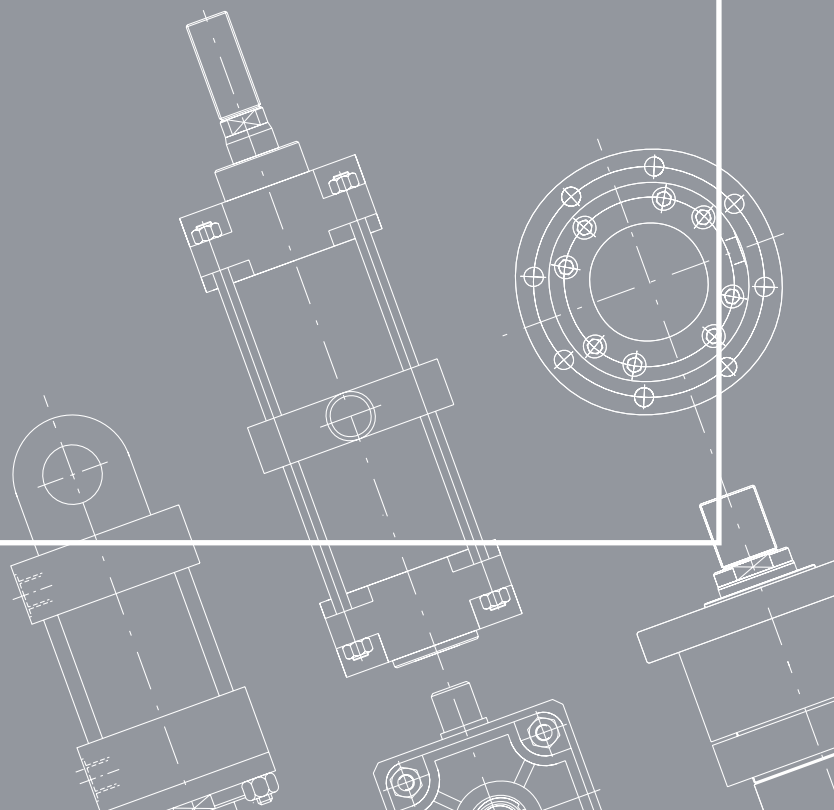




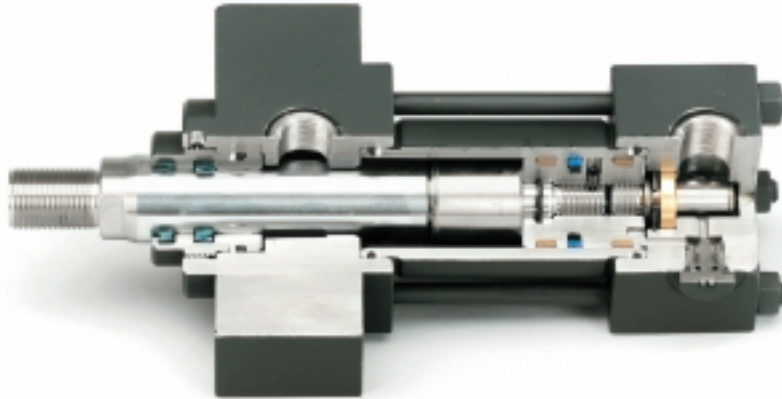
HYDRAULIC CYLINDERS
ISO 6020/2



Presentation

The range of hydraulic double-acting CMB A3 series cylinders and servo-cylinders has been developed to meet the most demanding drive unit requirements of the industrial sector in accordance with ISO 6020/2 (1991 edition) and DIN 24554 construction standards.

The compact construction with square heads and tie rods, the care taken in choosing the materials and seals used, combined with strict final testing which reproduces the cylinders' normal working conditions, make these hydraulic actuators a valid choice for all types of industrial applications in which maximum reliability and repeatability with high dynamic working features are required.



Technical features

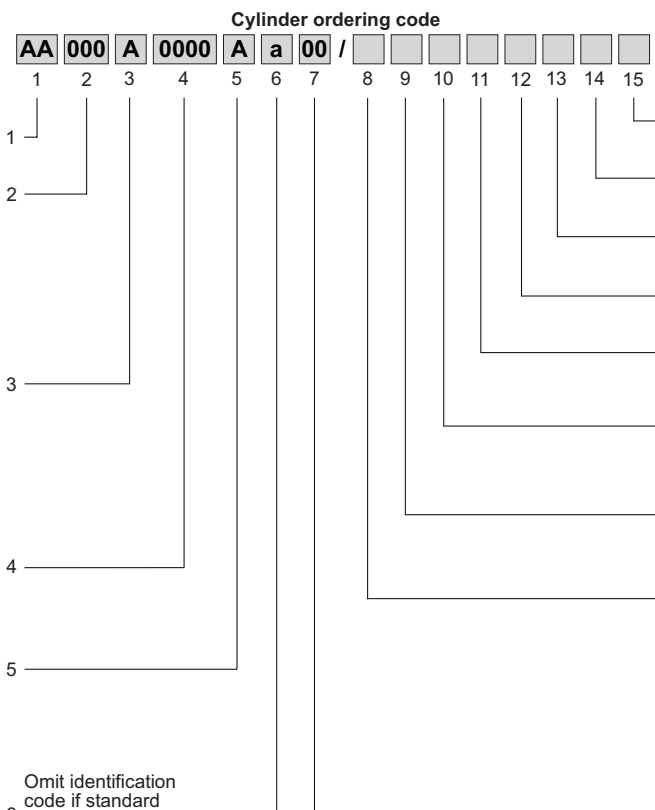
- **Interchangeable dimensions:** in accordance with standard ISO 6020/2 (1991 edition) and DIN 24554
- **Nominal working pressure (continuous service):** 160 bar (16 MPa)
- **Maximum working pressure:** 250 bar (25 MPa)
- **Available bore sizes:** from 25 to 200 mm
- **Rod diameters:** 2 or 3 diameters depending on the bore are available from 12 to 140 mm which enable the following cross-section ratios to be obtained:
 - a) 1:1.25 reduced-size rod
 - b) 1:1.4 medium-sized rod
 - c) 1:2 large-sized rod
- **Rod material:** high-resistance, hardened and tempered steel alloy, chromed and honed with a rugosity of $R_a = 0.2 \mu\text{m}$. On request the rod can be constructed using induction tempering heat treatment, in stainless steel or with Ni-Cr surface treatment
- **Stroke:** on request from the customer with dimensional tolerances from 0 to 1 mm for sizes up to 1000 mm and from 0 to 4 mm up to 6000 mm
- **Standard maximum speed:** 0.5 m/s
- **Standard temperature:** from $-20 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$
- **Standard hydraulic fluid:** mineral oil in accordance with ISO 6743/4 - 1982 with degree of purity in compliance with ISO 4406
- **Available mountings and accessories:** 14 different types of standard mounting compliant with ISO standards and 3 non-compliant completed by a vast range of accessories which enable any type of operational requirement to be met

