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Rodless Pneumatic Cylinders Magnetically Coupled

Series P1Z

PDE2522TCUK August 2015



ENGINEERING YOUR SUCCESS.

P1Z Rodless Pneumatic Cylinders Magnetically Coupled



Important

Before attempting any external or internal work on the cylinder or any connected components, make sure the cylinder is vented and disconnect the air supply in order to ensure isolation of the air supply.



Note

All technical data in this catalogue are typical data only. Air quality is essential for maximum cylinder service life (see ISO 8573).



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.

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Contents	Page
Overview	4
Basic Version	5
Features	5
Technical data	6
Materials	6
Loads, forces and moments	7
Cushioning diagram	8
Installation tips for use with external guide	8
Dimensions - Basic version	9
Dimensions - Flange mounting	10
Dimensions - Foot mounting	10
Order instructions	11
Guided Version	12
Features	12
Overview	13
Technical data	14
Materials	14
Loads, forces and moments	15
Permissible axial load, vertical mounting	16
Dimensions - Guided version	17
Dimensions - Elastomeric bumpers	18
Cushioning diagram for elastomeric bumpers	18
Dimensions - Hydraulic shock absorbers	19
Dimensions - Al-profile rail for magnetic switches	19
Order instructions	20
Reed switch and electronic sensors	21
Spare parts	23

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Overview

Basic Version



Hexagonal nuts

(included in scope of delivery)



Flange mounting

Option



Foot mounting

Option



Guided Version



Air connection on both sides

Standard



Air connection at one end

Option



With elastomeric bumpers

Standard



With hydraulic shock absorbers

Option



Profile rail for magnetic switches

Option



Profile rail with magnetic switches

Option



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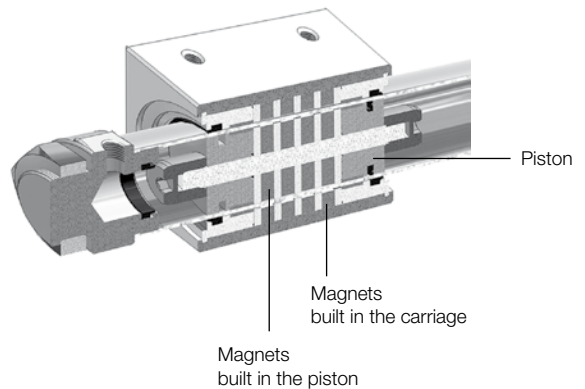
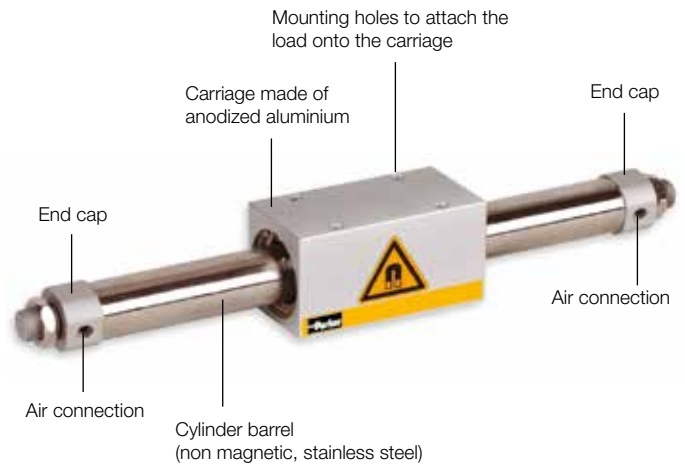
P1Z Series - Basic Version

Ø 16-40 mm

The P1Z is a rodless pneumatic cylinder. The piston and the carriage are equipped with ring magnets. The motion is transmitted via the magnetic force locking between the piston and the carriage.

Features:

- Double acting
- Magnetically coupled without mechanical connection
- Mechanical protection in case of occasional overload due to magnetic uncoupling
- Piston chamber and carriage are pressure tight
- Pressure tight and leak free system
- Dirt and dust cannot enter
- With adjustable pneumatic end cushioning on both sides
- Carriage is free to rotate 360° around the cylinder axis
- Various mounting arrangements



P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Mounting and Technical Data Basic Version

- The loads can be fitted onto the carriage by 4 tapped holes.
- The cylinder is mounted at the end caps with hexagonal nuts, flange or foot mountings.



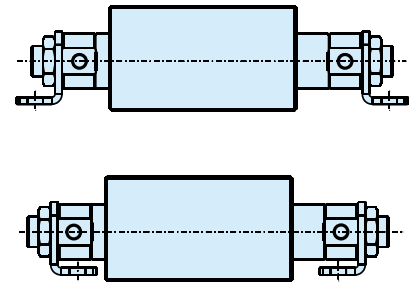
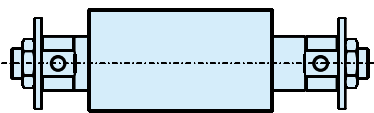
With 2 hexagonal nuts to fix the cylinder (included in scope of delivery)



Flange mounting (pair) option



Foot mounting (pair) option



Technical Data

Piston diameter Ø [mm]	16	20	25	32	40
Max. stroke length [mm]	1000	1500	2000	2000	2000
Stroke tolerance [mm] up to 1000 mm	0/+1.5				
Stroke tolerance [mm] > 1000 mm	0/+2				
Temperature range [°C]	0 to 60				
Operating medium	Filtered compressed air, dry, lubricated or unlubricated * (other media on request)				
Air supply port size	M5	G1/8	G1/8	G1/8	G1/4
Max. magnetic coupling force [N]	157	236	383	703	942
Velocity range [m/s]	0.1 to 1.3				
Min. operating pressure [bar]	1.8				
Max. operating pressure [bar]	6.5	7			
Cushion length [mm]	9	15	15	12	19
Weight [kg]					
at 0 mm stroke	0.28	0.46	0.83	1.35	2.01
per 100 mm stroke	0.043	0.082	0.088	0.14	0.16

Materials

Cylinder barrel	Stainless steel
Carriage	Anodised aluminium
End cap	Anodised aluminium
Seals	NBR

* if external lubrication is added, this must always be continued.

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

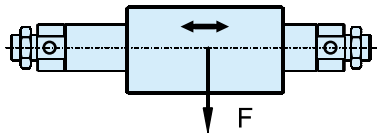
Loads, forces and moments Basic Version

If the operating conditions are outside of the permissible values, either the P1Z guided version or the P1Z in combination with an external guide should be used!

