



# HYDRAULIC CYLINDERS

TECHNICAL CATALOG



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Via Postale Vecchia, 111  
23857 Valgrehentino (LC)  
Telefono: +39 0341 660290

[www.grices.it](http://www.grices.it) | [info@grices.it](mailto:info@grices.it)

# GRICES

**EST. 1978**

HYDRAULIC CYLINDERS

**Grices** is a family run company founded in 1978 by *Mr. Bruno Cesana*, and is specialized in the production of high quality hydraulic cylinders for industrial and naval applications. As a result of over **35 years experience** in the hydraulic market, Grices has earned an important position in the national and international market granting functionality, safety and reliability to all customers.

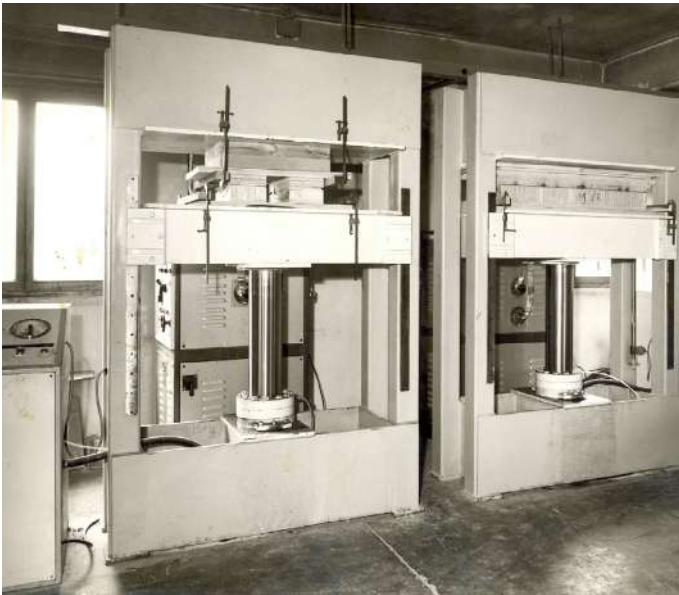
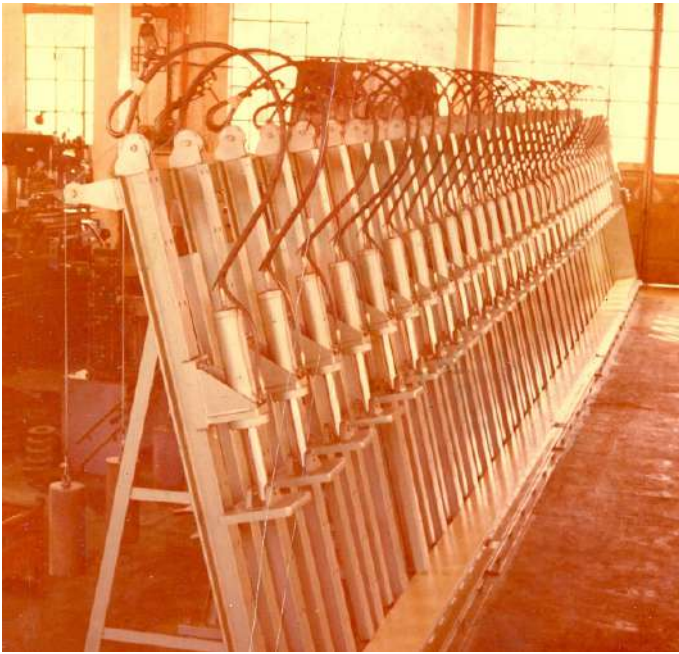
Thanks to the modular design, cutting-edge production machines and productive procedures, we can offer both standard cylinders **ISO/DIN/CNOMO** as well as **customized cylinders** designed by our technical team or from designs provided by the customer.

Grices provides competitive solutions for OEM applications and spare parts for many of the major international producers, granting complete compatibility. The skills and experience of the technical team allows us to closely collaborate with the customer in order to assist in choosing the best technical solutions for the requested application, offering flexibility and competence. Grices pays particular attention to the choice of raw materials, machining and assembly, assuring reliability and durability.

#### **Grices offer:**

- High quality standard and customized cylinders
- **Bore up to 400 mm**, stroke up to **4000 mm**, pressure up to **80MPa**
- A complete range of products
- International distribution
- Online cylinder configurator (EPC)
- Download drawings **CAD 2D and 3D**
- Direct technical support
- Hydraulic test on **100%** of all cylinders produced
- Complete tracking of production and delivery
- Quick delivery
- Competitive prices
- Last generation of machines interconnected by intranet system
- Qualified welders
- Internal production of all components
- Professionalism from beginning to end of the project
- **100% made in Italy**





# EPC ONLINE CONFIGURATOR

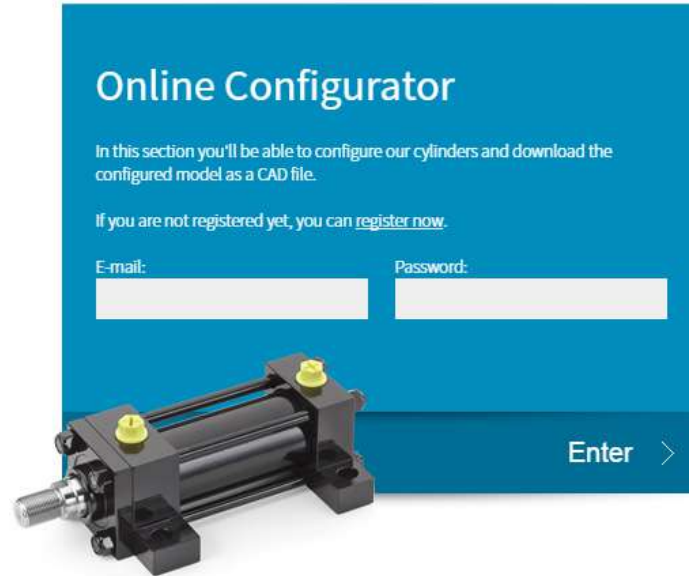
## QUICK AND INTUITIVE

**EPC** allows the configuration of all Grices' series in a quick and intuitive way, guiding you in the choice of all available options.

The **user friendly** interface makes the cylinder's code creation a simple process, and the cylinders' lists feature allows you to easily organize your codes.

With the **EPC** configurator you can download **2D, 3D** and **PDF** drawings (SAT, DWG, DXF formats), request quotes online, monitor the order progress, modify the delivery time and make orders online, receiving extra discounts. Thousands of clients already use this service, which simplify the tasks of both technical and commercial departments.

**Sign up** for our EPC configurator through the dedicated box, or send an e-mail to [sales@grices.it](mailto:sales@grices.it) requesting access.



## MAIN ADVANTAGES

### Shorter commission time

Thanks to the Grices EPC configurator you can create cylinders suited to your needs in a short time.

### Intuitive interface

The user-friendly EPC interface allows you to create your cylinders following a simple guided path.

### Offer requests

Once your list creation process has ended, you can request an offer directly online that will be sent to you from our server.

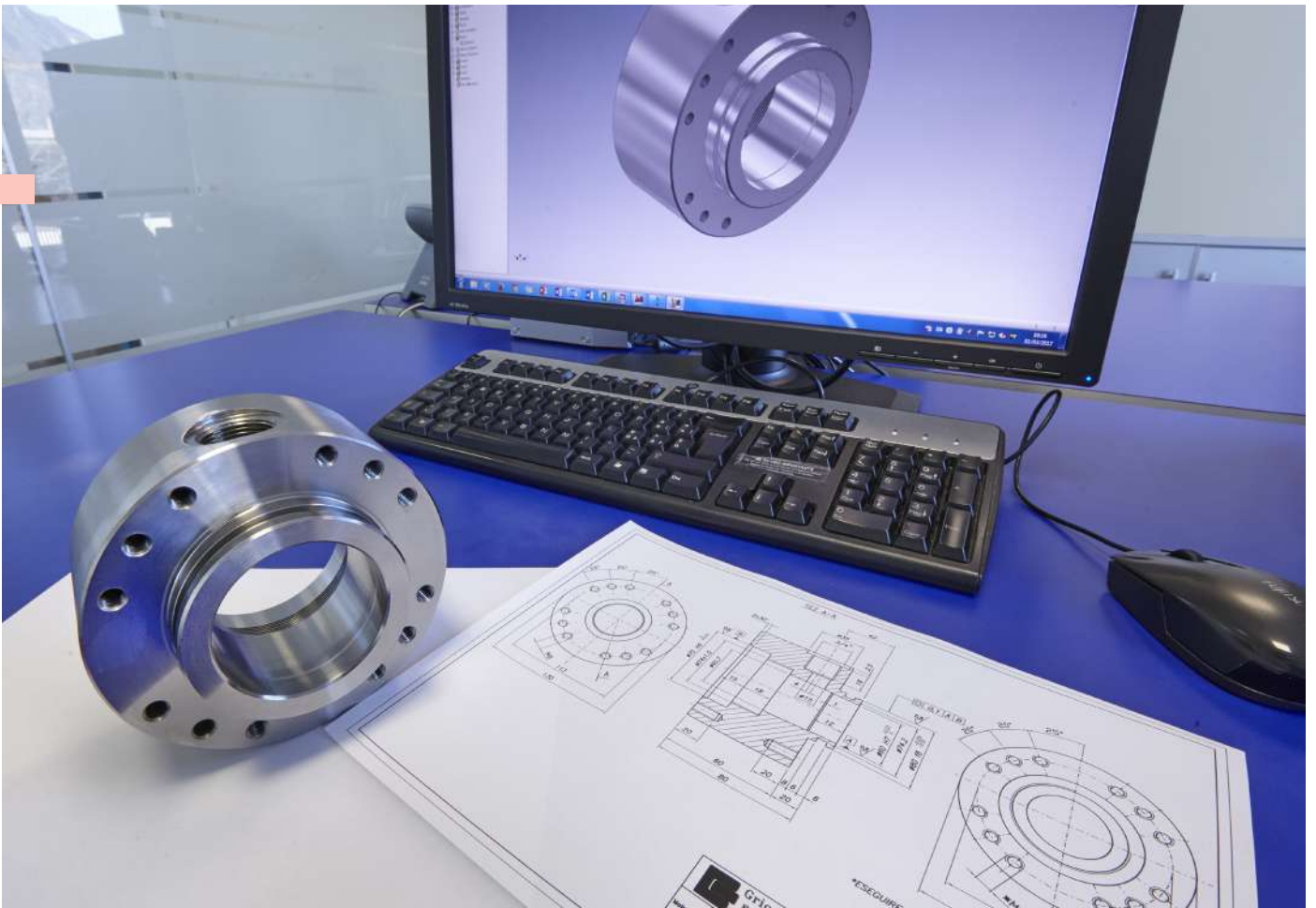
### Download 2D, 3D, PDF drawings

Download the drawings of the cylinder that you have created. Most of the formats are available: SAT, DWG, DXF, PDF.

### Online orders

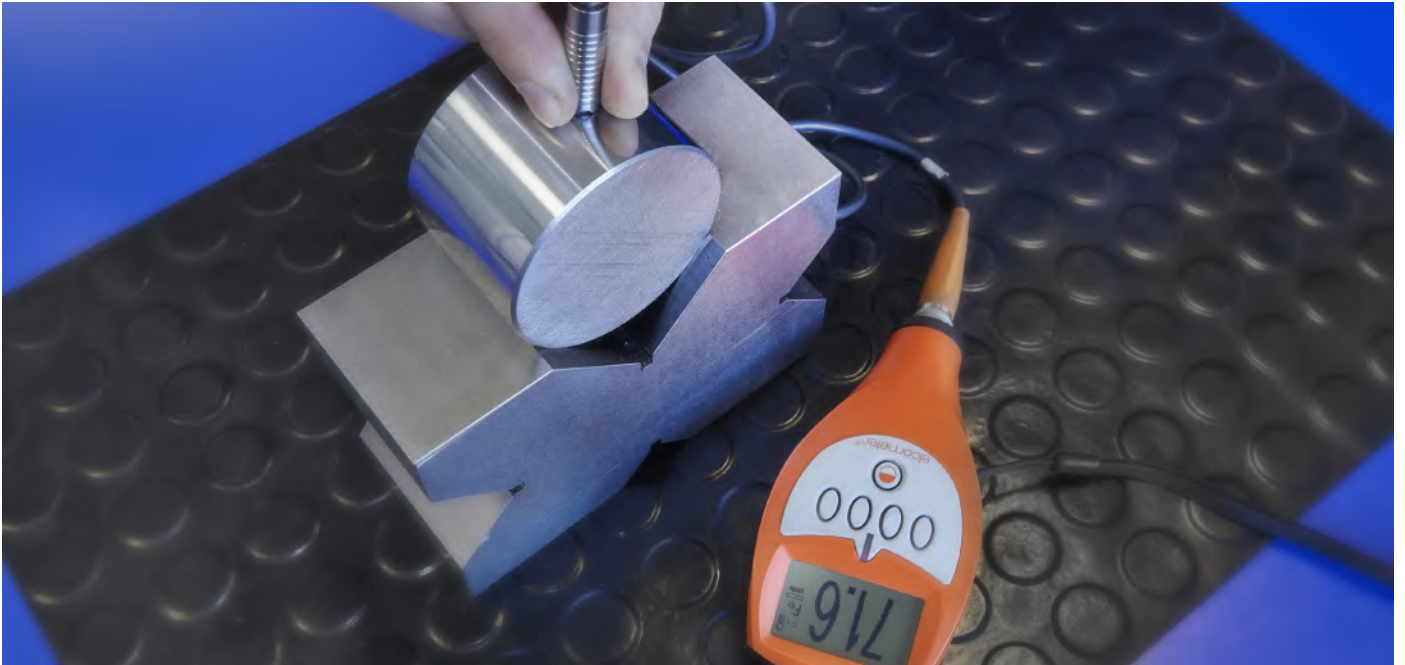
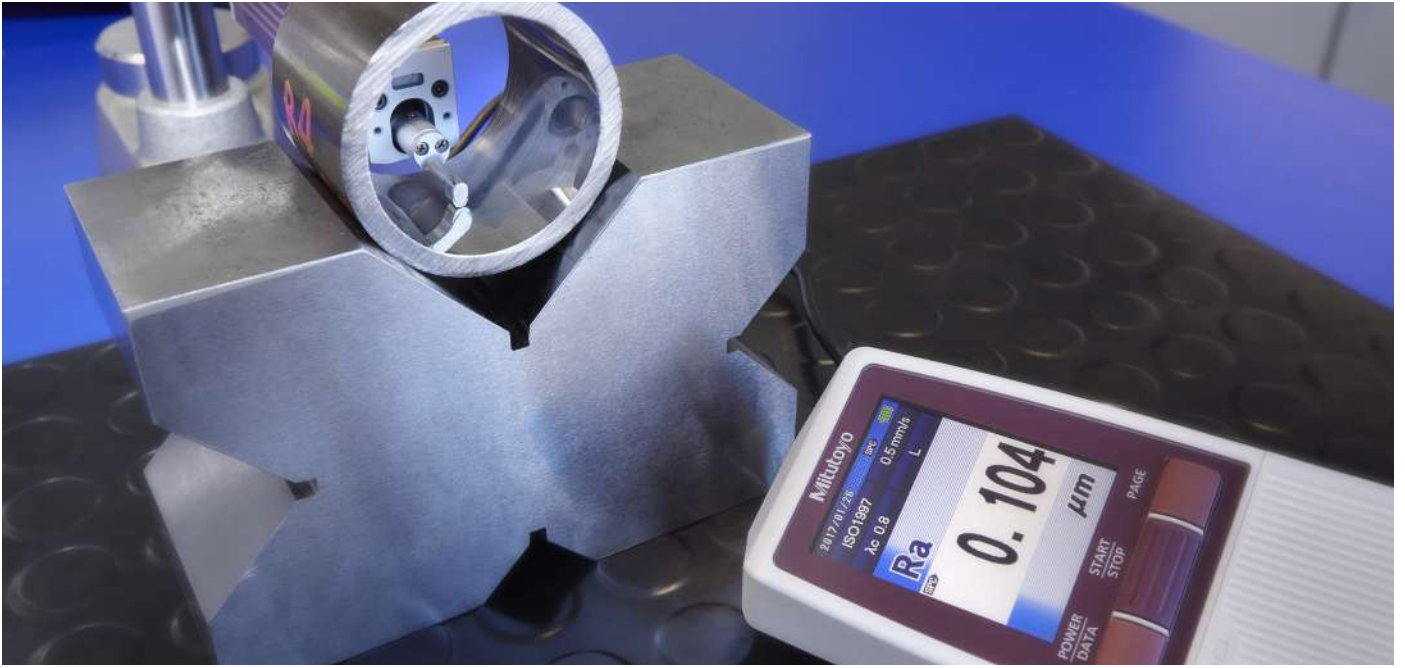
Make orders directly from our **EPC Configurator** receiving extra discounts.

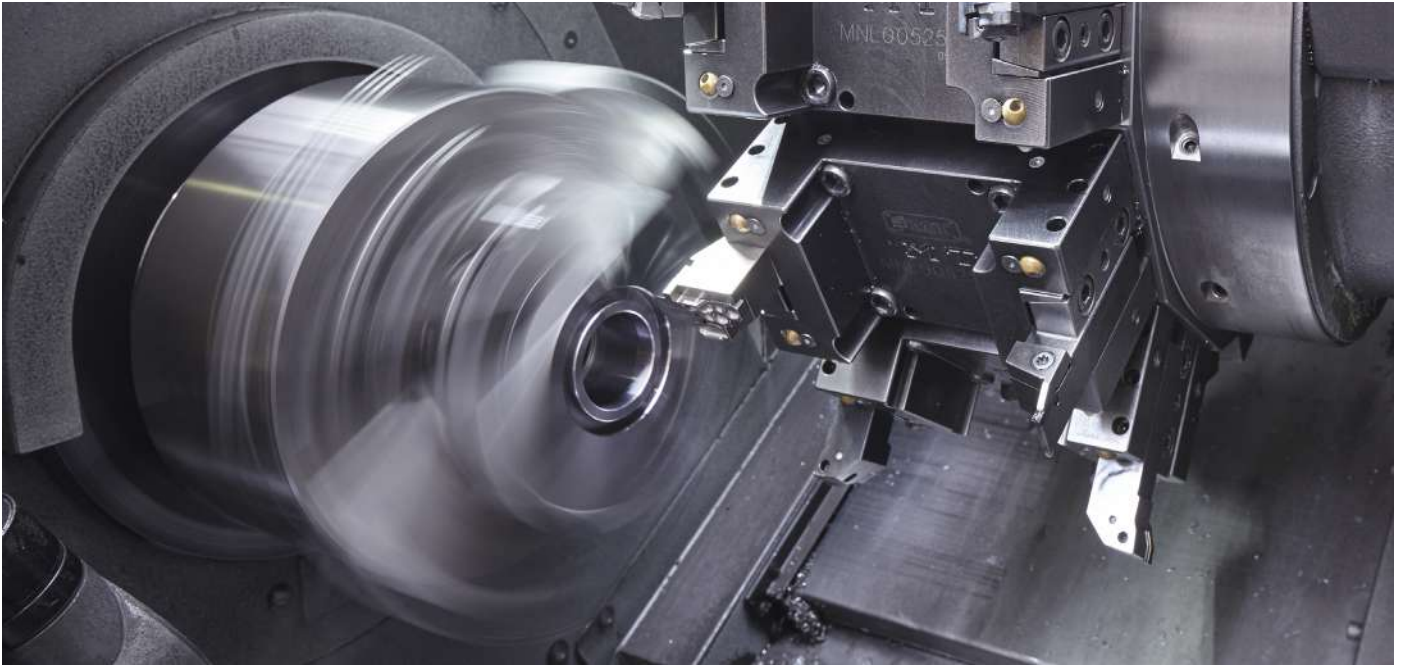
Login at: <http://configuratore.grices.it/>











**GRICES**  
HYDRAULIC CYLINDERS

www.grices.it  
LECCO - ITALY

DATE:  
12/2016

DWG:

222824

COM.:  
40189

C00060/025/000/0370FA0A/S DIS. 222824

# CUSTOMIZED CYLINDERS

## DESIGN AND PRODUCTION

An important part of Grices' production is dedicated to customized cylinders

Grices produces customized cylinders with the possibility to construct cylinders from the client's design or developing projects designed by our technical department on customer's request.

Grices has developed, in 35 years of experience, a know-how in cylinders production for different application sectors with a vast variety of operating conditions, such as temperature, pressure, fluid control, cyclical, lateral stress etc. We can provide the client with the best solution.

We are able to produce all necessary parts for the cylinders construction in our plant which include the accurate mounting processes and the final tests. This allows us to reach high standards of quality, reliability and enduring product performance.

### Technical specifications:

- Maximum pressure 80 MPa
- Bore 400 mm
- Stroke : for single rod up to 4000 mm
- Telescopic stroke up to 12000 mm
- Speed up to 1m/s

### Options:

- **Treatments:** chemical nickel plating, thickness chrome plating, nitriding, inducted hardening, cementation, phosphating
- **Painting:** is possible to paint with high thickness paintings in accordance with cycles and client's technical requirements
- **Sensors:** high pressure proximity sensors, adjustable switches with TPN/PNP/REED output
- **Transducers:** internal position transducers with analogue or digital output
- **Round bellows:** in different materials to protect the rod
- **Stroke regulator**
- **Air bleeds/minimess socket**
- **Special seals:** wide range depending on application, fluid and temperature
- Metallic **scrapers**

### Certification:

- Structural test with FEM ANALYSIS.
- Standards: ASME, AD2000, GOST, PED.
- Certificates: RI.NA, Lloyd, TUV, Bureau Veritas.



# CH CYLINDERS SERIES



**STANDARD ISO 6020/2 - 1991 -**  
DIN 24554 160 BAR COMPACT SERIES

The CH series follows International standards **ISO 6020/2 and DIN 24554**. The compact construction with squared heads and tie rod fits to every kind of industrial application with continuous nominal pressure up to 16 MPa.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability.

The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

Our production includes the optional integration of **position transducers** (see *CHT series*) and **adjustable magnetic sensors** (see *CHM series*).

## Technical characteristics:

- Standard ISO 6020/2 and DIN 24554.
- Nominal pressure 16 MPa (continuous operation)
- Maximum pressure 25 MPa
- Bore: 25-200 mm
- Stroke: up to 4000 mm
- Working temperature from -20°C to +150°C according to the chosen fluid and seals
- Up to 3 rod diameter per bore
- Single or double rod
- 14 Mounting styles Ref. ISO MP1 - MP3 - MS2 - MT1 - MT2 - MT4 - ME5 - ME6 - MP5 - MX6 - MX2 - MX5 - MX3 - MX1
- Wide choice of rod end accessories

## Options:

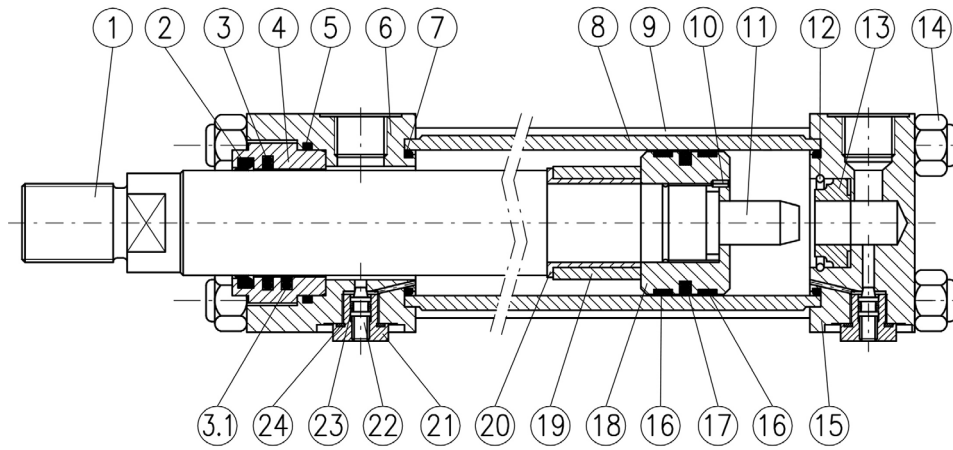
- Fixed or adjustable cushions
- Wide range of seals to suit speed, frequency, temperature and fluid specification
- Proximity sensor integrated in cylinder heads
- Integrated position transducer (see *CHT series*) with analog or digital output
- Adjustable magnetic sensors (see *CHM series*)
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed, inox
- Drainage

## EPC Cylinder configurator

This is an innovative tool that allows the client to configure CH cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available.

Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Polyurethane / PTFE
3	Rod seal	Polyurethane / PTFE
3.1	2nd Rod seal (option L)	NBR e PTFE
4	Guide sleeve	Spheroidal cast iron
5	O-Ring + PBK	NBR + Polyurethane
6	Head	Steel
7	O-Ring + PBK	NBR + Polyurethane
8	Body	Steel
9	Tie rod	Steel
10	Safety pin	Steel
11	Cushioning spur	Steel
12	Toroidal ring	Steel
13	Rear cushioning	Bronze
14	Self-braking nut	Steel
15	Rear head	Steel
16	Slide ring	PTFE
17	Piston seal	Polyurethane / PTFE
18	Piston	Steel
19	Front cushioning sleeve	Steel
20	Spacer	Steel
21	Locknut	Steel
22	Adjustment needle	Steel
23	O-Ring + PBN	NBR + Polyurethane
24	O-Ring seal	NBR

**Mounting style**



# TECHNICAL CHARACTERISTICS



**STANDARD ISO 6020/2 - 1991 -**  
DIN 24554 160 BAR COMPACT SERIES

## CHOOSING THE PRODUCTION SERIES

In order to identify the production series, make sure that, while the plant is working, the operating pressures indicated for each series are not exceeded. The general dimensioning of the cylinder ensures wide safety margins. Do not exceed the maximum pressure value that corresponds to the test pressure, considering also any overpressure caused by throttle valves in the circuits and/or by vertical loads with downward rods and end of stroke cushioning (*see paragraph 1.8*).

We recommend to adopt strokes longer by a few millimeters than the working stroke, in order to prevent the use of the cylinder's internal stops as a mechanical end of stroke. Also check that the expected working temperature and speed are consistent with the type of seals installed.

### 1.1 HYDRAULIC CYLINDERS – SERIES CH

The CH hydraulic cylinders, dimensioned according to standard ISO 6020/2 - DIN 24554, represent the future use of hydraulic actuators;

- Manufactured according to CNC technology, with top-quality materials, they provide maximum reliability and duration.
- The use of standard components during assembly facilitates the replacement of any worn components.
- They can be equipped with progressive cushions of rear and front end of stroke, consisting of self-centering spurs that can slow-down gradually the masses concerned, even of considerable size.
- The seals used are standard, and provide reliability and easy availability on the market.
- The available seals selection fits different speed, frequency, temperature and fluid conditions.

### 1.2 RANGE OF USE OF CH CYLINDERS

Nominal pressure 16 MPa (*continuous operation*)

Maximal pressure 25 MPa

### 1.3 CYLINDER BODY

The cylinder body is made up of a top-quality thick steel tube, either cold drawn or hot laminated, with elevated thickness and accurate internal surface (roughness  $RA \leq 0.4$  micron, diameter tolerance H8).

The strict quality controls of materials and the precision of manufacturing assure high straightness, concentricity and finishing.

### 1.4 ROD

Rods are made with top-quality steel and coated with hard chrome. This surface treatment ensures proper protection against any damage and corrosion, favouring the seals' endurance. The minimum surface finish is 0.2 micron.

Rods with strong chrome filling, induction-hardened, inox/chromed or made of special steel, can be manufactured on demand.

### 1.5 HEADS

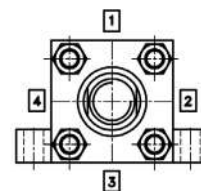
Heads are made of steel and are to ensure perfect concentricity between the cylinder body, the rod bearing and the rod. Wide inner passages are manufactured to minimize any load loss when the fluid is conveyed.



## 1.6 POSITION OF CONNECTIONS, AIR VENTS AND DAMPING REGULATION

Oil ports and cushioning standard positions are the following:

MOUNTING STYLE		FRONT HEAD Q	REAR HEAD R
TA - TP - AP - FA - FP - CS - CM - CF OI - OA - OP - ZA - ZP	Oil port	1	1
	Cushioning	3	3
PI	Oil port	1	1
	Cushioning	2	2



In order to define all possible combinations of oil ports, cushioning, air bleeds and sensors, refer to the configurator.

Login at: <http://configuratore.grices.it/>

## 1.7 PISTON

The piston is made with a special material, specially processed to ensure a concentric guide between rod cushioning bushing, cylinder body and head cushioning bushing. A large part of the radial surface is in contact with the cylinder body. This confers considerable stability, so that any rod bending, caused by external radial loads, is minimized.

## 1.8 END OF STROKE BRAKING

The end of stroke braking is usually adopted on all cylinders working at a speed > 0.1 m/sec., or when loads in vertical direction are activated. This braking is also a safety device in case of failure of servo-systems control equipment. The ratio below makes it possible to promptly calculate, based on the cylinder bore (cushioning section), the supply pressure, the cushioning length and the working speed, as well as the mass that can be cushioned by every single cylinder. This reaction limits the overpressure value to 250 bar, protecting the cylinder's components that are under stress during braking.

$$M = \frac{(p_2 \cdot S - p_1 \cdot A) \cdot 2 \cdot L_f}{V_0^2} \cdot 10^{-2} \quad [\text{kg}]$$

$P_1$  - supply pressure (bar)

$P_2$  - maximum pressure 250 (bar)

$V_0$  - working speed (m/s)

$S$  - cushioning section  $S_1$  or  $S_2$  (cm<sup>2</sup>)

$L_f$  - cushioning length  $L_{f1}$  or  $L_{f2}$  (mm)

$A$  - piston area (cm<sup>2</sup>)

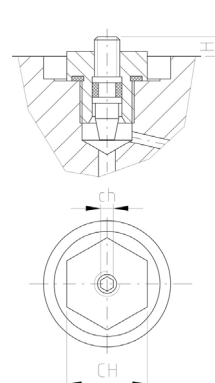
The cushioned mass values obtained from this ratio are simply theoretical, and Grices accepts no responsibility for the use of this ratio. The data to be inserted in the ratio to calculate the mass that can be cushioned may be obtained from the following table.

Bore (mm)	25	32	40	50	63	80	100	125	160	200
$S_1$ (cm <sup>2</sup> ) rod forward	1,77	3,52	5,50	7,68	13,07	21,98	35,51	51,81	98,94	144,37
$S_2$ (cm <sup>2</sup> ) rod backward	4,52	6,91	11,43	18,5	29,39	46,45	74,70	118,86	190,79	303,83
$L_{f1}$ (mm) rod forward	19	19	28	29	29	29	31	31	35	38
$L_{f2}$ (mm) rod backward	19	19	28	29	29	29	29	29	40	40
$A$ (cm <sup>2</sup> )	4,9	8	12,6	19,6	31,2	50,3	78,5	122,7	201,1	314,2

## 1.9 DAMPING ADJUSTMENT

For a precise cushioning adjustment, both ends of the cylinder are equipped with control valves, equipped a system that prevents their accidental removal. For cylinders with bores 25 - 32, these valves are not available. The table below shows the dimensions and typology of such devices, based on the cylinder bore.

Bore	Hmax (mm)	CH (mm)	ch (mm)
25 - 32	Fixed braking		
40	9	19	3
50	6,5	19	3
63	3,5	19	3
80	3,5	19	3
100	3,5	19	3
125	0	19	3
160	0	19	3
200	0	19	3

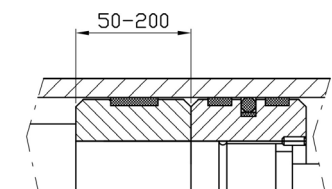


### 1.10 SPACERS

Cylinders with strokes > 1000mm should be equipped with spacers of adequate design that increase the rod and piston guide, in order to reduce any overload phenomena and premature wear.

The spacer allows to increase the contact surface between piston and cylinder body, improving the system rigidity. The table below indicates the spacer length based on stroke; for the stroke values not included in the table, contact our technicians. As a general rule, spacers are not mounted on cylinders when strokes are < 1000mm and on cylinders subjected to only one pulling action.

STROKE (mm)	1001 a 1500	1501 a 2000	2001 a 2500	2501 a 3000
Spacer symbol	1	2	3	4
Length (mm)	50	100	150	200



### 1.11 SEALS

The sealing system must be chosen according to the working conditions of the cylinder: speed, fluid type and temperature. Our cylinders feature seals provided with seats conforming to the ISO 7425 norm. That allows our cylinders to work under the heaviest conditions, such as very low or high speed, heavy working, mineral or synthetic fluids. The type of seals to be used in the relevant working conditions are indicated below.

- **TYPE A: (STANDARD)** usually supplied in the absence of particular recommendations, considerable sealing at low pressure, to be used for speeds up to 0.5 m/sec., at temperatures ranging between -20 and +80°C, operation with mineral oil, air, nitrogen.
- **TYPE B: (LOW FRICTION)** anti-friction, not recommended when loads are to be held in position, and recommended at speeds up to 4 m/sec., at temperatures ranging between -20 and +80°C, operation with mineral oil, air, nitrogen.
- **TYPE C: (LOW FRICTION, VITON)** anti-friction, not recommended when loads are to be held in position, and recommended at speeds up to 4 m/sec., at temperatures ranging between -20 and +135°C, operation with phosphoric ester-based fire-retardant fluids.
- **TYPE E: (NBR+PTFE)** anti-friction, not recommended when loads are to be held in position, and recommended at speeds up to 4 m/sec., at temperatures ranging between -20 and +60°C, operation with water-glycol.

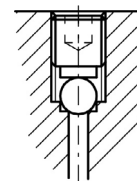
### 1.12 OIL PORTS

In order to reduce any turbulence and water hammer in the cylinder's connecting pipes as much as possible, we recommend that you ensure that the oil speed does not exceed 6 m/sec. The maximum flow rates that can be obtained with these criteria are shown in the table below.

OIL PORT Ø	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"
MAX. FLOW RATE (l/mm)	14	28	48	63	102	162

### 1.13 AIR BLEEDS

Air bleeds are provided on demand on both ends of the cylinder. Bleeds are mounted inside the head and the bottom, so as to be protected from any accidental removal, as shown in the figure on the right. To drain the system, unscrew the nut, discharge the air and close it again, carefully checking its sealing.



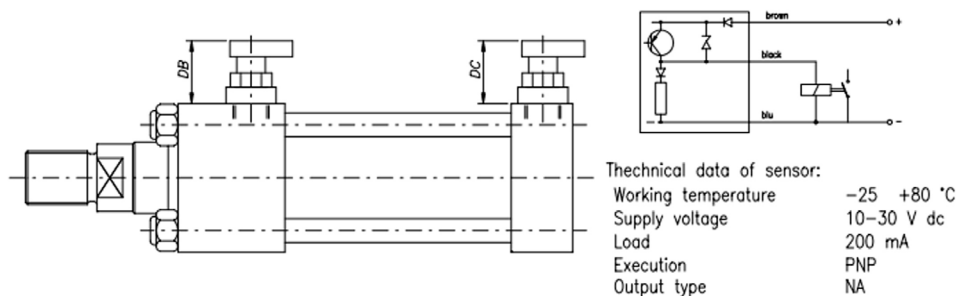
### 1.14 DRAINAGE

The drainage on the rod seal ensures better sealing at high speed, in particular in cylinders with strokes > 2000mm or in applications where the rod side chamber is constantly under pressure. The drainage port (1/8") is usually positioned on the same axis of the supply port and must be directly connected to the tank.

**For any further explanations on this matter, please contact our Technical Department.**

### 1.15 PROXIMITY SENSORS

When the piston position needs to be detected in any hydraulic system, proximity sensors can be mounted directly in the cylinder heads. The operating temperature is  $-25$  to  $+80^{\circ}\text{C}$ . Allowed dynamic pressure 350 bar. The sensor is provided with a built-in amplifier, with direct supply (10 to 30Vdc) with an analog PNP output for 200mA max., supplied complete with connector with a 4m long cable. Sensors can be mounted on head and bottom for bores from 40mm up to 200mm, and are arranged on side 2 of the cylinder. With feet mounting (PI), sensors are positioned on side 4. They make it possible to obtain an electric signal near the end of stroke positioning of the piston.



Bore	DB max (mm)	DC max (mm)
40	77	67
50	75	71
63	72	65
80	74	71
100	73	65
125	71	51
160	71	34
200	67	20

#### Restrictions:

- In OA and FA executions, the sensor is mounted on the head on side 3, facing the supply, and does not allow the mounting of cushioning adjustment;
- In PI execution (bores 40 – 50 – 63), sensors must be removed for fastening the feet's screws and then re-mounted. For all bores in presence of air bleeds they are arranged on the side of the cushioning adjustment;
- In OP and FP executions, the sensor is mounted on the bottom on side 3 facing the supply, and does not allow the mounting of cushioning adjustment;
- For 25 and 32mm bores, the proximity sensors are not provided.

### 1.15 STROKE TOLERANCE

STROKE	mm	0-500	501-1500	1501-3000	oltre 3000
TOLLERANCE	mm	$\pm 1$	$\pm 2$	$\pm 3$	$\pm 4,5$

### 1.16 TIE RODS TORQUE

BORE	mm	25	32	40	50	63	80	100	125	160	200
TIE ROD	mm	M5x0,8	M6x1	M8x1	M12x1,25	M12x1,25	M16x1,5	M16x1,5	M22x1,5	M27x2	M30x2
TORQUE	Nm	4,5-5	7,6-9	19-20,5	68-71	68-71	160-165	160-165	450-455	815-830	1140-1155

#### 2.1 PEAK LOAD

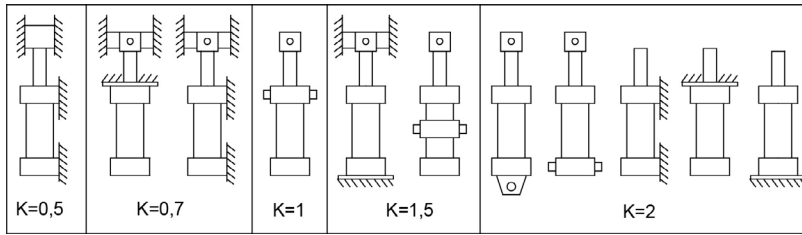
When the cylinder is working under compression, check the rod diameter at peak load. **Table 1** shows the most common types of restriction. Each of them is associated to a coefficient **K**. The maximum stroke of cylinder **L** multiplied by coefficient **K** produces the **LV** value (virtual length,  $LV = L \cdot K$ ). **Graph 2** indicates the rod's minimum diameter, based on load.

The point of intersection between **LV** in mm. and pushing force **F** in **KN** must be below the characteristic curve of the rod to be checked.

Example: cylinder CH63/28/750/FA/00B (front flange), that employs a 55 KN load.

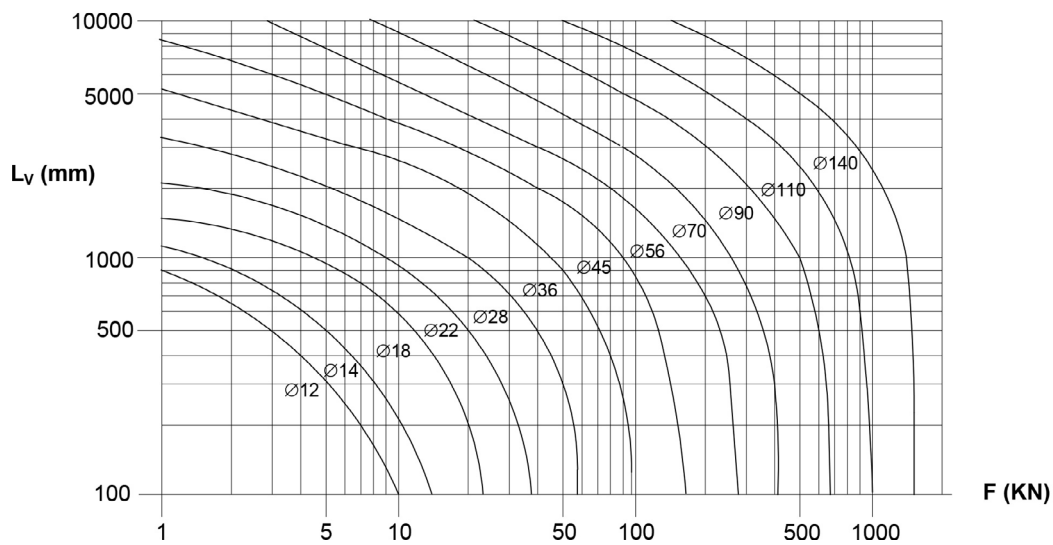
Table 1 shows coefficient K, determined by the type of restriction  $K = 2$ , the virtual length is  $LV = L \cdot K \quad LV = 750 \cdot 2 = 1500 \text{ mm}$ .

Table 1



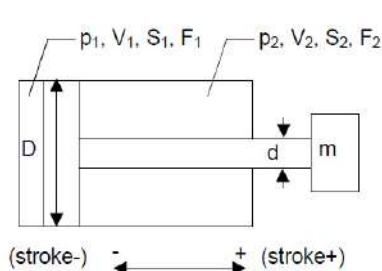
In graph 2 you can check whether the point of intersection between LV and F is below the curve of rod  $\varnothing 28$ . Since the stability condition has not been met, adopt the differential rod  $\varnothing 45$ . The cylinder CH63/45/750FA00B will be therefore selected, which meets the stability condition.

Graph 2



2.2 PRACTICAL UNIT OF MEASUREMENT

DESCRIPTION	SYMBOL	UNIT OF MEASURE
Section	S	cm <sup>2</sup>
Pressure	p	bar
Ø piston	D	mm
Ø rod	d	mm
Speed	V	m/s
Capacity	Q	l/min
Load	m	kg



**PUSHING FORCE (STROKE +)**  
 $F_1 = (p_1 \cdot S_1) \text{ (Kg)}$

**PUSHING SPEED (STROKE +)**  
 $V_1 = Q / (6 \cdot S_1) \text{ (m/s)}$

$$S_1 = \frac{\pi \cdot D^2}{4 \cdot 100} \text{ (cm}^2\text{)}$$

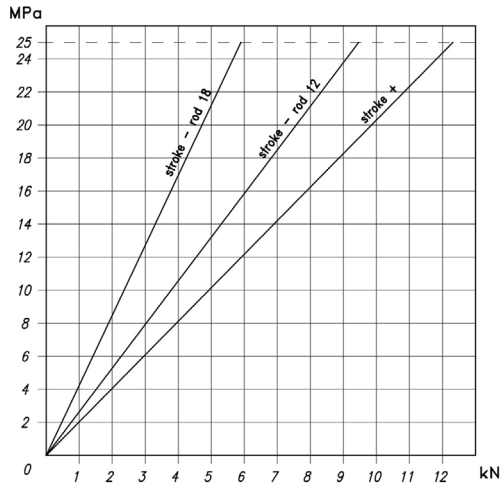
**PULLING FORCE (STROKE -)**  
 $F_2 = (p_2 \cdot S_2) \text{ (Kg)}$

**PULLING SPEED (STROKE -)**  
 $V_2 = Q / (6 \cdot S_2) \text{ (m/s)}$

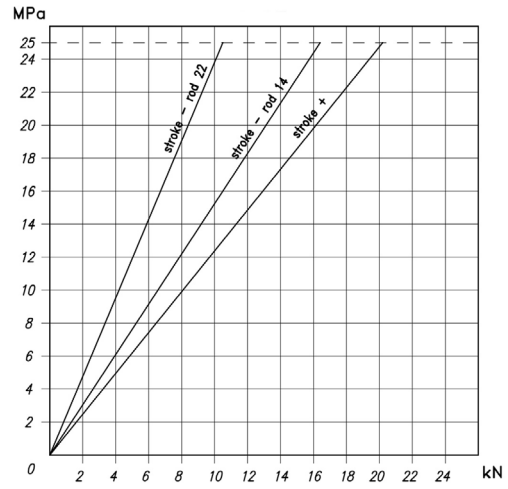
$$S_2 = \frac{\pi \cdot (D^2 - d^2)}{4 \cdot 100} \text{ (cm}^2\text{)}$$

# FORCE PRESSURE DIAGRAMS

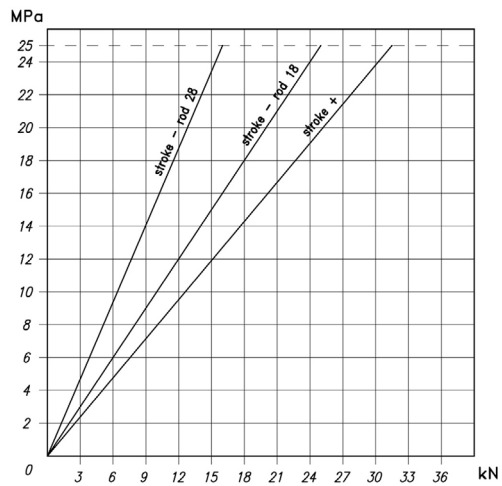
Bore 25



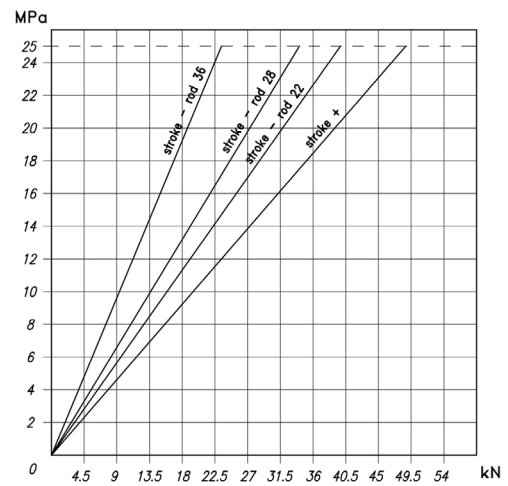
Bore 32



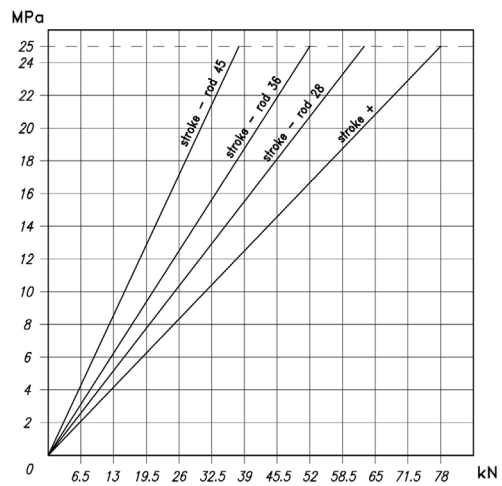
Bore 40



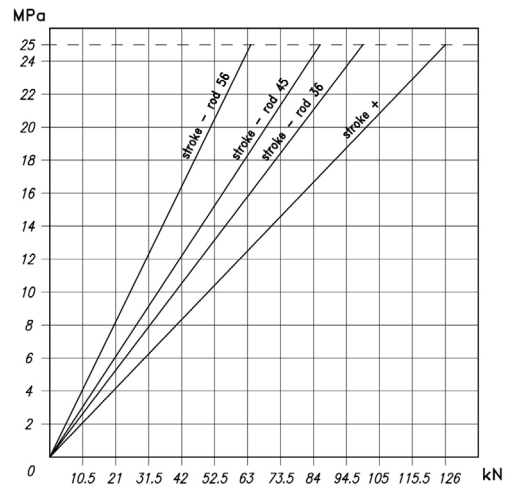
Bore 50



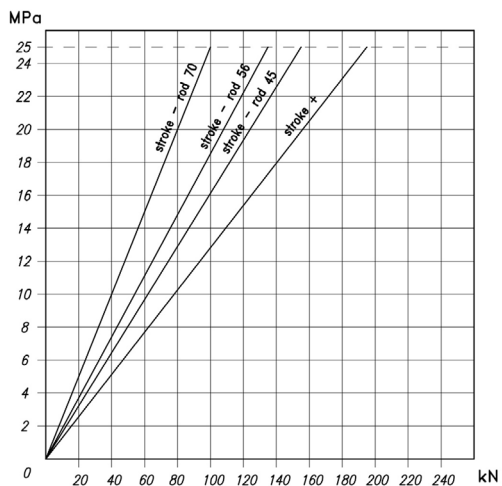
Bore 63



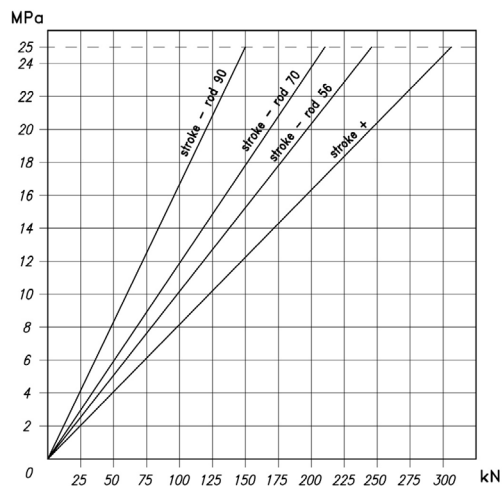
Bore 80



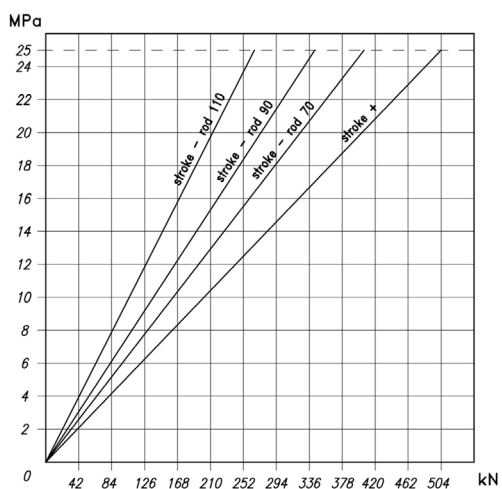
Bore 100



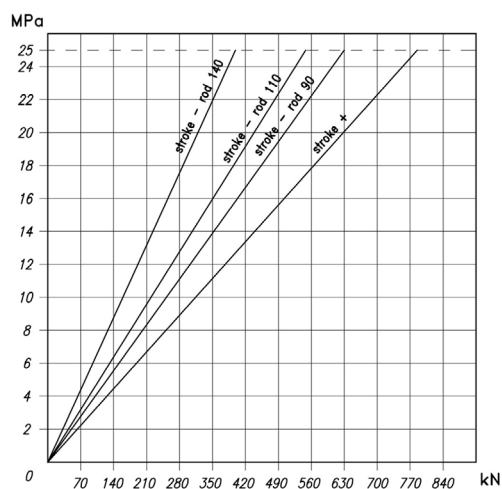
Bore 125



Bore 160



Bore 200



### 3.1 BUILT-IN PLATES

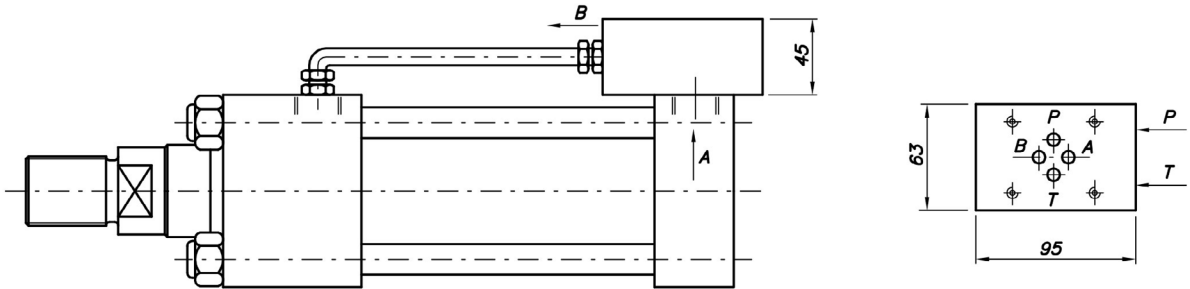
The CH cylinders can be provided with ISO/Cetop plate (03, 05), for mounting the valves directly on the cylinder.