How to order a CMB A3 series cylinder compliant with ISO 6020/2

The CMB A3 series cylinders compliant with ISO 6020/2 standards are provided with an identification code which describes the construction specifications in a non-ambiguous way.

To make up the code for the order, follow the code diagram set out below and insert the letters identifying the various features of the desired cylinder in the sequence given below.

Features	Description	Code
Series	To ISO 6020/2 standards	A3
	To ISO 6020/2 standards with magnetic sensors [!]	M3
	To ISO 6020/2 standards for taking transducer ^{!!}	T3
Bore	Specify bore in mm (indicate 3 figures)	-
Rod	Rod diameter 12 mm (bore 25)	A
	Rod diameter 14 mm (bore 32)	B
	Rod diameter 18 mm (bores 25, 32 and 40)	D
	Rod diameter 22 mm (bores 32, 40 and 50)	F
	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100, 125 and 160)	R
	Rod diameter 90 mm (bores 125, 160 and 200)	T
	Rod diameter 110 mm (bores 160 and 200)	V
Rod diameter 140 mm (bore 200)	Z	
Stroke	Specify the stroke in mm (indicate 4 figures)	-
Rod type	Without cushioning	C
	Front cushioning	E
	Rear cushioning	G
	Cushioning on both ends	P
	Double rod without cushioning	S
	Double rod with cushioning	T
Special machining	Light male rod threading	x
	Female rod threading	w
	Light female rod threading	y
	Customised machining	z
Mounting type	Basic version (not in line to ISO 6020/2)	00
	Rectangular front flange (not in line to ISO 6020/2)	01
	Rectangular rear flange (not in line to ISO 6020/2)	02
	Side foot (ISO MS2)	03
	Head trunnion (ISO MT1)	04
	Cap trunnion (ISO MT2)	05
	Intermediate fixed trunnion (ISO MT4)	06
	Rear clevis (ISO MP3)	07
	Rear spherical bearing (ISO MP5)	08
	Cap fixed clevis (ISO MP1)	09
	Extended front tie rods (ISO MX3)	10
	Extended rear tie rods (ISO MX2)	11
	Extended on both ends tie rods (ISO MX1)	12
	Head flange (ISO ME5)	13
Cap flange (ISO ME6)	14	
Front screwed tapped holes (ISO MX5)	30	
Rear screwed tapped holes (ISO MX6)	31	



When issuing the order for the cylinder, provide the following information:

- code identifying the model
- quantity
- special features (if requested) with any enclosed sketches and/or construction drawings
- operating conditions for special uses
- delivery date with type of priority

Code	Description	Features
K00	Specify the position of the front and rear inductive sensors	Position of inductive sensors
S00	Specify the position of the front and rear air bleeds	Position of air bleeds
R00	Specify the position of the front and rear braking adjustment devices	Position of braking adjustment devices
P00	Specify the position of front and rear connections	Position of connections
-	Specify the number of spacers (multiples of 50 mm)	Spacers
T	Seals for water and glycol mixtures	Seals
U*	Low friction seals	
V**	Seals for high temperatures and/or aggressive fluids	
D•	Front inductive sensor	Inductive sensors
E•	Rear inductive sensor	
F•	Front and rear inductive sensor	
A	Front air bleed	Air bleeds
B	Rear air bleed	
C^	Front and rear air bleeds	

* Minimum working pressure: 20 bar
 ** Maximum working temperature for M3, T3 and A3 series cylinders fitted with inductive sensors: 70 °C
 • Not available for bores 25 and 32, see page 38
 • Using inductive sensors, the cylinder must be provided with cushioning (front or rear)
 ^ Compulsory for T3 series cylinders

Seals and hydraulic fluids

The seals materials used on the CMB A3 series cylinders compliant with ISO 6020/2 standards meet most working requirements which use mineral oils compliant with ISO 6743/4-1982 standards as hydraulic thrust fluids. The working limits of the mixes used to produce the seals installed in the rod guide bush, piston and cylinder tube are given in the chart below in relation to the hydraulic fluid used, temperature, speed and minimum working pressure. Standard seals may work at a temperature of between -20 °C and +100 °C inclusive.

When particular working conditions are required, in which temperatures exceed these limits, CMB offers special high-temperature seals.

Should hydraulic fluids with a water and glycol mixtures or special fluid base be used, specially designed seals are available.

For applications in which low friction coefficients and the absence of stick-slip are required, low friction seals can be supplied.

Please indicate the identification code (omit if standard) of the type of mix required for the seals in the order code given on page 2.

On request, special type seals are available for uses not covered by the chart below and guide rings for high radial loads.

For further information, contact our Technical Department.

