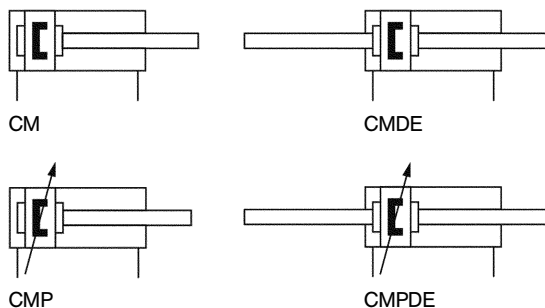
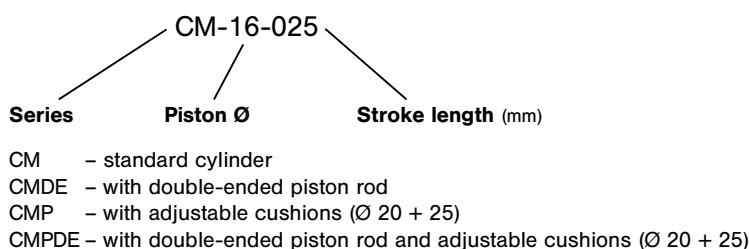


# Pneumatic cylinders series CM

Double acting with permanent magnet, ISO 6432, stainless steel  
M5 and G1/8 • piston Ø 16 to 25 mm



## Order code



## Design and function

Double acting pneumatic cylinder with permanent magnet and built-in cushioning rings.  
Standard stroke lengths in table below, additional lengths on request.

Valves of this series are available in explosion proof design in accordance with 94/9/EG (ATEX). For further details see chapter 13 of this catalogue.

Order number Please complete according to order code.	CM-16-...	CM-20-...	CM-25-...
<b>Piston Ø (mm)</b>	16	20	25
<b>Force at 6 bar in N*</b>	<b>Extension</b>	109	265
	<b>Retraction</b>	90	223
<b>Connection</b>	M5 (10/32 UNF)	G1/8	G1/8
<b>Piston rod thread</b>	M6	M8	M10 x 1.25
<b>Operating pressure</b>	1 ... 10 bar (14.5 ... 145 psi)		
<b>Temperature range</b>	- 30 °C ... + 80 °C (- 22 °F ... + 176 °F)		
<b>Medium</b>	Compressed air in accordance with ISO 8573-1:2001, Class 7 4 – and free of aggressive additives		
<b>Standard stroke lengths (mm)**</b>	10, 25, 40, 50, 80, 100, 125, 160, 200, 250, max. 250	10, 25, 40, 50, 80, 100, 125, 160, 200, 250, 320, 400, 500, max. 600	
<b>Materials***</b>	Cylinder tube: AISI 304 (1.4301) End caps: AISI 304 (1.4301) Piston rod: AISI 316 (1.4401) Seals: PU		

\* The internal friction is considered.

\*\* Refer to "Critical Load Diagram" on page 9.240 to determine critical values on the piston rod.

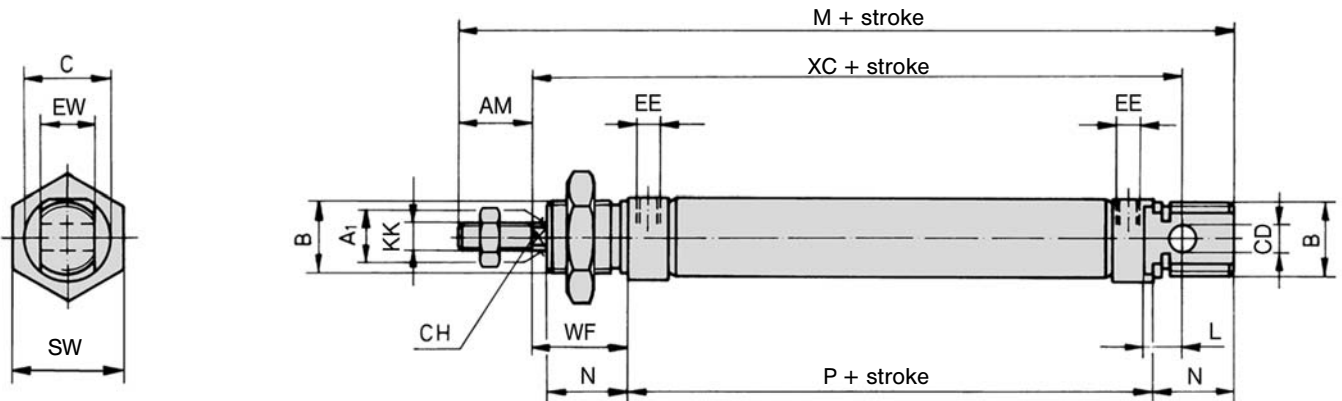
\*\*\* Other materials on request.

