applied to the cassette.

The datum line is a reference groove on one side of the rail.

2) Set the roller cassette on the rail with the adjustment screw facing towards you, while the datum line on the rail is away from you. Do not install the wipers on the cassette yet.

Do not install the wipers yet.

3) Make sure the four bolts on the adjustable side of the cassette are slightly loose and the bolts on the fixed side are tight before adjusting the drag screw.

One side of the cassette is fixed and the other side is floating.

4) The drag hex screw is located on one side of the cassette. Adjust the screw in for more drag and out for less. Do not try to adjust cassette with top plates bolts tight.

See the chart for drag adjustment hex screw size.

5) Adjust the drag on the cassette by sliding as it slides down the rail. Feel for an even amount of resistance as you turn the hex screw in and out.

6) Tighten down the top plate bolts to the proper torque specification. The tightening of the top plate bolts will add some resistance. If necessary, the adjustment procedure can be repeated for better sliding resistance for your application.

See the chart for top plate hex size and torque rating.

7) If the adjustment is done without a scale, it should move evenly. Some examples of improper adjustment are: If the cassette “hops”, it is too tight. If it is too loose, the top plate of the cassette will have play. Try to be in the middle.

8) To check your settings use a pull or push style scale. Slide the cassette down the entire rail at an even speed, measuring

the drag resistance. Your highest drag rating should be referenced when looking at the chart.

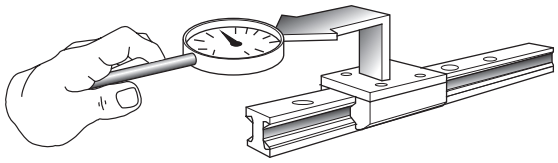
See the chart for drag resistance ratings for the size and type of cassette.

9) Install the clip on wipers. The wipers will add between 1-3 ounces of resistance. The wipers do not add any additional roller preload to the rail.

The clip on wipers can be installed at this time.

7.2 Double Sided Rail and Cassette

Aluminum roller guides are adjusted in such a way that the required stiffness under load is obtained. If self adjustment is preferred, we recommend that you measure the slide resistance as shown below. Before doing so, the mating structure should be checked for dimensional accuracy and flatness.



The cassettes which are mounted on the rails are adjusted clearance-free, without play. This adjusting method is required at the point on the rail where the cassette travels with the least slide resistance. Adjustment is completed in the non-loaded condition. The tolerances below refer to this condition.

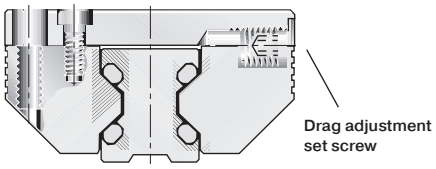
Slide resistance adjusment tolerance [N]

Series	FDC__HP, FDC__HC, FDC__AM, FDC__GF, FDC__VA						FDC__SP, FDC__SC						FDC__HD		
Size	12	15	20	25	35	45	12	15	20	25	35	45	25	35	45
Adjust. Value	0.5	1.0	1.5	2.0	3.0	3.5	0.2	0.5	1.0	1.5	2.0	2.5	2.5	4.0	5.0
Max. Value	2.0	3.0	4.5	6.0	9.0	10.5	0.5	1.0	2.0	3.0	4.0	5.0	5.0	7.0	8.0

All values are without wipers

Tolerances in the guide system may cause slight variations in the slide resistance, when the adjusted cassette is moved along the guide rail.

7.3 Double Sided Rail and Roller Cassette



To change the clearance setting, first the slave adjustable shoe screws on the cassette top plate are slightly loosened. Afterwards, the drag adjustment set screw is turned to increase or decrease slide resistance of the cassette. Turning the drag adjustment set screw effects a displacement of the roller shoe in relation to the cassette top plate.

After re-tightening of the cassette top plate, the slide resistance can be checked. This procedure can be repeated until the desired slide resistance is achieved.

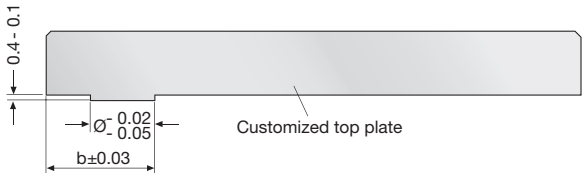
7.4 Rails and Rollershoes

When installing, it is important to distinguish between the master fixed side and the slave adjustable side rollershoe and rail. The rail on the master fixed side is aligned to the mating structure and fastened securely by all screws.

The rail on the slave adjustable side should be lightly tightened and movable with light force during initial alignment of parallel rails. Gauge blocks should be used between the parallel rails, by locating off the aligned and mounted master rail, in order to align the slave rail parallel to the master rail. Slave rail mounting bolts should be tightened as the slave rail is aligned at each bolt position. See paragraph 11.3 for further instructions on mounting parallel single sided rails.

7.5 Centering Groove on the Master Fixed Shoe and Custom Top Plate

Each pair of rollershoes are provided with centering grooves for optimum alignment to their mating top plate during mounting. One rollershoe should be designated as the master fixed rollershoe, even though both are designed with a centering groove on their top surface. The other shoe will serve as the slave adjustable side rollershoe. The mating customized top plate should be machined with a centering shoulder according to the following data.



Size	a	b
12	4,5	9,6
15	5,0	12,6
20	7,5	16,1
25	10,5	17,6
35	12,5	26,1

7.6 Adjusting Cassette Built with Rollershoes and Custom Top Plate

The centering shoulder on the top plate should be assembled with its respective fixed rollershoe centering groove and securely torqued to recommended specification. See cassette screw torque specifications under step 5, on previous page.

Assemble the adjustable rollershoe to the top plate also, parallel to the fixed rollershoe on the same side of the top plate. Its fasteners should be lightly tightened so that the adjustable rollershoe can be moved with light finger pressure.

As assembled cassette can then be slid onto parallel rails, while keeping the fixed rollershoe on the master fixed rail side. The incorporated drag adjustment set screw can then be turned clockwise to remove cassette play, or counter clockwise to reduce slide resistance while maintaining zero play.

Once the desired slide resistance is achieved with no cassette play, the adjustable rollershoe fasteners can also be torqued to specification.

8. Running accuracy

The running accuracy is measured from the top plate surface of the cassette, to the ideal straight line of travel. Running accuracy of the cassette to the rail is +/- .03mm (.0012") per meter, granted no greater than (.0024") straightness deviation per meter is maintained when mounting the rail.

9. Contact and support surfaces

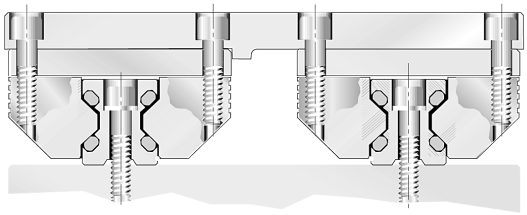
The contact and support surfaces have a substantial influence on functioning and precision of linear guides. Depending on the functional requirements of the system, the mating structure has to be machined with the corresponding degree of precision.

Machining errors on the mating structure will otherwise add to the running error of the guide system. In order to assure troublefree functioning, we recommend that a max. straightness deviation of ⩽ 0.1 mm (.0039") per running meter be maintained when mounting the rail.

10. Design hints

10.1 Parallel double sided rails and cassettes

The master fixed rail should always be established straight and true first, within the maximum straightness deviation specified in paragraph 9. With parallel rail arrangements, both rails should be mounted on the same mounting surface elevation and treated with equal surface preparation and tolerancing practices. Precise alignment in terms of spacing, parallelism and height is very important.



When coupled parallel to a driving actuator system, the adjustable side of the cassette should be placed on the side closest to the driving actuator. This will minimize driving actuator torque transferred to the adjustable side of the cassette.

11. Guide mounting instructions

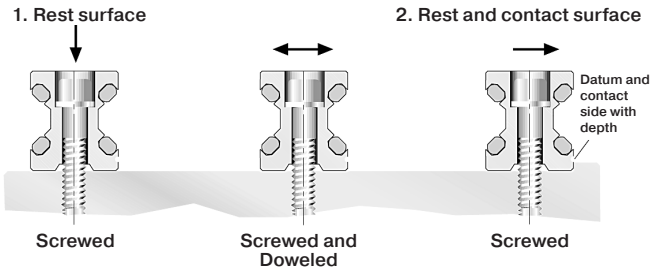
The useable load capacity is influenced by the connection between the guide elements and the mating structure. For this reason, a flat, straight and solid secure mounting surface should be provided. Adequate support of qualified loads and moments can then be achieved, along with desired running accuracy.

11.1 Mounting Double Sided Rails and Cassette

Depending on the load situation, certain double sided rails should either be screwed or screwed and dowelled, and respectively put into grooves or against a shoulder.

The rails can be secured best against shoulders and are screwed or screwed and dowelled to the mating structure. After final adjustment of rail straightness and parallelism, the rail mounting screws are tightened starting in the middle of the rail length. Rail mounting bolts should be torqued to specification by alternating between each bolt. The installer should start with the bolt in the center of the rail length and proceed by alternating between each bolt left of center and each bolt right of center, while working towards both ends of the rail.

Afterwards, the cassette should be moved back and forth along the total stroke distance of the rail. If the cassette travels smoothly, the mounting process can proceed or be completed.

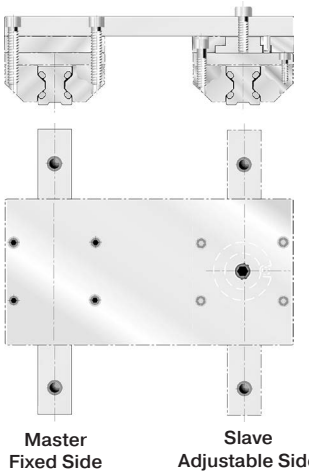


11.2 Mounting Parallel Double Sided Rails and Cassettes

With parallel double sided rail arrangements, we recommend that the master fixed rail side and slave adjustment rail sides of the guide system be identified. This allows optimum tolerances in parallelism to be achieved best by adjusting the slave adjustable rail, parallel to the master rail. The master fixed rail side should be mounted first to achieve the initial line of straight travel.

The example below displays a convenient method for adjusting the slave adjustable rail parallel to the fixed master rail. Once the cassette travel is smooth, without play, one can proceed with rail mounting.

Note that the top plate spanning across the cassettes on opposite rails is completely bolted down to the cassette on the master fixed side only. The top plate end over the slave adjustable side is only bolted in one location, in the center of the slave adjustment side cassette. With one bolt holding the top plate to the slave adjustment side cassette, this cassette can pivot while the slave adjustable rail self-aligns parallel to the fixed master rail side. The floating top plate setup is stroked along the entire rail length, to establish the parallelism between the two rails.



Calibrated gauge blocks can also be used to establish equal integrity in rail parallelism. The installer should seat and temporarily clamp short pieces of precision ground round stock, tangent to the two guideways on the inside of each rail.

Rail Size	Precision Round Stock Sizes Ø mm
12	11
15	11
20	14
25	16
35	27
45	35

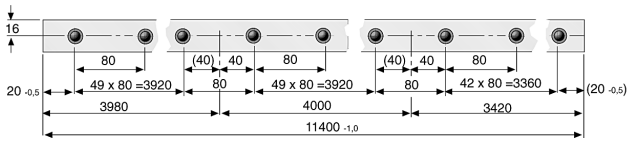
The calibrated gauge blocks can then be used, to locate off the precision round stock on the master fixed rail, in order to set the slave adjustable rail parallel. The gauge blocks are then locating the same way that the floating top plate is, by referencing both the master and slave rail guideway surfaces to establish parallelism.

Once the slave adjustable rail has been self-aligned, its bolts should also be torqued to specification in the order mentioned in paragraph 11.1. The top spanning across both cassettes on opposite rails, can then be securely fastened using all cassette mounting bolt holes.

12. Keyed Butt-jointing of Rail Sections

12.1 Rail Hole Spacing

Butt-jointed rails over L = 4000 mm are sectioned together according to the GDL standard. See "GDL's Keyed Butt-Jointed Rail Option" on page 118. Butt-jointed rails sections are cut so that the standard rail mounting hole spacing is maintained



Keyed butt-jointed rails are usually shipped completely assembled, but sometimes must be shipped partially assembled, due to shipping length limitations and shipping care. Partially assembled butt-jointed rails are supplied with a butt-jointing clamping fixture and the keyways and screws for fastening rail section together.

12.2 Mounting of butt-jointed rails

Clean mounting surfaces, then place rail sections loose on the guide path, one behind the other. Lay the rails in their correct sequence of the system design (i.e.: 1, 2, 3, 4...etc.). The orientation of the depth groove on the lower surface of the rail should always be on the same side for all rail sections being butt-jointed.

Any non-assembled rail sections should be aligned with the factory supplied butt-joint clamping fixture as displayed below.

See explanation of "GDL's Keyed Butt-Jointed Rail Option" on page 118.

Once all rail sections are assembled, the complete guide path can be aligned and fastened. Alignment and fastening should be conducted according to the applicable guide arrangement and steps previously described in this technical information section.

Units Conversion Tables

Force Conversions:

Multiply	By Conversion Factor	Result
pound-force	4.448	Newton
Newton	0.225	pound-force
kilogram-force	9.807	Newton
Newton	0.102	kilogram-force

Acceleration Conversions:

Multiply	By Conversion Factor	Result
feet/section ^{2}	0.305	meter/second ^{2}
meter/second ^{2}	3.281	feet/second ^{2}
inch/second ^{2}	0.025	meter/second ^{2}
meter/second ^{2}	39.370	inch/second ^{2}

Mass Conversions:

Multiply	By Conversion Factor	Result
ounce	28.349	gram
gram	0.035	ounce
kilogram	35.279	ounce
gram	0.001	kilgram
pound	0.453	kilogram
kilogram	2.205	pound

Bending Moment or Torque Conversions:

Multiply	By Conversion Factor	Result
pound-foot	1.356	Newton-meter
Newton-meter	0.737	pound-foot
Newton-meter	0.102	kilogram-meter
Kilogram-meter	9.807	Newton-meter

Velocity conversions:

Multiply	By Conversion Factor	Result
mile/hour	1.609	kilometer/hour
kilometer/hour	0.621	mile/hour
feet/second	0.305	meter/second
meter/second	3.281	feet/second
inch/minute	0.025	meter/minute
meter/minute	39.370	inch/minute

Length conversions:

Multiply	By Conversion Factor	Result
inch	25.4	millimeter
millimeter	0.039	inch
inch	0.025	meter
meter	39.370	inch
foot	0.305	meter
meter	3.281	foot

GDL Application Sheet

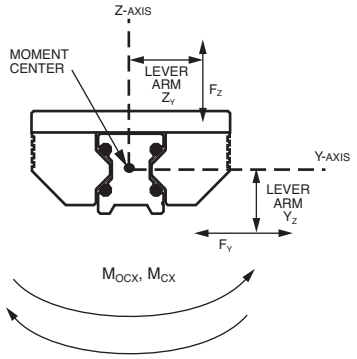
Distributor:_____ End-User: _____

Salesperson:_____

Phone: _____ Fax: _____ e-mail: _____

Other Information: _____

Roll



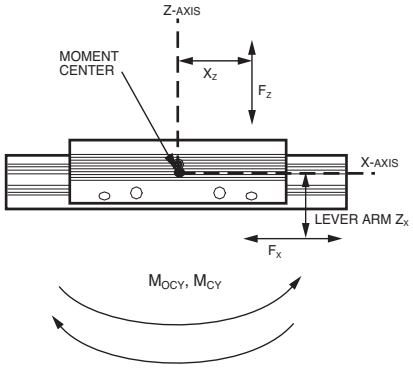
Roll load_____

X - Distance_____

Y - Distance_____

Z - Distance_____

Pitch



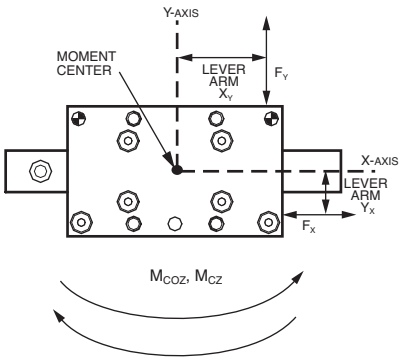
Pitch load_____

X - Distance_____

Y - Distance_____

Z - Distance_____

Yaw

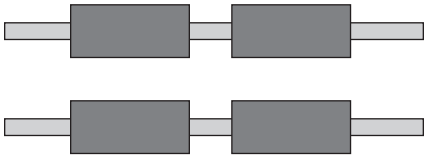


Yaw load _____

X - Distance_____

Y - Distance_____

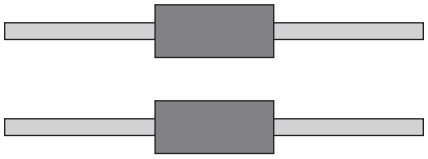
Z - Distance_____



Lengh of rails_____

Distance between rails _____

Distance between cassettes on each rail _____



Technical Data:

Stroke_____

Horizontal _____

Vertical_____

Velocity / Speed_____

Acceleration _____

Load / Mass _____

Load Distances_____

Lifetime Desired _____

Environment:
(Dirt, Humidity...)

Rodless Pneumatic Cylinders
2002 / P120 Series

2002 and P120 Series

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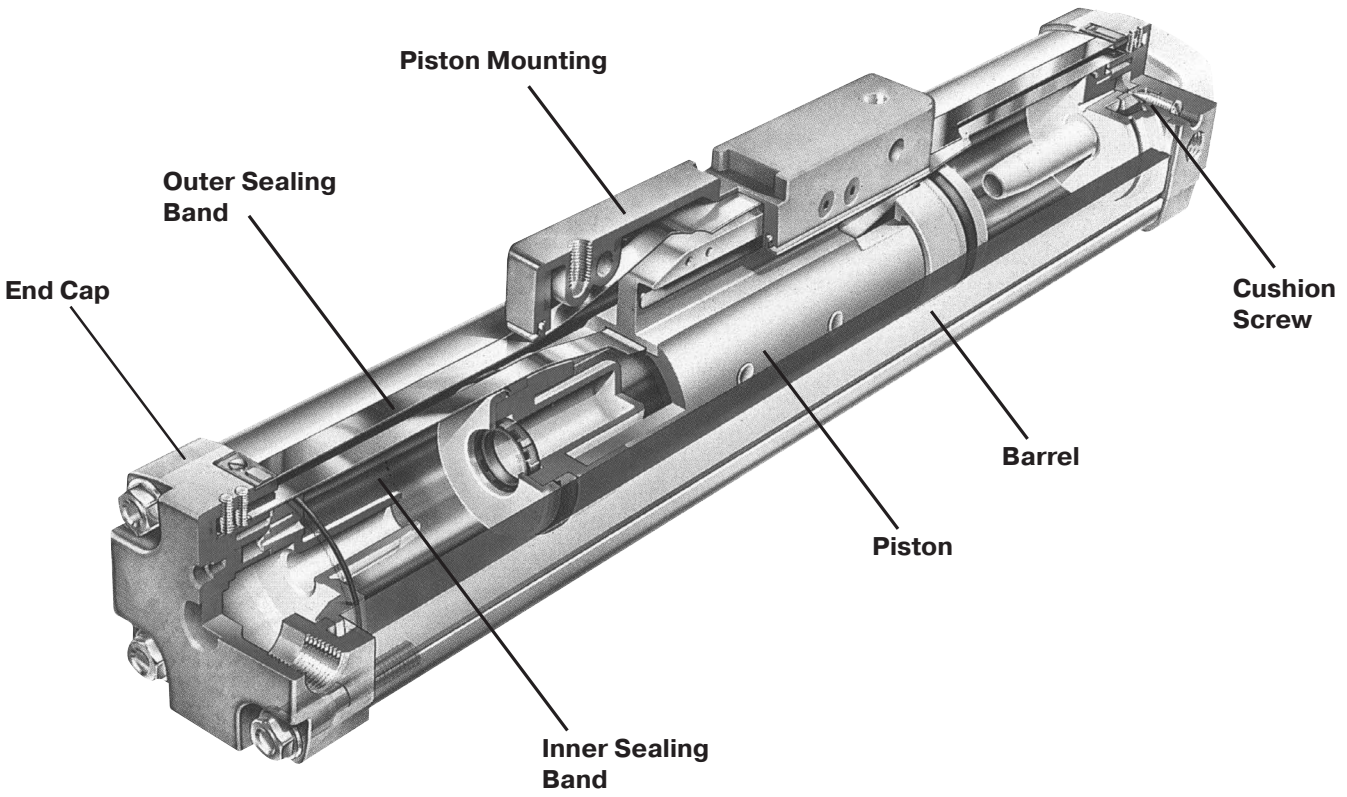


Features

1. The cylinder barrel of extruded anodized aluminum has a slot along its entire length. To provide rigidity the bore is eccentric to the outside diameter.
2. A flexible hardened stainless steel inner band running the entire length of the bore and passing through the piston provides a near-zero-leakage metal to metal seal. An outer band of the same material acts as a cover over the slot preventing foreign particles from entering into the cylinders interior.
3. The aluminum piston is fitted with synthetic bearing rings. The power transmission outward takes place through a positive, physical connection through the slot to the external piston mounting. This solid guide permits the acceptance of external forces and moments and minimizes frictional losses.
4. The extensive experience in the development and production of rodless cylinders, as well as the use of high quality components and materials, ensure a very serviceable design lending itself to high operating safety and optimum performance.
5. This unique design, using only 4 main components, makes cylinders reliable in operation and simple to maintain, providing long trouble free service.
6. Parker is the specialist in the rodless cylinder field, with the largest range of bore diameters and can offer the longest stroke lengths with application oriented accessories for cost effective designs. Parker has experience in all conceivable areas of industry, attributable to the thousands of applications in which rodless cylinders are used.

Technical Benefits

Design Options
Parker Pneumatic cylinders can be supplied as a basic model, or as a basic model with external guides depending on the application requirements.

Cylinder Mountings
Various types of piston mounting are available including one which allows the cylinder to be inverted under adverse operating conditions thus protecting the sealing bands. End mounting brackets and midsection supports are also available.

Operating Pressure
Max. 120 PSI

End Of Stroke Cushioning
Adjustable cushioning is provided as standard and ensures the piston stops smoothly, even at high speeds.

Oil Free Operation
The permanent lubricating grease eliminates the need for regular oil mist lubrication and provides long service life. Cylinders can be used in applications where maximum cleanliness is required. (e.g. electronics pharmaceutical and food processing industries).

Slow Speed Applications
The construction of the rodless cylinder allows for a low friction characteristic permitting extremely slow traversing speeds. For speeds below 4 inches / second we recommend that “slow speed” lubrication is specified.

Temperature Range/Piston Speed
Standard Buna-N seals are suitable for temperatures from 15°F to +175°F. FKM seals are required for higher temperatures as well as for use when piston speeds exceed 5 ft./sec. Please contact the Parker Applications Department if the required operating temperature is above 175°F.

Magnetic Pistons
All Series 2002 cylinders are supplied as standard with magnetic pistons for proximity switch actuation.

Proximity Switches
Magnetically operated Hall Effect switches (IS) or Reed switches (RS) are available to sense piston position at any point over the entire stroke length.

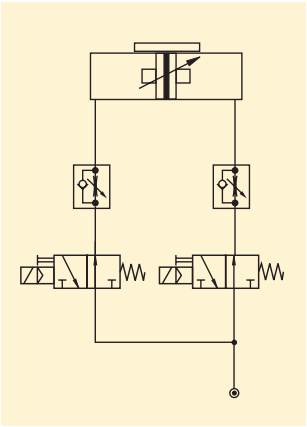
Corrosive Environments
All screws are plated. In extreme applications stainless steel can be supplied. Special aluminum coatings are available for added protection against chemical or caustic wash down of equipment or in environments where corrosive gases are present.

Cylinder Loading
Values are based on shock-free duty and should not be exceeded during piston acceleration.

Note:
Seal life can be significantly influenced by extremes of speed, load and temperature which exceed the approved limits. Contact the Parker Applications Department for assistance with special applications.

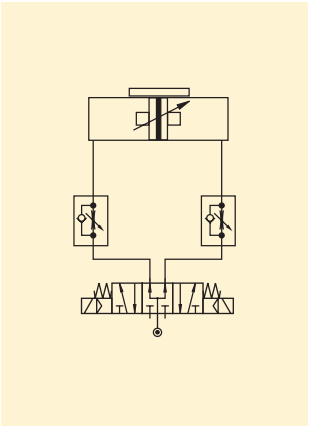
All specifications are subject to change without notice.

Circuit Configurations



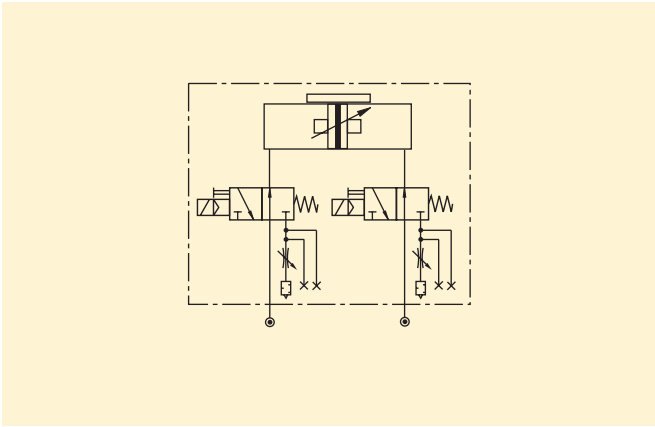
Circuit diagram for end of stroke application. Intermediate positioning is also possible.

The cylinder is controlled by two 3/2-way valves (normally open). The speed can be adjusted independently for both directions.

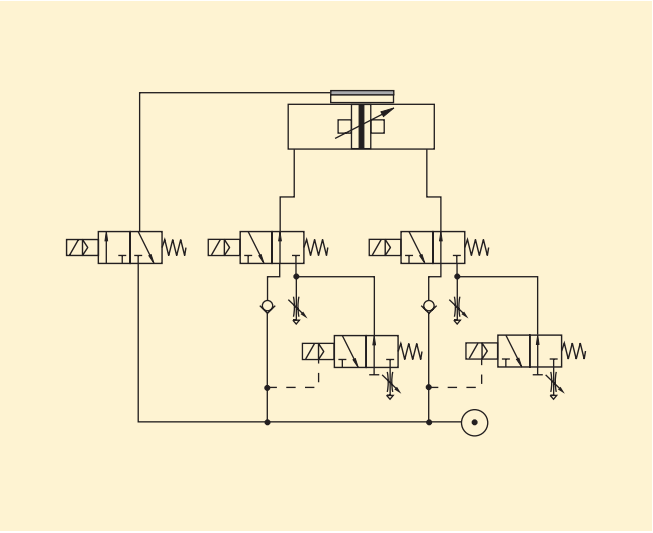


Circuit diagram for end of stroke application. Intermediate positioning is also possible.

The cylinder is controlled by a 5/3-way valve (middle position pressurized).The speed can be adjusted independently for both directions.

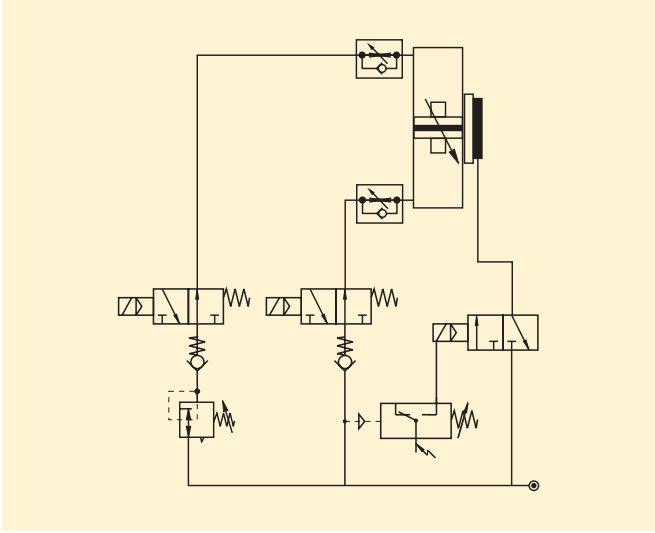


The optional integrated VOE Valves offer optimal control, and allow accurate positioning of intermediate positions and the lowest possible speeds.



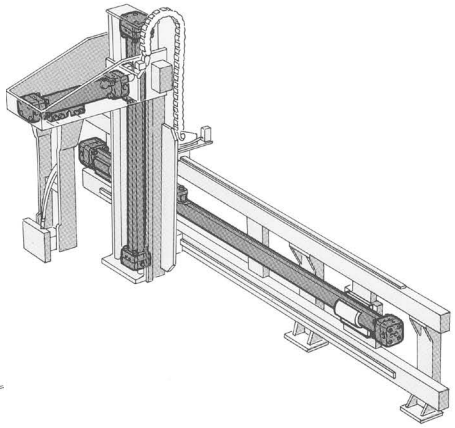
Fast/Slow speed cycle control with pneumatic brake for accurate positioning at high velocities. Additional 3/2-way valves with adjustable throttle valves at the exhaust of the standard directional control valves for two displacement speeds in each direction of the piston's travel.

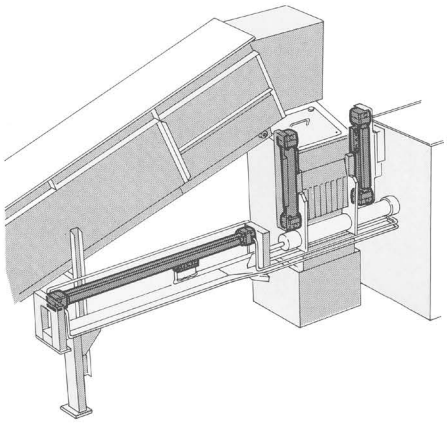
The valve controlling the brake is activated after the slow speed cycle is activated.

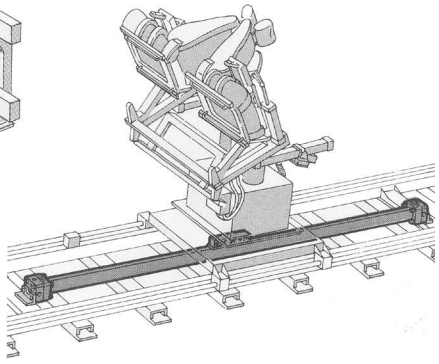


The combination of an OSP-cylinder with the passive MULTIBRAKE as shown here, allows accurate positioning and safety in case of loss of pneumatic air pressure.

Applications



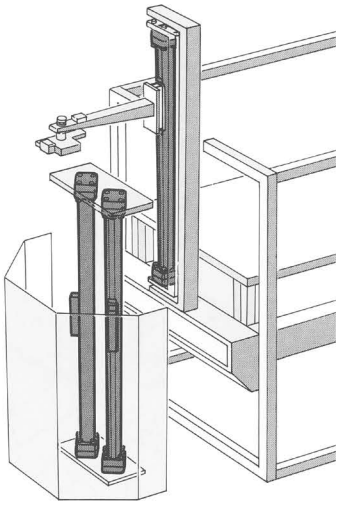


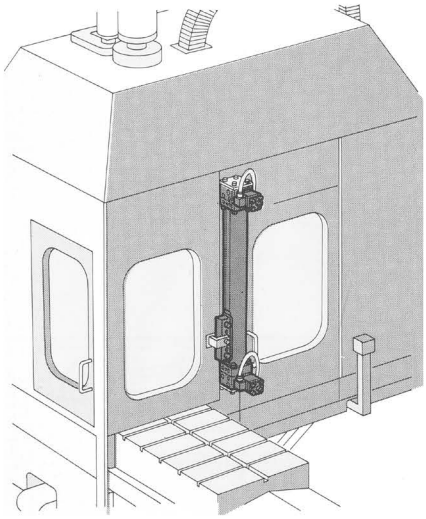


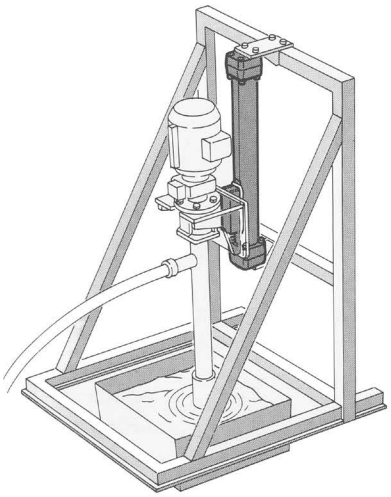
For more than 30 years Parker cylinders have provided solutions to linear motion problems in all types of industry.

