

# PNEUMATIC ACTUATORS

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**B**




































Products		Type	Illustration	Series	Page
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Isoclair round cylinders	Ø 8 to 25 mm - ISO 6432/CETOP/AFNOR	C/AS		435	P220-1
	Ø 32 to 63 mm - ISO 6431/CETOP	CIS		438	P225-1
Compact cylinders	Ø 20 to 100 mm - ISO 21287			449	P226-1
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# PNEUMATIC ACTUATORS

## Selection of equipment

standards	model		construction	Ø (mm)		standard stroke		detection	type	illustration	série	page		
	single acting	double acting		min.	max.	min.	max.							
														
														
								Equipped for position detection (1)						
<b>Panel cylinders</b>														
				●					E		429	P210-1		
<b>Isoclair round cylinders</b>														
ISO 6432 CETOP AFNOR NF E 49030					●					C-AS C-A		435	P220-1	
ISO 6431 CETOP					●					CIS		438	P225-1	
<b>Short-stroke cylinders</b>														
					●							441	P215-1	
					●						new	spare parts	441	P215-8
<b>Compact cylinders according to ISO 21287 standard</b>														
					●						ISO 21287 standard	449	P200-8	
ISO 21287					●						new	449	P226-1	
					●						spare parts	449	P226-4	
					●					CSC		CSC	P226B-3	
ISO 15552	Mountings according to ISO15552 standard				●							434 449 493	P226-5	

(1) Magnetic position detectors, see page 5



standards	double acting		model		construction	Ø (mm)	standard stroke		detection	type	illustration	series	page		
	Non-cushioned	Elastic cushioning	Adjust. pneumatic cushioning	Without			guide	min.						max.	min.
	●	●	●	●		6	80		●		selection chart		P259-1		
<b>Rodless cylinders with magnetic couplings</b>															
				●		6	40	50	2000	●	STN		445	P260-3	
					●	6	40	50	1500	●	STG		445	P260-9	
<b>Rodless band cylinders</b>															
				●		16	80	5	6000	●	STBN		448	P267-4	
					●	25	63	100	3800	●	STB		446	P265-2	
					●	16	80	5	5500	●	STB		448	P267-9	
					●	25	50	5	3750	●	STBB		448	P267-19	
											STBN-STB-STBB	Position detectors for cylinder series 448	881	P267-31	
<b>Actuators with linear guides</b>															
				●	●		16	63	10	100	●	CGT		CGT	P272-2
				●	●		16	32	10	160	●	P2L-P2B		447	P275-4
<b>Rotatable cylinders (90°-180°)</b>															
						●	12	20	-	-	● (1)	R (2 positions)		429	P285-1
						●	16	22	-	-	● (1)	RS (2, 3 and 4 positions)		429	P285-3

(1) Magnetic position detectors, see page 5

model		adaptation on cylinder type					illustration	series	page
Reed-switch type - 2 wires	Magneto-resistive - 3 wires (MR)	Isoclair cylinders, types C/AS, CC/AS, CIS, CIB	Profiled barrel with T slots, profiled series 453, compact series 449, short stroke series 441	Tie rods, series 450, type PCN	Profiled barrel with C slots, short stroke series 441	Profiled barrel - dovetail grooves, with linear guides, types P2L, P2B			
<b>Position detectors - for T-slot grooves</b>									
								REED	P291-1
								PNP NPN	P291-3
						integrated	mounting kits	N199	P291-5
<b>Position detectors - for C-slot grooves</b>									
								494	P291-7

### DEFINITION OF THE DIAMETER OF A CYLINDER

#### • THE DYNAMIC EFFORT DEVELOPED BY A CYLINDER

$$F = \text{Pressure} \times \text{piston area} \times \text{efficiency}$$

The efficiency of a cylinder depends on the diameter of the cylinder, on the pressure and on its mechanical construction.

The **graph and chart page 6** show the dynamic effort developed by a cylinder at the piston rod, at various supply pressures.

#### • LOAD FACTOR

This is the relationship expressed as a percentage between the actual load being moved by the cylinder and the dynamic effort available at the end of the piston rod.

$$\text{Load factor (in \%)} = \frac{\text{Actual load}}{\text{Dynamic effort}} \times 100$$

For an optimum installation of a cylinder, we recommend a cylinder with a load factor **inferior to or equal to 75%**.