## Pneumatic cylinders series CM

Double acting with permanent magnet, ISO 6432, stainless steel  
M5 and G1/8 • piston Ø 16 to 25 mm



### Dimensions for series CM + CMP (Ø 20 + 25)



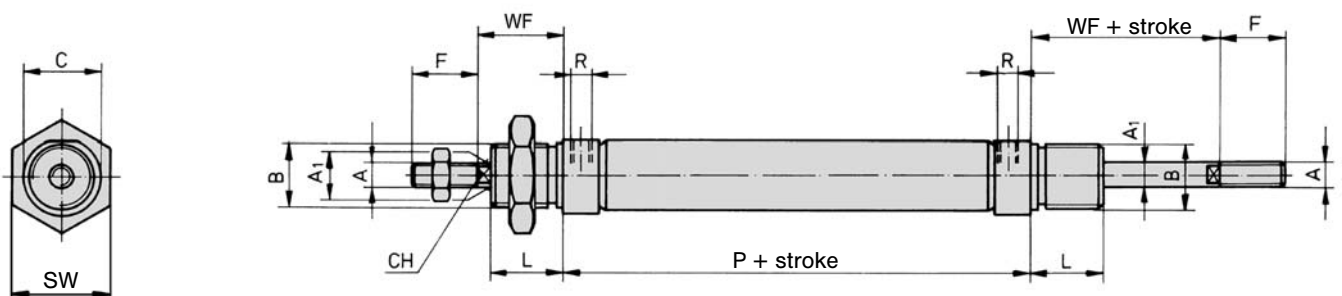
Ø	A <sup>1</sup>	AM	B	C	CD	CH	EE	EW	KK	L	M	N	P	SW	WF	XC
16	6	16	M16 x 1.5	19	6	5	M5	12	M6	9	109	18	53	22	22	82
20	8	20	M22 x 1.5	27	8	7	G1/8	16	M8	12	131	20	67	27	24	95
25	10	22	M22 x 1.5	30	8	9	G1/8	16	M10 x 1.25	12	140	22	68	27	28	104

H 9
d 13

## Pneumatic cylinders series CMDE + CMPDE

Piston Ø 16 – 25 mm  
Double acting with double-ended piston rod  
according to ISO 6432, stainless steel

### Dimensions for series CMDE + CMPDE (Ø 20 + 25)



Ø	A	A <sup>1</sup>	B	C	F	L	P	R	CH	SW	WF
16	M6	6	M16 x 1.5	19	16	18	53	M5	5	22	22
20	M8	8	M22 x 1.5	27	20	20	67	G1/8	7	27	24
25	M10 x 1.25	10	M22 x 1.5	30	22	22	68	G1/8	9	27	28