Offering simple designs, easy installation, clean operation and maintenance free duty, Parker cylinders are suitable for a diversity of applications and environments.

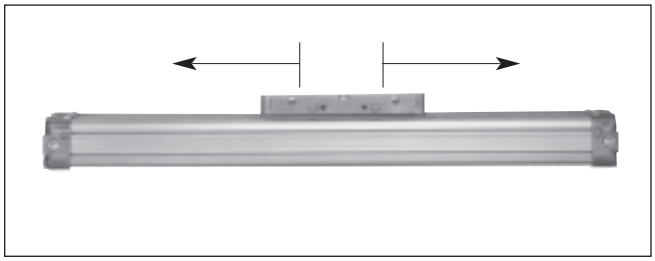
For more information or assistance with your linear motion tasks, please call an authorized distributor or Parker direct.





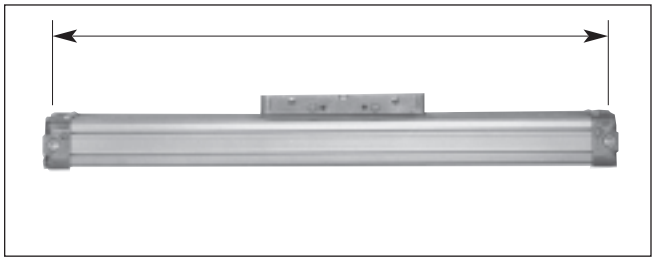


Six Unique Advantages



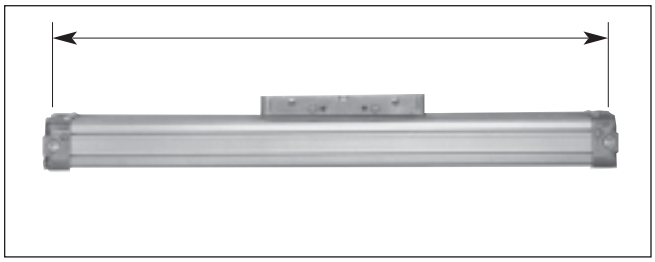
Equal Force and Speed

Equal piston area on each side of the piston allows for equal force and speed in both directions of travel. Additionally, the ability to “pneumatically lock” the piston at various points along the stroke is possible through the use of special valve configurations.



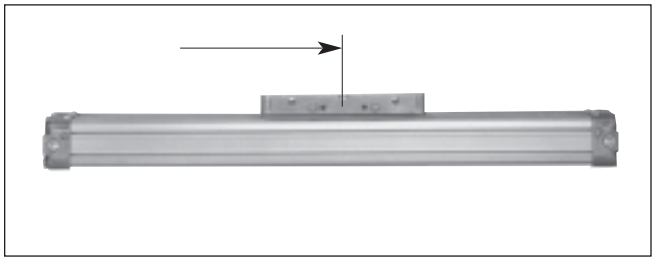
Any Length of Stroke

Infinitely variable strokes are available up to 480 inches and each cylinder is custom manufactured to customer requirements without incurring extended delivery times.



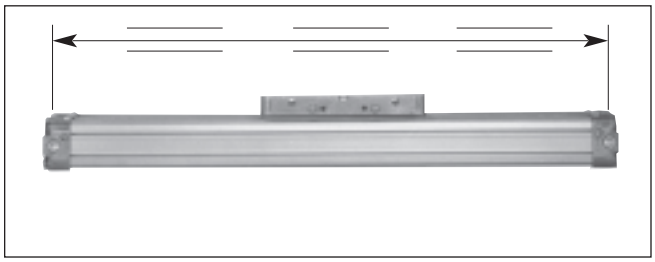
Space Saving

The lack of a piston rod allows for nearly half the space requirement of a “rod type” pneumatic cylinder. The result is a simpler, less costly installation reducing the amount of hardware and design time.



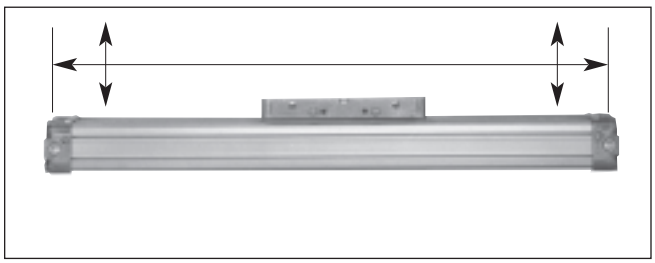
Accepts Cantilever Loads

The unique piston design and barrel rigidity allows the cylinder to accept high direct and bending moment loads without the need for additional support hardware.



Self Guiding

The internal self-supporting characteristics of the rodless cylinder provides guidance of the piston throughout the stroke. High priced guidance mechanisms (roundway bearings, precision slideways, etc.) are not required.



Inherent Rigidity

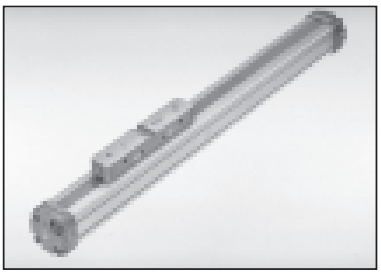
Integral strength and rigidity of the complete cylinder assembly will accommodate the heaviest of loads enabling the cylinder to form part of a structure or framework. This eliminates the need for expensive and bulky I-beams, channels and fabrications.

The Product Range

Series 2002 - Basic Cylinder

Bore sizes (mm): 16, 25, 32, 40, 50

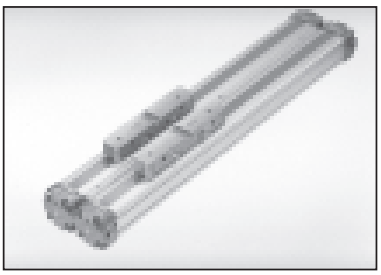
The basic cylinder series satisfies the support and guidance requirements of a great diversity of applications. Various mounting and control options are available for specific application needs.



Series 2002 - Joint Clamp

Bore sizes (mm): 25, 32, 40, 50

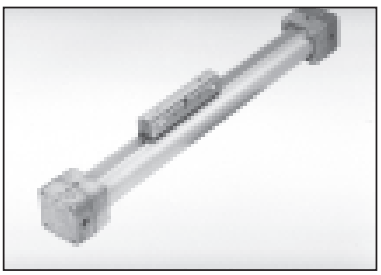
Two cylinders mounted in a tandem configuration for increased load and force requirements. The arrangement enhances lateral support and bending moment capabilities.



Series P120 - Basic Cylinder

Bore sizes (mm): 40, 63, 80

For high force and load requirements, the P120 series provides optimal strength and a unique package of options.



Ordering Procedure

Series 2002

32-2020/20X50-B-M

Cylinder Bore Size:
16, 25, 32, 40 or 50

Configuration:
- = Single Cylinder
J = Joint Clamp Unit
C=Clean Room Cylinder

Piston Quantity:
20 = Single Piston
22 = Double Piston

End Cap Cushion Placement:
20 = Standard Cushion Location (21 for 50mm)
30 = Cushion at Rear of Cap (31 for 50mm)
Note: Rear cushions are available on Ø25mm - Ø50mm only.

*Note: When entering total stroke length for 2220/2230 (double piston) cylinders be sure to first add the "CL" distance to the actual, effective stroke length. Enter this total in the cylinder part number. Follow the same procedure for pricing.

Piston Mounting Type:
20 = Standard Mount
25 = Floating Mount
For Joint Clamp Cylinders:
24 = Platform Mount

***Stroke Length:**
Enter metric strokes followed by "mm" (i.e. 200mm)

Seal Type:
B = Buna
F = FKM

Prelube Specification (optional):
M = Standard
C = Cleanroom
F = Food Grade
S = Slow Speed

Series P120

P124-S/20X50-B-M

Cylinder Series P120

Cylinder Bore Size:
4 = 40mm
6 = 63mm
8 = 80mm

Piston/Mount Configuration:

Short Piston
S/20 = Standard Mount
S/22 = Platform Mount
S/25 = Floating Mount

Long Piston
L/26 = Standard Mount
L/28 = Platform Mount

Stroke Length:
Enter metric strokes followed by "mm" (i.e. 200mm)

Seal Type:
B = Buna
F = FKM

Prelube Specification (optional):
M = Standard
C = Cleanroom
F = Food Grade
S = Slow Speed

Service Packs

Series 2002

SP32R-B-1 X S

Service Pack
Bore Size = 25, 32, 40, 50
B = Buna-N, F = FKM
1 = Single Piston
2 = Double Piston
Enter Stroke Length

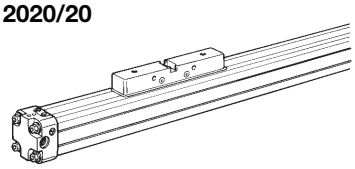
Series P120

SP124-B-S X S

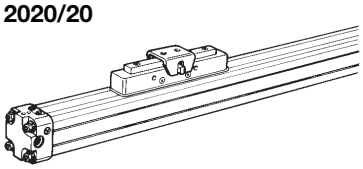
Service Pack
Bore Size: 124 = 40mm, 126 = 63mm, 128 = 80mm
B = Buna-N, F = FKM
S = Short Piston
L = Long Piston
Enter Stroke Length

2002 Summary

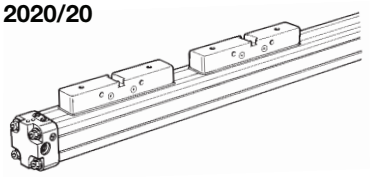
2020/20



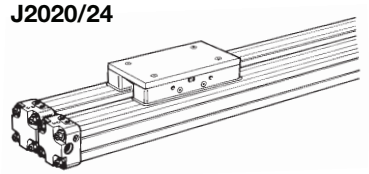
2020/20



2020/20

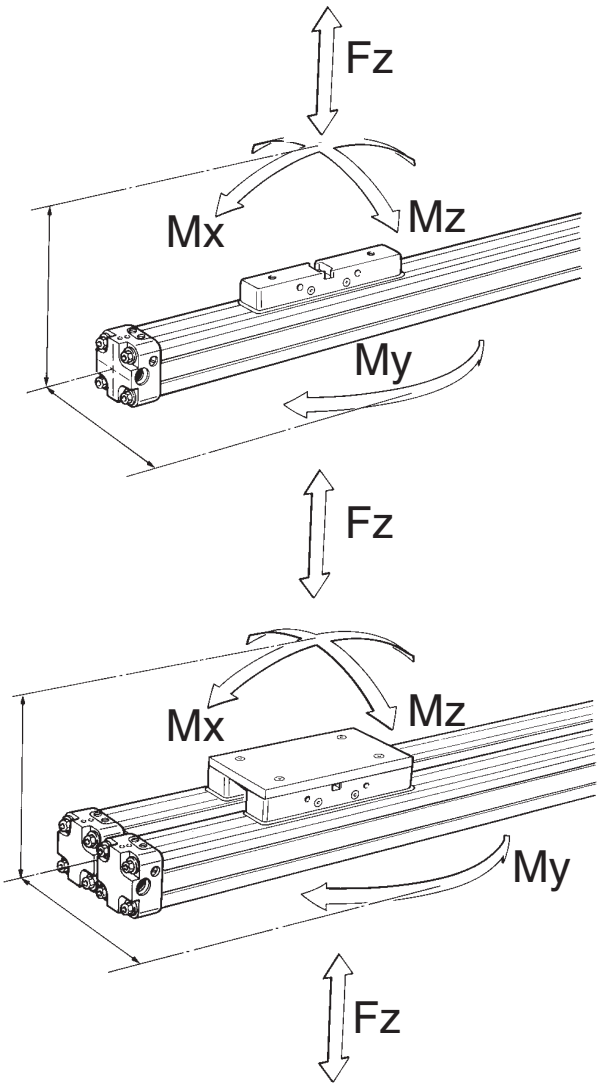


J2020/24



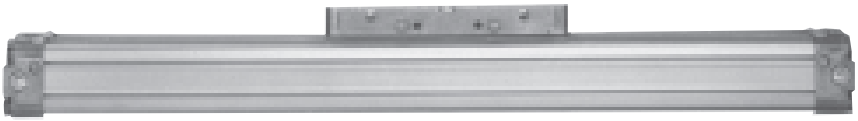
Series	Cyl Ø (mm)	Theoretical Force at 87 PSI (lbs. force)	Cushion Length (in.)	Max. Allowed Bending Moment Mx (in./lbs.)	Max. Allowed Bending Moment Mz (in./lbs.)	Max. Allowed Bending Moment My (in./lbs.)	Max. Allowed Load L (lbs.)
Series 2002 Single Piston	16	27	0.59	35	3	5	30
	25	66	0.55	132	9	27	65
	32	108	1.10	318	36	120	115
	40	169	1.42	575	53	156	195
	50	265	1.50	1017	98	312	270
Series 2002 Double Piston	16	27	0.59	81	6	9	60
	25	66	0.55	336	18	45	130
	32	108	1.10	720	72	600	230
	40	169	1.42	1320	106	792	390
	50	265	1.50	2304	196	1464	540
Joint Clamp Single Piston	25	132	0.55	264	115	54	130
	32	216	1.10	636	248	240	230
	40	338	1.42	1150	444	312	390
	50	530	1.50	2034	859	624	540
Joint Clamp Double Piston	25	132	0.55	672	230	90	260
	32	216	1.10	1440	496	1200	460
	40	338	1.42	2640	888	1584	780
	50	530	1.50	4608	1718	2928	1080
Series P120 Short Piston	40	169	1.26	528	36	72	170
	63	420	1.57	1776	72	216	370
	80	677	1.73	3192	144	420	590
Series P120 Long Piston	40	169	1.26	1200	72	216	170
	63	420	1.57	3984	144	660	370
	80	677	1.73	6372	288	1236	590

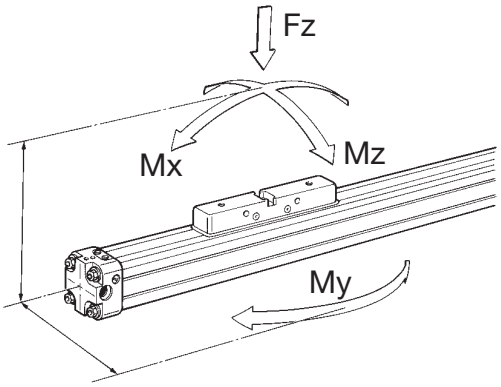
Loading Diagrams



Series 2002 - Basic Cylinder

Bore sizes: 16mm, 25mm, 32mm, 40mm and 50mm. Stroke lengths available up to 480"

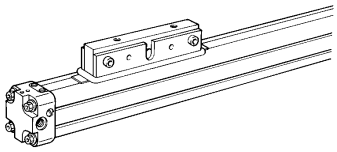
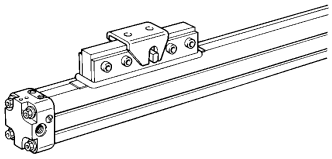
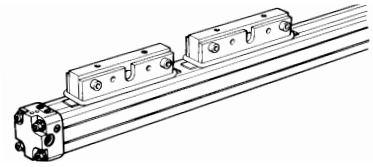




Loads, forces, moments

Cyl Ø (mm)	Theorectical Force at 87 PSI (lbs. force)	Cushion Length (in.)	Max. Allowed Bending Moment Mx (in./lbs.)	Max. Allowed Bending Moment Mz (in./lbs.)	Max. Allowed Bending Moment My (in./lbs.)	Max. Allowed Load L (lbs.)
Single Piston Values						
16	27	0.59	35	3	5	30
25	66	0.55	132	9	27	65
32	108	1.10	318	36	120	115
40	169	1.42	575	53	156	195
50	265	1.50	1017	98	312	270
Double Piston Values						
16	27	0.59	81	6	9	60
25	66	0.55	336	18	45	130
32	108	1.10	720	72	600	230
40	169	1.42	1320	106	792	390
50	265	1.50	2304	196	1464	540

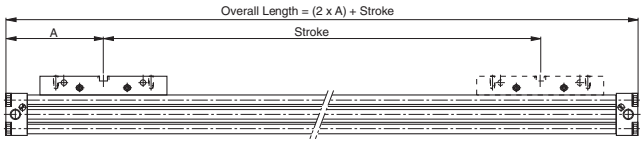
Piston Mountings - Ø 16mm

Design	Pictorial Representation	Description	Cyl. Ø	Weight 0" Stroke (lbs.)	Weight per inch (lbs.)
Type 2020/20		Piston Mounting NR20 Standard mounting. Mounted during cylinder assembly.	16	0.51	0.05
Type 2020/25		Piston Mounting NR25 Allows for a floating connection between the cylinder and an externally guided device.	16	0.55	0.05
Type 2220/20		Double Piston Mounting NR20 Two pistons in a single barrel using the standard NR20 mounting.	16	0.67	0.05

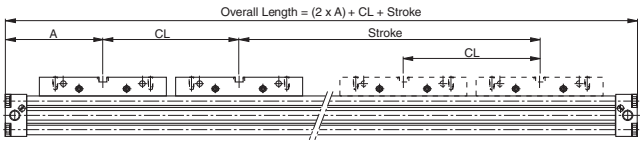
Overall Dimensions - Ø 16mm

Ø 16mm

Basic Dimensions (Single Piston)

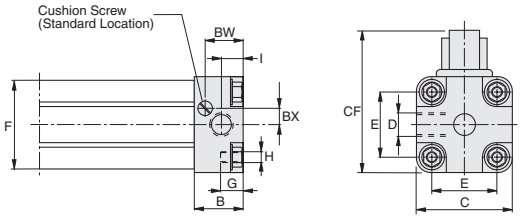


Basic Dimensions (Double Piston)

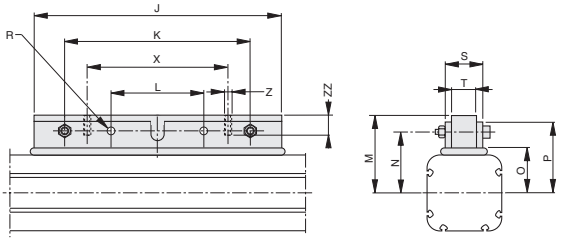


Min. CL Distances: Ø16mm = 3.60

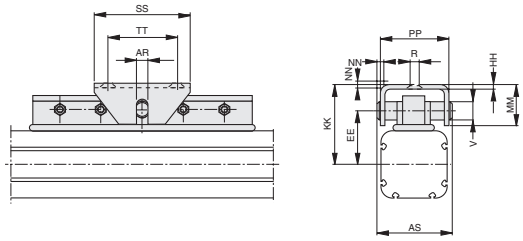
End Cap Dimensions Ø 16mm



Piston Mounting NR20



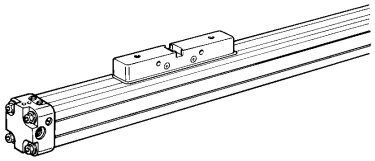
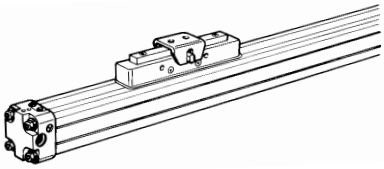
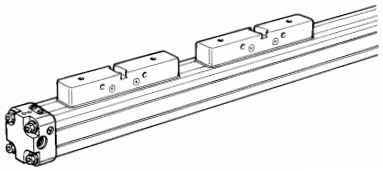
Piston Mounting NR25



Cyl Ø	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	V	X	Z
16	2.56	.59	1.06	M5	.71	.94	.20	M3	.22	2.99	2.52	1.26	1.18	.94	.63	1.14	.18	.71.	39	.20	1.89	M4

Cyl Ø	AR	AS	BW	BX	CF	HH	KK	LL	MM	NN	PP	SS	TT	ZZ
16	.12	1.10	.47	.16	1.71	.08	1.34	.96	.51	.06	.98	.79	.39	.31

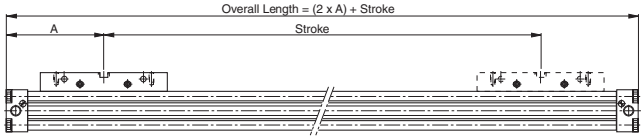
Piston Mountings - Ø 25mm, 32mm, 40mm, 50mm

Design	Pictorial Representation	Description	Cyl. Ø	Weight 0" Stroke (lbs.)	Weight per inch (lbs.)
Type 2020/20		Piston Mounting NR20 Standard mounting. Mounted during cylinder assembly.	25	1.32	0.11
			32	3.19	0.20
			40	5.17	0.29
			50	7.70	0.43
Type 2020/25		Piston Mounting NR25 Allows for a floating connection between the cylinder and an externally guided device.	25	1.54	0.11
			32	3.85	0.20
			40	5.83	0.29
			50	9.46	0.43
Type 2220/20		Double Piston Mounting NR20 Two pistons in a single barrel using the standard NR20 mounting.	25	2.05	0.11
			32	5.15	0.20
			40	9.10	0.29
			50	13.20	0.43

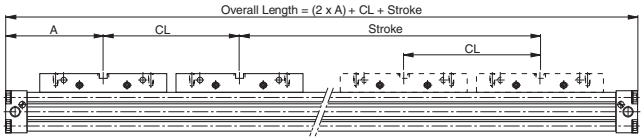
Overall Dimensions - Ø 25mm, 32mm, 40mm, 50mm

Ø 25mm, 32mm, 40mm and 50mm

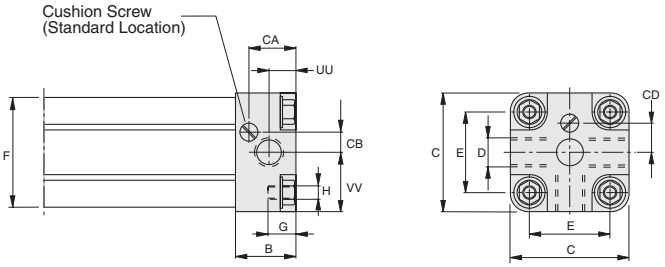
Basic Dimensions (Single Piston)



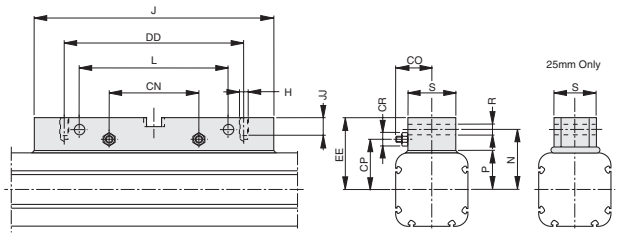
Basic Dimensions (Double Piston)



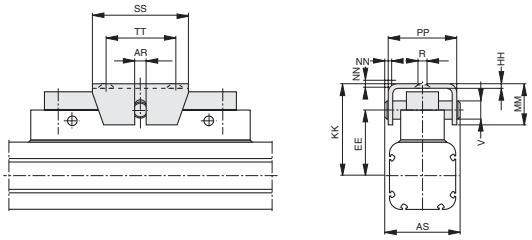
End Cap Dimensions



Piston Mounting NR20



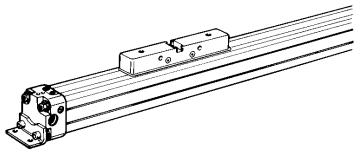
Piston Mounting NR25



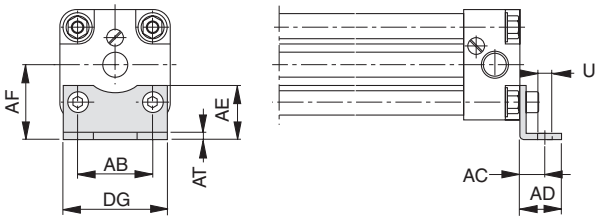
Cyl Ø	A	B	C	D	E	F	G	H	J	L	N	P	R	S	U	V	DD	EE
25	3.94	.91	1.57	1/8 NPT	1.06	1.42	.35	10-32	4.72	1.97	1.30	.75	.22	.91	.22	.31	3.15	1.50
32	4.92	1.06	2.09	1/4 NPT	1.42	1.93	.47	1/4-20	6.30	3.94	1.57	1.10	.26	1.26	.26	.47	4.72	1.89
40	5.91	1.06	2.48	1/4 NPT	1.81	2.32	.47	1/4-20	6.30	3.94	1.81	1.34	.26	1.26	.26	.47	4.72	2.13
50	6.70	1.26	3.07	3/8 NPT	2.13	2.83	.47	5/16-18	7.87	5.51	2.17	1.57	.35	1.34	.35	.63	6.30	2.56

Cyl Ø	HH	JJ	KK	LL	MM	NN	PP	SS	TT	UU	VV	AR	AS	BN	CA	CB	CD	CL (min.)
25	.12	.35	2.05	1.50	.79	±.10	1.46	1.26	.63	.33	.81	.20	1.65	2.05	.71	.26	.35	5.12
32	.16	.47	2.60	1.89	1.18	±.16	1.97	2.76	1.97	.41	1.04	.31	2.28	2.60	.83	.35	.51	6.90
40	.16	.47	2.83	2.13	1.18	±.16	1.97	2.76	1.97	.41	1.24	.31	2.28	2.83	.71	.51	.65	8.75
50	.20	.63	3.54	2.56	1.77	±.24	2.28	3.94	3.15	.49	1.54	.39	2.83	3.54	.83	.59	.73	10.00

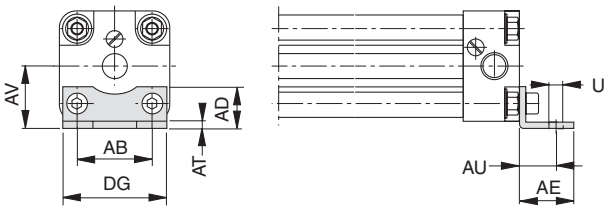
Cylinder Mountings - Ø 16mm, 25mm, 32mm, 40mm, 50mm

Design	Pictorial Representation	Description	Cyl. Ø	Part Number	Weight (lbs.)
Type NR4		End Cap Mounting	16	2172-0101	0.02
			25	2172-0201	0.07
			32	2172-0351	0.11
			40	2172-0451	0.13
			50	2172-0551	0.26

End Cap Mounting NR4



NR4 Mounting Bracket - Mtg. Style “A”

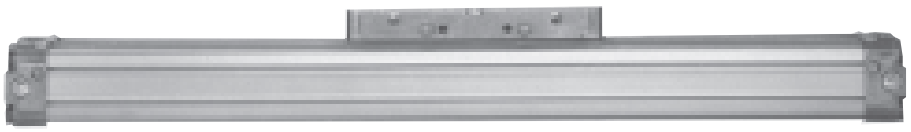


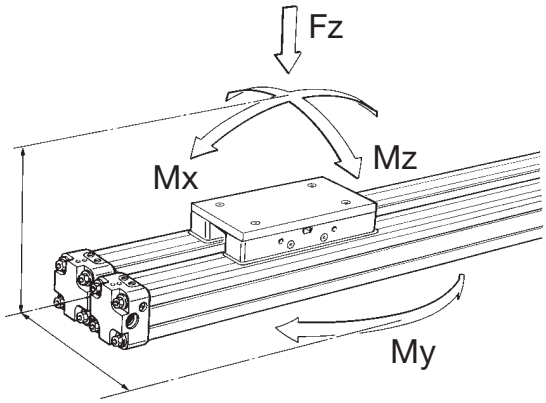
NR4 Mounting Bracket - Mtg. Style “B”

Cyl Ø	U	AB	AC	AD	AE	AF	AT	AU	AV	DG
16	.14	.71	.39	.55	.49	.59	.06	—	—	1.02
25	.22	1.06	.41	.71	.87	1.10	.08	.57	.94	1.54
32	.26	1.42	.47	.79	1.02	1.42	.12	.71	1.18	1.97
40	.26	1.81	.47	.79	1.02	1.61	.12	.71	1.38	2.36
50	.35	2.13	.71	1.10	1.34	2.01	.16	.94	1.77	2.91

Series 2002 - Joint Clamps

Bore sizes: 25mm, 32mm, 40mm and 50mm. Stroke lengths available up to 480"

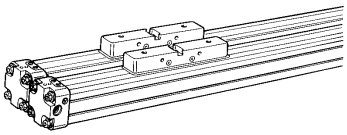
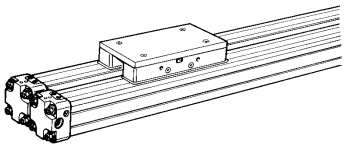
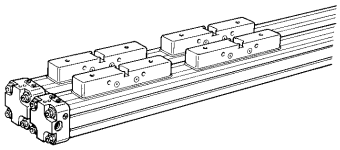
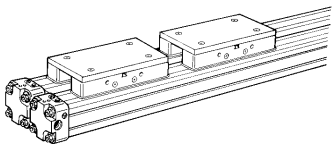




Loads, forces, moments

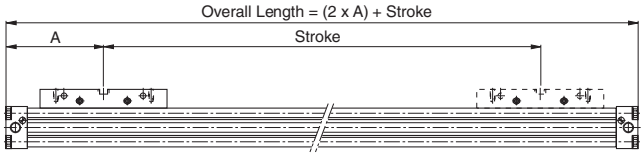
Cyl Ø (mm)	Theorectical Force at 87 PSI (lbs. force)	Cushion Length (in.)	Max. Allowed Bending Moment Mx (in./lbs.)	Max. Allowed Bending Moment Mz (in./lbs.)	Max. Allowed Bending Moment My (in./lbs.)	Max. Allowed Load L (lbs.)
Single Piston Values						
25	132	0.55	264	115	54	130
32	216	1.10	636	248	240	230
40	338	1.42	1150	444	312	390
50	530	1.50	2034	859	624	540
Double Piston Values						
25	132	0.55	672	230	90	260
32	216	1.10	1440	496	1200	460
40	338	1.42	2640	888	1584	780
50	530	1.50	4608	1718	2928	1080

Piston Mountings - Ø 25mm, 32mm, 40mm, 50mm

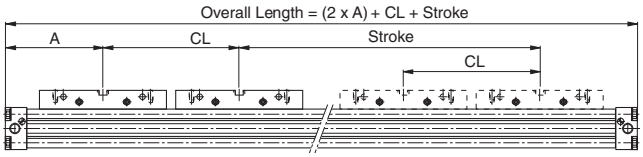
Designation	Pictorial Representation	Description	Cyl. Ø	Weight 0" Stroke (lbs.)	Weight per inch (lbs.)
Type J2020/20		Piston Mounting NR20 Standard mounting. Mounted during cylinder assembly.	25 32 40 50	2.82 6.84 10.92 16.50	0.24 0.46 0.63 0.97
Type J2020/24		Piston Mounting NR24 Flat, platform mounting. Provides a common connection across both pistons.	25 32 40 50	3.24 7.72 11.91 18.70	0.24 0.46 0.63 0.97
Type J2220/20		Piston Mounting NR20 Two pistons in each barrel using the standard NR20 mounting.	25 32 40 50	4.44 11.11 19.37 28.60	0.24 0.46 0.63 0.97
Type J2220/24		Piston Mounting NR24 Two pistons in each barrel. Provides a common connection across each set of pistons.	25 32 40 50	5.28 12.87 21.35 33.00	0.24 0.46 0.63 0.97

Overall Dimensions - Ø 25mm, 32mm, 40mm, 50mm

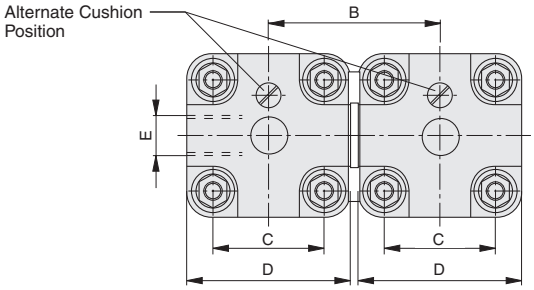
Basic Dimensions (Single Piston)



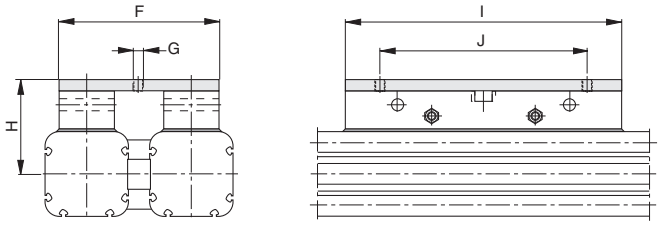
Basic Dimensions (Double Piston)



End Cap Cross Section

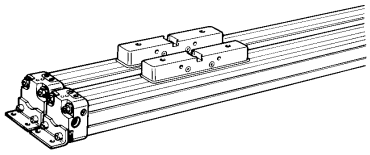


Piston Mounting NR24



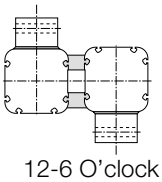
Cyl Ø	A	B	C	D	E	F	G	H	I	J	CL (min.)
25	3.94	1.73	1.06	1.57	1/8 NPT	2.76	1/4-20	1.81	4.72	3.15	5.12
32	4.92	2.20	1.42	2.09	1/4 NPT	3.54	5/16-18	2.28	6.30	4.73	6.90
40	5.91	2.60	1.81	2.48	1/4 NPT	3.94	5/16-18	2.52	6.30	4.73	8.75
50	6.70	3.19	2.13	3.07	3/8 NPT	4.73	3/8-16	3.15	7.88	6.30	10.00

Cylinder Mountings - Ø 25mm, 32mm, 40mm, 50mm

Design	Pictorial Representation	Description	Cyl. Ø	Part Number	Weight (lbs.)
Type NR4		End Cap Mounting Provides rigid end mounting of the cylinder.	25	2172-0201	0.07
			32	2172-0351	0.11
			40	2172-0451	0.13
			50	2172-0551	0.26

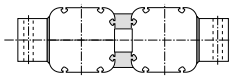
Orientation Examples

Orientation #1



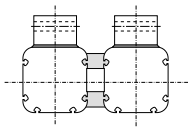
12-6 O'clock

Orientation #2



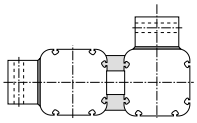
9-3 O'clock

Orientation #3



12-12 O'clock

Orientation #4

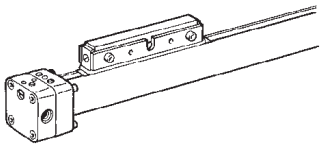


9-12 O'clock

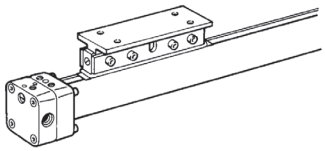
Note: Joint Clamp cylinder loadings will vary depending on the above orientation used.
Consult the factory for design assistance.