Forces [N]

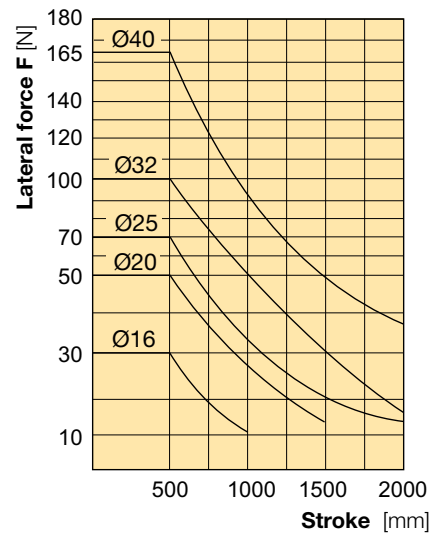
Piston [mm]	16	20	25	32	40
Theoretical force at 6 bar [N]	120	188	295	483	754
Max. magnetic coupling force [N]	157	236	383	703	942

Permissible lateral force, depending on the stroke length

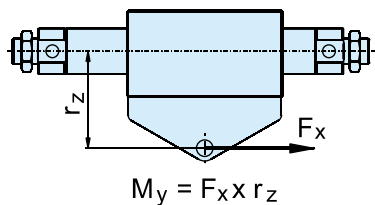


Ø [mm]	Permissible lateral force F [N]
16	30.0
20	50.0
25	70.0
32	100.0
40	165.0

The values are based on velocities $v \leq 0.4 \text{ m/s}$

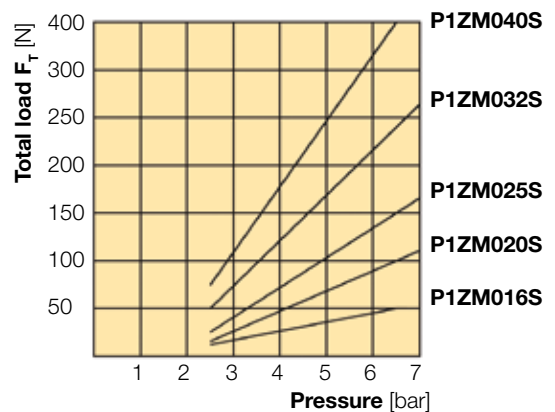
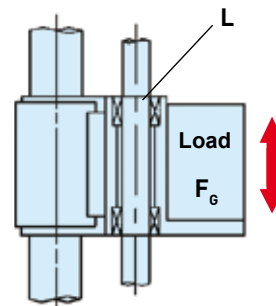


Permissible axial load, horizontal mounting



Ø [mm]	Max. Moment My [Nm]
16	1.2
20	2.5
25	3.8
32	8.5
40	13.0

Permissible axial load, vertical mounting

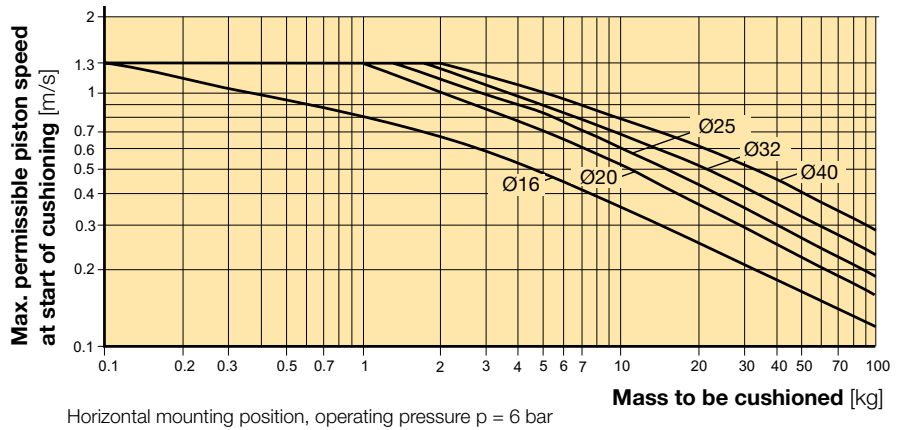


L = Weight of the external carriage
 FG = Load
 Ft = Total load = Load FG + Weight of the external carriage L + Force due to friction

Warning! Dynamic forces must not exceed the maximum magnetic coupling force!

Cushioning diagram

If the permitted limit values are exceeded, additional shock absorbers should be fitted in the area of the centre of gravity.

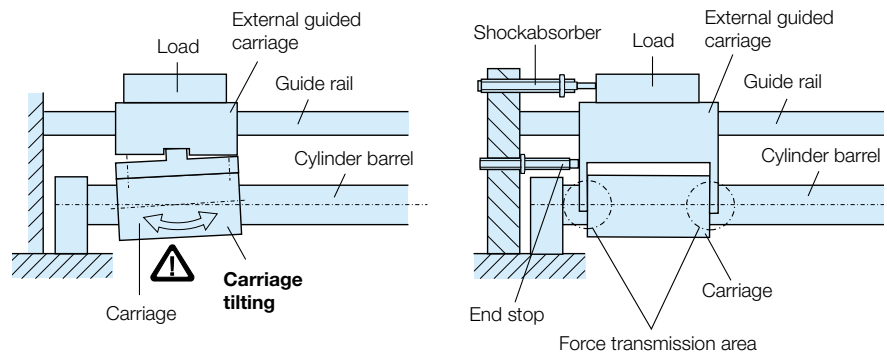


Installation tips for use with external guides

When stopping a load having a large inertia force at the stroke end, tilting of the carriage and damage to the bearings and cylinder barrel may occur (fig. left).

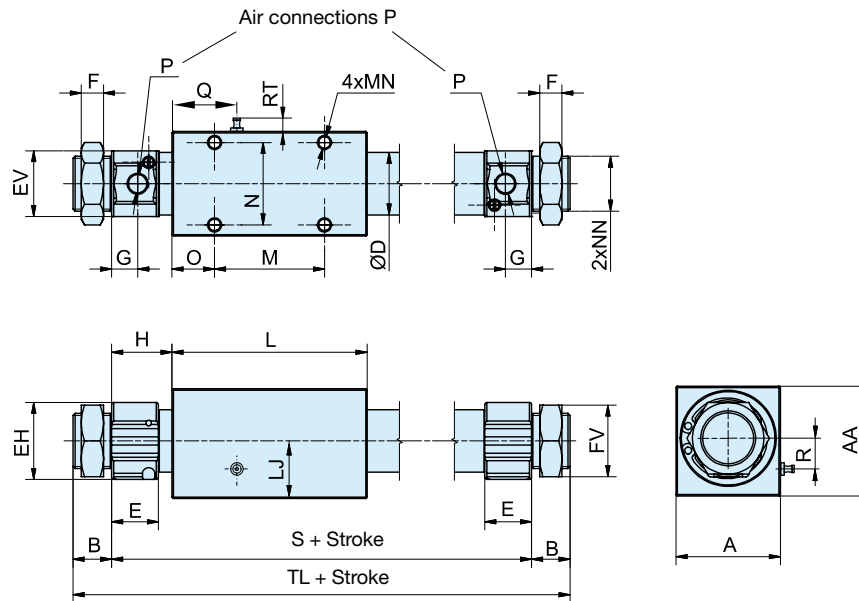
To prevent this, the force transmission should be realized at the middle axis of the cylinder.