#### CH cylinder with ISO/Cetop plate 03

- Can be mounted on cylinders with 40 to 200mm bores and minimum stroke 100 mm.
- P and T connections are of 3/8" BSP type.

For further details, contact our Technical Department.

NG03

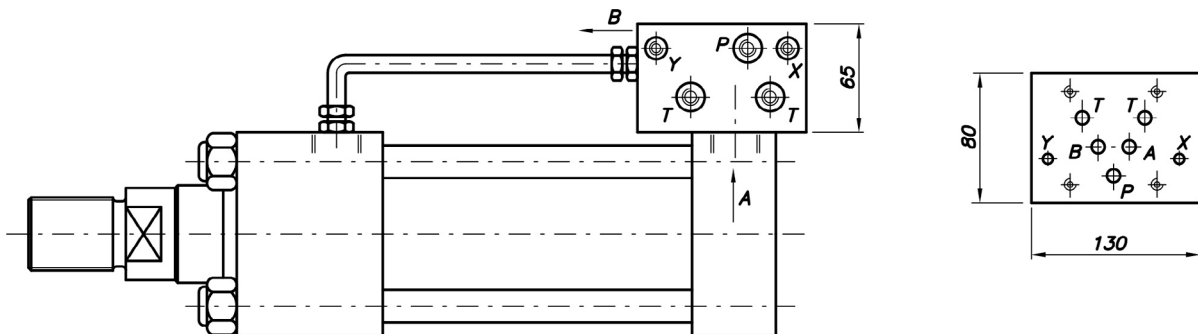


#### CH cylinder with ISO/Cetop plate 05

- Can be mounted on cylinders with 40 to 200mm bores and minimum stroke 150 mm.
- P and T connections are of 3/4" BSP type, X and Y connections are of 1/4" BSP type.

For further details, contact our Technical Department.

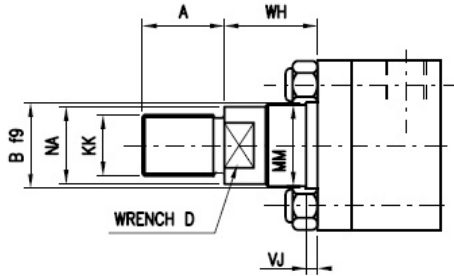
NG05



# DIMENSIONS OF THE ROD END

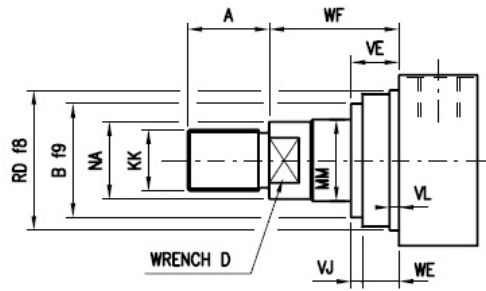
Rod end, type M and D

All, apart from FA fastening (ISO ME5)



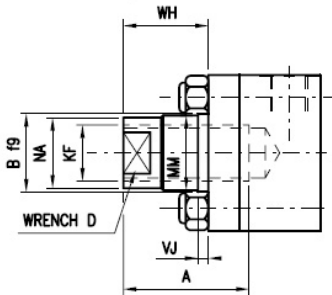
Rod end, type M and D

FA fastening (ISO ME5)



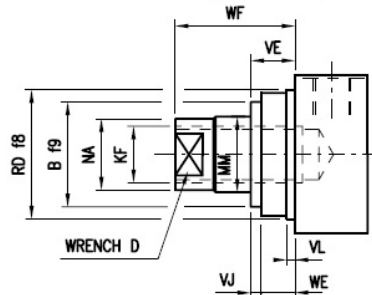
Rod end, type F

All, apart from FA fastening (ISO ME5)



Rod end, type F

FA fastening (ISO ME5)



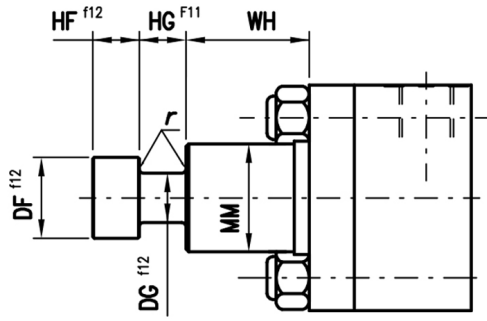
BORE	N° rod	MM rod	Type M ISO 6020/2 (1991)		Type D DIN 24554		Type F		B	D	NA	WF	WH	VE	VJ	EXECUTION			
			KK	A	KK	A	KF	A								VL min	RD	VJ	WE
25	1	12	M10x1,25	14	M10x1,25	14	M8x1	14	24	10	11	25	15	16	6	3	38	6	10
	2	18	M14x1,5	18	M10x1,25	14	M12x1,25	18	30	15	17	25	15	16	6				
32	1	14	M12x1,25	16	M12x1,25	16	M10x1,25	16	26	12	13	35	25	22	12	3	42	12	10
	2	22	M16x1,5	22	M12x1,25	16	M16x1,5	22	34	18	21	35	25	22	12				
40	1	18	M14x1,5	18	M14x1,5	18	M12x1,25	18	30	15	17	35	25	22	6	3	62	12	10
	2	28	M20x1,5	28	M14x1,5	18	M20x1,5	28	42	22	26	35	25	22	12				
50	1	22	M16x1,5	22	-	-	M16x1,5	22	34	18	21	41	25	25	9	4	74	9	16
	2	36	M27x2	36	M16x1,5	22	M27x2	36	50	30	34	41	25	25	9				
	3*	28*	M20x1,5	28	M16x1,5	22	M20x1,5	28	42	22	26	41	25	25	9				
63	1	28	M20x1,5	28	-	-	M20x1,5	28	42	22	26	48	32	28	12	4	75	12	16
	2	45	M33x2	45	M20x1,5	28	M33x2	45	60	39	43	48	32	29	13				
	3*	36*	M27x2	36	M20x1,5	28	M27x2	36	50	30	34	48	32	29	13				
80	1	36	M27x2	36	-	-	M27x2	36	50	30	34	51	31	29	9	4	82	9	20
	2	56	M42x2	56	M27x2	36	M42x2	56	72	48	54	51	31	29	9				
	3*	45*	M33x2	45	M27x2	36	M33x2	45	60	39	43	51	31	29	9				
100	1	45	M33x2	45	-	-	M33x2	45	60	39	43	57	35	32	10	5	92	10	22
	2	70	M48x2	63	M33x2	45	M48x2	63	88	62	68	57	35	32	10				
	3*	56*	M42x2	56	M33x2	45	M42x2	56	72	48	54	57	35	32	10				
125	1	56	M42x2	56	-	-	M42x2	56	72	48	54	57	35	32	10	5	105	10	22
	2	90	M64x3	85	M42x2	56	M64x3	85	108	80	88	57	35	32	10				
	3*	70*	M48x2	63	M42x2	56	M48x2	63	88	62	68	57	35	32	10				
160	1	70	M48x2	63	-	-	M48x2	63	88	62	68	57	32	32	7	5	125	7	25
	2	110	M80x3	95	M48x2	63	M80x3	95	133	100	108	57	32	32	7				
	3*	90*	M64x3	85	M48x2	63	M64x3	85	108	80	88	57	32	32	7				
200	1	90	M64x3	85	-	-	M64x3	85	108	80	88	57	32	32	7	5	150	7	25
	2	140	M100x3	112	M64x3	85	M100x3	112	163	128	138	57	32	32	7				
	3*	110*	M80x3	95	M64x3	85	M80x3	95	133	100	108	57	32	32	7				

\* Diameters not ISO-DIN



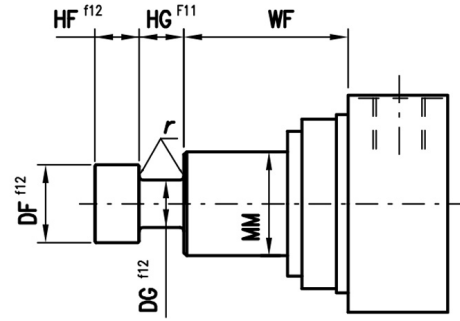
## Hammer head

All except FA mounting style (ISO ME5)



## Hammer head

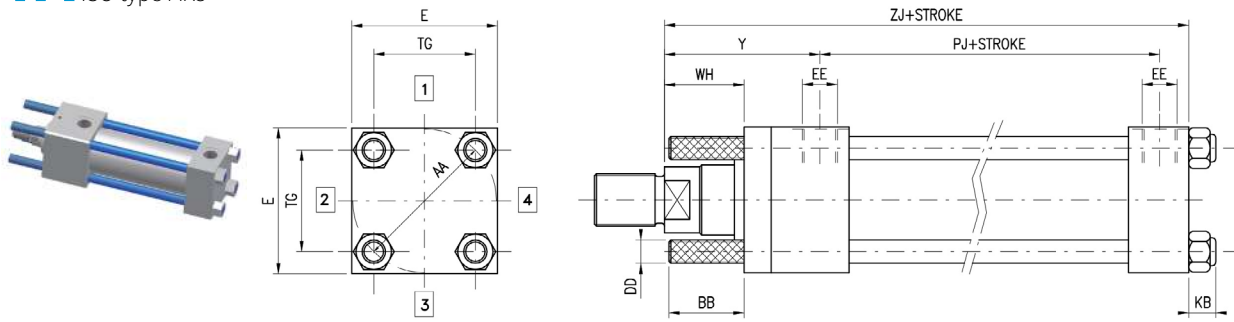
FA mounting style (ISO ME5)



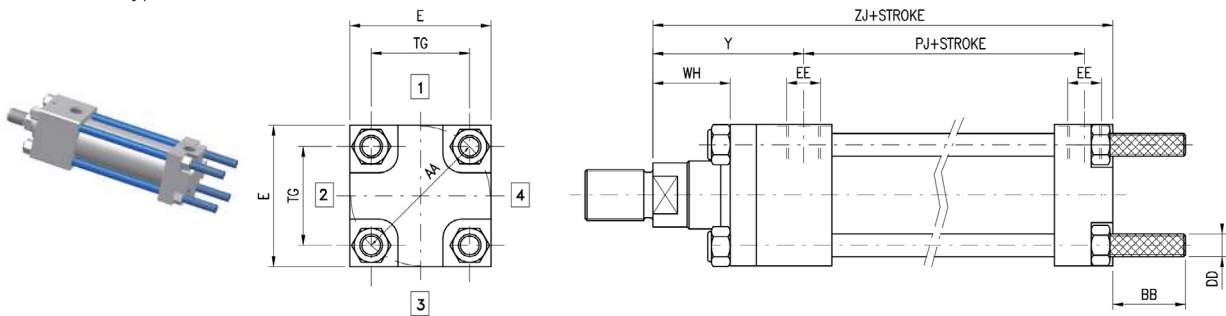
BORE	MM rod	DF	DG	HF	HG	r	WF	WH	Pmax. Traction Bar
32	22	18	11	8	8	0,5	35	25	160
40	28	22	14	10	10	0,5	35	25	160
50	28	22	14	10	10	0,5	41	25	100
	36	28	18	12,5	12,5	0,8	41	25	160
63	36	28	18	12,5	12,5	0,8	48	32	100
	45	35	22	16	16	0,8	48	32	160
80	45	35	22	16	16	0,8	51	31	100
	56	45	28	20	20	1,2	51	31	160
100	56	45	28	20	20	1,2	57	35	100
	70	56	35	25	25	1,2	57	35	160
125	70	56	35	25	25	1,2	57	35	100
	90	78	45	30	30	1,5	57	35	160
160	90	78	45	30	30	1,5	57	32	100
	110	106	65	35	35	1,5	57	32	160
200	110	106	65	35	35	1,5	57	32	100
	140	136	70	45	45	1,5	57	32	160

For bores and rods excluded from the chart, contact our Technical Department.

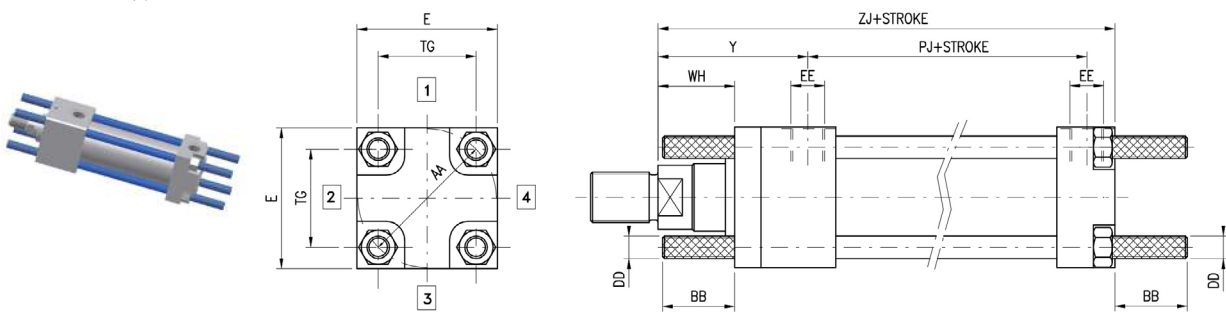
**TA** ISO type MX3



**TP** ISO type MX2



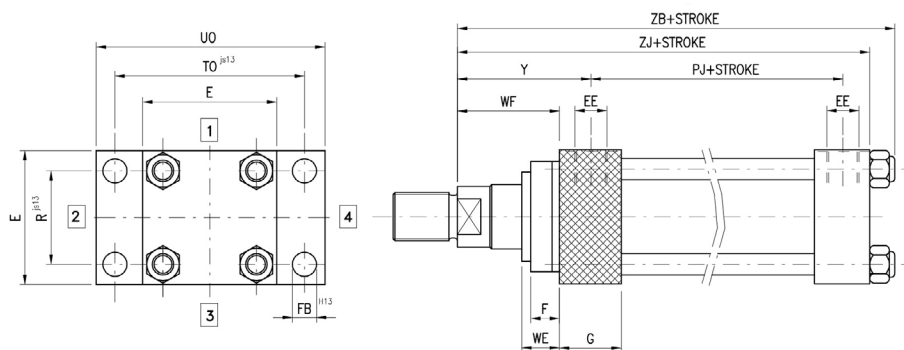
**AP** ISO type MX1



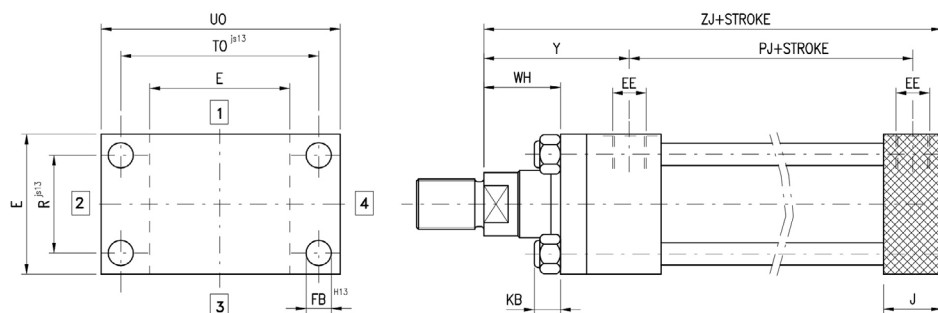
BORE	AA	BB	DD	E	EE	KB	TG	WH	ZJ	Y	PJ
25	40	19	M5x0,8	40*	1/4"	6,8	28,3	15	114	50	53
32	47	24	M6x1	45*	1/4"	7,8	33,2	25	128	60	56
40	59	35	M8x1	60	3/8"	10,6	41,7	25	153	62	73
50	74	46	M12x1,25	75	1/2"	14,8	52,3	25	159	67	74
63	91	46	M12x1,25	90	1/2"	14,8	64,3	32	168	71	80
80	117	59	M16x1,5	115	3/4"	18	82,7	31	190	77	93
100	137	59	M16x1,5	126	3/4"	18	96,9	35	203	82	101
125	178	81	M22x1,5	165	1"	25	125,9	35	232	86	117
160	219	92	M27x2	196	1"	30,8	154,9	32	245	86	121
200	269	115	M30x2	240	1 1/4"	33,2	190,2	32	299	98	158,5

\* On bores 25 and 32 the head is increased by 5mm to house the connection.

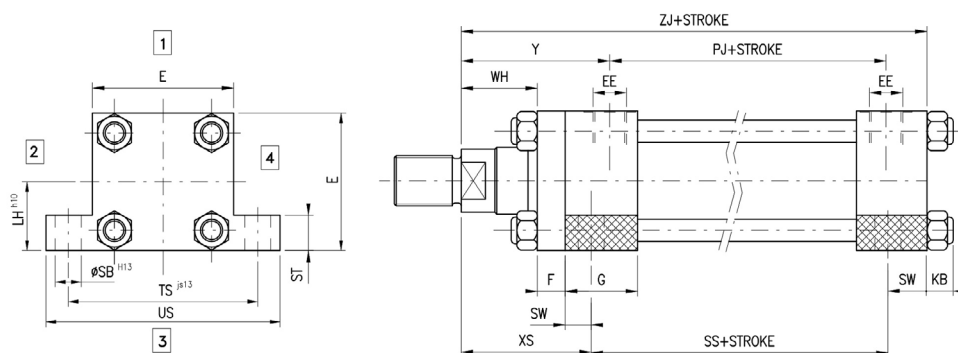
## FA ISO type ME5



## FP ISO type ME6



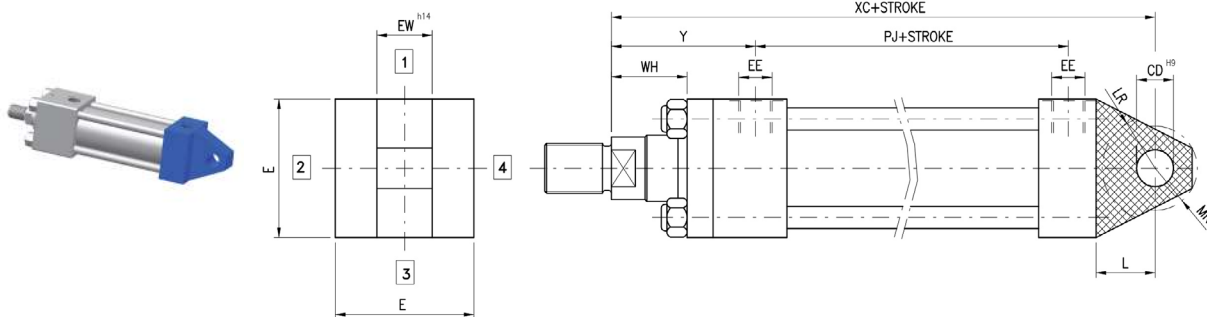
## PI ISO type MS2



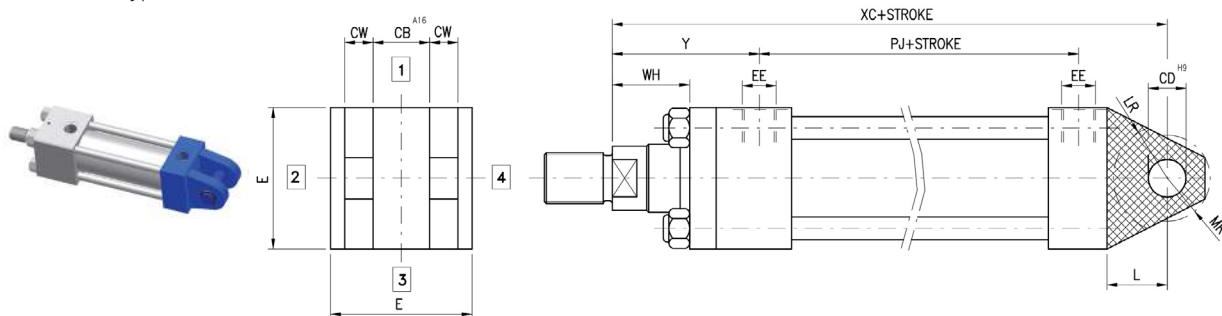
BORE	E	EE	F	FB	G	G1	J	KB	LH	R	SB	SS	ST	SW	TO	TS	UO	US	VE	WF	WH	XS	ZB	ZJ	Y	PJ
25	40*	1/4"	10	5,5	25	40	25	6,8	19	27	6,6	73	8,5	8	51	54	65	72	16	25	15	33	121	114	50	53
32	45*	1/4"	10	6,6	25	40	25	7,8	22	33	9	73	12,5	10	58	63	70	84	22	35	25	45	136	128	60	56
40	60	3/8"	10	11	38	45	38	10,6	31	41	11	98	12,5	10	87	83	110	103	22	35	25	45	164	153	62	73
50	75	1/2"	16	14	38	45	38	14,8	37	52	14	92	19	13	105	102	130	127	25	41	25	54	174	159	67	74
63	90	1/2"	16	14	38	45	38	14,8	44	65	18	86	26	17	117	124	145	161	29	48	32	65	183	168	71	80
80	115	3/4"	20	18	45	50	45	18	57	83	18	105	26	17	149	149	180	186	29	51	31	68	208	190	77	93
100	126	3/4"	22	18	45	50	45	18	63	97	26	102	32	22	162	172	200	216	32	57	35	79	221	203	82	101
125	165	1"	22	22	58	58	58	25	82	126	26	131	32	22	208	210	250	254	32	57	35	79	257	232	86	117
160	196	1"	25	26	58	58	58	30,8	101	155	33	130	38	29	253	260	300	318	32	57	32	86	276	245	86	121
200	240	1 1/4"	25	33	76	76	76	33,2	122	190	39	172	44	35	300	311	360	381	32	57	32	92	332	299	98	158,5

\* On bores 25 and 32 the head is increased by 5mm to house the connection.

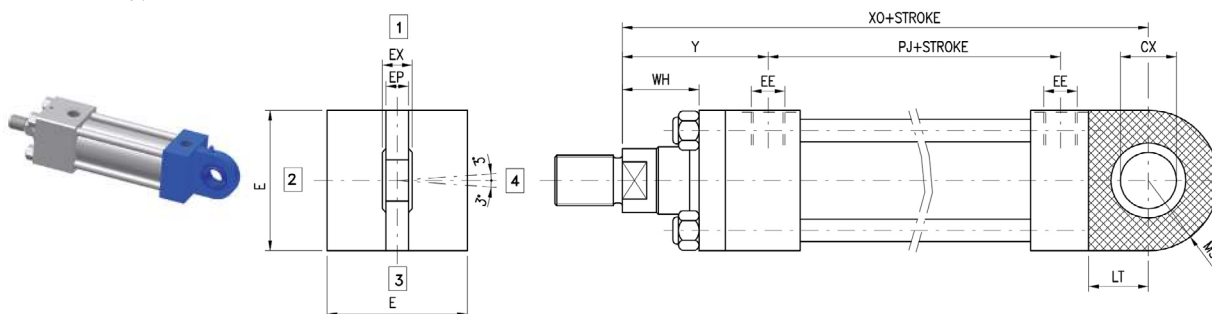
**CM** ISO type MP3



**CF** ISO type MP1



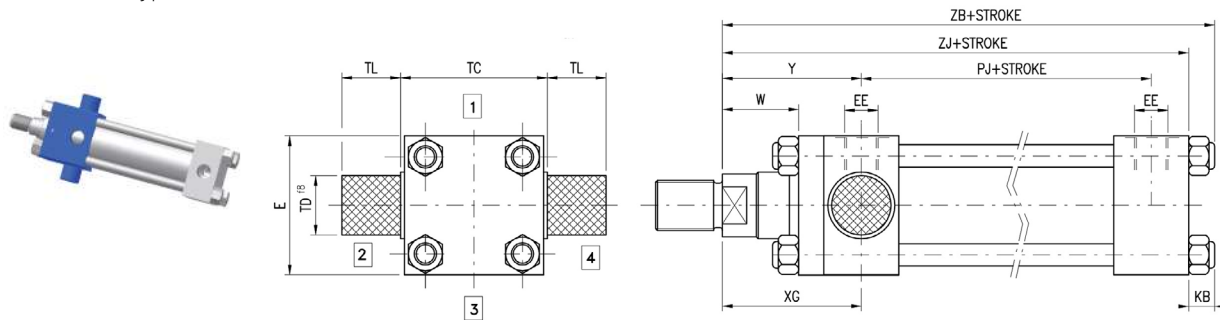
**CS** ISO type MP5



BORE	CB	CD	CW	CX	E	EE	EP	EW	EX	L	LR	LT	MR	MS	WH	XC	XO	Y	PJ
25	12	10	6	12	40*	1/4"	8	12	10	13	12	16	12	20	15	127	130	50	53
32	16	12	8	16	45*	1/4"	11	16	14	19	17	20	17	22,5	25	147	148	60	56
40	20	14	10	20	60	3/8"	13	20	16	19	17	25	17	29	25	172	178	62	73
50	30	20	15	25	75	1/2"	17	30	20	32	29	31	29	33	25	191	190	67	74
63	30	20	15	30	90	1/2"	19	30	22	32	29	38	29	40	32	200	206	71	80
80	40	28	20	40	115	3/4"	23	40	28	39	34	48	34	50	31	229	238	77	93
100	50	36	25	50	126	3/4"	30	50	35	54	50	58	50	62	35	257	261	82	101
125	60	45	30	60	165	1"	38	60	44	57	53	72	53	80	35	289	304	86	117
160	70	56	35	80	196	1"	47	70	55	78	59	107	59	98	32	308	337	86	121
200	80	70	40	100	240	1 1/4"	57	80	70	97	78	131	78	120	32	381	415	98	158,5

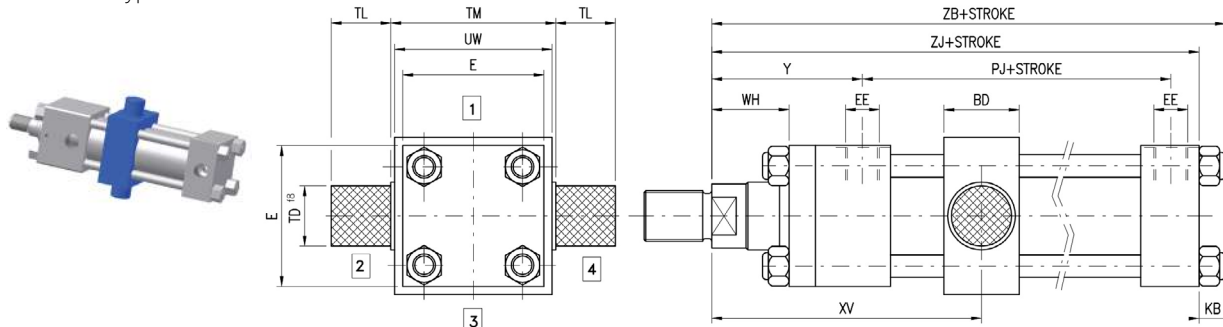
\* On bores 25 and 32 the head is increased by 5mm to house the connection.

# OA ISO type MT1

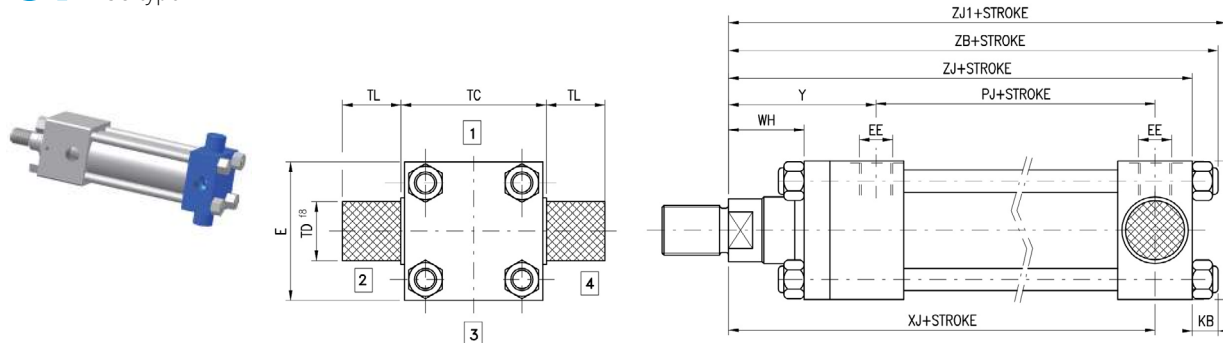


Note: for bores 100 to 200 the head and the flange consist in one single piece and the tie rods are screwed directly on the head.

# OI ISO type MT4



# OP ISO type MT2

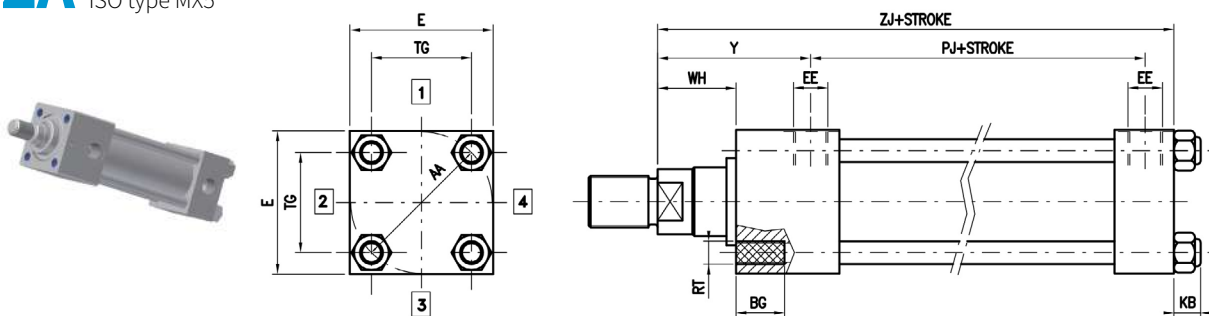


Note: for bores 100 to 200 the tie rods are screwed on the bottom head and the ZB quote become ZJ1

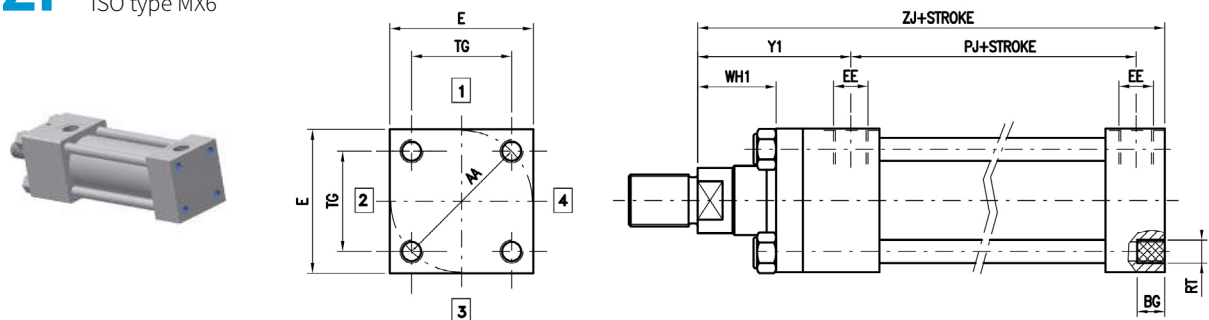
BORE	BD	E	EE	KB	TC	TD	TL	TM	UW	WH	XG	XJ	XV min	XV max	ZJ	ZJ1	ZB	Y	PJ
25	20	40*	1/4"	6,8	38	12	10	48	46	15	44	101	82	72+stroke	114	-	121	50	53
32	25	45*	1/4"	7,8	44	16	12	55	53	25	54	115	96	82+stroke	128	-	136	60	56
40	30	60	3/8"	10,6	63	20	16	76	74	25	57	134	107	88+stroke	153	-	164	62	73
50	40	75	1/2"	14,8	76	25	20	89	87	25	64	140	117	90+stroke	159	-	174	67	74
63	40	90	1/2"	14,8	89	32	25	100	98	32	70	149	132	91+stroke	168	-	183	71	80
80	48	115	3/4"	18	114	40	32	127	125	31	76	168	147	99+stroke	190	-	200	77	93
100	58	126	3/4"	18	127	50	40	140	138	35	71	187	158	107+stroke	203	216	-	82	101
125	68	165	1"	25	165	63	50	178	175	35	75	209	180	109+stroke	232	244	-	86	117
160	88	196	1"	30,8	203	80	63	215	212	32	75	230	198	104+stroke	245	273	-	86	121
200	108	240	1 1/4"	33,2	241	100	80	279	276	32	85	276	226	130+stroke	299	331	-	98	158,5

\* On bores 25 and 32 the head is increased by 5mm to house the connection.

**ZA** ISO type MX5



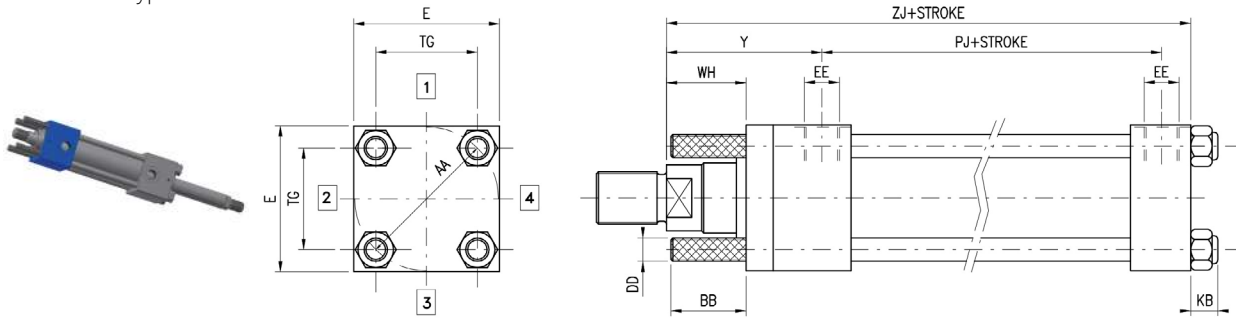
**ZP** ISO type MX6



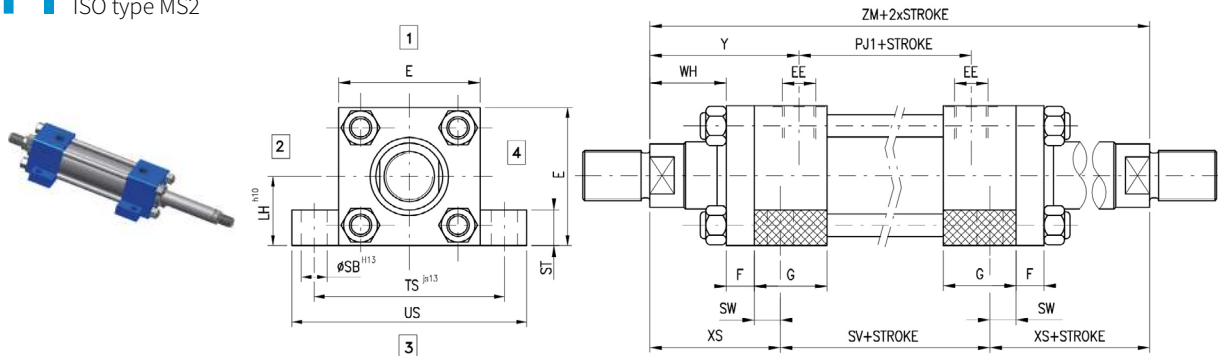
BORE	AA	BG min	E	EE	KB	RT	TG	WH	WH1	ZJ	Y	Y1	PJ
25	40	8	40*	1/4"	6,8	M5x0,8	28,3	15	15	114	50	50	53
32	47	9	45*	1/4"	7,8	M6x1	33,2	25	25	128	60	60	56
40	59	12	60	3/8"	10,6	M8x1,25	41,7	25	25	153	62	62	73
50	74	18	75	1/2"	14,8	M12x1,75	52,3	25	25	159	67	67	74
63	91	18	90	1/2"	14,8	M12x1,75	64,3	32	32	168	71	71	80
80	117	24	115	3/4"	18	M16x2	82,7	31	31	190	77	77	93
100	137	24	126	3/4"	18	M16x2	96,9	35	35	203	82	82	101
125	178	27	165	1"	25	M22x2,5	125,9	35	35	232	86	86	117
160	219	32	196	1"	30,8	M27x3	154,9	32	25	245	86	79	121
200	269	40	240	1 1/4"	33,2	M30x3,5	190,2	32	28	299	98	94	158,5

\* On bores 25 and 32 the head is increased by 5mm to house the connection.

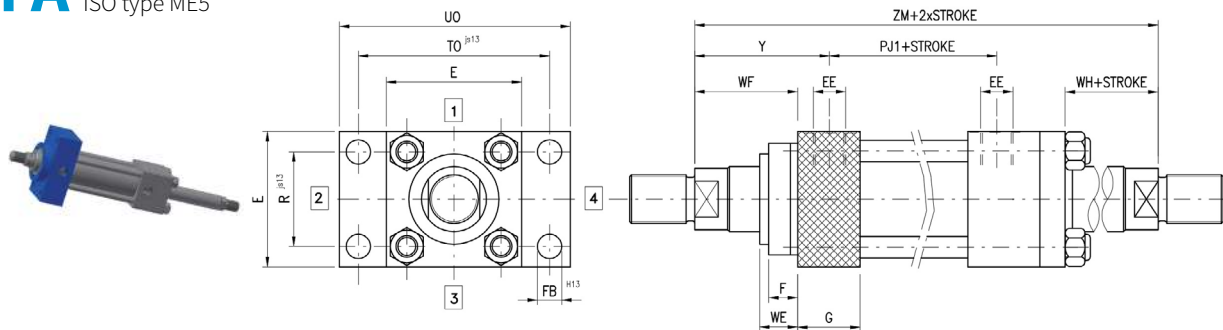
## TA ISO type MX3



## PI ISO type MS2



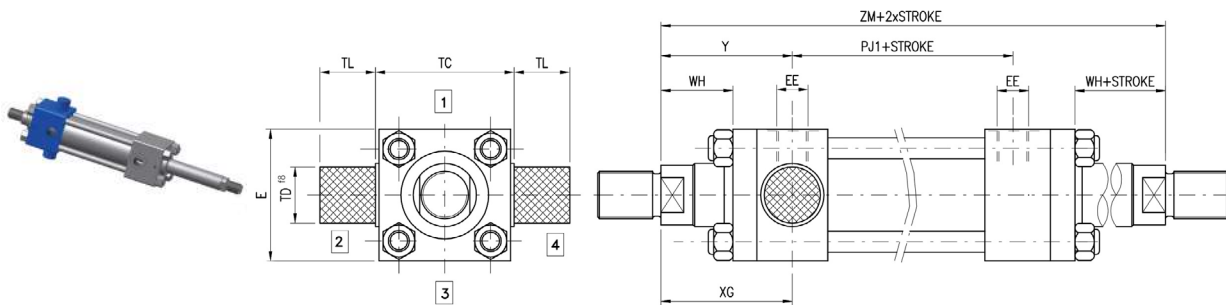
## FA ISO type ME5



BORE	BB	DD	E	EE	F	FB	G	G1	LH	R	SB	ST	SV	SW	TG	TO	TS	UO	US	VE	WF	WH	XS	ZM	Y	PJ1
25	19	M5x0,8	40*	1/4"	10	5,5	25	40	19	27	6,6	8,5	88	8	28,3	51	54	65	72	16	25	15	33	154	50	54
32	24	M6x1	45*	1/4"	10	6,6	25	40	22	33	9	12,5	88	10	33,2	58	63	70	84	22	35	25	45	178	60	58
40	35	M8x1	60	3/8"	10	11	38	45	31	41	11	12,5	105	10	41,7	87	83	110	103	22	35	25	45	195	62	71
50	46	M12x1,25	75	1/2"	16	14	38	45	37	52	14	19	99	13	52,3	105	102	130	127	25	41	25	54	207	67	73
63	46	M12x1,25	90	1/2"	16	14	38	45	44	65	18	26	93	17	64,3	117	124	145	161	29	48	32	65	223	71	81
80	59	M16x1,5	115	3/4"	20	18	45	50	57	83	18	26	110	17	82,7	149	149	180	186	29	51	31	68	246	77	92
100	59	M16x1,5	126	3/4"	22	18	45	50	63	97	26	32	107	22	96,9	162	172	200	216	32	57	35	79	265	82	101
125	81	M22x1,5	165	1"	22	22	58	58	82	126	26	32	131	22	125,9	208	210	250	254	32	57	35	79	289	86	117
160	92	M27x2	196	1"	25	26	58	58	101	155	33	38	121	29	154,9	253	260	300	318	32	57	32	86	293	86	121
200	115	M30x2	240	1 1/4"	25	33	76	76	122	190	39	44	169	35	190,2	300	311	360	381	32	57	32	92	353	98	157

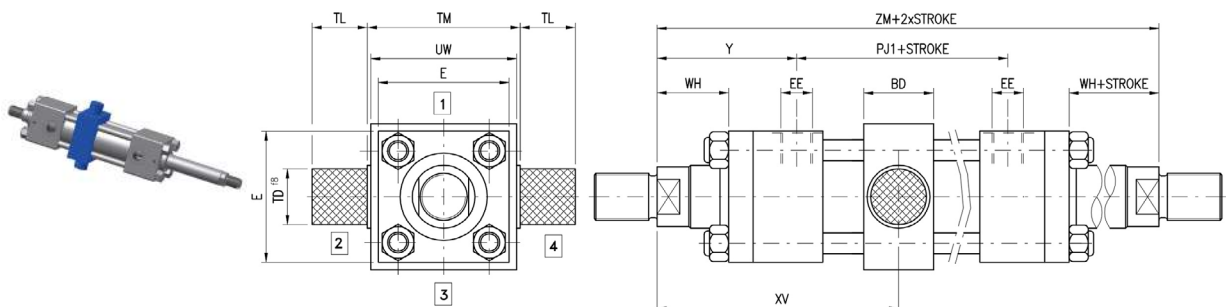
\* On bores 25 and 32 the head is increased by 5mm to house the connection.

**OA** ISO type MT1

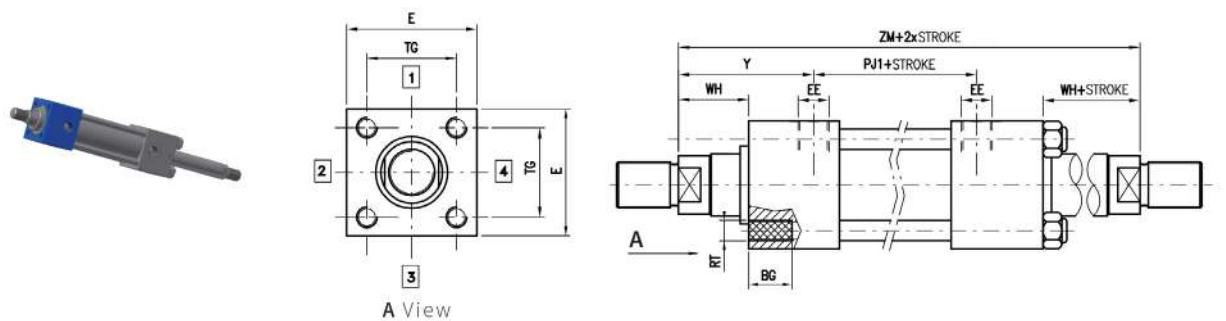


Note: for bores 100 to 200 the head and the flange consist in one single piece and the tie rods are screwed directly on the head.

**OI** ISO type MT4



**ZA** ISO type MX5



BORE	BD	BG min	E	EE	RT	TC	TD	TG	TL	TM	UW	WH	XG	XV min	XV max	ZM	Y	PJ1
25	20	8	40*	1/4"	M5x0,8	38	12	28,3	10	48	46	15	44	82	72 + stroke	154	50	54
32	25	9	45*	1/4"	M6x1	44	16	33,2	12	55	53	25	54	96	82 + stroke	178	60	58
40	30	12	60	3/8"	M8x1,25	63	20	41,7	16	76	74	25	57	107	88 + stroke	195	62	71
50	40	18	75	1/2"	M12x1,75	76	25	52,3	20	89	87	25	64	117	90 + stroke	207	67	73
63	40	18	90	1/2"	M12x1,75	89	32	64,3	25	100	98	32	70	132	91 + stroke	223	71	81
80	48	24	115	3/4"	M16x2	114	40	82,7	32	127	125	31	76	147	99 + stroke	246	77	92
100	58	24	126	3/4"	M16x2	127	50	96,9	40	140	138	35	71	158	107 + stroke	265	82	101
125	68	27	165	1"	M22x2,5	165	63	125,9	50	178	175	35	75	180	109 + stroke	289	86	117
160	88	32	196	1"	M27x3	203	80	154,9	63	215	212	32	75	198	104 + stroke	293	86	121
200	108	40	240	1 1/4"	M30x3,5	241	100	190,2	80	279	276	32	85	226	125 + stroke	353	98	157

\* On bores 25 and 32 the head is increased by 5mm to house the connection.