## Accessories for pneumatic cylinders series CM

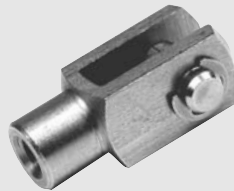
ISO 6432, stainless steel

M5 and G1/8 • piston Ø 16 to 25 mm

### Piston rod accessories



Rod eye  
**PO-...**  
Page 9.213



Rod clevis with pin  
**PD-...**  
Page 9.213



Piston rod nut  
**PL-...**  
Page 9.213

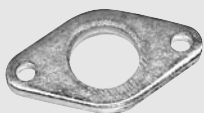
### Mounting accessories



Foot mount  
Ø 16–25  
**PA-...**  
Page 9.173



Clevis mount  
Ø 16–25  
**PC-...**  
Page 9.173



Flange mount  
Ø 16–25  
**PB-...**  
Page 9.173



Mounting nut  
Ø 16–25  
**PM-...**

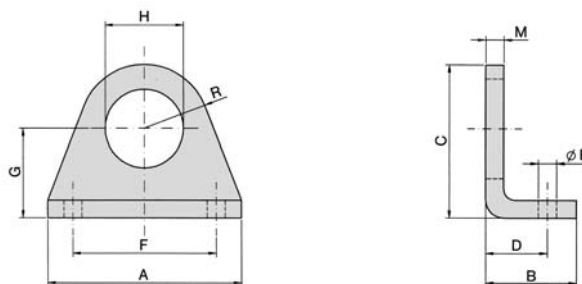
# Accessories for pneumatic cylinders series CM

ISO 6432, stainless steel

M5 and G1/8 • piston Ø 16 to 25 mm



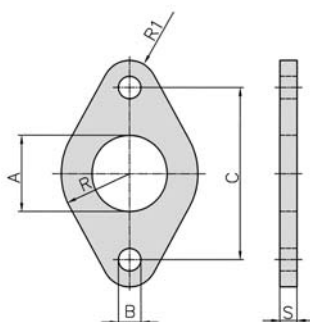
## Foot mount



Material: AISI 304 (1.4301)

Order number	A	B	C	D	E	F	G	H	M	R
PA-16	42	20	33	14	5.5	32	20	16.1	4	13
PA-25	54	25	45	17	6.6	40	25	22.1	5	20

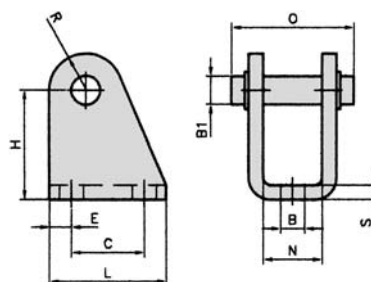
## Flange mount



Material: AISI 304 (1.4301)

Order number	A	B	C	R	R <sub>1</sub>	S
PB-16	16.1	5.5	40	15	6	4
PB-25	22.1	6.6	50	20	8	5

## Clevis mount



Material: AISI 304 (1.4301)

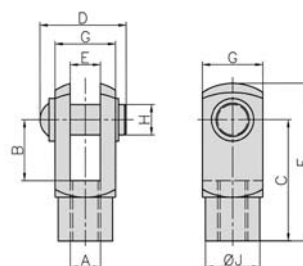
Order number	B	B <sub>1</sub>	C	H	L	N	O	R	S	E
PC-16	5.5	6	15	27	25	12.1	24	7	3	5
PC-25	6.6	8	20	30	32	16.1	30	10	4	6

# Piston rod accessories stainless steel

## Assignment to series

Series	Piston rod thread	Rod clevis	Piston rod nut	Rod eye
CM-16	M6	PD-16	PL-16	PO-16
CM-20	M8	PD-20	PL-20	PO-20
CM-25	M10 x 1.25	PD-25	PL-25	PO-25
CX-32				
CX-40	M12 x 1.25	PD-40	PL-40	PO-40
CX-50	M16 x 1.5	PD-63	PL-63	PO-63
CX-63				
CX-80	M20 x 1.5	PD-80	PL-80	PO-80
CX-100				