The combination of the shock absorber with an end stop, can help to prevent the tilting of the carriage (fig. right).



P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Dimensions - Basic version

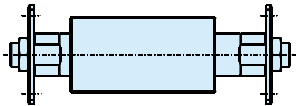
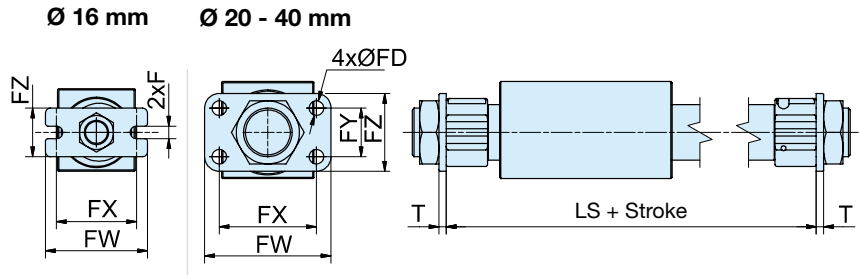


Ø [mm]	A	AA	B	ØD	E	EH	EV	F	FV	G	H	L	LJ	M	MN
16	32	34	10	18	14	18	18	4	14	5.5	18.5	61	16	34	M4 x 0.7 x 6
20	38	40	14	22.8	17	28	24	8	26	9.5	22	71	19	40	M5 x 0.8 x 8
25	48	48	16	27.8	17	34	30	8	32	9.5	22	76	24	50	M5 x 0.8 x 8
32	60	60	16	35	17	40	36	8	32	9.5	23	87	30	50	M6 x 1 x 10
40	70	70	16	43.0	21	48	45	10	41	11	29	92	35	60	M6 x 1 x 10

Ø [mm]	N	NN	O	P	Q	R	RT	S	TL
16	25	M10 x 1	13.5	M5 x 0.8	-	-	-	98	118
20	30	M20 x 1.5	15.5	G 1/8	-	-	-	115	143
25	30	M26 x 1.5	13	G 1/8	21	16	9	120	152
32	40	M26 x 1.5	18.5	G 1/8	-	-	-	133	165
40	40	M32 x 1.5	16	G 1/4	24	21	9	150	182

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

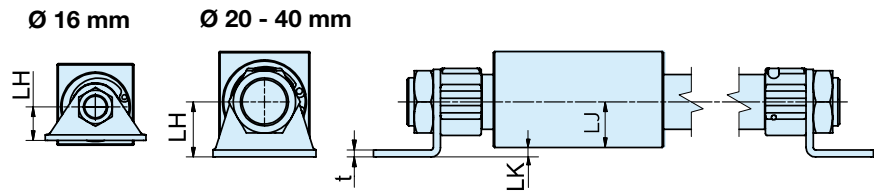
Flange mounting



Ø [mm]	F	Ø FD	FW	FX	FY	FZ	T	LS	Order no.
16	5.2	-	42	33	-	20	2.3	92	PDC15-FH*
20	-	6	52	40	20	32	3	115	PK1A20-FH*
25	-	7	80	64	28	44	5	120	PK1A25-FH*
32	-	7	80	64	28	44	5	133	PK1A25-FH*
40	-	7	80	64	28	44	5	150	PK1A40-FH*

Material: galvanised steel
 * The mountings are supplied in pairs.

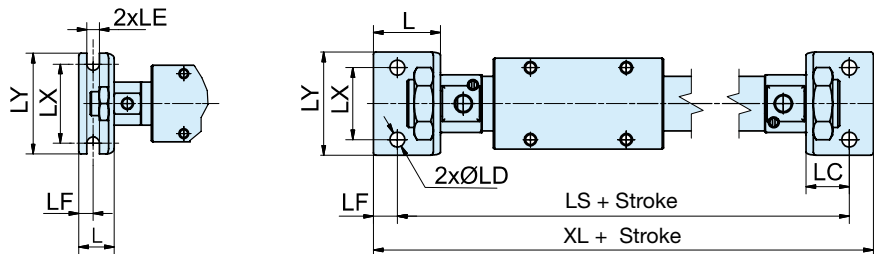
Foot mounting



Foot mounting outside



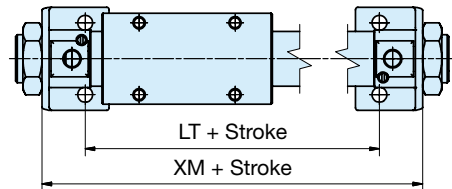
Ø 16 - 40 mm



Foot mounting inside



Only Ø 16 and 20 mm



Material: galvanised steel
 * The mountings are supplied in pairs.

** Inside foot mounting is not possible.

Ø [mm]	t	L	LC	ØLD	LE	LF	LH	LJ	LK	LX	LY	LS	LT	XL	XM	Order no.
16	2.3	14.8	8.8	-	5.2	6	14	16	-2	33	42	109.6	79	121.6	96.6	PDC15-LB*
20	3	28	18	6.2	-	10	23	19	4	30	43	151	85	171	121	PK1A20-LB*
25	3	35	23	7	-	12	30	24	6	46	62	166	**	222	**	PK1A25-LB*
32	3	35	23	7	-	12	30	30	0	46	62	179	**	203	**	PK1A25-LB*
40	3	36	24	7	-	12	30	35	5	46	62	198	**	254	**	PK1A40-LB*

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Order Instructions - Basic Cylinder - Series P1Z

Basic cylinder (15 digits)													With option (18 digits)				
P	1	Z	M	0	1	6	S	A	N	0	8	5	0	W	F	M	N

Piston diameter	
016	Ø 16 mm
020	Ø 20 mm
025	Ø 25 mm
032	Ø 32 mm
040	Ø 40 mm

End of stroke cushioning	
A	Pneumatically adjustable (Ø 16, 20, 25, 32 and 40 mm)

Stroke length	
max. stroke [mm]	Piston Ø [mm]
1000	Ø 16
1500	Ø 20
2000	Ø 25
2000	Ø 32
2000	Ø 40

Options	
B	without
W	with

Mountings	
N	without
F	Foot mounting
L	Flange mounting

Air supply port type	
M	Metric thread (Ø 16 mm)
B	G-thread (Ø 20 - 40 mm)
(Other types on request)	

Order code examples:

- **P1ZM016SAN0100B** Ø 16 mm, stroke 100 mm, supplied with hexagonal nuts on each end cap.
- **P1ZM020SAN1000WFBN** Ø 20 mm, stroke 1000 mm, with foot mounting at both end caps.