P120 Summary

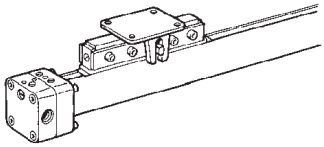
P120-S/20



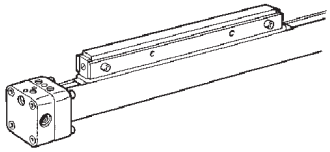
P120-S/22



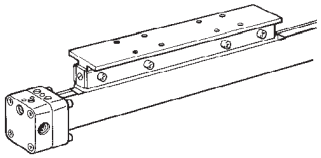
P120-S/25



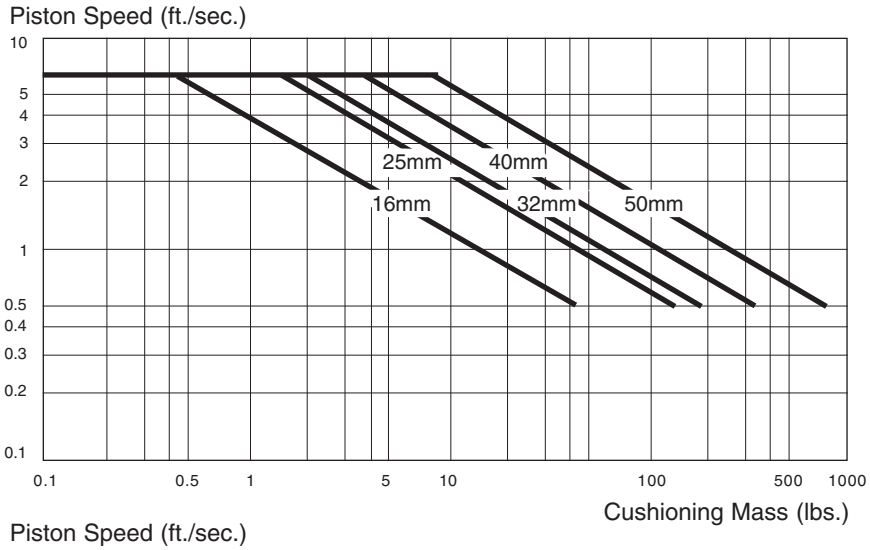
P120-L/26



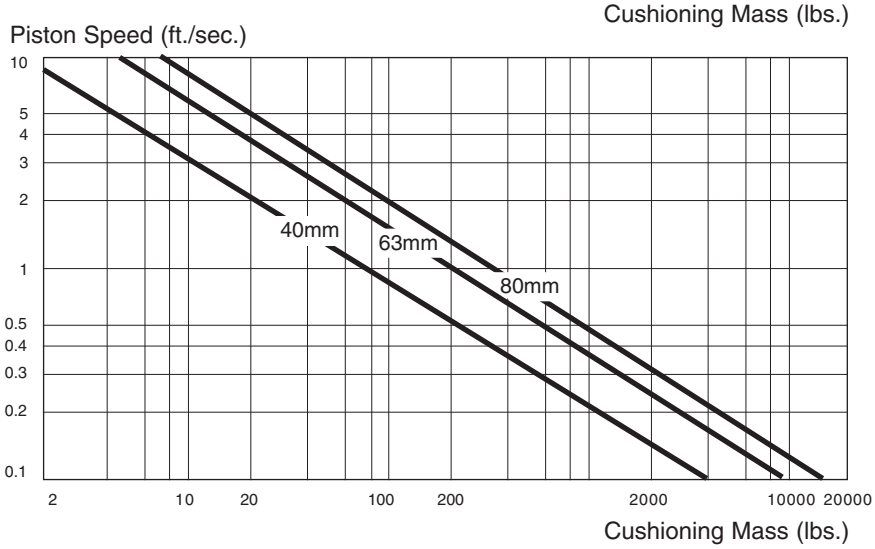
P120-L/28



Cushion Diagram Series 2002



Cushion Diagram Series P120

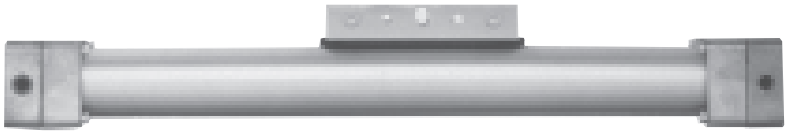


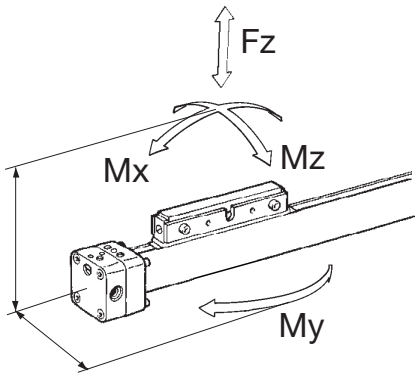
For inventory, lead times, and kit lookup, visit www.pdnplu.com

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Series P120 - Basic Design

Bore sizes: 40mm, 63mm and 80mm. Stroke lengths available up to 480"

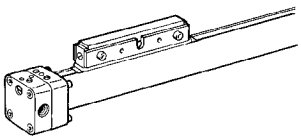
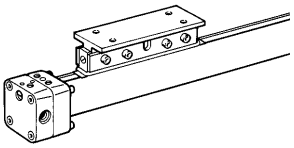
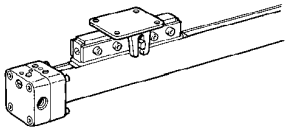
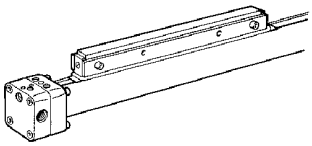
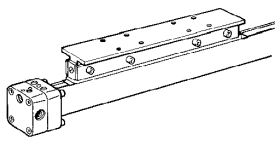




Loads, forces, moments

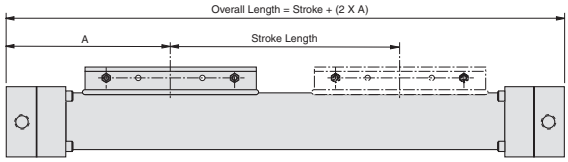
Cyl Ø (mm)	Theorectical Force at 87 PSI (lbs. force)	Cushion Length (in.)	Max. Allowed Bending Moment Mx (in./lbs.)	Max. Allowed Bending Moment Mz (in./lbs.)	Max. Allowed Bending Moment My (in./lbs.)	Max. Allowed Load L (lbs.)
Single Piston Values						
40	169	1.26	528	36	72	170
63	420	1.57	1776	72	216	370
80	677	1.73	3192	144	420	590
Double Piston Values						
40	169	1.26	1200	72	216	170
63	420	1.57	3984	144	660	370
80	677	1.73	6372	288	1236	590

Series P120 - Ø 40mm, 63mm, 80mm

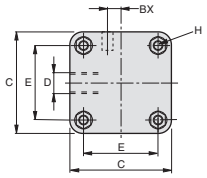
Designation	Pictorial Representation	Description	Cyl. Ø	Weight 0" Stroke (lbs.)	Weight per inch (lbs.)
Type P120-S/20		Piston Mounting S/20 Standard mounting. Mounted during cylinder assembly.	40 63 80	7.26 20.46 35.42	0.20 0.45 0.71
Type P120-S/22		Piston Mounting S/22 Flat, platform mounting	40 63 80	7.48 20.90 36.74	0.20 0.45 0.71
Type P120-S/25		Piston Mounting S/25 Allows for a floating connection between the cylinder and an externally guided device.	40 63 80	7.92 22.66 38.06	0.20 0.45 0.71
Type P120-L/26		Piston Mounting L/26 Standard mounting. Mounted during cylinder assembly.	40 63 80	11.00 30.58 51.04	0.20 0.45 0.71
Type P120-L/28		Piston Mounting L/28 Flat, platform mounting.	40 63 80	11.44 32.12 53.68	0.20 0.45 0.71

Overall Dimensions - Ø 40mm, 63mm, 80mm

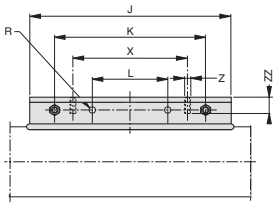
Basic Dimensions

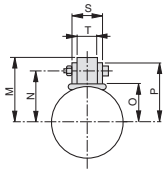


End Cap Dimensions

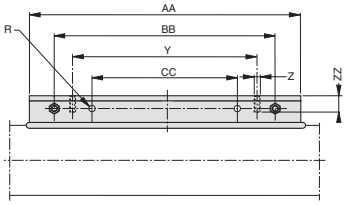


Piston Mounting S/20

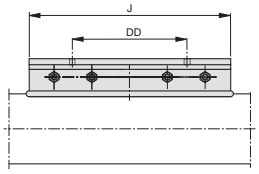


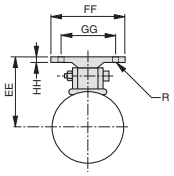


Piston Mounting L/26

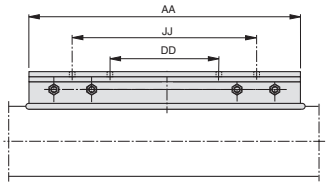


Piston Mounting S/22

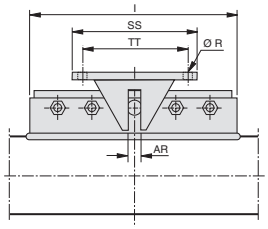


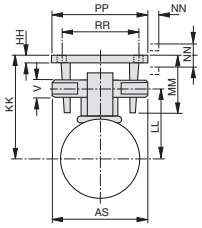


Piston Mounting L/28



Piston Mounting S/25



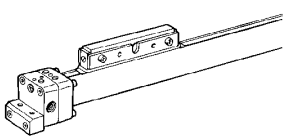


Cyl Ø	A (S/)	A (L/)	C	D	E	H	J	K	L	M	N	O	P	R	S
40	5.91	9.91	2.83	1/4 NPT	2.13	1/4-20	5.91	4.33	2.17	2.40	1.93	1.28	2.24	.28	1.10
63	8.46	14.46	4.17	3/8 NPT	3.07	5/16-18	8.66	7.09	3.54	3.27	2.68	1.89	3.07	.35	1.18
80	10.24	16.24	5.20	1/2 NPT	3.78	3/8-16	11.02	9.45	4.72	3.98	3.27	2.36	3.74	.43	1.26

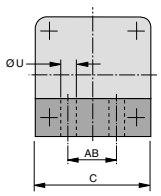
Cyl Ø	T	V	X	Y	Z	AA	AR	AS	BB	BX	CC	DD	EE	FF	GG
40	.71	.47	90	7.09	M6	11.81	.31	3.31	9.45	.43	4.72	3.15	2.60	2.36	1.77
63	.75	.63	140	11.81	M8	18.90	.39	3.54	15.75	.59	7.87	5.12	3.50	3.15	2.36
80	.79	.79	190	14.17	M10	22.05	.51	4.33	18.90	.63	9.45	7.09	4.25	3.94	2.95

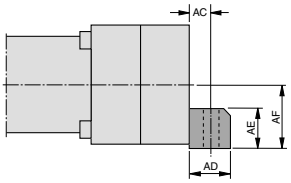
Cyl Ø	HH	JJ	KK	LL	MM	NN	PP	RR	SS	TT	ZZ	α
40	.24	6.30	2.95	2.00	1.26	±.32	2.76	2.17	3.54	2.95	.47	22°
63	.28	10.24	3.94	2.76	1.54	±.39	3.54	2.76	4.72	3.94	.63	15°
80	.31	14.17	4.80	3.39	1.89	±.47	4.33	3.35	5.91	4.92	.79	15°

Cylinder Mountings - Ø 40mm, 63mm, 80mm

Design	Pictorial Representation	Description	Cyl. Ø	Part Number	Weight (lbs.)
Type NR3		End Cap Lug Mount	40	2170-0451	0.22
			63	2170-0651	0.66
			80	2170-0851	1.32

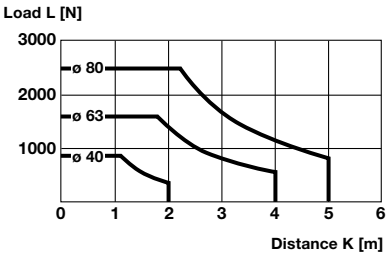
End Cap Lug Mount NR3

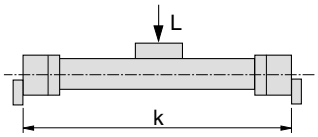




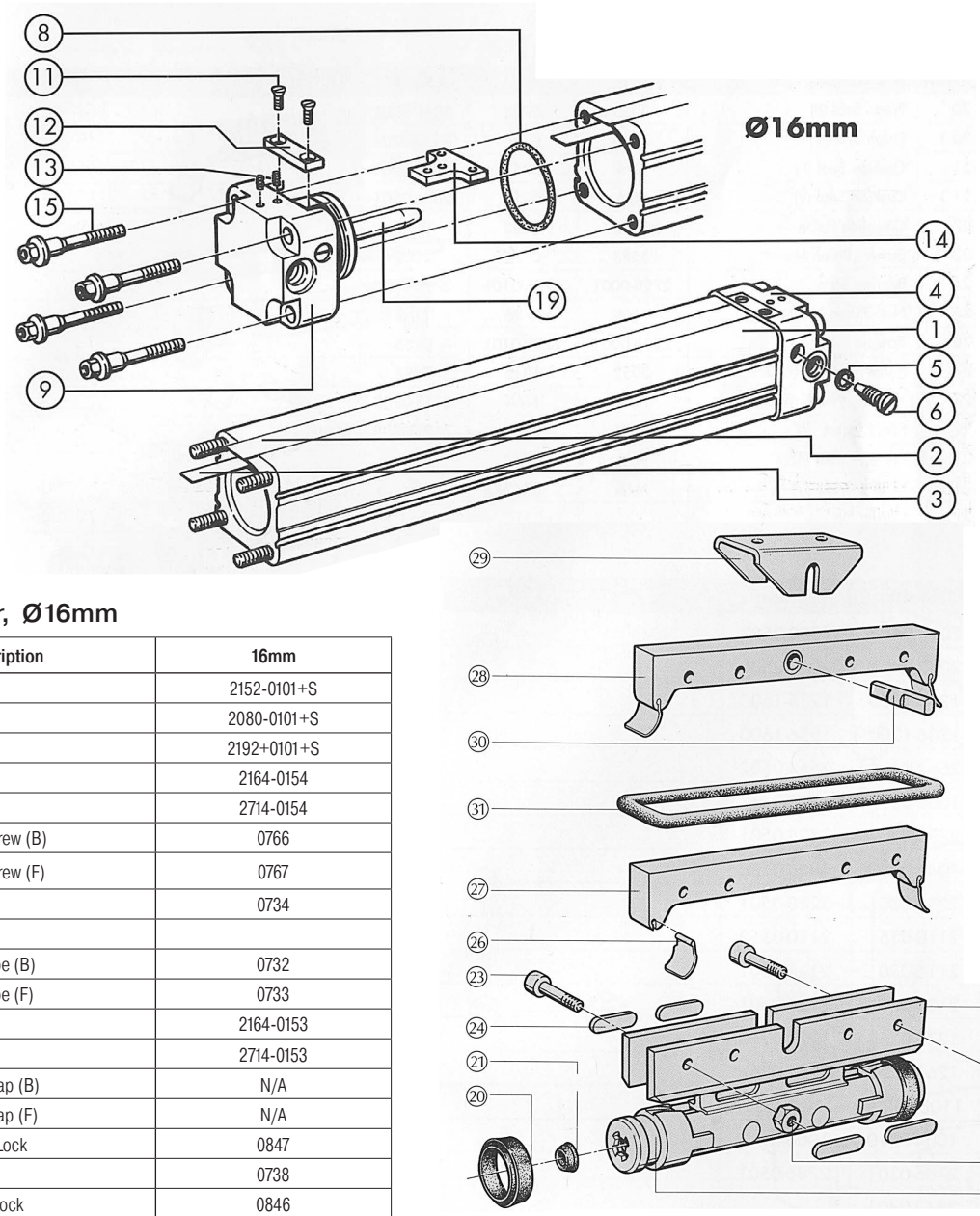
Cyl Ø	C	U	AB	AC	AD	AE	AF
40	2.83	.35	1.18	.49	.94	.94	1.50
63	4.17	.43	1.89	.59	1.18	1.57	2.24
80	5.20	.55	2.36	.69	1.38	1.97	2.83

Position of Cylinder Mounting





Spare Parts



2002 Basic Cylinder, Ø16mm

Item	Description	16mm
1	Cylinder Barrel	2152-0101+S
2***	Outer Band	2080-0101+S
3***	Inner Band	2192+0101+S
4	End Cap - Right (B)	2164-0154
4.1	End Cap - Right (F)	2714-0154
5	O-Ring - Cushion Screw (B)	0766
5.1	O-Ring - Cushion Screw (F)	0767
6	Cushion Screw	0734
7	N/A	
8	O-Ring - Cushion Pipe (B)	0732
8.1	O-Ring - Cushion Pipe (F)	0733
9	End Cap - Left (B)	2164-0153
9.1	End Cap - Left (F)	2714-0153
10	O-ring Gasket End Cap (B)	N/A
10.1	O-ring Gasket End Cap (F)	N/A
11	Screw - Outer Band Lock	0847
12	Outer Band Lock	0738
13	Screw - Inner Band Lock	0846
14	Inner Band Lock	0736
15	End Cap Screw	0735
19	Cushion Pipe	N/A
**	Service Pack-1 Piston (B)	SP16-B-1 xS
**	Service Pack-1 (F)	SP16-V-1 xS
**	Service Pack-2 (B)	SP16-B-2 xS
**	Service Pack-2 (F)	SP16-V-2 xS
	Seal Kit-1 (B)	2790-0101
	Seal Kit-1 (F)	2791-0101
	Seal Kit-2 (B)	2790-0101-2
	Seal Kit-2 (F)	2791-0101-2

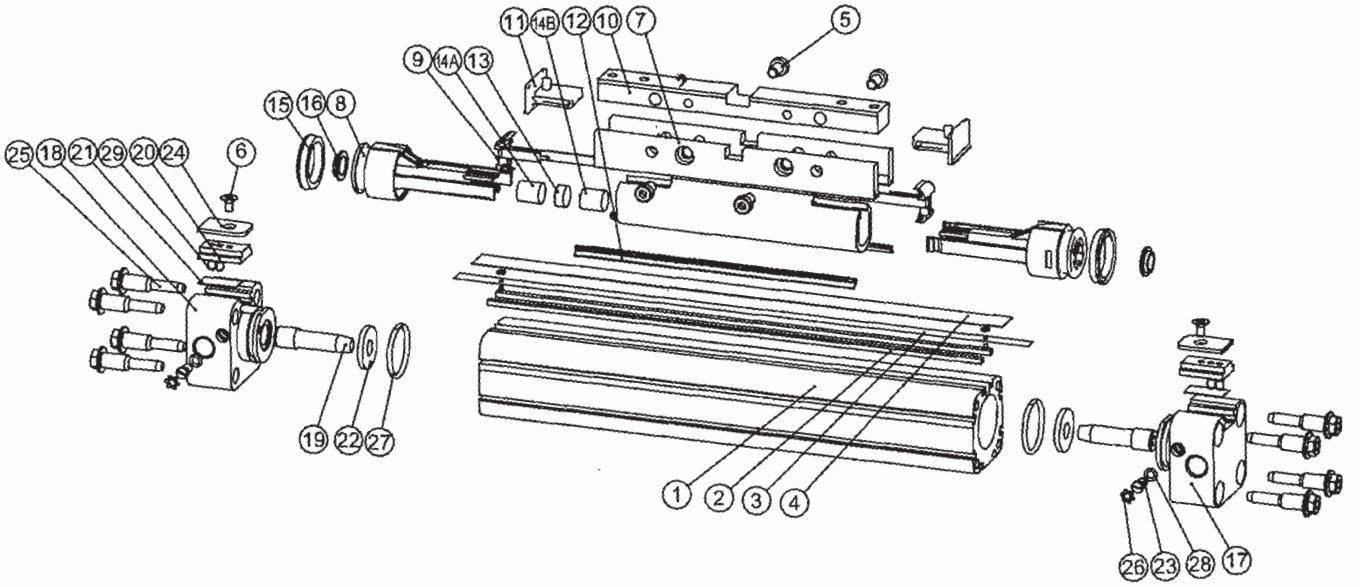
(B) = Buna-N
(F) = Fluorocarbon

** Note: Please identify stroke "S" required when ordering.

*** Note: These items can only be purchased in a service pack.

Item	Description	16mm
20	Piston Seal (B)	0745
20.1	Piston Seal (F)	0746
21	Cushion Seal (B)	0751
21.1*	Cushion Seal (F)	0752
22	Complete Piston	1853
23	Screw - Piston Mount	0754
24	Bearing Strip	2798-0101
25	Nut - Piston Mount	0796
26	Scraper	2238-0101
27	Piston Mount - NR20	1815
28	Bracket - NR25 Mount	N/A
29	Fork Bracket	0758
31	O-ring - Yoke (B)	0747
31.1	O-ring - Yoke (F)	0748

Spare Parts



NOTE: FOR 25mm ONLY, ITEMS 23, 26 & 28 ARE AN INTEGRAL PART OF THE CAP (ITEMS 17 & 18)

2002 Basic Cylinder, Ø25mm - Ø50mm

Item	Description	Kit to Purchase
1	Barrel	Purchase Separate
2	Magnet Strip	Purchase Separate
3	Inner Band	Service Pack
4	Outer Band	Service Pack
5	Piston Mount Screw	Piston Mount Kit
6	Outer Bandlock Screw	End Cap Assembly
7	Piston	Piston Assembly Kit
8	Support Ring (White, Red, Green)	Piston Assembly Kit
9	Slide Shoe (Yellow, Tan, Black)	Seal Kit
10	Piston Mounting	Piston Mount Kit
11	Scraper	Seal Kit
12	Slide Wiper	Seal Kit
13	Magnet	Piston Assembly Kit
14A	Magnet Holder (Aluminum)	Piston Assembly Kit
14B	Magnet Holder (Steel)	Piston Assembly Kit
15	Piston Seal	Seal Kit
16	Cushion Seal	Seal Kit
17	End Cap - Left Hand	End Cap Assembly
18	End Cap - Right Hand	End Cap Assembly
19	Cushion Pipe	End Cap Assembly

Item	Description	Kit to Purchase
20	Inner Band Lock	End Cap Assembly
21	Shim Piece	End Cap Assembly
22	Cushion Disc	Seal Kit
23	Cushion Adjustment Screw	End Cap Assembly
24	Outer Band Lock	End Cap Assembly
25	End Cap Screw	End Cap Assembly
26	Locking Ring	Purchase Separate
27	O-ring End Cap	Seal Kit
28	O-Ring - Cushion Screw	Seal Kit
29	Screw - Inner Band Lock	End Cap Assembly

* See page 159 for ordering instructions on kit part numbers.

Kit Parts

	Part Number			
Size	25mm	32mm	40mm	50mm
Barrel	**2152-0201 +S**	**2152-0301 +S**	**2152-0404 +S**	**2152-0502 +S**
Magnetic Strip	**2244-0201 +S**	**2244-0301 +S**	**2244-0451 +S**	**2244-0501 +S**

Piston Assembly Kits – includes seals, bearings, support rings, magnets and holders

(Buna)	**2002-25-PISTON-B**	**2002-32-PISTON-B**	**2002-40-PISTON-B**	**2002-50-PISTON-B**
(FKM)	**2002-25-PISTON-V**	**2002-32-PISTON-V**	**2002-40-PISTON-V**	**2002-50-PISTON-V**

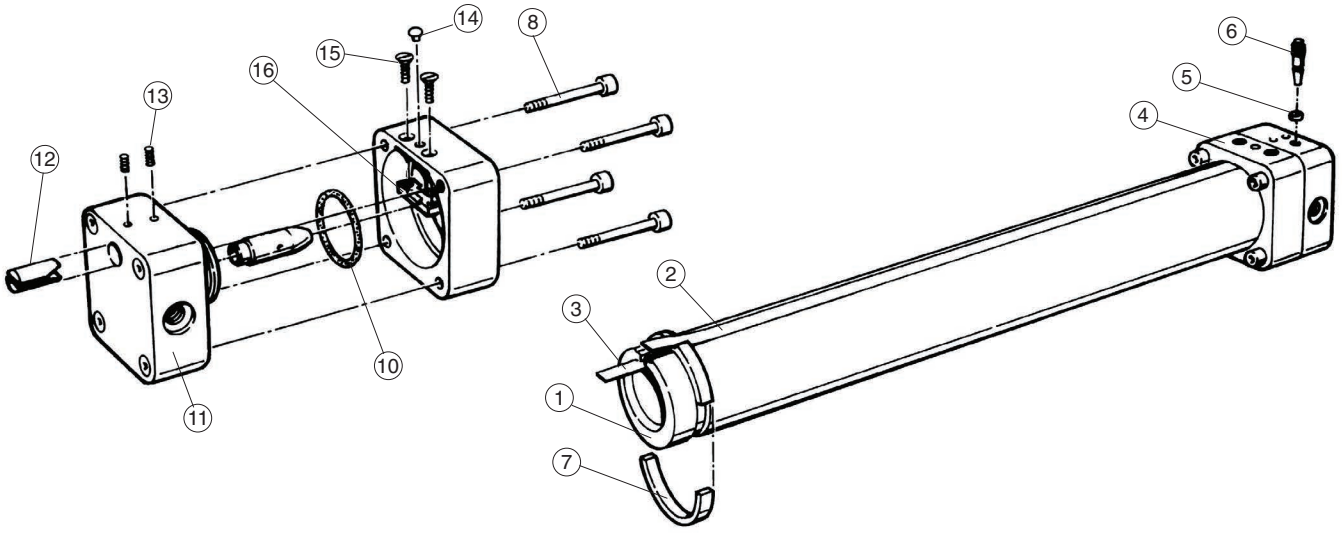
End Cap Assembly Kits – includes end cap set with cushion pipes, o-rings, cap screws, cushion discs, and hand locks

US Threads (Buna)	**2002-25-END-CAP-B**	**2002-32-END-CAP-B**	**2002-40-END-CAP-B**	**2002-50-END-CAP-B**
US Threads (FKM)	**2002-25-END-CAP-V**	**2002-32-END-CAP-V**	**2002-40-END-CAP-V**	**2002-50-END-CAP-V**
Metric Threads (Buna)	**2002-25-END-CAP-MO**	**2002-32-END-CAP-MO**	**2002-40-END-CAP-MO**	**2002-50-END-CAP-MO**
Metric Threads (FKM)	**2002-25-END-CAP-V-MO**	**2002-32-END-CAP-V-MO**	**2002-40-END-CAP-V-MO**	**2002-50-END-CAP-V-MO**

Piston Assembly Kits – includes piston mount, scrapers and screws

US Threads	**2002-25-PISTON-MT**	**2002-32-PISTON-MT**	**2002-40-PISTON-MT**	**2002-50-PISTON-MT**

Spare Parts



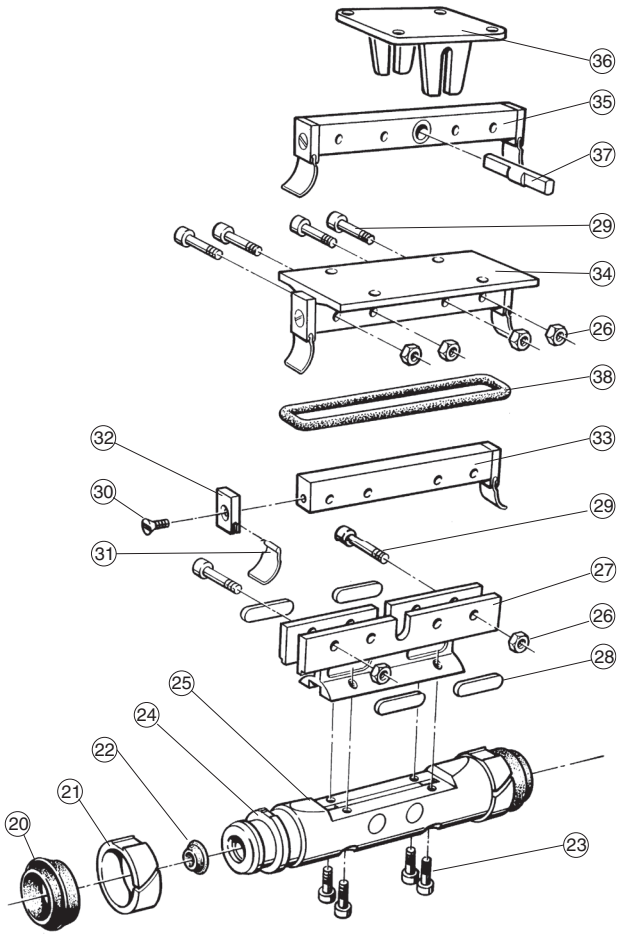
P120 Basic Cylinder, Ø40mm - Ø80mm

Item	Description	40mm	63mm	80mm
1	Cylinder Barrel S/	2152-0403+S	2152-0602+S	2152-0801+S
1.1	Cylinder Barrel L/	2153-0452+S	2153-0651+S	2153-0851+S
1.2	Magnet Strip	2244+0401+S	2244-0601+S	2074-0801
2***	Outer Band S/	2080-0403+S	2080-0603+S	2080-0801+S
2.1***	Outer Band L/	2081-0451+S	2081-0651+S	2081-0851+S
3***	Inner Band S/	2192-0402+S	2192-0602+S	2192-0802+S
3.1***	Inner Band L/	2193-0451+S	2193-0652+S	2193-0851+S
4	End Cap - Right (B)	2164-0454-R	2164-0654-R	2164-0852-R
4.1	End Cap - Right (F)	2714-0452-R	2714-0652-R	2714-0851-R
5	O-Ring - Cushion Screw (B)	1252-0101	1252-0101	1252-0101
5.1	O-Ring - Cushion Screw (F)	1262-0101	1262-0101	1262-0101
6	Cushion Screw	1213	1257	1257
7	Lock Ring - Upper/Lower	1207	1254	1263
8	Screw - End Cap	1004-0718	1004-0920	1004-1124
9	Cap Ring	2887	2889	1262
10	O-Ring - End Cap (B)	1250-0307	1250-0503	1250-0506
10.1	O-Ring - End Cap (F)	1261-0307	1261-0503	1261-0506
11	End Cap - Left (B)	2164-0454-L	2164-0654-L	2164-0852-L
11.1	End Cap - Left (F)	2714-0452-L	2714-0652-L	2714-0851-L
12	Inner Band Lock Set	4833	6833	8833
13	Screw - Inner Band Lock	1024-0605	1024-0605	1024-0807
14	Plug - Cap Ring	2847	2847	2847
15	Screw - Outer Band Lock	1033-0505	1033-0506	1033-0506
16	Outer Band Lock	1204	1204	1204
**	Service Pack-Short Piston (B)	SP124-B-S xS	SP126-B-S xS	SP128-B-S xS
**	Service Pack-Short Piston (F)	SP124-V-S xS	SP126-V-S xS	SP128-V-S xS
**	Service Pack-Long Piston (B)	SP124-B-L xS	SP126-B-L xS	SP128-B-L xS
**	Service Pack-Long Piston (F)	SP124-V-L xS	SP126-V-L xS	SP128-V-L xS
	Seal Kit-Short Piston (B)	2790-0401	2790-0601	2790-0801
	Seal Kit-Short Piston (F)	2791-0401	2791-0601	2791-0801
	Seal Kit-Long Piston (B)	2792-0401	2792-0601	2792-0801
	Seal Kit-Long Piston (F)	2793-0401	2793-0601	2793-0801

(B) = Buna-N
(F) = Fluorocarbon

** Note: Please identify stroke "S" required when ordering.
*** Note: These items can only be purchased in a service pack.