Code	Description	Seals material	Hydraulic fluid (standards ISO 6743/4-1982)	Minimum pressure	Temperature range	Maximum speed
	Standard	Nitrile rubber (NBR), Polyurethane (AU)	Mineral oil HH, HL, HLP, HLPD and HM	10 bar	from -20 °C to +100 °C	0,5 m/s
T	Water and glicol mixtures	Nitrile rubber (NBR), Charged bronze PTFE	Water and glicol mixtures (HFC)	10 bar	from -20 °C to +85 °C	0,5 m/s
U	Low friction	Nitrile rubber (NBR), Charged bronze PTFE	HH, HL, HLP, HLPD, HM mineral oil and water and glycol mixtures (HFC)	20 bar	from -20 °C to +100 °C	15 m/s
V	High temperature and/or aggressive fluids	Fluoroelastomer (FKM), Charged bronze PTFE	Non-inflammable hydraulic fluids with phosphoric ester base (HFD-R), high temperature hydraulic oil and/or environments with temperatures over 100 °C. Special hydraulic fluids.	10 bar	from -20 °C to +150 °C	1 m/s

! Not available for bores 160 and 200, see page 36

!! Not available for bores 25, 32, 40 (rods 18 and 22), 50 (rod 22), see page 39

Example of cylinder code: **A3063H0125E02**

A3 series cylinder compliant with ISO 6020/2 - bore 63 - rod 28 - stroke 125 - front cushioning - rectangular rear flange (not compliant with ISO standards). The positions of the inlet connections and front cushion are standard so they are not specified in the order code (oil feeding inlets side 1 on head and cap - cushion side 3 on head as specified in Table 19 on page 60).

Example of cylinder code: **A3125T0800Pw10/FU P14 K22**

A3 series cylinder compliant with ISO 6020/2 standards - bore 125 - rod 90 - stroke 800 - cushioning on both ends - female rod threading - extended front tie rods (ISO MX3) - front and rear inductive sensor - low friction seals - position of incoming connections side 1 on the head and side 4 on the cap - position of inductive sensor side 2 on head and side 4 on the cap - standard cushion position side 3 on head and cap (see Table 19 on page 60).

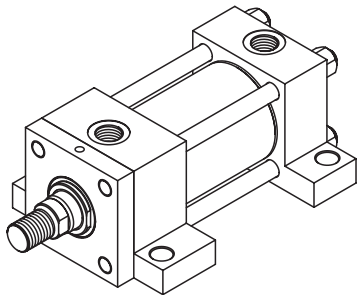
Mountings choice for the A3 series

The complete range of ISO 6020/2 A3 series cylinders manufactured by CMB offers 17 different mounting types capable of meeting most working requirements. On the following pages the general criteria to be used in choosing the type and space requirements of the mounting types for single rod and double rod cylinders with their corresponding accessories are described.

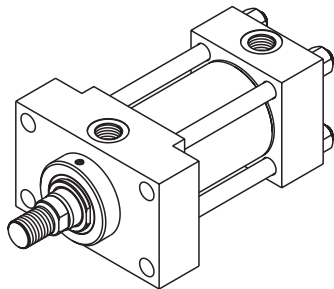
As regards special applications, our Technical Department is at your complete disposal for the construction of cylinders to particular requirements.

Main categories of mounting types

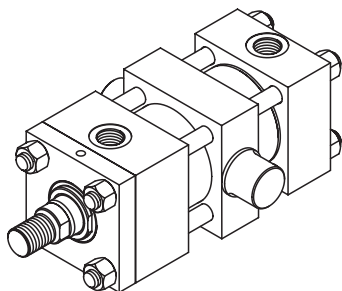
Side foot mounting



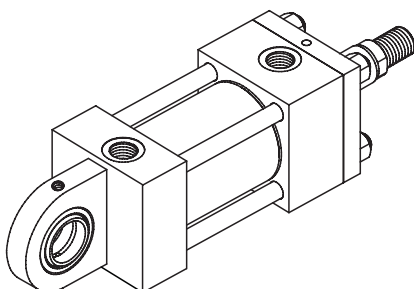
End mounting



Trunnion mounting



Pivot mounting



Side foot mounting

Cylinders with side foot mounting do not absorb loads around the rod axis and consequently the thrust generated by the cylinder creates a torque that tends to make it rotate around the bolting screws.

With this mounting type, stable support and effective guiding of the load must be guaranteed to reduce as far as possible the weight bearing down on the guide bush. This mounting type is available in just one construction shape which is identified by the code **03 (ISO MS2)**.

End mounting

This mounting type is indicated for cylinders that transmit power along their own axis and are therefore suitable for moving loads in a straight line.

It is available in nine different construction shapes which are identified by the following codes:

01 - Rectangular front flange (**not in line to ISO 6020/2**)

02 - Rectangular rear flange (**not in line to ISO 6020/2**)

10 - Extended front tie rods (**ISO MX3**)

11 - Extended rear tie rods (**ISO MX2**)

12 - Extended on both ends tie rods (**ISO MX1**)

13 - Head flange (**ISO ME5**)

14 - Cap flange (**ISO ME6**)

30 - Front screwed tapped holes (**ISO MX5**)

31 - Rear screwed tapped holes (**ISO MX6**)

The choice amongst the different types of mounting available depends not only on the overall dimensions but also on the direction of the reaction force generated on the support according to whether the cylinder works by pushing or pulling.

Hinge mounting

Cylinders with hinge mounting are suitable for both pushing and pulling applications in which the load to be moved follows a curvilinear course which enables the forces around its own axis to be absorbed.