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

P1Z Series - Guided Version

Ø 16 - 40 mm

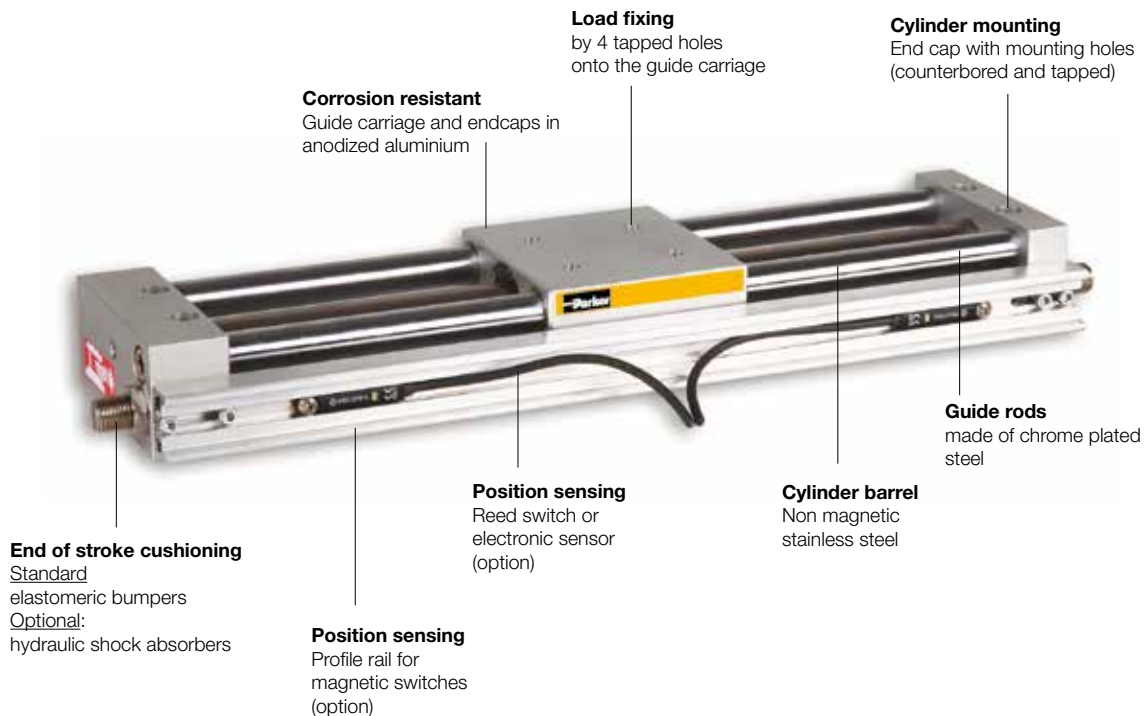
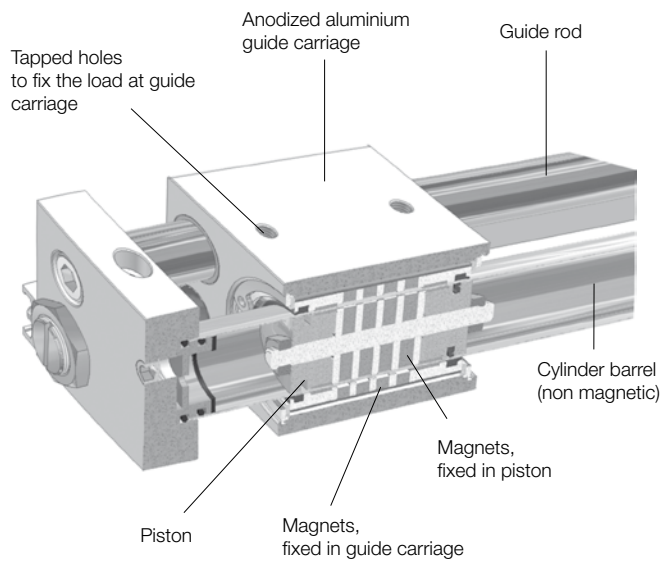
The P1Z is a rodless pneumatic cylinder with guide. The piston and the guide carriage are equipped with ring magnets.

The motion is transmitted via the magnetic force between the piston and the guide carriage.

The guided version consists of a carriage fitted with 4 plain bearings, guided on 2 guide rods. The design provides high rigidity, accurate guidance and a non rotating movement.

Features:

- Double acting with guide
- Magnetically coupled without mechanical connection
- Mechanical protection in case of occasional overload due to magnetic uncoupling
- Piston chamber and Slide are pressure tight
- Pressure tight and leak free system
- Air connection at one end (option)
- End of stroke cushioning: with elastomeric bumpers (standard), with hydraulic shock absorbers (option)
- Position sensing: Al-profile rail for magnetic switches (option). Magnetic switches available as reed switches or as electronic sensors (option).



Guided Version

Ø 16 - 40 mm

Air connection



Guided version P1Z and air connection on both sides (standard)



Guided version P1Z and air connection at one end (option)

End of stroke cushioning

The end of stroke cushioning for light loads is provided by elastomeric bumpers (standard).

For medium and heavy loads hydraulic shock absorbers should be used (option).



Guided version P1Z and elastomeric bumpers (standard)



Guided version P1Z and hydraulic shock absorbers (option)

Position sensing

The guide carriage is fitted with a magnet for position sensing (standard)

An Al-profile rail for magnetic switches is available as an option. The rail is located on the same side as the elastomeric bumpers or the shock absorbers.

Reed switches or electronic sensors in several versions can be moved in the profile rail along the entire stroke length.



Guided version P1Z with magnet in the guide carriage for position sensing (standard).



Guided version P1Z and Al-profile rail for magnetic switches (option).



Guided version P1Z and Al-profile rail with 2 magnetic switches (option).

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Mounting and Technical Data

Guided Version

The loads can be fixed onto the guide carriage by 4 tapped holes.

Cylinder mounting provided with 4 tapped and counterbored holes. Additional mountings are not required.