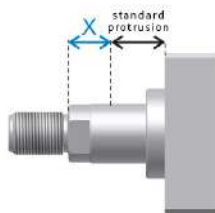
# EXAMPLE OF ORDER ACRONYM

## CH/40/28/0/100/OI01A0000000Q1000R100000XV...

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
<b>SERIES</b>	Tie rod execution	<b>CH</b>	<b>CH/</b>
<b>BORE</b>	Indicate mm		<b>CH/40/</b>
<b>ROD</b>	Indicate mm		<b>CH/40/28/</b>
<b>ROD N°2</b>	Indicate mm (piston rod only)		<b>CH/40/28/0/</b>
<b>STROKE</b>	Indicate mm		<b>CH/40/28/0/100/</b>
<b>EXECUTION</b>	Rear + front protruding tie rods - MX1	<b>AP</b>	<b>CH/40/28/0/100/OI</b>
	Front flange - ME5	<b>FA</b>	
	Rear flange - ME6	<b>FP</b>	
	Feet - MS2	<b>PI</b>	
	Female hinge - MP1	<b>CF</b>	
	Male hinge - MP3	<b>CM</b>	
	Joint hinge -MP5	<b>CS</b>	
	Front trunnion - MT1	<b>OA</b>	
	Intermediate trunnion - MT4	<b>OI</b>	
	Rear trunnion - MT2	<b>OP</b>	
	Front protruding tie rods MX3	<b>TA</b>	
	Rear protruding tie rods - MX2	<b>TP</b>	
	Front treaded holes - MX5	<b>ZA</b>	
	Rear treaded holes - MX6	<b>ZP</b>	
<b>CUSHIONING</b>	None	<b>0</b>	<b>CH/40/28/0/100/OI0</b>
	Front cushioning	<b>1</b>	
	Rear cushioning	<b>2</b>	
	Front + rear cushioning	<b>3</b>	
<b>SPACER</b>	None	<b>0</b>	<b>CH/40/28/0/100/OI01</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Polyurethane (standard)	<b>A</b>	<b>CH/40/28/0/100/OI01A</b>
	Nitrile + PTFE (anti-friction)	<b>B</b>	
	Viton + PTFE (high temperatures)	<b>C</b>	
	Nitrile+carbographite(anti-friction water glycol)	<b>E</b>	
<b>1° ROD ENDS</b>	Type M (standard)	<b>0</b>	<b>CH/40/28/0/100/OI01A0</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
	Hammer head	<b>U</b>	
<b>2° ROD ENDS</b>	Type M (standard)	<b>0</b>	<b>CH/40/28/0/100/OI01A00</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
	Hammer head	<b>U</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	<b>CH/40/28/0/100/OI01A000</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DOUBLE ROD SEAL</b>	None	<b>0</b>	<b>CH/40/28/0/100/OI01A0000</b>
	Double rod seal	<b>L</b>	
<b>DRAINAGE</b>	None	<b>0</b>	<b>CH/40/28/0/100/OI01A00000</b>
	Rod side	<b>W</b>	

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
ROD TREATMENT	None				0	CH/40/28/0/100/OI01A000000 <b>0</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768				P	
	Hardening and chromium-plating				T	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h				N	
PROXIM. SENSORS	None				0	CH/40/28/0/100/OI01A000000 <b>0</b>
	Front				X1	
	Rear				X2	
	Front + rear				X3	
<b>FRONT HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CH/40/28/0/100/OI01A0000000 <b>Q1</b>
POS. CUSHIONING	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q10</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q100</b>
	Side 1	Side 2	Side 3	Side 4		
POS. SENSOR	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q1000</b>
	Side 1	Side 2	Side 3	Side 4		
<b>REAR HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CH/40/28/0/100/OI01A0000000 <b>Q1000R1</b>
POS. CUSHIONING	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q1000R10</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q1000R100</b>
	Side 1	Side 2	Side 3	Side 4		
POS. SENSOR	0 if not requested					CH/40/28/0/100/OI01A0000000 <b>Q1000R1000</b>
	Side 1	Side 2	Side 3	Side 4		
*EXTRA ROD N°1 X1 QUOTE	Indicate mm					CH/40/28/0/100/OI01A0000000 <b>Q1000R10000</b>
*EXTRA ROD N°2 X2 QUOTE	Indicate mm					CH/40/28/0/100/OI01A0000000 <b>Q1000R100000</b>
XV QUOTE	Indicate mm (only version MT4)					CH/40/28/0/100/OI01A0000000 <b>Q1000R100000XV...</b>
<b>OPTIONS</b>						
HYDRAULIC PLATE	ISO Cetop 03				NG03	CH/40/28/0/100/OI01A0000000 <b>Q1000R100000XV.../NG03</b> <i>if requested, indicate at the end of the code</i>
	ISO Cetop 05				NG05	

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



For further information on connections position, air bleeds and standard cushioning adjustment see paragraph 1.6.

Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CHT CYLINDERS SERIES

**STANDARD ISO 6020/2 - 1991 -**  
DIN 24554 160 BAR COMPACT SERIES



**CHT series** integrates **magnetostrictive transducers** that allows to keep track of the rod position. This series is designed to guarantee maximum reliability, high performance and endurance.

The integrated transducer and the technology used, assure precision and lack of friction, as the parts in movement are not in contact with each other.

These characteristics allow the cylinder to operate in heavy working environments, protected from dirt and shock, ensuring maximum reliability of the system and reducing the need of maintenance to a minimum. Transducers can be supplied with analogue, digital or IO/LINK output.

The compact construction that follows **ISO 6020/2 and DIN 24554** standards, with squared heads and tie rods, suits every kind of industrial application with compact dimensions and continuous nominal pressure up to 16 MPa. The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allow Grices to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability.

The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

## Technical specifications:

- Standard ISO 6020/2 and DIN 24554 mounting styles.
- Magnetostrictive position transducer integrated with analogue output signal (intensity or tension) or digital output signal (SSI, CAN-open, PROFIBUS-DP or IO/LINK)
- Nominal pressure 16 MPa (continuous operation)
- Maximum pressure 25 MPa
- Bore 40-200 mm
- Stroke: up to 4000 mm
- Up to 3 rod diameter per bore
- 10 Mounting styles Ref. ISO MP1 - MP3 - MS2 - MT1 - MT2 - MT4 - ME5 - MP5 - MX3 - MX5

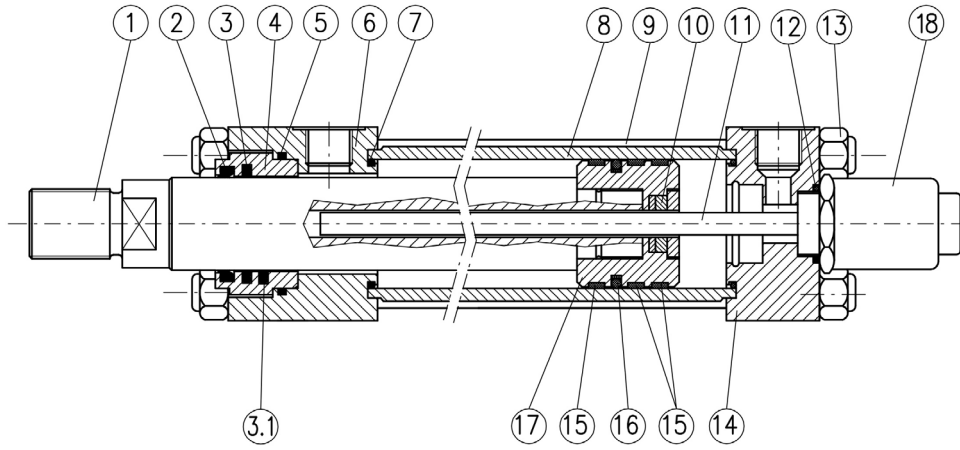
## Options:

- Analogue output signal: 4/20 mA or 0/10 V
- Digital output signal: SSI, CAN-open, PROFIBUS-DP, IO/LINK
- Front cushioning
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed
- Drainage
- Subplate CETOP 03/05
- Protective case

## EPC Cylinder configurator

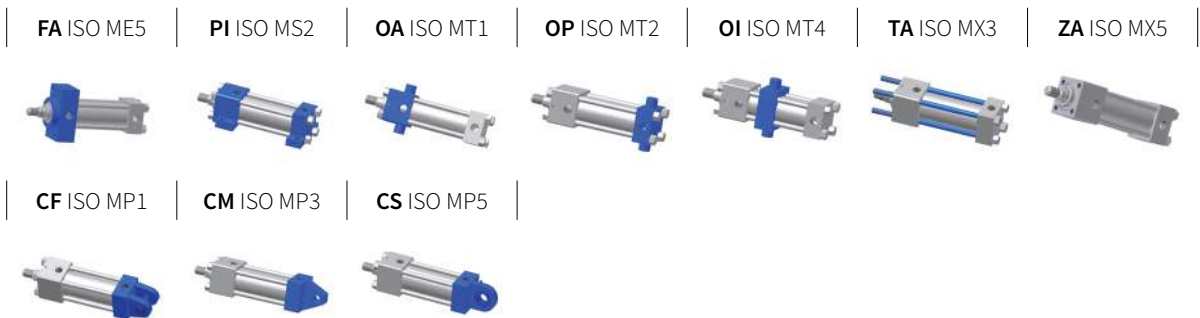
This is an innovative tool that allows the client to configure CHT cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Polyurethane
3	Rod seal	NBR e PTFE / Polyurethane
3.1	2° Rod seal (option L)	NBR e PTFE
4	Guide sleeve	Spheroidal cast iron
5	O-Ring + PBK	NBR + Polyurethane
6	Head	Steel
7	O-Ring + PBK	NBR + Polyurethane
8	Body	Steel
9	Tie rod	Steel
10	Magnet	-
11	Waveguide	Steel
12	O-Ring	NBR
13	Self-braking nut	Steel
14	Rear head	Steel
15	Anti-friction slide	PTFE
16	Piston B seal	NBR
17	Piston	Steel
18	Position transducer	-

**Mounting style**



# TECHNICAL CHARACTERISTICS



**STANDARD ISO 6020/2 - 1991 -**  
 DIN 24554 160 BAR COMPACT SERIES

## LINEAR POSITION TRANSDUCERS

To immediately check the rod position, install a linear position transducer.

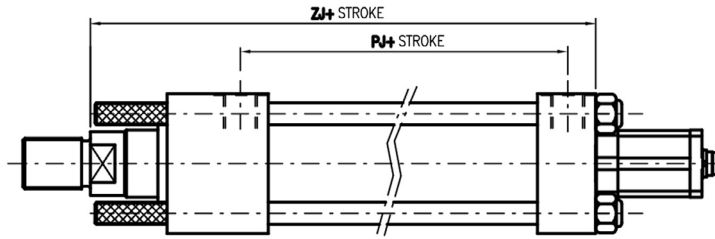
The magnetostrictive technology allows to detect the rod position even in heavy duty conditions and/or high frequency applications, avoiding the contact between the moving parts.

The transducer, in addition to offering a high reliability, permits easy maintenance. Analogue or digital versions are available.

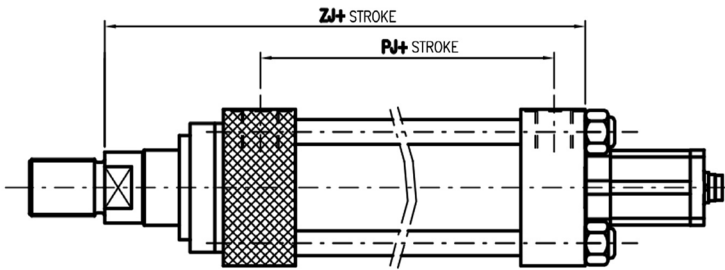
<b>Resolution</b>	0,01 mm
<b>Independent linearity</b>	±0,05 % (% of the total stroke)
<b>Repeatability</b>	±0,01 % (% of the total stroke)
<b>Max. speed</b>	2 m/sec
<b>Working temperature</b>	-20 +80 °C
<b>Analogue/digital signal</b>	0+10 V 10+0 V or 4+20 mA / SSI, CAN OPEN, PROFIBUS DP, IO/LINK
<b>Strokes</b>	50÷3850 mm
<b>Max. transducer pressure</b>	35 MPa (350 Bar)
<b>Power supply</b>	24 V DC ±10 %
<b>Protection degree (connector installed)</b>	IP-67

1.1 AVAILABLE VERSIONS AND DIMENSIONS

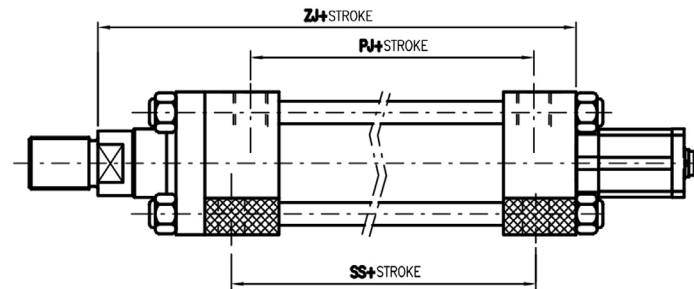
**TA** ISO type MX3



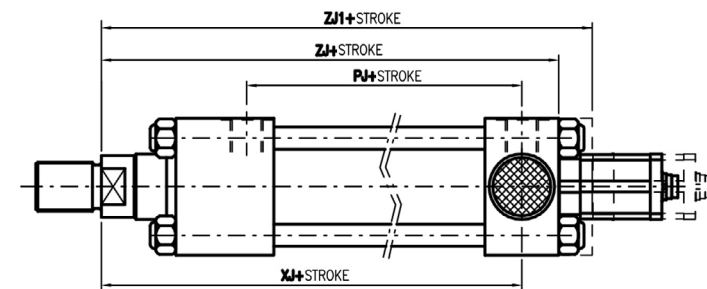
**FA** ISO type ME5



**PI** ISO type MS2

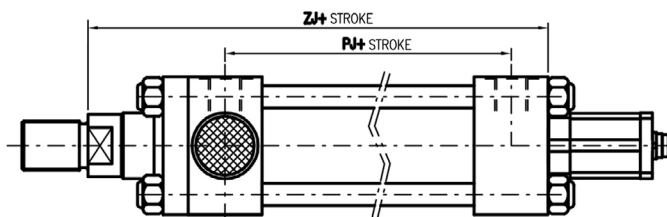
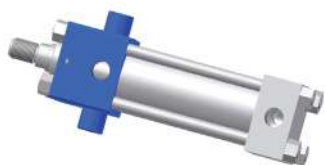


**OP** ISO type MT2

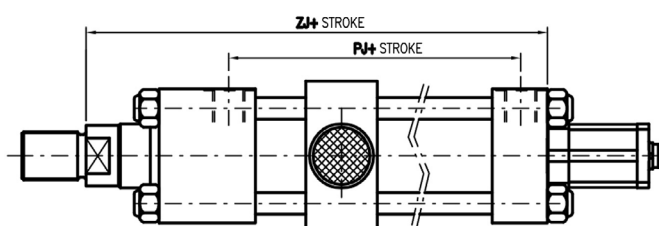
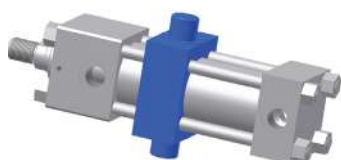


OP: (ISO MT2)

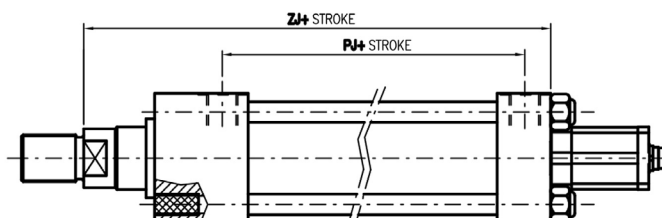
**OA** ISO type MT1



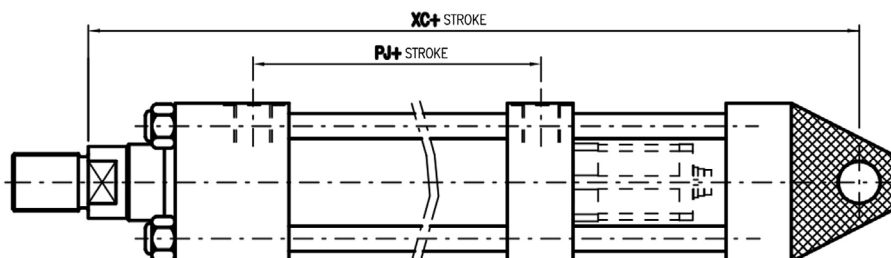
**OI** ISO type MT4



**ZA** ISO type MX5

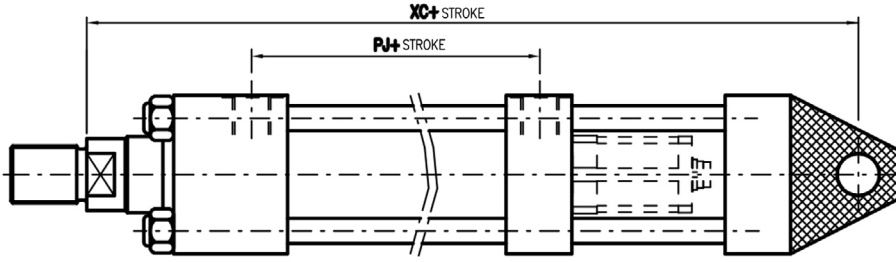


**CM** ISO type MP3

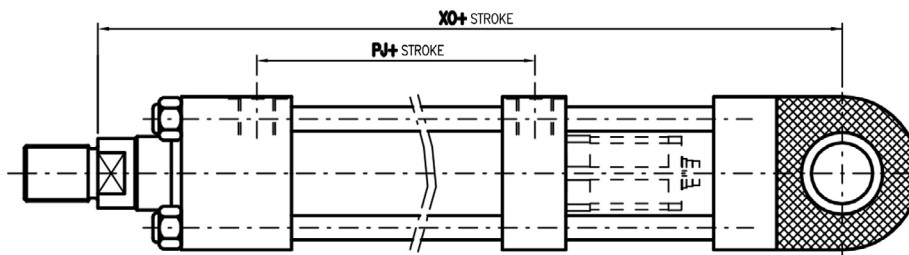




**CF** ISO type MP1

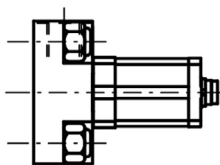


**CS** ISO type MP5



BORE	PJ	SS	XC	XJ	XO	ZJ	ZJ1
40	*107	*132	NA	*168	NA	*187	NA
50	*108	*126	NA	*174	NA	*193	NA
63	*112	*118	*444	*181	*450	*200	NA
80	93	105	*494	168	*503	190	NA
100	101	102	*536	187	*540	203	216
125	232	131	*575	209	*590	232	244
160	121	130	*607	230	*636	245	273
200	158,5	172	*694	276	*728	299	331

\* Dimensions not ISO



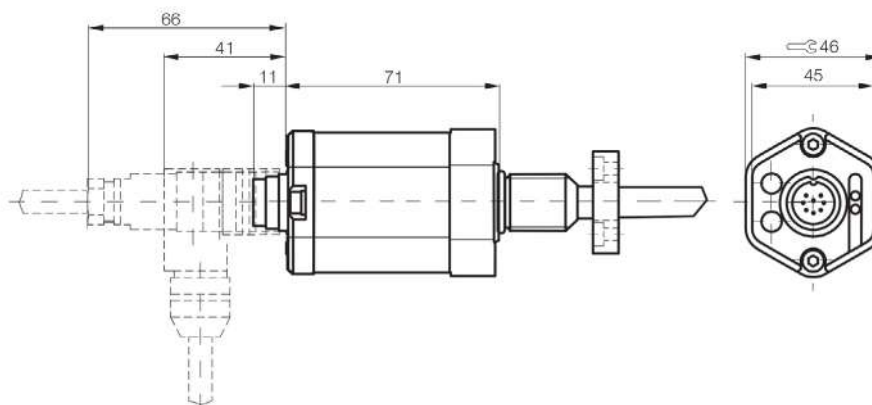
Nuts configuration for bottom head bore 40-50  
Mounting style TA - FA - PI - OP - OA - OI - ZA

## 1.2 TRANSDUCERS DIMENSION

Transducers dimension **TYPE UT - UC - SI** with connector type:

**STRAIGHT CBKS-S 32-00: Y1**

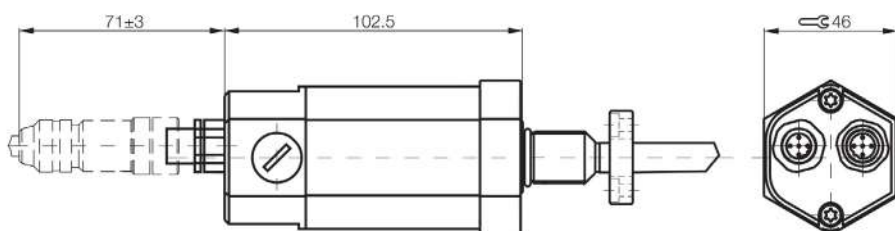
**90° CBKS-S 33-00: Y2**



Transducers dimension **TYPE HH** with connector type **Y4**:

**CBKS-S 92-00**

**CBKS-S 94-00**

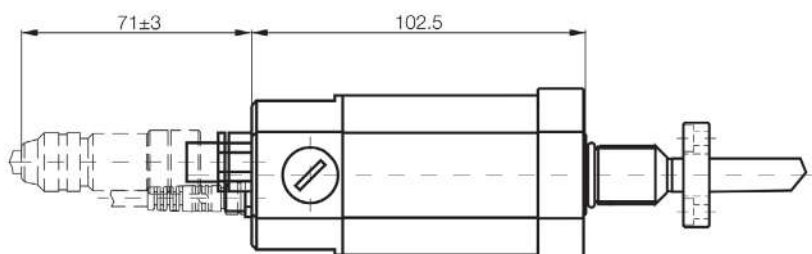


Transducers dimension **TYPE TT** with connector type **Y3**:

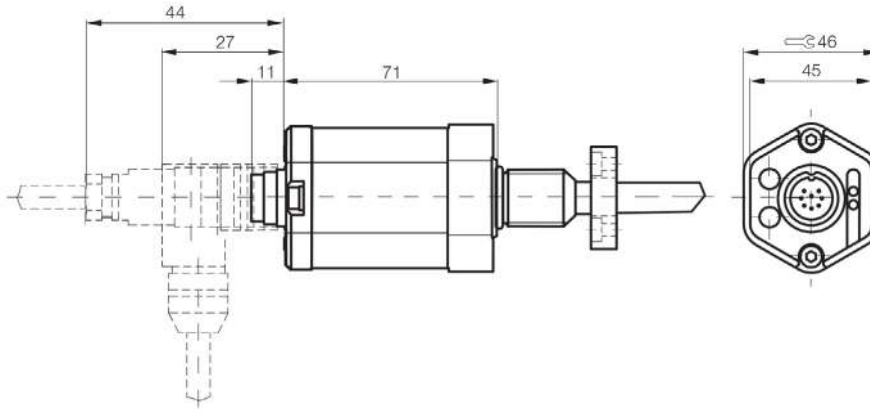
**CBKS-S 105-00**

**CBKS-S 103-00**

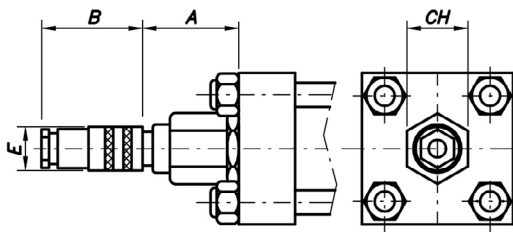
**CBKS-S 48-15-CP-05**



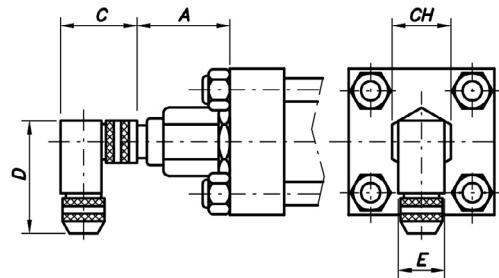
Transducers dimension **TYPE IO/LINK** with outlets **Y5** and **Y6**



**1.3 CONNECTORS DIMENSION**



Type: CBKS-S 32 M-00



Type: CBKS-S 33 M-00

Type	A	B	C	D	E	CH
CBKS-S 32 M-00	74	69	-	-	18	46
CBKS-S 33 M-00	74	-	48	54	20	46

Connection	Pin	Color
3	1	Yellow
7	2	Grey
5	3	Pink
2	5	Green
8	6	Blue
6	7	Brown
1	4	White

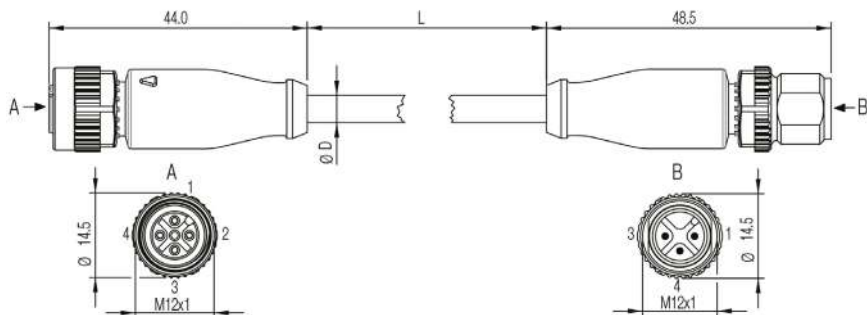
View from the bushing weld side

**IO/LINK CONNETTORS**

Position transducer (A)		IO/LINK Master (B)
1	L+ (18...30 V)	1
2	None	-
3	L- (GND)	3
4	C/Q	4

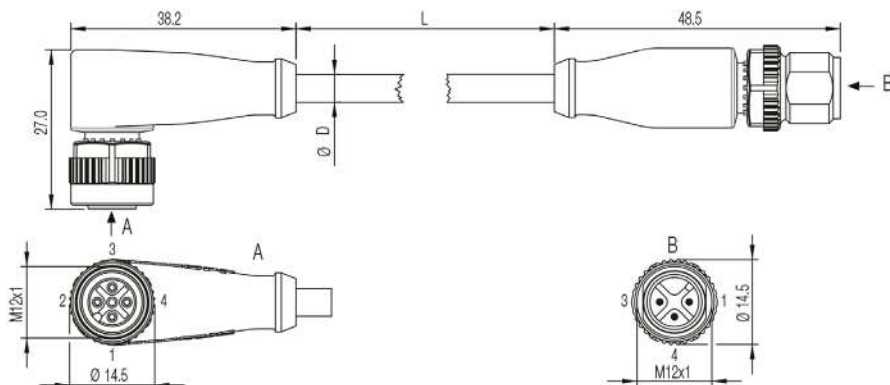
**Straight outlet - straight connector option Y5 - IO/LINK**

PBCC0374 with 4m cable



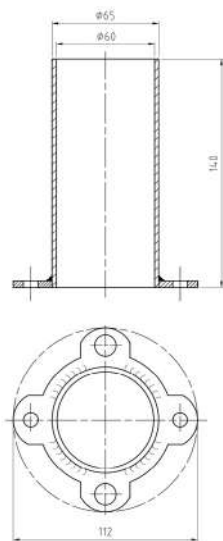
**Angled outlet - straight connector option Y6 - IO/LINK**

PBCC037M with 4m cable



**1.4 SENSOR PROTECTION DIMENSIONS**

For bore 63 mm onwards



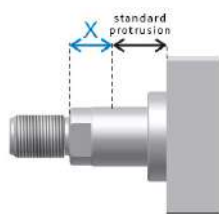
# EXAMPLE OF ORDER ACRONYM

**CHT/50/28/530/OI00BUT00000Y1Q132R120XV...**

CHARACTERISTIC	DESCRIPTION	SYM.	EXMAPLE
<b>SERIES</b>	Tie rod execution	<b>CHT</b>	<b>CHT/</b>
<b>BORE</b>	Indicate in mm		CHT/ <b>50/</b>
<b>ROD</b>	Indicate in mm		CHT/50/ <b>28/</b>
<b>STROKE</b>	Indicate in mm		CHT/50/28/ <b>530/</b>
<b>EXECUTION</b>	Front flange	<b>FA</b>	CHT/50/28/530/ <b>OI</b>
	Feet	<b>PI</b>	
	Female hinge	<b>CF</b>	
	Male hinge	<b>CM</b>	
	Joint hinge	<b>CS</b>	
	Front trunnion	<b>OA</b>	
	Intermediate trunnion	<b>OI</b>	
	Rear trunnion	<b>OP</b>	
	Front protruding tie rods	<b>TA</b>	
	Front treaded holes	<b>ZA</b>	
<b>CUSHIONING</b>	None	<b>0</b>	CHT/50/28/530/OI <b>0</b>
	Front cushioning	<b>1</b>	
<b>SPACER</b>	None	<b>0</b>	CHT/50/28/530/OI <b>00</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Nitrile+PTFE (anti-friction)	<b>B</b>	CHT/50/28/530/OI <b>00B</b>
<b>TRANSDUCER OUTPUT</b>	Tension 0-10 V UT	<b>UT</b>	CHT/50/28/530/OI <b>00BUT</b>
	Electrical current 4-20 M	<b>UC</b>	
	SSI Iterface	<b>SI</b>	
	CANopen Iterface	<b>HH</b>	
	PROFIBUS Interface	<b>TT</b>	
	IO/LINK Interface	<b>LK</b>	
<b>ROD END</b>	Type M (standard)	<b>0</b>	CHT/50/28/530/OI <b>00BUT0</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
	Hammer head	<b>U</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	CHT/50/28/530/OI <b>00BUT00</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DOUBLE ROD SEAL</b>	None	<b>0</b>	CHT/50/28/530/OI <b>00BUT000</b>
	Double rod seal	<b>L</b>	
<b>DRAINAGE</b>	None	<b>0</b>	CHT/50/28/530/OI <b>00BUT0000</b>
	Rod side	<b>W</b>	
<b>ROD TREATMENT</b>	Standard chromium-plated	<b>0</b>	CHT/50/28/530/OI <b>00BUT00000</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768	<b>P</b>	
	Hardening and chromium-plating	<b>T</b>	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h	<b>N</b>	
<b>CONNECTOR</b>	None	<b>0</b>	CHT/50/28/530/OI <b>00BUT000000</b>
	Straight CBKS-S 32 M-00	<b>Y1</b>	
	Angled 90° CBKS-S 33 M-00	<b>Y2</b>	

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
CONNECTOR	Male connector CBKS-S-105-00				Y3	CHT/50/28/530/OI00BUT000000
	Female connector CBKS-S-103-00					
	Supply cable CBKS-S 48-15-CP-05					
	Female connector CBNS-S92-00				Y4	
	Male connector CBNS-S94-00				Y5	
	Straight outlet - straight connector PBCC 0374				Y6	
	Angled outlet - straight connector PBCC 037M					
<b>FRONT HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CHT/50/28/530/OI00BUT000000 <b>Q1</b>
POS. CUSHIONING	0 if not requested					CHT/50/28/530/OI00BUT000000 <b>Q13</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CHT/50/28/530/OI00BUT000000 <b>Q132</b>
	Side 1	Side 2	Side 3	Side 4		
<b>REAR HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CHT/50/28/530/OI00BUT000000 <b>Q132R1</b>
POS. AIR BLEED	0 if not requested					CHT/50/28/530/OI00BUT000000 <b>Q132R12</b>
	Side 1	Side 2	Side 3	Side 4		
*EXTRA ROD X1 QUOTE	Indicate mm					CHT/50/28/530/OI00BUT000000 <b>Q132R120</b>
XV QUOTE	Indicate mm (only version MT4)					CHT/50/28/530/OI00BUT000000 <b>Q132R120XV...</b>

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

**Note**

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant. For further information contact our Technical Department.



# CHM CYLINDERS SERIES

**STANDARD ISO 6020/2 - 1991 -**  
DIN 24454 160 BAR COMPACT SERIES



**CHM cylinder series**, with **adjustable proximity sensors**, derives from the CH series and follows international standards **ISO 6020/2 and DIN 24554**. The compact construction with squared heads and tie rod fits to every kind of industrial application with continuous nominal pressure up to **12 MPa**.

The tube in stainless steel and the piston with integrated permanent magnet allows the sensor to detect the rod position. These sensors can be used to execute sequences of cycles or to set the desired position. The sensors are mounted with adjustable brackets on the tie rods and can be positioned along all cylinder stroke. As the sensors detect the integrated permanent magnet of the piston, the commutation of the electrical circuit occurs.

The sensor available is: **KPN** type, electronic with high sensitivity and infinite electronic life, with 3 circuit cables.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allow us to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

## Technical specifications:

- Standard ISO 6020/2 and DIN 24554.
- Adjustable proximity sensors type KPN "Hall effect" IP67
- Nominal pressure 12 MPa (continuous operation)
- Maximum pressure 16 MPa
- Bore 25-100 mm
- Stroke up to 4000 mm
- Single or double rod
- Up to 3 rod diameter per bore
- 13 Mounting styles Ref. ISO MP1 - MP3 - MS2 - MT1 - MT2 - ME5 - ME6 - MP5 - MX6 - MX2 - MX5 - MX3 - MX1

## Options:

- Fixed or adjustable cushionings
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed
- Drainage

## EPC Cylinder configurator

This is an innovative tool that allows the client to configure CHM cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available.

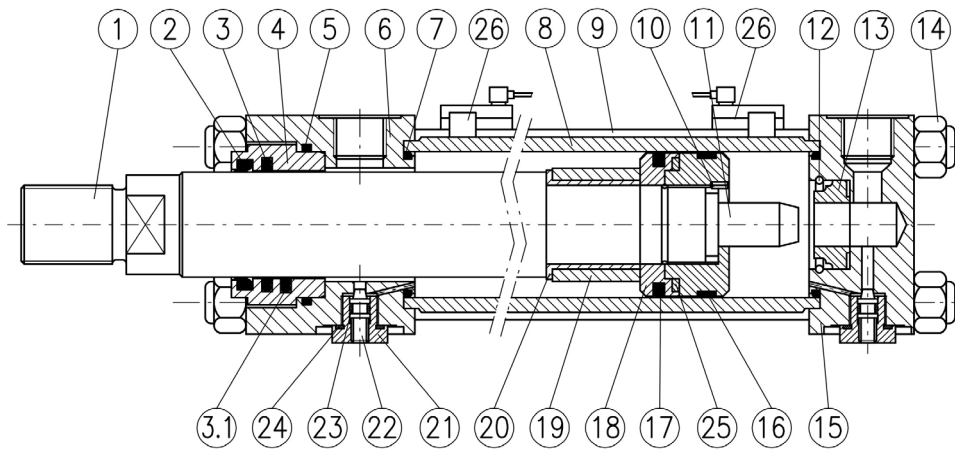
Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers.

With the complete access, reserved to the purchasing department, it is possible to make orders directly.

For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>





N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Polyurethane
3	Rod seal	Polyurethane / PTFE
3.1	2nd Rod seal (option L)	Polyurethane / PTFE
4	Guide sleeve	Cast iron
5	O-Ring + PBK	Nitrile rubber + Polyurethane
6	Head	Steel
7	O-Ring + PBK	Nitrile rubber + Polyurethane
8	Body	Nonmagnetic stainless steel
9	Tie rod	Steel
10	Safety pin	Steel
11	Cushioning spur	Steel
12	Toroidal ring	Steel
13	Rear cushioning bushing	Bronze
14	Self-braking nut	Steel
15	Rear head	Steel
16	Anti-friction slide	PTFE
17	Piston seal	Nitrile rubber PTFE / Polyurethane
18	Piston	Nonmagnetic steel
19	Front cushioning sleeve	Steel
20	Spacer	Steel
21	Safety plug	Steel
22	Adjustment needle	Steel
23	O-Ring	Nitrile rubber
24	Locknut	NBR
25	Position indicator	-
26	Sensor switch	-

**Mounting style**



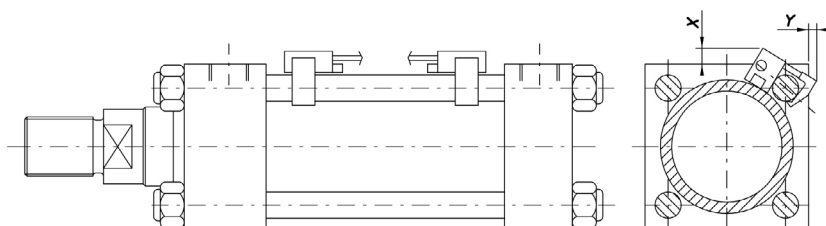
# TECHNICAL CHARACTERISTICS

STANDARD ISO 6020/2 - 1991 -  
DIN 24454 160 BAR COMPACT SERIES



## ADJUSTABLE POSITION SENSORS

The sensors mounted on the cylinder body and detect the presence of the magnetic field created by the magnet inside the cylinder. The sensor is a switch and accordingly must be always mounted in series to a load (of inductive, resistive or capacitive type), without exceeding the limits of its electrical characteristics. The LED sensors work at a minimum voltage of 20V, because of their display circuit. Sensors are provided with 3 m long cable. The sensor dimensions are indicated in the table below, and must be added to dimensions specified for series CH.

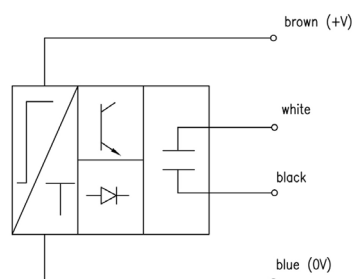


Bore	25	32	40	50	63	80	100
X (mm)	33	32	29	26	24	21	22
Y (mm)	21	23	17	15	14	10	12

## TECHNICAL CHARACTERISTICS

PARAMETER	Unit	SFM01
Nominal voltage DC	V	24 ±20%
Visual signal led	-	SI
Relay contact output	-	SI
PNP output	-	SI
NPN output	-	SI
Reverse polarity protection	-	SI
Short circuit protection	-	SI
Inductive load protection	-	SI
Power supply noise protection	-	SI
Electrical nominal life (worst case)	n	200.000
Mechanical nominal life (worst case)	n	10e7
Position repeatability const. temp.	mm	0,1
Hysteresis		0,3
Switch off time (15-80ms)	-	SI
Max working temperature	°C	70
Protection level	-	IP67
Max. admitted current	A	1 30W
Delay	msec	15
Armoured cable 4x0.25	-	-

### Circuit



## AVAILABLE MODELS

The OI execution is not available. Any other execution is manufactured with 25 to 100mm bore.

## SENSOR INSTALLATION

When the sensors are located near the cylinder heads (< 15mm), magnetic interference can occur, caused by the magnetic field generated by the piston magnet and cylinder heads. This can cause difficulties in sensors commutation.

For further information contact our Technical Department.

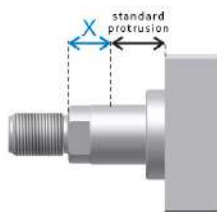
# EXAMPLE OF ORDER ACRONYM

## CHM/50/28/0/530/FA00A00I000KPN0Q132R13200

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
<b>SERIES</b>	Tie rod execution, with magnetic sensors	<b>CHM</b>	<b>CHM/</b>
<b>BORE</b>	Indicate in mm		CHM/ <b>50/</b>
<b>ROD</b>	Indicate in mm		CHM/50/ <b>28/</b>
<b>ROD N°2</b>	Indicate in mm (piston rod only)		CHM/50/28/ <b>0/</b>
<b>STROKE</b>	Indicate in mm		CHM/50/28/0/ <b>530/</b>
<b>EXECUTION</b>	Rear + front protruding tie rods	<b>AP</b>	CHM/50/28/0/530/ <b>FA</b>
	Front flange	<b>FA</b>	
	Rear flange	<b>FP</b>	
	Feet	<b>PI</b>	
	Female hinge	<b>CF</b>	
	Male hinge	<b>CM</b>	
	Joint hinge	<b>CS</b>	
	Front trunnion	<b>OA</b>	
	Rear trunnion	<b>OP</b>	
	Front protruding tie rods	<b>TA</b>	
	Rear protruding tie rods	<b>TP</b>	
	Front treaded holes	<b>ZA</b>	
	Rear treaded holes	<b>ZP</b>	
	<b>CUSHIONING</b>	None	
Front cushioning		<b>1</b>	
Rear cushioning		<b>2</b>	
Front + rear cushioning		<b>3</b>	
<b>SPACER</b>	None	<b>0</b>	CHM/50/28/0/530/FA <b>00</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Elastomer + nitrile (standard)	<b>A</b>	CHM/50/28/0/530/FA <b>00A</b>
	Nitrile + ptfе (anti-friction)	<b>B</b>	
<b>1° ROD ENDS</b>	Type M (standard)	<b>0</b>	CHM/50/28/0/530/FA <b>00A0</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
	Hammer head	<b>U</b>	
<b>2° ROD ENDS</b>	Type M (standard)	<b>0</b>	CHM/50/28/0/530/FA <b>00A00</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
	Hammer head	<b>U</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	CHM/50/28/0/530/FA <b>00A00I</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DOUBLE ROD SEAL</b>	None	<b>0</b>	CHM/50/28/0/530/FA <b>00A00I0</b>
	Double rod seal	<b>L</b>	
<b>DRAINAGE</b>	None	<b>0</b>	CHM/50/28/0/530/FA <b>00A00I00</b>
	Rod side	<b>W</b>	

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
ROD TREATMENT	None				0	CHM/50/28/0/530/FA00A00I000
	Heavy chromium-plated, 0.045Mm thick, 100H salt mist iso 3768				P	
	Hardening and chromium-plating				T	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h				N	
SENSOR SWITCHES	None				0	CHM/50/28/0/530/FA00A00I000KPN
	SFM 01				KPN	
N° OF SWITCHES	Indicate quantity					CHM/50/28/0/530/FA00A00I000KPN0
<b>FRONT HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CHM/50/28/0/530/FA00A00I000KPN0Q1
POS. CUSHIONING	0 if not requested					CHM/50/28/0/530/FA00A00I000KPN0Q13
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CHM/50/28/0/530/FA00A00I000KPN0Q132
	Side 1	Side 2	Side 3	Side 4		
<b>REAR HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CHM/50/28/0/530/FA00A00I000KPN0Q132R1
POS. CUSHIONING	0 if not requested					CHM/50/28/0/530/FA00A00I000KPN0Q132R13
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CHM/50/28/0/530/FA00A00I000KPN0Q132R132
	Side 1	Side 2	Side 3	Side 4		
*EXTRA ROD N°1 X1 QUOTE	Indicate mm					CHM/50/28/0/530/FA00A00I000KPN0Q132R1320
*EXTRA ROD N°2 X2 QUOTE	Indicate mm					CHM/50/28/0/530/FA00A00I000KPN0Q132R13200
<b>OPTIONS</b>						
HYDRAULIC PLATE	ISO Cetop 03				NG03	if requested, indicate at the end of the code CHM/50/28/0/530/FA00A00I000KPN0Q132R13200/NG03
	ISO Cetop 05				NG05	

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CA CYLINDERS SERIES

STANDARD ISO 6020/1



**CA cylinders** series follows international standard **ISO 6020/1**. The compact construction with round head fits to the most demanding and challenging industrial actuation requests with continuous nominal pressure up to **16 MPa**.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allow us to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature. Our production includes the optional integration of position transducers (*see CAT series*).

## Technical characteristics:

- Standard ISO 6020/1
- Nominal pressure 16 MPa (continuous operation)
- Maximum pressure 25 MPa
- Bore 40-320 mm
- Stroke up to 4000 mm
- Single or double rod
- Up to 2 rod diameter per bore
- 8 Mounting styles Ref. ISO MP3 - MF4 - MF3 - MS2 - MT4 - MF1 - MF2 - MP5
- Wide range of accessories for rod end and mounting styles

## Options:

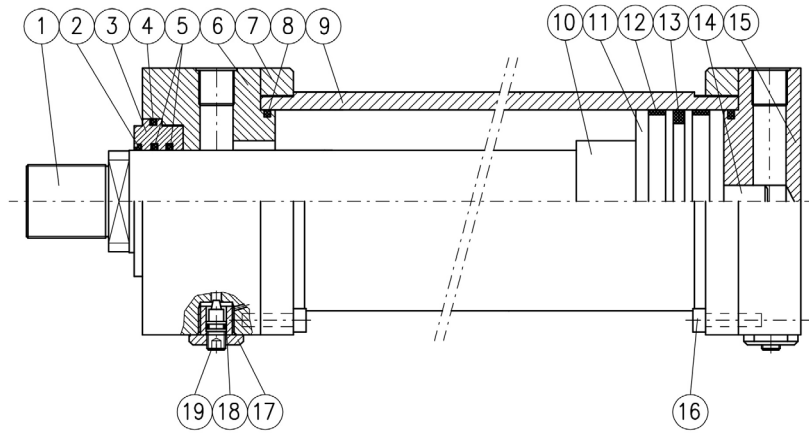
- Fixed or adjustable cushionings
- Wide range of seals to suit speed, frequency, temperature and fluid specification
- Proximity sensor integrated in cylinder heads
- Magnetostrictive position transducer integrated with analogue output signal (intensity or tension) or digital output signal (SSI, CAN-open, PRODIFUB-DP or IO/LINK) (*see CAT series*)
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed, inox
- Subplate CETOP 03/05
- Drainage

## Configuratore EPC

This is an innovative tool that allows the client to configure CA cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available.

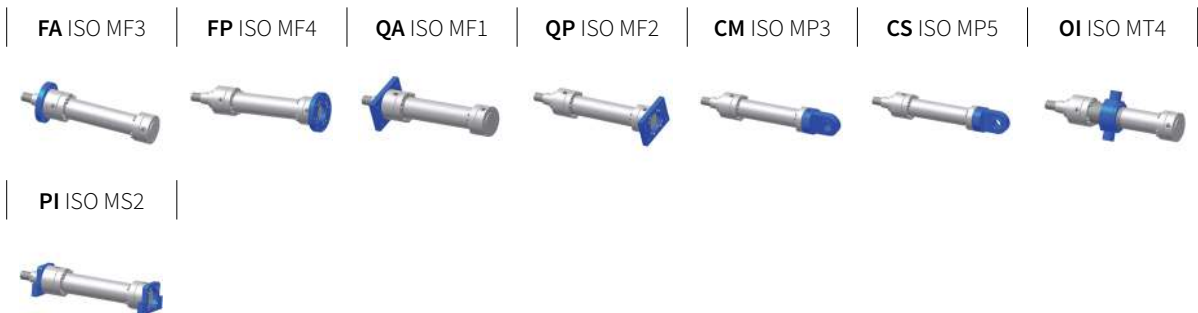
Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Polyurethane
3	Guide sleeve	Spheroidal cast iron
4	O-Ring + anti-extrusion	NBR + Polyurethane
5	Rod seal	NBR/PTFE
6	Front head	Steel
7	Counterflange	Steel
8	O-Ring + anti-extrusion	NBR + Polyurethane
9	Body	Steel
10	Front cushioning sleeve	Steel
11	Piston	Steel
12	Sliding guide	MCF80
13	Piston B seal	NBR/PTFE
14	Rear cushioning	Steel
15	Rear head	Steel
16	Cylindrical head screw	Steel
17	Safety plug	Steel
18	O-Ring	NBR
19	Adjustment needle	Steel

### Mounting style



# TECHNICAL CHARACTERISTICS



STANDARD ISO 6020/1

## CHOOSING THE PRODUCTION SERIES

In order to identify the production series ensure that while the plant is working, the operating pressures indicated for each series are not exceeded. The general dimensioning of the cylinder ensures wide safety margins. Do not exceed the maximum pressure value that corresponds to the test pressure, considering also any overpressure caused by throttle valves in the circuits and/or by vertical loads with downward rods and end of stroke cushioning (see paragraph 1.7).

We recommend adopting strokes longer by a few millimetres than the working stroke, in order to prevent the use of the use of the cylinder's internal stops as a mechanical end of stroke. Also check that the expected working temperature and speed are consistent with the type of seals installed.

### 1.1 HYDRAULIC CYLINDERS – SERIES CA

The CA hydraulic cylinders are dimensioned according to standard ISO 6020/1;

- Manufactured according to CNC technology, with top-quality materials, they provide maximum reliability and duration.
- The use of standard components during assembly facilitates the replacement of any worn components.
- They can be equipped with progressive cushions of rear and front end of stroke, consisting of self-centering spurs that can slow-down gradually the masses concerned, even of considerable size.
- The seals used are standard, and provide reliability and easy availability on the market. The available seals selection fits different speed, frequency, temperature and fluid conditions

### 1.2 RANGE OF USE OF CA CYLINDER

Nominal pressure 16 Mpa

Maximal pressure 25 Mpa

### 1.3 CYLINDER BODY

The cylinder body is made up of a top-quality thick steel tube, either cold drawn or hot laminated, with elevated thickness and accurate internal surface (roughness  $RA \leq 0.4$  micron, diameter tolerance H8).

### 1.4 ROD

Rods are made with top-quality steel and coated with hard chrome. This surface treatment ensures proper protection against any damage and corrosion, favouring the seals' endurance. The minimum surface finish is 0.2 micron. Rods with strong chrome filling, induction-hardened, inox/chromed or made of special steel, can be manufactured on demand.

### 1.5 HEAD

Heads are made of steel and are manufactured to ensure perfect concentricity between the cylinder body, the rod bearing and the rod. Wide inner passages are manufactured to minimize any load loss when the fluid is conveyed.