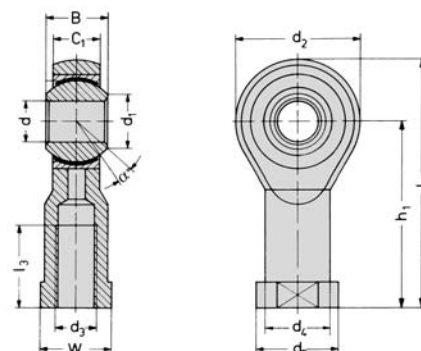
## Rod clevis with pin



Material: stainless steel 1.4305

Order number	A	B	C	D	E	F	G	H	J
PD-16	M6	12	24	17	6	31	12	6	10
PD-20	M8	16	32	20	8	42	16	8	14
PD-25	M10 x 1.25	20	40	25	10	52	20	10	18
PD-40	M12 x 1.25	24	48	30	12	62	24	12	20
PD-63	M16 x 1.5	32	64	39	16	83	32	16	26
PD-80	M20 x 1.5	40	80	48	20	105	40	20	34
			± 0,3					h <sub>11</sub>	

## Rod eye

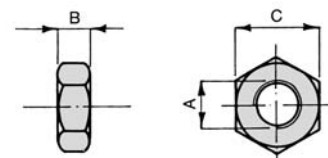


Material Body: stainless steel 1.4057  
 Bearing housing: stainless steel 1.4571 PTFE coated  
 Inner ring: stainless steel 1.4034 hardened

Order number	d <sub>3</sub>	d	d <sub>1</sub>	d <sub>2</sub>	d <sub>4</sub>	d <sub>5</sub>	B	C <sub>1</sub>	W	L <sub>3</sub>	L <sub>4</sub>	h <sub>1</sub>	α
PO-16	M6	6	8.9	20	10	13	9	6.75	11	12	40	30	13
PO-20	M8	8	10.4	24	12.5	16	12	9	13	16	48	36	13
PO-25	M10 x 1.25	10	12.9	28	15	19	14	10.5	17	20	57	43	13
PO-40	M12 x 1.25	12	15.4	32	17.5	22	16	12	19	22	66	50	13
PO-63	M16 x 1.5	16	19.3	42	22	27	21	15	22	28	85	64	15
PO-80	M20 x 1.5	20	24.3	50	27.5	34	25	18	32	33	102	77	15

## Piston rod nut

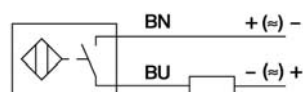
Order number	A	B	C
PL-16	M6	3.2	10
PL-20	M8	4	13
PL-25	M10 x 1.25	5	17
PL-40	M12 x 1.25	6	19
PL-63	M16 x 1.5	8	24
PL-80	M20 x 1.5	10	30



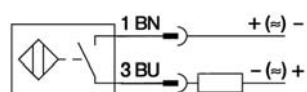
Material: stainless steel 1.4301

## Proximity sensors

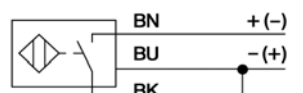
### Wiring diagram



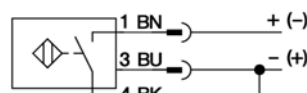
Reed  
**ZS-5600**



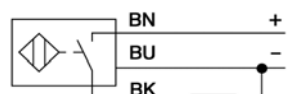
Reed  
**ZS-5601**



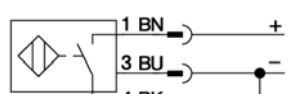
Reed  
**ZS-5700, ZS-5700-10**



Reed  
**ZS-5701**

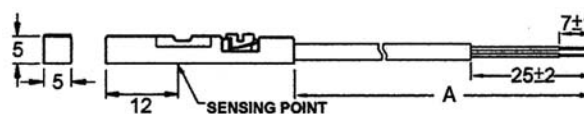


PNP  
**ZS-6700, ZS-7300**



PNP  
**ZS-6701, ZS-7302** (dimensions for ZS-7302, page 9.221)