Spare Parts

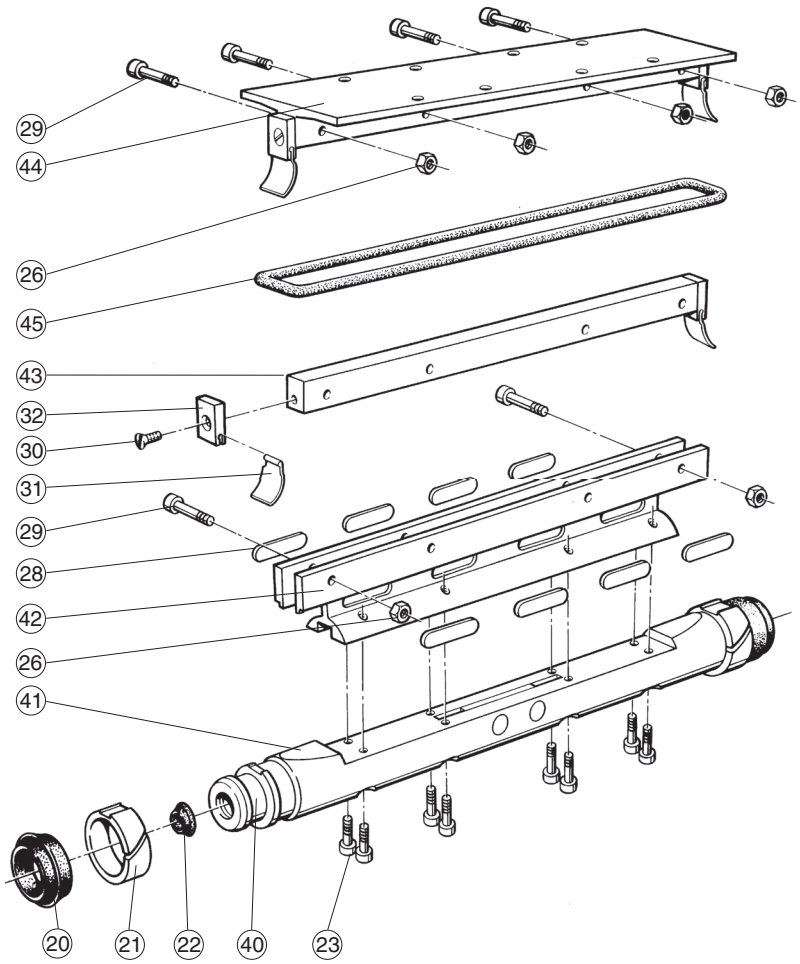


P120 - Short Piston, Ø40mm - Ø80mm

Item	Description	40mm	63mm	80mm
20	Piston Seal (B)	1275	1345	1375
20.1	Piston Seal (F)	1276	1346	1376
21	Bearing Ring	1274	1344	1374
22	Cushion Seal (B)	1277	1347	1377
22.1	Cushion Seal (F)	1278	1348	1378
23	Screw - Yoke	1000-0612	1000-0816	1000-0818
24	Piston Axle (non-magnetic) S/	4843	6843	8843
24.1	Piston Axle (magnet 1 side) S/	N/A	6843	8843
25	Piston Axle (magnet 2 side) S/	4843	6843	8843
26	Nut - Piston Mount	1040-0600	1040-0800	1040-1000
27	Piston Yoke	1287	1356	1406
28	Bearing Strip	2798-0401	2798-0601	2798-0801
29	Screw - Piston Mount	1283	1000-0816	1000-1018
30	Screw - Piston Mount End	1038-0507	1038-0507	1038-0507
31	Scraper	1279	1349	1379
32	Piston Mount End Plate	1286	2040-0604	2040-0801
33	Piston Mount - S/20	1817	2503	2504
34	Piston Mount - S/22	2505	2507	2508
35	Piston Mount - S/25	2186-0404	2186-0604	2186-0802
36	Fork Bracket	1947	1955	1963
37	Carrier Pin	1948	1956	1964
38	O-Ring - Yoke (B)	1281	1351	1401
38.1	O-Ring - Yoke (F)	1282	1352	1402

(B) = Buna-N (F) = Fluorocabron

Spare Parts



P120 - Long Piston, Ø40mm - Ø80mm

Item	Description	40mm	63mm	80mm
20	Piston Seal (B)	1275	1345	1375
20.1	Piston Seal (F)	1276	1346	1376
21	Bearing Ring	1274	1344	1374
22	Cushion Seal (B)	1277	1347	1377
22.1	Cushion Seal (F)	1278	1349	1378
23	Screw - Yoke	1000-0612	1000-0816	1000-0818
26	Nut - Piston Mount	1040-0600	1040-0800	1040-1000
28	Bearing Strip	2798-0401	2798-0601	2798-0801
29	Screw - Piston Mount	1283	1000-0816	1000-1018
30	Screw - Piston Mount End	1038-0507	1038-0507	1038-0507
31	Scraper	1279	1349	1379
32	Piston Mount End	1286	2040-0604	2040-0801
40	Piston Axle (non-magnetic) L/	4844	6844	8844
40.1	Piston Axle (magnet 1 side) L/	N/A	6844	8844
41	Piston Axle (magnet 2 side) L/	4844	6844	8844
42	Piston Yoke	1298	1367	1417
43	Piston Mount - L/26	2492	2494	2495
44	Piston Mount - L/28	2496	2498	2499
45	O-Ring - Yoke (B)	1272-0526	1365	1272-0542
45.1	O-Ring - Yoke (F)	1297	1262-0538	1416

(B) = Buna-N (F) = Fluorocarbon

Kit Parts

Service Packs - Series 2002 / Series P120 - All bore sizes.

	Bore Sizes				
Series 2002	16mm	25mm	32mm	40mm	50mm
Buna-N Service Pack Single Piston	**SP16-B-1**	**SP25R-B-1**	**SP32R-B-1**	**SP40R-B-1**	**SP50R-B-1**
FKM Service Pack Single Piston	**SP16-V-1**	**SP25R-V-1**	**SP32R-V-1**	**SP40R-V-1**	**SP50R-V-1**
Buna-N Service Pack Double Piston	**SP16-B-2**	**SP25R-B-2**	**SP32R-B-2**	**SP40R-B-2**	**SP50R-B-2**
FKM Service Pack Double Piston	**SP16-V-2**	**SP25R-V-2**	**SP32R-V-2**	**SP40R-V-2**	**SP50R-V-2**

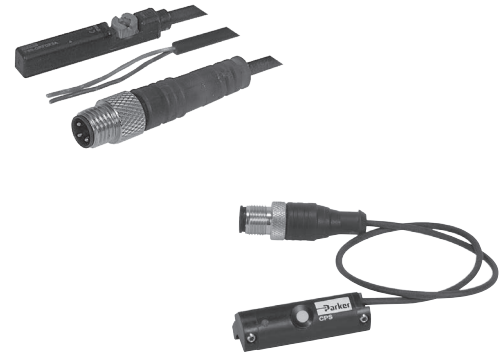
	Bore Sizes		
Series P120	40mm	60mm	80mm
Buna-N Service Pack Short Piston	**SP124-B-S**	**SP126-B-S**	**SP128-B-S**
FKM Service Pack Short Piston	**SP124-V-S**	**SP126-V-S**	**SP128-V-S**
Buna-N Service Pack Long Piston	**SP124-B-L**	**SP126-B-L**	**SP128-B-L**
FKM Service Pack Long Piston	**SP124-V-L**	**SP126-V-L**	**SP128-V-L**

Note: All Service Packs contain complete seal kits, inner and outer bands, cleaning tool, grease and repair instructions.

Upgrade Kit - required for cylinders manufactured prior to January 1, 2002

	Bore Sizes			
Series 2002	25mm	32mm	40mm	50mm
Buna-N Upgrade Kit Single Piston	**25-UPGRADE-S-B**	**32-UPGRADE-S-B**	**40-UPGRADE-S-B**	**50-UPGRADE-S-B**
FKM Upgrade Kit Single Piston	**25-UPGRADE-S-V**	**32-UPGRADE-S-V**	**40-UPGRADE-S-V**	**50-UPGRADE-S-V**
Buna-N Upgrade Kit Double Piston	**25-UPGRADE-S-B-2**	**32-UPGRADE-S-B-2**	**40-UPGRADE-S-B-2**	**50-UPGRADE-S-B-2**
FKM Upgrade Kit Double Piston	**25-UPGRADE-S-V-2**	**32-UPGRADE-S-V-2**	**40-UPGRADE-S-V-2**	**50-UPGRADE-S-V-2**

Note: Upgrade kits include piston assembly, end cap assembly, piston mount assembly and complete service pack.
*S = Stroke



Rodless Pneumatic Cylinders
P8S Electronic & Reed Sensors

P8S Sensors

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P8S Continuous Position Sensors (CPS)

Features	159
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P8S Electronic and Reed Sensors

The P8S Series magnetic cylinder sensor enables quick, precise and contactless sensing of the piston's position in cylinders. It is easy to mount, can be used in numerous applications and offers an outstanding price-performance ratio.

Product Overview

As the term magnetic switch suggests, these are operated by magnetic fields; another description widely used is magnetic "SENSOR". As our eyes sense change of light, our ears sense the change of sound, magnetic sensors / switches sense the change of magnetic flux in pneumatic and hydraulic cylinders. When magnetic sensors sense a magnetic field it will give a switching signal, through a control circuit, allowing sensing or control operation to be achieved.

Because of the characteristics of magnetic sensors they can sense a change of magnetic field relative to the position of the magnet, such as in a pneumatic or hydraulic cylinder, whereby the magnet is attached to a moving piston and thus the position of the moving part (ie Piston) can be detected.

The magnet is mounted on the piston of the cylinder and thus moves with the piston.

The magnetic sensor (switch) is fixed either directly to the cylinder or with an additional mounting bracket. When the piston (magnet) moves to the position under a magnetic sensor, the switch will operate due to the change of the magnetic field and give a switching signal.

Thus the position of the piston can be identified and a resulting signal generated to continue the sequence of a circuit.

Magnetic sensors available can be classified into two different groups, they are sensors with contacts which are called

mechanically operated or reed sensors and the other type is sensors without contacts and are called solid state type or electronic.

Parker P8S Series sensors are suitable for use with a large range of actuators. They can either be inserted directly into the cylinder tube extrusion or mounted using additional brackets. For direct mounting the sensor is positioned within the cylinder sensor groove, offering mechanical protection, then securely clamped into position by a simple turn of a screw. For other cylinder versions there are a number of optional sensors brackets that clamp to the cylinder and offer other mounting positions.

For easy installation there are several cable lengths available with either M8 connector or flying lead. The electronic sensors are "Solid State", i.e. they have no moving parts. They are provided with short-circuit protection and transient protection as standard. The built-in electronics make the sensors suitable for applications with high on and off switching frequency where long service life is required.

Please note that for low temperature applications sensors are normally specified for full performance down to -30°C only. High temperature cylinders do not have a magnetic piston and therefore cannot be used with sensors.

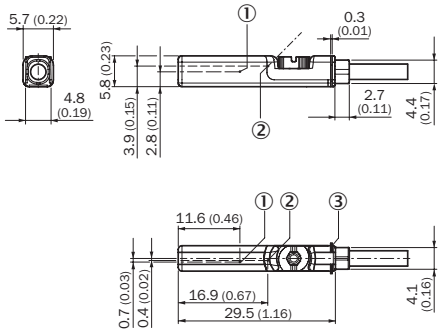
Technical Data - Square body design, insert straight in T-slot, screw 1/4 turn

	Electronic PNP | NPN	Electric Reed
Cylinder type:	Profile with T-slot	
Cylinder type with adapter:	Profile with S-slot (dovetail) | Tie rods | Round cylinders	
Installation:	Quarter turn, fixed by allen key 2.5 mm or flathead screwdriver	
Housing length:	29.5 mm	29.5 mm 5 - 30 V AC/DC
	24 mm (NAMUR ATEX)	29.5 mm 5 -120 V AC/DC
		32.5 mm 5 - 230 V AC/DC
Output Type:	PNP | NPN	Reed
Switching (on/off) switching frequency:	± 1,000 Hz	± 400 Hz
Output Function:	Normally Open (NO) Normally Closed (NC) 3-wire	Normally Open (NO) Normally Closed (NC) 2-wire Normally Open (NO) 3-wire
Enclosure rating:	IP67	
	IP67 (NAMUR ATEX)	-
Supply Voltage:	10 to 30 V DC	-
	8.2 to 20 V DC (NAMUR 1GD)| 10 to 26 V DC (ATEX 3GD)	5 to 30 | 5 to 120 | 5 to 230 V AC/DC 2-wire, 3-wire depending on type
Power consumption:	<= 8 mA	-
	<= 10 mA (NAMUR, ATEX)	-
Voltage drop:	<= 2 V	<= 3.5 V 2-wire | <= 0.1 V 3-wire
	<= 2.2 V (NAMUR, ATEX)	-
Continuous output current Ia:	<= 100 mA	<= 100 mA 3-wire
	<= 60 mA (NAMUR) | <= 50 mA (ATEX)	<= 500 mA (DC) | <= 300 mA (AC)
Switching capacity:	-	<= 6 W

	Electronic PNP | NPN	Electric Reed
Protection class:	III	III | II 2-wire depending on type
		III 3-wire
Response sensitivity:	2.6 to 3.3 mT	2.1 to 3.4 mT
	2.8 mT (NAMUR, ATEX)	-
Overrun distance:	10 mm	
	9 mm (NAMUR, ATEX)	-
Hysteresis:	<= 0.8 mT	-
	<= 0.5 mT (NAMUR, ATEX)	-
Repeatability:	<= 0.1 mT	
Reverse polarity protection:	Yes	No 2-wire
	-	Yes 3-wire
Short circuit protection:	Yes	-
Power-up pulse protection:	Yes (NAMUR, ATEX)	-
Ambient operating temperature range:	-30 to +80 °C (PUR cable) | -30 to +70°C (PVC cable)	
	-25 to +80 °C (NAMUR 1GD) | -20 to +50°C (ATEX 3GD)	
Shock and vibration resistance:	30 g 11 ms / 10 ... 55 Hz, 1 mm	
EMC:	According to EN 60947-5-2	
International standard:	CE | C UL US | RoHs | Ex | IEC | IEC Ex	
Housing material:	Plastic polyamid PA12	
Screw material:	Stainless steel	
Cable material:	PUR (Polyurethane) | PVC (Polyvinyl Chloride)	
Conductor cross-section:	0.14 mm² | 0,12 mm² depending on type 0.14 mm² (NAMUR, ATEX)	
Indication LED color:	Yellow, no LED reed NC	
Connector:	M8R (knurled nuts) | None (Flying lead)	

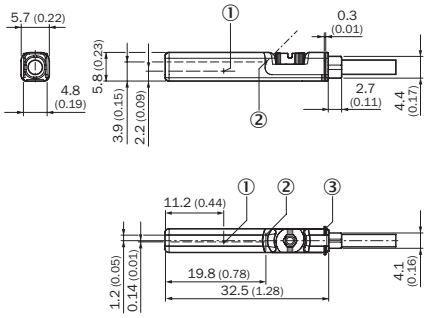
Dimensions in mm (inch)

PNP, NPN Output 10 to 30 V DC



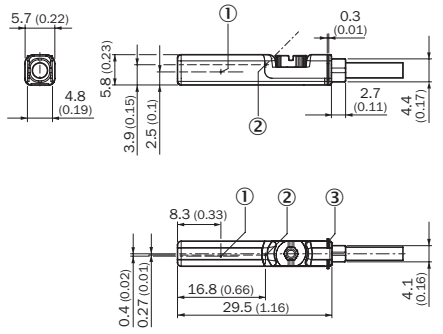
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 230 V AC/DC



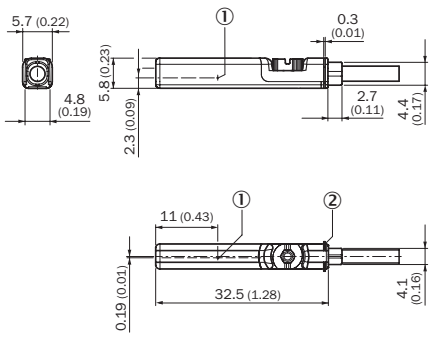
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 30 V AC/DC



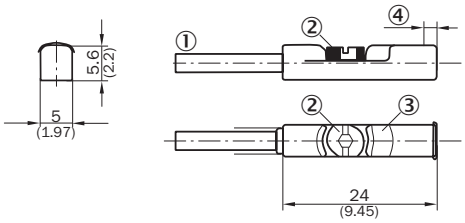
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 120 V AC/DC



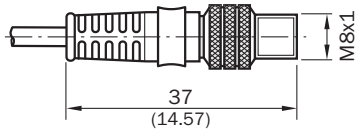
① Position sensor element
② Retaining ribs

NAMUR ATEX 1G, 1D, ATEX 3G, 3D



① Connection
② Fixing screw
③ Indication LED
④ Position of sensor element; short overrun distance: 2 mm;
long overrun distance: 1.7 mm

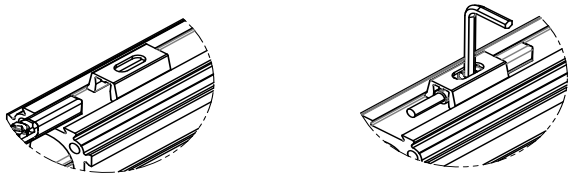
Connector M8R



Installation

Square body design, Insert straight in T-slot, screw 1/4 turn

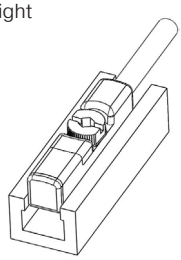
With Adapter in S-Dovetail Slot



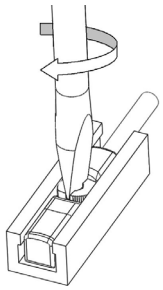
Note:
The adapter is delivered with each sensor.

Without Adapter directly in T-Slot

Put-in straight



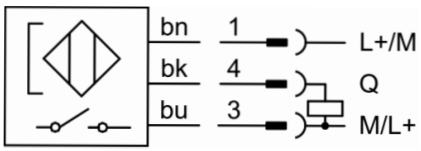
Screw 1/4 turn



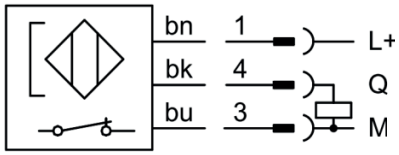
Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Connection type and diagram

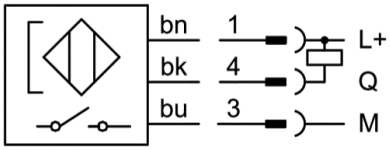
PNP NO



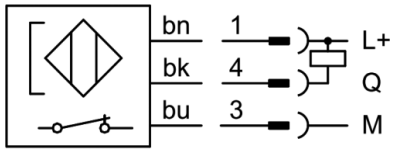
PNP NC



NPN NO

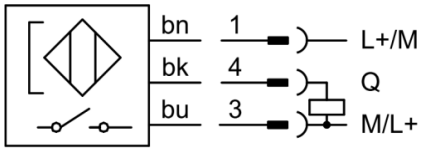


NPN NC

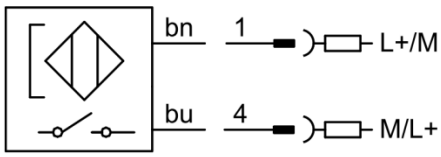


bn: brown
bk: black
bu: blue
Q: load
M: Mass
L+: Power

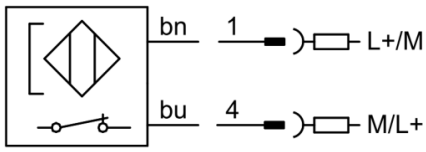
Reed NO 3-wire



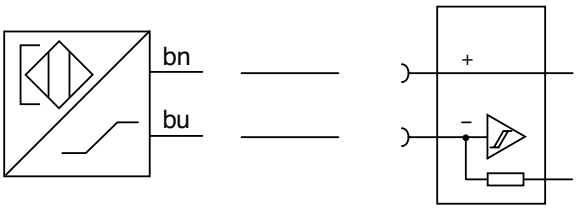
Reed NO 2-wire



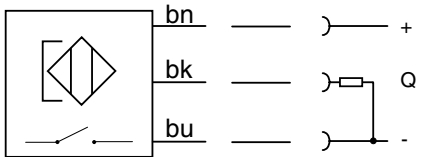
Reed NC 2-wire



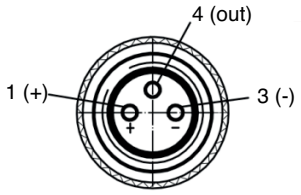
NAMUR NO ATEX 1G, 1D



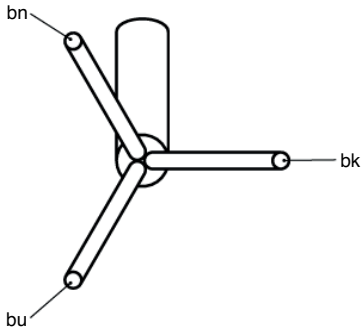
PNP NO ATEX 3G, 3D



Pin assignment, M8 with knurled nut



Flying leads



Square body design, Insert straight in T-slot, screw 1/4 turn

NPN NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
NPN-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGMFAX**
NPN-NC, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGMFDX**
NPN-NC, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGMCHX**

NPN NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
NPN-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGNFAX**
NPN-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGNFDX**
NPN-NO, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGNCHX**

PNP NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
PNP-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGQFAX**
PNP-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PVC IP67**	**P8SAGQFLX**
PNP-NC, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGQFDX**
PNP-NC, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGQCHX**

PNP NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
PNP-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGPFAX**
PNP-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PVC IP67**	**P8SAGPFLX**
PNP-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGPFDX**
PNP-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PVC IP67**	**P8SAGPFTX**
PNP-NO, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGPCHX**

REED NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NC, No LED, 2 wire	5-30 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGEFRX**
Reed-NC, No LED, 2-wire	5-120 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGEFRX1**
Reed-NC, No LED, 2-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGECNX**

REED NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NO, with LED, 2-wire	5-30 V AC/DC	3 m Flying Lead	**PUR IP67**	**P8SAGRFAX**
Reed-NO, with LED, 2-wire	5-120 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGRFLX1**
Reed-NO, with LED, 2-wire	5-230 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGRFLX2**
Reed-NO, with LED, 2-wire	5-230 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGRFDX2**
Reed-NO, with LED, 2-wire	5-120 V AC/DC	10 m Flying Lead	**PVC IP67**	**P8SAGRFTX1**
Reed-NO, with LED, 2-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGRCHX**

REED NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NO, with LED, 3-wire	5-30 V AC/DC	3 m Flying Lead	**PUR IP67**	**P8SAGSFAX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGSFLX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGSFDX**
Reed-NO, with LED, 3-wire	10-30 V AC/DC	10 m Flying Lead	**PVC IP67**	**P8SAGSFTX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGSCHX**

ATEX IP67	VOLTAGE	CONNECTION	CABLE	Order Code
PNP-NO, with LED, 3-wire	10-26 V DC	3 m Flying lead	**PUR IP67**	**P8SAGPFAXS**
NAMUR-NO, with LED, 2-wire	8.2-20 V DC	5 m Flying Lead	**PVC IP67**	**P8SAGDFMXW ***
NAMUR-NO, with LED, 2-wire	8.2-20 V DC	10 m Flying Lead	**PVC IP67**	**P8SAGDFTXW ***

Note:
-30 to +80 °C (PUR cable) I -30 to + 70 °C (PVC cable) I -25 to +80 °C (NAMUR 1GD I -20 to +50 °C (ATEX 3GD)
All sensors come with an adapter for S-dovetail Parker type OSP grooves.
* with an aluminium adapter

P8S Continuous Position Sensors

Many applications require more than just end of stroke sensing of an actuator, but traditional methods of continuous sensing are expensive to implement. Parker's CPS (Continuous Position Sensor) enables quick, precise and contactless continuous position sensing of a magnetic piston.

CPS sensors continuously supply data via analog outputs or IO-Link. Analog position sensors have a voltage output of 0 V ... 10 V as well as a current output of 4 mA ... 20 mA. CPS enables flexible machine concepts, making it possible to solve tasks in areas such as quality monitoring and process control in conjunction with pneumatic cylinders. This continuous transfer of position data upgrades the functionality of the pneumatic cylinders by making them more intelligent, and as a result, more versatile. CPS settings can be adjusted during or after installation using a teach button or using IO-Link.

CPS can be mounted directly in standard T-slots without the need for additional accessories. Mounting on other cylinder types, (round, tie rod) is possible with adapters.

- Continuous position sensing
- IO-Link communication with M12 connector
- No modification to the actuator
- Analog version with M8 connector
- 5 sizes with sensing ranges from 32 mm to 256 mm
- IP67 design suitable for any industrial application
- Yellow teach button for easy set-up

Technical specification:

1 ms sampling rate

0.03% full scale resolution

0.06% full scale repeatability

0.3 mm Linearity error

How it works:

The CPS product detects the position of an actuator via the magnet on the piston. The sensor settings can easily be adjusted during installation using the yellow teach button or during operation over the IO-Link communication. This upgrades the functionality of the pneumatic actuator by making it more intelligent and versatile in support of the Industry 4.0 initiative.

How it connects:

Analog version has a M8 connector and a voltage output of 0-10V as well as a current output of 4-20mA. IO-Link version has a M12 connector and transmits position via 2 bytes of process input data and also allows for parameter control of measuring range and locking of the teach button.

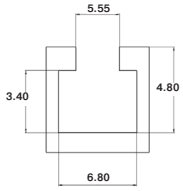
It can be controlled by Class A or Class B IO-Link Masters.

How it installs:

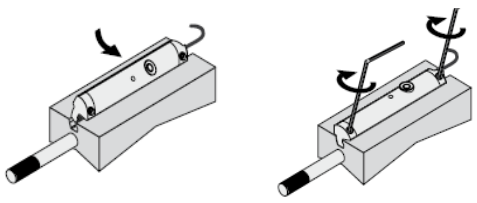
The Parker CPS requires the use of a magnetic piston. The product will ft T-slot cylinders without any additional mounting hardware.

Without Adapter:

Direct drop-in T-slot
T-slot dimensions [mm ± 0.1]



1. Pivot sensor into the slot
2. Teach the CPS unit the desired measuring range
3. Tighten set screws

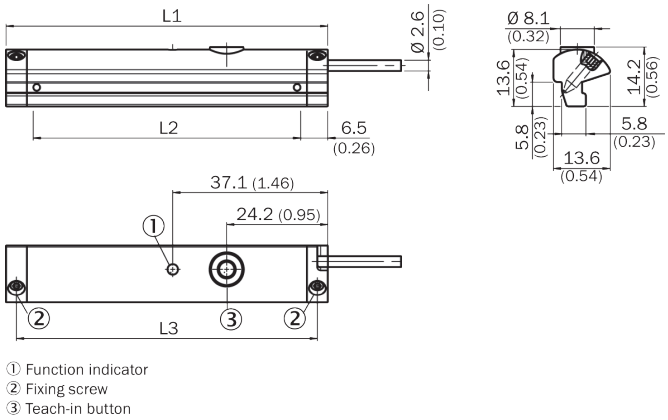


Technical Data

Cylinder type:	Profile with T-slot
Installation:	Drop in, fixed by allen key 1.5 mm
Measuring range:	32 to 256 mm depending on type 1)
Housing length:	45 to 269 mm depending on type
Output Function:	Analog | IO-Link
Analog output (voltage):	0 to 10 V | -
Analog output (current):	4 to 20 mA | -
Teach-in:	Yes
Enclosure rating:	IP 67 (according to EN 60529)
Supply Voltage: 2)	15 to 30 V DC
Power consumption: 3)	<= 22 mA (analog) | <= 25 ma (IO-Link)
Max load resistance: 4)	<= 500 Ω
Min load resistance: 5)	<= 2 kΩ
Protection class:	III
Time delay before availability:	1.5 s
Required magnetic field sensitivity:	3 mT / 2 mT (analog) | 3 mT (IO-Link)
Resolution: 6)	0.03% full scale range (max >=0.05 mm)
Linearity error: 7)	0.3 mm
Repeat accuracy: 8)	0.06% full scale range (>= 0.1 mm)
Sampling rate: 9)	1 ms
Indication LED color:	Yellow (analog)
Reserve polarity protection:	Yes (analog)
Short circuit protection:	Yes (analog)
Ambient operating temperature range:	-20 to +70 °C (PUR cable)
Shock and vibration resistance:	30 g 11 ms / 10 ... 55 Hz, 1 mm
EMC: 10)	According to EN 60947-5-2
International standard:	CE | C UL US | CCC (not applicable) | RoHs | IO-Link
UL file No:	On request
Housing material:	Plastic polyamid PA12
Screw material:	Stainless steel
Cable material:	PUR (Polyurethane)
Conductor cross-section:	0.08 mm²
Connector:	M12 (IO-Link) or M8 (analog)

1) ± 1 mm
2) Reverse-polarity protected, operation in short-circuit protected network: max. 8 A.
3) Without load
4) Power output, at 24 V
5) Voltage output
6) FSR: Full Scale Range; max. measuring range.
7) At 25 °C, linearity error (maximum deviation)depending on response curve and minimal deviation function.
8) At 25 °C, repeatability magnet movement in one direction.
9) Only in standard mode, not in IO-Link mode.
10) The analogue measured value can deviate under transient conditions.

Dimensions in mm (inch)



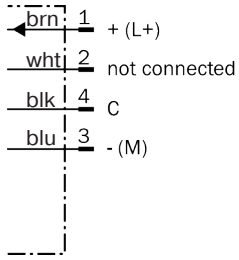
Part Number				
L1	L2 *	L3	Analog	IO-Link
45	32	40	**P8SAGACHA**	**P8SAGHMHA**
77	64	72	**P8SAGACHB**	**P8SAGHMHB**
141	128	136	**P8SAGACHD**	**P8SAGHMHD**
205	192	200	**P8SAGACHF**	**P8SAGHMHF**
269	256	264	**P8SAGACHH**	**P8SAGHMHH**

*L2 equal to the measuring range.

Note:
PUR cable with M12 (IO-Link) or M8 (Analog) male connector knurled nut, 4-pin, 0,3 meter length.
Please consult for measuring range 96, 160 & 224 mm.

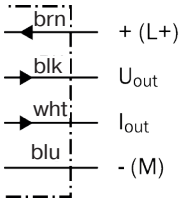
Connection type and diagram

IO Link version



PUR 0.3 meter length
with M12 male connector
knurled nut, 4-pin

Analog version



PUR 0.3 meter length
with M8 male connector
knurled nut, 4-pin

Ordering Information - Drop-in T-slot

Output	Measuring Length	Configuration Option	Part Number	Weight [g]	For Product Series
Analog	32 mm	Teach Button	**P8SAGACHA**	16	With T-slot groove *
	64 mm		**P8SAGACHB**	26	
	128 mm		**P8SAGACHD**	46	
	192 mm		**P8SAGACHF**	66	
	256 mm		**P8SAGACHH**	86	
IO-Link	32 mm	Teach Button or IO-Link parameter	**P8SAGHMHA**	20	With T-slot groove *
	64 mm		**P8SAGHMHB**	30	
	128 mm		**P8SAGHMHD**	50	
	192 mm		**P8SAGHMHF**	70	
	256 mm		**P8SAGHMHH**	90	

* Required magnetic field sensitivity: 3mT / -2 mT (Analog) / 3mT (IO-Link)

Note:
PUR cable with M12 (IO-Link) or M8 (Analog) male connector knurled nut, 4-pin, 0,3 meter length.
Please consult for measuring range 96, 160 & 224 mm.