Technical Data

Piston diameter Ø [mm]	16	20	25	32	40
Max. stroke length [mm]	750	1000	1500	1500	1500
Stroke tolerance [mm] up to 1000 mm	0/+1.5				
Stroke tolerance [mm] > 1000 mm	0/+2				
Temperature range [°C]	0 to 60				
Operating medium	Filtered compressed air, dry, lubricated or unlubricated * (other media on request)				
Air supply port size	M5	G1/8	G1/8	G1/8	G1/4
Max. magnetic coupling force [N]	157	236	383	703	942
Velocity range [m/s]	0.5 to 0.4				
Min. operating pressure [bar]	2.3	2			
Max. operating pressure [bar]	6.5	7			
Weight [kg]					
at 0 mm stroke	0.9	1.52	1.70	3.63	5.44
per 100 mm stroke	0.2	0.33	0.42	0.53	0.86

Materials

Cylinder barrel	Stainless steel
Carriage	Anodised aluminium
End cap	Anodised aluminium
Seals	NBR
Guide rods	Chrome plated steel

* if external lubrication is added, this must always be continued.

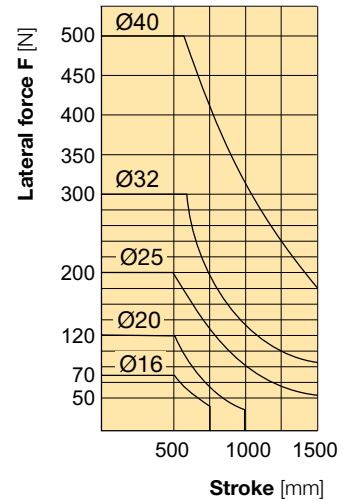
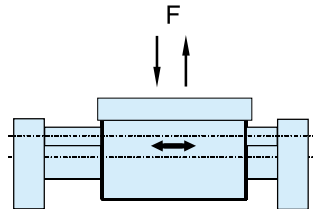
P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Loads, forces and moments Guided Version

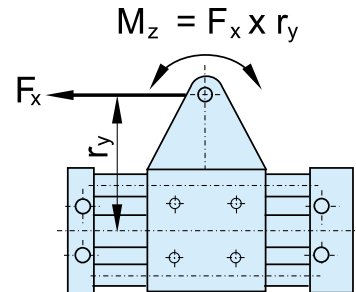
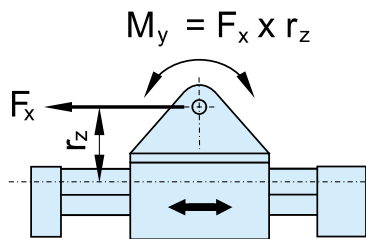
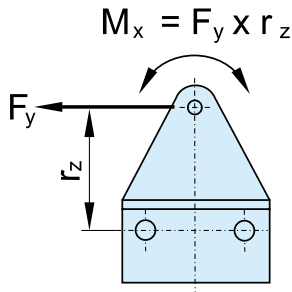
Forces [N]

Piston [mm]	16	20	25	32	40
Theoretical force at 6 bar [N]	120	188	295	483	754
Max. magnetic coupling force [N]	157	236	383	703	942

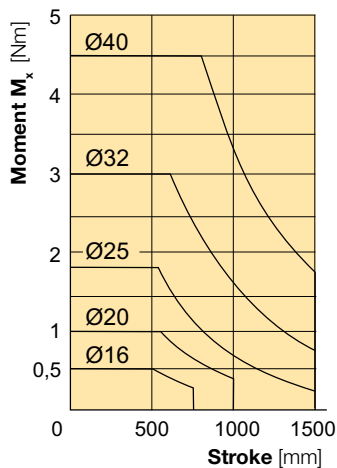
Permissible lateral force, depending on the stroke length



Ø [mm]	Max. Moment M_x [Nm]	Max. Moment M_y [Nm]	Max. Moment M_z [Nm]
16	0.5	2.4	2.4
20	1.0	5.0	5.0
25	1.8	9.5	9.5
32	3.0	15.0	15.0
40	4.5	24.0	24.0



Permissible moment M_x depending on the stroke length

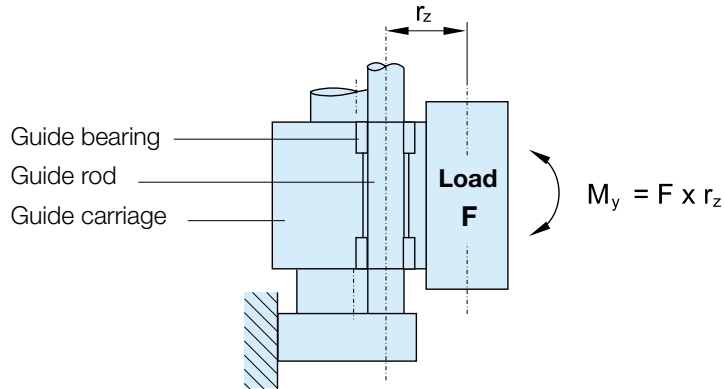


Dynamic forces must not exceed the maximum magnetic coupling force!

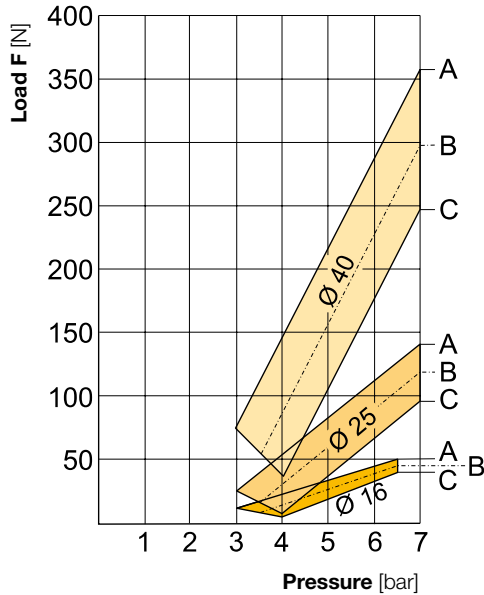
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Permissible axial load, vertical mounting

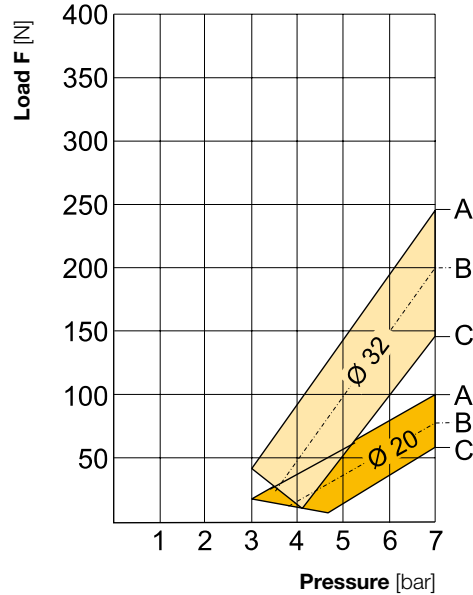
For vertical applications please refer to the values in the diagrams!