Three forms of construction are available for the oscillating versions and three for the versions with rear hinge, which can be identified by the following codes:

Trunnion mounting

04 - Head trunnion (**ISO MT1**)

05 - Cap trunnion (**ISO MT2**)

06 - Intermediate fixed trunnion (**ISO MT4**)

Pivot mounting

07 - Rear clevis (**ISO MP3**)

08 - Rear spherical bearing (**ISO MP5**)

09 - Cap fixed clevis (**ISO MP1**)

Double rod cylinders mounting

Double rod cylinders are available for all mounting types except for the following versions:

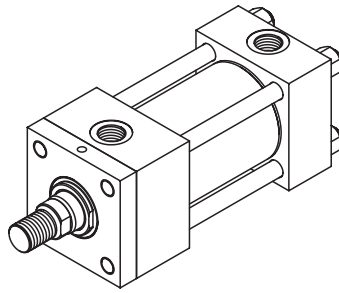
07 - Rear clevis (**ISO MP3**)

08 - Rear spherical bearing (**ISO MP5**)

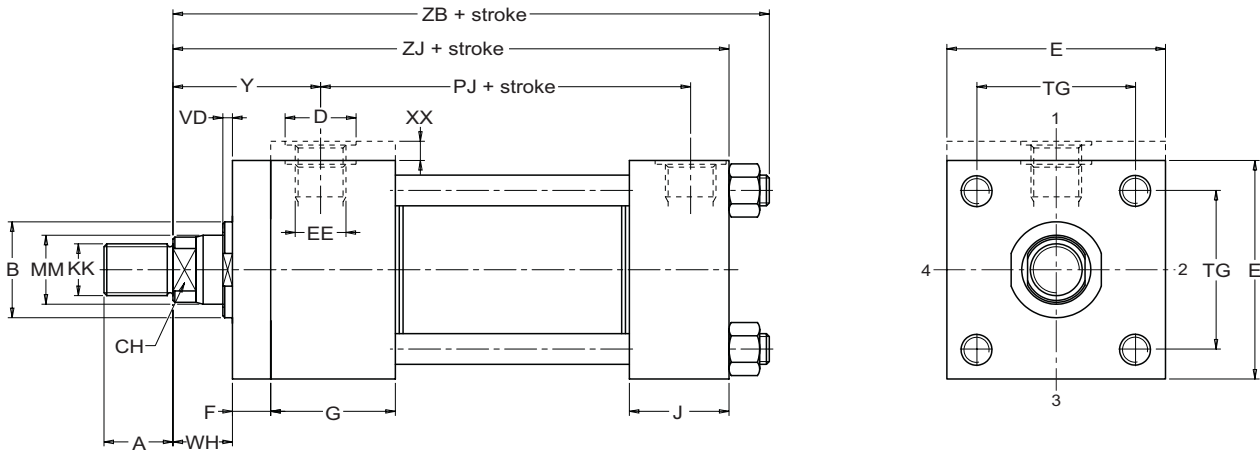
09 - Cap fixed clevis (**ISO MP1**)

ISO 6020/2 A3 Series

Type **00**
(Not to ISO standards)



Basic version

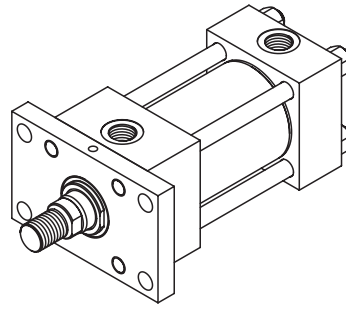


Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	E	EE (BSP)	D Ø	F	G	J	KK (Metric)	PJ	TG	VD	WH	Y	ZB _{max}	ZJ
25	12	14	24	9	5	40	1/4"	22	10	45	35	M10x1,25	54	28,3	6	15	50	121	114
	18	18	30	14								M14x1,5							
32	14	16	26	11	5	45	1/4"	22	10	45	36	M12x1,25	57	33,2	12	25	60	137	128
	18	18	30	14								M14x1,5			6				
	22	22	34	17								M16x1,5			12				
40	18	18	30	14	-	60	3/8"	25	10	55	45	M14x1,5	74	41,7	6	25	62	166	153
	22	22	34	17								M16x1,5			12				
	28	28	42	22								M20x1,5			10				
50	22	22	34	17	-	75	1/2"	30	15	55	45	M16x1,5	76	52,3	7	26	68	176	159
	28	28	42	22								M20x1,5			7				
	36	36	50	30								M27x2			10				
63	28	28	42	22	-	90	1/2"	30	15	55	45	M20x1,5	80	64,3	7	33	71	185	168
	36	36	50	30								M27x2			10				
	45	45	60	36								M33x2			14				
80	36	36	50	30	-	114	3/4"	37	20	65	52	M27x2	93	82,7	5	31	77	212	190
	45	45	60	36								M33x2			9				
	56	56	72	50								M42x2			9				
100	45	45	60	36	-	126	3/4"	37	22	69	55	M33x2	101	96,9	7	35	82	225	203
	56	56	72	50								M42x2			7				
	70	63	88	60								M48x2			10				
125	56	56	72	50	-	164	1"	47	22	78	71	M42x2	117	125,9	6	35	86	260	232
	70	63	88	60								M48x2			10				
	90	85	108	75								M64x3			10				
160	70	63	88	60	-	198	1"	47	25	86	63	M48x2	130	154,9	7	32	86	279	245
	90	85	108	80								M64x3			7				
	110	95	133	100								M80x3			7				
200	90	85	108	80	-	240	1" 1/4	54	25	103	80	M64x3	165	190,2	7	32	98	336	299
	110	95	133	100								M80x3			7				
	140	112	163	130								M100x3			7				

Unless otherwise specified, all dimensions are given in millimetres.