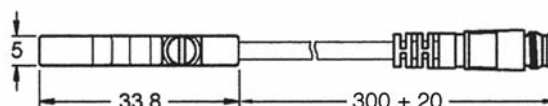
### Dimensions



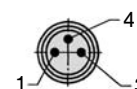
**ZS-5600, ZS-6700, ZS-7300**; A = 3.000 ± 20

**ZS-5700**; A = 5.000 ± 20

**ZS-5700-10**; A = 10.000 ± 20



**ZS-5601, ZS-5701, ZS-6701**



### Function principles

Magnetic field sensors are actuated by magnetic fields and are especially suited for piston position detection in pneumatic cylinders. Based on the fact that magnetic fields can permeate non-magnetizable metals, it is possible to detect a permanent magnet attached to the piston through the aluminum wall of the cylinder.

### Mounting tip

The sensor is firmly fixed in the groove by clockwise rotation of the screw.

### Proximity sensors Reed contact



Order number	ZS-5600	ZS-5601	ZS-5700	ZS-5700-10	ZS-5701
<b>Design</b>	2-pole Reed sensor (non-polarized) normally open		3-pole Reed sensor* normally open		
<b>Cable</b>	ø 2.8, PUR				
<b>Cable cross section</b>	n/a				
<b>Cable length</b>	3 m	0.3 m	5 m	10 m	0.3 m
<b>Cable plug</b>	-	M8	-	-	M8
<b>Overtravel speed</b>	n/a				
<b>Max. absolute hysteresis</b>	n/a				
<b>Temperature drift</b>	n/a				
<b>min. absolute repeat accuracy</b>	n/a				
<b>Operating temperature</b>	- 10 °C ... + 70 °C				
<b>Degree of protection</b>	IP 67				
<b>Housing material</b>	Plastic				
<b>Switching status indication</b>	LED red		LED yellow		
<b>Rated operational voltage</b>	5 ... 240 V AC/DC	5 ... 60 V AC/DC	5 ... 30 V DC		
<b>Rated operational current I<sub>E</sub></b>	3 ... 100 mA		≤ 500 mA		
<b>DC</b>	3 ... 100 mA		≤ 500 mA		
<b>AC</b>	3 ... 100 mA		≤ 500 mA		
<b>Breaking capacity</b>	≤ 10 W				
<b>No-load current</b>	n/a		≤ 10 mA		
<b>Max. OFF-state current</b>	0 mA				
<b>Max. switching frequency</b>	≤ 0.2 kHz				
<b>Rated insulation voltage</b>	n/a				
<b>Short-circuit protection</b>	no				
<b>Max. voltage drop at I<sub>E</sub></b>	≤ 2.5 V		≤ 0.1 V		
<b>Wire breakage</b>	no				
<b>Reverse polarity protection</b>	yes				
<b>Vibration resistance</b>	9 g (1.5 mm, 10 – 55 Hz – 10 Hz)				
<b>Shock resistance</b>	30 g (11 ms)				
<b>Explosion proof</b>	-				

\* Useable as 2-wire contact, voltage 0 ... 30 V AC / 0 ... 30 V DC, LED has no function.

## Proximity sensors

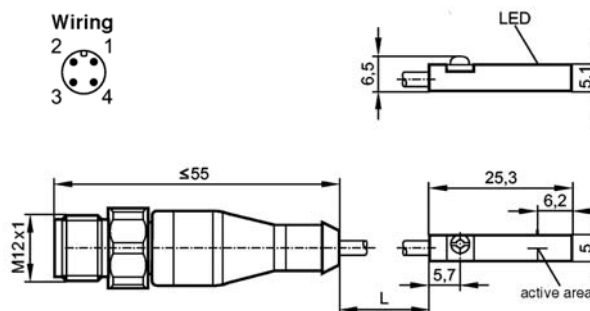
### Mounting bracket for round cylinder Ø 8 – 63 mm