Cylinder Ø 16, 25, 40



Cylinder Ø 20, 32



Ø [mm]	Max. Load F [N]	B Max. Moment $M_y / 2$ [Nm]	C Max. Moment M_y [Nm]
16	50.0	1.2	2.4
20	100.0	2.5	5.0
25	140.0	4.75	9.5
32	240.0	7.5	15.0
40	360.0	12.0	24.0

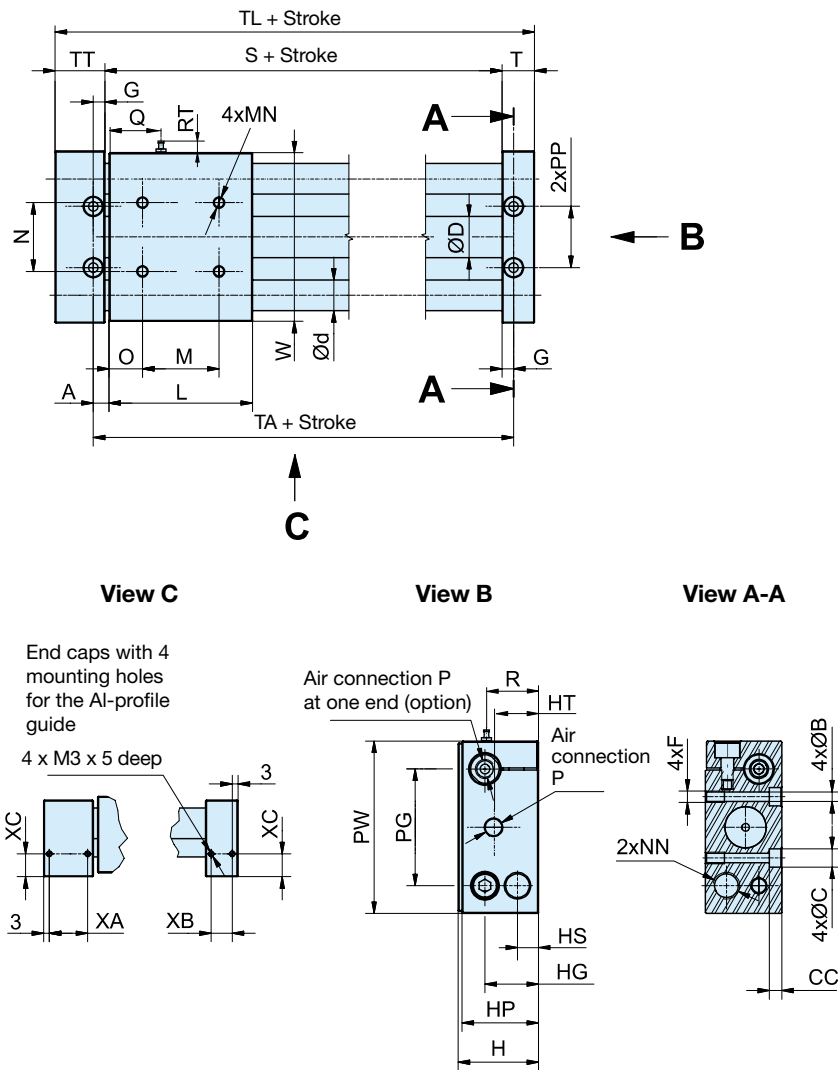
A = curve at moment $M_y = 0$

B = curve at moment $M_y/2 =$ see column B

C = curve at moment $M_{y \max.} =$ see column C

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Dimensions - Guided version

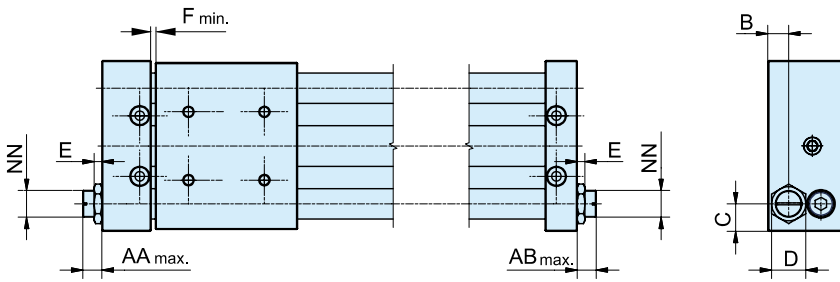


Ø [mm]	A	ØB	ØC	CC	ØD	Ød	F x depth	G	H	HG	HP	HS	HT	L	M	MN x depth
16	8	4.3	8	4.5	17.4	12	M5 x 10	6	34	25	33.5	12	21.5	65	34	M5 x 8
20	8	5.5	9.5	6.5	21.4	16	M6 x 10	6	42	28	40	12	23.5	75	40	M6 x 10
25	10	7	11	6.5	26.4	16	M8 x 10	8	54	32	52	40	24.5	80	40	M8 x 10
32	13.5	8.7	14	8	33.6	20	M10 x 15	10	66	46	64	20	41	91	60	M8 x 12
40	12.5	8.7	14	8	41.6	25	M10 x 15	10.5	76	50	74	56	28	95	65	M8 x 12

Ø [mm]	N	O	P	PG	PP	PW	Q	R	RT	S	T	TA	TL	TT	W	XA	XB	XC
16	30	15.5	M5	50	27	70	-	-	-	69	14	81	106	23	68	17	8	12
20	36	17.5	G1/8	61	32	90	-	-	-	79	17	91	122	26	88	20	11	12
25	70	20	G1/8	70	42	100	23	34	9	84	17	100	127	26	97	20	11	32
32	50	15.5	G1/8	86	50	122	-	-	-	97	20	117	145	28	118	22	14	12
40	105	15	G1/4	104	64	145	25.5	59	9	99	22	120	156	35	142	28	16	42

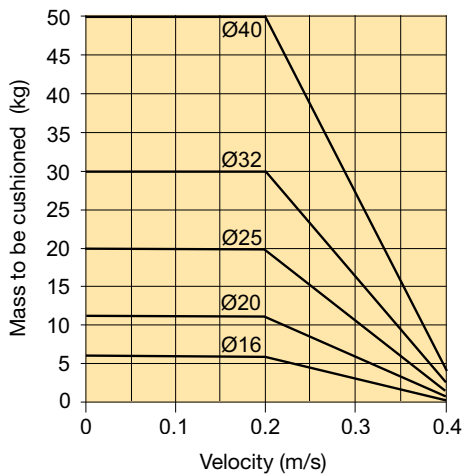
P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Standard: Elastomeric bumpers



Ø [mm]	AA _{max.}	AB _{max.}	B	C	D	E	F _{min.}	NN
16	13	13	12	10	14	4	2	M10X1
20	10	10	11	14.5	17	6	2	M14X1.5
25	11	20	40	15	17	6	2	M14x1.5
32	12	12	20	18	27	6	2,5	M20X1.5
40	11	11	56	20.5	27	6	2	M20x1.5

Cushioning diagram for elastomeric bumpers



The diagram shows the capacities of the P1Z cylinders with elastomeric bumpers.