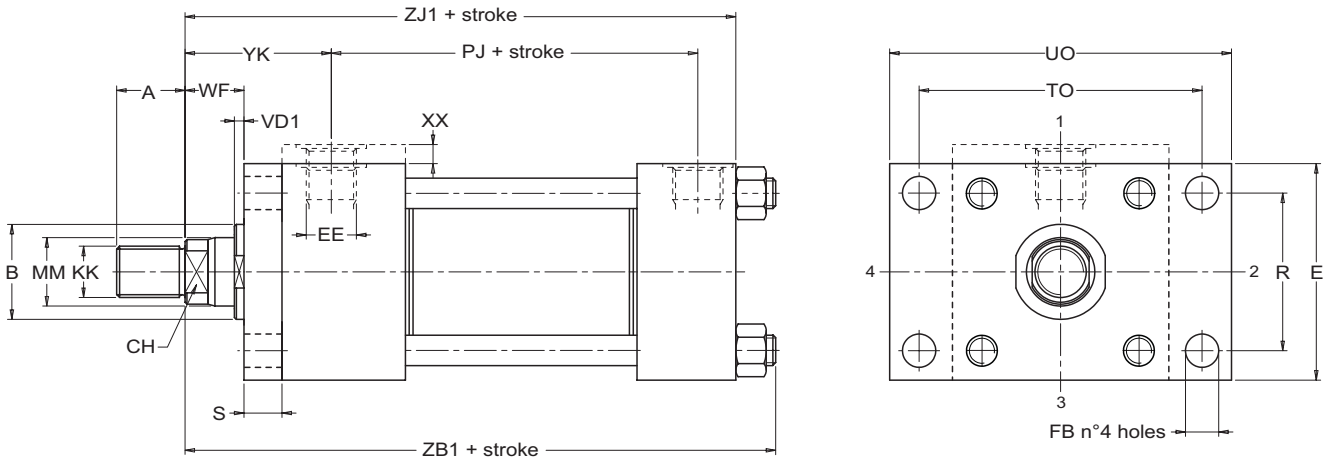


Rectangular front flange



Type 01

(Not to ISO standards)

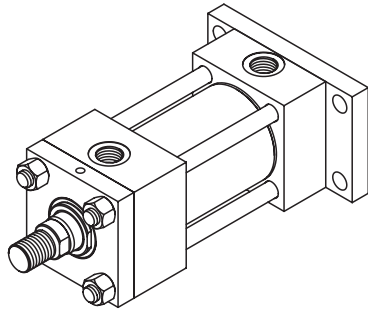


Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	E	EE (BSP)	FB Ø	KK (Metric)	PJ	R	S	TO	UO	VD1	WF	YK	ZB1 _{max}	ZJ1
25	12	14	24	9	5	40	1/4"	5,5	M10x1,25	54	27	10	51	64	6	25	60	131	124
	18	18	30	14					M14x1,5										
32	14	16	26	11	5	45	1/4"	6,6	M12x1,25	57	33	10	58	70	12	35	70	147	138
	18	18	30	14					M14x1,5						6				
	22	22	34	17					M16x1,5						12				
40	18	18	30	14	-	60	3/8"	11	M14x1,5	74	41	12	87	110	4	35	74	178	165
	22	22	34	17					M16x1,5						10				
	28	28	42	22					M20x1,5						8				
50	22	22	34	17	-	75	1/2"	13,5	M16x1,5	76	52	15	105	130	7	41	83	191	174
	28	28	42	22					M20x1,5						7				
	36	36	50	30					M27x2						10				
63	28	28	42	22	-	90	1/2"	13,5	M20x1,5	80	65	18	117	140	4	48	89	203	186
	36	36	50	30					M27x2						7				
	45	45	60	36					M33x2						11				
80	36	36	50	30	-	114	3/4"	17,5	M27x2	93	83	20	149	180	5	51	97	232	210
	45	45	60	36					M33x2						9				
	56	56	72	50					M42x2						9				
100	45	45	60	36	-	126	3/4"	17,5	M33x2	101	97	25	162	190	4	57	107	250	228
	56	56	72	50					M42x2						4				
	70	63	88	60					M48x2						7				
125	56	56	72	50	-	164	1"	22	M42x2	117	126	25*	208	240	4	57	111	285	257
	70	63	88	60					M48x2						7				
	90	85	108	75					M64x3						6				
160	70	63	88	60	-	198	1"	26	M48x2	130	155	27**	253	300	5	57	113	306	272
	90	85	108	80					M64x3										
	110	95	133	100					M80x3										
200	90	85	108	80	-	240	1" 1/4	33	M64x3	165	190	27***	300	350	5	57	125	363	326
	110	95	133	100					M80x3										
	140	112	163	130					M100x3										

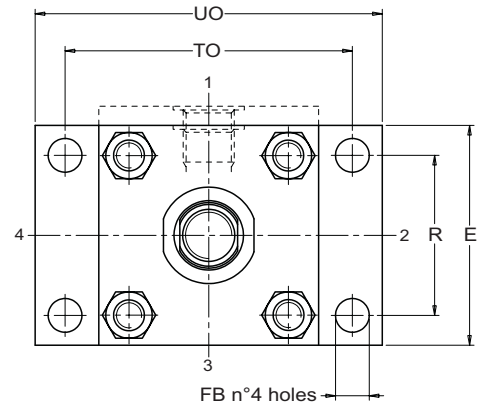
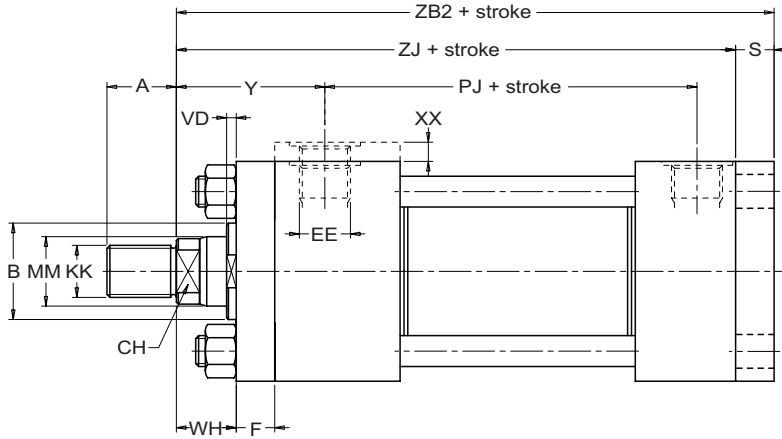
* Max 200 bar ** Max 150 bar *** Max 120 Bar
 Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 02 (Not to ISO standards)