EXAMPLE: calculate a cylinder to lift a load of 130 daN with a pressure of 7 bar (gauge pressure).

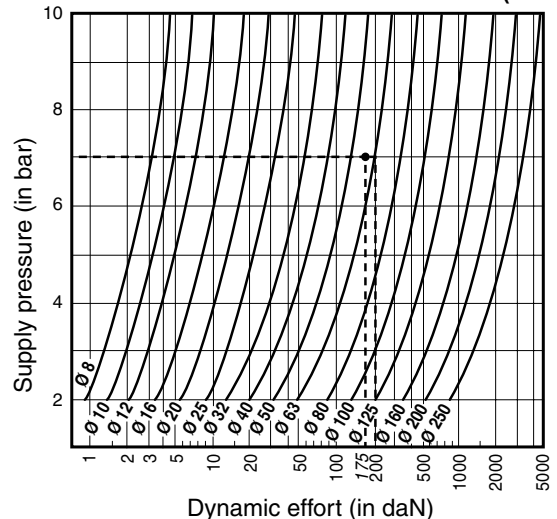
$$\text{Theoretical dynamic effort} = \frac{\text{actual load}}{\text{load factor}} = \frac{130}{0,75} = 175 \text{ daN}$$

The graph below shows the cross over point between the dynamic effort and the supply pressure. The cylinder diameter required will be that where the curve passes this point or the cylinder giving a force immediately above that required.

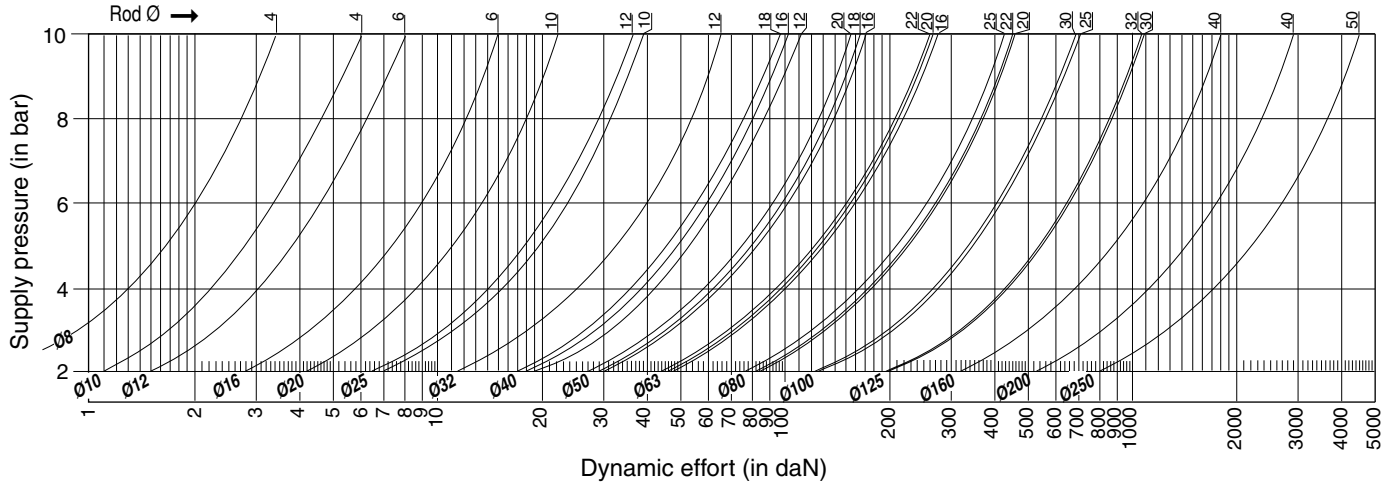
In the example above: 175 daN is between Ø 50 and Ø 63. The cylinder recommended is the Ø 63 mm which will develop a force of 200 daN at 7 bar and the actual load factor is :