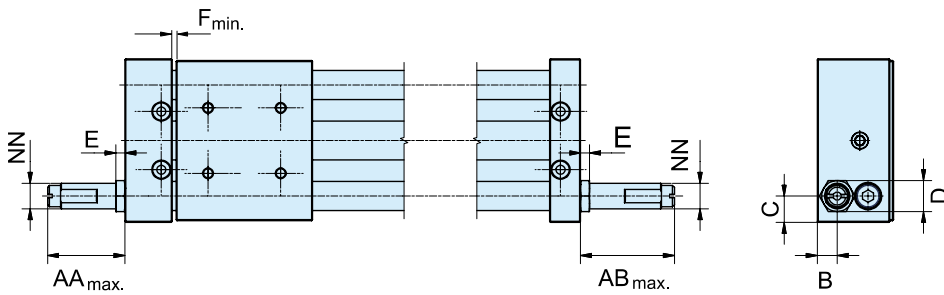
If the intersection between speed and mass is above the curves, it is imperative to use hydraulic shock absorbers to prevent cylinder damage.

Example:

Cylinder Ø 32 mm, at a velocity of 0.3 m/s with a mass of 25 kg choose hydraulic shock absorbers.

Cylinder Ø 20 mm, at a velocity of 0.2 m/s with a mass of 10 kg choose the elastomeric bumpers.

Option: Hydraulic shock absorbers



Ø [mm]	AA _{max.}	AB _{max.}	B	C	D	E	F _{min.}	NN
16	18	27	12	10	12	4	2	M10X1
20	47	56	11	14.5	17	6	2	M14X1.5
25	47	56	40	15	17	6	2	M14x1.5
32	56	66	20	18	23	8	3.5	M20x1.5
40	51	64	56	20.5	23	8	2	M20x1.5

Option: Al-profile rail for magnetic switches

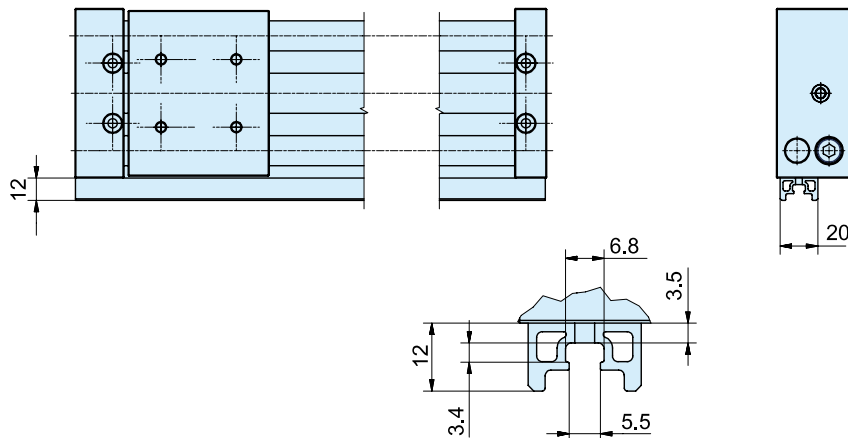
Position sensing

The rail is located on the same side as the end of stroke cushioning elements (Bumpers or shocks).

Reed switches or electronic sensors can be moved in the profile rail along the entire stroke length.



Dimensions (Ø 16 - 40 mm)



P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Order Instructions - Guided version

Basic cylinder (15 digits)												With option (18 digits)					
P	1	Z	M	0	1	6	T	C	N	0	8	5	0	W	N	M	L

Piston diameter	
016	Ø 16 mm
020	Ø 20 mm
025	Ø 25 mm
032	Ø 32 mm
040	Ø 40 mm

Version	
G	Guided version and air connection on both sides
T	Guided version and air connection at one end

End of stroke cushioning	
C	with elastomeric bumpers
H	with two hydraulic shock absorbers

Stroke length	
max. stroke [mm]	piston Ø [mm]
750	Ø 16
1000	Ø 20
1500	Ø 25
1500	Ø 32
1500	Ø 40

Options	
B	without
W	with

Air supply port type	
M	Metric thread (Ø 16 mm)
B	G-thread (Ø 20 - 40 mm)
(Other types on request)	

Position sensing	
N	without
L	Al-profile without magnetic switch
S	2 Reed switches, 0.3 m with M8 connector, snap in
C	2 Reed switches, 3 m flying leads
K	2 Electronic sensors PNP 0.3 m with M8 connector, snap in
H	2 Electronic sensors PNP 3 m flying leads

Order code examples:

- **P1ZM016TCN0100B** Cylinder guided version -Ø 16 mm, stroke 100 mm, with air connection at one end and elastomeric bumpers.

- **P1ZM020GHN1000WNBL** Cylinder guided version -Ø 20 mm, stroke 1000 mm, with air connection on both sides, with two hydraulic shock absorbers and profile rail for magnetic switches.

Reed Switch and Electronic Sensor

Series P8S



Magnetic Switches

Magnet switches are used for the contactless sensing of end or intermediate positions of the carriage.

The new generation of t-slot switches convince with easy mounting avoiding special tools and with a drop in mounting. Due to new electronics the hysteresis is very small and allows a very accurate switching point.

Electronic Sensor

This type of electronic sensor with PNP function provides a short circuit as well as a transient protection as standard. The new state of the art electronics inside can be used for endless lifetime. Especially if the application demand for high switching frequency is required.

Reed Switch

The 2-pole reed switch is a price attractive alternative while offering reliable and proven function for a lot of applications. An integrated LED shows the status of the switch visually.

Carriage speed and switching distance affect signal duration and should be considered in conjunction with the minimum reaction time of ancillary control equipment.

In accordance to this, the contact travel must be included in the calculation.