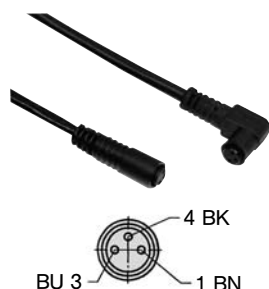
Material: metal,  
plastic PA GI/6T

Order number	Piston Ø
NT-250	8 to 25 mm
NT-500	32 to 63 mm

### Dimensions for ZS-7302



### Connecting cable for ZS-5601, ZS-5701 and ZS-6701



Cable: PUR, black, 3 x 0.25 mm<sup>2</sup>, Ø 3.9, high flexible  
Operating voltage 0 ... 48 V AC/DC

Order number	Length of cable	Connection
KA-30	3 m	8 mm sensor snap-in, straight
KA-50	5 m	8 mm sensor snap-in, straight
KA-51	5 m	8 mm sensor snap-in, 90°
KA-100	10 m	8 mm sensor snap-in, straight
KA-101	10 m	8 mm sensor snap-in, 90°

### Proximity sensors electronic

Order number	ZS-6700	ZS-6701	ZS-7300	ZS-7302
<b>Design</b>	electronic, magnet-induktive sensor, normally open PNP output			
<b>Cable</b>	Ø 2,8, PUR		n/a	
<b>Cable cross section</b>	n/a		3 x 0,14 mm <sup>2</sup>	
<b>Cable lengths</b>	3 m	0,3 m	6 m	0,3 m
<b>Cable plug</b>	-	M8	-	M12
<b>Overtravel speed</b>	n/a		≤ 10 m/s	
<b>Max. absolute hysteresis</b>	n/a		n/a	
<b>Temperatur drift</b>	n/a		≤ 0,1 mm	
<b>Min. absolute repeat accuracy</b>	n/a		≤ 0,2 mm	
<b>Operating temperature</b>	- 10 °C ... + 70 °C		- 25 °C ... + 60 °C	
<b>Degree of protection</b>	IP 67		IP65/IP67	IP 67
<b>Housing material</b>	Plastic		Body: PA; Mounting band: stainless steel	
<b>Switching status indication</b>	LED green		LED yellow	
<b>Rated operational voltage</b>	5 ... 30 V DC		10 ... 30 V DC	
<b>Rated operational current I<sub>E</sub></b>	≤ 200 mA		≤ 100 mA	
<b>DC</b>	-		-	
<b>AC</b>	-		-	
<b>Breaking capacity</b>	6 W		n/a	
<b>No-load current</b>	≤ 10 mA		≤ 10 mA	
<b>Max. OFF-state current</b>	n/a		n/a	
<b>Max. switching frequency</b>	≤ 1 kHz		> 6.000 Hz	> 10.000 Hz
<b>Rated insulation voltage</b>	n/a		n/a	
<b>Short-circuit protection</b>	yes		yes	
<b>Max. voltage drop at I<sub>E</sub></b>	≤ 1,0 V		≤ 2,5 V	
<b>Wire breakage</b>	yes		n/a	
<b>Reverse polarity protection</b>	yes		yes	
<b>Vibration resistance</b>	9 g (1.5 mm, 10 – 55 Hz – 10 Hz)		n/a	
<b>Shock resistance</b>	50 g (11 ms)		n/a	
<b>Explosion proof</b>	-		EX II 3G Ex nA T4 X EX II 3D Ex tD A22 IP67 T125°C X	EX II 3D Ex tc IIIC T125°C Dc X

## Force chart

The chart shows extension and retraction forces for double acting cylinders in N. A correction factor of 0,9 for the internal friction is already calculated. Minor influences based on the cushioning bushings are disregarded.