Rectangular rear flange

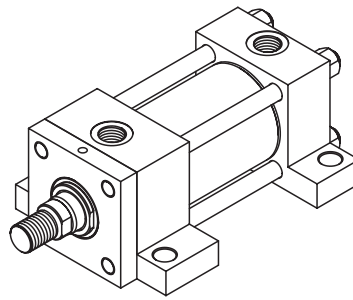


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	F	FB Ø	KK (Metric)	PJ	R	S	TO	UO	VD	WH	Y	ZB2	ZJ
25	12	14	24	9	5	40	1/4"	10	5,5	M10x1,25	54	27	10	51	64	6	15	50	124	114
	18	18	30	14						M14x1,5										
32	14	16	26	11	5	45	1/4"	10	6,6	M12x1,25	57	33	10	58	70	12	25	60	138	128
	18	18	30	14						M14x1,5						6				
	22	22	34	17						M16x1,5						12				
40	18	18	30	14	-	60	3/8"	10	11	M14x1,5	74	41	12	87	110	6	25	62	165	153
	22	22	34	17						M16x1,5						12				
	28	28	42	22						M20x1,5						10				
50	22	22	34	17	-	75	1/2"	15	13,5	M16x1,5	76	52	15	105	130	7	26	68	174	159
	28	28	42	22						M20x1,5						7				
	36	36	50	30						M27x2						10				
63	28	28	42	22	-	90	1/2"	15	13,5	M20x1,5	80	65	18	117	140	7	33	71	186	168
	36	36	50	30						M27x2						10				
	45	45	60	36						M33x2						14				
80	36	36	50	30	-	114	3/4"	20	17,5	M27x2	93	83	20	149	180	5	31	77	210	190
	45	45	60	36						M33x2						9				
	56	56	72	50						M42x2						9				
100	45	45	60	36	-	126	3/4"	22	17,5	M33x2	101	97	25	162	190	7	35	82	228	203
	56	56	72	50						M42x2						7				
	70	63	88	60						M48x2						10				
125	56	56	72	50	-	164	1"	22	22	M42x2	117	126	25*	208	240	6	35	86	257	232
	70	63	88	60						M48x2						10				
	90	85	108	75						M64x3						10				
160	70	63	88	60	-	198	1"	25	26	M48x2	130	155	27**	253	300	7	32	86	272	245
	90	85	108	80						M64x3						7				
	110	95	133	100						M80x3						7				
200	90	85	108	80	-	240	1" 1/4	25	33	M64x3	165	190	27***	300	350	7	32	98	326	299
	110	95	133	100						M80x3						7				
	140	112	163	130						M100x3						7				

* Max 200 bar ** Max 150 bar *** Max 120 Bar

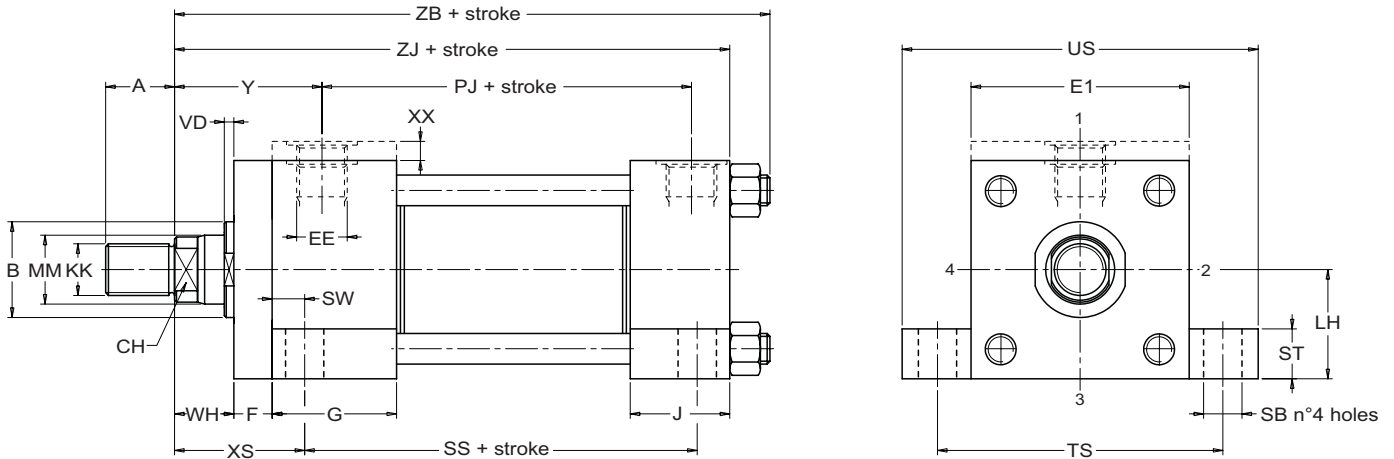
Unless otherwise specified, all dimensions are given in millimetres.

Side foot



Type 03

(ISO MS2)