Technical Data

Magnetic sensor	P8S-GR
Electrical Characteristics	
Switching output / function	Reed / NO
Electric configuration	2-pole
Indicator LED yellow	yes
Operating voltage U_b	10 - 30 AC/DC
Ripple of U_b	$\leq 10\%$
Voltage drop	$\leq 3\text{ V}$
Continuous current	$\leq 100\text{ mA}$
Max. switching capacity	$\leq 6\text{ W}$
Switchable capacity load	100 nF
Switching frequency	$\leq 400\text{ Hz}$
Time delay before availability	1.5 / 0.5 ms
Switch point accuracy	$\leq 0.2\text{ mm}$
Switching distance	ca. 15 mm
Hysteresis	2 mm
EMC to EN 60947-5-2	yes
Lifetime	$\geq 40 \times 10^6$ cycles

Mechanical characteristics

Housing	PA12
Cable type	PUR / black
Cable cross section	2 x 0.14 mm ²
Bending radius fixed installation	$\geq 20\text{ mm}$
Bending radius moving	$\geq 30\text{ mm}$

Shock resistance

Protection EN 60529	68 IP
Ambient temperature range	- 25 °C to + 80 °C
Vibration EN 60068-2-6 (G)	15, 11 ms, 10 up to 55 Hz, 1 mm
Permanent shock EN 60068-2-29 (G)	30, 11 ms, 1000 shocks per axis
Shock EN 60068-2-27	50, 11 ms

Technical Data

Magnetic sensor	P8S-GP
Electrical Characteristics	
Switching output / function	PNP / NO
Electric configuration	3-pole
Indicator LED yellow	yes
Operating voltage U_b	10 - 30 DC
Voltage drop	$\leq 2\text{ V}$
Power consumption unloaded $U_b = 24\text{ V}$	$\leq 10\text{ mA}$
Continuous current	$\leq 200\text{ mA}$
Switching frequency	$\leq 5000\text{ Hz}$
Time delay before availability	0.5 / 25 ms
Switch point accuracy	$\leq 0.2\text{ mm}$
Switching distance	ca. 15 mm
Hysteresis	2 mm
EMC to EN 60947-5-2	yes
Lifetime	unlimited
Short circuit protection	yes
Reverse polarity protection	yes
Power-up pulse Suppression	yes
Protection for inductive load	yes
ATEX certification	yes
Category	3D / 3G

Mechanical characteristics

Housing	PA12
Cable type	PUR / black
Cable cross section	2 x 0.14 mm ²
Bending radius fixed installation	$\geq 20\text{ mm}$
Bending radius moving	$\geq 30\text{ mm}$

Shock resistance

Protection EN 60529	68 IP
Ambient temperature range	- 25 °C to + 80 °C
Vibration EN 60068-2-6 (G)	15, 11 ms, 10 up to 55 Hz, 1 mm
Permanent shock EN 60068-2-29 (G)	30, 11 ms, 1000 shocks per axis
Shock EN 60068-2-27 (G)	50, 11 ms

P1Z Rodless Pneumatic Cylinders Magnetically Coupled

Magnetic Switches

Electric Service Life Protective Measures

The reed switches are sensitive to excessive currents and inductions. With high switching frequencies and inductive loads such as relays, solenoid valves or lifting magnets, service life will be greatly reduced.

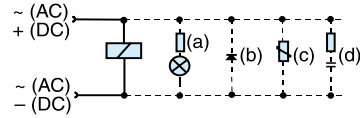
With resistive and capacitive loads with high switch-on current, such as light bulbs, a protective resistor should be fitted. This also applies to long cable lengths and voltages over 100 V.

In the switching of inductive loads such as relays, solenoid valves and lifting magnets, voltage peaks (transients) are generated which must be suppressed by protective diodes, RC loops or varistors.

Connection Examples

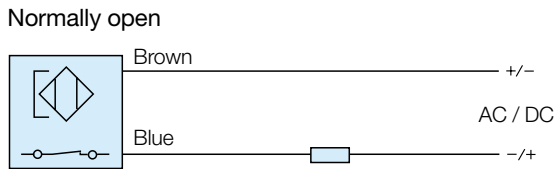
Load with protective circuits

- (a) Protective resistor for light bulb
- (b) Freewheel diode on inductivity
- (c) Varistor on inductivity
- (d) RC element on inductivity

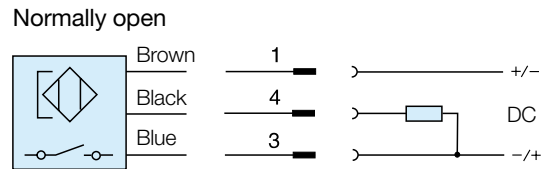


For the type P8S-GP, external protective circuits are not normally needed.

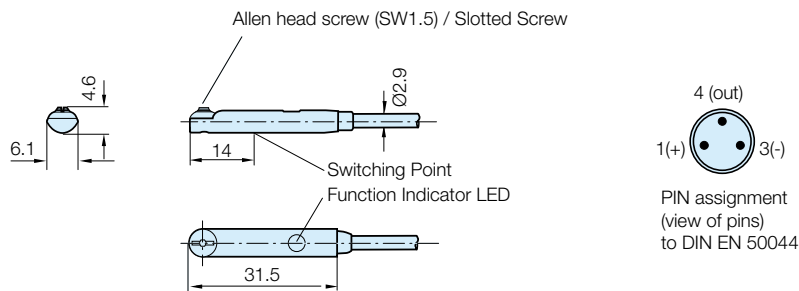
Electrical Connection - Reed Switch



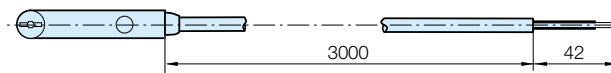
Electrical Connection - Electronic Sensor PNP



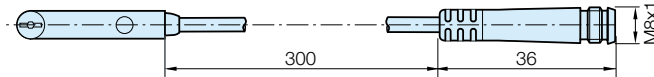
Dimensions (mm)



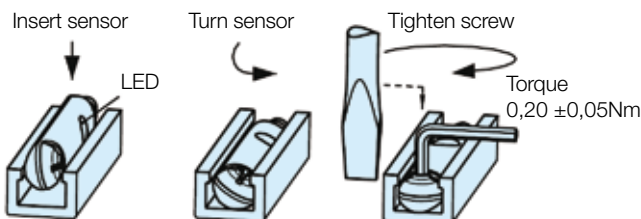
P8S-GRFAX, P8S-GPFAX cable with flying leads



P8S-GRSHX, P8S-GPSHX cable with M8 snap in connector



Sensor Installation



Order number

	M8 Connector, snap in, 3-pole 0.3 m	FL flying leads 3 m
Reed NO (2-wire)	P8S-GRSHX	P8S-GRFAX
PNP NO	P8S-GPSHX	P8S-GPFAX

Spare parts**Elastomeric bumpers**

(2 pieces)



Ø [mm]	Order no.
16	14332
20	14333
25	
32	14334
40	

Screw in one-way flow control valve with exhaust restrictor

(1 piece)



Ø [mm]	Connection	Order no.
16	M5	KT0433
20		
25	G 1/8	KW0520
32		
40	G 1/4	KW0521

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