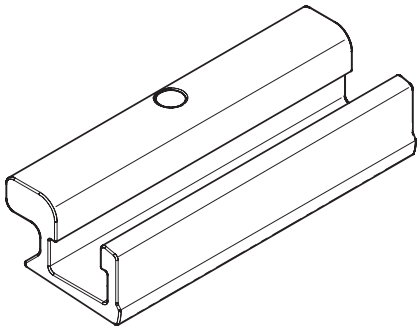
Mountings and brackets

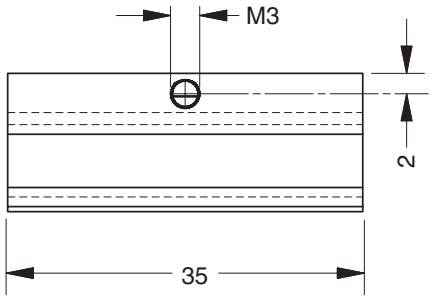
For products series	Part Number	Weight [g]
T-Slot OSP Ø 10	**8872FIL**	3
T-Slot P Series Ø 16	**8865FIL**	4
T-Slot P Series Ø 25-80	**8866FIL**	5
S-Dovetail OSP, pack of 10	**P8S-TMA09**	10
Ambient temperature -30 to +80 °C		

All mountings can be moved on the cylinder body before screwing in place and then putting sensors in the slots.

Sensor adapter bracket (Used with P1X Series)

Part number P8S-TMA0Y
(Shown larger than actual size)





NOTE: Must be ordered separately when ordering sensors.

Male connectors for connecting cables

Cable connectors for producting your own connecting cables.
The conncectors can be quickly attached to the cable without special tools. Only the outer sheath of the cable is removed.
The connectors are available for M8 screw connector and meet protection class IP65.

Technical Data

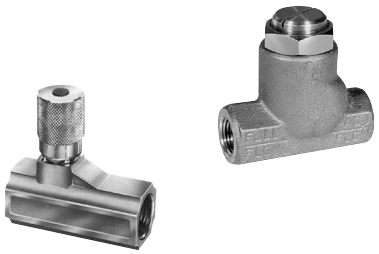
Operating voltage:	max. 32 V AC/DC
Opertaing current per contact:	max. 4 A
Connection cross section:	0.25... 0.5 mm² (conductor diameter min 0.1 mm)
Protection class:	IP65 and IP67 when plugged and screwed down (EN 60529)
Temperature range:	- 25... + 85°C

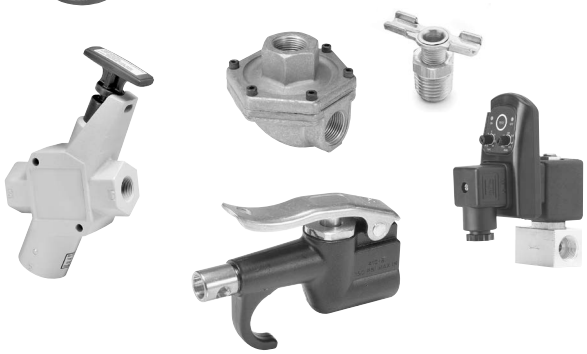
Connector	Weight [kg]	Part number
M8 screw connector		**P8CS0803J**
M12 screw connector	0.022	**P8CS1204J**

Cables to extend cable sensor lengths with M8*

Description	Part number	Weight [g]	For Product Series
Cable flex PVC 3 meter with 8mm snap-in connector / flying leads	**9126344341**	70	P8S Sensors with M8
Cable flex PVC 10 meter with 8mm snap-in connector / flying leads	**9126344342**	210	P8S Sensors with M8
Cable PUR 3 meter with 8mm snap-in female connector / flying leads	**9126344345**	70	P8S Sensors with M8
Cable flex PUR 10 meter with 8mm snap-in connector / flying leads	**9126344346**	210	P8S Sensors with M8
Cable PVC 5 meter with M8 screw female connector / flying leads	**KC4041**	120	P8S Sensors with knurled M8

*Note: not applicable for P8S CPS Sensors as no cable available





Air Preparation Products
Airline Accessories

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337 Series Micrometer Flow Control Valves, 1/8" to 3/4" Ports

The "337" Series Flow Control Valves meter flow of air in one direction and allow free flow in the reverse direction.

Valves are manufactured with a fine tapered needle providing precise flow control, even at low flow rates. The perimeter of the adjustment knob features numerical micrometer position markings providing a visual indication of the setting. Once the desired flow is selected, a set screw can be tightened to maintain the setting.

These valves are available with NPTF ports in 1/8", 1/4", 3/8", 1/2", and 3/4" sizes. This series is recommended for pneumatic service.

Material Specifications

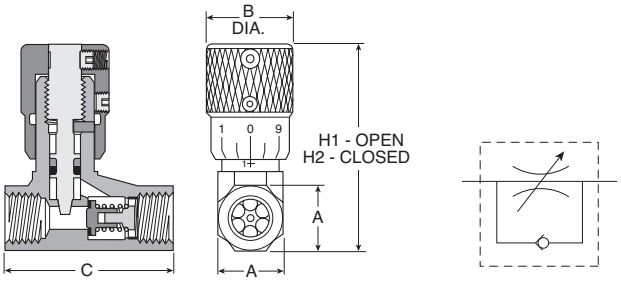
Body	Brass
Check Seal	Urethane
Knob	Aluminum
Needle	Stainless steel
Needle Seals	Buna N (Fluorocarbon optional – consult factory)
Retainer	Zinc- Plated Steel
Spring	Stainless Steel
Set Screw	Steel

Operating Information

Maximum operating pressure:
250 PSIG
Cracking pressure for return check poppet 1 to 2 PSIG

Operating temperature:*
Standard: 0°F to 180°F
Extended: 0°F to 300°F (consult factory)

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.



337 Micrometer Flow Control Valves – NPT

Port Size	Flow (SCFM †) Adj.	Free Flow	A	B	C	H1	H2	Part Number	Service Kits
1/8"	15	32	9/16"	0.75	1.47	2.03	1.81	**003371000**	**003378000**
1/4"	28	75	11/16"	0.75	1.47	2.28	2.03	**003371001**	**003378001**
3/8"	59	139	7/8"	0.88	2.31	2.84	2.53	**003371002**	**003378002**
1/2"	126	183	1-3/16"	1.06	3.25	3.62	3.22	**003371003**	**003378003**
3/4"	140	327	1-3/8"	1.06	3.25	3.72	3.31	**003371004**	**003378004**

337 Micrometer Flow Control Valves – BSPP

Port Size	Flow (SCFM †) Adj.	Free Flow	A	B	C	H1	H2	Part Number	Service Kits
1/8"	15	32	9/16"	0.75	1.47	2.03	1.81	**00337G1000**	**003378000**
1/4"	28	75	11/16"	0.75	1.47	2.28	2.03	**00337G1001**	**003378001**

† At 100 PSIG inlet pressure with full pressure drop.

Most popular.

338 Series Flow Control Valves, 1/8" to 3/4" Ports

"338" Series needle valves bi-directionally meter the flow of air through the valve.

This series features a fine tapered needle providing precise flow of air in both directions. Numerical micrometer position markings are stamped on the perimeter of the adjustment knob which provide a visual indication of the setting. Once the desired flow is selected, a set screw can be tightened to maintain the setting.

These valves are available with NPTF ports in 1/8", 1/4", 3/8" 1/2" and 3/4" sizes. This series is recommended for pneumatic service.

Material Specifications

Body	Brass
Internal Components	Stainless steel
Seals	Buna N (Fluorocarbon optional – consult factory)

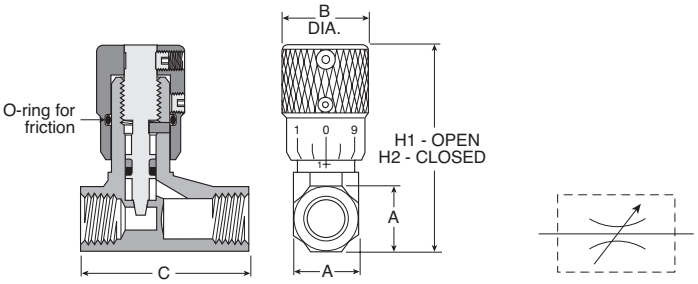
Operating Information

Maximum operating pressure: 250 PSIG

Operating temperature:*

Standard:	0°F to 180°F
Extended:	0°F to 300°F (consult factory)

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.



338 Needle Valves – NPT

Port Size	Flow (SCFM †)	A	B	C	H1	H2	Part Number	Service Kits
1/8"	15	9/16"	0.75	1.47	2.03	1.81	**003381100**	**003378000**
1/4"	28	11/16"	0.75	1.47	2.28	2.03	**003381101**	**003378001**
3/8"	59	7/8"	0.88	2.31	2.84	2.53	**003381102**	**003378002**
1/2"	126	1-3/16"	1.06	3.25	3.62	3.22	**003381103**	**003378003**
3/4"	140	1-3/8"	1.06	3.25	3.72	3.31	**003381104**	**003378004**

338 Needle Valves – BSPP

Port Size	Flow (SCFM †)	A	B	C	H1	H2	Part Number	Service Kits
1/8"	15	9/16"	0.75	1.47	2.03	1.81	**00338G1100**	**003378000**
1/4"	28	11/16"	0.75	1.47	2.28	2.03	**00338G1101**	**003378001**

† At 100 PSIG inlet pressure with full pressure drop.

☐ Most popular.

3250 Series Flow Control Valves, 1/8" to 3/4" Ports

The "3250" Series Flow Control Valves are specifically designed to accurately meter the flow of air in one direction and allow free flow in the opposite direction. The "3250" Series Flow Control Valves are also suitable for low pressure hydraulic service.

When air is moving in the free flow direction through the valve, it forces the poppet off its seat and unrestricted air flow is permitted.

When air is moving in the metered direction through the valve, air pressure and the force of the poppet spring causes the poppet to close. Flow must then be through the orifice that is controlled by the metering screw. Opening this screw allows more flow; closing it, less flow.

Material Specifications

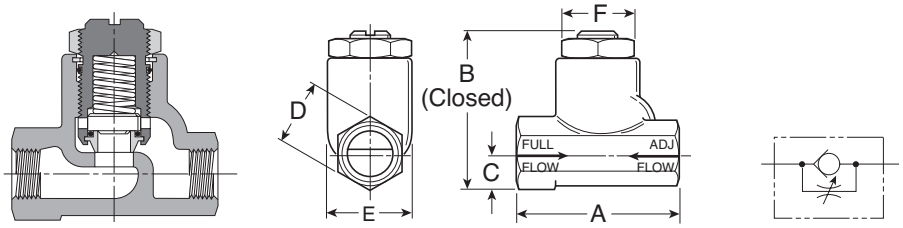
Body	Brass
Internal Components	Brass, Stainless steel
Seals	Buna N

Operating Information

Operating pressure: 250 PSIG (Air)
250 PSIG (Hydraulic)

Operating temperature:
Standard: 0˚F to 180˚F
Extended: 0˚F to 300˚F

Valve will operate mounted in any position. Lock nut on metering screw prevents change in setting during operation.



3250 Flow Control Valves, 1/8" to 3/4" Ports – NPT

Port Size	Max. flow (SCFM) Metered Direction	Free flow Direction	A	B	C	D	E	F	Part Number
1/8"	70	60	1.75	1.56	0.37	0.62	0.81	0.68	**032500119**
1/4"	130	120	2.33	1.97	0.44	0.75	1.09	0.94	**032500219**
3/8"	220	205	2.66	2.44	0.56	1.00	1.38	1.19	**032500319**
1/2"	295	346	3.11	3.06	0.75	1.25	1.63	1.38	**032500419**
3/4"	420	615	3.56	3.69	0.88	1.50	2.00	1.75	**032500519**

3250 Flow Control Valves, 1/8" to 3/4" Ports – BSPP

Port Size	Max. flow (SCFM) Metered Direction	FreeCion	A	B	C	D	E	F	Part Number
1/8"	70	60	1.75	1.56	0.37	0.62	0.81	0.68	**3250G0119**
1/4"	130	120	2.33	1.97	0.44	0.75	1.09	0.94	**3250G0219**
3/8"	220	205	2.66	2.44	0.56	1.00	1.38	1.19	**3250G0319**
1/2"	295	346	3.11	3.06	0.75	1.25	1.63	1.38	**3250G0419**
3/4"	420	615	3.56	3.69	0.88	1.50	2.00	1.75	**3250G0519**

Most popular.

3250 Series Needle Valves, 1" to 1-1/2" Ports

These extra large flow control valves have been developed to provide effective flow settings for large diameter cylinders and for other similar air applications. Each valve has a fine screw adjustment allowing precise settings which are secured by a sturdy lock nut.

Large internal port passages coupled with unique soft seal poppet and inline design provide maximum full flow capacity and minimum pressure drop in the free flow direction. Their cone shaped brass metering valve will provide consistent cylinder speed by regulating cylinder exhaust.

Material Specifications

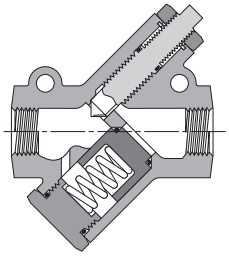
Body	Cast Aluminum
Internal Components	Brass, Aluminum
Seals	Buna N, Urethane
Spring	Stainless Steel

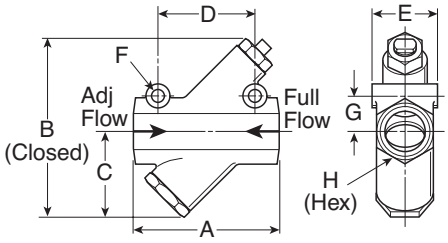
Operating Information

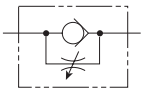
Maximum operating pressure: 250 PSIG

Operating temperature:

Standard:	-40°F to 180°F
Extended:	-40°F to 350°F (consult factory)







3250 Flow Control Valves, 1" to 1-1/2" Ports – NPT

Port Size	Max. Flow Needle Open SCFM †	Cv	A	B	C	D	E	F	G	H	Part Number
1"	1000	12.3	5.00	6.50	3.00	3.25	2.25	.39	1.31	2.13	**032501000**
1-1/4"	1200	13.8	5.00	6.50	3.00	3.25	2.25	.39	1.31	2.13	**032501250**
1-1/2"	1800	17.5	5.88	8.00	3.75	3.50	2.50	.39	1.50	2.38	**032501500**

3250 Flow Control Valves, 1" to 1-1/2" Ports – BSPP

Port Size	Max. Flow Needle Open SCFM †	Cv	A	B	C	D	E	F	G	H	Part Number
1"	1000	12.3	5.00	6.50	3.00	3.25	2.25	.39	1.31	2.13	**03250G1000**
1-1/4"	1200	13.8	5.00	6.50	3.00	3.25	2.25	.39	1.31	2.13	**03250G1250**
1-1/2"	1800	17.5	5.88	8.00	3.75	3.50	2.50	.39	1.50	2.38	**03250G1500**

† At 100 PSIG inlet pressure with full pressure drop.

Most popular.

For inventory, lead times, and kit lookup, visit www.pdnplu.com

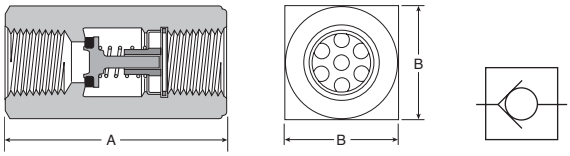
Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

339 Series Check Valves, 1/8" to 3/4" Ports

"339" Series check valves allow free flow in one direction and provide positive checked flow in the reverse direction. These valves are available with NPTF ports in 1/8", 1/4", 3/8", 1/2" & 3/4" sizes. This series is recommended for pneumatic service.

Material Specifications

Body	Brass
Internal Components	Brass / stainless steel / zinc-plated steel
Seals	Urethane (standard) Fluorocarbon (optional, consult factory)



Operating Information

Operating pressure: 250 PSIG max.
Cracking pressure 1 to 2 PSIG

Operating temperature:*
Standard: 0°F to 180°F
Extended Option: 0°F to 300°F (consult factory)

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

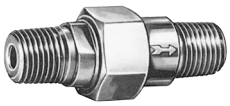
339 Check Valve

Port Size	Flow (SCFM †)	A	B	Part Number NPT	Part Number BSPP
1/8"	35	1.22	0.56	**003393000**	**00339G3000**
1/4"	75	1.34	0.69	**003393001**	**00339G3001**
3/8"	143	2.00	0.88	**003393002**	–
1/2"	162	2.56	1.19	**003393003**	–
3/4"	323	2.66	1.38	**003393004**	–

† At 100 PSIG inlet pressure with full pressure drop.

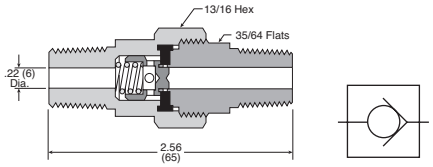
3047 Series Check Valves, 1/4" Ports

"3047" Series check valves allow free flow in one direction and provide positive checked flow in the reverse direction. This valve is available with a male 1/4" NPTF connection and is recommended for pneumatic service.



Material Specifications

Body	Brass
Internal Components	Brass / stainless steel
Seals	Nitrile



Operating Information

Operating pressure: 250 PSIG max.
Cracking pressure 1 to 2 PSIG

Operating temperature:*
Standard: 0°F to 180°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

3047 Check Valve

Port size	Flow (SCFM †)	Part Number
1/4"	30	**030470099**

† At 100 PSIG inlet pressure with full pressure drop.

Most popular.

EM Series – Sintered Bronze Muffler / Filters

Muffler / filters effectively reduce air exhaust noises to an industry accepted level with minimum flow restriction. They protect valves, impact wrenches, screw drivers and other air tools by preventing dirt and other foreign matter from entering the system. Non-corrosive. Can be cleaned with many common solvents.

EM Series

Pipe Thread	Overall Length	Hex Size	Part Number
M5	.75	5/16"	**EMM5**
1/8"	1.00	7/16"	**EM12**
1/4"	1.32	9/16"	**EM25**
3/8"	1.54	11/16"	**EM37**
1/2"	1.85	7/8"	**EM50**
3/4"	2.29	1-1/6"	**EM75**
1"	2.91	1-5/16"	**EM100**
1-1/4"	3.25	1-11/16"	**EM125**
1-1/2"	3.69	2"	**EM150**

Operating Information

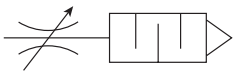
Operating pressure: 250 PSIG (Air)
Cracking pressure 1 to 2 PSIG

Operating temperature:* 0°F to 300°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

Muffler / Flow Controls

Muffler / flow controls provide an acceptable exhaust noise level and effectively meter exhaust. Installed in valve exhaust ports, they control cylinder piston speeds throughout a wide range. The adjusting screw cannot be accidently blown out, can be locked to maintain setting. Brass and bronze construction. Clean with commonly used solvents.



Muffler / Flow Controls

Pipe Thread	Overall Length	Hex Size	Part Number
1/8"	1.15	9/16"	**045020002**
1/4"	1.42	1/2"	**045040004**
3/8"	1.49	11/16"	**045060060**
1/2"	1.77	7/8"	**045080080**
3/4"	1.98	1-1/16"	**045120012**
1"	2.15	1-5/16"	**045160016**

Operating Information

Operating pressure: 250 PSIG (Air)
Cracking pressure 1 to 2 PSIG

Operating temperature:* 0°F to 300°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

☐ Most popular.

Breather Vents

These low silhouette versions of the muffler / filter are useful where space is a problem and / or to prevent contamination. Use for vacuum relief or pressure equalization in gear boxes, oil tanks, reservoirs, etc. Non-corrosive.

Breather Vent

Pipe Thread	Overall Length	Hex Size	Part Number
1/8"	0.44	7/16"	**047020002**
1/4"	0.63	9/16"	**047040004**
3/8"	0.75	11/16"	**047060006**
1/2"	0.88	7/8"	**047080008**
3/4"	1.00	1-1/6"	**047120012**
1"	1.31	1-5/16"	**047160016**
1-1/4"	1.41	1-11/16"	**047200020**
1-1/2"	1.50	2"	**047240024**

NOTE: Breather vents should not be used as exhaust mufflers.

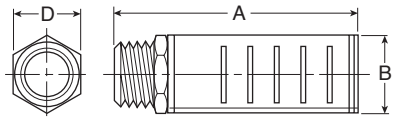
Operating Information

Operating pressure: 150 PSIG (Air) max.
Operating temperature:* 0°F to 300°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

ES Series – Silencer

The silencer is designed to give superior performance in noise control with a minimum effect on air efficiency. "Trimline" design allows location in the tightest places without extra plumbing and fittings. Fits directly into the exhaust port of more than 90% of present commercial valves. Slotted body permits rapid discharge of air without undesirable back pressure. Unique nylon screen element resists dirt buildup or clogging.



Operating Information

Operating pressure: 250 PSIG (Air) max.
Operating temperature:* 0°F to 300°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

ES Series – Silencer

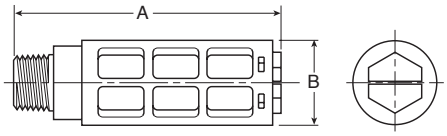
Pipe Thread	Flow SCFM @ 100 PSIG inlet	Dimensions A	B	D	Part Numbers NPTF	BSPT (R)
1/8"	115	1.85	0.81	0.63	**ES12MC**	**ESB12MC**
1/4"	129	1.85	0.81	0.63	**ES25MC**	**ESB25MC**
3/8"	219	3.31	1.26	1.00	**ES37MC**	**ESB37MC**
1/2"	549	3.31	1.26	1.00	**ES50MC**	**ESB50MC**
3/4"	893	4.56	2.01	1.62	**ES75MC**	**ESB75MC**
1"	1,013	4.56	2.01	1.62	**ES100MC**	**ESB100MC**
1-1/4"	1,486	5.69	2.88	—	**ES125MC**	**ESB125MC**
1-1/2"	1,580	5.69	2.88	—	**ES150MC**	**ESB150MC**

Most popular.

ASN Air Line Silencer, Plastic

- Compact
- Lightweight
- Easy to Install
- Excellent Noise Reduction
- Protects Components from Contamination
- NPT and BSPT Threads Available

The plastic silencer is designed to give excellent noise reduction with a minimum effect on air efficiency. The "Trimline" design allows for locating the silencer in the tightest places without extra plumbing or fittings. Fits directly into the exhaust port of most commercial valves. Open surface area of element allows for rapid discharge of air without undesirable back pressure.



Operating Information

Operating pressure:	0 to 150 PSIG (0 to 10 bar, 0 to 1034 kPa)
Operating temperature:	14°F to 140°F (-10°C to 60°C)

Material Specifications

Body	Acetal (Plastic)
Element	Polyethylene

ASN Air Line Silencer, Plastic

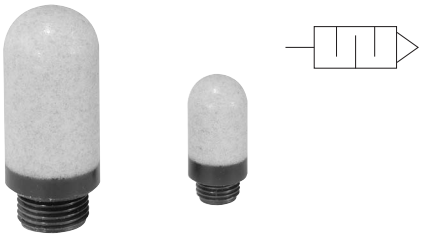
Thread Size	A (mm)	B (mm)	Maximum Flow (SCFM) 100 PSIG Inlet	Sound Pressure Level (dBA) 20 PSIG inlet	Sound Pressure Level (dBA) 100 PSIG inlet	Part Number NPT	Part Number BSPT
M5	0.43 (11)	0.32 (8)	15	69	79	**AS-5**	
1/8"	1.57 (40)	0.63 (16)	51	69	81	**ASN-6**	**AS-6**
1/4"	2.56 (65)	0.83 (21)	124	67	84	**ASN-8**	**AS-8**
3/8"	3.35 (85)	0.98 (25)	247	83	98	**ASN-10**	**AS-10**
1/2"	3.74 (95)	1.18 (30)	370	69	96	**ASN-15**	**AS-15**

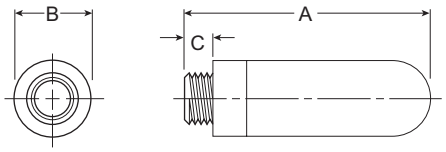
Most popular.

P6M G Thread Air Line Silencer, Plastic

- All Plastic Ultra Light Weight Versions
- High Noise Level Reduction
- Low Back Pressure Generation

The plastic silencer is designed to give excellent noise reduction with a minimum effect on air efficiency. The “Trimline” design allows for locating the silencer in the tightest places without extra plumbing or fittings. Fits directly into the exhaust port of most commercial valves. Open surface area of element allows for rapid discharge of air without undesirable back pressure.





Operating Information

Operating pressure:	0 to 246 PSIG (0 to 17 bar, 0 to 1700 kPa)
Operating temperature:	
Plastic	14°F to 176°F (-10°C to 80°C)
Metal	14°F to 165°F (-10°C to 74°C)
Efficiency	92%

P6M G Thread, Air Line Silencer, Plastic

Port Thread	A	Diameter B	C	Weight (grams)	Part Number
M5	0.91 (23)	0.26 (6,5)	0.16 (4)	0.01	**P6M-PAC5**
G1/8	1.14 (29)	0.55 (14)	0.24 (6)	0.02	**P6M-PAB1**
G1/4	1.34 (34)	0.67 (17)	0.24 (6)	0.04	**P6M-PAB2**
G3/8	2.36 (60)	0.98 (25)	0.35 (9)	0.06	**P6M-PAB3**
G1/2	2.52 (64)	0.98 (25)	0.43 (11)	0.10	**P6M-PAB4**
G3/4	5.51 (140)	1.50 (38)	0.55 (14)	0.50	**P6M-PAB6**
G1	6.30 (160)	1.89 (48)	0.79 (20)	0.62	**P6M-PAB8**

Most popular.

ECS Reclassifier, Air Line Muffler

The ECS (Muffler-Reclassifier) eliminates unwanted oil mist and reduces exhaust noise from pneumatic valves, cylinders and air motors.

- 99.97% Oil Removal Efficiencies
- 25 dBA Noise Attenuation
- 1/2" NPT and 1" NPT
- Disposable Units
- Continuous or Plugged Drain Option
- Metal Retained Construction
- Fast Exhaust Time

Operating Information

Maximum line pressure:	100 PSIG (6.8 bar)
Maximum operating temperature:	125°F (52°C)

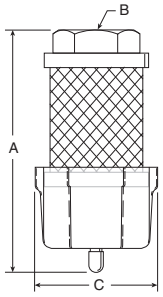
Improve Overall Plant Environment

Exhaust oil mist and noise pollution have a direct impact on worker productivity.

Oil aerosol mist from lubricators and compressors is pervasive and enters the industrial plant environment through the exhaust ports of valves, cylinders and air motors. This rapidly expanding exhaust also produces sudden and excessive noise.

The ECS (Muffler-Reclassifier) is 99.97% efficient at removing the oil aerosols. The ECS also acts as a silencer to lower the dBA levels below O.S.H.A. requirements.

The result is a cleaner, quieter environment which equates to greater work productivity and safety.



Operation

Compressor oils and lubricating oils are exhausted from valves, cylinders and air motors into the ECS. Oil aerosols are “coalesced” into larger droplets and gravity pulls them into the attached drain sump. The sump can then be drained manually or by using a 1/4" ID plastic tube drain. The air flowing into the ECS is also muffled or silenced as it enters the inside of the ECS and passes through the filter media into the atmosphere.

Proven Technology

The ECS units are constructed from the same materials that go into our oil removal coalescing filter elements.

The seamless design insures media uniformity and strength. This proven technology provides high coalescing efficiency with low pressure drop.

The filter media is supported by cylindrical perforated steel retainers both inside and out. These retainers, fully plated for excellent corrosion resistance, give the ECS units high rupture strength in either flow direction. These filters can also be used as high efficiency inlet or bypass filters for vacuum pumps, or breather elements to protect the air above critical process liquids.

ECS3 / ECS5

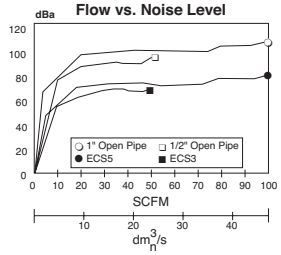
The ECS solves two problems inherent in compressed air exhaust from valves, cylinders and air motors - oil mist removal and noise abatement.

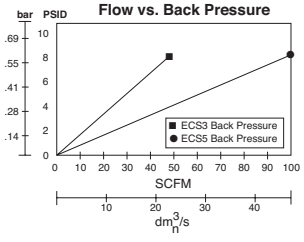
The ECS will improve your industrial plant environment, thereby improving worker productivity.

ECS Reclassifier, Air Line Muffler

Thread Size	A	B	C	Part Number
1/2	5.30 (135 mm)	1/2" NPT	2.57 (65 mm)	ECS3
1	7.30 (185mm)	1" NPT	2.57 (65mm)	ECS5

Performance Characteristics





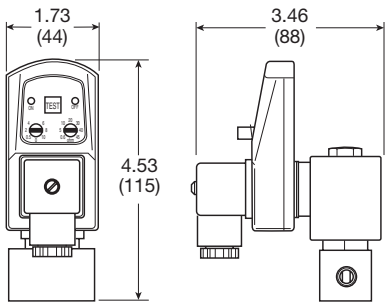
Most popular.

Automatic Electrical Drain Valve – WDV3-G

The WDV3 Electrical Drain is designed to remove condensate from compressors, compressed air dryers and receivers up to any size, type or manufacturer.

Benefits

- Does not air-lock during operation
- Compressed air systems up to any size
- The direct acting valve is serviceable
- Suitable for all types of compressors
- Test (micro-switch) feature
- High time cycle accuracy
- Large (4.5mm) valve orifice



Operating Information

Operating pressure:	230 psig (16 bar)
Ambient operating temperature:	34°F to 130°F (1.1°C to 54°C)
Voltages:	115VAC, 230/50-60Hz, 24VDC
Coil insulation:	Class H, 340°F (171.1°C)
Current rating:	4mA maximum
Timer –	
Open time	.5 to 10 sec., adjustable
Cycle time	.5 to 45 min., adjustable

Material specifications

Valve body	Brass / stainless steel
Enclosure (IP65 / NEMA 4)	ABS plastic
Internal parts	Brass / stainless steel
Valve seals	FPM (Fluorocarbon)

Automatic Electrical Drain Valve

Port Size	Primary Voltage	Weight (Kg)	Model Number
1/4	120VAC	1.8 (0.8 kg)	**WDV3-G12BL**
1/4	230VAC	1.8 (0.8 kg)	**WDV3-G22BL**
3/8	120VAC	1.8 (0.8 kg)	**WDV3-G13BL**
3/8	230VAC	1.8 (0.8 kg)	**WDV3-G23BL**
1/2	120VAC	1.8 (0.8 kg)	**WDV3-G14BL**
1/2	230VAC	1.8 (0.8 kg)	**WDV3-G24BL**
1/2	24VDC	1.8 (0.8 kg)	**WDV3-G34BL**

ED Zero Air Loss Condensate Drains

Zero air loss condensate drains are designed for economical removal of unwanted water, oil emulsions, and other liquids. These drains will only open when liquid is present and will not allow any compressed air to escape from the system.