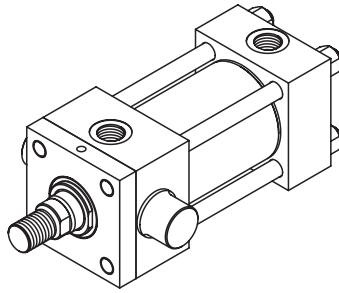


Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	E1	EE (BSP)	F	G	J	KK (Metric)	LH ^{h10}	PJ	SB Ø	SS	ST	SW	VD	TS	US	XS	WH	Y	ZB _{max}	ZJ
25	12	14	24	9	5	38	1/4"	10	45	35	M10x1,25	19	54	6,6	73	8,5	8	6	54	70	33	15	50	121	114
	18	18	30	14							M14x1,5														
32	14	16	26	11	5	44	1/4"	10	45	36	M12x1,25	22	57	9	73	12,5	10	12	63	84	45	25	60	137	128
	18	18	30	14							M14x1,5							6							
	22	22	34	17							M16x1,5							12							
40	18	18	30	14	-	60	3/8"	10	55	45	M14x1,5	31	74	11	98	12,5	10	6	83	102	45	25	62	166	153
	22	22	34	17							M16x1,5							12							
	28	28	42	22							M20x1,5							10							
50	22	22	34	17	-	75	1/2"	15	55	45	M16x1,5	37	76	14	92	19	13	7	102	126	54	26	68	176	159
	28	28	42	22							M20x1,5							7							
	36	36	50	30							M27x2							10							
63	28	28	42	22	-	90	1/2"	15	55	45	M20x1,5	44	80	18	86	26	17	7	124	160	65	33	71	185	168
	36	36	50	30							M27x2							10							
	45	45	60	36							M33x2							14							
80	36	36	50	30	-	114	3/4"	20	65	52	M27x2	57	93	18	105	26	17	5	149	186	68	31	77	212	190
	45	45	60	36							M33x2							9							
	56	56	72	50							M42x2							9							
100	45	45	60	36	-	126	3/4"	22	69	55	M33x2	63	101	26	102	32	22	7	172	216	79	35	82	225	203
	56	56	72	50							M42x2							7							
	70	63	88	60							M48x2							10							
125	56	56	72	50	-	164	1"	22	78	71	M42x2	82	117	26	131	32	22	6	210	254	79	35	86	260	232
	70	63	88	60							M48x2							10							
	90	85	108	75							M64x3							10							
160	70	63	88	60	-	198	1"	25	86	63	M48x2	101	130	33	130	38	29	7	260	318	86	32	86	279	245
	90	85	108	80							M64x3							7							
	110	95	133	100							M80x3							7							
200	90	85	108	80	-	240	1" 1/4	25	103	80	M64x3	122	165	39	172	44	35	7	311	380	92	32	98	336	299
	110	95	133	100							M80x3							7							
	140	112	163	130							M100x3							7							

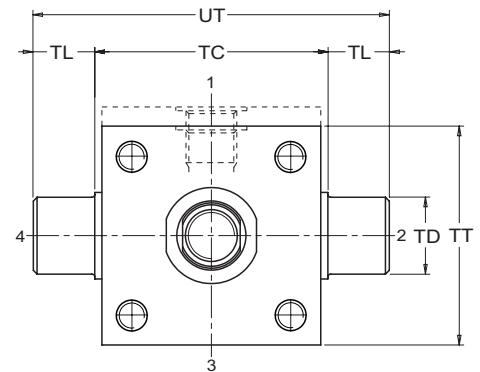
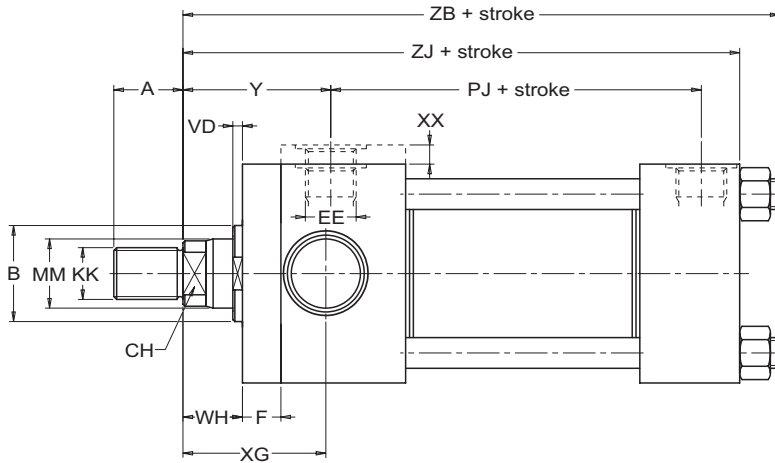
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Tipo 04 (ISO MT1)



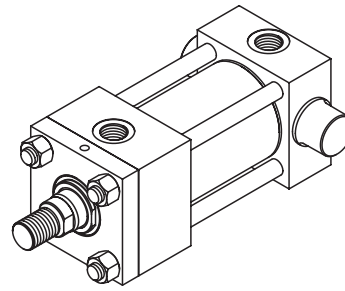
Head trunnion



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	F	EE (BSP)	KK (Metric)	PJ	TC	TD ^{f8} Ø	TL	TT	UT	VD	XG	WH	Y	ZB _{max}	ZJ
25	12	14	24	9	5	10	1/4"	M10x1,25	54	38	12	10	38	58	6	44	15	50	121	114
	18	18	30	14				M14x1,5												
32	14	16	26	11	5	10	1/4"	M12x1,25	57	44	16	12	44	68	12	54	25	60	137	128
	18	18	30	14				M14x1,5							6					
	22	22	34	17				M16x1,5							12					
40	18	18	30	14	-	10	3/8"	M14x1,5	74	63	20	16	60	95	6	57	25	62	166	153
	22	22	34	17				M16x1,5							12					
	28	28	42	22				M20x1,5							10					
50	22	22	34	17	-	15	1/2"	M16x1,5	76	76	25	20	75	116	7	64	26	68	176	159
	28	28	42	22				M20x1,5							7					
	36	36	50	30				M27x2							10					
63	28	28	42	22	-	15	1/2"	M20x1,5	80	89	32	25	88	139	7	70	33	71	185	168
	36	36	50	30				M27x2							10					
	45	45	60	36				M33x2							14					
80	36	36	50	30	-	20	3/4"	M27x2	93	114	40	32	114	178	5	76	31	77	212	190
	45	45	60	36				M33x2							9					
	56	56	72	50				M42x2							9					
100	45	45	60	36	-	-	3/4"	M33x2	101	127	50	40	126	207	7	71	35	82	225	203
	56	56	72	50				M42x2							7					
	70	63	88	60				M48x2							10					
125	56	56	72	50	-	-	1"	M42x2	117	165	63	50	164	265	6	75	35	86	260	232
	70	63	88	60				M48x2							10					
	90	85	108	75				M64x3							10					
160	70	63	88	60	-	-	1"	M48x2	130	203	80	63	198	329	7	75	32	86	279	245
	90	85	108	80				M64x3							7					
	110	95	133	100				M80x3							7					
200	90	85	108	80	-	-	1 1/4"	M64x3	165	241	100	80	240	401	7	85	32	98	336	299
	110	95	133	100				M80x3							7					
	140	112	163	130				M100x3							7					