### 1.6 PISTON

The piston is made with a special material, specially processed to ensure a concentric guide between rod cushioning sleeve, cylinder body and head cushioning sleeve. A large part of the radial surface is in contact with the cylinder body. This confers considerable stability, so that any rod bending, caused by external radial loads, is minimized.



### 1.7 END OF STROKE CUSHIONING

The end of stroke cushioning is usually adopted on all cylinders working at a speed > 0.1 m/sec., or when loads in vertical direction are activated. This cushioning is also a safety device in case of servo-systems control equipment failure. The ratio below makes it possible to promptly calculate, based on the cylinder bore (cushioning section), the supply pressure, the cushioning length and the working speed, as well as the mass that can be cushioned by every single cylinder. This reaction limits the overpressure value to 250 bar, protecting the cylinder's components that are under stress during braking.

$$M = \frac{(p_2 \cdot S - p_1 \cdot A) \cdot 2 \cdot L_f}{V_0^2} \cdot 10^{-2} \quad [\text{kg}]$$

$P_1$  - supply pressure (bar)

$P_2$  - maximum pressure 250 (bar)

$V_0$  - working speed (m/s)

$S$  - cushioning section  $S_1$  or  $S_2$  (cm<sup>2</sup>)

$L_f$  - cushioning length  $L_{f1}$  or  $L_{f2}$  (mm)

$A$  - piston area (cm<sup>2</sup>)

The cushioned mass values obtained from this ratio are simply theoretical, and Grices accepts no responsibility for the use of this ratio. The data to be inserted in the ratio to calculate the mass that can be cushioned may be obtained from the following table.

Bore (mm)	40	50	63	80	100	125	160	200	250	320
$S_1$ (cm <sup>2</sup> ) rod forward	5,5	8,2	13,8	23,8	37,8	56	102	151	177	352
$S_2$ (cm <sup>2</sup> ) rod backward	11,4	18,5	29,1	46,4	73,2	114	189	294	471	748
$L_f$ (mm)	28	30	30	30	32	32	40	46	95	100
$A$ (cm <sup>2</sup> )	17,6	19,6	31,2	50,3	78,5	122,7	201,1	314,2	490,6	803,8

The standard cushioning is in position 3 (figure A); it is possible to request a different cushioning position.

### 1.8 CUSHIONING ADJUSTMENT

For a precise cushioning adjustment, both ends of the cylinder are equipped with control valves, as shown in figure on the right.

These devices are equipped with a system that prevents their accidental removal. These devices are located on side 3.

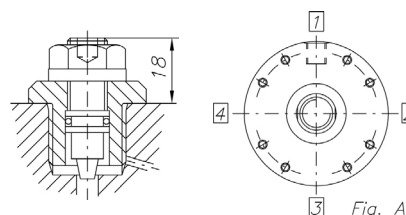


Fig. A

### 1.9 SPACERS

Cylinders with strokes > 1000mm should be equipped with spacers of adequate design that increase the rod and piston guide, in order to reduce any overload phenomena and premature wear.

The spacer allows increase of the contact surface between piston and cylinder body, improving the system rigidity.

The table below indicates the spacer length based on stroke; for the stroke values not included in the table, contact our technicians. As a general rule, spacers are not mounted on cylinders when strokes are < 1000mm and on cylinders subjected to only one pulling action.

STROKE (mm)	1001 a 1500	1501 a 2000	2001 a 2500	2501 a 3000
Spacer symbol	1	2	3	4
Length (mm)	50	100	150	200

### 1.10 SEALS

On the basis of particular working conditions of the cylinders, such as speed, fluid used and temperature, the relevant seal shall be chosen in conformity with the manufacturer's recommendations.

Our cylinders feature low-friction seals with seats conforming to the provisions of ISO 7425, that allow our cylinders to work under the heaviest conditions, such as very low or high speed, high working frequency, mineral or synthetic fluids.

The type of seals to be used in the relevant working conditions are indicated below:

- **TYPE A: (STANDARD)** usually supplied in the absence of particular recommendations, considerable sealing at low pressure, to be used for speeds up to 0.5 m/sec., at temperatures ranging between -20 and +80°C, operation with mineral oil, air, nitrogen.
- **TYPE B: (NITRILE+PTFE)** anti-friction, not recommended when loads are to be held in position, and recommended at speeds ≤ 4 m/sec., at temperatures ranging between -10 and +75°C, operation with mineral oil or glycol water.
- **TYPE C: (VITON+PTFE)** anti-friction, not recommended when loads are to be held in position, for high-temperature fluids, up to +135°C, maximum speed 4m/sec. Can be used also with phosphoric esters.

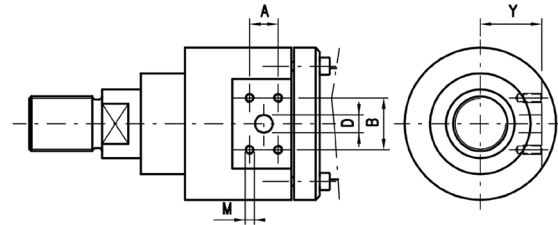
### 1.11 OIL PORTS

Oil ports are BSP threaded, with boring conforming to DIN 3852/2, standard position 1 in figure A; other alternative positions can be provided on demand. Optional presetting for mounting SAE 6000 flanges (*contact our Technical Department*).

In order to reduce as much as possible any turbulence and water hammer in the cylinder's connecting pipes, the oil speed does not exceed 6 m/sec. The maximum flow rates that can be obtained with these criteria are shown in the table below.

OIL PORT Ø	1/2"	3/4"	1"	1 1/4"	1 1/2"
MAX. FLOW RATE (l/mm)	40	53	85	136	212

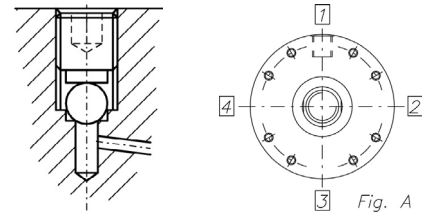
BORE	FLANGE SAE 3000					
	Flange DN	Y	A	B	D	M
100	19	71	22,2	47,6	19	M10x1,5
125		89				
160	25	110	26,2	52,4	25	
200		137				
250	32	177	30,2	58,7	32	
320		220				



### 1.12 AIR BLEEDS

Air bleeds are provided on demand on both ends of the cylinder. Bleeds are mounted inside the head and the bottom, so as to be protected from any accidental removal, as shown in the figure on the right.

Standard position: 2 in figure A; other alternative positions can be provided on demand.



### 1.14 DRAINAGE

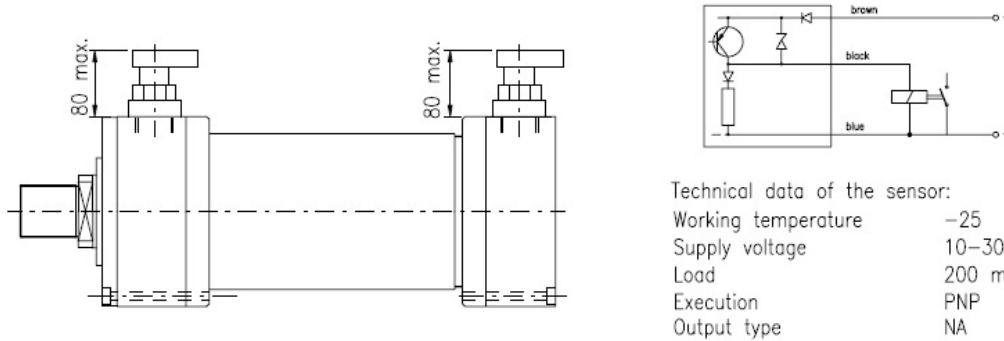
The drainage on the rod seal ensures better sealing at high speed, in particular in cylinders with strokes > 2000mm or in applications where the rod side chamber is constantly under pressure. The drainage port (1/8") is usually positioned on the same axis of the supply port and must be directly connected to the tank.

**For any further explanations on this matter, please contact our Technical Department.**

### 1.14 PROXIMITY SENSORS

When the piston position needs to be detected in any hydraulic system, proximity sensors can be mounted directly in the cylinder heads. The operating temperature is  $-25$  to  $+80^{\circ}\text{C}$ . Allowed dynamic pressure 350 bar.

The sensor is provided with a built-in amplifier, with direct supply (10 to 30Vdc) with an analog PNP output for 200mA max., supplied complete with connector with a 4m long cable. Sensors can be mounted on head and bottom, and are arranged on side 4 of the cylinder. It is possible to request a different positioning. Sensors offer the possibility to obtain an electric signal near the end of stroke positioning of the piston.



Technical data of the sensor:

Working temperature	$-25$ $+80^{\circ}\text{C}$
Supply voltage	10–30 V cc
Load	200 mA
Execution	PNP
Output type	NA

BORES	DB max (mm)	Dcmax (mm)
40	81	72
50	77	65
63	72	55
80	70	51
100	63	52
125	57	35
160	44	22
200	51	0
250	32	0
320	10	0

For a definition of all possible combinations of placement of power supplies, cushioning, air bleeds and sensors, refer to the configurator.

Login at: <http://configuratore.grices.it/>

### 1.15 STROKE TOLERANCE

STROKE	mm	0-500	501-1500	1501-3000	3000+
TOLERANCE	mm	$\pm 1$	$\pm 2$	$\pm 3$	$\pm 4,5$

### 1.16 TIE RODS TORQUE

BORE	mm	40	50	63	80	100	125	160	200	250	320
TIE ROD	mm	M6	M8	M10	M8	M10	M12	M12	M16	M20	M24
TORQUE	Nm	6	12	23	22	60	100	100	260	500	640

### 2.1 PEAK LOAD

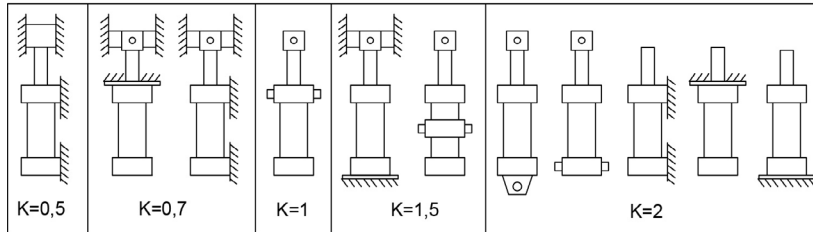
When the cylinder is working under compression, check the rod diameter at peak load. **Table 1** shows the most common types of restriction. Each of them is associated to a coefficient **K**. The maximum stroke of cylinder **L** multiplied by coefficient **K** produces the **LV** value (virtual length,  $LV = L \cdot K$ ). **Graph 2** indicates the rod's minimum diameter, based on load.

The point of intersection between **LV** in mm. and pushing force **F** in **KN** must be below the characteristic curve of the rod to be checked.

Example: cylinder CA63/28/750/FA/00B (front flange) employs a 55 kN load.

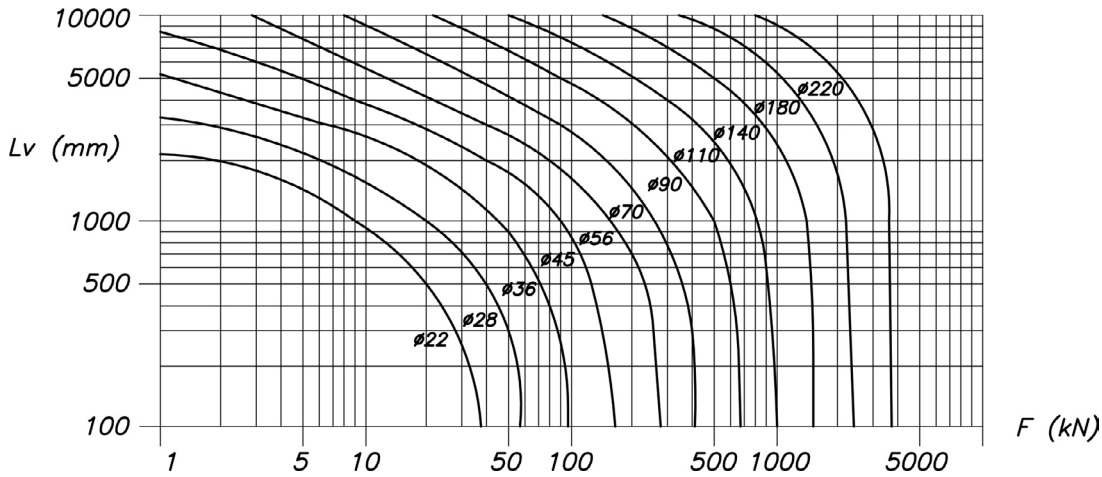
Table 1 shows coefficient K, determined by the type of restriction  $K = 2$ , the virtual length is  $LV = L \cdot K \quad LV = 750 \cdot 2 = 1500 \text{ mm}$ .

Table 1



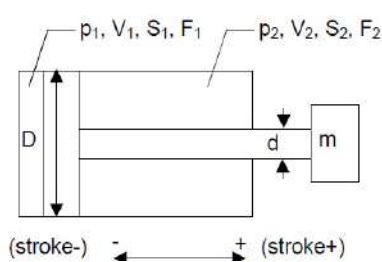
In graph 2 you can check whether the point of intersection between LV and F is below the curve of rod  $\varnothing 45$ . Once the stability condition has been met the rod  $\varnothing 45$  can be adopted. If the result was negative (intersection point of LV and F over the curve) you should choose a cylinder with a larger rod.

Graph 2



2.2 PRACTICAL UNIT OF MEASUREMENT

DESCRIPTION	SYMBOL	UNIT OF MEASURE
Section	S	cm <sup>2</sup>
Pressure	p	bar
∅ piston	D	mm
∅ rod	d	mm
Speed	V	m/s
Capacity	Q	l/min
Load	m	kg



PUSHING FORCE (STROKE +)

$$F_1 = (p_1 \cdot S_1) \text{ (Kg)}$$

PUSHING SPEED (STROKE +)

$$V_1 = Q / (6 \cdot S_1) \text{ (m/s)}$$

$$S_1 = \frac{\pi \cdot D^2}{4 \cdot 100} \text{ (cm}^2\text{)}$$

PULLING FORCE (STROKE -)

$$F_2 = (p_2 \cdot S_2) \text{ (Kg)}$$

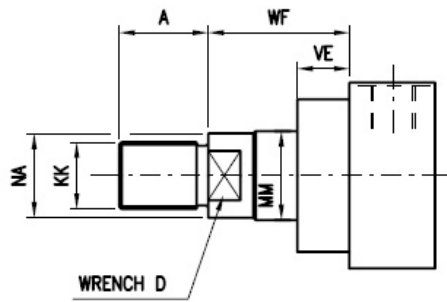
PULLING SPEED (STROKE -)

$$V_2 = Q / (6 \cdot S_2) \text{ (m/s)}$$

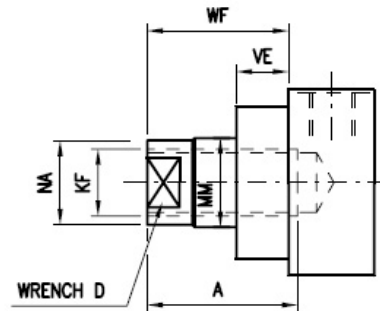
$$S_2 = \frac{\pi \cdot (D^2 - d^2)}{4 \cdot 100} \text{ (cm}^2\text{)}$$

# DIMENSIONS OF THE ROD END

Rod end type M and D

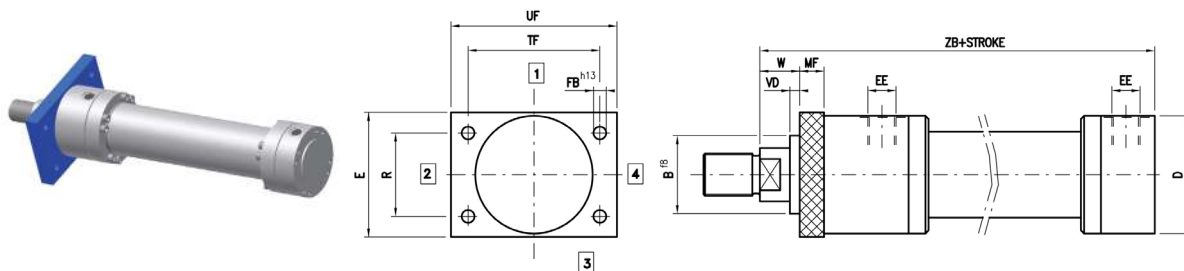


Rod end type M and F



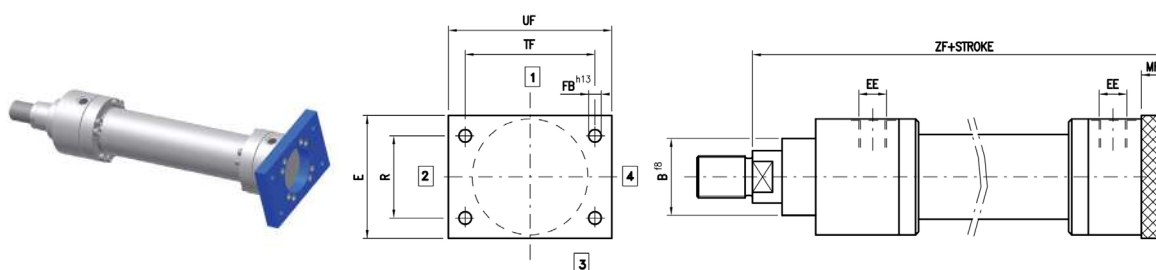
BORE	N° rod	MM rod	Type M ISO 6020/1		Type D		Type F		D	NA	WH	VE
			KK	A	KK	A	KF	A				
40	1	22	M16x1,5	22	-	-	M16x1,5	22	18	21	32	19
	2	28	M20x1,5	28	M16x1,5	22	M20x1,5	28	22	26	32	19
50	1	28	M20x1,5	28	-	-	M20x1,5	28	22	26	38	24
	2	36	M27x2	36	M20x1,5	28	M27x2	36	30	34	38	24
63	1	36	M27x2	36	-	-	M27x2	36	30	34	45	29
	2	45	M33x2	45	M27x2	36	M33x2	45	39	43	45	29
80	1	45	M33x2	45	-	-	M33x2	45	39	43	54	36
	2	56	M42x2	56	M33x2	45	M42x2	56	48	54	54	36
100	1	56	M42x2	56	-	-	M42x2	56	48	54	57	37
	2	70	M48x2	63	M42x2	56	M48x2	63	62	68	57	37
125	1	70	M48x2	63	-	-	M48x2	63	62	68	60	37
	2	90	M64x3	85	M48x2	63	M64x3	85	80	88	60	37
160	1	90	M64x3	85	-	-	M64x3	85	80	88	66	41
	2	110	M80x3	95	M64x3	85	M80x3	95	100	108	66	41
200	1	110	M80x3	95	-	-	M80x3	95	100	108	75	45
	2	140	M100x3	112	M80x3	95	M100x3	112	128	138	75	45
250	1	140	M100x3	112	-	-	M100x3	112	128	138	96	64
	2	180	M125x4	125	M100x3	112	M125x4	125	n°4 holes Ø 10	175	96	64
320	1	180	M125x4	125	-	-	M125x4	125	n°4 holes Ø 10	175	108	71
	2	220	M160x4	160	M125x4	125	M160x4	160	n°4 holes Ø 10	214	108	71

## QA ISO type MF1



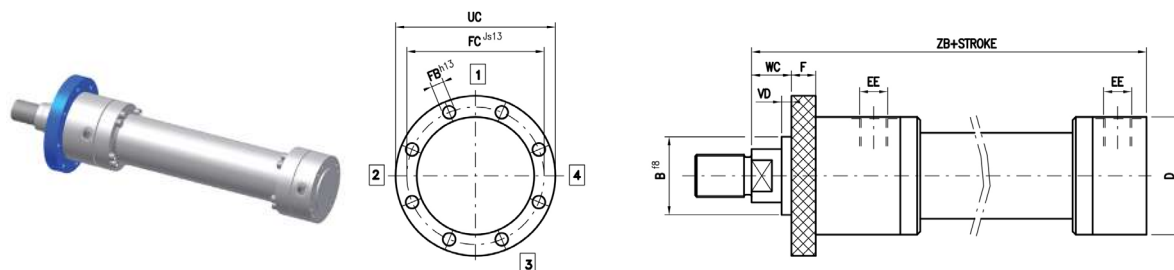
Available for bores up to 125

## QP ISO type MF2



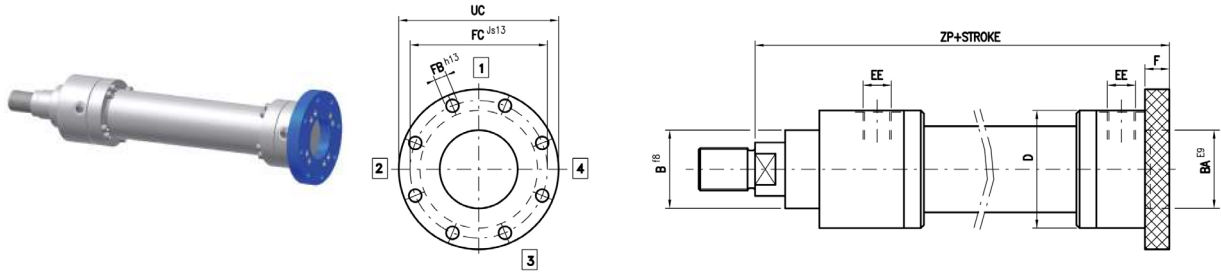
Available for bores up to 125

## FA ISO type MF3

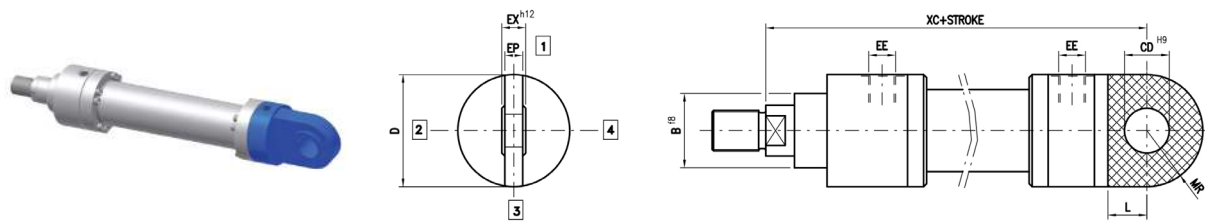


BORE	B	D	E	EE	F	FB	FC	MF	R	TF	UC	UF	VD	WF	ZB	ZF	VA
40	50	78	80	1/2"	16	9	106	16	40,6	98	125	115	3	16	190	206	4
50	60	95	100	1/2"	20	11	126	20	48,2	116,4	148	140	4	18	205	225	7
63	70	116	120	3/4"	25	13,5	145	25	55,5	134	170	160	4	20	224	249	5
80	85	130	135	3/4"	32	17,5	165	32	63,1	152,5	195	185	4	22	250	282	5
100	106	158	160	1"	32	22	200	32	76,5	184,8	238	225	5	25	300	332	5
125	132	192	195	1"	32	22	235	32	90,2	217,1	272	255	5	28	325	357	6
160	160	232	-	1 1/4"	36	22	280	-	-	-	316	-	5	30	370	-	10
200	200	285	-	1 1/4"	40	26	340	-	-	-	385	-	5	35	450	-	10
250	250	365	-	1 1/2"	56	33	420	-	-	-	500	-	8	40	550	-	10
320	320	450	-	1 1/2"	63	39	520	-	-	-	600	-	8	45	660	-	10

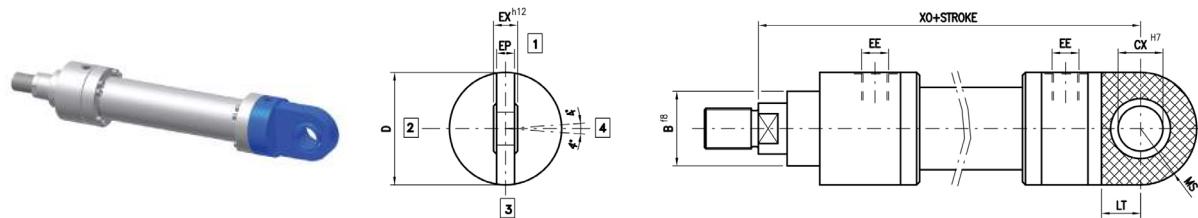
# FP ISO type MF4



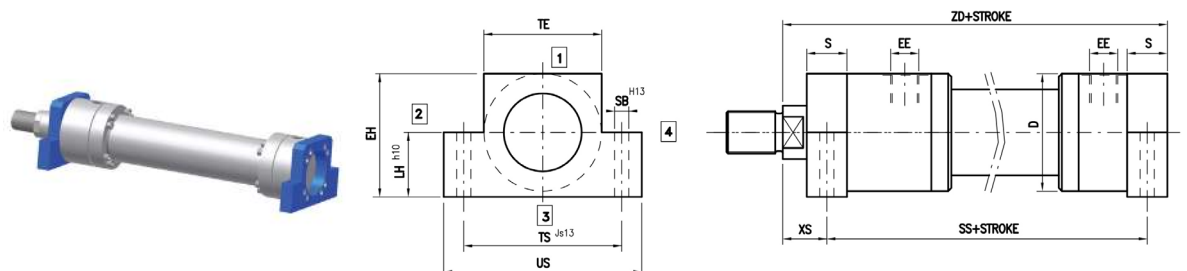
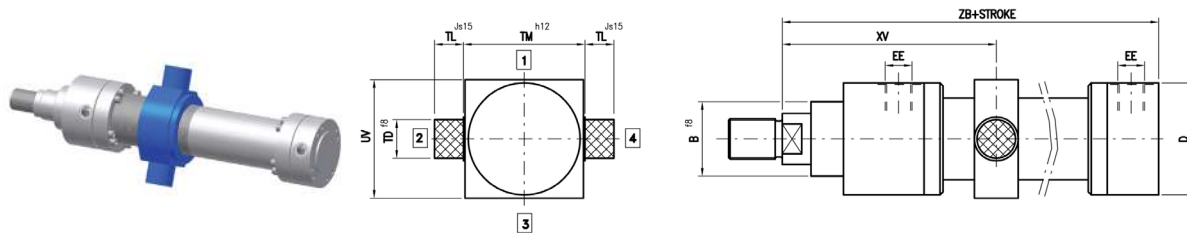
# CM ISO type MP3



# CS ISO type MP5



BORE	B	BA	CD	CX	D	EE	EX	EP	F	FB	FC	L	LT	MS	MR	UC	ZP	XC	XO
40	50	50	20	20	78	1/2"	20	18	16	9	106	38	38	25	25	125	206	231	231
50	60	60	25	25	95	1/2"	25	22	20	11	126	45	45	27,5	27,5	148	225	257	257
63	70	70	32	32	116	3/4"	32	27	25	13,5	145	65	65	35	35	170	249	289	289
80	85	85	40	40	130	3/4"	40	35	32	17,5	165	82	82	50	50	195	282	332	332
100	106	106	50	50	158	1"	50	40	32	22	200	95	95	63	63	238	332	395	395
125	132	132	63	63	192	1"	63	52	32	22	235	103	103	72,5	72,5	272	357	428	428
160	160	160	80	80	232	1 1/4"	80	66	36	22	280	135	135	90	90	316	406	505	505
200	200	200	100	100	285	1 1/4"	100	84	40	26	340	165	165	112	112	385	490	615	615
250	250	250	125	125	365	1 1/2"	125	102	56	33	420	223	223	160	160	500	606	773	773
320	320	320	160	160	450	1 1/2"	160	130	63	39	520	270	270	200	200	620	723	930	930



Available for bores up to 200

BORE	B	D	EE	EH	LH	S	SB	SS	TD	TE	TL	TM	TS	UV	US	ZB	ZD	XS	XV min	XV max	VA
40	50	78	1/2"	82	43	25	11	183	20	78	16	90	100	78	120	194	215	19,5	130	93 + stroke	4
50	60	95	1/2"	100	52	32	14	199	25	95	20	105	120	95	145	205	237	22	142	102 + stroke	7
63	70	116	3/4"	120	62	32	18	211	32	116	25	120	150	116	180	224	256	29	160	107 + stroke	5
80	85	130	3/4"	135	70	40	22	236	40	130	32	135	170	130	210	250	290	34	180	122 + stroke	5
100	106	158	1"	161	82	50	26	293	50	158	40	160	205	158	250	300	350	32	210	152 + stroke	5
125	132	192	1"	196	100	56	33	321	63	192	50	195	245	195	300	325	381	32	235	157 + stroke	6
160	160	232	1 1/4"	238	119	60	33	364	80	232	63	240	295	240	350	370	430	36	273	177 + stroke	10
200	200	285	1 1/4"	288	145	72	39	447	100	285	80	295	350	390	415	450	522	39	337	267 + stroke	10
250	250	365	1 1/2"	-	-	-	-	-	125	-	100	370	-	480	-	550	-	-	393	298 + stroke	10
320	320	450	1 1/2"	-	-	-	-	-	160	-	125	470	-	600	-	660	-	-	486	370 + stroke	10



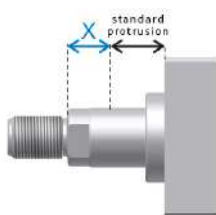
# EXAMPLE OF ORDER ACRONYM

CA/50/28/530/OI00A0I000Q1324R13240XV...

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
<b>SERIES</b>	Execution ISO 6020/1	<b>CA</b>	<b>CA</b>
<b>BORE</b>	Indicate in mm		CA/ <b>50</b> /
<b>ROD</b>	Indicate in mm		CA/50/ <b>28</b> /
<b>STROKE</b>	Indicate in mm		CA/50/28/ <b>530</b> /
<b>EXECUTION</b>	Square front flange	<b>QA</b>	CA/50/28/530/ <b>OI</b>
	Square rear flange	<b>QP</b>	
	Front flange	<b>FA</b>	
	Rear flange	<b>FP</b>	
	Male hinge	<b>CM</b>	
	Joint hinge	<b>CS</b>	
	Intermediate trunnion	<b>OI</b>	
	Feet	<b>PI</b>	
<b>CUSHIONING</b>	None	<b>0</b>	CA/50/28/530/OI <b>0</b>
	Front cushioning	<b>1</b>	
	Rear cushioning	<b>2</b>	
	Front + rear cushioning	<b>3</b>	
<b>SPACER</b>	None	<b>0</b>	CA/50/28/530/OI <b>00</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Polyurethane (standard)	<b>A</b>	CA/50/28/530/OI <b>00A</b>
	Nitrile + ptfе (anti-friction) standard	<b>B</b>	
	Viton + ptfе (high temperatures)	<b>C</b>	
<b>ROD END</b>	Type M (standard)	<b>0</b>	CA/50/28/530/OI <b>00A0</b>
	Type D	<b>D</b>	
	Type F	<b>F</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	CA/50/28/530/OI <b>00A0I</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DRAINAGE</b>	None	<b>0</b>	CA/50/28/530/OI <b>00A0I0</b>
	Rod side	<b>W</b>	
<b>ROD TREATMENT</b>	Standard chromium-plated	<b>0</b>	CA/50/28/530/OI <b>00A0I00</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768	<b>P</b>	
	Hardening and chromium-plating	<b>T</b>	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h	<b>N</b>	
<b>PROXIMITY SENSOR</b>	None	<b>0</b>	CA/50/28/530/OI <b>00A0I000</b>
	Front	<b>X1</b>	
	Rear	<b>X2</b>	
	Front + rear	<b>X3</b>	

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
<b>FRONT HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CA/50/28/530/OI00A0I000Q <b>1</b>
POS. CUSHIONING	0 if not requested					CA/50/28/530/OI00A0I000Q <b>13</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CA/50/28/530/OI00A0I000Q <b>132</b>
	Side 1	Side 2	Side 3	Side 4		
POS. SENSOR	0 if not requested					CA/50/28/530/OI00A0I000Q <b>1324</b>
	Side 1	Side 2	Side 3	Side 4		
<b>REAR HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		CA/50/28/530/OI00B0I000Q1324R <b>1</b>
POS. CUSHIONING	0 if not requested					CA/50/28/530/OI00B0I000Q1324R <b>13</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					CA/50/28/530/OI00B0I000Q1324R <b>132</b>
	Side 1	Side 2	Side 3	Side 4		
POS. SENSOR	0 if not requested					CA/50/28/530/OI00B0I000Q1324R <b>1324</b>
	Side 1	Side 2	Side 3	Side 4		
*EXTRA ROD X QUOTE	Indicate mm					CA/50/28/530/OI00B0I000Q1324R1324 <b>0</b>
XV QUOTE	Indicate mm (only version MT4)					CA/50/28/530/OI00B0I000Q1324R13240 <b>XV...</b>
<b>OPTIONS</b>						
OIL PORTS	SAE 3000				<b>Y</b>	<i>if requested, indicate at the end of the code</i> CA/50/28/530/OI00B0I000Q1324R13240XV.../ <b>Y</b>

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, it is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CAT CYLINDERS SERIES

STANDARD ISO 6020/1



**CAT series** integrates **magnetostrictive transducers** and follows international standard ISO 6020/1; this series is designed to guarantee maximum reliability, high performance and endurance.

The compact construction with round heads fits to the most demanding and challenging industrial actuation requests with continuous nominal pressure up to **16 MPa**.

The integrated transducer and the used technology, assure precision and lack of wear, as the parts in movement are not in contact with each other.

These characteristics allow the cylinder to operate in heavy working environments, protected from dirt and shock, ensuring maximum reliability of the system and reducing the need of maintenance to a minimum. Transducers can be supplied with analogue or digital output.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allow to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

## Technical characteristics:

- Standard ISO 6020/1
- Magnetostrictive position transducer integrated with analogue output signal (intensity or tension) or digital output signal (SSI, CAN-open, PROFIBUS-DP or IO/LINK)
- Nominal pressure 16 MPa (continuous operation)
- Maximum pressure 25 MPa
- Bore 40-320 mm
- Stroke up to 4000 mm
- Single or double rod
- Up to 2 rod diameter per bore
- 6 Mounting styles Ref. ISO MP3 - MF3 - MS2 - MT4 - MF1 - MP5

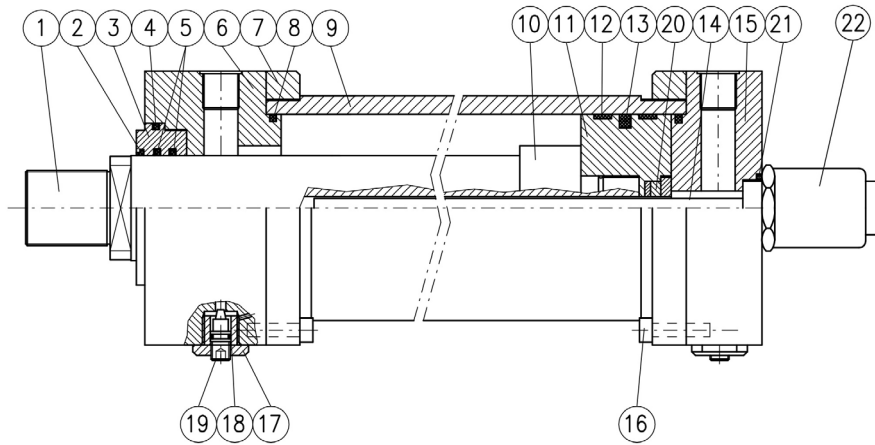
## Options:

- Analogue output signal: 4/20 mA or 0/10 V
- Digital output signal: SSI, CAN-open, PROFIBUS-DP, IO/LINK
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed
- Drainage
- Subplate CETOP 03/05
- Protection case

## EPC Cylinder configurator

This is an innovative tool that allows the client to configure CAT cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Polyurethane
3	Guide sleeve	Cast iron
4	O-Ring + anti-extrusion	Nitrile rubber + sealon
5	Rod seal	Nitrile rubber + PTFE
6	Front head	Steel
7	Counterflange	Steel
8	O-Ring + anti-extrusion	Nitrile rubber + sealon
9	Body	Steel
10	Front cushioning sleeve	Steel
11	Piston	Steel
12	Sliding guide	MCF80
13	Piston B seal	Nitrile rubber + PTFE
14	Transducer	Stainless steel
15	Rear head	Steel
16	Cilindrical head screw	Steel
17	Safety plug	Steel
18	O-Ring	Nitrile rubber
19	Adjustment needle	Steel
20	Magnet	-
21	O-Ring	Nitrile rubber
22	Position Transducer	-

### Mounting style



# TECHNICAL CHARACTERISTICS

STANDARD ISO 6020/1



## LINEAR POSITION TRANSDUCER

To immediately check the rod position, install a linear position transducer.

The magnetostrictive technology allows rod position detection even in heavy duty conditions and/or high frequency applications, avoiding the contact between the moving parts.

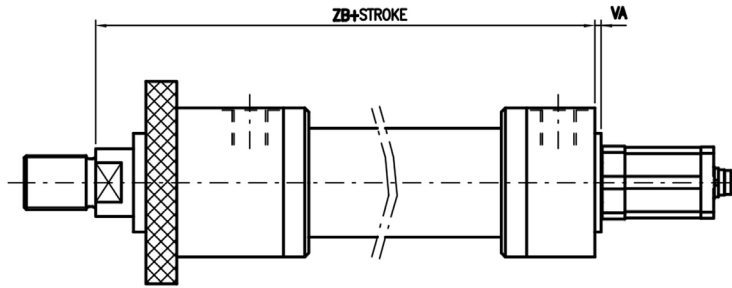
The transducer, besides offering a high reliability, permits easy maintenance. Its replacement does not require the cylinder dismantling.

Analogue or digital versions are available.

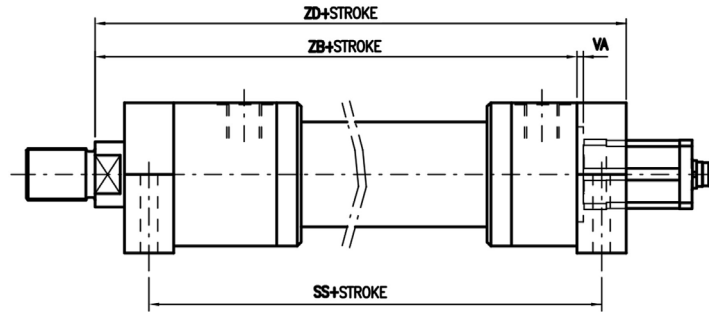
<b>Resolution</b>	0,01 mm
<b>Independent linearity</b>	±0,05 % (% of the total stroke)
<b>Repeatability</b>	±0,01 % (% of the total stroke)
<b>Max. speed</b>	2 m/sec
<b>Working temperature</b>	-20 +80 °C
<b>Analogue/digital signal</b>	0+10 V 10+0 V or 4+20 mA / SSI, CAN OPEN, PROFIBUS DP, IO/LINK
<b>Strokes</b>	50÷3850 mm
<b>Max. transducer pressure</b>	35 MPa (350 Bar)
<b>Power supply</b>	24 V DC ±10 %
<b>Protection degree (connector installed)</b>	IP-67

1.1 AVAILABLE VERSIONS AND DIMENSIONS

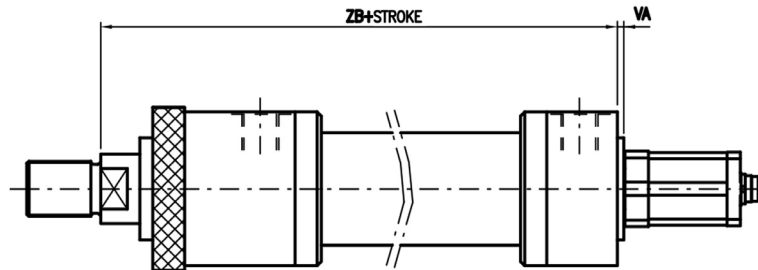
**FA** ISO type ME5



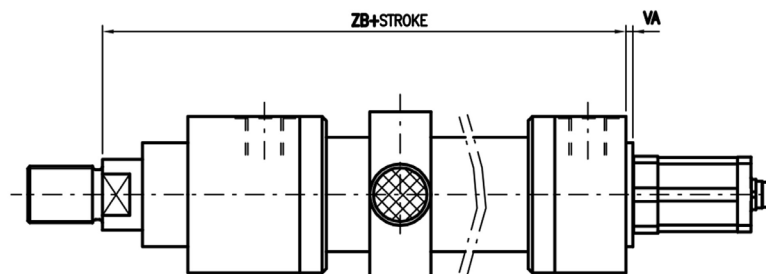
**PI** ISO type MS2

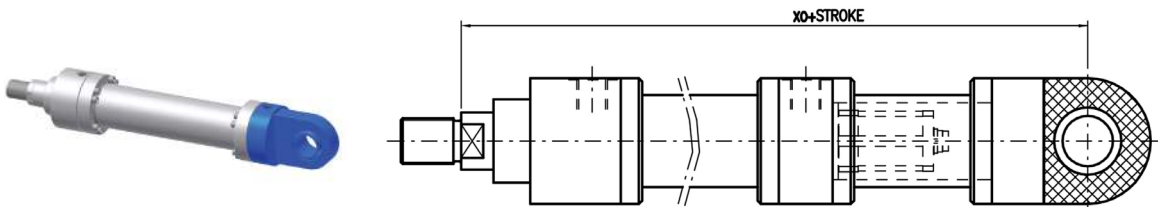
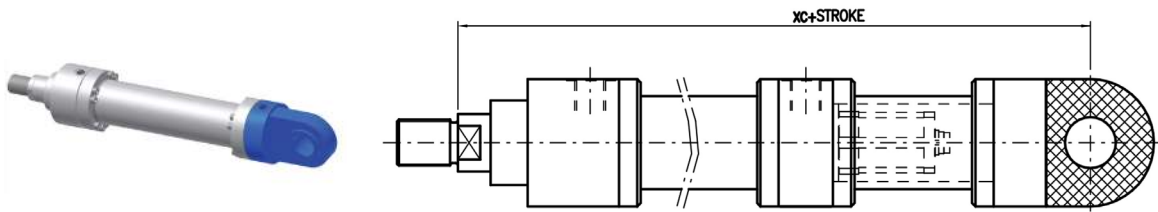


**QA** ISO type MF1



**OI** ISO type MT4





BORE	ZB	VA	SS	ZD	XC	XO
40	190	4	NA	NA	NA	NA
50	205	7	199	237	NA	NA
63	224	5	211	256	539*	539*
80	250	5	236	290	584*	584*
100	300	5	293	350	672*	672*
125	325	6	321	381	724*	724*
160	370	10	364	430	816*	816*
200	450	10	447	522	953*	953*
250	550	10	NA	NA	1243*	1243*
320	660	10	NA	NA	1420*	1420*

\* Dimensions not ISO

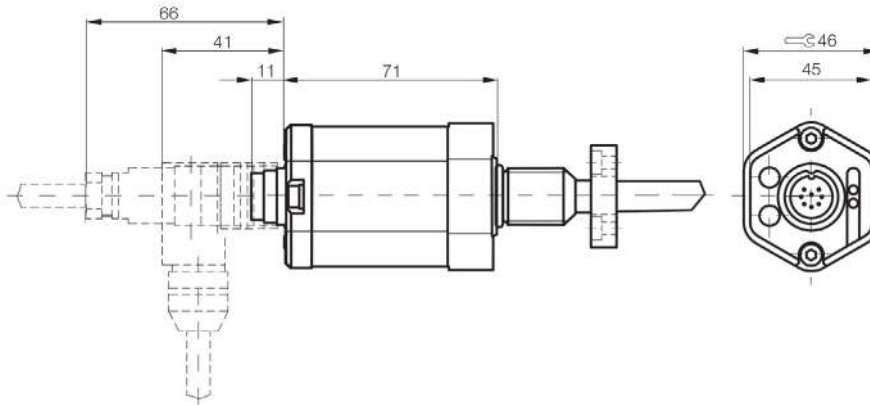


## 1.2 TRANSDUCERS DIMENSION

Transducers dimension **TYPE UT - UC - SI** with connector type:

**STRAIGHT CBKS-S 32-00: Y1**

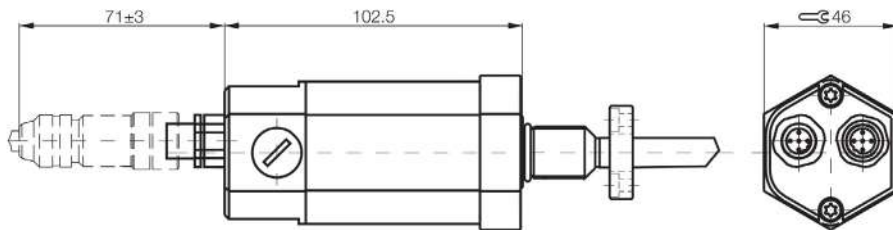
**90° CBKS-S 33-00: Y2**



Transducers dimension **TYPE HH** with connector type **Y4**:

**CBKS-S 92-00**

**CBKS-S 94-00**

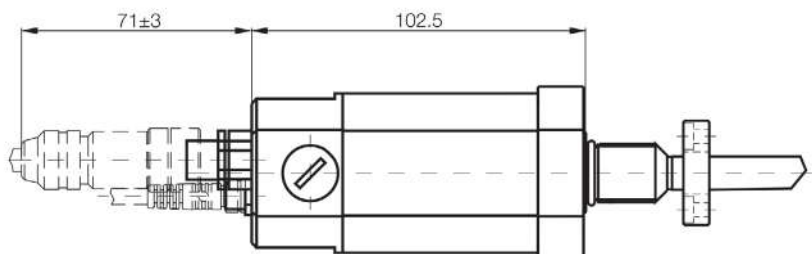


Transducers dimension **TYPE TT** with connector type **Y3**:

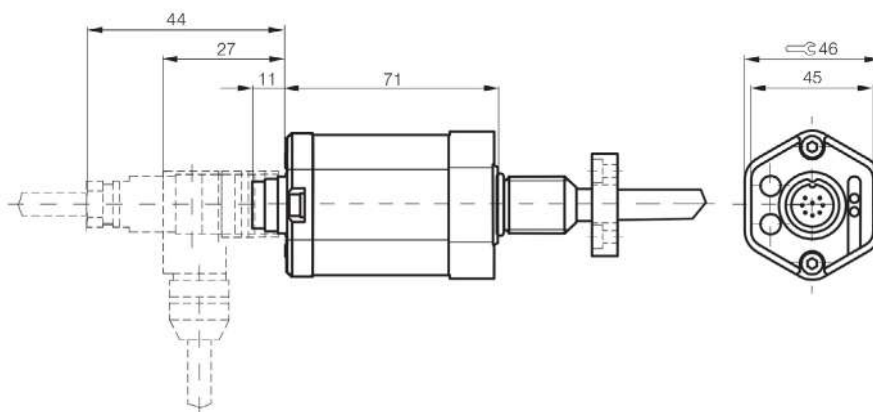
**CBKS-S 105-00**

**CBKS-S 103-00**

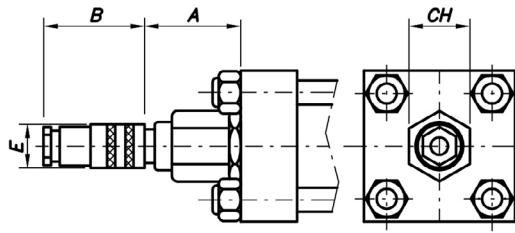
**CBKS-S 48-15-CP-05**



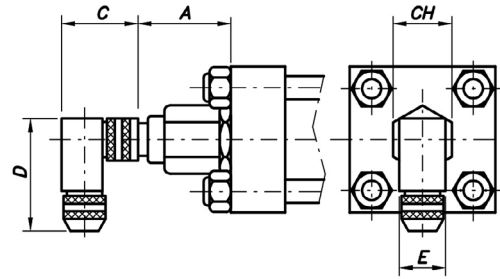
Transducers dimension **TYPE IO/LINK** with outlets **Y5** and **Y6**



### 1.3 CONNECTORS DIMENSION



Type: CBKS-S 32 M-00



Type: CBKS-S 33 M-00

Type	A	B	C	D	E	CH
CBKS-S 32 M-00	74	69	-	-	18	46
CBKS-S 33 M-00	74	-	48	54	20	46

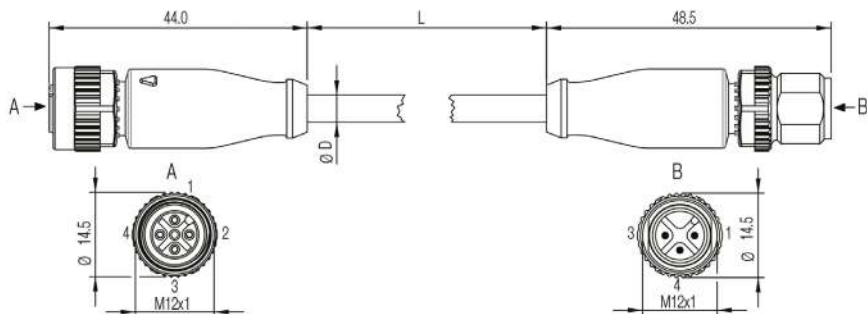
Connection	Pin	Color
<p>View from the bushing weld side</p>	1	Yellow
	2	Grey
	3	Pink
	4	Green
	5	Blue
	6	Blue
	7	Brown
	8	White

### IO/LINK CONNETTORS

Position transducer (A)		IO/LINK Master (B)
1	L+ (18...30 V)	1
2	None	-
3	L- (GND)	3
4	C/Q	4

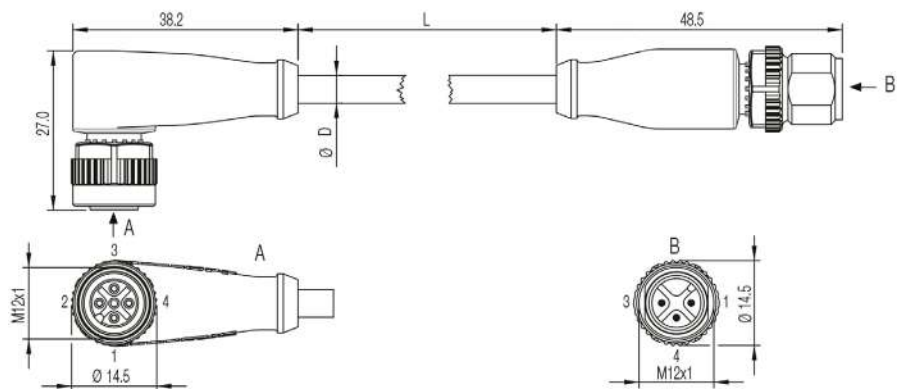
**Straight outlet - straight connector option Y5 - IO/LINK**

PBCC0374 with 4m cable

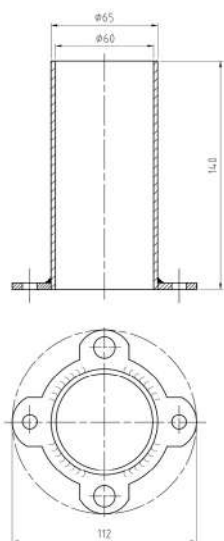


**Angled outlet - straight connector option Y6 - IO/LINK**

PBCC037M with 4m cable



**1.4 SENSOR PROTECTION DIMENSIONS**



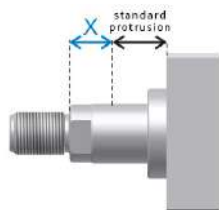
# EXAMPLE OF ORDER ACRONYM

## CAT/50/28/530/OI00BUT00000Y1Q102R120XV...

CHARACTERISTIC	DESCRIPTION	SYM.	EXMAPLE
<b>SERIES</b>	Tie rod execution	<b>CAT</b>	<b>CAT/</b>
<b>BORE</b>	Indicate in mm		CAT/ <b>50/</b>
<b>ROD</b>	Indicate in mm		CAT/50/ <b>28/</b>
<b>STROKE</b>	Indicate in mm		CAT/50/28/ <b>530/</b>
<b>EXECUTION</b>	Front flange	<b>FA</b>	CAT/50/28/530/ <b>OI</b>
	Feet	<b>PI</b>	
	Square front flange	<b>QA</b>	
	Male hinge	<b>CM</b>	
	Joint hinge	<b>CS</b>	
	Intermediate trunnion	<b>OI</b>	
<b>CUSHIONING</b>	None	<b>0</b>	CAT/50/28/530/OI <b>0</b>
<b>SPACER</b>	None	<b>0</b>	CAT/50/28/530/OI <b>00</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Nitrile + PTFE (anti-friction)	<b>B</b>	CAT/50/28/530/OI <b>00B</b>
<b>TRANSDUCER OUTPUT</b>	Tension 0-10 V UT	<b>UT</b>	CAT/50/28/530/OI <b>00BUT</b>
	Electrical current 4-20 M	<b>UC</b>	
	SSI Iterface	<b>SI</b>	
	CANopen Iterface	<b>HH</b>	
	PROFIBUS Interface	<b>TT</b>	
	IO/LINK Interface	<b>LK</b>	
<b>ROD END</b>	Type M (standard)	<b>0</b>	CAT/50/28/530/OI <b>00BUT0</b>
	Type F	<b>F</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	CAT/50/28/530/OI <b>00BUT00</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DOUBLE ROD SEAL</b>	None	<b>0</b>	CAT/50/28/530/OI <b>00BUT000</b>
	Double rod seal	<b>L</b>	
<b>DRAINAGE</b>	None	<b>0</b>	CAT/50/28/530/OI <b>00BUT0000</b>
	Rod side	<b>W</b>	
<b>ROD TREATMENT</b>	Standard chromium-plated	<b>0</b>	CAT/50/28/530/OI <b>00BUT00000</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768	<b>P</b>	
	Hardening and chromium-plating	<b>T</b>	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h	<b>N</b>	
<b>CONNECTOR</b>	None	<b>0</b>	CAT/50/28/530/OI <b>00BUT000000</b>
	Straight CBKS-S 32 M-00	<b>Y1</b>	
	Angled 90° CBKS-S 33 M-00	<b>Y2</b>	
	Male connector CBKS-S-105-00 Female connector CBKS-S-103-00 Supply cable CBKS-S 48-15-CP-05	<b>Y3</b>	
	Female connector CBNS-S92-00 Male connector CBNS-S94-00	<b>Y4</b>	
	Straight outlet - straight connector PBCC 0374	<b>Y5</b>	
	Angled outlet - straight connector PBCC 037M	<b>Y6</b>	

FRONT HEAD					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CAT/50/28/530/OI00BUT000000Q1
POS. CUSHIONING	0 if not requested				CAT/50/28/530/OI00BUT000000Q10
POS. AIR BLEED	0 if not requested				CAT/50/28/530/OI00BUT000000Q102
	Side 1	Side 2	Side 3	Side 4	
REAR HEAD					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CAT/50/28/530/OI00BUT000000Q102R1
POS. AIR BLEED	0 if not requested				CAT/50/28/530/OI00BUT000000Q102R12
	Side 1	Side 2	Side 3	Side 4	
*EXTRA ROD X QUOTE	Indicate mm				CAT/50/28/530/OI00BUT000000Q102R120
XV QUOTE	Indicate mm (only version MT4)				CAT/50/28/530/OI00BUT000000Q102R120XV...