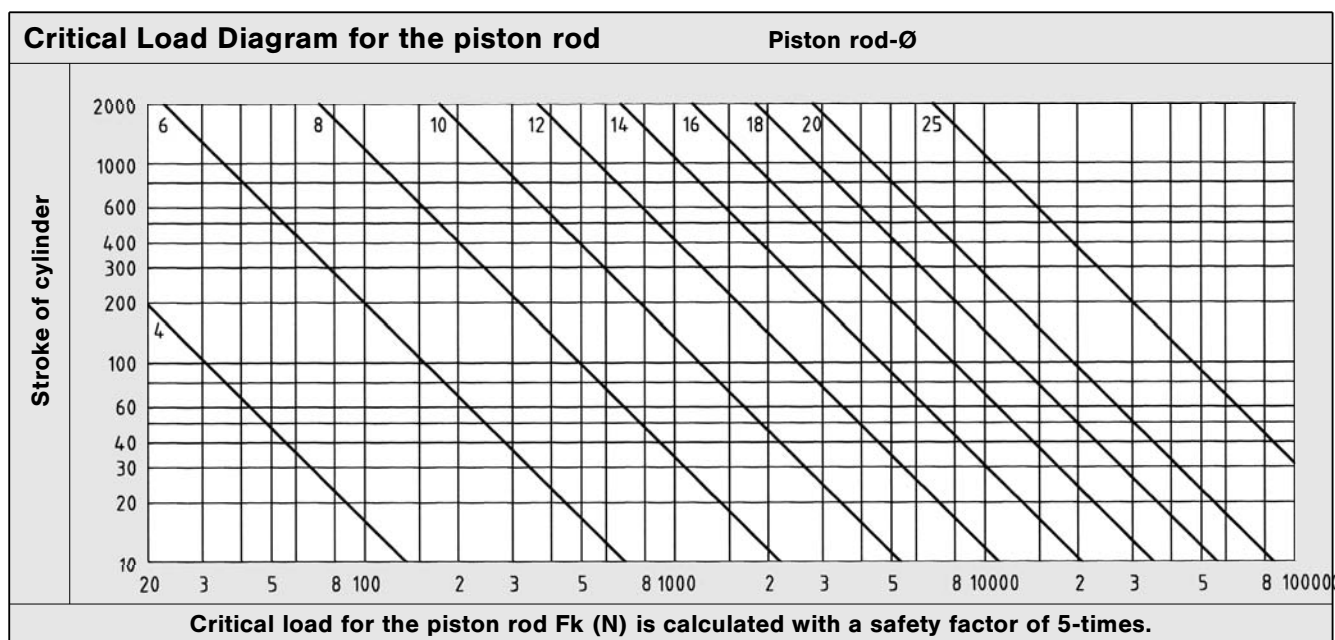
Cylinder Ø	Cylinder series	Rod diameter Ø	Piston area [cm <sup>2</sup> ]	Pressure in bar							
				2	3	4	5	6	7	8	
8	HM	4	Extension force 0,50	9	14	18	23	27	32	36	
			Retraction force 0,38	7	10	14	17	20	24	27	
10	HM	4	Extension force 0,79	14	21	28	35	42	49	57	
			Retraction force 0,66	12	18	24	30	36	42	47	
12	HM	6	Extension force 1,13	20	31	41	51	61	71	81	
			Retraction force 0,85	15	23	31	38	46	53	61	
16	HM, CM	6	Extension force 2,01	36	54	72	90	109	127	145	
			Retraction force 1,73	31	47	62	78	93	109	124	
	NXD	8	Retraction force 1,51	27	41	54	68	81	95	109	
20	HM, CM	8	Extension force 3,14	57	85	113	141	170	198	226	
			Retraction force 2,64	47	71	95	119	142	166	190	
	NXD, NYD, LX	10	Retraction force 2,36	42	64	85	106	127	148	170	
25	HM, NXD, NYD, CM	10	Extension force 4,91	88	132	177	221	265	309	353	
			Retraction force 4,12	74	111	148	185	223	260	297	
	LX	12	Retraction force 3,78	68	102	136	170	204	238	272	
32	XL, NXD, NYD, CX	12	Extension force 8,04	145	217	289	362	434	506	579	
			Retraction force 6,91	124	187	249	311	373	435	497	
	LX	16	Retraction force 6,03	109	163	217	271	326	380	434	
40	NXD, NYD	12	Extension force 12,56	226	339	452	565	678	791	904	
			Retraction force 11,43	206	309	411	514	617	720	823	
	XL, LX, CX	16	Retraction force 10,55	190	285	380	475	570	665	760	
50	NXD, NYD	16	Extension force 19,63	353	530	707	883	1060	1236	1413	
			Retraction force 17,62	317	476	634	793	951	1110	1268	
	XL, LX, CX	20	Retraction force 16,49	297	445	593	742	890	1039	1187	
63	NXD, NYD	16	Extension force 31,16	561	841	1122	1402	1682	1963	2243	
			Retraction force 29,15	525	787	1049	1312	1574	1836	2099	
	XL, LX, CX	20	Retraction force 28,02	504	756	1009	1261	1513	1765	2017	
80	NXD, NYD	20	Extension force 50,24	904	1356	1809	2261	2713	3165	3617	
			Retraction force 47,10	848	1272	1696	2120	2543	2967	3391	
	XL, CX	25	Retraction force 45,33	816	1224	1632	2040	2448	2856	3264	
100	XL, NXD,	25	Extension force 78,50	1413	2120	2826	3533	4239	4946	5652	
	NYD, CX		Retraction force 73,59	1325	1987	2649	3312	3974	4636	5299	
125	XL	32	Extension force 122,66	2208	3312	4416	5520	6623	7727	8831	
			Retraction force 114,62	2063	3095	4126	5158	6189	7221	8252	
160	XG	40	Extension force 200,96	3617	5426	7235	9043	10852	12660	14469	
			Retraction force 188,40	3391	5087	6782	8478	10174	11869	13565	
200	XG	40	Extension force 314,00	5652	8478	11304	14130	16956	19782	22608	
			Retraction force 301,44	5426	8139	10852	13565	16278	18991	21704	
250	XG	50	Extension force 490,63	8831	13247	17663	22078	26494	30909	35325	
			Retraction force 471,00	8478	12717	16956	21195	25434	29673	33912	
320	XG	63	Extension force 803,84	14469	21704	28938	36173	43407	50642	57876	
			Retraction force 772,68	13908	20862	27817	34771	41725	48679	55633	