Operating Information

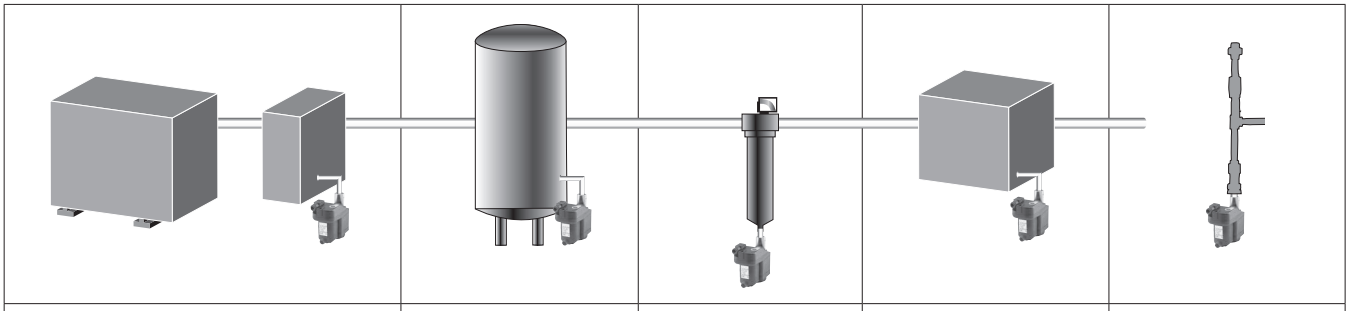
Maximum pressure:	232 psig (16 bar)
Ambient operating temperature:	35°F to 140°F (1.6°C to 60°C)
Voltages optional –	NPT 115/50-60Hz, standard
BSPP ports	230/50-60Hz & 24VDC

Zero Air Loss Condensate Drains

Port Size (NPT)	Compressor Aftercooler (scfm)*	Capacity Refrigeration Dryer (scfm)**	Filter (scfm)	Drain Capacity per Day (gal/liter)	Model Number	Service Kit
1 @ 3/8 (in), 1 @ 3/8 (out)	—	—	424	6 (22.7)	**ED3002N115-K**	**SKED3000N115**
1 @ 1/2 (in), 1 @ 3/8 (out)	141	282	1,413	13 (49.2)	**ED3004N115-K**	**SKED3000N115**
2 @ 1/2 (in), 1 @ 3/8 (out)	247	494	2,472	23 (87.1)	**ED3007N115-K**	**SKED3000N115**
2 @ 1/2 (in), 1 @ 3/8 (out)	1,059	2,119	10,594	100 (378.5)	**ED3030N115-K**	**SKED3000N115**
2 @ 1/2 (in), 1 @ 3/8 (out)	3,532	7,063	35,315	330 (1,249.2)	**ED3100N115-K**	**SKED3000N115**

* Based on 100 PSI working pressure, air compressor inlet at 77°F (25°C) at 60% RH, air discharge temperature of 95°F (35°C) following the aftercooler, pressure dewpoint of 37°F (2.8°C) after the refrigerated dryer.
** Condensate from aftercooler or refrigerated dryer to be drained upstream – only for residual oil content or small quantities of condensate.
Note: A 6 ft. line cord will be included with each drain.

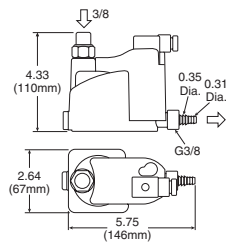
Where Are Condensate Drains Used?



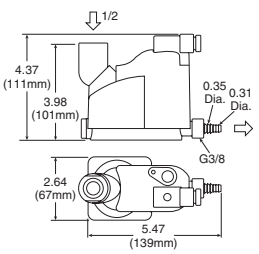
Compressor with Aftercooler	Receiver Tank	Filter	Air Dryer	Drip Leg
Removes the condensate that is collected after the air cools in the aftercooler	Removes the condensate that is collected when the air cools inside of the receiver tank	Removes the condensate that is collected in the filter bowl	Removes the condensate that is collected in the air dryer	Point-of-use applications: removes the condensate from compressed air pipes in a plant

Dimensions

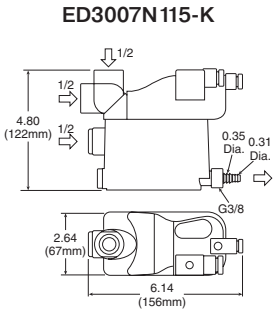
ED3002N115-K



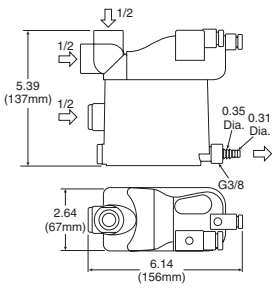
ED3004N115-K



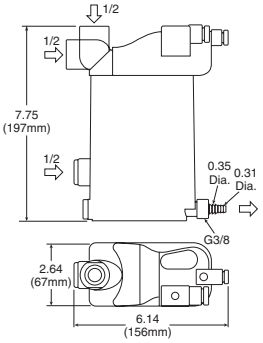
ED3007N115-K



ED3030N115-K



ED3100N115-K



Most popular.

For inventory, lead times, and kit lookup, visit www.pdnplu.com

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Drains Cocks

Drain cocks are manufactured in external seats. Hand tightening provides a metal - to - metal seal.

Drain Cock Nomenclature

Example:

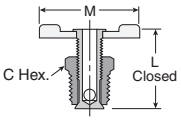
DC 604 - 2

- Drain Cock
- External Seat
- 1/8" Pipe Thread

Operating Information

Operating pressure:	150 psig (150 bar)
Temperature ranges:	
Internal seal	-65°F to 250°F (-53.9°C to 12.1°C)
External seal	-25°F to 250°F (-31.7°C to 12.1°C)
Operating fluid:	Air, water, gas and certain other fluids

Note: Lubricant may not be compatible with some fluids, contact factory for special fluid requirements.



External Seal - Drain Cock DC604

Temperature Range: -25° to 250°F

Part Number	Pipe Thread	C Hex	L	M
DC604-2*	1/8	7/16	.85	1.25
DC604-4	1/4	9/16	1.00	1.38
DC604-6*	3/8	11/16	1.22	1.68

*When assembled handle wings are down facing

LV Series

Lockout valves are installed in pneumatic drop legs, or individual pneumatic control lines. In accordance with OSHA procedures, lockout valves are used during maintenance and service procedures of pneumatically (air) operated equipment.

- Used for compliance with OSHA 29 CFR part 1910
- 1/4" to 2" pipe sizes. NPT or BSPP
- Yellow cast aluminum body with red handle (NACE MR0175 / ISO 15156)
- Inline or surface mountable
- Built in port for pressure verification to meet ANSI B11 and PMMI B155 requirements
- Fluorocarbon slipper seals for easy shifting, even after long periods of inactivity

Material specifications

Description	LV
Body:	Cast aluminum alloy
Handle:	Plastic
Spool:	Aluminum
Seals:	Carboxylated nitrile
Detent spring:	Stainless steel
Grease:	Magnalube G†

† Trademark Magnalube

Operating Information

Operating pressure:

Compact	15 to 145 PSIG
Standard	15 to 300 PSIG
High flow	15 to 300 PSIG

Operating temperature: 40°F to 175°F

Operating media: Clean, dry, compressed air (5 micron)

Compact

Port In/Out	Port Exhaust	SCFM In/Out	SCFM Exhaust	Wt (lb)	Part Number *
1/4	3/8	41.8	40.7	0.9	**LV2N3B**
3/8	3/8	60.7	60.7	0.9	**LV3N3B**

Standard

Port In/Out	Port Exhaust	Scfm In/Out	Scfm Exhaust	Wt (lb)	Part Number *
3/8	3/4	107.7	81.1	2.0	**LV3N6B**
1/2	3/4	161.4	90.9	2.0	**LV4N6B**
3/4	3/4	187.7	93.2	2.0	**LV6N6B**
3/4	1-1/4	297.7	204	3.2	**LV6NAB**
1	1-1/4	375	216	3.2	**LV8NAB**
1-1/4	1-1/4	436.4	221	3.2	**LVANAB**

High Flow

Port In/Out	Port Exhaust	Scfm In/Out	Scfm Exhaust	Wt (lb)	Part Number *
1-1/2	2	761.4	1156	8.2	**LVBNCB**
2	2	918.2	1186	8.2	**LVCNCB**

NOTE: Exhaust flow rates calculated using inlet pressure 100 psig (6.7 bar), pressure drop 5 psi (0.34 bar), air temp 68°F (20°C), and 36% relative humidity.
* For BSPP ports, change 4th digit from "N" to "B"

Most popular.

EZ Series

The EZ series meets all the same standards as the LV series with the added feature of a soft start when opened. There are still 2 detented positions for the handle (push close, pull to open), but when pulled open, an adjustable needle valve controls the rate of pressure build-up. This can protect equipment during start up after maintenance. The EZ is distinguishable from the LV series by the blue dot on the label.

3/4" Exhaust Shown

Features

- Combines lockout and soft-start functions in a single unit
- Used in systems for compliance with OSHA standard 29 CFR part 1910
- 3/8 Inch to 1-1/4 inch pipe sizes
- Cv's from 3.7 to 13.7
- 3/4 and 1-1/4 inch: exhaust ports available
- Exhaust port threaded for installation of silencer or line for remote exhausting
- Inline or surface mountable
- Yellow cast aluminum body with red handle. Blue dot on body indicates EZ Series valve
- Fluorocarbon slipper seals for easy shifting, even after long periods of inactivity

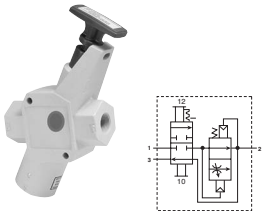
Operating Information

Operating pressure:
Standard 15 to 300 PSIG
Operating temperature: 40°F to 175°F
Operating media: Clean, dry, compressed air (5 micron)

Material specifications

Description	
Body:	Cast aluminum alloy
Handle:	Plastic
Spool:	Aluminum
Seals:	Carboxylated nitrile
Detent spring:	Stainless steel
Grease:	Magnalube G †

† Trademark Magnalube



NOTE: Exhaust flow rates calculated using inlet pressure 100 psig (6.7 bar), pressure drop 5 psi (0.34 bar), air temp 68°F (20°C), and 36% relative humidity.
* For BSPP ports, change 5th digit from "N" to "B"

Most popular.

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Applications

Lockout valves are installed in pneumatic drop legs, or individual pneumatic control lines (see Figure 1). In accordance with OSHA procedures, EZ valves are used during maintenance and service procedures of pneumatically (air) operated equipment. Prior to servicing, the red handle is pressed inward, blocking pressure and relieving all downstream air pressure. A padlock is installed through the locking hasp, preventing accidental actuation during the maintenance procedure. Following maintenance, the padlock is removed and the red handle is pulled outward, gradually returning air pressure to the system. (For complete Lockout / Tagout procedures, consult OSHA Standard 29 CFR Part 1910 in U.S. Federal Register/Vol. 54 No. 169, Friday, September 1, 1989 / Page 36644.)

Mounting

Valves can be inline mounted or surface mounted using the two mounting holes provided in the valve body. Mount valves in plain view with the handle oriented for accessibility.

Placement of Lockout Device

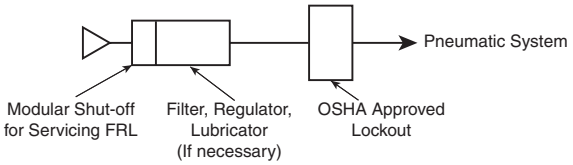
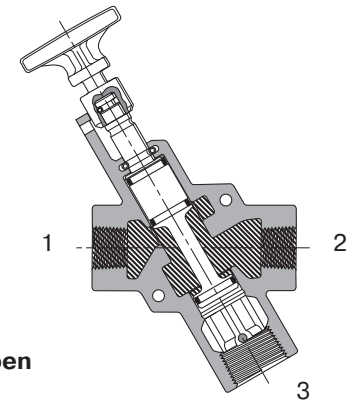


Figure 1.

LV Operation

Normal Machine Operation – Valve Open

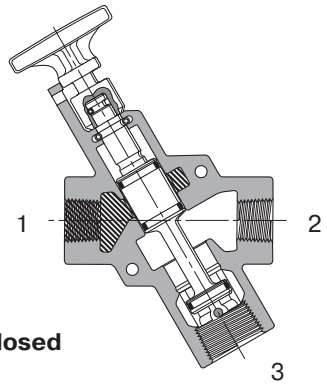
With the handle pulled outward. Inlet Port 1 is open to outlet Port 2. Exhaust Port 3 is blocked.



Open

Lockout Operation – Valve Closed

With the handle pushed inward. Inlet Port 1 is blocked. Outlet Port 2 is open to Exhaust Port 3.

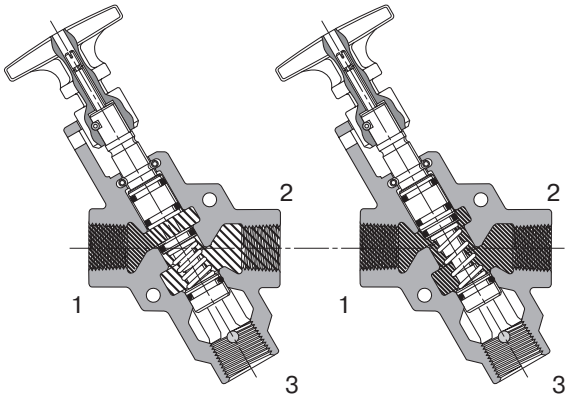


Closed

EZ Operation

Normal Machine Operation – Valve Open

When the red handle is pulled outward, the adjustable needle valve (accessed through the top of the handle) setting determines the rate of pressure buildup. When downstream pressure reaches the full flow described in the specifications below, Inlet Port 1 is open to outlet Port 2. Exhaust Port 3 is blocked.

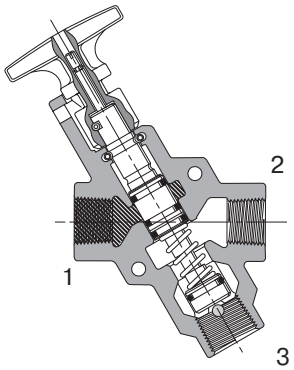


Open
Pressure Building Up

Open
Full Flow

Lockout Operation – Valve Closed

When the red handle is pushed inward, the Inlet Port 1 is blocked. Downstream air is exhausted through Exhaust Port 3.



Closed

Corrosion Resistant Mufflers for Harsh Environments

Port Size	Construction	Threads	Dimensions In. (mm) Width	Length	Part Number
1/4	Stainless steel	Male. NPT	0.56 (14.2)	1.75 (44.5)	**5500A2004**
1/2	Stainless steel	Male, NPT	0.87 (22.1)	2.75 (69.7)	**5500A4004**
1	Stainless steel	Male, NPT	1.31 (33.3)	3.87 (98.3)	**5500B6004**
2	Nickel plated	Male, NPT	2.37 (60.2)	5.50 (139.7)	**5500A9004***

* Nickel plated

* NPT ports standard, for BSPT ports, add a "B" after the "S"

Pop-up Pressure Indicator

Brass – Part # **988A30** – Can be used on all LV or EZ series to provide visual verification of line exhaust

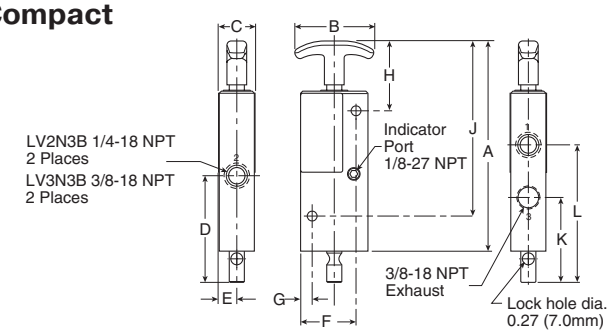
Stainless – Part# **1155H30** – Can be used on SS LV series to provide visual verification of line exhaust

Pressure Switch

- Part # **PPS1-2C3-RHM** (DIN 9.4mm connector)
- Part # **PPS1-2C3-RWL** (18" leads)
- Signal verification of line exhaust
- Field adjustable set point

LZ Series, Exhaust Port - Compact, Standard, High Flow

Compact



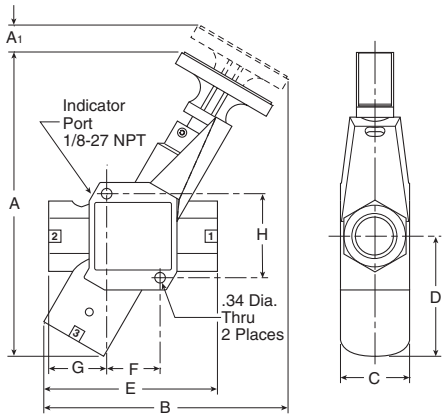
Compact LV Series, 3/8" Exhaust Port Dimensions

A	B	C	D	E	F
6.50 (165)	2.25 (57)	1.05 (27)	3.04 (77)	.51 (13)	1.58 (40)

G	H	J	K	L
.33 (8)	1.99 (51)	4.99 (127)	2.42 (62)	3.92 (100)

Inches (mm)

Standard



Compact LV Series, 3/4" Exhaust Port Dimensions

A	A1	B	C	D	E
8.32 (211)	0.64 (16)	6.60 (168)	2.00 (51)	3.06 (78)	4.24 (108)

F	G	H
1.32 (111)	1.56 (40)	2.21 (56)

Inches (mm)

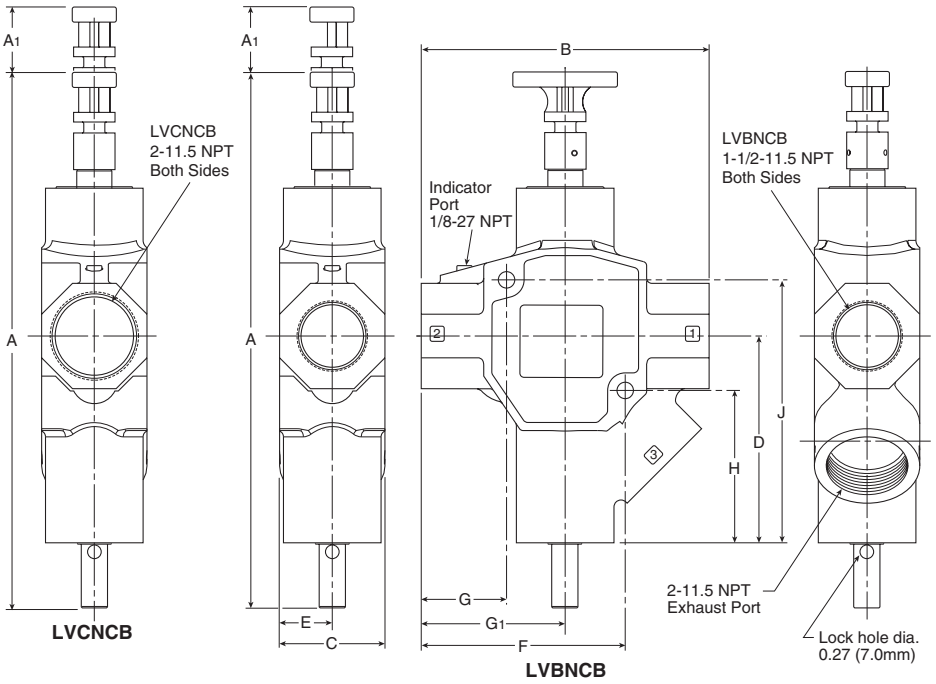
Compact LV Series, 1-1/4" Exhaust Port Dimensions

A	A1	B	C	D	E
9.91 (252)	0.85 (22)	7.95 (202)	2.25 (57)	3.91 (99)	5.65 (144)

F	G	H
1.74 (44)	1.89 (48)	2.74 (70)

Inches (mm)

High Flow



High Flow LV Series, 2" Exhaust Port Dimensions

A	A1	B
14.82 (376)	1.87 (47)	8.20 (208)

C	D	E
3.00 (76)	5.89 (150)	1.50 (38)

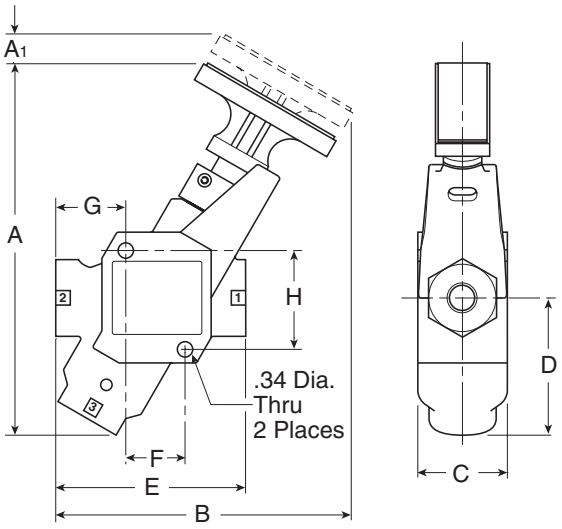
F	G	G1
5.81 (148)	2.43 (62)	4.10 (104)

H	J
4.34 (110)	7.49 (190)

Inches (mm)

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

EZ Series, Exhaust Port - Standard Flow



EZ 3/4" Exhaust Port Dimensions

A	A1	B	C	D
8.32 (211)	0.64 (16)	6.60 (168)	2.00 (51)	3.06 (78)

E	F	G	H
4.24 (108)	1.32 (111)	1.56 (40)	2.21 (56)

Inches (mm)

EZ 1-1/4" Exhaust Port Dimensions

A	A1	B	C	D
9.91 (252)	0.85 (22)	7.95 (202)	2.25 (57)	3.91 (99)

E	F	G	H
5.65 (144)	1.74 (44)	1.89 (48)	2.74 (70)

Inches (mm)

AirGuard Protection System

CAUTION !

Product Features:

- **Maintenance Friendly**
  Repair possible while plant is still operating
- **Economic**
  Competitive pricing
- **Complies with EU Standard**
  EN 983 - § 5.3.4.3.2
- **Reliable and Tamperproof**
  No adjustment necessary
- **Complies with ISO Standard**
  4414 - § 5.4.5.11.1
- **Complies with MSHA Regulation**
  30CFR 56.13021, 57.13021 and 57.1730
- **Lightweight**
  Compact size
  Compatible with all Pneumatic Systems
  Can be used as a Flow Blocker
- **TUV Approval**
  No. 01-02-0145
- **EU Registered Utility**
  Model No. 0025 73 525
- **Complies with OSHA Regulation Standard**
  29CFR 1926.302 (Partial)

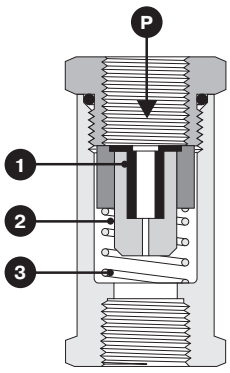
Protect your most important assets: your employees and their equipment!

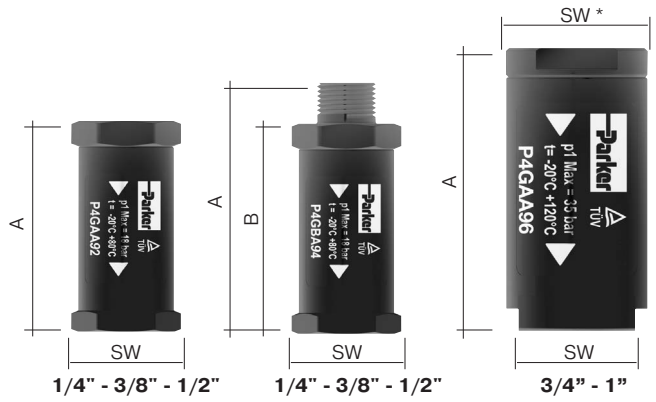
The AirGuard offers simple but efficient protection of a broken compressed-air hose. The air supply is immediately shut off by the AirGuard, should the volume of air exceed a set value. This “value” is factory preset and is set to allow normal air consumption when using air tools.

Should the air consumption exceeds the set value, e.g. the air line is severed, then the internal piston instantly shuts off the main flow. An integral bleed hole allows some air to flow though. This enables the line pressure to automatically reset the AirGuard once the main line break is repaired.

Function:

(P) is the inlet. Air passes the piston (1) and continues through the seat (3). The air flow, passing the piston, is slowed down by means of length wise grooves on the outer side of the piston. If the flow is too high, the air cannot pass the piston quickly enough, and the piston is forced against the spring (2) and towards the seat. The maximum flow is shown in the graph. If the value indicated is exceeded e.g. if the hose suddenly breaks - the air supply is automatically shut of. An integral bleed hole allows some air to flow though. This enables the line pressure to automatically reset the AirGuard once the main line break is repaired.



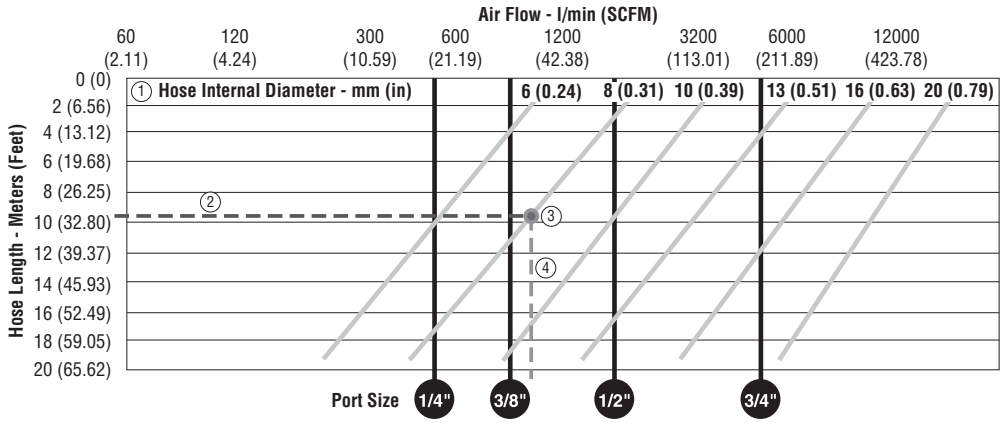


Weight and Dimensions metric (imperial)

Thread Connection	Dimensions inch (mm) A	B	SW	Weight oz. (g)	Max. Inlet Pressure	Temp. Range	Material	P1 Inlet Thread	P2 Outlet Thread	Part Number NPT
1/4"	1.89 (48)	-	.87 (22)	1.06 (30)	255 psig (18 bar)	-4°F to 176°F (-20°C to 80°C)	Housing: Aluminum Piston: Polyacetal	Female	Female	**P4GAA92**
1/4"	2.28 (58)	49 (1.93)	.87 (22)	1.27 (36)				Male	Female	**P4GBA92**
3/8"	2.32 (59)	-	1.10 (28)	2.05 (58)				Female	Female	**P4GAA93**
3/8"	2.80 (71)	59 (2.32)	1.10 (28)	2.19 (62)				Male	Female	**P4GBA93**
1/2"	2.56 (65)	-	1.22 (31)	2.75 (78)				Female	Female	**P4GAA94**
1/2"	3.15 (80)	65 (2.56)	1.22 (31)	3.00 (85)				Male	Female	**P4GBA94**
3/4"	2.99 (76)	-	1.18/1.42* (30/36*)	3.77 (107)		-4°F to 248°F (-20°C to 120°C)	Housing: Aluminum Piston: Aluminum	Female	Female	**P4GAA96**
1"	3.94 (100)	-	1.61/1.97* (41/50*)	10.58 (300)	500 psig (35 bar)			Female	Female	**P4GAA98**

How to Select the Optimal Size of an AirGuard

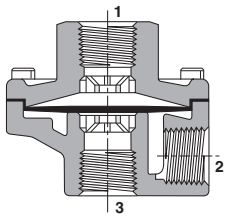
Information based on an inlet pressure of 7 bar (100 psig)



a. Determine the internal diameter of the hose, tube or pipe being used ① (see specification Hose-internal Diameter, diagonal line).
b. Determine the length of the hose, tube or pipe ② (Hose length in meters).
c. Define the intersection of point a and b, and mark a vertical line downwards. ③ - ④ In the example chart (dot ③) and the dashed line (④).
d. The next vertical black line, left of the intersection line (④) tells the correct AirGuard size (in inches).
e. Important: Every flow value to the right of the respective vertical line (black) would activate the AirGuard in case of a bursting hose, pipe or tube. All AirGuard sizes right of the intersection line (④) are too big and will not close up.
f. Example: Which air fuse should be used for a hose, pipe or tube bearing 8 mm inner diameter and 10 meters of length - follow the 10 meter line (②) to the intersection point (dot ③). Now the next left black line marks the correct size.
g. Result: The correct size in our example is the AirGuard 3/8"

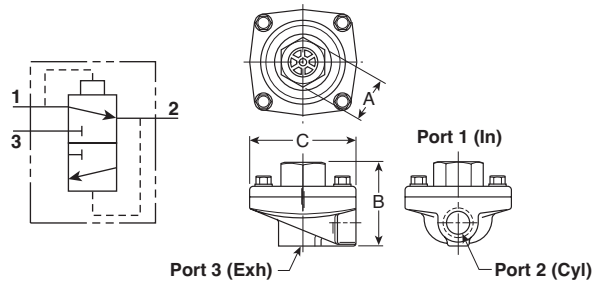
OR Series Quick Exhaust & Shuttle Valves

Quick exhaust valves provide rapid exhaust of control air when placed between control valve and actuator. They can also be used as shuttle valves. Diaphragm materials are available in urethane, Nitrile, Fluorocarbon, and PTFE to meet a wide variety of operating conditions.



Material Specifications

Body	Die cast aluminum
Static Seals	Nitrile standard with urethane (Others see chart below)
Diaphragm	Standard – Urethane Optional – Fluorocarbon, PTFE, or Nitrile (Depending on size)



Operating Information

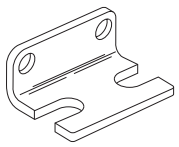
Operating pressure (Air): 150 PSIG (max), 3 PSIG (min)
200 PSIG (max), 50 PSIG (min) for Model No. 0R37TB (PTFE diaphragm)

Operating temperature:*

Urethane:	0°F to 180°F* (-18°C to 80°C)
Nitrile:	0°F to 180°F* (-18°C to 80°C)
Fluorocarbon:	0°F to 400°F* (-18°C to 205°C)
PTFE:	0°F to 500°F* (-18°C to 260°C)

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.

Mounting Bracket Kit – No. 036408100
(Including body screws)
For "OR12" and "OR25" sizes with 7/8" "A" Dimension.



Model Selection, Performance Data and Dimensions

Port 1	Port 2	Port 3	Flow (SCFM †)	Part Number NPTF	Part Number BSPP "G"	A	B	C	Service Kit No.
STANDARD Urethane diaphragms (Nitrile static seals)									
1/4"	1/4"	3/8"	150	**0R25NB**	**0RB25NB**	1" Hex	2.06	2.44	**033400105**
	3/8"	3/8"	240	**0R25PB**	—	1" Hex	2.06	2.44	**033400105**
3/8"	3/8"	3/8"	240	**0R37B**	**0RB37B**	1" Hex	2.06	2.44	**033400105**
1/2"	1/2"	1/2"	450	**0R50B**	**0RB50B**	1-1/2" Hex	2.88	3.38	**034750109**
3/4"	3/4"	3/4"	550	**0R75B**	**0RB75B**	1-1/2" Hex	2.88	3.38	**034750109**
Nitrile diaphragms (Nitrile static seals)									
1/8"	1/8"	1/8"	70	**0R12B**	**0RB12B**	7/8" Sq.	1.75	1.88	**033400105**
	1/8"	1/4"	70	**0R12NB**	**0RB12NB**	7/8" Sq.	1.75	1.88	**033400105**
1/4"	1/4"	1/4"	90	**0R25B**	**0RB25B**	7/8" Sq.	1.75	1.88	**036408000**
	1/4"	3/8"	90	**0R25NFB**	**0RB25NFB**	1" Hex	2.06	2.44	**033408000**
3/8"	3/8"	3/8"	240	**0R37FB**	**0RB37FB**	1" Hex	2.06	2.44	**033408000**
3/4"	3/4"	3/4"	550	**0R75FB**	**0RB75FB**	1-1/2" Hex	2.88	3.38	**034759000**
Fluorocarbon diaphragms for extended temperature operation (Fluorocarbon static seals)									
1/8"	1/8"	1/8"	70	**0R12VB**	**0RB12VB**	7/8" Sq.	1.75	1.88	**036508000**
	1/8"	1/4"	70	**0R12NVB**	**0RB12NVB**	7/8" Sq.	1.75	1.88	**036508000**
1/4"	1/4"	1/4"	90	**0R25VB**	**0RB25VB**	7/8" Sq.	1.75	1.88	**036508000**
3/8"	3/8"	3/8"	240	**0R37VB**	**0RB37VB**	1" Hex	2.06	2.44	**033400319**
1/2"	1/2"	1/2"	450	**0R50VB**	**0RB50VB**	1-1/2" Hex	2.88	3.38	**034750120**
3/4"	3/4"	3/4"	550	**0R75VB**	**0RB75VB**	1-1/2" Hex	2.88	3.38	**034750120**
PTFE diaphragms for higher pressure and temperature (Fibre static seals)									
3/8"	3/8"	3/8"	240	**0R37TB**	**0RB37TB**	1" Hex	2.06	2.44	**033400504**

† At 100 PSIG inlet pressure with full pressure drop.