$$\frac{130 \text{ daN}}{200 \text{ daN}} \times 100 = 65 \%$$

#### EFFORTS DEVELOPED AT THE END OF THE ROD (ROD OUT)



### EFFORTS DEVELOPED AT THE END OF THE ROD (ROD RETURNED)



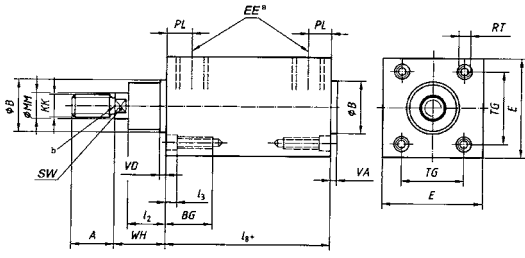
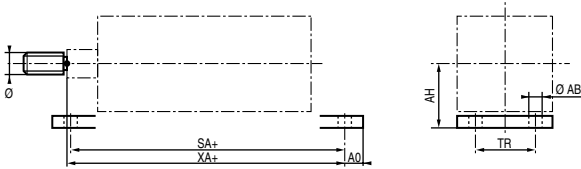
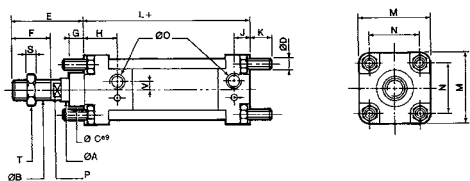
### EFFORTS DEVELOPED BY A CYLINDER (in daN)

Cylinder Ø (mm)	Rod Ø (mm)	Cylinder types						Piston cross-section area (cm <sup>2</sup> )		Dynamic effort developed (in daN) at various supply pressures (in bar)									
		Isoclair		Series 449	Series 450-453	PCN	PIS			2		4		6		8		10	
		C-CC-CIS	CIX					●	○	●	○	●	○	●	○	●	○	●	○
8	4	x						0,5	0,4	1,0	0,5	1,5	1,5	2,5	2,0	3,5	2,5	4,5	3,5
10	4	x						0,8	0,6	1,5	1,0	2,5	2,5	4,0	3,5	5,5	4,5	7,5	6,0
12	6	x	x					1,1	0,8	2,0	1,5	4,0	3,0	6,0	4,5	8,5	6,0	10,5	8,0
16	6	x	x					2,0	1,7	3,5	3,0	7,5	6,0	10,0	9,0	15,0	12,0	19,0	15,0
20	10	x	x	x				3,1	2,3	5,5	4,0	12,0	9,0	16,0	13,5	23,0	18,0	30,0	22,0
25	10	x	x	x				4,9	4,1	8,5	7,0	15,0	15,0	24,0	24,0	38,0	31,0	48,0	39,0
32	12	x	x	x	x			8,0	6,9	13,0	11,5	30,0	25,0	46,0	40,0	62,0	52,0	77,0	66,0
	12			x		x		11,5	11,5	19,0	19,0	42,0	42,0	64,0	64,0	87,0	87,0	111,5	111,5
40	16		x		x			12,6	10,6	21,0	18,0	46,0	39,0	70,0	59,0	95,0	80,0	122,0	102,5
	18	x				x		10,0	10,0	17,0	17,0	36,5	36,5	56,0	56,0	75,5	75,5	97,0	97,0
50	16			x				17,6	17,6	30,0	30,0	64,0	64,0	100,5	100,5	134,0	134,0	170,5	170,5
	18	x				x		19,6	17,0	33,0	29,0	70,0	62,0	110,0	97,0	150,0	130,0	190,0	165,0
63	20		x		x			16,5	16,5	27,0	27,0	58,0	58,0	92,0	92,0	124,0	124,0	155,0	155,0
	16			x				29,1	29,1	47,5	47,5	101,5	101,5	159,5	159,5	218,5	218,5	273,5	273,5
80	20		x		x			31,2	28,1	53,0	46,0	110,0	98,0	170,0	154,0	230,0	211,0	290,0	264,0
	22	x				x		27,4	27,4	44,0	44,0	97,0	97,0	150,0	150,0	200,0	200,0	260,0	260,0
100	20			x				47,2	47,2	82,0	82,0	172,5	172,5	266,0	266,0	365,5	365,5	457,0	457,0
	22				x			50,3	46,5	88,0	81,0	185,0	170,0	285,0	262,0	385,0	360,0	480,0	450,0
125	25		x		x			45,4	45,4	77,0	77,0	163,0	163,0	255,0	255,0	341,0	341,0	427,0	427,0
	25			x	x			78,5	73,6	135,0	126,5	272,0	272,0	412,5	412,5	562,5	562,5	703,0	703,0
160	30					x		71,5	71,5	123,0	123,0	264,0	264,0	440,0	401,0	600,0	546,5	750,0	683,0
	30					x		123,0	115,7	210,0	198,0	433,0	433,0	700,0	658,5	925,0	870,0	1150,0	1082,0
200	32				x			115,0	115,0	196,5	196,5	430,0	430,0	700,0	654,5	925,0	865,0	1150,0	1075,0
	40			x	x			201,0	188,0	350,0	320,0	750,0	700,0	1150,0	1100,0	1550,0	1500,0	1900,0	1800,0
250	40			x	x			314,0	302,0	550,0	530,0	1150,0	1100,0	1800,0	1700,0	2400,0	2300,0	3000,0	2900,0
	50					x		491,0	471,0	825,0	800,0	1800,0	1700,0	2800,0	2750,0	3700,0	3600,0	4800,0	4500,0