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CC CYLINDERS SERIES

## STANDARD ISO 6022



**CC cylinders** series follows International standards **ISO 6022 and DIN 24333**.

The construction with round heads fits to the most demanding and challenging industrial actuation requests in the iron and steel industry, with continuous nominal pressure up to **25 MPa**. The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature. Our production includes the optional integration of position transducers (*see CCT series*)

### Technical characteristics:

- Standard ISO 6022 and DIN 24333
- Nominal pressure 25 MPa (continuous operation)
- Maximum pressure 32 MPa
- Bore 50-320 mm
- Stroke up to 4000 mm
- Single or double rod
- 5 Mounting styles Ref. ISO MF3 - MF4 - MT4 - MP5 - EB (*basic execution*)

### Options:

- Fixed or adjustable cushions
- Proximity sensor integrated in cylinder heads
- Magnetostrictive position transducer integrated with analogue output signal (intensity or tension) or digital output signal (SSI, CAN-open, PRODIFUB-DP or IO/LINK) (*see CCT series*)
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed
- Drainage
- Subplate CETOP 03/05

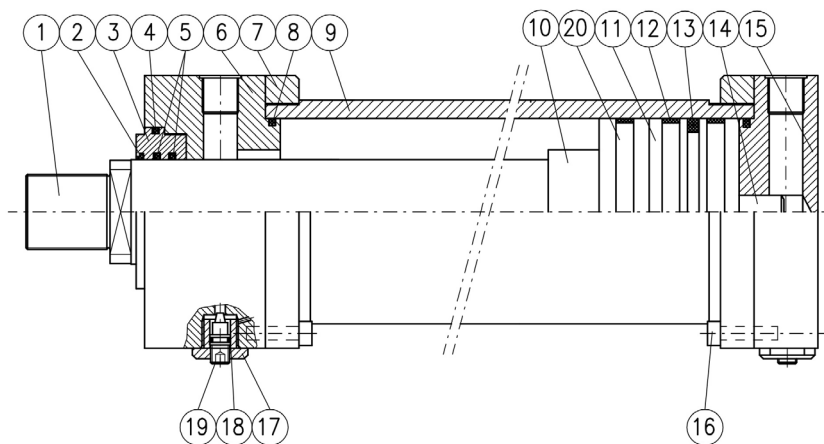
### Configuratore EPC

This is an innovative tool that allows the client to configure CC cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers.

With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>





N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Nitrile rubber + PTFE
3	Guide sleeve	Cast iron / Steel
4	O-Ring + anti-extrusion	Nitrile rubber + sealon
5	Rod seal	Nitrile rubber + PTFE
6	Front head	Steel
7	Counterflange	Steel
8	O-Ring + anti-extrusion	Nitrile rubber + sealon
9	Body	Steel
10	Front cushioning sleeve	Steel
11	Piston	Steel
12	Sliding guide	MCF80
13	Piston B seal	Nitrile rubber + PTFE
14	Cushioning spur	Steel
15	Rear head	Steel
16	Cilindrical head screw	Steel
17	Safety plug	Steel
18	O-Ring	Nitrile rubber
19	Adjustment needle	Steel
20	Spacer	Steel

### Mounting style



# TECHNICAL CHARACTERISTICS



## STANDARD 6022

### CHOOSING THE PRODUCTION SERIES

In order to identify the production series, ensure that, while the plant is working, the operating pressures indicated for each series are not exceeded. The general dimensioning of the cylinder ensures wide safety margins. Do not exceed the maximum pressure value that corresponds to the test pressure, considering also any overpressure caused by throttle valves in the circuits and/or by vertical loads with downward rods and end of stroke cushioning (see paragraph 1.7).

We recommend adopting strokes longer by a few millimetres than the working stroke, in order to prevent the use of the cylinder's internal stops as a mechanical end of stroke. Also check that the expected working temperature and speed are consistent with the type of seals installed.

### 1.1 HYDRAULIC CYLINDERS – SERIES CC

The CC hydraulic cylinders are dimensioned according to standard ISO 6022;

- Manufactured according to CNC technology, with top-quality materials, they provide maximum reliability and duration
- The use of standard components during assembly facilitates the replacement of any worn components
- They can be equipped with progressive cushionings of rear and front end of stroke, consisting of self-centering spurs that can slow-down gradually the masses concerned, even of considerable size.
- The seals used are standard, and provide reliability and easy availability on the market. The available seals selection fits different speed, frequency, temperature and fluid conditions

### 1.2 RANGE OF USE OF CC CYLINDERS

Nominal pressure 25 Mpa (250 bar), recommended for normal use

Maximal pressure 32 Mpa (320 bar)

### 1.3 CYLINDER BODY

The cylinder body is made up of a top-quality thick steel tube, either cold drawn or hot laminated, with elevated thickness and accurate internal surface (roughness  $RA \leq 0.4$  micron, diameter tolerance H8)

### 1.4 ROD

Rods are made with top-quality steel and coated with hard chrome. This surface treatment ensures proper protection against any damage and corrosion, favouring the seals' endurance. The minimum surface finish is 0.2 micron. Rods with strong chrome filling, induction-hardened, nickel/chromium plated, inox/chromed or made of special steel, can be manufactured on demand.

### 1.5 HEAD

Heads are made of steel and are manufactured to ensure perfect concentricity between the cylinder body, the rod bearing and the rod. Wide inner passages are manufactured to minimize any load loss when the fluid is conveyed.

### 1.6 PISTON

The piston is made with a special material, specially processed to ensure a concentric guide between rod cushioning sleeve, cylinder body and head cushioning bushing. A large part of the radial surface is in contact with the cylinder body. This confers considerable stability, so that any rod bending, caused by external radial loads, is minimized.

### 1.7 END OF STROKE CUSHIONING

The end of stroke cushioning is usually adopted on all cylinders working at a speed > 0.1 m/sec., or when loads in vertical direction are activated. This cushioning is also a safety device in case of servo-systems control equipment failure. The ratio below makes it possible to promptly calculate, based on the cylinder bore (cushioning section), the supply pressure, the cushioning length and the working speed, as well as the mass that can be cushioned by every single cylinder. This reaction limits the overpressure value to 320 bar, protecting the cylinder's components that are under stress during braking.

$$M = \frac{(p_2 \cdot S - p_1 \cdot A) \cdot 2 \cdot L_f}{V_0^2} \cdot 10^{-2} \quad [\text{kg}]$$

$P_1$  - supply pressure (bar)

$P_2$  - maximum pressure 250 (bar)

$V_0$  - working speed (m/s)

$S$  - cushioning section  $S_1$  or  $S_2$  (cm<sup>2</sup>)

$L_f$  - cushioning length  $L_{f1}$  or  $L_{f2}$  (mm)

$A$  - piston area (cm<sup>2</sup>)

The cushioned mass values obtained from this ratio are simply theoretical, and Grices accepts no responsibility for the use of this ratio. The data to be inserted in the ratio to calculate the mass that can be cushioned may be obtained from the following table.

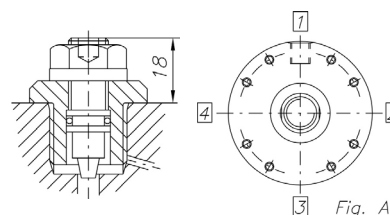
Bore (mm)	50	63	80	100	125	160	200	250	320
∅ Rod (mm)	36	45	56	70	90	110	140	180	220
$S_1$ (cm <sup>2</sup> ) rod forward	8,2	13,8	23,8	37,8	56	102	151	177	352
$S_2$ (cm <sup>2</sup> ) rod backward	18,5	29,1	46,4	73,2	114	189	294	471	748
$L_f$ (mm)	30	30	30	32	32	40	46	95	100
$A$ (cm <sup>2</sup> )	19,6	31,2	50,3	78,5	122,7	201,1	314,2	490,6	803,8

The standard cushioning is in position 3 (figure A); is possible to request a different cushioning position.

### 1.8 CUSHIONING ADJUSTMENT

For a precise cushioning adjustment, both ends of the cylinder are equipped with control valves, as shown in figure on the right.

These devices are equipped with a system that prevents their accidental removal. These devices are located on side 3.

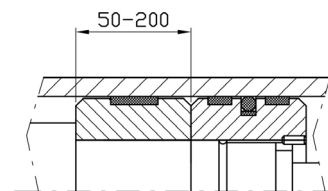


### 1.9 SPACERS

Cylinders with strokes > 1000mm should be equipped with spacers of adequate design that increase the rod and piston guide, in order to reduce any overload phenomena and premature wear.

The spacer allows increase of the contact surface between piston and cylinder body, improving the system rigidity. The table below indicates the spacer length based on stroke; for the stroke values not included in the table, contact our technicians. As a general rule, spacers are not mounted on cylinders when strokes are < 1000mm and on cylinders subjected to only one pulling action.

STROKE (mm)	1001 a 1500	1501 a 2000	2001 a 2500	2501 a 3000
Spacer symbol	1	2	3	4
Length (mm)	50	100	150	200



### 1.10 SEALS

The sealing system must be chosen according to the working conditions of the cylinder: speed, fluid type and temperature. Our cylinders feature seals provided with seats conforming to the ISO 7425 norm. That allows our cylinders to work under the heaviest conditions, such as very low or high speed, heavy working, mineral or synthetic fluids. The type of seals to be used in the relevant working conditions are indicated below:

- **TYPE B standard: (NITRILE+PTFE)** anti-friction, not recommended when loads are to be held in position, and recommended at speeds ≤ 4 m/sec., at temperatures ranging between -10 and +75°C, operation with mineral oil or glycol water.
- **TYPE C: (VITON+PTFE)** anti-friction, not recommended when loads are to be held in position, for high-temperature fluids up to +135°C, maximum speed 4m/sec. Can be used also with phosphoric esters.

## Options:

- **TYPE H: (CHEVRON)** special option recommended when loads are to be held in position.

Contact our Technical Department for their availability.

### 1.11 OIL PORTS

Oil ports are BSP threaded, with boring conforming to DIN 3852/2, standard position 1 in figure A; other alternative positions can be provided on demand. Supplies with ISO 6162-2 compatible drilling for mounting SAE 6000 psi flanges are available on request (contact our Technical Department).

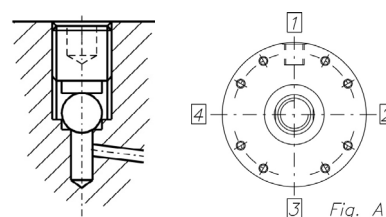
In order to reduce as much as possible any turbulence and water hammer in the cylinder's connecting pipes, ensure that the oil speed does not exceed 6 m/sec. The maximum flow rates that can be obtained with these criteria are shown in the table below.

OIL PORT Ø	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
MAX. FLOW RATE (l/mm)	40	53	85	136	212	320

\*SAE flanges option: ask our technical department for availability and dimensions

### 1.12 AIR BLEEDS

Air bleeds are provided on demand on both ends of the cylinder. Bleeds are mounted inside the head and the bottom, so as to be protected from any accidental removal, as shown in the figure on the right. Standard position: 2 in figure A; other alternative positions can be provided on demand.



### 1.13 DRAINAGE

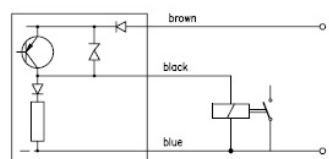
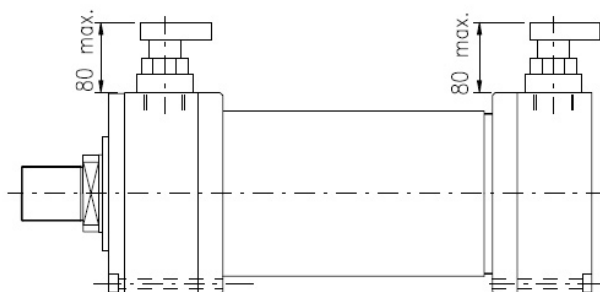
The drainage on the rod seal ensures better sealing at high speed, in particular in cylinders with strokes > 2000mm or in applications where the rod side chamber is constantly under pressure. The drainage port (1/8") is usually positioned on the same axis of the supply port and must be directly connected to the tank.

### 1.14 PROXIMITY SENSORS

When the piston position needs to be detected in any hydraulic system, proximity sensors can be mounted directly in the cylinder heads. The operating temperature is -25 to +80°C. Allowed dynamic pressure 350 bar.

The sensor is provided with a built-in amplifier, with direct supply (10 to 30Vdc) with an analogue PNP output for 200mA max., supplied complete with connector with a 4m long cable.

Sensors can be mounted on head and bottom, and are arranged on side 4 of the cylinder. It is possible to demand a different positioning. They make it possible to obtain an electric signal near the end of stroke positioning of the piston.



Technical data of the sensor:

Working temperature	-25 +80 °C
Supply voltage	10-30 V cc
Load	200 mA
Execution	PNP
Output type	NA

## 2.1 PEAK LOAD

When the cylinder is working under compression, check the rod diameter at peak load. **Table 1** shows the most common types of restriction. Each of them is associated to a coefficient **K**.

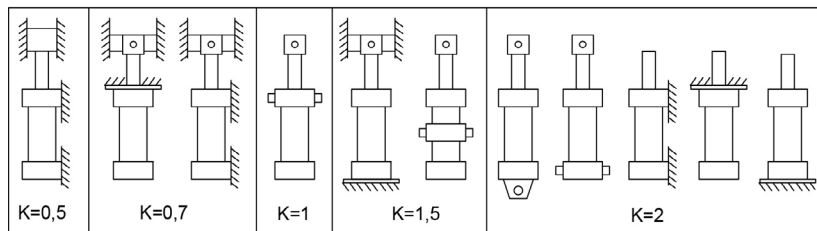
The maximum stroke of cylinder **L** multiplied by coefficient **K** produces the **LV** value (virtual length,  $LV = L \cdot K$ ).

**Graph 2** indicates the rod's minimum diameter, based on load. The point of intersection between **LV** in mm. and pushing force **F** in **KN** must be below the characteristic curve of the rod to be checked.

*Example:* cylinder **CC63/45/750/FA/00B** (front flange) employs a **40 KN**.

**Table 1** shows coefficient **K**, determined by the type of restriction  $K = 2$ , the virtual length is  $LV = L \cdot K$   $LV = 750 \cdot 2 = 1500$  mm.

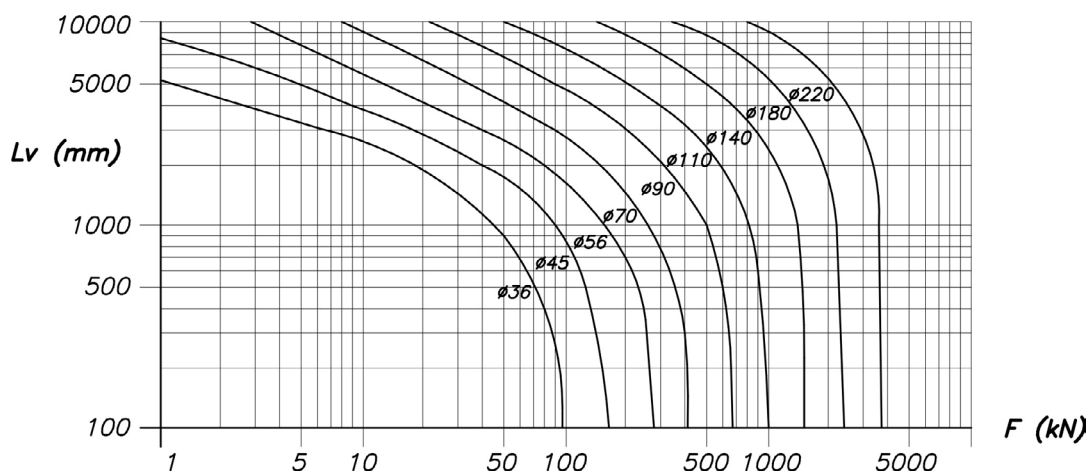
**Tabella 1**



In **graph 2** you can check whether the point of intersection between **LV** and **F** is below the curve of rod  $\varnothing 45$ .

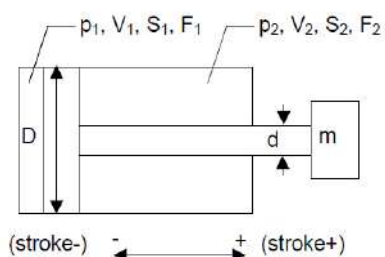
Once the stability condition has been met the rod  $\varnothing 45$  can be adopted. If the result was negative (intersection point of **LV** and **F** over the curve) you should choose a cylinder with a larger rod.

**Graph 2**



## 2.2 PRACTICAL UNIT OF MEASUREMENT

DESCRIPTION	SYMBOL	UNIT OF MEASURE
Section	S	cm <sup>2</sup>
Pressure	p	bar
Ø piston	D	mm
Ø rod	d	mm
Speed	v	m/s
Capacity	Q	l/min
Load	m	kg

**PUSHING FORCE (STROKE +)**

$$F_1 = (p_1 \cdot S_1) \text{ (Kg)}$$

**PUSHING SPEED (STROKE +)**

$$V_1 = Q / (6 \cdot S_1) \text{ (m/s)}$$

$$S_1 = \frac{\pi \cdot D^2}{4 \cdot 100} \text{ (cm}^2\text{)}$$

**PULLING FORCE (STROKE -)**

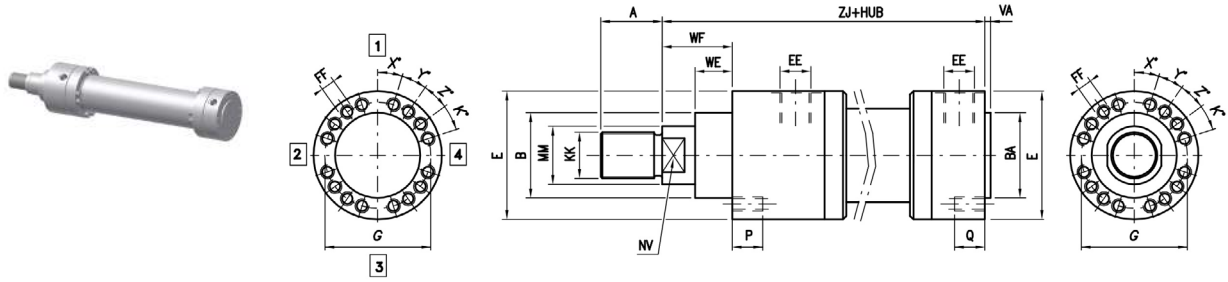
$$F_2 = (p_2 \cdot S_2) \text{ (Kg)}$$

**PULLING SPEED (STROKE -)**

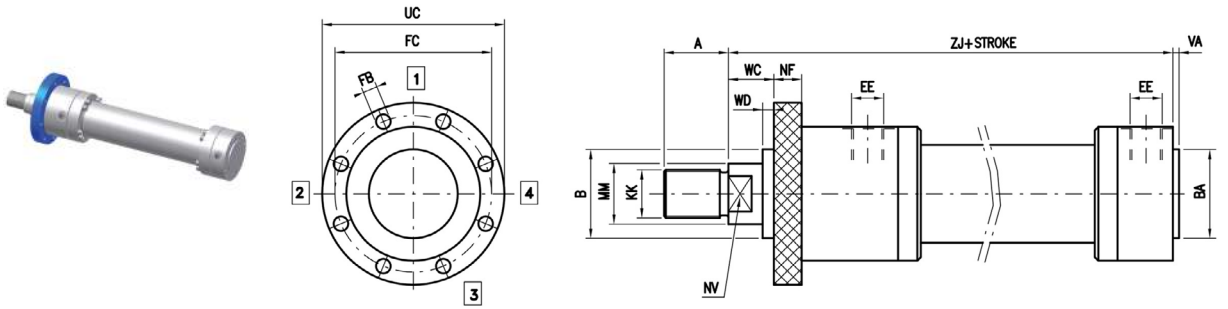
$$V_2 = Q / (6 \cdot S_2) \text{ (m/s)}$$

$$S_2 = \frac{\pi \cdot (D^2 - d^2)}{4 \cdot 100} \text{ (cm}^2\text{)}$$

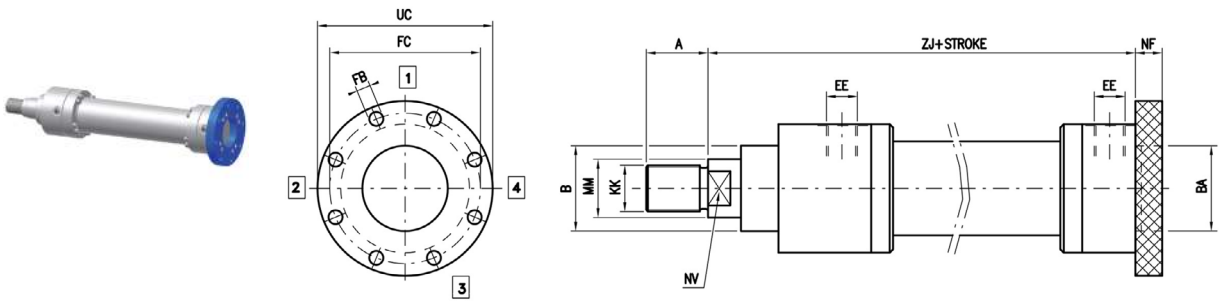
# EB Base



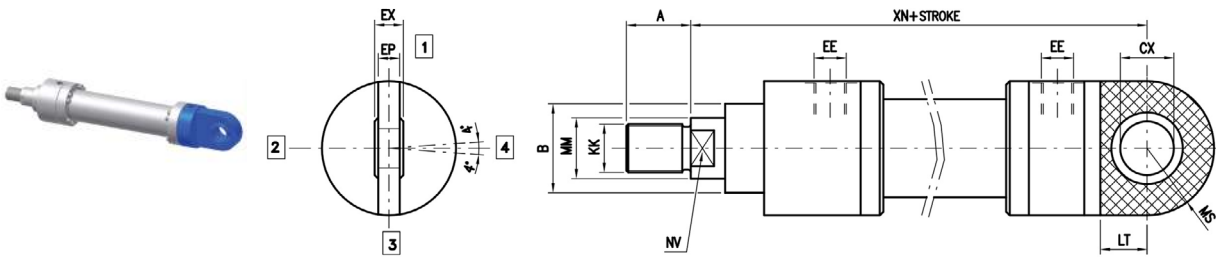
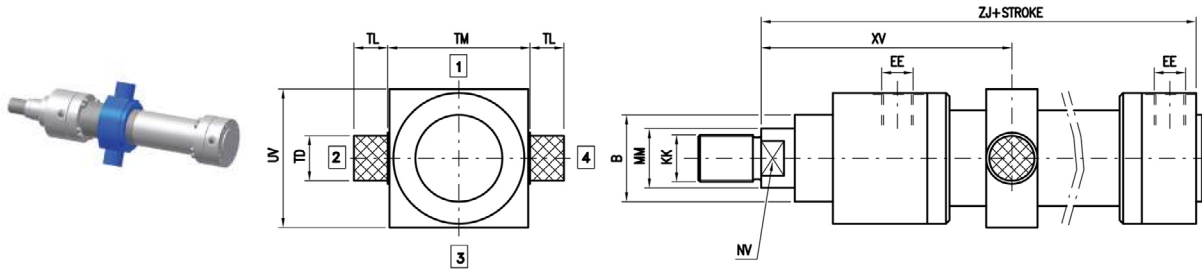
# FA ISO type MF3



# FP ISO type MF4



BORE	MM	KK	A	B	BA	E	EE	FB	FC	FF	G	GF	K°	NF	NV	P	Q	UC	VA	VD	WC	WE	WF	X°	Y°	Z°	ZJ	ZP
50	36	M27x2	36	63	63	108	1/2"	14	132	M8	84	84	0°	25	28	16	16	165	4	4	22	29	47	32,5°	25°	0°	240	265
63	45	M33x2	45	75	75	124	3/4"	14	150	M8	100	100	0°	28	36	21	21	180	5	4	25	32	53	32°	26°	0°	270	298
80	56	M42x2	56	90	90	148	3/4"	18	180	M10	120	120	0°	32	46	20	20	220	5	4	28	36	60	35°	20°	0°	300	332
100	70	M48x2	63	110	110	175	1"	22	212	M12	148	148	0°	36	60	25	25	260	6	5	32	41	68	35°	20°	0°	335	371
125	90	M64x3	85	132	132	210	1"	22	250	M16	180	180	0°	40	75	30	28	295	6	5	36	45	76	35°	20°	0°	390	430
160	110	M80x3	95	160	160	270	1 1/4"	26	315	M16	230	230	0°	45	95	45	35	370	7	5	40	50	85	25°	20°	20°	460	505
200	140	M100x3	112	200	200	330	1 1/4"	33	385	M20	288	288	0°	56	120	40	38	460	8	5	45	61	101	25°	20°	20°	540	596
250	180	M125x4	125	250	250	410	1 1/2"	39	475	M24	370	370	0°	63	-	45	45	540	8	8	50	71	113	25°	20°	20°	640	703
320	220	M160x4	160	320	320	510	1 1/2"	45	600	M30	450	450	15°	80	-	66	66	680	8	8	56	88	136	22,5°	15°	15°	750	830



BORE	MM	KK	B	CX	EE	EP	EX	LT	MS	NV	TD	TL	TM	UV	ZJ	XN	XV min	XV+max stroke
50	36	M27x2	63	32	1/2"	27	32	40	40	28	32	25	112	112	240	305	177	120
63	45	M33x2	75	40	3/4"	35	40	50	50	36	40	32	125	135	270	348	206	140
80	56	M42x2	90	50	3/4"	40	50	63	63	46	50	40	150	162	300	395	236	155
100	70	M48x2	110	63	1"	52	63	71	80	60	63	50	180	196	335	442	277	170
125	90	M64x3	132	80	1"	60	80	90	100	75	80	63	224	250	390	520	321	190
160	110	M80x3	160	100	1 1/4"	80	100	112	125	95	100	80	280	270	460	617	398	220
200	140	M100x3	200	125	1 1/4"	102	125	160	160	120	125	100	335	320	540	756	452	250
250	180	M125x4	250	160	1 1/2"	130	160	200	200	-	160	125	425	-	640	903	500	270
320	220	M160x4	320	200	1 1/2"	162	200	250	250	-	200	160	530	-	750	1080	630	280



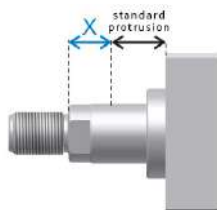
# EXAMPLE OF ORDER ACRONYM

## CC/50/36/530/OI00B0I000Q1324R13240XV...

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
<b>SERIES</b>	Execution ISO 6022				<b>CC</b>	CC
<b>BORE</b>	Indicate in mm					CC/ <b>50</b> /
<b>ROD</b>	Indicate in mm					CC/50/ <b>36</b> /
<b>STROKE</b>	Indicate in mm					CC/50/36/ <b>530</b> /
<b>EXECUTION</b>	Base				<b>EB</b>	CC/50/36/530/ <b>OI</b>
	Front flange				<b>FA</b>	
	Rear flange				<b>FP</b>	
	Joint hinge				<b>CS</b>	
	Intermediate trunnion				<b>OI</b>	
<b>CUSHIONING</b>	None				<b>0</b>	CC/50/36/530/ <b>OI0</b>
	Front cushioning				<b>1</b>	
	Rear cushioning				<b>2</b>	
	Front + rear cushioning				<b>3</b>	
<b>SPACER</b>	None				<b>0</b>	CC/50/36/530/ <b>OI00</b>
	50 mm				<b>1</b>	
	100 mm				<b>2</b>	
	150 mm				<b>3</b>	
	200 mm				<b>4</b>	
<b>SEALS</b>	Nitrile + ptfe (anti-friction) standard				<b>B</b>	CC/50/36/530/ <b>OI00B</b>
	Viton + ptfe (high temperatures)				<b>C</b>	
<b>ROD END</b>	Type M (standard)				<b>0</b>	CC/50/36/530/ <b>OI00B0</b>
	Type F				<b>F</b>	
<b>AIR BLEEDS</b>	None				<b>0</b>	CC/50/36/530/ <b>OI00B0I</b>
	Front				<b>G</b>	
	Rear				<b>H</b>	
	Front + rear				<b>I</b>	
<b>DRAINAGE</b>	None				<b>0</b>	CC/50/36/530/ <b>OI00B0I0</b>
	Rod side				<b>W</b>	
<b>ROD TREATMENT</b>	Standard chromium-plated				<b>0</b>	CC/50/36/530/ <b>OI00B0I00</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768				<b>P</b>	
	Hardening and chromium-plating				<b>T</b>	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h				<b>N</b>	
<b>PROXIMITY SENSOR</b>	None				<b>0</b>	CC/50/36/530/ <b>OI00B0I000</b>
	Front				<b>X1</b>	
	Rear				<b>X2</b>	
	Front + rear				<b>X3</b>	
<b>FRONT HEAD</b>						
<b>POS. OIL PORTS</b>	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>		CC/50/36/530/ <b>OI00B0I000Q1</b>
<b>POS. CUSHIONING</b>	<b>0</b> if not requested					CC/50/36/530/ <b>OI00B0I000Q13</b>
	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>		
<b>POS. AIR BLEED</b>	<b>0</b> if not requested					CC/50/36/530/ <b>OI00B0I000Q132</b>
	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>		
<b>POS. SENSOR</b>	<b>0</b> if not requested					CC/50/36/530/ <b>OI00B0I000Q1324</b>
	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>		

REAR HEAD					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CC/50/36/530/OI00B0I000Q1324R <b>1</b>
POS. CUSHIONING	0 if not requested				CC/50/36/530/OI00B0I000Q1324R <b>13</b>
	Side 1	Side 2	Side 3	Side 4	
POS. AIR BLEED	0 if not requested				CC/50/36/530/OI00B0I000Q1324R <b>132</b>
	Side 1	Side 2	Side 3	Side 4	
POS. SENSOR	0 if not requested				CC/50/36/530/OI00B0I000Q1324R <b>1324</b>
	Side 1	Side 2	Side 3	Side 4	
*EXTRA ROD X QUOTE	Indicate mm				CC/50/36/530/OI00B0I000Q1324R1324 <b>0</b>
XV QUOTE	Indicate mm (only version MT4)				CC/50/36/530/OI00B0I000Q1324R1340 <b>XV...</b>

\*Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CCT CYLINDERS SERIES

## STANDARD ISO 6022



**CCT cylinders** series integrates magnetostrictive transducers and follows International standards **ISO 6022** and **DIN 24333**. The construction with round heads fits to the most demanding and challenging industrial actuation requests in the iron and steel industry, with continuous nominal pressure up to **25 MPa**.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

### Technical specifications:

- Standard ISO 6022 and DIN 24333.
- Magnetostrictive position transducer integrated with analogue output signal (intensity or tension) or digital output signal (SSI, CAN-open, PROFIBUS-DP or IO/LINK)
- Nominal pressure 25 MPa (continuous operation)
- Maximum pressure 32 MPa
- Bore 50-320 mm
- Stroke: up to 4000 mm
- 4 Mounting styles Ref. ISO MF3 - MT4 - MP5 - EB (*basic execution*)

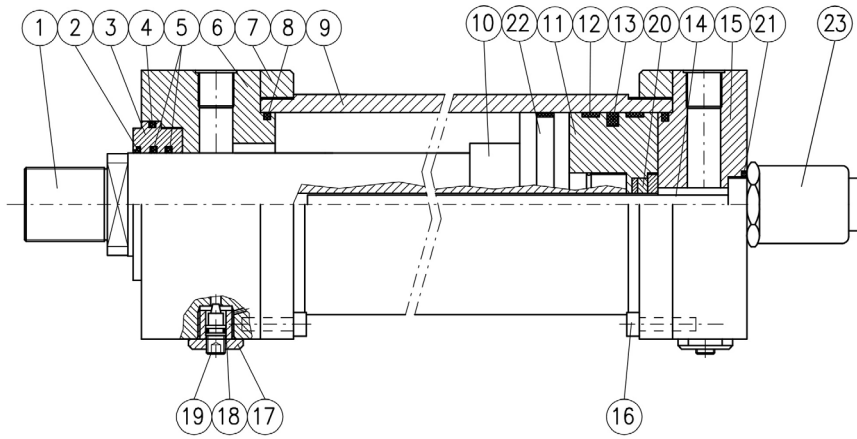
### Options:

- Analogue output signal: 4/20 mA or 0/10 V
- Digital output signal: SSI, CAN-open, PROFIBUS-DP or IO/LINK
- Front cushioning
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed
- Drainage
- Subplate CETOP 03/05
- Protection case

### EPC Cylinder configurator

This is an innovative tool that allows the client to configure CCT cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Dust scraper	Nitrile rubber
3	Guide sleeve	Cast iron
4	O-Ring + anti-extrusion	Nitrile rubber + sealon
5	Rod seal	Nitrile rubber + PTFE
6	Front head	Steel
7	Counterflange	Steel
8	O-Ring + anti-extrusion	Nitrile rubber + sealon
9	Body	Steel
10	Front cushioning sleeve	Steel
11	Piston	Steel
12	Sliding guide	MCF80
13	Piston B seal	Nitrile rubber + PTFE
14	Transducer	Stainless steel
15	Rear head	Steel
16	Cylindrical head screw	Steel
17	Safety plug	Steel
18	O-Ring	Nitrile rubber
19	Adjustment needle	Steel
20	Magnet ring	-
21	O-Ring	Nitrile rubber
22	Spacer	Steel
23	Position transducer	-

### Mounting style



# TECHNICAL CHARACTERISTICS

STANDARD ISO 6022



## LINEAR POSITION TRANSDUCERS

To immediately check the rod position, install a linear position transducer.

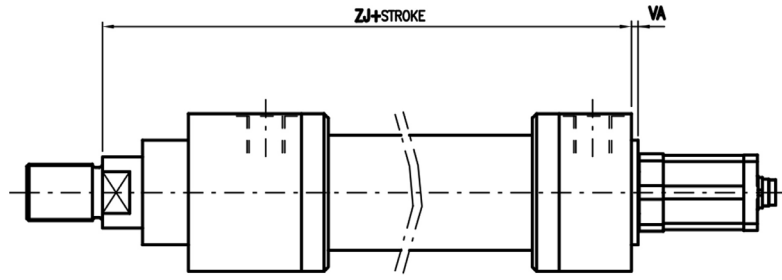
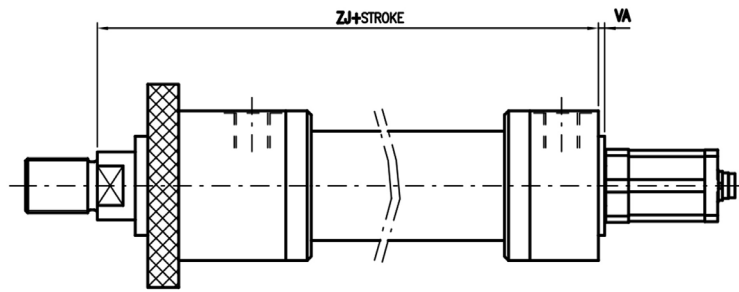
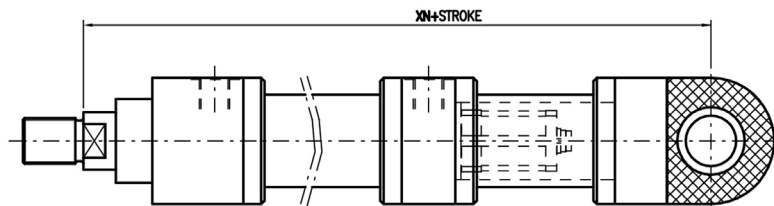
The magnetostrictive technology allows rod position detection even in heavy duty conditions and/or high frequency applications, avoiding the contact between the moving parts.

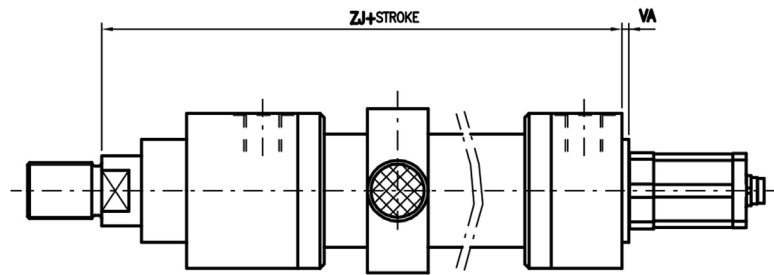
The transducer, in addition to offering a high reliability, permits an easy maintenance. Its replacement does not require the cylinder dismounting.

Analogue or digital versions are available.