Most popular.

Shuttle Valves

Shuttle valves determine a single pneumatic output from two separate inputs. If pressure is applied to both ports simultaneously, the valve will select the port with the higher pressure.

Material Specifications

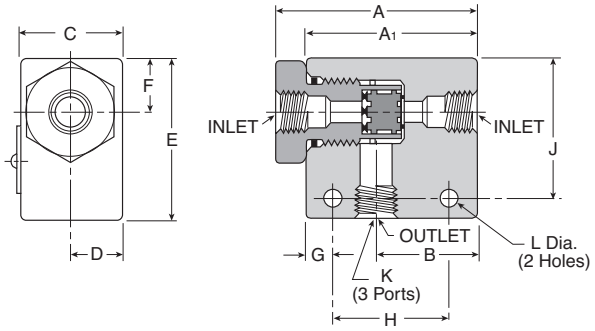
Body	Aluminum
Internal Components	Aluminum
Seals	Nitrile

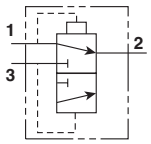
Operating Information

Operating pressure:
Maximum: 200 PSIG
Minimum: Differential Pressure 3 PSIG

Operating temperature:* 0°F to 160°F

* Ambient temperatures below freezing require moisture-free air. Ambient temperatures below freezing and above 180° require lubricants especially selected for suitability at these temperatures. Pneumatic valves should be used with filtered and lubricated air.



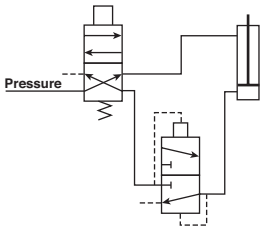


Model Selection and Dimensions

Port Size	Flow (Cv)	Dimensions A	A1	B	C	D	E	F	G	H	J	K	L	Part Number
1/8"	0.32	N/A	1.62	0.81	0.62	0.31	1.00	0.281	0.312	1.00	0.75	1/8 - 27	0.219	**N1641001**
1/4"	1.65	2.50	2.12	1.25	1.25	0.62	2.00	0.67	0.265	1.25	1.35	1/4 - 18	0.219	**N1642003**
3/8"	2.02	2.50	2.12	1.25	1.25	0.62	2.00	0.67	0.265	1.25	1.35	3/8 - 16	0.219	**N1643003**

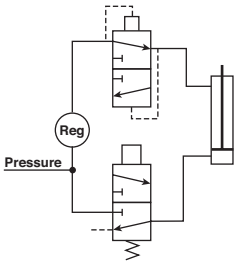
Most popular.

Typical "Quick Exhaust Valve" Applications



Rapid Retraction – Double Acting Cylinder

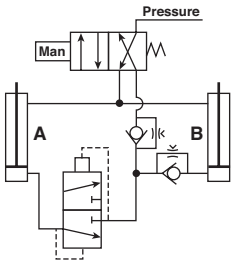
In this circuit, air is exhausted through a Quick Exhaust Valve that is **close coupled** to the cap end of the cylinder. Because the Quick Exhaust Valve has a greater exhaust capacity than the four-way Control Valve, increased cylinder speed can be accomplished with a smaller and less expensive control valve.



Dual Pressure Actuation of Double Acting Cylinder

This circuit utilizes a Quick Exhaust Valve and a three-way Control Valve to permit rapid extension of the cylinder at a high pressure.

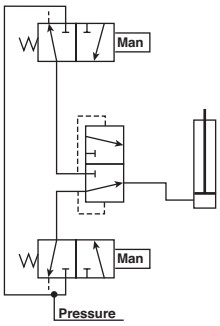
NOTE: Line pressure must be 3 or 4 times greater than rod end pressure. Effective working pressure is the differential between the cap and rod end.



Bi-Directional Control of Two Double Acting Cylinders

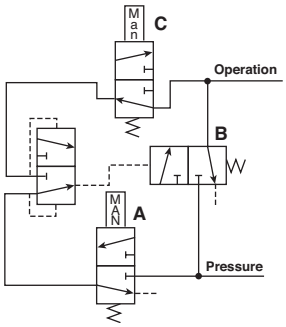
This circuit provides maximum control with a minimum of valving. A large four-way Control Valve is not needed to permit the rapid retraction of Cylinder A, as the Quick Exhaust Valve performs this function. The extension of Cylinders A and B and retraction of Cylinder B are controlled by Speed Control Valves.

Typical "Shuttle Valve" Applications



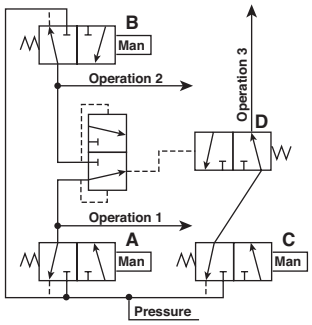
"OR" Circuit

The most common application of the Shuttle Valve is the "OR" Circuit. Here a cylinder or other work device can be actuated by either control valve. The valves can be manually or electrically actuated and located in any position.



Memory Circuit

This circuit enables continuous operation once initiated. Pressure is delivered to the circuit when Valve A is actuated. This allows pressure to pass through the shuttle valve actuating Valve B. Pressure then flows through Valve B and also the other side of the shuttle valve which holds Valve B open for continuous operation. To unlock the circuit, Valve C must be opened to exhaust the circuit and allow Valve B to return to its normally closed position.



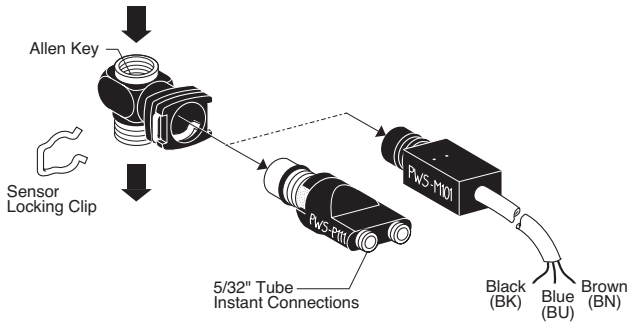
Interlock

This circuit prevents the occurrence of a specific operation while one or another operation takes place. When either Valve A or B is actuated to perform operation 1 or 2, Valve D is shifted to the closed position and prevents operation 3 from occurring.

Threshold Sensors

The plug-in threshold sensors provide feedback information on pneumatic cylinder status in either pneumatic or electrical outputs. Mounted into the cylinder port, these devices monitor the back pressure of the cylinder's exhaust. When the cylinder's piston stops, the back pressure rapidly drops and the threshold sensor provides the desired output. Ideal for variable stroke applications such as robotics where other sensor type devices such as limit switches are impractical, these devices provide a signal whenever the cylinder stops motion.

The threshold sensor consists of two complementary sub assemblies (1) the banjo fitting and (2) the plug-in sensor element. In all cases, the sensor is easily plugged into the banjo fitting and locked in place with a spring clip. The banjo fitting is designed to accept (piggy backed) other functional fittings such as flow controls or blocking valves. Simply select the sensor based on the type feedback signal that best fits the application.



Operating Information

Operating pressure: 0 to 150 PSIG (0 to 10.3 bar)

Operating temperature:

Operating	5°F to 140°F (-15°C to 60°C)
Storage	-40°F to 160°F (-40°C to 70°C)

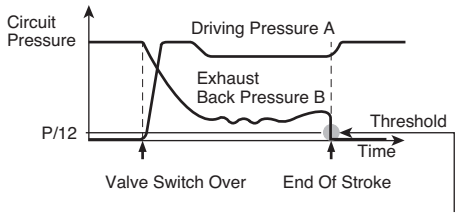
⚠ **Caution:** If it is possible that the ambient temperature may all below freezing, the medium must be moisture free to prevent internal damage or unpredictable behavior.

Mounting

Banjo fittings in 10-32 to 1/2" pipe sizes are designed to be installed directly into actuator ports (up to 5" bore cylinders). The banjo fitting can accommodate other functional fittings and components such as right angle flow control valves or blocking valves. Banjo fittings screw into actuators using an Allen wrench or 5/16" hex head wrench for 10-32 size. Electrical or pneumatic feedback element snaps into place using a locking clip.

Operation

Pneumatic sensors have a continuous pressure signal applied to the sensor device. Electrical sensors have a continuous electrical signal applied to the sensor device. The threshold sensor assembly mounted directly into the cylinder Port provides an output signal S, which can be pneumatic or electrical, when the falling back pressure in the exhausting chamber of the cylinder reaches the operating threshold (approximately 6-9 PSIG). (The device is a normally passing device. The output is only on when there is nearly zero pressure at the cylinder.)



Material specifications

Body	Thermoplastic
Mounting screw	Brass

Banjo Sockets (with Sensor Clip)

	Port Size	Wrench	Part Number
	10-32	5/16" Hex	**PWSB1557**
	1/8"	3/16" Allen	**PWSB1887**
	1/4"	5/16" Allen	**PWSB1997**
	3/8"	3/8" Allen	**PWSB1337**
	1/2"	1/2" Allen	**PWSB1227**

Plug-in Sensors

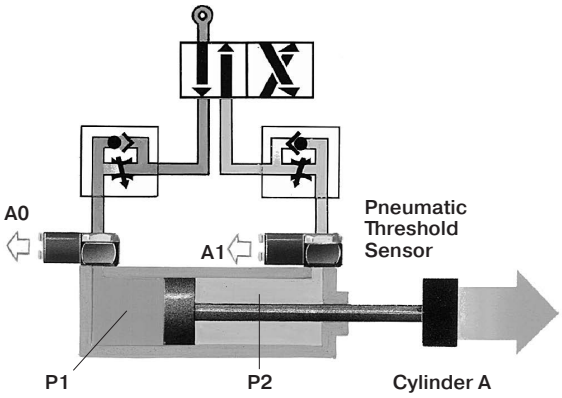
	Output	Connection	Part number
	Pneumatic	5/32" push-in	**PWSP111**
	Electrical	3-wire cable (6 ft)	**PWSM1012**

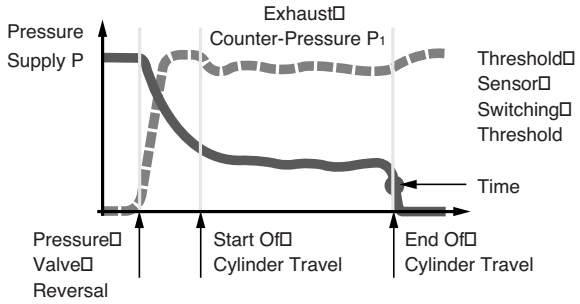
☐ Most popular.

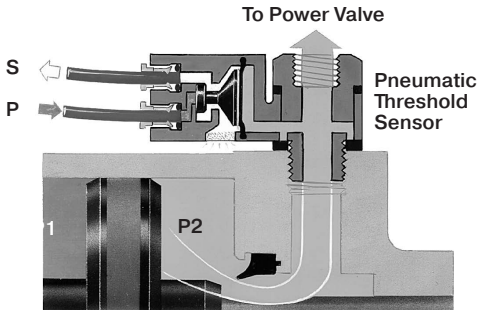
Specifications

Maximum Operating Frequency	10 Hz
Pilot Pressure (PWSP111)	>64 PSIG (4.4 bar)
Threshold Pressure	6 to 9 PSIG (.4 to .6 bar)
Output Flow Rate (PWSP111)	3 SCFM at 90 PSIG
Current Rating (PWSM1012) –	5 VA, 250 VAC 5W, 48 VAC
Life Expectancy –	10 million cycles with dry air at 90 PSIG, 68°F, and 1 Hz operating frequency
Voltage Range (PWSM1012) –	12 - 240 VAC 12 - 48 VDC

Air Quality – Standard Shop Air, Lubricated or Dry 40 µm Filtration







PWS General Characteristics

Permissible Fluids	Air or neutral gas, 50 µm filtration, lubricated or not
Flow	N/A
Mechanical Life	10 Million
Maximum Operating Frequency	10Hz
Maximum Mounting Torque:	
10-32 UNF and M5	88 inch pounds
1/8"	70 inch pounds
1/4"	105 inch pounds
3/8"	265 inch pounds
1/2"	310 inch pounds
Adjustment	N/A
Adjustment Locking	N/A

Piloting and De-Piloting Pressure

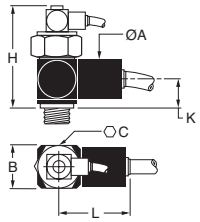
Threshold sensors	Pilot with operating pressure of 90 PSI	Depilot with operating pressure of 90 PSI
PWSP111	64 PSI	6 PSI
PWSM1012	15 PSI	9 PSI
PWSE101 and PWSE111	10 PSI	7 PSI

Fluid Power		Universal Description	Electrical	
Function	Symbol		Function	Symbol
Normally Closed (N.C.)	2-Way / 3-Way	**Normally Non-Passing (NNP)**	**Normally Open (N.O.)**	
Normally Open (N.O.)	2-Way / 3-Way	**Normally Passing (NP)**	**Normally Closed (N.C.)**	

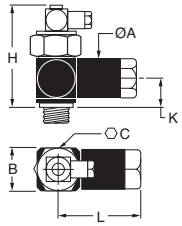
Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Blocking Valves

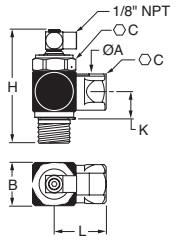
PWBA14/34



PWBA18/38



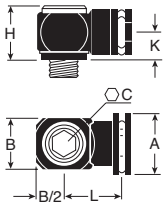
PWBA38



ØA	B	C	K	H	L	Flow*	Part Number
0.86" (22)	0.82" (21)	0.94" (24)	0.53" (13.5)	2.32" (59)	1.54" (39)	14.8	**PWBA1468/3468**
0.86" (22)	0.82" (21)	0.94" (24)	0.53" (13.5)	2.09" (53)	1.54" (39)	19.4	**PWBA1469/3469** **PWBA1489**
1.06""(27)	1.10" (28)	0.94" (24)	0.55" (14)	2.09" (53)	1.98" (50)	45.9	**PWBA1483** **PWBA1493/3493**
1.22" (31)	1.30" (33)	1.30" (33)	0.94" (24)	2.59" (66)	2.59" (66)	81.2	**PWBA1412/3412**
0.86" (22)	0.82" (21)	0.94" (24)	0.53" (13.5)	2.32" (59)	1.71" (43.5)	14.8	**PWBA1898/3888**
0.86" (22)	0.82" (21)	0.94" (24)	0.53" (13.5)	2.09" (53)	1.71" (43.5)	19.4	**PWBA1899/3899**
1.06" (27)	1.10" (28)	0.94" (24)	0.55" (14)	2.09" (53)	2.18" (55)	45.9	**PWBA1833/3833**
1.22" (31)	1.30" (33)	1.30" (33)	0.94" (24)	2.59" (66)	2.47" (63)	81.2	**PWBA1822/3822**
0.75" (19)	0.87" (22)	0.83" (21)	0.67" (17)	2.20" (56)	1.73" (44)	14.8	**PWBA38887**
0.75" (19)	0.87" (22)	0.83" (21)	0.67" (17)	2.20" (56)	1.73" (44)	19.4	**PWBA38997**
1.06" (27)	1.18" (30)	1.06" (27)	0.91" (23)	2.64" (67)	1.42" (36)	45.9	**PWBA38337**
1.06" (27)	1.18" (30)	1.06" (27)	0.91" (23)	2.64" (67)	1.42" (36)	81.2	**PWBA38227**

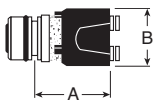
Threshold Sensors

Banjo Socket



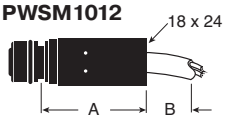
A	B	C	H	K	L	Part Number
.98 (25)	.43 (11)	5/16" Hex	.79 (20)	.40 (10)	.67 (17)	**PWSB1557**
.98 (25)	.63 (16)	3/16" Allen	.71 (18)	.40 (10)	.79 (20)	**PWSB1887**
.98 (25)	.83 (21)	5/16" Allen	.71 (18)	.40 (10)	.87 (22)	**PWSB1997**
.98 (25)	1.10 (28)	3/8" Allen	.79 (20)	.47 (12)	.98 (25)	**PWSB1337**
.98 (25)	1.30 (33)	1/2" Allen	.93 (24)	.55 (14)	1.02 (26)	**PWSB1227**

PWSP111



A	B	Part Number
.87 (22)	.79 (20)	**PWSP111**
1.26 (32)	.79 (20)	**PWSM1012**

PWSM1012

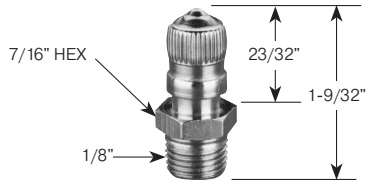


Tank Valves

For tanks, steel barrels, compressors and other pneumatic containers where a dependable automatic air valve is needed. Equipped with standard valve core and sealing cap. Maximum operating pressure is 185 PSIG. Temperature range is -40°F to 220°F.

091660060, 1/8" pipe thread, dome shaped cap

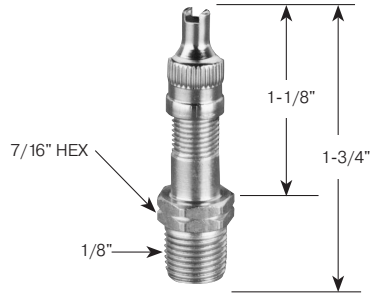
Has a 1/8" pipe thread at bottom for minimum protrusion. N/P finish, dome shaped cap.



Thread size	Box qty	Part number
1/8	25	091660060

006450060, 1/8" pipe thread at bottom, screwdriver type cap

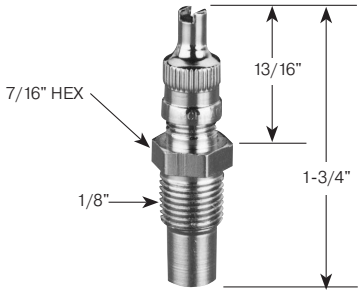
A 1/8" pipe thread at bottom permits maximum protrusion. N/P finish, screwdriver type cap.



Thread size	Box qty	Part number
1/8	25	006450060

014680006, 1/8" pipe thread part way up the stem, screwdriver type cap

Has a 1/8" pipe thread part way up the stem which allows for minimum protrusion. N/P finish, has screwdriver type cap.



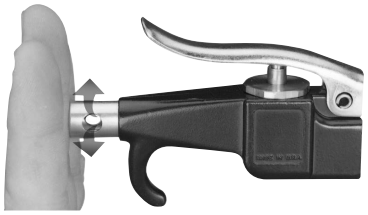
Thread size	Box qty	Part number
1/8	25	014680006

Most popular.

O.S.H.A. Certification — All safety blow guns conform to the requirements of Compressed Air Standards as currently described in the U.S. Bureau of Labor Standards, paragraph 1910.242, when pressurized at the inlet to a maximum of 100 PSIG. Conform to current O.S.H.A. Directive No. 100-1.

Brass Nozzle Blow Guns

Contoured lever or button control both provide a natural, comfortable grip even when used with gloves. Finger guard and hang-up hook for finger protection and quick safe storage. Die cast zinc body, painted finish.



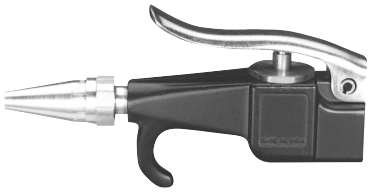
Brass Nozzle Blow Gun

Type	Inlet Port	SCFM Rating*	Part Number
Lever operated	1/4	20	**004750010**
Button operated	1/4	20	**004700010**

* Based on 100 PSIG inlet pressure.

Vortec FLO-GAIN Blow Guns

A quiet Vortec FLO-GAIN nozzle is combined with a high performance blow gun. Compressed air attains sonic velocity through an adjustable slot and attaches to the exterior surface of the cone shaped nozzle. Settings are shown on a micrometer dial. Sound level of 80 dBA with 80 PSIG inlet. Finger guard and hang-up hook offers desirable finger protection and quick secure storage. Die cast zinc body, painted finish.



Vortec FLO-GAIN Blow Gun

Type	Inlet Port	SCFM Rating*	Part Number
Lever operated	1/4	70+	**004750900**
Button operated	1/4	70+	**004700900**

* Based on 100 PSIG inlet pressure.

Self-Regulating Blow Gun

Designed with integral self-regulating pressure reducing valve for automatic shut-off when nozzle is blocked. Prevents air pressure buildup over 30 PSIG in compliance with U.S. Dept. of Labor standards.

Air shield aids in protecting the operator against blow back of flying chips of dirt. Designed to operate at less than 90 dBA to comply with government regulations. Die cast zinc body, painted finish.

Self-Regulating Blow Gun

Type	Inlet Port	SCFM Rating*	Part Number
Lever operated	1/4	10	**004750010**

* Based on 100 PSIG inlet pressure.

Most popular.

Performance Data

Inlet Pressure	Blocked Pressure	Sound Level
70 PSIG	17.0 PSIG	79 dBA
100 PSIG	21.0 PSIG	83 dBA
175 PSIG	28.0 PSIG	87 dBA

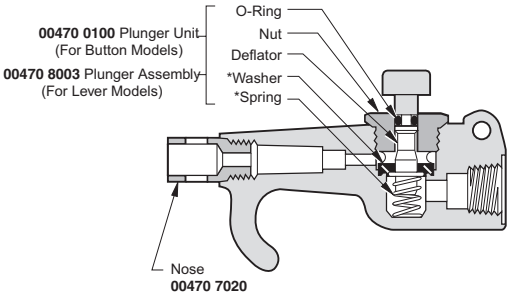
Brass Nozzle

004707020

General purpose nozzles are supplied as standard on 004700010 and 004750010 blow guns. Conform to the requirements of the Williams Steiger Occupational Safety and Health Act of 1970, paragraph 1910.242 when fitted with blow guns pressurized at the inlet to a maximum of 100 PSIG. Conform to O.S.H.A. Directive 100-1.

	Part Number
Brass Nozzle	**004707020**

470 and 475 Series Blow Guns



* Contained in Service Kit No. **00470 0090**

Most popular.

For inventory, lead times, and kit lookup, visit www.pdnplu.com

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, OH
www.parkeroriga.com

Compact Flow Control Valves	**FCC731** Meter Out  Page 197	**FCC731** Meter Out - BSPP  Page 197	**FCCB731** Bi-Directional Flow Control  Page 197	**FCCB731** Bi-Directional Flow Control - BSPP  Page 197	**FCKC731** Knobless Meter Out Flow Control  Page 198
FCKC731 Knobless Flow Control - BSPP  Page 198	**FCKCB731** Knobless Bi-Directional Flow Control - BSPP  Page 198				
Miniature Flow Control Valves	**FCM731** Meter Out Flow Control  Page 199	**FCM731** Flow Control - BSPP  Page 199	**FCMB731** Bi-Directional Flow Control - BSPP  Page 199	**FCMK731** Knobless Mini Meter Out Flow Control  Page 199	
Swivel Outlet Flow Control Valves	**FCCS731** Compact Swivel Outlet Flow Control  Page 200	**FCMS731** Mini Swivel Outlet Flow Control  Page 200	**FCMS731** Miniature Swivel Outlet - BSPP  Page 200	**FCCS731** Compact Swivel Outlet - BSPP  Page 200	
Plug-In Flow Control Valves	**FCMSP731** Mini Flow Control  Page 201	**FCMSP701** Miniature Flow Control  Page 201	**FCCSP731** Compact Flow Control  Page 201		
In-Line Flow Control Valves	**FC832** Flow Control  Page 202	**FCB832** Bi-Directional Flow Control  Page 202	**FCPM832** Panel Mountable Flow Control  Page 203	**FC836** Threaded Flow Control  Page 203	**FC836** Threaded Flow Control - BSPP  Page 203
Compact Metal Flow Control Valves	**FC705** Push-to-Connect Metal Flow Control  Page 204	**FC701** Push-to-Connect Metal Flow Control - BSPP  Page 204	**FC708** Threaded Port Meter Out Flow Control  Page 204	**FC702** Threaded Port Metal Flow Control - BSPP  Page 204	
Flow Control Check Valves	**32PLCK** In-Line Check Valve  Page 205	**W68PLCK** Male Check Valve  Page 205	**W68PLCKI** Male Check Valve Meter In  Page 205	**68PLCK** Male Check Valve Meter Out - BSPP  Page 206	**68PLCKI** Male Check Valve Meter In - BSPP  Page 206

Blocking Flow Control Valves	**FC601** Push-to-Connect Lock Out Valves  Page 207	**FC601** Push-to-Connect Lock-Out Valve - BSPP  Page 207	**FC602** Threaded Port Lock Out Valves  Page 207	**FC608** Threaded Port Lock-Out Valve - BSPP  Page 207	
Threshold Sensor	**PSBJ731** Pneumatic - 5/32 Pilot  Page 208	**PSBJ731** Pneumatic - 4mm Pilot  Page 208	**PSPJ731** Pneumatic - 10-32 Pilot  Page 208	**PSBJ708** Pneumatic - M5 Pilot  Page 208	

Compact Flow Control Valves

Compact flow control regulators ensure excellent performance of flow and are perfectly suited for reduced spaces due to their small size. The sensitivity of the adjustment screw provides very precise air flow control and regulation. A locking nut guarantees stability of adjustment against vibration tampering of the flow setting.

Material Specifications

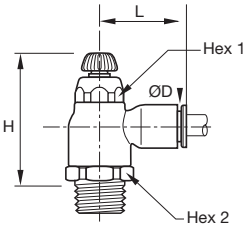
Body (depending upon the model)	Glass reinforced nylon 6.6 Brass
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Base	Nickel-plated brass

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

Applicable Tube

Tube O.D.	1/8, 5/32, 1/4, 3/8
Tube O.D. (mm)	4, 6, 8, 10, 12



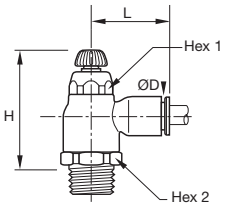
FCC731 Compact Meter Out - NPT

Tube Size (In)	NPT	Hex 1 (In)	Hex 2 (In)	H Open	H Closed	L	Part Number
5/32	1/8	0.63	0.39	1.67	1.44	0.85	**FCC731-5/32-2**
	1/4	0.63	0.39	1.67	1.44	0.85	**FCC731-5/32-4**
1/4	1/8	0.63	0.39	1.67	1.44	0.85	**FCC731-4-2**
	1/4	0.63	0.39	1.67	1.44	0.85	**FCC731-4-4**
3/8	1/4	0.91	0.67	2.03	1.71	1.22	**FCC731-6-4**
	3/8	0.91	0.67	2.03	1.71	1.22	**FCC731-6-6**

FC731 Compact Meter Out - BSPP

Tube Size (mm)	BSPP	Hex 1 (mm)	Hex 2 (mm)	H Open	H Closed	L	Part Number
4	1/8	10	16	38.0	44.0	22.0	**FCC731-4M-2G**
6	1/8	10	16	38.0	44.0	22.0	**FCC731-6M-2G**
	1/4	10	16	36.5	42.5	22.0	**FCC731-6M-4G**
8	1/8	14	19	41.5	48.0	28.0	**FCC731-8M-2G**
	1/4	14	19	41.5	48.0	28.0	**FCC731-8M-4G**
	3/8	14	19	41.5	48.0	28.0	**FCC731-8M-6G**
10	1/4	17	23	45.5	53.5	31.5	**FCC731-10M-4G**
	3/8	17	23	45.5	54.0	31.5	**FCC731-10M-6G**
12	3/8	17	23	45.5	54.0	35.0	**FCC731-12M-6G**
	1/2	17	24	45.5	54.0	35.0	**FCC731-12M-8G**

Most popular.

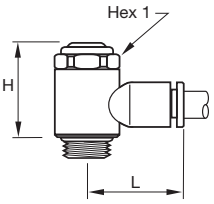


FCCB731 Compact Bi-Directional Flow Control - NPT

Tube Size (In)	NPT	Hex 1 (In)	Hex 2 (In)	H Open	H Closed	L	Part Number
5/32	1/8	0.63	0.39	1.67	1.44	0.85	**FCCB731-5/32-2**
1/4	1/8	0.63	0.39	1.67	1.44	0.85	**FCCB731-4-2**
	1/4	0.63	0.39	1.67	1.44	0.85	**FCCB731-4-4**

FCCB731 Compact Bi-Directional Flow Control - BSPP

Tube Size (mm)	BSPP	Hex 1 (mm)	Hex 2 (mm)	H Open	H Closed	L	Part Number
4	1/8	10	16	38.0	44.0	22.0	**FCCB731-4M-2G**
6	1/8	10	16	38.0	44.0	22.0	**FCCB731-6M-2G**
	1/4	10	16	36.5	42.5	22.0	**FCCB731-6M-4G**
8	1/8	14	19	41.5	48.0	28.0	**FCCB731-8M-2G**
	1/4	14	19	41.5	48.0	28.0	**FCCB731-8M-4G**
	3/8	14	19	41.5	48.0	28.0	**FCCB731-8M-6G**

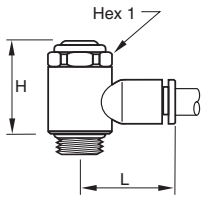


FCKC731 Knobless Meter Out Flow Control - NPT

Tube Size (In)	NPT / UNF	Hex 1 (In)	H	L	Part Number
1/8	10-32	10-32	–	0.69	**FCKC731-2-0**
	1/8	1/8	13	0.79	**FCKC731-2-2**
5/32	10-32	10-32	–	0.69	**FCKC731-5/32-0**
	1/8	1/8	13	0.79	**FCKC731-5/32-2**
1/4	10-32	10-32	–	0.69	**FCKC731-4-0**
	1/8	1/8	13	0.79	**FCKC731-4-2**
	1/4	1/4	17	1.04	**FCKC731-4-4**
5/16	1/8	1/8	13	0.79	**FCKC731-5-2**
	1/4	1/4	17	1.04	**FCKC731-5-4**
3/8	1/4	1/4	17	1.04	**FCKC731-6-4**
	3/8	3/8	20	1.14	**FCKC731-6-6**

FCKC731 Knobless Meter Out Flow Control - BSPP

Tube Size (mm)	BSPP / M5	Hex 1 (mm)	H	L	Part Number
4	M5x0.8	8.0	17.5	17.0	**FCKC731-4M-M5**
	1/8	13.0	25.0	19.0	**FCKC731-4M-2G**
6	M5x0.8	8.0	17.5	19.0	**FCKC731-6M-M5**
	1/8	13.0	25.0	21.0	**FCKC731-6M-2G**
	1/4	17.0	26.5	22.0	**FCKC731-6M-4G**
8	1/8	13.0	25.0	26.0	**FCKC731-8M-2G**
	1/4	17.0	26.5	27.0	**FCKC731-8M-4G**
	3/8	20.0	37.5	29.0	**FCKC731-8M-6G**
10	1/4	17.0	26.5	29.0	**FCKC731-10M-4G**
	3/8	20.0	37.5	31.0	**FCKC731-10M-6G**
	1/2	23.0	43.0	37.0	**FCKC731-10M-8G**
12	3/8	20.0	37.5	6.8	**FCKC731-12M-6G**
	1/2	23.0	43.0	37.0	**FCKC731-12M-8G**



FCKCB731 Knobless Bi-Directional Flow Control - BSPP

Tube Size (In)	BSPP / M5	Hex 1 (In)	H	L	Part Number
4	M5x0.8	8	17.5	17.0	**FCKCB731-4M-M5**
	1/8	13	25.0	19.0	**FCKCB731-4M-2G**
6	M5x0.8	8	17.5	19.0	**FCKCB731-6M-M5**
	1/8	13	25.0	21.0	**FCKCB731-6M-2G**
	1/4	17	26.5	22.0	**FCKCB731-6M-4G**
8	1/8	13	25.0	26.0	**FCKCB731-8M-2G**
	1/4	17	26.5	27.0	**FCKCB731-8M-4G**
	3/8	20	37.5	29.0	**FCKCB731-8M-6G**

Miniature Flow Control Valves

The miniature flow control regulator is especially adapted for all very small sized pneumatic applications (micro-pneumatic in particular). They are specifically designed for use with small bore cylinders (pancake / flat cylinders). Miniature flow control regulators are available in meter out, meter in and Bi-Directional versions.