# Technical charts

This table shows the air consumption for a single stroke of 100 mm. These statements are based upon extension and are in NI.

Piston Ø mm	Air pressure in bar/psi						
	2 (29 psi)	3 (43.4 psi)	4 (58 psi)	5 (72.5 psi)	6 (87 psi)	7 (101.5 psi)	8 (116 psi)
8	0.02	0.02	0.03	0.03	0.04	0.04	0.05
10	0.02	0.03	0.04	0.05	0.05	0.06	0.07
12	0.03	0.05	0.06	0.07	0.08	0.09	0.10
16	0.06	0.08	0.10	0.12	0.14	0.16	0.18
20	0.09	0.13	0.16	0.19	0.22	0.25	0.28
25	0.15	0.20	0.25	0.29	0.34	0.39	0.44
32	0.24	0.32	0.40	0.48	0.56	0.64	0.72
40	0.38	0.50	0.63	0.75	0.88	1.01	1.13
50	0.59	0.79	0.98	1.18	1.37	1.57	1.77
63	0.94	1.25	1.56	1.87	2.18	2.49	2.81
80	1.51	2.01	2.51	3.02	3.52	4.02	4.52
100	2.36	3.14	3.93	4.71	5.50	6.28	7.07



$$F_k = \frac{\pi^2 EI}{L_k^2 S}$$

- $F_k$  = permitted critical force (N)
- $E$  = elasticity module (N/mm<sup>2</sup>)
- $I$  = moment of inertia (mm<sup>4</sup>)
- $L_k$  = effective length of critical load
- $S$  = security

Elastic cases of buckling according to Euler