<b>Resolution</b>	0,01 mm
<b>Independent linearity</b>	±0,05 % (% of the total stroke)
<b>Repeatability</b>	±0,01 % (% of the total stroke)
<b>Max. speed</b>	2 m/sec
<b>Working temperature</b>	-20 +80 °C
<b>Analogue/digital signal</b>	0+10 V 10+0 V or 4+20 mA / SSI, CAN OPEN, PROFIBUS DP, IO/LINK
<b>Strokes</b>	50÷3850 mm
<b>Max. transducer pressure</b>	35 MPa (350 Bar)
<b>Power supply</b>	24 V DC ±10 %
<b>Protection degree (connector installed)</b>	IP-67

## 1.1 AVAILABLE VERSIONS AND DIMENSIONS

**EB** Basic**FA** ISO type MF3**CS** ISO type MP5



BORE	ZJ	VA	XN
50	240	4	NA
63	270	4	*601
80	300	5	*646
100	335	6	*701
125	390	6	*840
160	460	7	*964
200	540	10	*1158
250	640	10	*1405
320	750	8	*1704

\* Dimensions not ISO

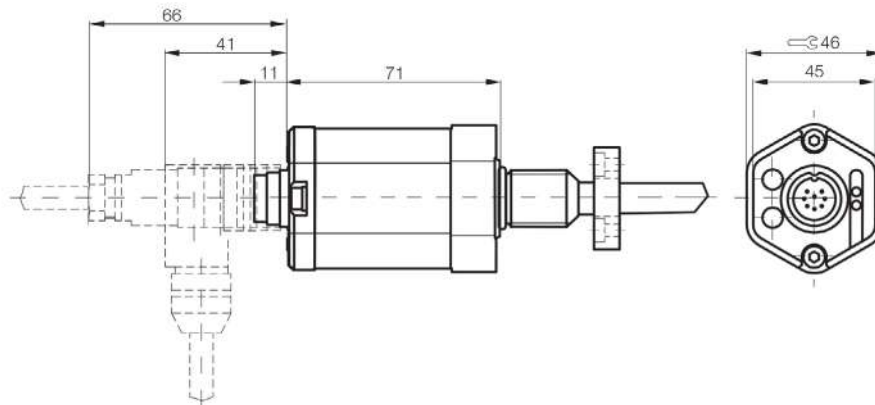


## 1.2 TRANSDUCERS DIMENSION

Transducers dimension **TYPE UT - UC - SI** with connector type:

**STRAIGHT CBKS-S 32-00: Y1**

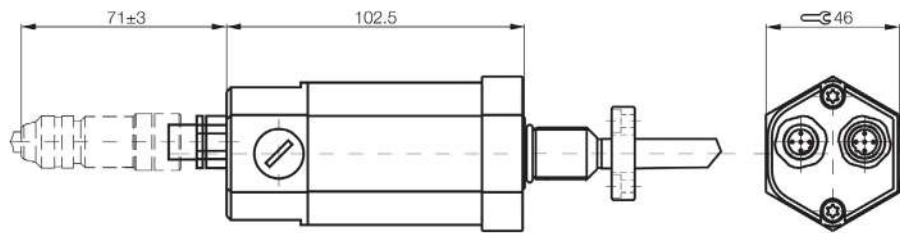
**90° CBKS-S 33-00: Y2**



Transducers dimension **TYPE HH** with connector type **Y4**:

**CBKS-S 92-00**

**CBKS-S 94-00**

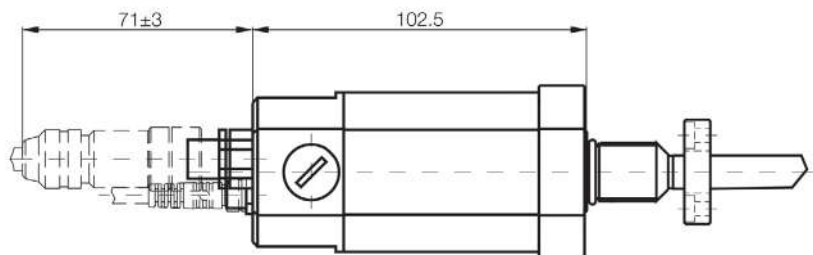


Transducers dimension **TYPE TT** with connector type **Y3**:

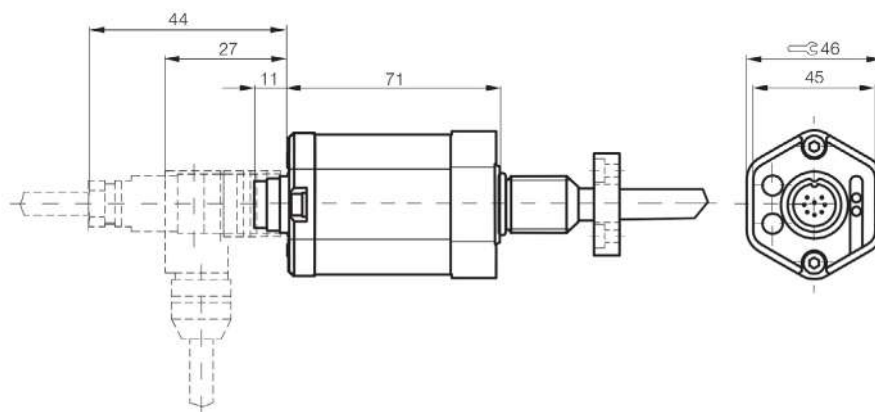
**CBKS-S 105-00**

**CBKS-S 103-00**

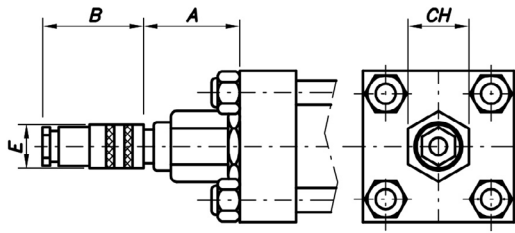
**CBKS-S 48-15-CP-05**



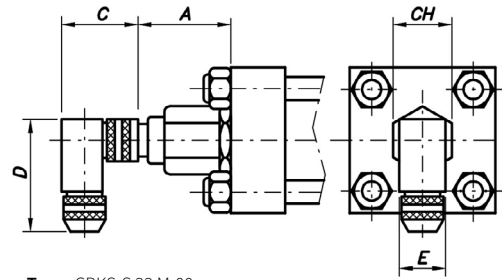
Transducers dimension **TYPE IO/LINK** with outlets **Y5** and **Y6**



## 1.3 CONNECTORS DIMENSION



Type: CBKS-S 32 M-00



Type: CBKS-S 33 M-00

Type	A	B	C	D	E	CH
CBKS-S 32 M-00	74	69	-	-	18	46
CBKS-S 33 M-00	74	-	48	54	20	46

Connection	Pin	Color
1	1	Yellow
2	2	Grey
3	3	Pink
4	4	Green
5	5	Blue
6	6	Brown
7	7	White
8	8	

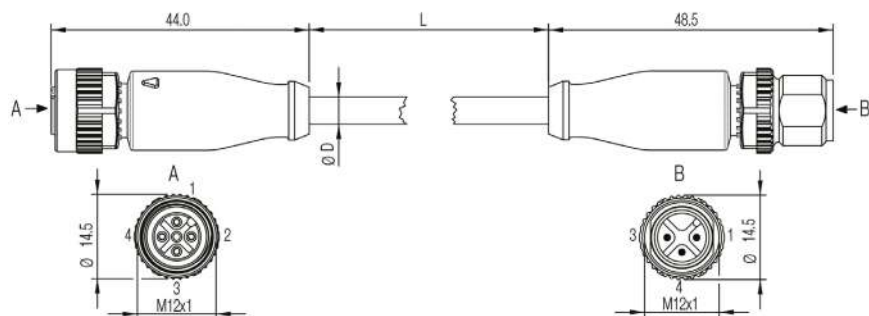
View from the bushing weld side

## IO/LINK CONNETTORS

Position transducer (A)		IO/LINK Master (B)
1	L+ (18...30 V)	1
2	None	-
3	L- (GND)	3
4	C/Q	4

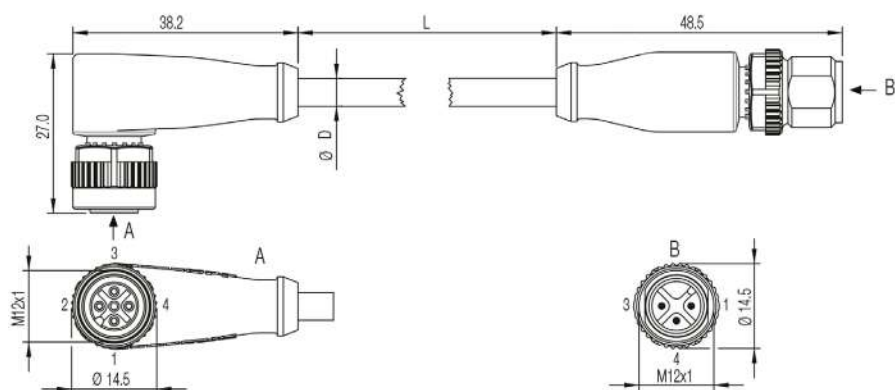
### Straight outlet - straight connector option Y5 - IO/LINK

PBCC0374 with 4m cable

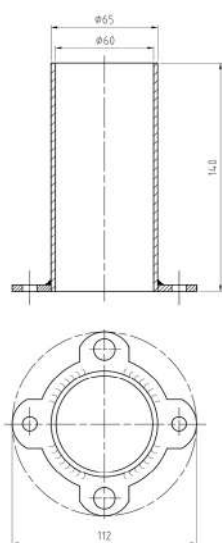


### Angled outlet - straight connector option Y6 - IO/LINK

PBCC037M with 4m cable



### 1.4 SENSOR PROTECTION DIMENSIONS



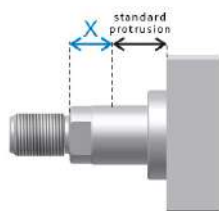
# EXAMPLE OF ORDER ACRONYM

## CCT/50/36/530/OI00BUT00000Y1Q102R120XV...

CHARACTERISTIC	DESCRIPTION	SYM.	EXMAPLE
<b>SERIES</b>	Tie rod execution	<b>CCT</b>	<b>CCT/</b>
<b>BORE</b>	Indicate in mm		<b>CCT/50/</b>
<b>ROD</b>	Indicate in mm		<b>CCT/50/36/</b>
<b>STROKE</b>	Indicate in mm		<b>CCT/50/36/530/</b>
<b>EXECUTION</b>	Basic	<b>EB</b>	<b>CCT/50/36/530/OI</b>
	Front flange	<b>FA</b>	
	Square front flange	<b>QA</b>	
	Male hinge	<b>CM</b>	
	Joint hinge	<b>CS</b>	
	Intermediate trunnion	<b>OI</b>	
<b>CUSHIONING</b>	None	<b>0</b>	<b>CCT/50/36/530/OI0</b>
<b>SPACER</b>	None	<b>0</b>	<b>CCT/50/36/530/OI00</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Nitrile + PTFE (anti-friction)	<b>B</b>	<b>CCT/50/36/530/OI00B</b>
<b>TRANSDUCER OUTPUT</b>	Tension 0-10 V	<b>UT</b>	<b>CCT/50/36/530/OI00BUT</b>
	Electrical current 4-20 mA	<b>UC</b>	
	SSI Interface	<b>SI</b>	
	CANopen Interface	<b>HH</b>	
	PROFIBUS Interface	<b>TT</b>	
	IO/LINK Interface	<b>LK</b>	
<b>ROD END</b>	Type M (standard)	<b>0</b>	<b>CCT/50/36/530/OI00BUT0</b>
	Type F	<b>F</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	<b>CCT/50/36/530/OI00BUT00</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	
<b>DOUBLE ROD SEAL</b>	None	<b>0</b>	<b>CCT/50/36/530/OI00BUT000</b>
	Double rod seal	<b>L</b>	
<b>DRAINAGE</b>	None	<b>0</b>	<b>CCT/50/36/530/OI00BUT0000</b>
	Rod side	<b>W</b>	
<b>ROD TREATMENT</b>	Standard chromium-plated	<b>0</b>	<b>CCT/50/36/530/OI00BUT00000</b>
	Heavy chromium-plated, 0.045mm thick, 100h salt mist ISO 3768	<b>P</b>	
	Hardening and chromium-plating	<b>T</b>	
	Ni-CROMAX30 chromium-plated, nickelplated, ASTM B 117 1000h	<b>N</b>	
<b>CONNECTOR</b>	None	<b>0</b>	<b>CCT/50/36/530/OI00BUT000000</b>
	Straight CBKS-S 32 M-00	<b>Y1</b>	
	Angled 90° CBKS-S 33 M-00	<b>Y2</b>	
	Male connector CBKS-S-105-00 Female connector CBKS-S-103-00 Supply cable CBKS-S 48-15-CP-05	<b>Y3</b>	
	Female connector CBNS-S92-00 Male connector CBNS-S94-00	<b>Y4</b>	
	Straight outlet - straight connector PBCC 0374	<b>Y5</b>	
	Angled outlet - straight connector PBCC 037M	<b>Y6</b>	

FRONT HEAD					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CCT/50/36/530/OI00BUT000000Q1
POS. CUSHIONING	0 if not requested				CCT/50/36/530/OI00BUT000000Q10
POS. AIR BLEED	0 if not requested				CCT/50/36/530/OI00BUT000000Q102
	Side 1	Side 2	Side 3	Side 4	
REAR HEAD					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CCT/50/36/530/OI00BUT000000Q102R1
POS. AIR BLEED	0 if not requested				CCT/50/36/530/OI00BUT000000Q102R12
	Side 1	Side 2	Side 3	Side 4	
*EXTRA ROD X QUOTE	Indicate mm				CCT/50/36/530/OI00BUT000000Q102R120
XV QUOTE	Indicate mm (only version MT4)				CCT/50/36/530/OI00BUT000000Q102R120XV...

\* Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

#### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CB CYLINDERS SERIES

## SHORT STROKE COMPACT WITH ADJUSTABLE MAGNETIC SENSORS



The **CB series** comprises compact cylinders with short stroke and adjustable **magnetic sensors**. The particular small size and the restrained weight make these cylinders ideal for moulding applications of plastics and locks.

The choice of selected materials, the new superficial treatment, the severe controls of 100% of all cylinders produced and the quality of the means of production, grant high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

### Technical specifications:

- Adjustable proximity sensors type SEP "Hall effect" IP67
- Adjustable proximity sensors type SER "Reed effect" IP67
- Nominal pressure 16 MPa (continuous operation)
- Maximum pressure 25 MPa
- Bore 25-100 mm
- 4 Mounting style
- Body extracted from full block with rear head integrated
- New treatment of hard anodic oxidation
- Improved endurance to usury and abrasion
- Surface hardness increased to 400-600 Vickers

### Options:

- Chromed/inox AISI316 rod
- Standard version
- Magnetic version
- Viton seals (only in N version)

### EPC Cylinder configurator

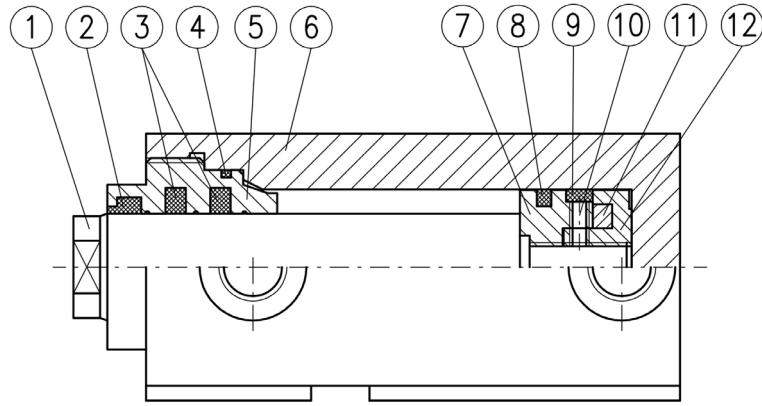
This is an innovative tool that allows the client to configure CB cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D, and gives the user the possibility to save projects and request offers.

With the complete access, reserved to the purchasing department, it is possible to make orders directly.

For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>





N°	ITEM	MATERIAL
1	Rod	Steel
2	Scraper	Nitrile rubber
3	Rod seals	Nitrile rubber + PTFE
4	O-Ring	Nitrile rubber
5	Guide sleeve	Cast iron
6	Body	Light alloy
7	Front seal holder	Light alloy
8	Piston seal	Nitrile rubber + PTFE
9	Piston guide	PTFE
10	O-Ring	Nitrile rubber
11	Permanent magnet	-
12	Rear seal holder	Light alloy

### Mounting style



# TECHNICAL CHARACTERISTICS

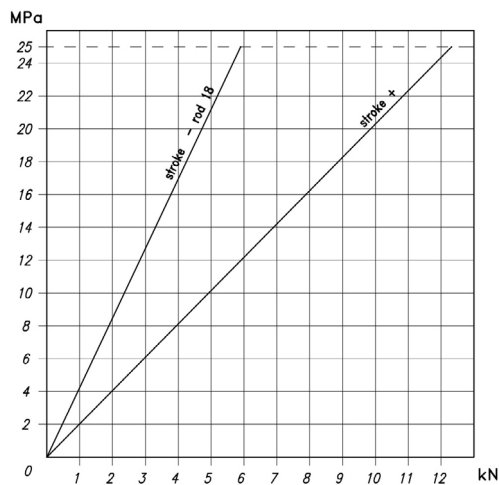


**SHORT STROKE COMPACT**  
WITH ADJUSTABLE MAGNETIC SENSORS

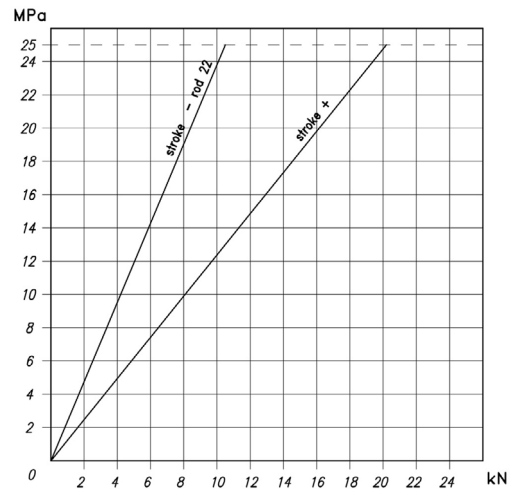
<b>Bore</b>	<b>mm</b>	<b>25</b>	<b>32</b>	<b>40</b>	<b>50</b>	<b>63</b>	<b>80</b>	<b>100</b>	
<b>Oil ports</b>	<b>BSP</b>	1/4"	1/4"	1/4"	1/4"	3/8"	1/2"	1/2"	
<b>Rod diameter</b>	<b>mm</b>	18	22	22	28	28	36	45	
<b>Temperature</b>	<b>°C</b>	-20°C +80°C normal and magnetic version -20°C +135°C normal version only							
<b>Tolerance on stroke</b>	<b>mm</b>	+/- 0,5							
<b>Continuous working pressure</b>	<b>Mpa</b>	16							
	<b>(bar)</b>	160							
<b>Maximum intermittent pressure</b>	<b>Mpa</b>	25							
	<b>(bar)</b>	250							
<b>Maximum speed</b>	<b>m/s</b>	0,5							
		Limit the maximum speed of end of stroke piston to 0.1m/sec. It is always recommendable to limit speed with flow limiters <i>For any further explanations, contact our Technical Department</i>							
<b>Maximum capacity</b>	<b>l/s</b>	2	3	5	7	12	20	30	
<b>Net weight</b>	<b>Stroke 20 mm</b>	<b>Kg</b>	0,8	1,2	1,6	2,5	3,9	6,5	10,5
	<b>Stroke 50 mm</b>		1	1,5	1,9	3	4,5	7,5	12

## FORCE PRESSURE DIAGRAMS

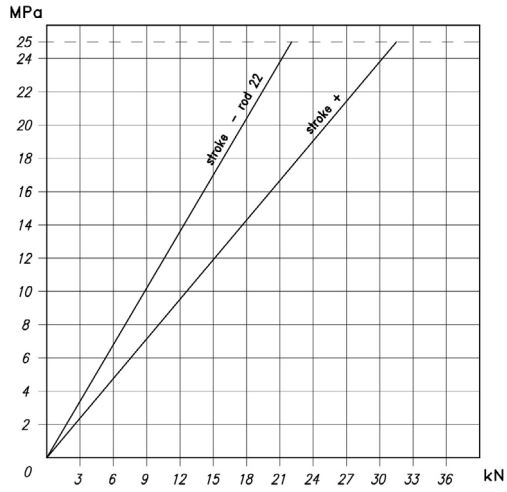
Bore 25



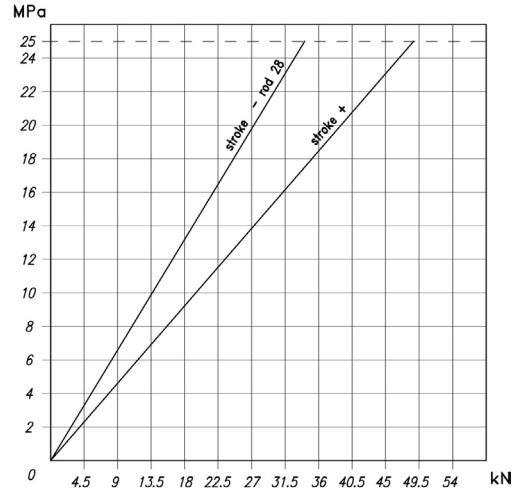
Bore 32



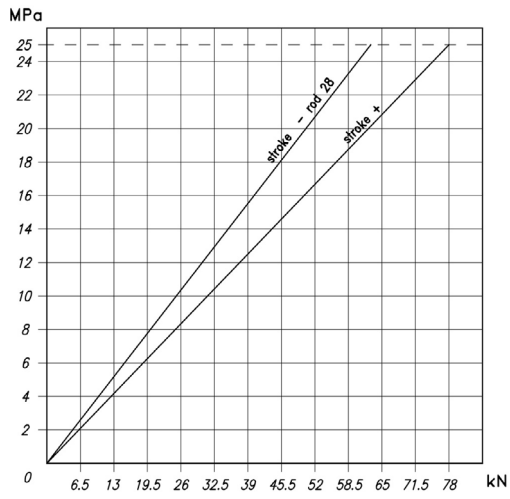
Bore 40



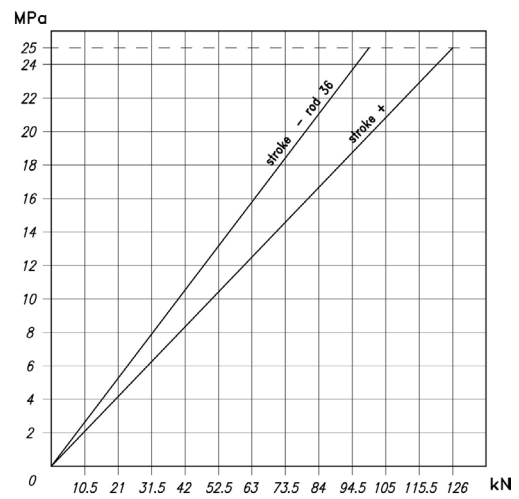
Bore 50



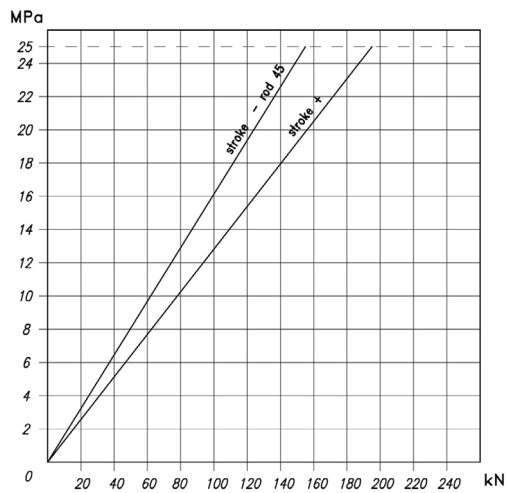
Bore 63



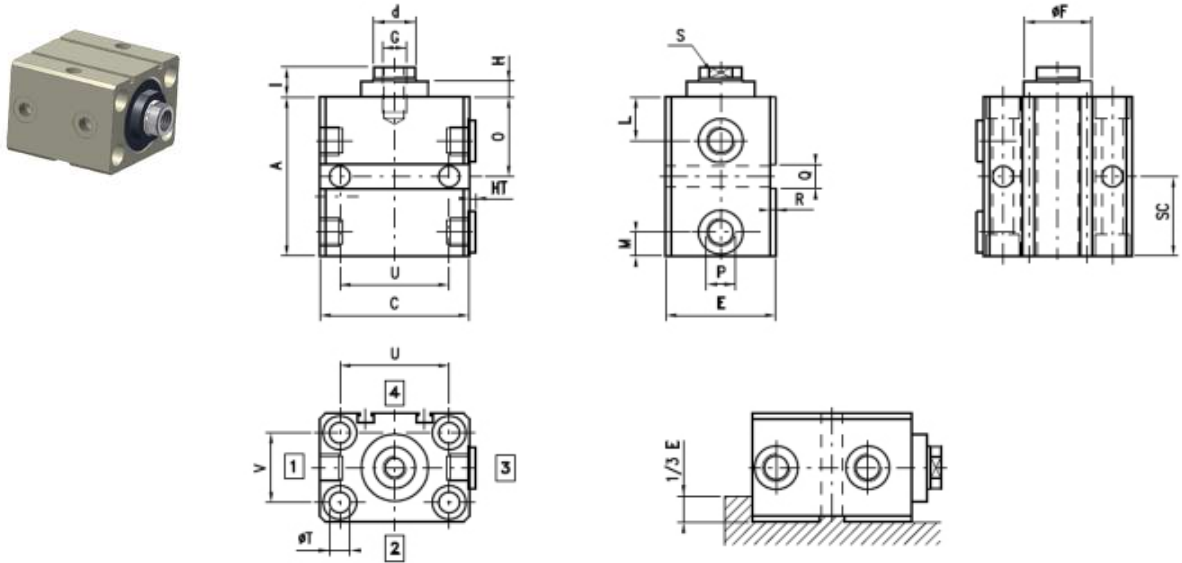
Bore 80



Bore 100

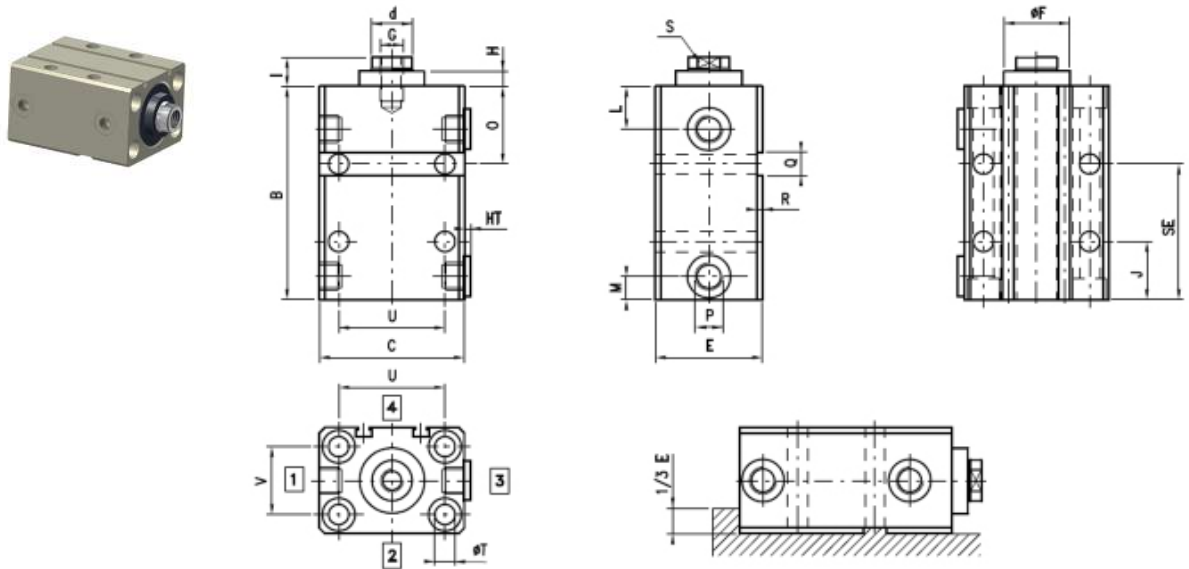


# EB Basic stroke 20 mm



Oil ports can also be placed on side 3 by mounting the caps in position 1

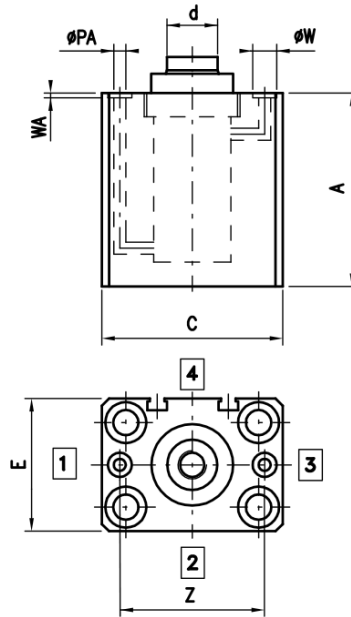
# EB Basic stroke 50 mm



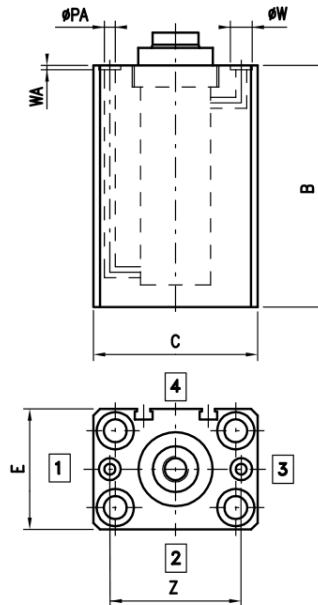
Oil ports can also be placed on side 3 by mounting the caps in position 1

BORE	d	A	B	C	E	F	G	H	HT	I	J	L	M	O	P	Q	R	S	SC	SE	T	U	V
25	18	77	107	65	45	32	M10	6,5	5	14	30	22	12	37	1/4"	10	2	14	40	70	9	50	30
32	22	80	110	75	55	34	M12	8	5	15	30	22	12	40	1/4"	12	3	18	40	70	11	55	35
40	22	93	123	85	63	34	M14	7	5	17	35	24	14	43	1/4"	12	3	18	50	80	11	63	40
50	28	95	125	100	75	42	M20	8	5	20	35	25	14,5	45	1/4"	15	5	24	50	80	13	76	45
63	28	105	135	115	90	50	M20	7	5	20	40	29	21	55	3/8"	15	5	24	50	80	13	90	55
80	36	120	150	140	110	60	M27	7	5	20	50	35	25	60	1/2"	20	5	32	60	90	17	110	75
100	45	130	160	170	140	72	M33	8	5	25	60	37	28	70	1/2"	20	5	40	60	90	17	135	95

**AF** Front supply stroke 20 mm



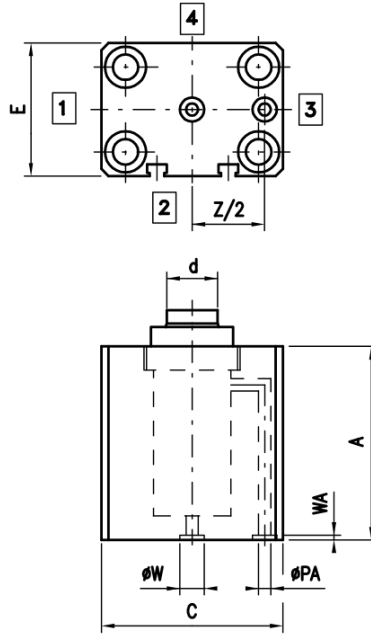
**AF** Front supply stroke 50 mm



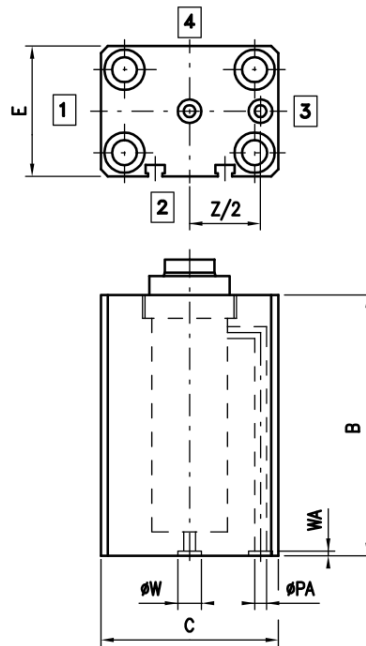
BORE	d	A	B	C	E	PA	W	WA	Z
25	18	77	107	65	45	5	10	1,9	51
32	22	80	110	75	55	5	10	1,9	60
40	22	93	123	85	63	5	10	1,9	65
50	28	95	125	100	75	5	10	1,9	80
63	28	105	135	115	90	6	13	1,9	95
80	36	120	150	140	110	6	13	1,9	118
100	45	130	160	170	140	6	13	1,9	140

\*For missing quotes see base execution

**AP** Rear supply stroke 20 mm



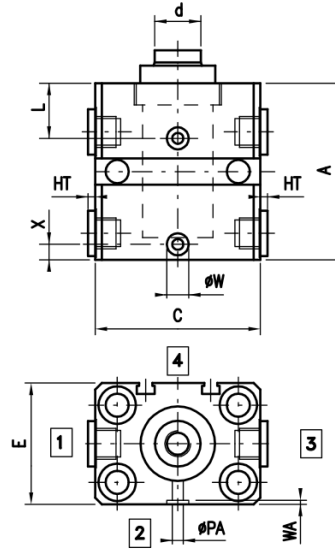
**AP** Rear supply stroke 50 mm



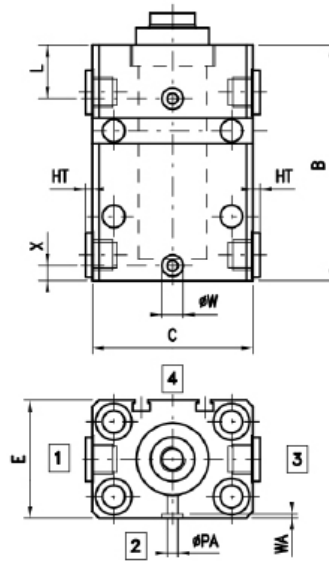
BORE	d	A	B	C	E	PA	W	WA	Z
25	18	77	107	65	45	5	10	1,9	51
32	22	80	110	75	55	5	10	1,9	60
40	22	93	123	85	63	5	10	1,9	65
50	28	95	125	100	75	5	10	1,9	80
63	28	105	135	115	90	6	13	1,9	95
80	36	120	150	140	110	6	13	1,9	118
100	45	130	160	170	140	6	13	1,9	140

\*For missing quotes see base execution

**AL** Side supply stroke 20 mm

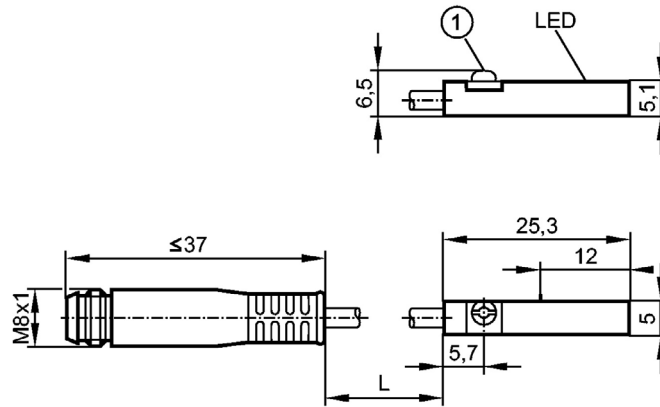


**AL** Side supply stroke 50 mm



BORE	d	A	B	C	E	HT	L	PA	W	WA	X
25	18	77	107	65	45	5	22	5	10	1,9	7
32	22	80	110	75	55	5	22	5	10	1,9	7
40	22	93	123	85	63	5	24	5	10	1,9	10
50	28	95	125	100	75	5	25	5	10	1,9	10
63	28	105	135	115	90	5	29	6	13	1,9	15
80	36	120	150	140	110	5	35	6	13	1,9	17
100	45	130	160	170	140	5	37	6	13	1,9	20

\* For missing quotes see base execution



1- eccentric mounting style

ELECTRICAL DATA	
Electrical model	DC PNP
Operating voltage (V)	10...30 DC; "supply class 2" cULus
Absorbed electric current (mA)	< 10
Insulation class	III
Reverse polarity protection	YES

OUTPUTS	
Output function	NO
Voltage drop (V)	< 2,5
Electric current capacity (mA)	100
Short circuit protection	YES
Overload protection	YES
Switching frequency (Hz)	6000

SURVEY FIELD	
Reaction sensibility (mT)	2,0
Transfer speed (m/s)	> 10

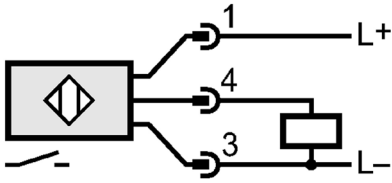
PRECISION / DEVIATION	
Hysteresis (mm)	< 1,0
Repeatability (mm)	< 0,2

REACTION TIMES	
Availability delay [ms]	< 30

ENVIRONMENTAL CONDITIONS	
Environment temperature (°C)	-25...85
Protection	IP 65 / IP 67



ELECTRICAL CONNECTION	
Connection	PUR / 0,3 cable; with M8 connector (with snap-on threaded joint)

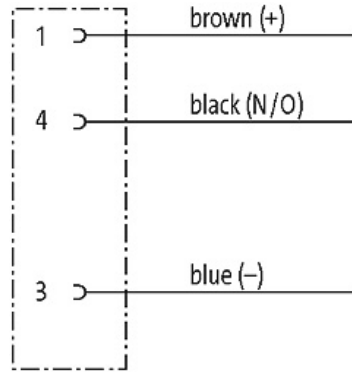


Cabling



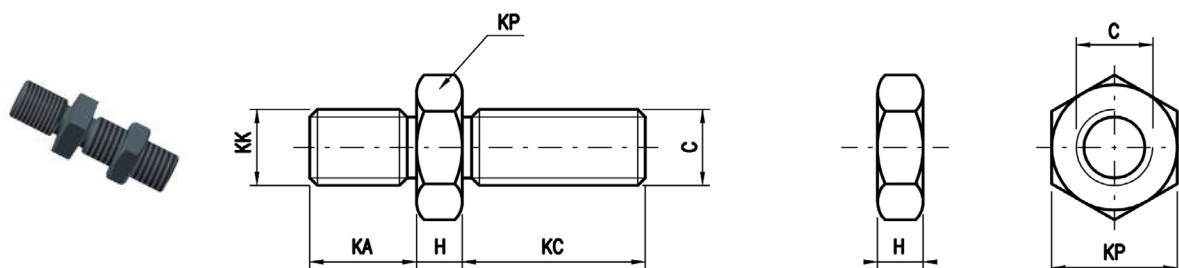
## CAP25 Cable for sensors

CABLE FOR SENSOR	
CAP25	3 wires cable, length = 5m with M8 connector



# TFD

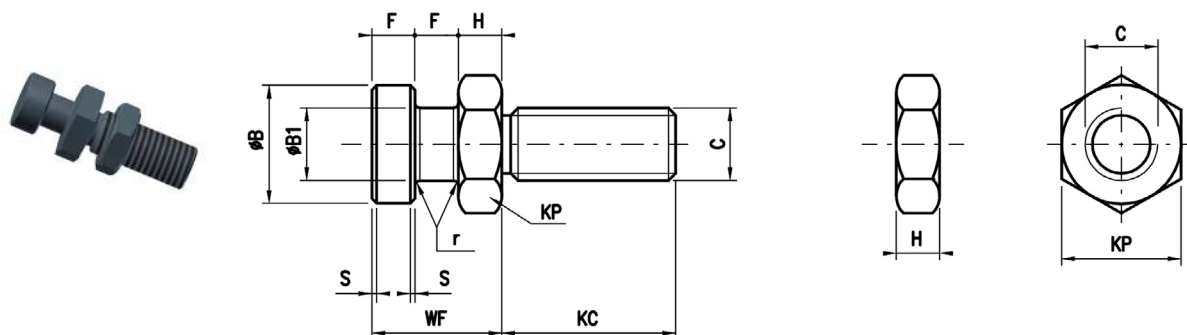
Male end with nut



Cod.	C	H	KA	KC	KK	KP
TFD25	M10	6	14	24	M10x1,25	17
TFD32	M12	7	16	28	M12x1,25	19
TFD40	M14	8	18	33	M14x1,5	22
TFD50	M20	9	28	39	M20x1,5	30
TFD63	M20	9	28	39	M20x1,5	30
TFD80	M27	12	36	52	M27x2	36
TFD100	M33	14	45	64	M33x2	46

# TMD

Hammer head with nut



Cod.	B	B1	C	F	H	KC	KP	r	s	WF
TMD25	16	10	M10	7	6	24	17	0,5	0,5	20
TMD32	18	11	M12	8	7	28	19	0,5	0,5	23
TMD40	18	11	M14	8	8	33	22	0,5	0,5	24
TMD50	22	14	M20	10	9	39	30	0,5	0,5	29
TMD63	22	14	M20	10	9	39	30	0,5	0,5	29
TMD80	28	18	M27	12,5	12	52	36	0,8	0,8	37
TMD100	35	22	M33	16	14	64	46	0,8	0,8	46

# EXAMPLE OF ORDER ACRONYM

## CB/50/20/EBBMD0

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
SERIES	Short stroke	CB	CB/
BORE	Indicate in mm		CB/50/
ROD	Indicate in mm		CB/50/20/
EXECUTION	Standard	EB	CB/50/20/EB
	Front supply	AF	
	Rear supply	AP	
	Side supply	AL	
SEALS	Low friction (standard) -20 +80°C	B	CB/50/20/EBB
	Viton, low friction -20 +135°C*	C	
VERSION	Normal -20 +135°C*	N	CB/50/20/EBBM
	Magnetic -20 +80°C	M	
LIMITED STROKE	Indicate limited stroke value	D	CB/50/20/EBBMD0

\* Normal model N only

CHARACTERISTIC	DESCRIPTION	CODE
PNP SWITCH	Electrical magnetic sensor PNP with connection	SEP00
	5m cable with connection for PNP sensor	CAP25

# REPLACEMENT ORDER ACRONYM

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
SEAL KIT	Short stroke	KCB	KCB
BORE	Indicate in mm		KCB/50/
SEALS	Low friction (standard) -20 +80°C	B	KCB/50/B
	Viton, low friction -20 +135°C*	C	

CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
ROD COMPLETED WITH PREMOUNTED PISTON	Short stroke	SCB	SCB
BORE	Indicate in mm		SCB/50/
STROKE	Indicate in mm		SCB/50/20/
SEALS	Low friction (standard) -20 +80°C	B	SCB/50/20/B
	Viton, low friction -20 +135°C*	C	
VERSION	Normal -20 +135°C*	N	SCB/50/20/BM
	Magnetic -20 +80°C	M	

\* Normal model N only

Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.

# CL CYLINDERS SERIES



## WELDED CYLINDERS

The **CL series**, welded cylinders with accessible prices, is suitable for the mobile sector or for applications which do not present cyclical fatigue stress.

The choice of selected materials, the hydraulic and electronic controls of 100% of all cylinders produced and the quality of the means of production, allow to reach high standards of quality, reliability and enduring product performance.

The seals used, supplied by premium suppliers, grant high performance and international availability.

The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature

### Technical characteristics:

- Nominal pressure 14 MPa
- Maximum pressure 21 MPa
- Bore 40-100 mm
- Stroke up to 4000 mm
- Single or double rod
- 2 rod diameter per bore
- 6 mounting styles
- 3 versions of rod mounting styles

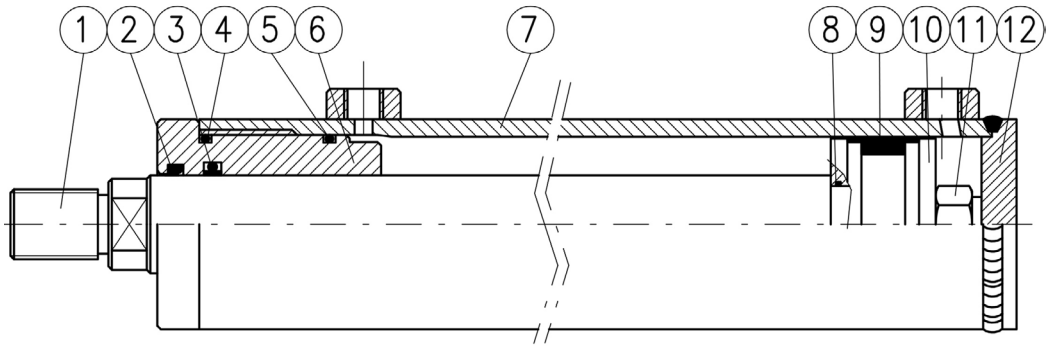
### Options:

- Integrated position transducer with analogue output signal: 4/20 mA or 0/10V (contact our technical department)
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed

### EPC Cylinder configurator

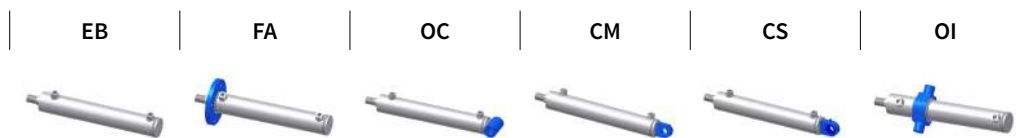
This is an innovative tool that allows the client to configure CL cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Scraper	Polyurethane
3	Rod seal	Polyurethane
4	O-Ring	Nitrile rubber
5	O-Ring + PBK	Nitrile rubber + Polyurethane
6	Guide	Cast iron
7	Body	Steel
8	O-Ring	Nitrile rubber
9	Piston seal	Nitrile rubber
10	Piston	Steel
11	Nut	Steel
12	Rear head	Steel

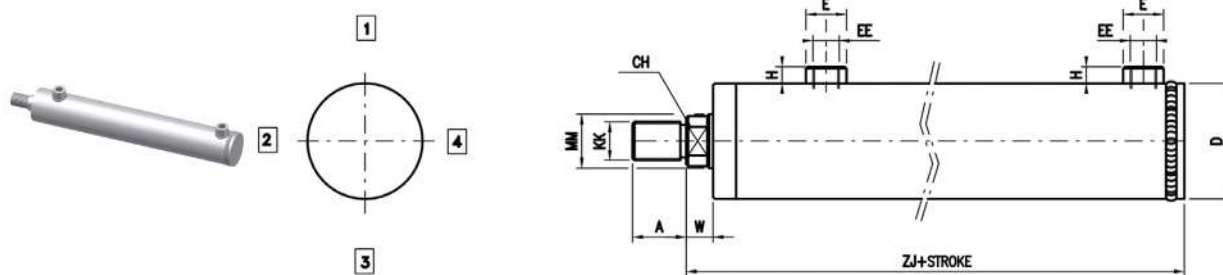
#### Mounting style



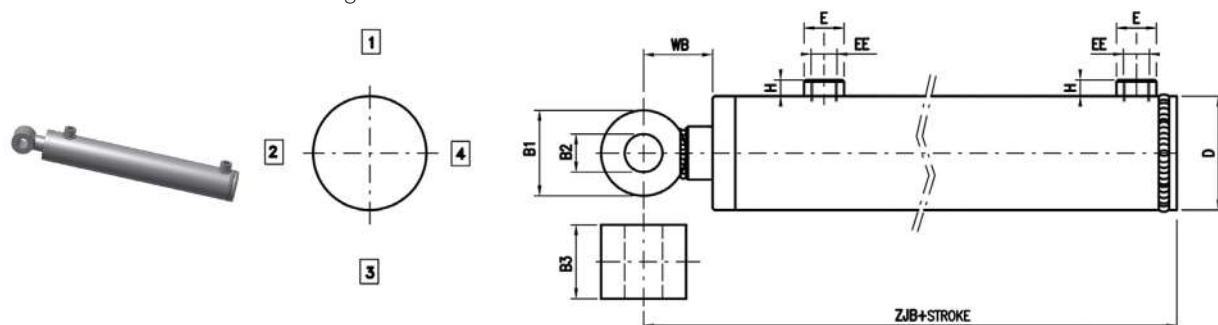
#### Rod mounting style



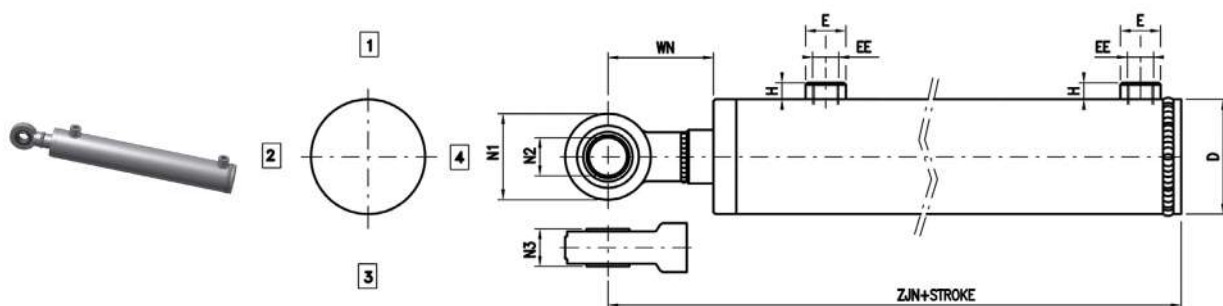
## EBM Basic - male thread



## EBB Basic - welded bushing



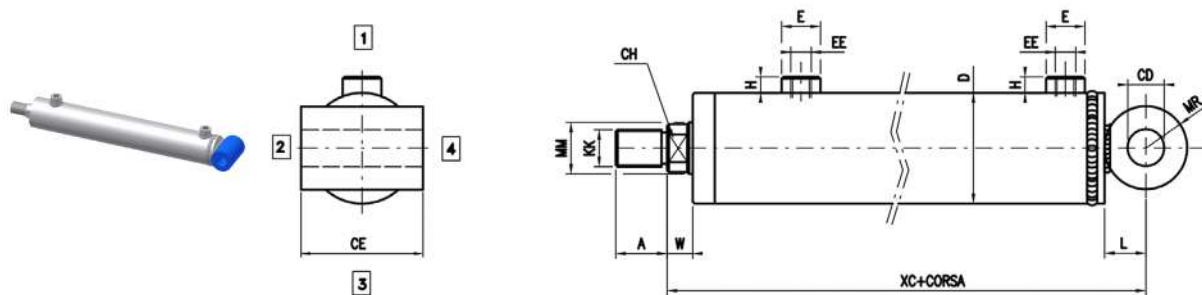
## EBN Basic - welded joint



BORE	MM Rod	CH	KK	A	B1	B2	B3	D	E	EE	H	N1	N2	N3	W	WB	WN	ZJ	ZJB	ZJN
40	20	18	M16x1,5	22	40	20,5	40	50	22	1/4"	16	53	20	16	13	42	60	121	150	168
	25	22	M20x1,5	28																
50	25	22	M20x1,5	28	40	20,5	40	60	26	3/8"	17	53	20	16	14	42	60	132	160	178
	30	24	M20x1,5	28																
60	30	24	M20x1,5	28	50	25,5	45	70	26	3/8"	17	64	25	20	16	48	68	153	185	205
	35	29	M27x2	36																
70	35	29	M27x2	36	50	30,5	55	80	26	3/8"	17	73	30	22	16	48	74	153	185	211
	40	34	M27x2	36																
80	40	34	M27x2	36	50	30,5	55	95	30	1/2"	18	73	30	22	18	50	76	176	208	234
	50	44	M33x2	45																
100	50	44	M33x2	45	70	40,25	70	115	30	1/2"	18	92	40	28	20	60	94	210	250	284
	60	52	M42x2	56																