● Efforts developed with rod out (bottom side)

○ Efforts developed with rod returned (rod side)

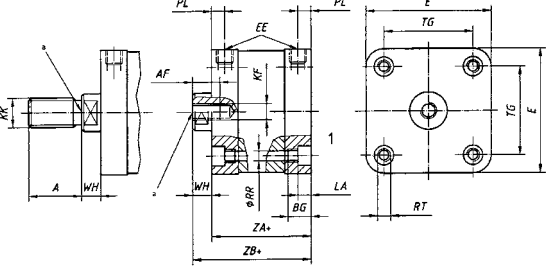
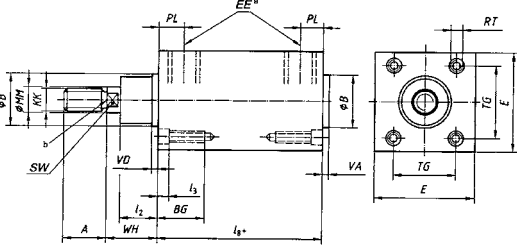
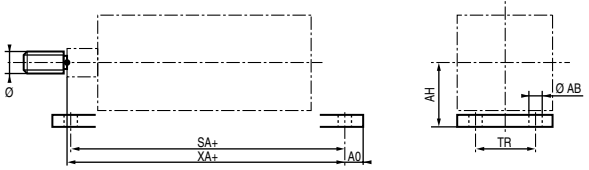
Note : Cylinders with double crossbar develop identical efforts in both working directions. Their values are the ones defined here-above for efforts developed with rod **returned**.