Material Specifications

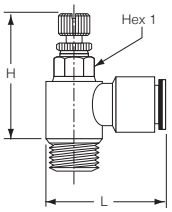
Body (depending upon the model)	Glass reinforced nylon 6.6 Brass
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Base	Nickel-plated brass

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

Applicable Tube

Tube O.D.	1/8, 5/32, 1/4
Tube O.D. (mm)	3, 4, 6, 8



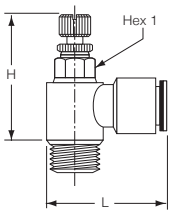
FCM731 Miniature Meter Out Flow Control - NPT

Tube Size (In)	NPT	Hex 1 (mm)	H Open	H Closed	L	Part Number
1/8	10-32	6	1.14	0.91	0.67	**FCM731-2-0**
	1/8	7	1.41	1.26	0.69	**FCM731-2-2**
5/32	10-32	6	1.02	0.93	0.67	**FCM731-5/32-0**
	1/8	7	1.16	1.06	0.71	**FCM731-5/32-2**
1/4	10-32	6	1.02	0.93	0.73	**FCM731-4-0**
	1/8	7	1.16	1.06	0.75	**FCM731-4-2**
	1/4	8	1.28	1.18	0.77	**FCM731-4-4**

FCM731 Miniature Meter Out Flow Control - BSPP

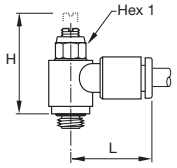
Tube Size (mm)	BSPP	Hex 1 (mm)	H Closed	H Open	L	Part Number
3	M3x0.5	6	23.5	26.0	17.0	**FCM731-3M-M3**
	M5x0.8	6	23.5	26.0	17.0	**FCM731-3M-M5**
4	M3x0.5	6	23.5	26.0	16.5	**FCM731-4M-M3**
	M5x0.8	6	23.5	26.0	17.0	**FCM731-4M-M5**
	1/8	7	27.0	29.5	18.0	**FCM731-4M-2G**
6	M5x0.8	6	23.5	26.0	18.0	**FCM731-6M-M5**
	1/8	7	27.0	29.5	18.5	**FCM731-6M-2G**
	1/4	8	30.0	32.5	19.0	**FCM731-6M-4G**
8	1/8	13	26.5	31.0	26.0	**FCM731-8M-2G**
	1/4	16	29.0	34.0	27.5	**FCM731-8M-4G**
	3/8	20	36.0	42.0	29.0	**FCM731-8M-6G**

Most popular.



FCMB731 Miniature Bi-Directional Flow Control - BSPP

Tube Size (mm)	BSPP	Hex 1	H Open	H Closed	L	Part Number
4	M5x0.8	6	23.5	26.0	16.5	**FCMB731-4M-M5**
	1/8	7	27.0	29.5	17.0	**FCMB731-4M-2G**
6	M5x0.8	6	23.5	26.0	18.0	**FCMB731-6M-M5**
	1/8	7	27.0	29.5	18.0	**FCMB731-6M-2G**
6	1/4	8	30.0	32.5	18.5	**FCMB731-6M-4G**



FCMB731 Miniature Bi-Directional Flow Control - BSPP

Tube Size (in)	NPT	Hex 1 mm	H Open	H Closed	L	Part Number
1/8	10-32	6	0.79	0.65	0.65	**FCMK731-2-0**
	1/8	6	0.85	0.71	0.71	**FCMK731-2-2**
5/32	10-32	6	0.79	0.65	0.65	**FCMK731-5/32-0**
	1/8	6	0.85	0.71	0.71	**FCMK731-5/32-2**
1/4	10-32	6	0.79	0.65	0.65	**FCMK731-4-0**
	1/8	6	0.85	0.71	0.73	**FCMK731-4-2**
	1/4	6	0.97	0.83	0.73	**FCMK731-4-4**

Swivel Outlet Flow Control Valves

Flow control regulators with “swivel outlet” are especially designed to allow a vertical or angled tube exit where access is restricted. The swivel outlet comes with instant push-in connection to ease installation. Flow control regulators with swivel outlet are available in meter out and meter in versions.

Material Specifications

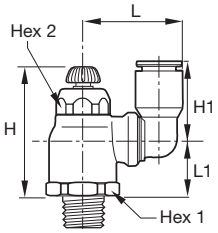
Body	Glass reinforced nylon 6.6
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Base	Nickel-plated brass

Applicable Tube

Tube O.D.	5/32, 1/4, 3/8
Tube O.D. (mm)	4, 6, 8, 10, 12

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

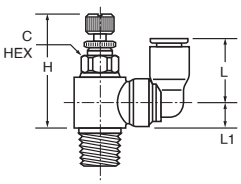


FCCS731 Compact Swivel Outlet Flow Control

Tube Size (In)	NPT	Hex 1 mm	Hex 2 mm	H Closed	H Open	H1	L	L1	Part Number
1/4	1/8	19	10	1.87	2.09	0.63	0.93	0.65	**FCCS731-4-2**
	1/4	19	14	1.79	1.99	0.73	1.00	0.89	**FCCS731-4-4**
3/8	1/4	23	17	1.93	2.20	1.04	1.34	0.97	**FCCS731-6-4**
	3/8	23	17	1.93	2.20	1.04	1.34	0.97	**FCCS731-6-6**

FCCS731 Compact Swivel Outlet - BSPP

Tube Size (In)	BSPP	Hex 1 mm	Hex 2 mm	H Closed	H Open	H1	L	L1	Part Number
6	1/8	16	10	38.0	44.0	16.0	23.5	18.0	**FCCS731-6M-2G**
	1/4	16	10	36.5	42.5	16.0	23.5	16.5	**FCCS731-6M-4G**
8	1/8	19	14	41.5	48.0	23.0	28.0	19.0	**FCCS731-8M-2G**
	1/4	19	14	41.5	48.0	23.0	28.0	19.5	**FCCS731-8M-4G**
	3/8	19	14	41.5	48.0	23.0	28.0	17.5	**FCCS731-8M-6G**
10	1/4	23	17	45.5	53.5	26.5	35.0	21.0	**FCCS731-10M-4G**
	3/8	23	17	45.5	54.0	26.5	35.0	21.5	**FCCS731-10M-6G**
12	3/8	23	17	45.5	54.0	31.0	38.0	21.5	**FCCS731-12M-6G**
	1/2	23	17	45.5	54.0	31.0	38.0	21.0	**FCCS731-12M-8G**



FCMS731 Mini Swivel Outlet Flow Control

Tube Size (In)	NPT	Hex 1 mm	H Closed	H Open	H1	L	L1	Part Number
5/32	10-32	6	0.96	1.08	0.55	0.73	0.26	**FCMS731-5/32-0**
	1/8	8	1.08	1.20	0.55	0.73	0.33	**FCMS731-5/32-2**

FCMS731 Miniature Swivel Outlet - BSPP

Tube Size (In)	BSPP	Hex 1 mm	H Closed	H Open	H1	L	L1	Part Number
4	M5x0.8	6	24.5	27.5	14.5	19.5	6.5	**FCMS731-4M-M5**
	1/8	7	27.5	31.0	14.5	20.0	8.5	**FCMS731-4M-2G**
6	M5x0.8	6	24.5	27.5	16.0	21.5	6.5	**FCMS731-6M-M5**
6	1/8	7	27.5	31.0	16.0	22.0	8.5	**FCMS731-6M-2G**

Plug-In Flow Control Valves

Plug-in flow control regulators can be directly mounted into existing fittings and allow very compact installations. They are particularly suited for mounting in manifolds using cartridges. Their design and function give equal performance to that of flow control regulators with threaded connections.

Material Specifications

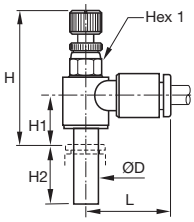
Body	Glass reinforced nylon 6.6
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Tailpiece	Nickel-plated brass

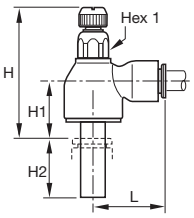
Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

Applicable Tube

Tube O.D.	1/8, 5/32, 1/4
Tube O.D. (mm)	4, 6, 8, 10, 12





FCMSP731 Plug-In Mini Flow Control

Tube Size (In)	Hex 1 mm	H Open	H Closed	H1	H2	L	Part Number
1/8	6	1.04	0.94	0.12	0.59	0.67	**FCMSP731-2**
5/32	6	1.10	1.00	0.37	0.61	0.67	**FCMSP731-5/32**
1/4	7	1.18	1.08	0.12	0.73	0.73	**FCMSP731-4**

FCMSP701 - Plug-In Miniature Flow Control

Tube Size (mm)	Hex 1 mm	H Closed	H Open	H1	H2	L	Part Number
4	6	25.5	28.0	9.5	15.5	17.0	**FCMSP701-4M**
6	7	27.5	29.0	10.5	17.0	18.5	**FCMSP701-6M**

FCCSP731 Plug-In Compact Flow Control

Tube Size (mm)	Hex 1 mm	H Closed	H Open	H1	H2	L	Part Number
6	10	35.0	41.0	14.0	17.0	22.0	**FCCSP731-6M**
8	14	39.5	46.5	16.0	21.5	28.0	**FCCSP731-8M**
10	17	43.5	51.5	17.5	24.5	31.5	**FCCSP731-10M**
12	17	43.0	51.0	17.0	27.0	31.5	**FCCSP731-12M**

In-Line Flow Control Valves

In-line flow controls are unidirectional flow control valves. Intake air flows freely through the flow control; exhaust air is metered out through a specially designed adjustment screw. An arrow on the body of the valve indicates the direction of controlled flow. They can be easily added to existing circuitry. Simply splice it into the cylinder port line.

They can be used individually or they may be stacked together using two joining clips.

Material Specifications

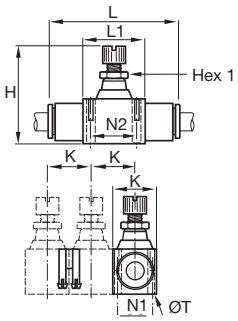
Body	Glass reinforced nylon 6.6
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Tailpiece	Nickel-plated brass

Applicable Tube

Tube O.D.	5/32, 1/4, 5/16, 3/8, 1/2
Tube O.D. (mm)	4, 6, 8, 10, 12

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

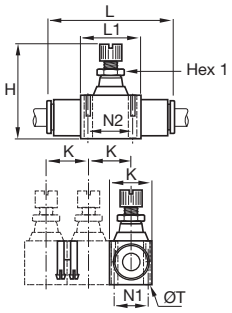


FC832 In-Line Flow Control

Tube Size (In)	Hex 1 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
5/32	5	1.15	1.31	0.47	1.52	0.59	0.31	0.43	0.09	**FC832-5/32**
1/4	8	1.54	1.74	0.66	2.00	0.90	0.43	0.66	0.12	**FC832-4**
5/16	11	1.73	1.97	0.73	2.38	1.02	0.49	0.79	0.13	**FC832-5**
3/8	14	2.03	2.38	0.94	2.87	1.29	0.62	1.01	1.60	**FC832-6**
1/2	14	2.24	2.63	1.09	3.35	1.37	0.78	1.07	0.16	**FC832-8**

FC832 In-Line Flow Control

Tube Size (mm)	Hex 1 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
4	5	29.5	33.5	12.0	39.0	15.0	8.0	11.0	2.2	**FC832-4M**
6	8	39.5	44.5	17.0	54.0	23.0	11.0	17.0	3.2	**FC832-6M**
8	11	44.0	50.0	18.5	60.5	26.0	12.5	20.0	3.2	**FC832-8M**
10	14	52.0	61.0	24.0	76.0	33.0	16.0	26.0	4.2	**FC832-10M**
12	14	57.5	67.5	28.0	86.0	35.0	20.0	27.5	4.2	**FC832-12M**

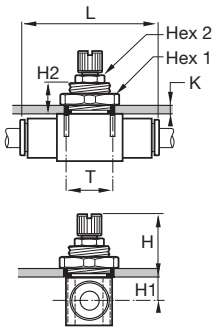


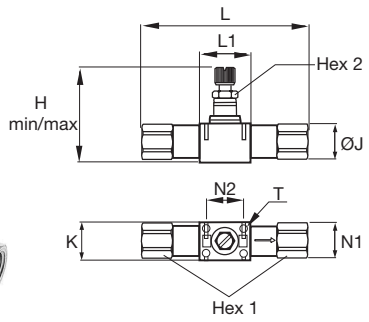
FCB832 In-Line Bi-Directional Flow Control

Tube Size (In)	Hex 1 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
5/32	5	1.15	1.31	0.47	1.52	0.59	0.31	0.43	0.09	**FCB832-5/32**
1/4	8	1.54	1.74	0.66	2.00	0.90	0.43	0.66	0.12	**FCB832-4**
5/16	11	1.73	1.97	0.73	2.38	1.02	0.49	0.79	0.13	**FCB832-5**

FCB832 In-Line Bi-Directional Flow Control

Tube Size (mm)	Hex 1 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
4	5	29.5	33.5	12.0	39.0	15.0	8.0	11.0	2.2	**FCB832-4M**
6	8	39.5	44.5	17.0	54.0	23.0	11.0	17.0	3.2	**FCB832-6M**
8	11	44.0	50.0	18.5	60.5	26.0	12.5	20.0	3.2	**FCB832-8M**





FCPM832 In-Line Panel Mountable Flow Control

Tube Size (mm)	Hex 1 mm	Hex 2 mm	H Closed	H Open	K	L	H1	H2	T	Part Number
4	14		21.5	25.5	6.0	39.0	6.5	11.0	10.5	**FCPM832-4M**
6	19		27.5	32.5	7.0	54.0	7.5	13.5	16.5	**FCPM832-6M**
8	24	11	28.5	34.5	7.0	60.5	9.0	13.5	18.5	**FCPM832-8M**
10	30	14	29.5	38.5	7.0	76.0	11.5	13.5	24.5	**FCPM832-10M**
12	32	14	32.0	42.0	8.0	86.0	12.5	15.5	27.5	**FCPM832-12M**

FC836 Threaded In-Line Flow Control

NPT	Hex 1 mm	Hex 2 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
1/8	13	8.00	1.56	1.75	0.67	2.70	0.91	0.43	0.67	0.12	**FC836-2**
1/4	16	11.00	1.73	1.97	0.73	3.27	1.02	0.49	0.79	0.12	**FC836-4**
3/8	22	14.00	2.05	2.40	0.94	3.82	1.30	0.63	1.02	0.16	**FC836-6**
1/2	24	14.00	2.26	2.66	1.10	4.76	1.38	0.79	1.08	0.16	**FC836-8**

FC836 Threaded In-Line Flow Control - BSPP

BSPP	Hex 1 mm	Hex 2 mm	H Closed	H Open	K	L	L1	N1	N2	T	Part Number
1/8	13	8	39.5	44.5	17.0	68.5	23.1	11.0	17.0	3.2	**FC836-2G**
1/4	16	11	44.0	50.0	18.5	83.0	25.9	12.5	20.0	3.2	**FC836-4G**
3/8	19	14	52.0	61.0	24.0	97.0	33.0	16.0	26.0	4.2	**FC836-6G**
1/2	24	14	57.5	67.5	28.0	121.0	35.0	20.0	27.5	4.2	**FC836-8G**

Compact Metal Flow Control Valves

Metal flow control regulators are suited for use in severe conditions (temperatures, sparks, abrasion, etc). The screw and locking nut have been designed for easy manipulation, by hand. Adjustment can be made with a screwdriver and locking by use of a wrench.

Material Specifications

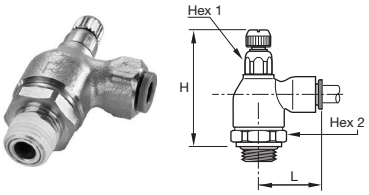
Body	Treated brass
Gripping Ring	Stainless Steel
Adjustment Screws	Nickel-plated brass
Locking Nut	Nickel-plated brass
Tailpiece	Nickel-plated brass

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	30°F to 160°F
Working fluid:	Compressed air

Applicable Tube

Tube O.D.	1/8, 5/32, 1/4, 3/8
Tube O.D. (mm)	4, 6, 8, 10, 12, 14

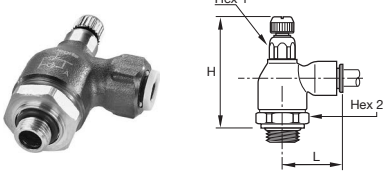


FC705 Push-to-Connect Metal Flow Control

Tube Size (In)	NPT	Hex 1 mm	Hex 2 mm	H Closed	H Open	L	Part Number
3/8	1/4	19	14	1.91	2.11	1.14	**FC705-6-4**
	3/8	25	17	2.15	2.40	1.40	**FC705-6-6**

FC708 Threaded Port Meter Out Flow Control

NPT	Hex 1 mm	Hex 2 mm	H Closed	H Open	L	L1	L2	Part Number
1/8	19	10	1.79	2.01	0.89	0.87	1.14	**FC708-2**
1/4	19	14	1.91	2.11	1.28	0.87	1.28	**FC 7115-11-11**
3/8	25	17	2.15	2.40	1.36	0.91	1.44	**FC708-6**
1/2	25	17	2.15	2.40	1.50	0.91	1.50	**FC7115-18-18**



FC701 Push-to-Connect Metal Flow Control - BSPP

Tube Size (mm)	BSPP	Hex 1 mm	Hex 2 mm	H Closed	H Open	L	Part Number
4	1/8	10	19	47.0	53.0	21.0	**FC701-4M-2G**
6	1/8	10	19	47.0	53.0	24.5	**FC701-6M-2G**
	1/4	10	19	47.5	53.0	24.5	**FC701-6M-4G**
8	1/8	14	19	50.0	55.0	29.0	**FC701-8M-2G**
	1/4	14	19	50.0	56.0	29.0	**FC701-8M-4G**
	3/8	17	25	56.0	62.0	30.5	**FC701-8M-6G**
10	1/4	14	19	50.0	56.0	35.0	**FC701-10M-4G**
	3/8	17	25	56.0	62.0	35.0	**FC701-10M-6G**
12	3/8	17	25	56.0	62.0	38.0	**FC701-12M-6G**
	1/2	17	25	55.0	62.0	38.0	**FC701-12M-8G**
14	1/2	17	25	55.0	62.0	41.0	**FC701-14M-8G**

FC702 Threaded Port Meter Out Flow Control - BSPP

BSPP	Hex 1 mm	Hex 2 mm	H Closed	H Open	L	Part Number
1/8	10	19	47.0	52.5	22.5	**FC702-2G**
1/4	14	19	50.5	55.5	32.0	**FC702-4G**
3/8	17	25	56.0	62.0	34.5	**FC702-6G**
1/2	17	25	55.0	62.0	37.5	**FC702-8G**

Flow Control Check Valves

These in-line check valves allows air to pass in one direction while blocking flow in the other direction. Their extreme compactness and light weight make them suitable as a safety item in compressed air circuits. The body of the fitting contains an arrow to indicate the direction of flow.

Material Specifications

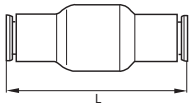
Body	32PLCK: Nylon/nickel plated brass 68PLCK: Nylon body with nickel-plated brass base VC: Acetal
Gripping Ring	Stainless Steel
O-ring	Nitrile (32PLCK & 68PLCK) EPDM (VC)

Applicable Tube

Tube O.D.	PLCK: 5/32, 1/4, 5/16, 3/8 VC: 1/4, 5/16, 3/8
Tube O.D. (mm)	PLCK: 4, 6, 8, 10, 12

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	34°F to 150°F
Cracking pressure:	PLCK: 7 PSI VC: 1/3 PSI
Working fluid:	Compressed air

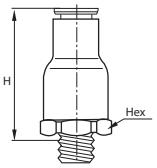


32PLCK In-Line Check Valve - NPT

Tube Size (In)	L	Part Number
3/8	2.50	**32PLCK-6**

32PLCK In-Line Check Valve - BSPP

Tube Size (mm)	L	Part Number
4	38.5	**32PLCK-4M**
6	41.0	**32PLCK-6M**
10	63.5	**32PLCK-10M**
12	66.5	**32PLCK-12M**

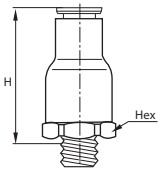


W68PLCK Male Check Valve

Tube Size (In)	NPT/ UNF	Hex mm	H	Part Number
1/4	1/8	19	1.42	**W68PLCK-4-2**
1/4	1/4	19	1.42	**W68PLCK-4-4**
3/8	1/4	23	1.65	**W68PLCK-6-4**
3/8	3/8	23	1.65	**W68PLCK-6-6**

W68PLCKI Male Check Valve Meter In

Tube Size (in)	NPT/ UNF	Hex mm	H	Part Number
1/4	1/8	19	1.42	**W68PLCKI-4-2**
1/4	1/4	19	1.42	**W68PLCKI-4-4**
3/8	1/4	23	1.65	**W68PLCKI-6-4**
3/8	3/8	23	1.65	**W68PLCKI-6-6**



68PLCK Male Check Valve Meter Out - BSPP

Tube Size (mm)	BSPP	Hex 1 mm	H	Part Number
4	M5x0.8	9	32.0	**68PLCK-4M-M5**
4	1/8	16	28.5	**68PLCK-4M-2G**
6	1/8	16	30.5	**68PLCK-6M-2G**
6	1/4	16	30.5	**68PLCK-6M-4G**
8	1/8	19	36.0	**68PLCK-8M-2G**
8	1/4	19	36.0	**68PLCK-8M-4G**

68PLCKI Male Check Valve Meter In - BSPP

Tube Size (mm)	BSPP	Hex 1 mm	H	Part Number
4	M5x0.8	9	32.0	**68PLCKI-4M-M5**
6	1/8	16	30.5	**68PLCKI-6M-2G**
8	1/8	19	36.0	**68PLCKI-8M-2G**
8	1/4	19	36.0	**68PLCKI-8M-4G**
10	3/8	23	42.0	**68PLCKI-10M-6G**
12	3/8	23	42.0	**68PLCKI-12M-6G**
12	1/2	23	44.0	**68PLCKI-12M-8G**

Blocking Flow Control Valves

Blocking valves prevents damage to work and equipment in the event of a loss of pressure. Blocking valves which are mounted in pairs on a cylinder lock the piston by simultaneously cutting off the supply and exhaust. Functional locks are more precise and rapid when blocking valves are located on the cylinder: the volume of air in the pipe work no longer needs to be taken into consideration.

Material Specifications

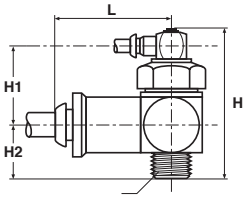
Body	Treated brass
Gripping Ring	Stainless Steel
Seals, Diaphragm	Nitrile

Applicable Tube

Tube O.D.	1/8, 5/32, 1/4, 3/8
Tube O.D. (mm)	4, 6, 8, 10, 12, 14

Operating Information

Pressure range:	15 to 145 PSI
Temperature range:	-4°F to 160°F
Number of cycles:	> 10 million at 68°F and 1 Hz
Leak rate:	< 3.2 CCM
Working fluid:	Compressed air

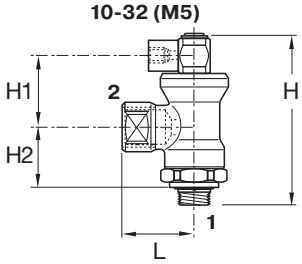


FC601 Push-to-Connect Lockout Valves

Tube Size (In)	NPT	Hex mm	H	H1	H2	L	Part Number
1/4	1/8	21	2.03	1.24	0.79	1.10	**FC601-4-2**
1/4	1/4	21	2.03	1.24	0.79	1.10	**FC601-4-4**
3/8	3/8	24	2.19	1.14	1.04	1.38	**FC601-6-6**
1/2	1/2	24	2.19	1.14	1.04	1.69	**FC601-8-8**

FC601 Push-to-Connect Lockout Valve - BSPP

Tube Size (mm)	BSPP	Hex 1 mm	H	H1	H2	L	Part Number
6	1/8	21	53	24.5	21.0	28.0	**FC601-6M-2G**
6	1/4	21	53	24.5	21.0	28.0	**FC601-6M-4G**
8	1/4	21	53	24.5	21.0	28.0	**FC601-8M-4G**
8	3/8	24	56	25.0	23.0	34.5	**FC601-8M-6G**
10	3/8	24	56	25.0	23.0	35.0	**FC601-10M-6G**
12	1/2	24	56	25.0	23.0	37.5	**FC601-12M-8G**



FC602 Threaded Port Lockout Valves

1 NPT	2 NPT	Hex mm	H	H1	H2	L	Part Number
1/4	1/8	21	2.03	1.24	0.79	1.04	**FC602-2**
1/4	1/4	21	2.03	1.24	0.79	1.04	**FC602-4**
3/8	3/8	24	2.19	1.14	1.04	1.34	**FC602-6**
1/2	1/2	24	2.19	1.14	1.04	1.57	**FC602-8**

FC608 Threaded Port Lockout Valve - BSPP

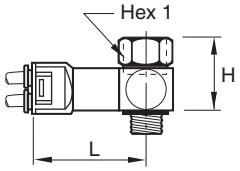
1 BSPP	2 BSPP	Hex 1 mm	H	H1	H2	L	Part Number
1/8	1/4	21	53	24.5	21.0	28.0	**FC608-4G-2G**
1/4	1/4	21	53	24.5	21.0	28.0	**FC608-4G-4G**
3/8	3/8	24	56	25.0	23.0	34.0	**FC608-6G-6G**
1/2	1/2	24	56	25.0	23.0	41.0	**FC608-8G-8G**

Threshold Sensor

The sensor fitting detects the absence of pressure and translates it to a high pressure pneumatic output. When used to monitor the decaying or exhausting side of a pneumatic cylinder's piston, it emits a positive output. When the cylinder comes to the end of its stroke, wherever that may be, the signal emitted from the sensor can then be used to pilot the next step.

Operating Information

	PSBJ, PSPJ	PSPE
Working pressure:	45 to 115 PSI	45 to 115 PSI
Breaking pressure:	8.5 PSI	7 PSI
Working temperature:	5˚F to 140˚F	–
Response time:	3 Ms	–
Current rating:	–	5A / 250VAC 5W / 48VDC
Reset pressure: UL listed component	10 PSI	10 PSI

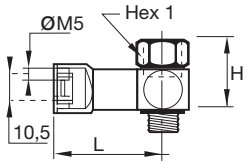


PSBJ731 Pneumatic Threshold Sensor - 5/32 Pilot

NPT / UNF	Hex 1 mm	H	L	Part Number
10-32	5/16	0.62	1.70	**PSBJ731-0**
1/8	9/16	0.90	1.74	**PSBJ731-2**
1/4	5/8	1.09	1.81	**PSBJ731-4**
3/8	7/8	1.13	1.91	**PSBJ731-6**
1/2	1	1.17	2.05	**PSBJ731-8**

PSBJ731 Pneumatic Threshold Sensor - 4mm Pilot

BSPP	Hex 1 mm	H	L	Part Number
M5x0.8	8	16	43.5	**PSBJ731-M5**
1/8	14	23	44.5	**PSBJ731-2G**
1/4	17	28	46.5	**PSBJ731-4G**
3/8	22	29	49.0	**PSBJ731-6G**
1/2	27	30	52.5	**PSBJ731-8G**



PSPJ731 Pneumatic Threshold Sensor - 10-32 Pilot

NPT	Hex 1 mm	H	L	Part Number
1/8	9/16	0.90	1.58	**PSPJ731-2**
1/4	5/8	1.09	1.66	**PSPJ731-4**
3/8	7/8	1.13	1.76	**PSPJ731-6**

PSBJ708 Pneumatic Threshold Sensor - M5 Pilot

BSPP	Hex 1 mm	H	L	Part Number
1/8	14	23	40.5	**PSBJ708-2G**
1/4	17	28	42.5	**PSBJ708-4G**

Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

⚠ WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1. GENERAL INSTRUCTIONS

1.1. Scope: This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.

1.2. Fail-Safe: Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.

1.3. Relevant International Standards: For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See **www.iso.org** for ordering information.

1.4. Distribution: Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.

1.5. User Responsibility: Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
- Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
- Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
- Assuring compliance with all applicable government and industry standards.

1.6. Safety Devices: Safety devices should not be removed, or defeated.

1.7. Warning Labels: Warning labels should not be removed, painted over or otherwise obscured.

1.8. Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to **www.parker.com**, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

2.1. Flow Rate: The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.

2.2. Pressure Rating: Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.

2.3. Temperature Rating: Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.

2.4. Environment: Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.

2.5. Lubrication and Compressor Carryover: Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.

2.6. Polycarbonate Bowls and Sight Glasses: To avoid potential polycarbonate bowl failures:

- Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
- Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, keytones, esters or certain alcohols.
- Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5

2.8. Product Rupture: Product rupture can cause death, serious personal injury, and property damage.
- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
- Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
- Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1. Component Inspection: Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.

3.2. Installation Instructions: Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER,or at **www.parker.com**.

3.3. Air Supply: The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1. Maintenance: Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.9. Failure to follow routine maintenance can lead to a reduction in the expected service life of the product and can result in damage to the system, personal injury and/or property damage.

4.2. Installation and Service Instructions: Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker website at **www.parker.com**.

4.3. Lockout / Tagout Procedures: Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)

4.4. Visual Inspection: Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
- Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation including but not limited to swelling, bulging, creaks or leaks.
- Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
- Any observed improper system or component function: Immediately shut down the system and correct malfunction.
- Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

Caution: Leak detection solutions should be rinsed off after use.

4.5. Routine Maintenance Issues:
- Remove excessive dirt, grime and clutter from work areas.
- Make sure all required guards and shields are in place.

4.6. Functional Test: Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.

4.7. Service or Replacement Intervals: It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Failure to follow routine service can lead to a reduction in the expected service life of the product and can result in damage to the system, personal injury and/or property damage. Service intervals need to be established based on:
- Previous performance experiences.
- Government and / or industrial standards.
- When failures could result in unacceptable down time, equipment damage or personal injury risk.

4.8. Servicing or Replacing of any Worn or Damaged Parts: To avoid unpredictable system behavior that can cause death, personal injury and property damage:
- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
- Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
- Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.

4.9. Putting Serviced System Back into Operation: Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.

PARKER-HANNIFIN CORPORATION
OFFER OF SALE

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer:	means any customer receiving a Quote for Products.
Goods:	means any tangible part, system or component to be supplied by Seller.
Products:	means the Goods, Services and/or Software as described in a Quote.
Quote:	means the offer or proposal made by Seller to Buyer for the supply of Products.
Seller:	means Parker-Hannifin Corporation, including all divisions and businesses thereof.
Services:	means any services to be provided by Seller.
Software:	means any software related to the Goods, whether embedded or separately downloaded.
Terms:	means the terms and conditions of this Offer of Sale.

2. Terms. All sales of Products by Seller are expressly conditioned upon, and will be governed by the acceptance of, these Terms. These Terms are incorporated into any Quote provided by Seller to Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms or conditions of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

3. Price; Payment. The Products set forth in the Quote are offered for sale at the prices indicated in the Quote. Unless otherwise specifically stated in the Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2020). All sales are contingent upon credit approval and full payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

4. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate, and Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repackage any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

5. Warranty. The warranty for the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".**

6. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR**

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ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

8. Confidential Information. Buyer acknowledges and agrees that any technical, commercial, or other confidential information of Seller, including, without limitation, pricing, technical drawings or prints and/or part lists, which has been or will be disclosed, delivered or made available, whether directly or indirectly, to Buyer ("Confidential Information"), has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller.

9. Loss to Buyer's Property. Any tools, patterns, materials, equipment or information furnished by Buyer or which are or become Buyer's property ("Buyer's Property"), will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property. Furthermore, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

10. Special Tooling. "Special Tooling" includes but is not limited to tools, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Goods. Seller may impose a tooling charge for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole discretion at any time.

11. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

12. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

13. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. **Unauthorized Uses**. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tools, equipment, plans, drawings, designs, specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

14. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

15. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

16. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, delays or failures in delivery from carriers or suppliers, shortages of materials, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by force majeure shall be tolled for the duration of such force majeure and rescheduled for mutually agreed dates as soon as practicable after the force majeure condition ceases to exist. Force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or sub-contractors.

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17. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

18. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

19. Ownership of Software. Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

20. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

21. Governing Law. These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

22. Entire Agreement. These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

23. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Laws.

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Parker Hannifin Corporation
Pneumatic Division
135 Quadral Drive
Wadsworth, OH 44281 USA

Tel: 330 336 3511
Fax: 330 334 3335
website www.parkeroriga.com
E-mail: pdncustsvc@parker.com