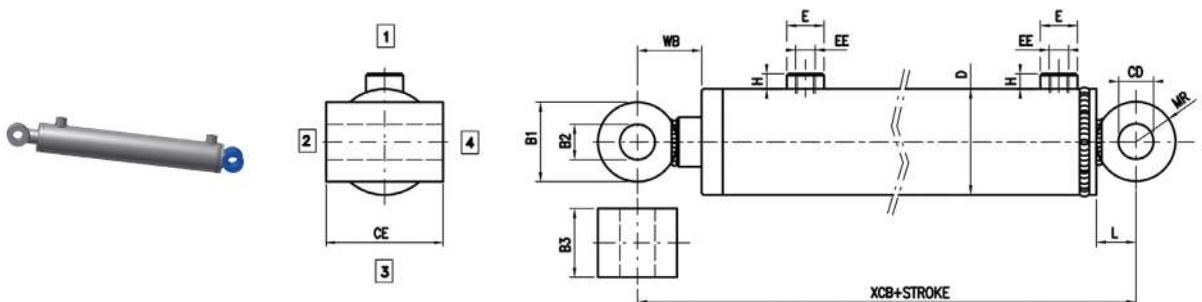
# OCM

Eye hinge - male thread



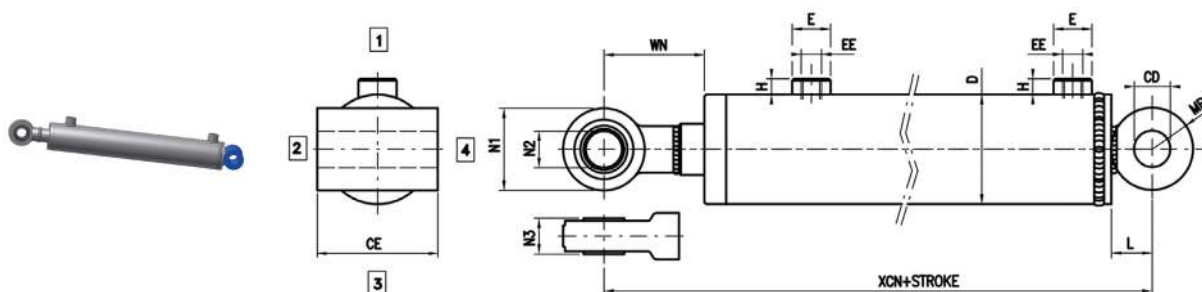
# OCB

Eye hinge - welded bushing



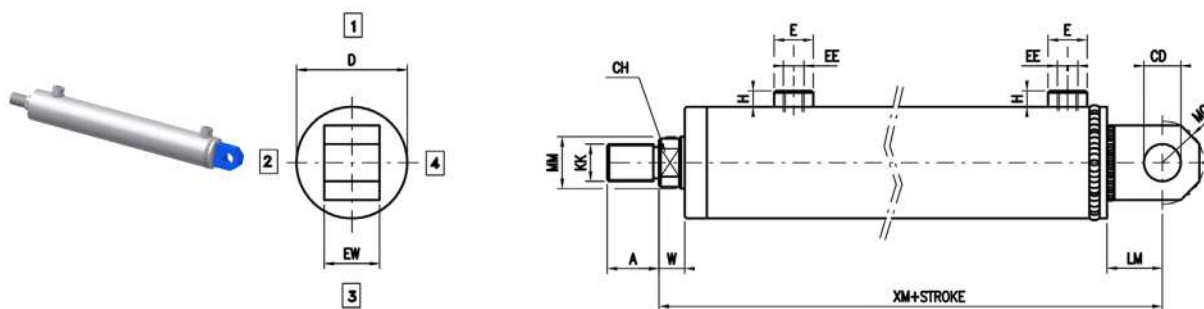
# OCN

Eye hinge - welded joint

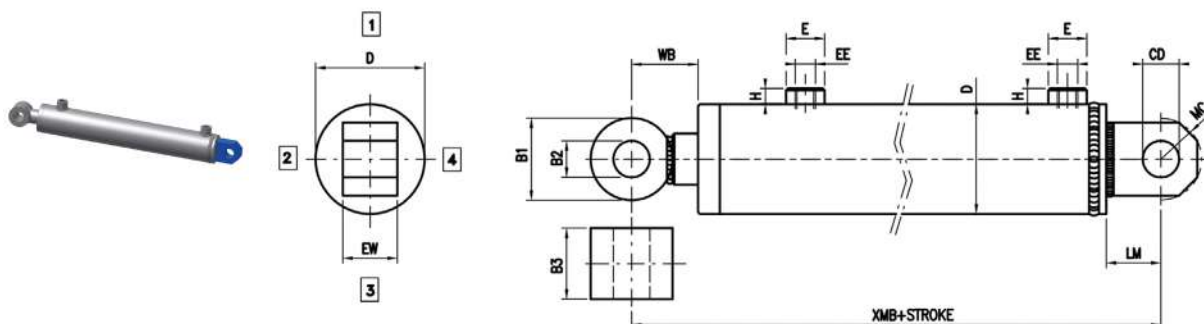


BORE	MM Rod	CH	KK	A	B1	B2	B3	CD	CE	D	E	EE	H	L	MR	N1	N2	N3	W	WB	WN	XC	XCB	XCN
40	20	18	M16x1,5	22	40	20,5	40	20,25	70	50	22	1/4"	16	20	20	53	20	16	13	42	60	141	170	188
	25	22	M20x1,5	28																				
50	25	22	M20x1,5	28	40	20,5	40	20,25	70	60	26	3/8"	17	20	20	53	20	16	14	42	60	152	180	198
	30	24	M20x1,5	28																				
60	30	24	M20x1,5	28	50	25,5	45	25,25	80	70	26	3/8"	17	25	25	64	25	20	16	48	68	178	210	230
	35	29	M27x2	36																				
70	35	29	M27x2	36	50	30,5	55	30,25	110	80	26	3/8"	17	30	30	73	30	22	16	48	74	183	215	241
	40	34	M27x2	36																				
80	40	34	M27x2	36	50	30,5	55	30,25	110	95	30	1/2"	18	30	30	73	30	22	18	50	76	206	238	264
	50	44	M33x2	45																				
100	50	44	M33x2	45	70	40,25	70	40,25	130	115	30	1/2"	18	35	35	92	40	28	20	60	94	245	285	319
	60	52	M42x2	56																				

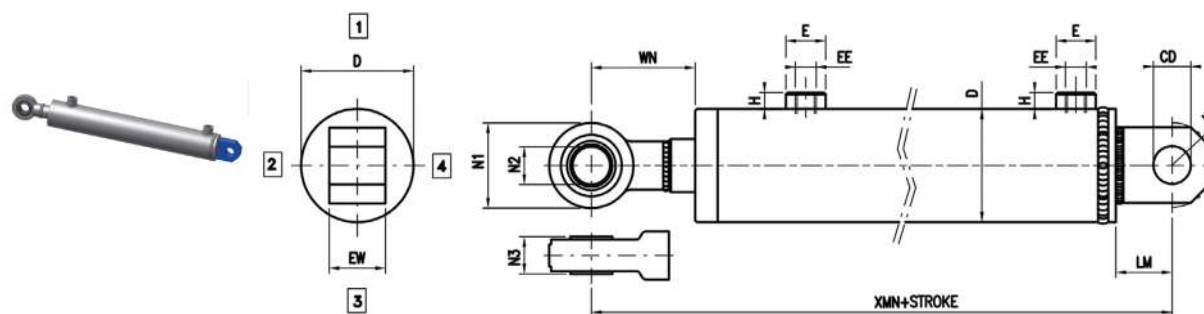
## CMM Male hinge - male thread



## CMB Male hinge - welded bushing



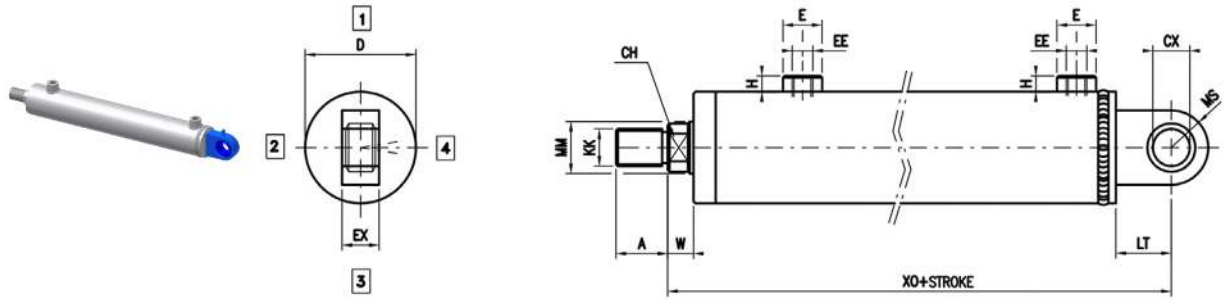
## CMN Male hinge - welded joint



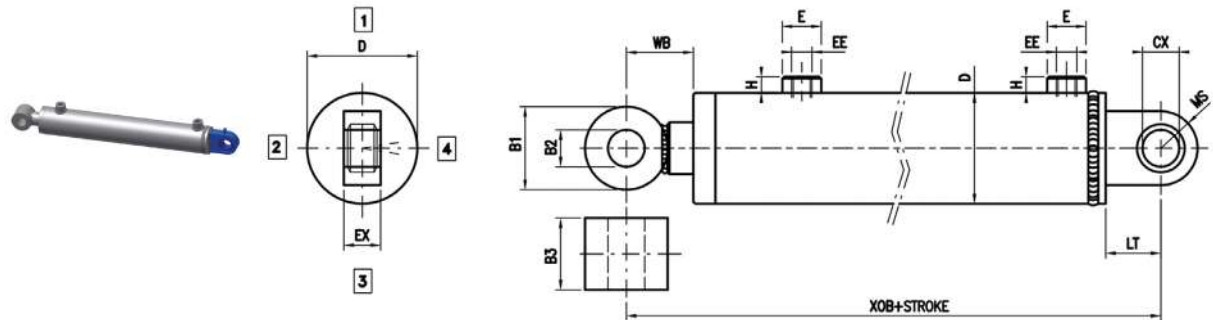
BORE	MM Rod	CH	KK	A	B1	B2	B3	CD	D	E	EE	EW	H	LM	MC	N1	N2	N3	W	WB	WN	XM	XMB	XMN
40	20	18	M16x1,5	22	40	20,5	40	20,25	50	22	1/4"	25	16	30	26	53	20	16	13	42	60	151	180	198
	25	22	M20x1,5	28																				
50	25	22	M20x1,5	28	40	20,5	40	20,25	60	26	3/8"	25	17	30	26	53	20	16	14	42	60	162	190	208
	30	24	M20x1,5	28																				
60	30	24	M20x1,5	28	50	25,5	45	25,25	70	26	3/8"	30	17	35	30	64	25	20	16	48	68	188	220	240
	35	29	M27x2	36																				
70	35	29	M27x2	36	50	30,5	55	30,25	80	26	3/8"	35	17	45	35	73	30	22	16	48	74	198	230	256
	40	34	M27x2	36																				
80	40	34	M27x2	36	50	30,5	55	30,25	95	30	1/2"	35	18	45	35	73	30	22	18	50	76	221	253	279
	50	44	M33x2	45																				
100	50	44	M33x2	45	70	40,25	70	40,25	115	30	1/2"	56	18	55	42	92	40	28	20	60	94	265	305	339
	60	52	M42x2	56																				



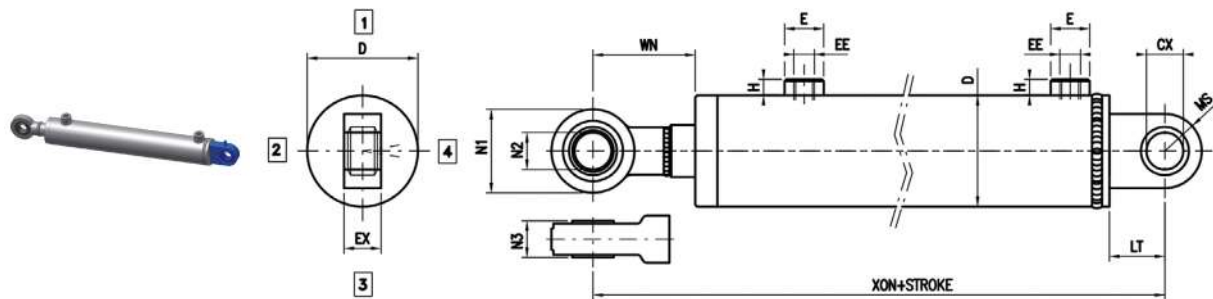
# CSM

 Joint hinge - male thread


# CSB

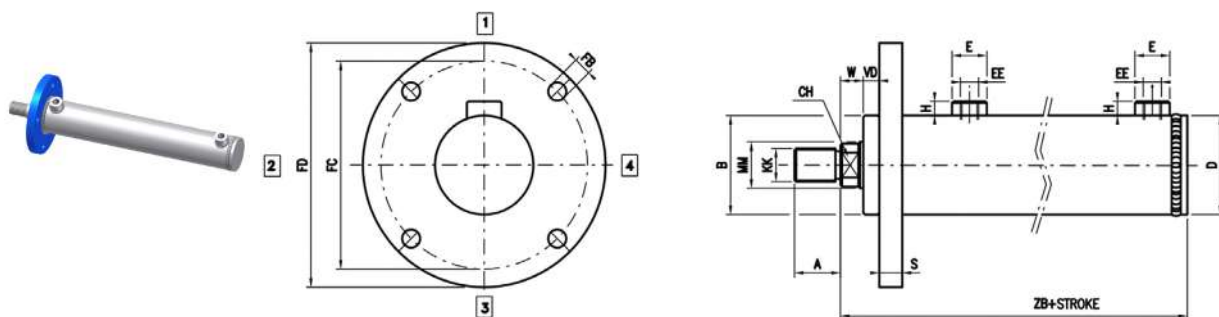
 Joint hinge - welded bushing


# CSN

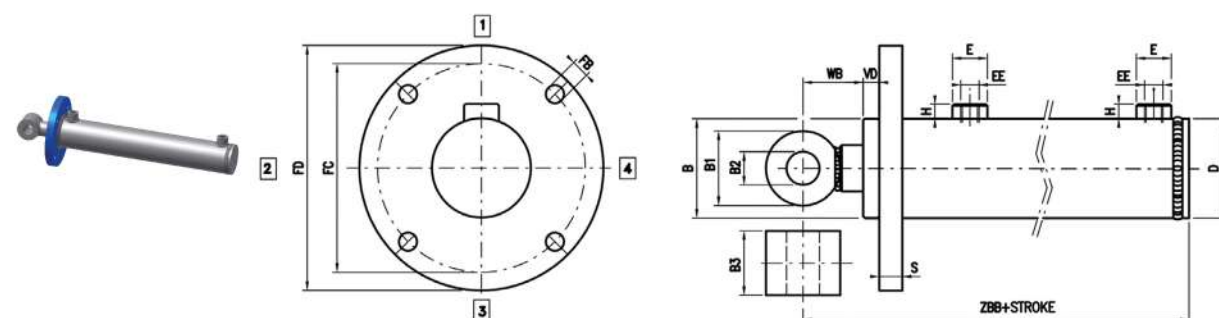
 Joint hinge - welded joint


BORE	MM Rod	CH	KK	A	B1	B2	B3	CX	D	E	EE	EX	H	LT	MS	N1	N2	N3	W	WB	WN	XO	XOB	XON
40	20	18	M16x1,5	22	40	20,5	40	20	50	22	1/4"	19	16	38	25	53	20	16	13	42	60	159	188	206
	25	22	M20x1,5	28																				
50	25	22	M20x1,5	28	40	20,5	40	20	60	26	3/8"	19	17	38	25	53	20	16	14	42	60	170	198	216
	30	24	M20x1,5	28																				
60	30	24	M20x1,5	28	50	25,5	45	25	70	26	3/8"	23	17	45	27,5	64	25	20	16	48	68	198	230	250
	35	29	M27x2	36																				
70	35	29	M27x2	36	50	30,5	55	30	80	26	3/8"	28	17	51	32,5	73	30	22	16	48	74	204	236	262
	40	34	M27x2	36																				
80	40	34	M27x2	36	50	30,5	55	30	95	30	1/2"	28	18	51	32,5	73	30	22	18	53	79	224	259	285
	50	44	M33x2	45																				
100	50	44	M33x2	45	70	40,25	70	40	115	30	1/2"	35	18	69	50	92	40	28	20	60	94	279	319	353
	60	52	M42x2	56																				

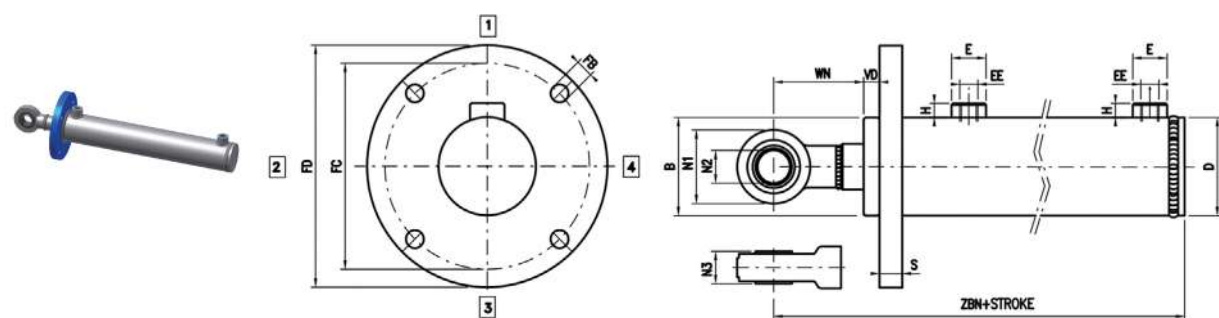
## FAM Front flange - male thread



## FAB Front flange - welded bushing



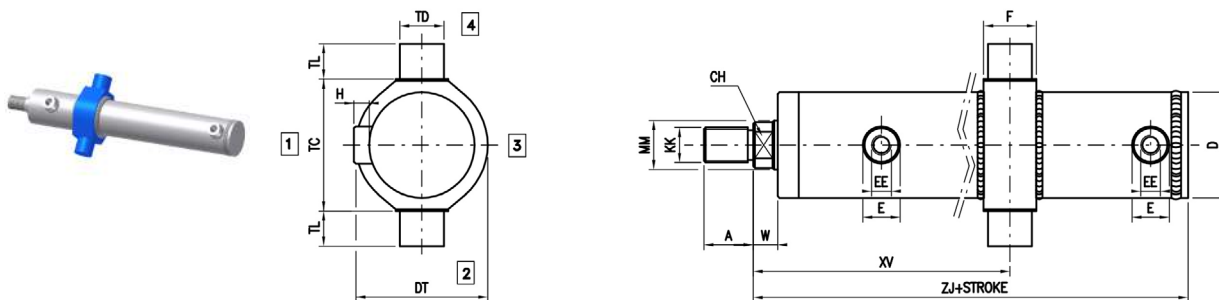
## FAN Front flange - welded joint



BORE	MM Rod	CH	KK	A	B	B1	B2	B3	D	E	EE	FB	FC	FD	H	N1	N2	N3	S	VD	W	WB	WN	ZB	ZBB	ZBN
40	20	18	M16x1,5	22	49	40	20,5	40	50	22	1/4"	11	87	109	20	53	20	16	12,5	8	13	42	60	123	152	170
	25	22	M20x1,5	28																						
50	25	22	M20x1,5	28	59	40	20,5	40	60	26	3/8"	13	105	128	20	53	20	16	14,5	8	14	42	60	134	162	180
	30	24	M20x1,5	28																						
60	30	24	M20x1,5	28	69	50	25,5	45	70	26	3/8"	13	117	142	25	64	25	20	16,5	10	16	48	68	156	188	208
	35	29	M27x2	36																						
70	35	29	M27x2	36	79	50	30,5	55	80	26	3/8"	15	127	162	30	73	30	22	16,5	10	16	48	74	156	188	214
	40	34	M27x2	36																						
80	40	34	M27x2	36	94	50	30,5	55	95	30	1/2"	17 n°6	149	181	30	73	30	22	18,5	10	18	50	76	178	210	236
	50	44	M33x2	45																						
100	50	44	M33x2	45	114	70	40,25	70	115	30	1/2"	17 n°6	162	194	35	92	40	28	24,5	12	20	60	94	210	250	284
	60	52	M42x2	56																						

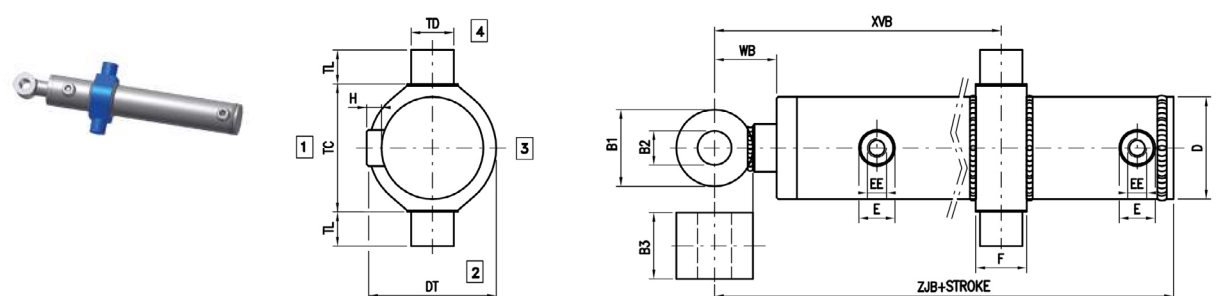
# OIM

Intermediate trunnion - male thread



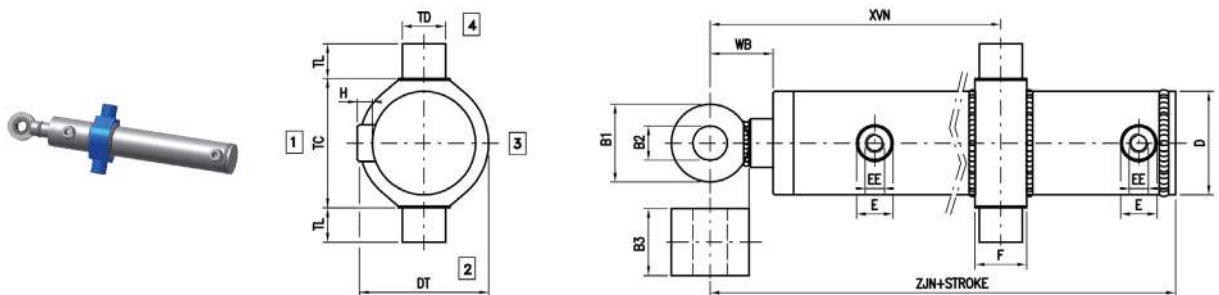
# OIB

Intermediate trunnion - welded bushing



# OIN

Intermediate trunnion - welded joint



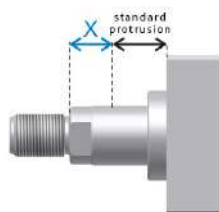
BORE	MM Rod	CH	KK	A	B1	B2	B3	D	DT	E	EE	H	N1	N2	N3	TC	TD	TL	XV min	XV max	XVB min	XVB max	XVN min	XVN max	W	WB	WN	ZJ	ZJB	ZJN
40	20	18	M16x1,5	22	40	20,5	40	50	65	22	1/4"	20	53	20	16	70	20	20	100	50 + stroke	129	79 + stroke	147	97 + stroke	13	42	60	121	150	168
	25	22	M20x1,5	28																52 + stroke		80 + stroke		98 + stroke						
50	25	22	M20x1,5	28	40	20,5	40	60	75	26	3/8"	20	53	20	16	80	25	25	110	52 + stroke	138	80 + stroke	156	98 + stroke	14	42	60	134	162	180
	30	24	M20x1,5	28																62 + stroke		94 + stroke		114 + stroke						
60	30	24	M20x1,5	28	50	25,5	45	70	90	26	3/8"	25	64	25	20	100	30	30	120	62 + stroke	152	94 + stroke	172	114 + stroke	16	48	68	153	185	205
	35	29	M27x2	36																65 + stroke		99 + stroke		123 + stroke						
70	35	29	M27x2	36	50	30,5	55	80	100	26	3/8"	30	73	30	22	110	35	35	125	65 + stroke	157	99 + stroke	183	123 + stroke	16	48	74	153	185	211
	40	34	M27x2	36																75 + stroke		107 + stroke		133 + stroke						
80	40	34	M27x2	36	50	30,5	55	95	115	30	1/2"	30	73	30	22	115	40	40	140	75 + stroke	172	107 + stroke	198	133 + stroke	18	50	76	176	208	234
	50	44	M33x2	45																95 + stroke		132 + stroke		169 + stroke						
100	50	44	M33x2	45	70	40,25	70	115	145	30	1/2"	35	92	40	28	145	50	50	172	95 + stroke	209	132 + stroke	246	169 + stroke	20	60	94	210	250	284
	60	52	M42x2	56																95 + stroke		132 + stroke		169 + stroke						

# EXAMPLE OF ORDER ACRONYM

## CL/50/28/530/OIMO AQ1R10XV...

CHARACTERISTIC	DESCRIPTION			SYM.	EXAMPLE
<b>SERIES</b>	Welded cylinders			<b>CL</b>	<b>CL/</b>
<b>BORE</b>	Indicate in mm				<b>CL/50/</b>
<b>ROD</b>	Indicate in mm				<b>CL/50/28/</b>
<b>STROKE</b>	Indicate in mm				<b>CL/50/28/530/</b>
<b>EXECUTION</b>	Base			<b>EB</b>	<b>CL/50/28/530/OI</b>
	Front flange			<b>FA</b>	
	Eye hinge			<b>OC</b>	
	Male hinge			<b>CM</b>	
	Joint hinge			<b>CS</b>	
	Intermediate trunnion			<b>OI</b>	
<b>ROD END</b>	Male thread			<b>M</b>	<b>CL/50/28/530/OIM</b>
	Welded bushing			<b>B</b>	
	Welded joint			<b>N</b>	
<b>SPACES</b>	None			<b>0</b>	<b>CL/50/28/530/OIM0</b>
	50 mm			<b>1</b>	
	100 mm			<b>2</b>	
	150 mm			<b>3</b>	
	200 mm			<b>4</b>	
<b>SEALS</b>	Elastomer + Nitrile (low pressure seal)			<b>A</b>	<b>CL/50/28/530/OIM0A</b>
<b>FRONT HEAD</b>					
<b>POS. OIL PORTS</b>	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>	<b>CL/50/28/530/OIM0AQ1</b>
<b>REAR HEAD</b>					
<b>POS. OIL PORTS</b>	Side <b>1</b>	Side <b>2</b>	Side <b>3</b>	Side <b>4</b>	<b>CL/50/28/530/OIM0AQ1R1</b>
<b>*EXTRA ROD X QUOTE</b>	Indicate mm				<b>CL/50/28/530/OIM0AQ1R10</b>
<b>XV - XVB - XVN QUOTE</b>	Indicate mm (only version OI)				<b>CL/50/28/503/OIM0AQ1R10XV...</b>

\* Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



# CE CYLINDERS SERIES



## WELDED CYLINDERS

The **CE series**, welded cylinders with ample guides and accurate processing, is suitable for the usage on industrial and mobile machines, for applications without cyclical fatigue stress.

The choice of selected materials, the hydraulic and electronic controls of 100% of all cylinders produced and the quality of the means of production, allow to reach high standards of quality, reliability and enduring product performance. The welding process is carried out with the help of special machines by our qualified and certified staff.

The seals used, supplied by premium suppliers, grant high performance and international availability. The wide range of seals, allows us to offer cylinders for applications with different kinds of hydraulic fluids, speed, frequency and operating temperature.

### Technical specifications:

- Nominal pressure 16 MPa
- Maximum pressure 25 MPa
- Bore 40-200 mm
- Stroke up to 4000 mm
- Single or double rod
- 2 rod diameter per bore
- 8 mounting styles

### Options:

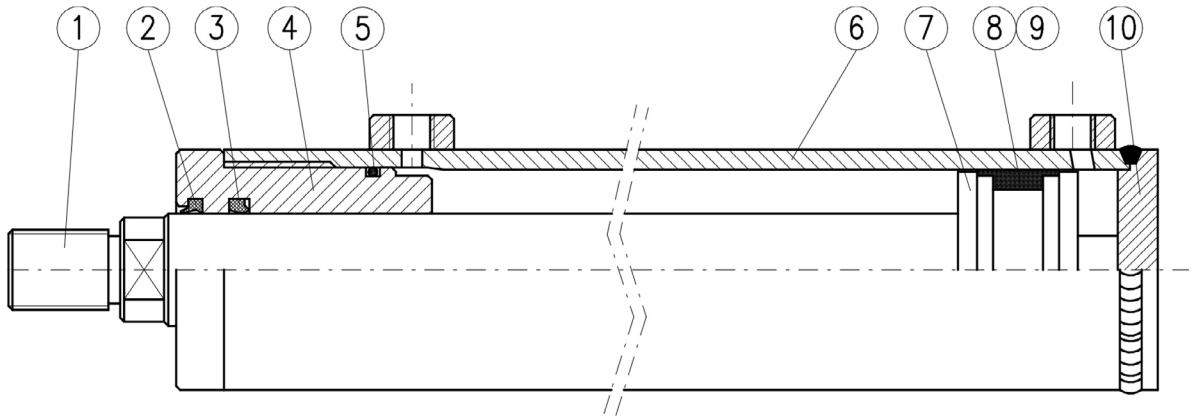
- Integrated position transducer with analogue output signal: 4/20 mA or 0/10 V (contact our technical department)
- Air bleeds
- Rod treatment : chromed, induction hardened and chromed, nickel-chromed

### EPC Cylinder configurator

This is an innovative tool that allows the client to configure CE cylinders in a rapid and intuitive way, guiding the technician through the choices of all the options available.

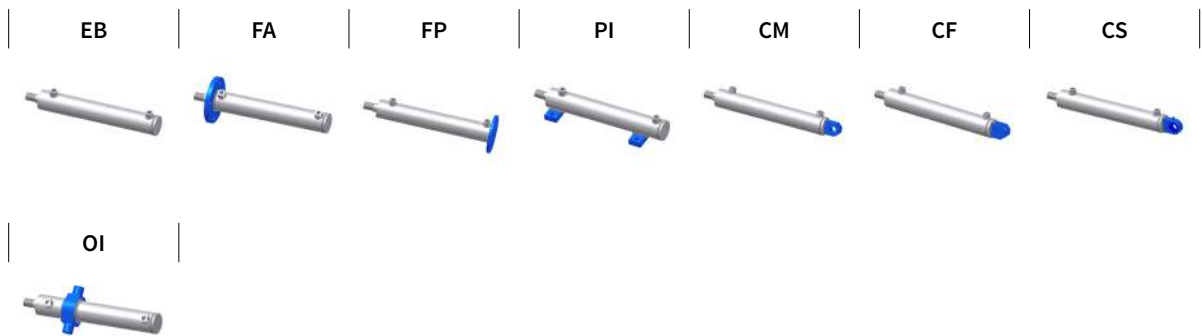
Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers. With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

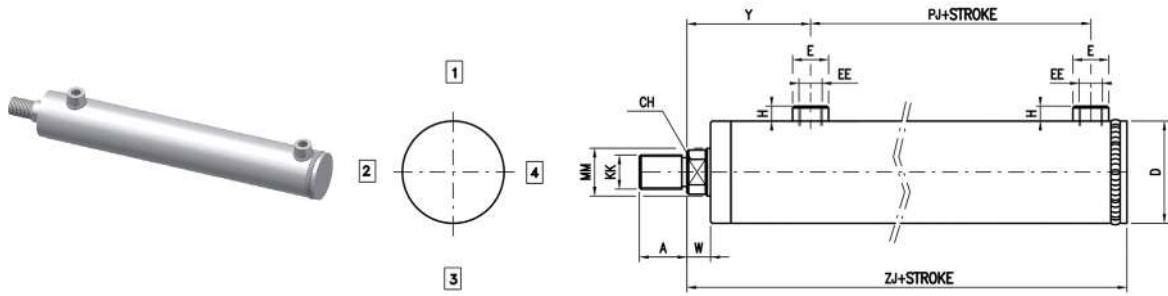
Login at: <http://configuratore.grices.it/>



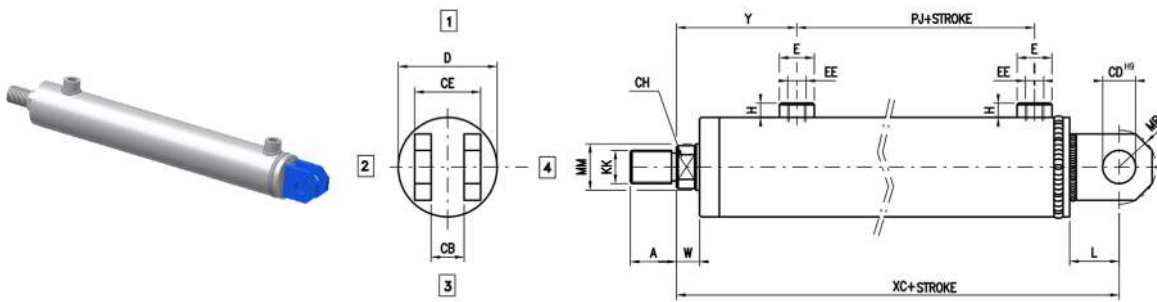
N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Scraper	Polyurethane
3	Rod seal	Polyurethane
4	Guide	Cast iron
5	O-Ring + PBK	Nitrile rubber / Polyurethane
6	Body	Steel
7	Piston	Steel
8	Piston seal	Nitrile rubber
9	Guide rings	Acetal resin
10	Rear head	Steel

Mounting style





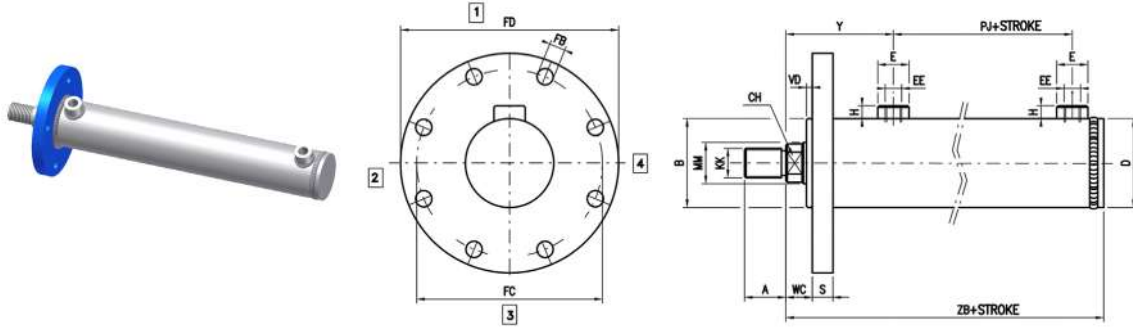
**CF** Female hinge



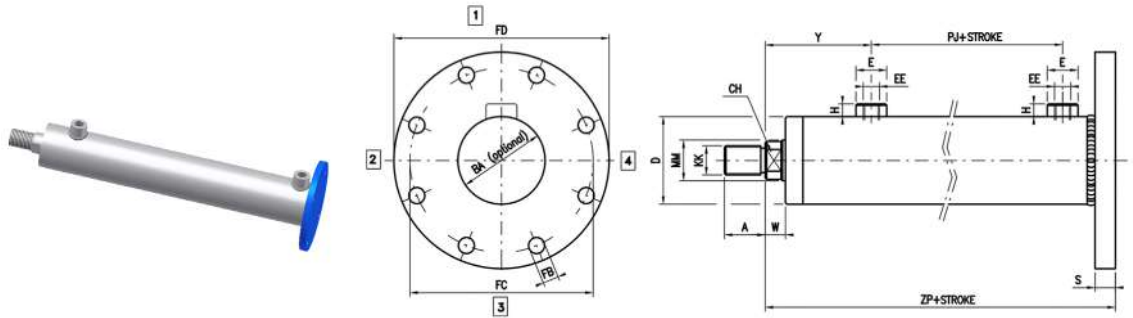
BORE	MM Rod	CH	KK	A	CB	CD	CE	D	E	EE	H	L	MR	PJ	W	ZJ	XC	Y
40	22	18	M16x1,5	22	15	15	31	50	25	3/8"	16	25	16,5	48,5	13	130	155	64
	28	22	M20x1,5	28														
50	28	22	M20x1,5	28	20	20	40	60	25	3/8"	16	30	20	52	14	143	173	73
	36	30	M27x2	36														
63	36	30	M27x2	36	25	25	49	73	30	1/2"	18	35	25	49	16	150	185	79
	45	39	M33x2	45														
80	45	39	M33x2	45	30	30	60	95	30	1/2"	18	45	32	56	18	173	218	94
	56	48	M42x2	56														
100	56	48	M42x2	56	40	40	80	115	35	3/4"	20	55	42	57	20	190	245	105
	70	62	M48x2	63														
125	70	62	M48x2	63	50	50	90	140	35	3/4"	20	70	50	75	23	228	298	123
	90	80	M64x3	85														
160	90	80	M64x3	85	60	60	130	180	45	1"	25	80	58	76	25	260	340	140
	110	100	M80x3	95														
200	110	100	M80x3	95	70	70	140	230	45	1"	25	90	68	111	30	290	380	160
	140	128	M100x3	112														



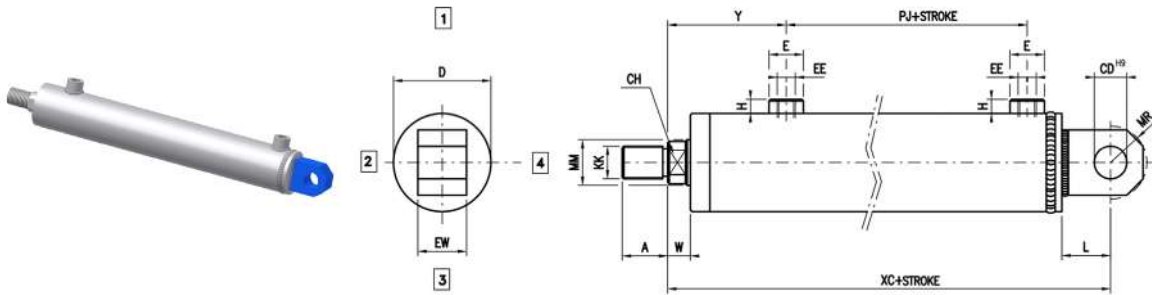
# FA Front flange



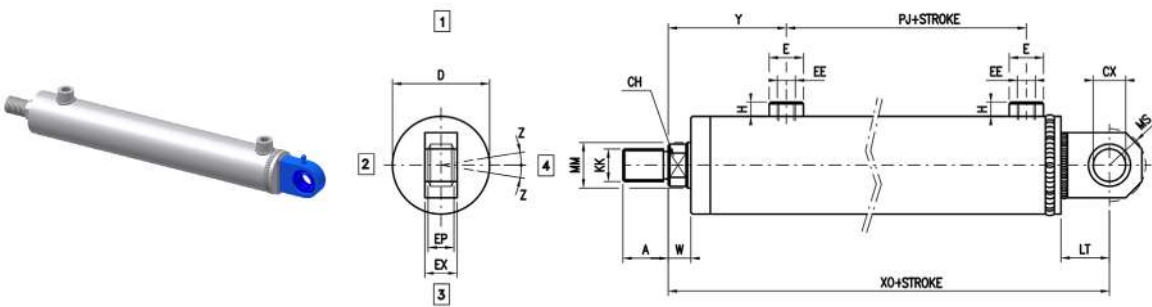
# FP Rear flange



BORE	MM Rod	CH	KK	A	B	BA	D	E	EE	FB	FC	FD	H	PJ	S	VD	W	WC	Y	ZB	ZP
40	22	18	M16x1,5	22	50	50	50	25	3/8"	9	106	124	16	48,5	14	3	13	16	64	130	139
	28	22	M20x1,5	28																	
50	28	22	M20x1,5	28	60	60	60	25	3/8"	11	126	148	16	52	14	4	14	18	73	143	150
	36	30	M27x2	36																	
63	36	30	M27x2	36	70	70	73	30	1/2"	13,5	145	172	18	49	14	4	16	20	79	150	155
	45	39	M33x2	45																	
80	45	39	M33x2	45	85	85	95	30	1/2"	17,5	165	200	18	56	20	4	18	22	94	173	183
	56	48	M42x2	56																	
100	56	48	M42x2	56	106	106	115	35	3/4"	22	200	244	20	57	25	5	20	25	105	190	200
	70	62	M48x2	63																	
125	70	62	M48x2	63	132	132	140	35	3/4"	22	235	280	20	75	30	5	23	28	123	228	243
	90	80	M64x3	85																	
160	90	80	M64x3	85	160	160	180	45	1"	22	280	324	25	76	35	5	25	30	140	273	275
	110	100	M80x3	95																	
200	110	100	M80x3	95	200	200	230	45	1"	26	340	390	25	111	40	5	30	35	160	308	305
	140	128	M100x3	112																	

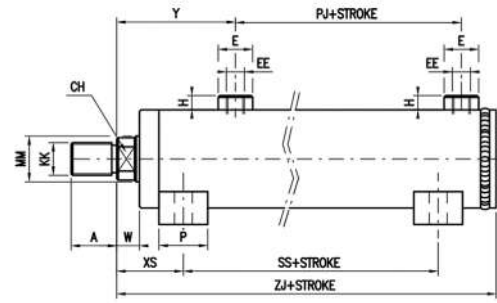
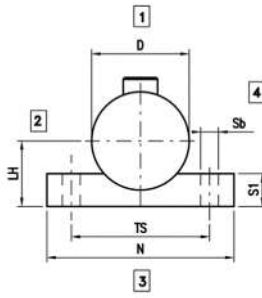


**CS** Joint hinge

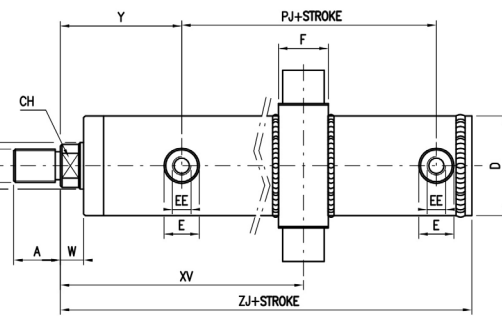
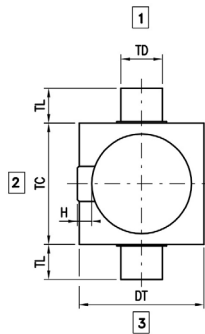


BORE	MM Rod	CH	KK	A	CB	CX	D	E	EE	EW	EX	EP	H	L	LT	MR	MS	PJ	W	XC	XO	Y	Z
40	22	18	M16x1,5	22	15	20	50	25	3/8"	28	19	16	16	25	38	16,5	25	48,5	13	155	168	64	9°
	28	22	M20x1,5	28																			
50	28	22	M20x1,5	28	20	20	60	25	3/8"	30	19	16	16	30	38	20	25	52	14	173	181	73	9°
	36	30	M27x2	36																			
63	36	30	M27x2	36	25	25	73	30	1/2"	36	23	20	18	35	45	24,5	27,5	49	16	185	195	79	7°
	45	39	M33x2	45																			
80	45	39	M33x2	45	30	30	95	30	1/2"	42	28	22	18	45	51	31,5	32,5	56	18	218	224	94	6°
	56	48	M42x2	56																			
100	56	48	M42x2	56	40	40	115	35	3/4"	56	35	28	20	55	69	42	50	57	20	245	259	105	7°
	70	62	M48x2	63																			
125	70	62	M48x2	63	50	50	140	35	3/4"	68	40	35	20	70	88	50	61,5	75	23	298	316	123	6°
	90	80	M64x3	85																			
160	90	80	M64x3	85	60	60	180	45	1"	80	50	44	25	80	100	58	70	76	25	340	360	140	6°
	110	100	M80x3	95																			
200	110	100	M80x3	95	70	70	230	45	1"	85	55	49	25	90	115	68	82	111	30	380	405	160	6°
	140	128	M100x3	112																			

# PI Feet



# OI Trunnion



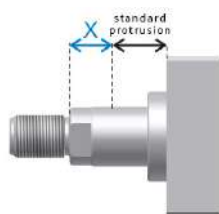
BORE	MM Rod	CH	KK	A	D	DT	E	EE	F	H	LH	N	P	PJ	Sb	SS	S1	TC	TD	TL	TS	W	XS	XVmin	XVmax	Y	ZJ
40	22	18	M16x1,5	22	50	70	25	3/8"	30	16	35	100	20	48,5	11	44	16	65	20	15	75	13	35	107	70 + stroke	64	130
	28	22	M20x1,5	28																							
50	28	22	M20x1,5	28	60	80	25	3/8"	35	16	40	110	30	52	13	45	18	75	25	20	85	14	40	119	80 + stroke	73	143
	36	30	M27x2	36																							
63	36	30	M27x2	36	73	90	30	1/2"	40	18	48	130	35	49	15	59	20	100	30	25	100	16	45	129	78 + stroke	79	150
	45	39	M33x2	45																							
80	45	39	M33x2	45	95	115	30	1/2"	50	18	60	160	40	56	17	69	22	115	40	35	125	18	50	149	95 + stroke	94	173
	56	48	M42x2	56																							
100	56	48	M42x2	56	115	135	35	3/4"	60	20	74	185	50	57	19	77	25	145	50	40	148	20	55	157	89 + stroke	105	190
	70	62	M48x2	63																							
125	70	62	M48x2	63	140	160	35	3/4"	70	20	90	240	70	75	25	82	30	170	60	50	190	23	70	173	113 + stroke	123	228
	90	80	M64x3	85																							
160	90	80	M64x3	85	180	213	45	1"	80	25	115	295	70	76	28	103	35	220	70	60	245	25	75	220	136 + stroke	140	273
	110	100	M80x3	95																							
200	110	100	M80x3	95	230	290	45	1"	90	25	155	380	100	111	39	143	45	270	80	70	311	30	100	225	156 + stroke	160	308
	140	128	M100x3	112																							

# EXAMPLE OF ORDER ACRONYM

## CE/50/28/530/OI0A0Q1R100XV...

CHARACTERISTIC	DESCRIPTION			SYM.	EXAMPLE
SERIES	Welded cylinders			CE	CE/
BORE	Indicate in mm				CE/50/
ROD	Indicate in mm				CE/50/28/
STROKE	Indicate in mm				CE/50/28/530/
EXECUTION	Base			EB	CE/50/28/530/OI
	Front flange			FA	
	Rear flange			FP	
	Feet			PI	
	Female hinge			CF	
	Male hinge			CM	
	Joint hinge			CS	
	Intermediate trunnion			OI	
SPACER	None			0	CE/50/28/530/OI0
	50 mm			1	
	100 mm			2	
	150 mm			3	
	200 mm			4	
SEALS	elastomer + nitrile (low pressure sealing)			A	CE/50/28/530/OI0A
ROD END	Type M (standard)			0	CE/50/28/530/OI0A0
	Type F (request dim. to Technical Dept.)			F	
<b>FRONT HEAD</b>					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CE/50/28/530/OI0A0Q1
<b>REAR HEAD</b>					
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4	CE/50/28/530/OI0A0R1
*EXTRA ROD X QUOTE	Indicate mm				CE/50/28/530/OI0A0R10
XV QUOTE	Indicate mm (only version OI)				CE/50/28/530/OI0A0R10XV...

\* Specify the possible *extra-rod (X)* size in addition to the standard rod protrusion:



Login at: <http://configuratore.grices.it/>

Configure your cylinder in a quick and intuitive way choosing all the available options.

### Note

The indicated operating pressures are efficient for smooth applications without blows. For extreme loads or high operating pressures with high frequency, it is necessary to use mounting styles and thread-rod links designed to be stress-resistant.

For further information contact our Technical Department.



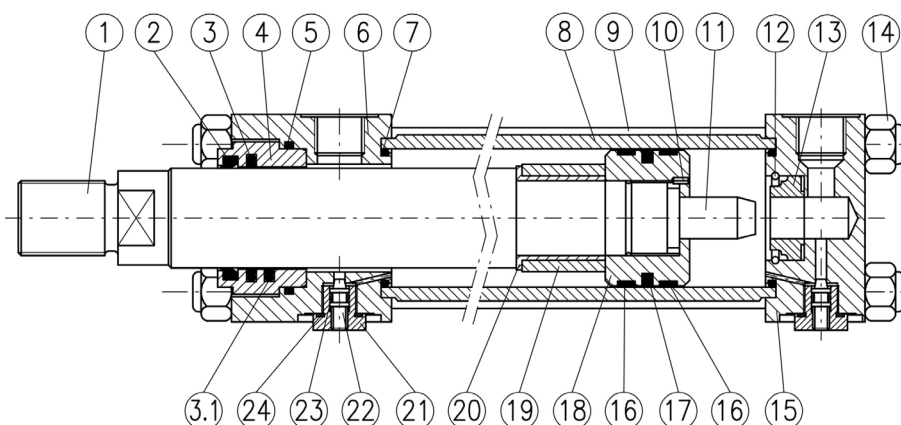
# KIT COMPONENTS CH SERIES

STANDARD ISO 6020/2 - 1991 -  
DIN 24554 160 BAR COMPACT SERIES



Grices offers assembly kits for the CH series (ISO 6020/2) and the CHM (ISO 6020/2 magnetic), the simple assembling process does not require any particular equipment.

The offer includes all the standard mounting styles that follow the ISO 6020/2 standard; the components' modularity reduces the necessity to stock, since the high flexibility of the configurations makes them suitable for multiple applications.