STANDARDS OF CYLINDERS Ø 32 to 320 mm	INTERCHANGEABILITY	
	within the standard	between standards
<p><b>ISO 15552 cylinders</b> (year: 2004)</p> <p>This new international standard <b>cancels and replaces</b> ISO 6431. It defines the outer dimensions of a <b>bare</b> cylinder and equipped with its mountings.</p>  <p><b>Series 450-453</b> cylinder complies with the international standards</p>	<p>Full interchangeability between the manufacturers is achieved at every level:</p> <ul style="list-style-type: none"> <li>• bare cylinder,</li> <li>• each mounting,</li> <li>• complete unit.</li> </ul>	<p>For full interchangeability with ISO 15552, ISO 6431 cylinder must be equipped with its mountings, and reciprocally.</p>
<p><b>AFNOR NF ISO 15552</b> (june 2004) - DIN ISO 15552</p> <p>These standards fully include the international standard ISO 15552. L'AFNOR NF ISO 15552 is completed with a definition of the rod diameters MM and cancels and replaces standard NFE 49003 parts 1 to 3.</p> <p><b>Series 450-453</b> cylinder complies with the international standards</p>		
<p><b>ISO 6431 cylinders</b> (year: 1983)</p> <p>This international standard defined a cylinder unit equipped with its mountings without specifying the bare cylinder alone. It is cancelled and replaced by above standard ISO 15552.</p>  <p><b>Series 450-453</b> cylinder complies with the international standards</p>	<p>Interchangeability between manufacturers is achieved by replacing both the cylinder <b>and</b> its mountings.</p>	
<p><b>AFNOR NFE 49003 - VDMA 24562 cylinders</b> (year: 1992)</p> <p>These standards first define the outer dimensions of a <b>bare</b> cylinder and then its mountings; the cylinder with its mountings installed then corresponds to a <b>cylinder unit according to above standard ISO 6431</b></p>	<p>Full interchangeability between the manufacturers is achieved at every level:</p> <ul style="list-style-type: none"> <li>• bare cylinder,</li> <li>• each mounting,</li> <li>• complete unit.</li> </ul>	<p>A cylinder to AFNOR NFE 49003 - either bare or equipped with its mountings - is interchangeable with a cylinder to AFNOR NF ISO 15552 and vice versa.</p>
<p><b>CNOMO 06.07.02/AFNOR NFE 49001 cylinders</b> (year: 1968)</p> <p>The French standards define first all the external dimensions of a <b>bare</b> cylinder then the mountings</p>  <p><b>Type PCN series 437</b> cylinders complies with the French standards</p>	<p>Full interchangeability between the manufacturers is achieved at every level:</p> <ul style="list-style-type: none"> <li>• bare cylinder,</li> <li>• each mounting,</li> <li>• complete unit.</li> </ul>	<p>No interchangeability can be achieved between CNOMO/NFE 49001 cylinder (bare or equipped) and AFNOR NFE 49003 cylinder or ISO 6431 cylinder, and reciprocally.</p>

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Note : ISO 6432 and AFNOR NFE 49030 standards apply only to mini-cylinders Ø 8 to 25 mm.

STANDARDS OF CYLINDERS	INTERCHANGEABILITY	
	within the standard	between standards
<p><b>ISO 21287</b> Ø 20 to 100 mm</p> <p>This new international standard defines the outer dimensions of a compact <b>bare</b> cylinder and equipped with its mountings. The center-to-center mounting distances of dia. 32 to 100 mm cylinders are identical to those of standard ISO 15552.</p>  <p><i>Series 449 cylinders complies with the international standards</i></p>	<p>Full interchangeability between the manufacturers is achieved at every level:</p> <ul style="list-style-type: none"> <li>• bare cylinder,</li> <li>• each mounting,</li> <li>• complete unit.</li> </ul>	<p>←</p> <p>Dia. 32 to 100 mm cylinders can be equipped with all mountings to ISO 15552.</p> <p>↑</p>
<p><b>ISO 15552</b> Ø 32 to 320 mm</p> <p>This new international standard <b>cancels and replaces</b> ISO 6431. It defines the outer dimensions of a <b>bare</b> cylinder and equipped with its mountings.</p>  <p><i>Series 450-453 cylinder complies with the international standards</i></p>	<p>Full interchangeability between the manufacturers is achieved at every level:</p> <ul style="list-style-type: none"> <li>• bare cylinder,</li> <li>• each mounting,</li> <li>• complete unit.</li> </ul>	<p>←</p> <p>↑</p>
<p><b>AFNOR NF ISO 15552 - DIN ISO 15552</b></p> <p>These standards fully include the international standard ISO 15552. L'AFNOR NF ISO 15552 is completed with a definition of the rod diameters MM and cancels and replaces standard NFE 49003 parts 1 to 3.</p> <p><i>Series 450-453 cylinder complies with the international standards</i></p>		<p>For full interchangeability with ISO 15552, ISO 6431 cylinder must be equipped with its mountings, and reciprocally.</p> <p>↑</p>
<p><b>ISO 6431</b> (de 1983)</p> <p>This international standard defined a cylinder unit equipped with its mountings without specifying the bare cylinder alone. It is cancelled and replaced by above standard ISO 15552.</p>  <p><i>Series 450-453 cylinder complies with the international standards</i></p>	<p>Interchangeability between manufacturers is achieved by replacing both the cylinder <b>and</b> its mountings.</p>	<p>↑</p>

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