N°	ITEM	MATERIAL
1	Rod	Chromium-plated steel
2	Scraper	Polyurethane / PTFE
3	Rod seal	Polyurethane / PTFE
3.1	2nd Rod seal (option L)	NBR e PTFE
4	Guide sleeve	Spheroidal cast iron
5	O-Ring + PBK	NBR + Polyurethane
6	Head	Steel
7	O-Ring + PBK	NBR + Polyurethane
8	Body	Steel
9	Tie rod	Steel
10	Safety pin	Steel
11	Cushioning spur	Steel
12	Toroidal ring	Steel
13	Rear cushioning sleeve	Bronze
14	Self-braking nut	Steel
15	Rear head	Steel
16	Slide ring	PTFE
17	Piston seal	Polyurethane / PTFE
18	Piston	Steel
19	Anti-friction slide	Steel
20	Spacer	Steel
21	Locknut	Steel
22	Adjustment needle	Steel
23	O-Ring + PBN	NBR + Polyurethane
24	O-Ring seal	NBR

## Mounting style



## EXAMPLE OF ORDER ACRONYM

### KH/40/28/OI01A0Q1000R100

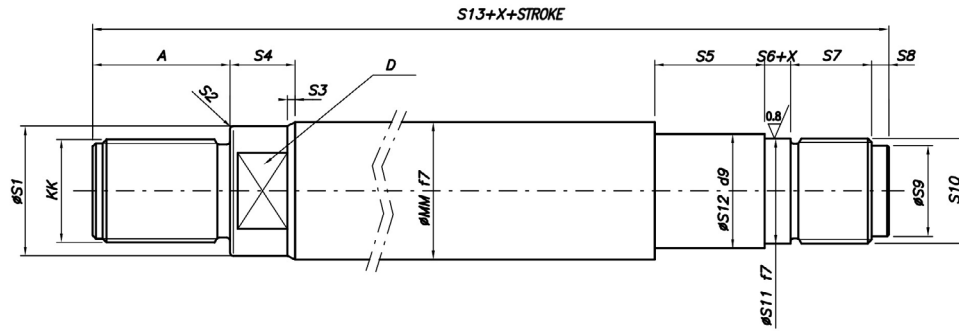
CHARACTERISTIC	DESCRIPTION	SYM.	EXAMPLE
<b>SERIES</b>	Tie rod execution	<b>KH</b>	<b>KH/</b>
<b>BORE</b>	Indicate mm		KH/ <b>40/</b>
<b>ROD</b>	Indicate mm		KH/40/ <b>28/</b>
<b>EXECUTION</b>	Rear + front protruding tie rods - MX1	<b>AP</b>	KH/40/28/ <b>OI</b>
	Front flange - ME5	<b>FA</b>	
	Rear flange - ME6	<b>FP</b>	
	Feet - MS2	<b>PI</b>	
	Female hinge - MP1	<b>CF</b>	
	Male hinge - MP3	<b>CM</b>	
	Joint hinge -MP5	<b>CS</b>	
	Front trunnion - MT1	<b>OA</b>	
	Intermediate trunnion - MT4	<b>OI</b>	
	Rear trunnion - MT2	<b>OP</b>	
	Front protruding tie rods MX3	<b>TA</b>	
	Rear protruding tie rods - MX2	<b>TP</b>	
	Front treaded holes - MX5	<b>ZA</b>	
	Rear treaded holes - MX6	<b>ZP</b>	
<b>CUSHIONING</b>	None	<b>0</b>	KH/40/28/OI <b>0</b>
	Front cushioning	<b>1</b>	
	Rear cushioning	<b>2</b>	
	Front cushioning + rear	<b>3</b>	
<b>SPACER</b>	None	<b>0</b>	KH/40/28/OI <b>01</b>
	50 mm	<b>1</b>	
	100 mm	<b>2</b>	
	150 mm	<b>3</b>	
	200 mm	<b>4</b>	
<b>SEALS</b>	Polyurethane (standard)	<b>A</b>	KH/40/28/OI <b>01A</b>
	Nitrile + ptfe (anti-friction)	<b>B</b>	
	Viton + ptfe (high temperatures)	<b>C</b>	
	Nitrile+carbographite(anti-friction water glycol)	<b>E</b>	
<b>AIR BLEEDS</b>	None	<b>0</b>	KH/40/28/OI01A <b>000</b>
	Front	<b>G</b>	
	Rear	<b>H</b>	
	Front + rear	<b>I</b>	

CHARACTERISTIC	DESCRIPTION				SYM.	EXAMPLE
<b>FRONT HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		KH/40/28/OI01A0 <b>Q1</b>
POS. CUSHIONING	0 if not requested					KH/40/28/OI01A0 <b>Q10</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					KH/40/28/OI01A0 <b>Q100</b>
	Side 1	Side 2	Side 3	Side 4		
<b>REAR HEAD</b>						
POS. OIL PORTS	Side 1	Side 2	Side 3	Side 4		KH/40/28/OI01A0 <b>Q100R1</b>
POS. CUSHIONING	0 if not requested					KH/40/28/OI01A0 <b>Q100R10</b>
	Side 1	Side 2	Side 3	Side 4		
POS. AIR BLEED	0 if not requested					KH/40/28/OI01A0 <b>Q100R100</b>
	Side 1	Side 2	Side 3	Side 4		

*For further information on ports, air bleeds and cushioning position see paragraph 1.6 of CH series*



# ROD DIMENSIONS

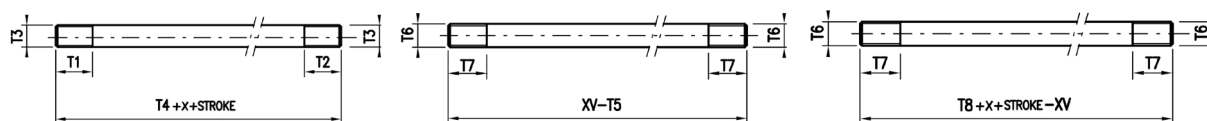


BORE	MM	KK	A	D	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
25	12	M10x1,25	14	10	11	1	1	8	23	3	16	0	-	M10x1	10	10	98
	18	M14x1,5	18	15	17	1	1	8	23	3	16	0	-	M10x1	10	10	102
32	14	M12x1,25	16	12	13	1,3	1	11	23	4	19	0	-	M12x1,25	12	12	114
	22	M16x1,5	22	18	21	1,3	1	11	23	4	19	0	-	M12x1,25	12	12	120
40	18	M14x1,5	18	15	17	1,3	1	8	32	10	16	3	14	M16x1,5	16	16	127
	28	M20x1,5	28	22	27	1,7	1	11	32	10	16	3	14	M16x1,5	16	16	137
50	22	M16x1,5	22	18	21	1,5	1	11	33	6	20	3	17	M20x1,5	20	20	137
	28	M20x1,5	28	22	27	1,7	1	11	33	6	20	3	17	M20x1,5	20	20	143
	36	M27x2	36	30	34	2	2	13	33	6	20	3	17	M20x1,5	20	20	151
63	28	M20x1,5	28	22	27	1,7	1	11	33	7	21	3	18	M24x1,5	24	24	152
	36	M27x2	36	30	34	2	2	13	33	7	21	3	18	M24x1,5	24	24	160
	45	M33x2	45	39	43	2	2	14	33	7	21	3	21,5	M24x1,5	24	24	169
80	36	M27x2	36	30	34	2,3	2	13	33	8	24	6	27	M30x2	32	32	175
	45	M33x2	45	39	43	2,3	2	14	33	8	24	6	27	M30x2	32	32	184
	56	M42x2	56	48	54	2,3	2	19	33	8	24	6	27	M30x2	32	32	195
100	45	M33x2	45	39	43	2	2	14	35	9	31	5	30	M33x2	35	40	197
	56	M42x2	56	48	54	2,3	2	19	35	9	31	5	30	M33x2	35	40	208
	70	M48x2	63	62	68	2,7	2	22	35	9	31	5	30	M33x2	35	40	215
125	56	M42x2	56	48	54	2,3	2	19	36	10	40	3	44	M48x2	50	50	224
	70	M48x2	63	62	68	2,7	2	22	36	10	40	3	44	M48x2	50	50	231
	90	M64x3	85	80	88	2,7	2	22	36	10	40	3	44	M48x2	50	50	253
160	70	M48x2	63	62	68	2,7	2	22	41	13	38	2	59,5	M64x3	65	65	231
	90	M64x3	85	80	88	2,7	2	22	41	13	38	2	59,5	M64x3	65	65	253
	110	M80x3	95	100	108	2,7	2	22	41	13	38	2	59,5	M64x3	65	65	263
200	90	M64x3	85	80	88	2,7	2	22	38,8	13	59	5	75	M80x3	82	85	295
	110	M80x3	95	100	108	2,7	2	22	38,8	13	59	5	75	M80x3	82	85	305
	140	M100x3	112	128	138	2,7	2	22	38,8	13	59	5	75	M80x3	82	85	322

**X quote = number of spacers for 50mm**

# TIE RODS DIMENSIONS

## Execution OI MT4



BORE	EXECUTION	T1	T2	T3	T4	T5	T6	T7	T8
25	AP	29	29	M5x0,8	137	-	-	-	-
	CF	10	10	M5x0,8	89	-	-	-	-
	CM	10	10	M5x0,8	89	-	-	-	-
	CS	10	10	M5x0,8	89	-	-	-	-
	FA	10	10	M5x0,8	64	-	-	-	-
	FP	10	10	M5x0,8	89	-	-	-	-
	OA	10	10	M5x0,8	111	-	-	-	-
	OI	-	-	-	-	10	M5x0,8	10	119
	OP	10	10	M5x0,8	111	-	-	-	-
	PI	10	10	M5x0,8	111	-	-	-	-
	TA	29	10	M5x0,8	124	-	-	-	-
	TP	10	25	M5x0,8	124	-	-	-	-
	ZP	10	15	M5x0,8	95	-	-	-	-
ZA	10	10	M5x0,8	64	-	-	-	-	
32	AP	35	35	M6x1	151	-	-	-	-
	CF	15	15	M6x1	98	-	-	-	-
	CM	15	15	M6x1	98	-	-	-	-
	CS	15	15	M6x1	98	-	-	-	-
	FA	15	15	M6x1	74	-	-	-	-
	FP	15	15	M6x1	99	-	-	-	-
	OA	15	15	M6x1	119	-	-	-	-
	OI	-	-	-	-	17	M6x1	15	136
	OP	15	15	M6x1	119	-	-	-	-
	PI	15	15	M6x1	119	-	-	-	-
	TA	35	15	M6x1	135	-	-	-	-
	TP	15	35	M6x1	135	-	-	-	-
	ZP	15	15	M6x1	96	-	-	-	-
ZA	15	15	M6x1	76	-	-	-	-	
40	AP	45	50	M8x1	198	-	-	-	-
	CF	15	15	M8x1	113	-	-	-	-
	CM	15	15	M8x1	113	-	-	-	-
	CS	15	15	M8x1	113	-	-	-	-
	FA	15	15	M8x1	96	-	-	-	-
	FP	15	15	M8x1	113	-	-	-	-
	OA	15	15	M8x1	144	-	-	-	-
	OI	-	-	-	-	17	M8x1	15	161
	OP	15	15	M8x1	144	-	-	-	-
	PI	15	15	M8x1	144	-	-	-	-
	TA	50	15	M8x1	171	-	-	-	-
	TP	15	50	M8x1	171	-	-	-	-
	ZP	15	15	M8x1	113	-	-	-	-
ZA	15	15	M8x1	96	-	-	-	-	

X quote = number of spacers for 50mm

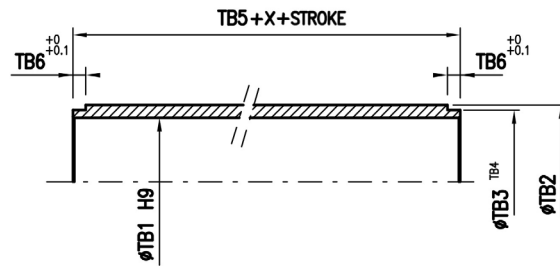
BORE	EXECUTION	T1	T2	T3	T4	T5	T6	T7	T8
50	AP	62	62	M12x1,25	226	-	-	-	-
	CF	20	20	M12x1,25	130	-	-	-	-
	CM	20	20	M12x1,25	130	-	-	-	-
	CS	20	20	M12x1,25	130	-	-	-	-
	FA	20	20	M12x1,25	107	-	-	-	-
	FP	20	20	M12x1,25	130	-	-	-	-
	OA	20	20	M12x1,25	160	-	-	-	-
	OI	-	-	-	-	11	M12x1,25	20	173
	OP	20	20	M12x1,25	160	-	-	-	-
	PI	20	20	M12x1,25	160	-	-	-	-
	TA	62	20	M12x1,25	194	-	-	-	-
	TP	20	62	M12x1,25	194	-	-	-	-
	ZP	20	20	M12x1,25	130	-	-	-	-
ZA	20	20	M12x1,25	107	-	-	-	-	
63	AP	62	62	M12x1,25	226	-	-	-	-
	CF	20	20	M12x1,25	132	-	-	-	-
	CM	20	20	M12x1,25	132	-	-	-	-
	CS	20	20	M12x1,25	132	-	-	-	-
	FA	20	20	M12x1,25	109	-	-	-	-
	FP	20	20	M12x1,25	132	-	-	-	-
	OA	20	20	M12x1,25	164	-	-	-	-
	OI	-	-	-	-	18	M12x1,25	20	182
	OP	20	20	M12x1,25	164	-	-	-	-
	PI	20	20	M12x1,25	164	-	-	-	-
	TA	62	20	M12x1,25	196	-	-	-	-
	TP	20	62	M12x1,25	196	-	-	-	-
	ZP	20	20	M12x1,25	132	-	-	-	-
ZA	20	20	M12x1,25	109	-	-	-	-	
80	AP	84	84	M16x1,5	277	-	-	-	-
	CF	25	25	M16x1,5	152	-	-	-	-
	CM	25	25	M16x1,5	152	-	-	-	-
	CS	25	25	M16x1,5	152	-	-	-	-
	FA	25	25	M16x1,5	127	-	-	-	-
	FP	25	25	M16x1,5	152	-	-	-	-
	OA	25	25	M16x1,5	195	-	-	-	-
	OI	-	-	-	-	13	M16x1,5	25	208
	OP	25	25	M16x1,5	195	-	-	-	-
	PI	25	25	M16x1,5	195	-	-	-	-
	TA	84	25	M16x1,5	236	-	-	-	-
	TP	25	84	M16x1,5	236	-	-	-	-
	ZP	25	25	M16x1,5	152	-	-	-	-
ZA	25	25	M16x1,5	132	-	-	-	-	
100	AP	84	84	M16x1,5	286	-	-	-	-
	CF	25	25	M16x1,5	161	-	-	-	-
	CM	25	25	M16x1,5	161	-	-	-	-
	CS	25	25	M16x1,5	161	-	-	-	-
	FA	25	25	M16x1,5	135	-	-	-	-
	FP	25	25	M16x1,5	161	-	-	-	-
	OA	25	25	M16x1,5	134	-	-	-	-
	OI	-	-	-	-	21	M16x1,5	25	216
	OP	25	25	M16x1,5	161	-	-	-	-
	PI	25	25	M16x1,5	204	-	-	-	-
	TA	84	25	M16x1,5	245	-	-	-	-
	TP	25	84	M16x1,5	245	-	-	-	-
	ZP	25	25	M16x1,5	161	-	-	-	-
ZA	25	25	M16x1,5	139	-	-	-	-	

X quote = number of spacers for 50mm

BORE	EXECUTION	T1	T2	T3	T4	T5	T6	T7	T8
125	AP	108	108	M22x1,5	359	-	-	-	-
	CF	30	30	M22x1,5	194	-	-	-	-
	CM	30	30	M22x1,5	194	-	-	-	-
	CS	30	30	M22x1,5	194	-	-	-	-
	FA	30	30	M22x1,5	172	-	-	-	-
	FP	30	30	M22x1,5	194	-	-	-	-
	OA	30	30	M22x1,5	167	-	-	-	-
	OI	-	-	-	-	15	M22x1,5	30	253
	OP	30	30	M22x1,5	194	-	-	-	-
	PI	30	30	M22x1,5	247	-	-	-	-
	TA	105	30	M22x1,5	303	-	-	-	-
	TP	30	108	M22x1,5	303	-	-	-	-
ZP	30	30	M22x1,5	194	-	-	-	-	
ZA	30	30	M22x1,5	172	-	-	-	-	
160	AP	120	120	M27x2	397	-	-	-	-
	CF	40	40	M27x2	212	-	-	-	-
	CM	40	40	M27x2	212	-	-	-	-
	CS	40	40	M27x2	212	-	-	-	-
	FA	40	40	M27x2	196	-	-	-	-
	FP	40	40	M27x2	212	-	-	-	-
	OA	40	40	M27x2	275	-	-	-	-
	OI	-	-	-	-	10	M27x2	40	267
	OP	40	40	M27x2	212	-	-	-	-
	PI	40	40	M27x2	275	-	-	-	-
	TA	120	40	M27x2	336	-	-	-	-
	TP	40	120	M27x2	336	-	-	-	-
ZP	40	40	M27x2	212	-	-	-	-	
ZA	40	40	M27x2	200	-	-	-	-	
200	AP	150	150	M30x2	497	-	-	-	-
	CF	40	40	M30x2	261	-	-	-	-
	CM	40	40	M30x2	261	-	-	-	-
	CS	40	40	M30x2	261	-	-	-	-
	FA	40	40	M30x2	239	-	-	-	-
	FP	40	40	M30x2	261	-	-	-	-
	OA	40	40	M30x2	234	-	-	-	-
	OI	-	-	-	-	13	M30x2	40	318
	OP	40	40	M30x2	261	-	-	-	-
	PI	40	40	M30x2	333	-	-	-	-
	TA	150	40	M30x2	333	-	-	-	-
	TP	40	150	M30x2	415	-	-	-	-
ZP	40	40	M30x2	261	-	-	-	-	
ZA	40	40	M30x2	239	-	-	-	-	

X quote = number of spacers for 50mm

# TUBES DIMENSIONS



BORE	TB1	TB2	TB3	TB4	TB5	TB6
25	25	33	30	-0,077 / -0,020	29,2	2,6
32	32	40	37	-0,087 / -0,025	33,2	2,6
40	40	50	49,5	-0,087 / -0,025	49	8
50	50	60	59,5	-0,104 / -0,03	49	8
63	63	73	72,5	-0,104 / -0,03	51	8
80	80	95	94	-0,123 / -0,036	58	8
100	100	115	114	-0,123 / -0,036	65	8
125	125	140	139	-0,143 / -0,043	73	8
160	160	180	178	-0,143 / -0,043	77	8
200	200	230	228	-0,165 / -0,055	101	8

X quote = number of spacers for 50mm

# ATTACHMENTS FOR HYDRAULIC CYLINDERS

STANDARD ISO/DIN  
SPECIAL ACCESSORIES



## A wide range of accessories for cylinders:

- Spherical rod eye
- Rod clevis
- Rod eye plain
- Pivot pin
- Straight clevis bracket
- Angled clevis bracket
- Eye bracket
- Trunnion bracket following ISO 6982, ISO 8133, ISO 8132, DIN 24556.

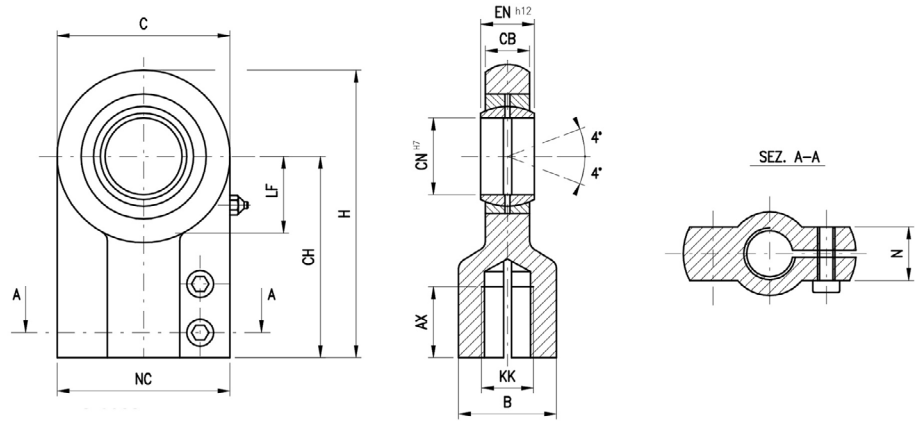
## EPC Cylinder configurator

This is an innovative tool that allows the client to configure cylinders and accessories in a rapid and intuitive way, guiding the technician through the choices of all the options available. Once the cylinder code is defined, the EPC software provides 2D, 3D and PDF drawings, and gives the user the possibility to save projects and request offers.

With the complete access, reserved to the purchasing department, it is possible to make orders directly. For all orders received through EPC an extra discount will be applied.

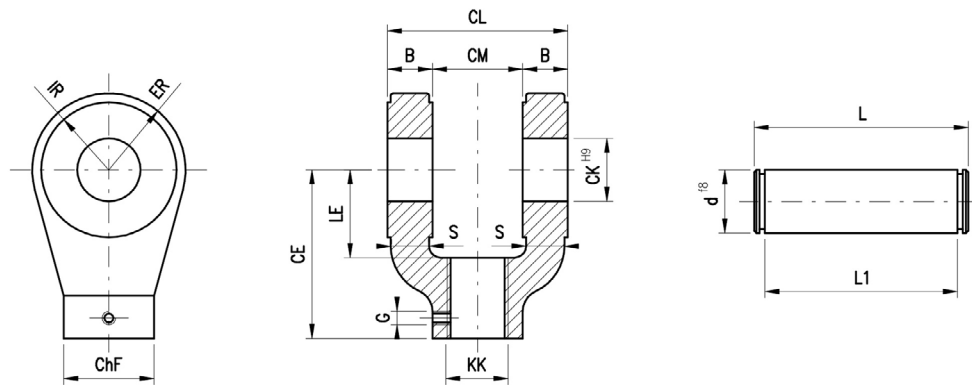
Login at: <http://configuratore.grices.it/>

**AS** ISO 6982



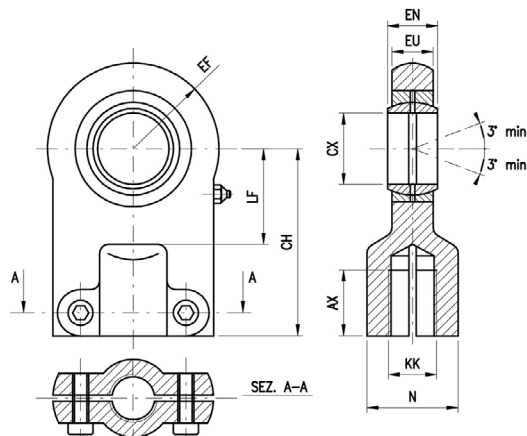
Cod.	KK	B	AX min	C	CB	CH	CN	H	LF	N	NC	EN	Tight. screw	Torque (Nm)	Mass (kg)	Force (kN)
AS14	M12x1,25	16	17	32	10,5	38	12	54	14	10,6	32	12	M5x12	6	0,12	8
AS18	M14x1,5	21	19	40	13	44	16	64	18	13	40	16	M6x14	10	0,23	12,5
AS22	M16x1,5	25	23	47	17	52	20	77	22	17	47	20	M8x18	25	0,42	20
AS28	M20x1,5	30	29	58	21	65	25	96	27	17	54	25	M8x18	25	0,68	32
AS36	M27x2	38	37	70	27	80	32	118	32	22	66	32	M10x22	49	1,14	50
AS45	M33x2	47	46	89	32	97	40	146	41	26	80	40	M10x25	49	2,08	80
AS56	M42x2	58	57	108	40	120	50	179	50	32	96	50	M12x35	86	4,47	125
AS70	M48x2	70	64	132	52	140	63	211	62	38	114	63	M16x40	210	7,65	200
AS90	M64x3	90	86	168	66	180	80	270	78	48	148	80	M20x50	410	14,55	320
AS110	M80x3	110	96	210	84	210	100	322	98	62	178	100	M24x65	710	28,2	500
AS140	M100x3	135	113	264	103	260	125	405	120	72	200	125	M24x75	710	43,5	780

**FI** ISO 8133



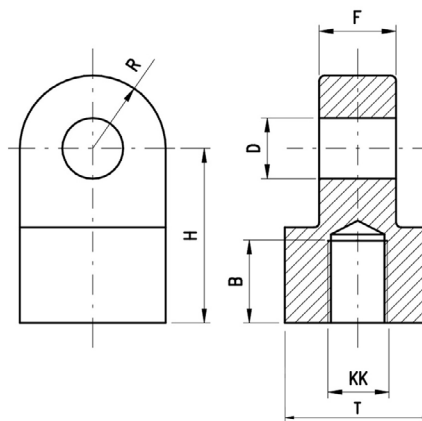
Cod.	CM	KK	CK	CE	CL	ChF	LE	ER	B	IR	L	L1	S	G	d
FI12	12	M10x1,25	10	32	24	19	13	12	6	10	34	29	5	M5x5	10
FI14	16	M12x1,25	12	36	32	21	19	17	8	15	43	37	7	M5x5	12
FI18	20	M14x1,5	14	38	40	21	19	17	10	15	51	45	8	M5x5	14
FI22	30	M16x1,5	20	54	60	32	32	29	15	26	73	66	13	M6x6	20
FI28	30	M20x1,5	20	60	60	32	32	29	15	26	73	66	13	M6x6	20
FI36	40	M27x2	28	75	80	40	39	34	20	30	95	87	17	M6x6	28
FI45	50	M33x2	36	99	100	56	54	50	25	46	117	107	22	M8x8	36
FI56	60	M42x2	45	113	120	56	57	53	30	49	139	129	27	M8x8	45
FI70	70	M48x2	56	126	140	75	63	59	35	38	161	149	31	M8x8	56
FI90	80	M64x3	70	168	160	95	83	78	40	45	181	169	37	M12x12	70
FI110	80	M80x3	70	168	160	95	83	78	40	74	181	169	37	M12x12	70

Note: pivot included



Cod.	KK	CX		EN		EF max	CH js 13	AX min	LF min	EU h13	N max	Mass kg	Force KN
		tol mm		tol mm									
OS12	M10x1,25	12	0	10	0 -0,12	20	42	15	16	8	17	0,12	8
OS14	M12x1,25	16	-0,008	14		22,5	48	17	20	11	21	0,215	12,5
OS18	M14x1,5	20	0 -0,012	16		27,5	58	19	25	13	25	0,38	20
OS22	M16x1,5	25		20		32,5	68	23	30	17	30	0,66	32
OS28	M20x1,5	30		22		40	85	29	35	19	36	1,16	50
OS36	M27x2	40		28		50	105	37	45	23	45	2,1	80
OS45	M33x2	50		35		62,5	130	46	58	30	55	3,85	125
OS56	M42x2	60	0	44	0	80	150	57	68	38	68	8,05	200
OS70	M48x2	80	-0,015	55	-0,15	103	185	64	92	47	90	19	320
OS90	M64x3	100	0 -0,02	70	0 -0,2	120	240	86	116	57	110	28	500

## OF

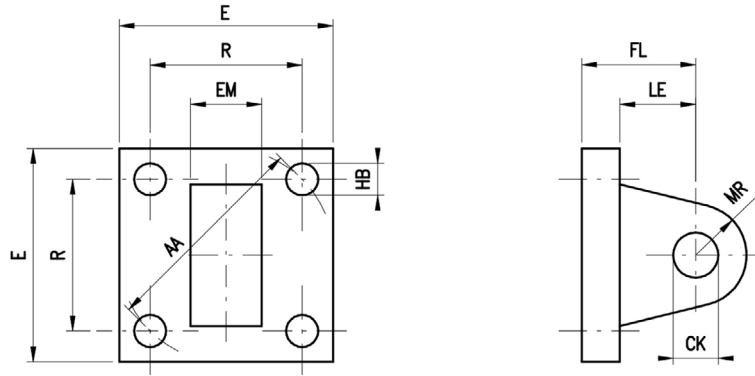


Cod.	KK	B	H	D	F	R	T
OF22	M16x1,5	24	38	15	25	16,5	35
OF28	M20x1,5	30	50	20	30	20	40
OF36	M27x2	37	62	25	36	24,5	49
OF45	M33x2	46	76	30	42	31,5	65
OF56	M42x2	59	101	40	56	42	98



# AM

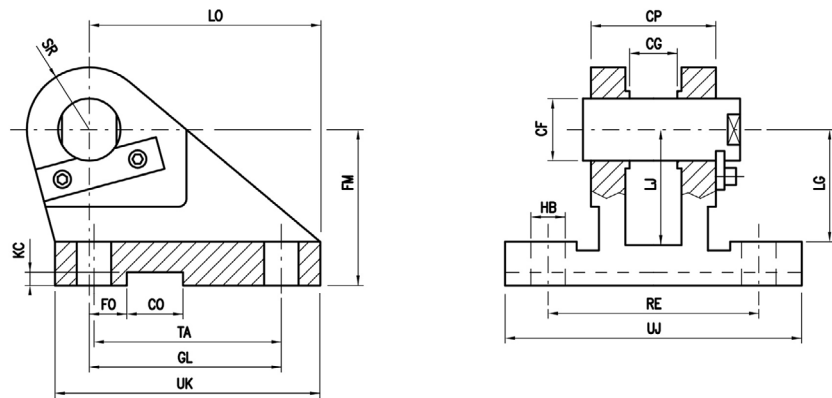
ISO 8133



Cod.	CK (H8)	EM (H13)	FL JS14	MR max	LE min	AA	HB (H13)	R JS14	E	Mass kg	Force N
AM25	10	12	23	12	13	40	5,5	28,3	40	0,3	8000
AM32	12	16	29	17	19	47	6,6	33,2	45	0,45	12500
AM40	14	20	29	17	19	59	9	41,7	60	0,9	20000
AM50	20	30	48	29	32	74	13,5	52,3	75	1,3	32000
AM63	20	30	48	29	32	91	13,5	64,3	90	1,9	50000
AM80	28	40	59	34	39	117	17,5	82,7	115	4	80000
AM100	36	50	79	50	54	137	17,5	96,9	126	6,25	125000
AM125	45	60	87	53	57	178	26	125,9	165	11,4	200000
AM160	56	70	103	59	63	219	30	154,9	205	20,8	320000
AM200	70	80	132	78	82	269	33	190,2	245	38,8	500000

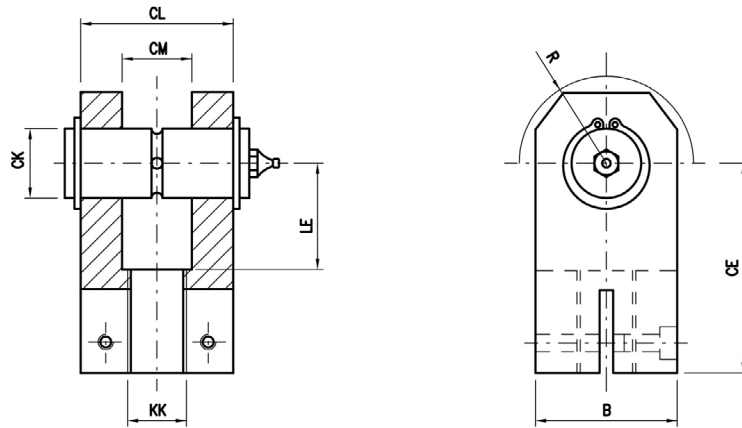
# AP

DIN 24556



Cod.	CP	CG	FM	CF (K7)	LJ	LG	LO	SR	UJ	UK	GL	TA	RE	FO	CO	KC	HB	Mass kg	Force KN
AP25	30	10	40	12	29	28	56	12	75	60	46	40	55	16	10	3,3	9	0,52	8
AP32	40	14	50	16	38	37	74	16	95	80	61	55	70	18	16	4,3	11	1,05	12,5
AP40	50	16	55	20	40	39	80	20	120	90	64	58	85	20	16	4,3	13,5	1,72	20
AP50	60	20	65	25	49	48	98	25	140	110	78	70	100	22	25	5,4	15,5	2,72	32
AP63	70	22	85	30	63	62	120	30	160	135	97	90	115	24	25	5,4	17,5	5,15	50
AP80	80	28	100	40	73	72	148	40	190	170	123	120	135	24	36	8,4	22	9,3	80
AP100	100	35	125	50	92	90	190	50	240	215	155	145	170	35	36	8,4	30	18,3	125
AP125	120	44	150	60	110	108	225	60	270	260	187	185	200	35	50	11,4	39	35	200
AP160	160	55	190	80	142	140	295	80	320	340	255	260	240	35	50	11,4	45	63	320
AP200	200	70	210	100	152	150	335	100	400	400	285	300	300	35	63	12,4	48	109	500

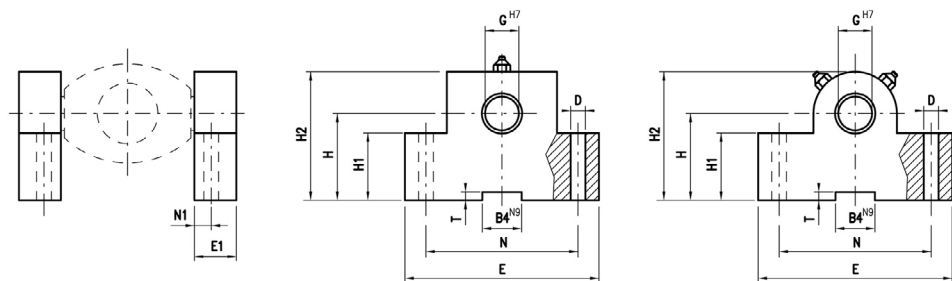
Note: pivot included



Cod.	CK (H9)	CL	CM	CE	LE min	KK	B	R max	Mass kg	Force KN
AF14	12	28	12	38	18	M12x1,25	25	16	0,16	8
AF18	16	36	16	44	22	M14x1,5	30	20	0,27	12,5
AF22	20	45	20	52	27	M16x1,5	40	25	0,53	20
AF28	25	56	25	65	34	M20x1,5	50	32	1,12	32
AF36	32	70	32	80	42	M27x2	65	40	2,18	50
AF45	40	90	40	97	52	M33x2	80	50	4,4	80
AF56	50	110	50	120	64	M42x2	100	63	7,6	125
AF70	63	140	63	140	75	M48x2	120	71	17,7	200
AF90	80	170	80	180	94	M64x3	150	90	30,6	320

Note: pivot included

## OISH

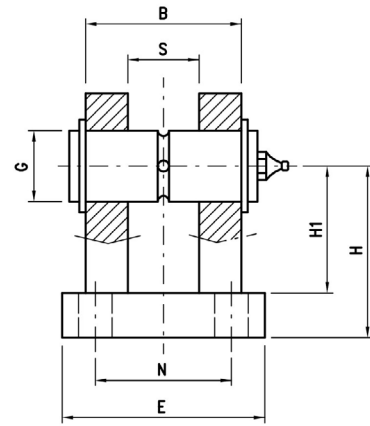
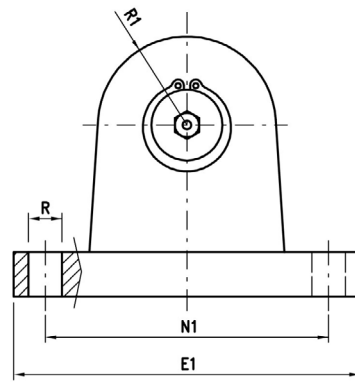


OISH25-40

OISH50-160

Cod.	H	H1	H2	G	E	E1	N	D	N1	B4	T	F KN	Mass kg
OISH25	34	25	49	12	63	17	40	9	8	10	3,3	8	0,46
OISH32	40	30	59	16	80	21	50	11	10	16	4,3	12,5	0,83
OISH40	45	38	69	20	90	21	60	11	10	16	4,3	20	1,21
OISH50	55	45	80	25	110	26	80	13,5	12	25	5,4	32	2,15
OISH63	65	52	100	32	150	33	110	17,5	15	25	5,4	50	4,63
OISH80	76	60	120	40	170	41	125	22	16	36	8,4	80	7,78
OISH100	95	75	140	50	210	51	160	26	20	36	8,4	125	14,3
OISH125	112	85	177	63	265	61	200	33	25	50	11,4	200	23,4
OISH160	140	112	220	80	325	81	250	39	31	50	11,4	320	53,1

\* Provided in couple



Cod.	B	E	E1	G (H9)	H	H1	N	N1	R1	R	S	Mass kg	Force KN
AH14	28	40	70	12	34	22	20	50	12	9	12	0,31	8
AH18	36	50	90	16	40	27	26	65	16	11	16	0,6	12,5
AH22	45	58	98	20	45	30	32	75	20	11	20	1,3	20
AH28	56	70	113	25	55	37	40	85	25	13,5	25	1,9	32
AH36	70	85	143	32	65	43	50	110	32	17,5	32	3,3	50
AH45	90	108	170	40	76	52	65	130	40	22	40	6	80
AH56	110	130	220	50	95	65	80	170	50	26	50	12	125
AH70	140	160	270	63	112	75	100	210	63	33	63	19,2	200
AH90	170	210	320	80	140	95	125	250	80	39	80	37,6	320

Note: pivot included

# MXO NAVAL CYLINDERS

**INOX AISI 316**  
BRASS OT58 CHROMED



The **MXO series** is part of the **nautical standard** Grices production.

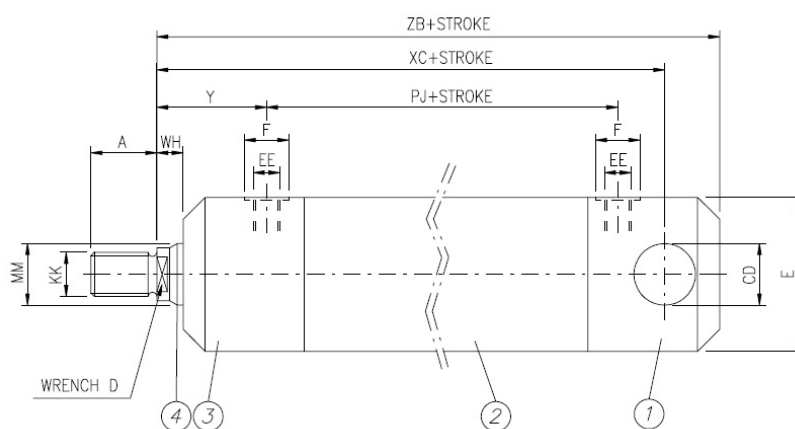
The usage of stainless steel **AISI 316** assures the total absence of corrosion. The sleek and smooth design makes this series suitable for nautical applications with continuous nominal pressure up to **12 MPa**.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability

## Technical characteristics:

- Nominal pressure 12 MPa (continuous operation)
- Maximum pressure 16 MPa
- Bore: 40-50 mm
- Stroke: up to 1000 mm
- Seals: Elastometer + nitrile, high sealing capacity

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rear head	Chromium-plated brass
2	Tube	AISI 316 stainless steel
3	Front head	Chromium-plated brass
4	Rod	AISI 316 stainless steel

## ORDER ACRONYM

In orders report the acronym followed by stroke length in mm.

Example: **MXO 40/500** (stroke 500)

CODE	AL	MM	A	CD	D	E	F	EE	KK	PJ	WH	XC	Y	ZB
MXO 40	40	28	28	20	22	60	22	1/4"	M20x1,5	119	12	194	53	214
MXO 50	50	28	28	20	22	70	22	1/4"	M20x1,5	124	12	199	53	219

# MXP NAVAL CYLINDERS



## INOX AISI 316

BRASS OT58 CHROMED

The **MXP series** is part of the **nautical standard** Grices production.

The usage of stainless steel **AISI 316** assures the total absence of corrosion. The addition of a power source from the rear pivot pin and the resulting removal of external hoses, makes the application suitable for a sleek design.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allow to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability.

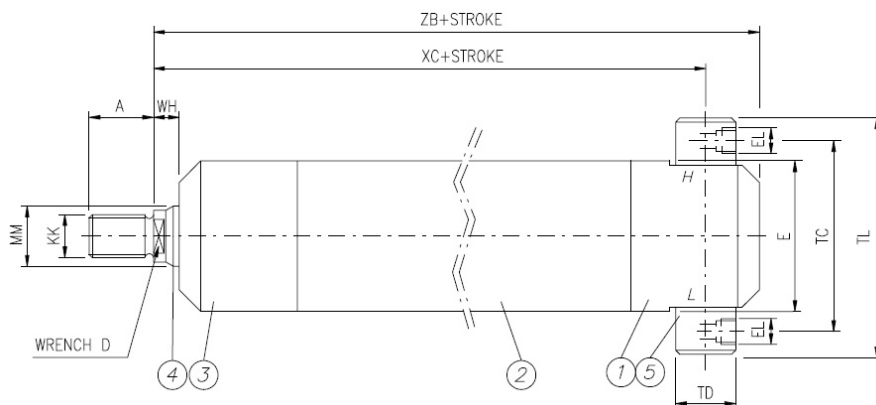
### Technical specifications:

- Nominal pressure 12 MPa (continuous operation)
- Maximum pressure 16 MPa
- Bore: 40-50 mm
- Stroke: up to 1000 mm
- Seals: Elastometer + nitrile, high sealing capacity
- Power source from rear pin

### Options:

- STP fixing brackets of the cylinder to boat stern.

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rear head	Chromium-plated brass 58
2	Tube	AISI 316 stainless steel
3	Front head	Chromium-plated brass 58
4	Rod	AISI 316 stainless steel
5	Pin	AISI 316 stainless steel

### ORDER ACRONYM

In orders report the acronym followed by stroke length in mm.

*Example: MXP 40/500 (stroke 500)*

COD	AL	MM	A	D	E	EL	KK	TC	TD	TL	WH	XC	ZB
MXP 40	40	28	28	22	60	1/8"	M20x1,5	87	28	117	12	216	240
MXP 50	50	28	28	22	70	1/8"	M20x1,5	98	28	128	12	221	245

# COA NAVAL CYLINDERS

INOX AISI 316  
BRASS OT58



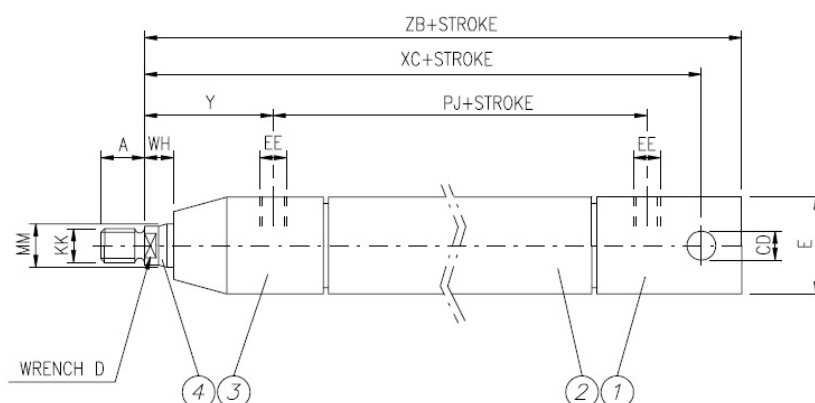
The **COA series** is part of the nautical standard Grices production. The usage of **AISI 316** stainless steel and OT58 brass assures the total absence of corrosion. The sleek and smooth design makes this series suitable for nautical applications in particular for ramp movement and gangway extraction, with continuous nominal pressure up to **8 MPa**.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability.

## Technical specifications:

- Nominal pressure 8 MPa (continuous operation)
- Maximum pressure 12 MPa
- Bore: 30-40 mm
- Stroke: up to 2000 mm
- Seals: Elastometer + nitrile, high sealing capacity

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rear head	Brass
2	Tube	Brass
3	Front head	Brass
4	Rod	AISI 316 stainless steel

## ORDER ACRONYM

In orders report the acronym followed by stroke length in mm.

*Example: COA 30/500 (stroke 500)*

COD	AL	A	CD	D	E	EE	KK	MM	PJ	WH	XC	Y	ZB
COA 30	30	18	12	15	40	1/8"	M14x1,5	18	69	12	119	48	136
COA 40	40	22	14	17	55	1/4"	M16x1,5	22	59	12	106	45	123

# COB NAVAL CYLINDERS

INOX AISI 316

BRASS OT58



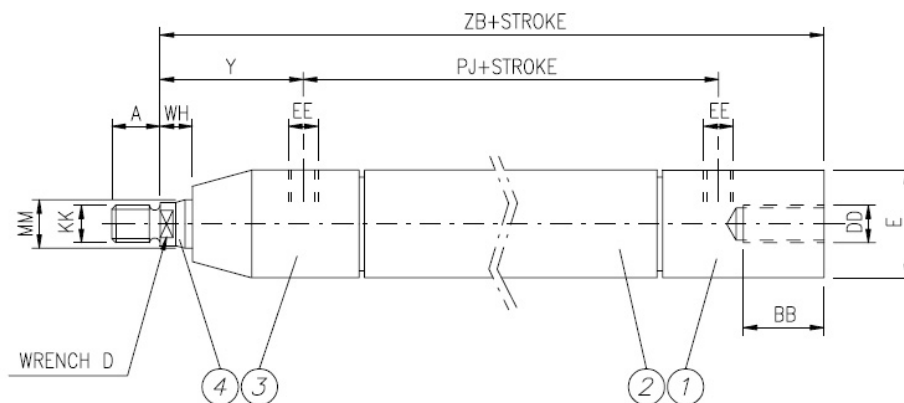
The **COB series** is part of the nautical standard Grices production. The usage of **AISI 316** stainless steel and OT58 brass assures the total absence of corrosion. The sleek and smooth design makes this series suitable for nautical applications in particular for ramp movement and gangway extraction, with continuous nominal pressure up to **8 MPa**.

The choice of selected materials, the severe controls of 100% of all cylinders produced and the quality of the means of production, allows us to reach high standards of quality, reliability and enduring product performance. The seals used, supplied by premium suppliers, grant high performance and international availability.

## Technical specifications:

- Nominal pressure 8 MPa (continuous operation)
- Maximum pressure 12 MPa
- Bore: 30-40 mm
- Stroke: up to 2000 mm
- Seals: Elastometer + nitrile, high sealing capacity

Login at: <http://configuratore.grices.it/>



N°	ITEM	MATERIAL
1	Rear head	Brass
2	Tube	Brass
3	Front head	Brass
4	Rod	AISI 316 stainless steel

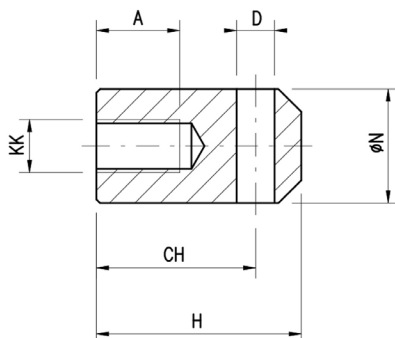
## ORDER ACRONYM

In orders report the acronym followed by stroke length in mm.

*Example: COB 30/500 (stroke 500)*

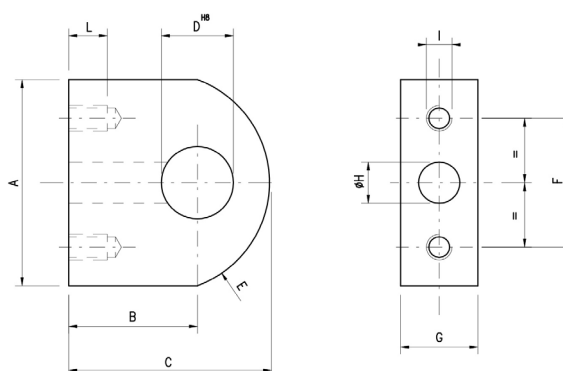
COD	AL	A	BB	D	DD	E	EE	KK	MM	PJ	WH	Y	ZB
COB 30	30	18	20	15	M14	40	1/8"	M14x1,5	18	69	12	48	136
COB 40	40	22	20	17	M16	55	1/4"	M16x1,5	22	59	12	45	123

# MALE ROD MOUNTING STYLE Chromed brass



COD	A	CH	D	H	KK	Ø N
TS18	22	42	12	54	M14x1,5	30
TS22	24	46	14	60	M16x1,5	40
TS28	30	50	20	75	M20x1,5	40

# FASTNERS Chromed brass



To be used only for MXP series

COD	A	B	C	Ø D	E	F	G	Ø H	I	L
STP28	70	50	78	28	35	50	30	16	M10	20





# OPERATING INSTRUCTIONS FOR HYDRAULIC CYLINDERS



## INSTALLATION

- Mounting and placing in service must be carried out by qualified staff, following the instruction for use.
- Do not exceed the maximum working conditions.
- Assure that the seals are compatible with the hydraulic fluid used
- Use the specific fluid during entire product lifetime
- The rod must be carefully handled to avoid damages on the superficial covering that could reduce the reliability and the operating principles
- Lateral forces on the rod must be avoided
- Mount the cylinder avoiding misalignment between rod and fixing device; when small alignment errors are expected, a spherical joint must be used.
- Proximity sensors are calibrated before the shipping. In case of need of further regulations contact our technical department
- Do not remove the sensor on pressured cylinders
- Do not remove the transducers on pressured cylinders
- While the supply is turned on, do not connect or disconnect the connectors
- Assure that the hoses are conformed for the requested maximum pressure and capacity.
- Assure that the connections are fastened before pressurising the system
- Vent the system and the cylinder
- Fill the cylinder slowly to avoid sudden movement
- If necessary, calibrate cushioning valves to obtain the best performance

## MAINTENANCE

- Fluids loss must be checked regularly. In case of fluid loss, the seals must be replaced with original Grices seals.
- Assure that the hydraulic fluid cleanliness follows the ISO 17/14 class standard.
- Check that the rod chromed surface is not damaged: damage can suggest oil contamination or excessive lateral load.
- Determine the lubrication of spherical joints, pivots and other non self-lubricated parts.
- The rod must be retracted during the system extended stop.
- In case of replacement necessity, follow these points.
- Use only original replacements supplied by Grices.
- Assure possessing all the necessary tools in order to accomplish the replacement without damaging the components.
- Disassemble and reassemble the cylinder in the right order.
- Rod and piston seals must be assembled in the right position.
- Use the right tightening torque to screw bolts and nuts.
- The replacement time of components susceptible to wear, such as seals, joint ends and guide bands depends on cylinder's working conditions.