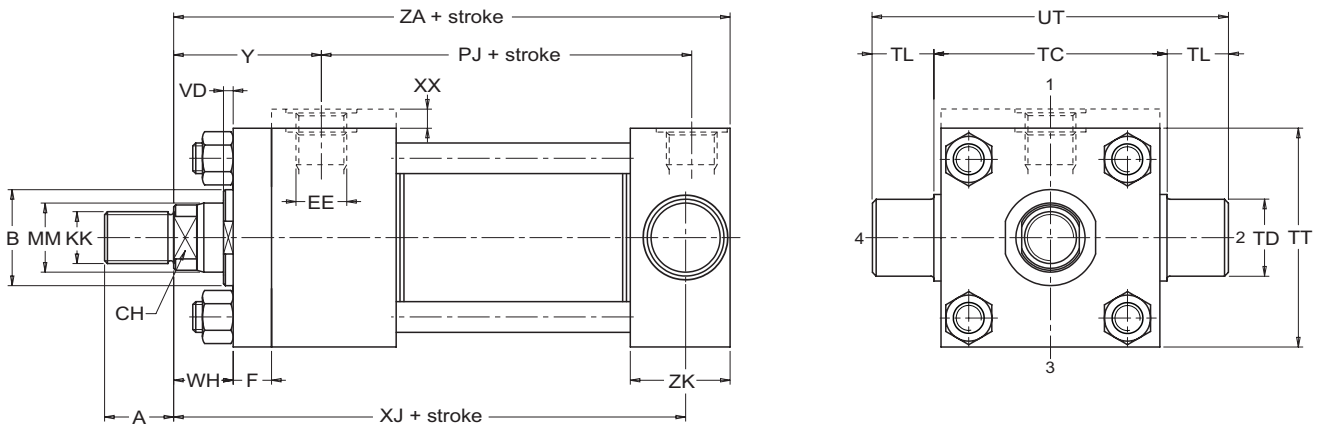
Unless otherwise specified, all dimensions are given in millimetres.

Cap trunnion



Type 05

(ISO MT2)

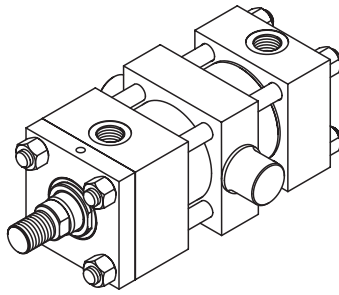


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	F	EE (BSP)	KK (Metric)	PJ	TC	TD ^{f8} Ø	TL	TT	UT	VD	XJ	WH	Y	ZA	ZK
25	12	14	24	9	5	10	1/4"	M10x1,25	54	38	12	10	38	58	6	101	15	50	114	35
	18	30	14	M14x1,5																
32	14	16	26	11	5	10	1/4"	M12x1,25	57	44	16	12	44	68	12	115	25	60	128	36
	18	30	14	M14x1,5				6												
	22	34	17	M16x1,5				12												
40	18	18	30	14	-	10	3/8"	M14x1,5	74	63	20	16	60	95	6	134	25	62	153	45
	22	34	17	M16x1,5				12												
	28	42	22	M20x1,5				10												
50	22	22	34	17	-	15	1/2"	M16x1,5	76	76	25	20	75	116	7	140	26	68	159	45
	28	42	22	M20x1,5				7												
	36	50	30	M27x2				10												
63	28	28	42	22	-	15	1/2"	M20x1,5	80	89	32	25	88	139	7	149	33	71	168	45
	36	50	30	M27x2				10												
	45	60	36	M33x2				14												
80	36	36	50	30	-	20	3/4"	M27x2	93	114	40	32	114	178	5	168	31	77	190	52
	45	60	36	M33x2				9												
	56	72	50	M42x2				9												
100	45	45	60	36	-	22	3/4"	M33x2	101	127	50	40	126	207	7	187	35	82	216	68
	56	72	50	M42x2				7												
	70	88	60	M48x2				10												
125	56	56	72	50	-	22	1"	M42x2	117	165	63	50	164	265	6	209	35	86	246	85
	70	88	60	M48x2				10												
	90	108	75	M64x3				10												
160	70	63	88	60	-	25	1"	M48x2	130	203	80	63	198	329	7	230	32	86	277	95
	90	108	80	M64x3				7												
	110	133	100	M80x3				7												
200	90	85	108	80	-	25	1" 1/4	M64x3	165	241	100	80	240	401	7	276	32	98	334	115
	110	133	100	M80x3				7												
	140	163	130	M100x3				7												

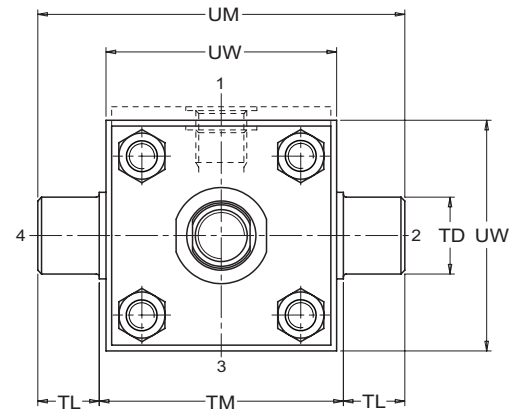
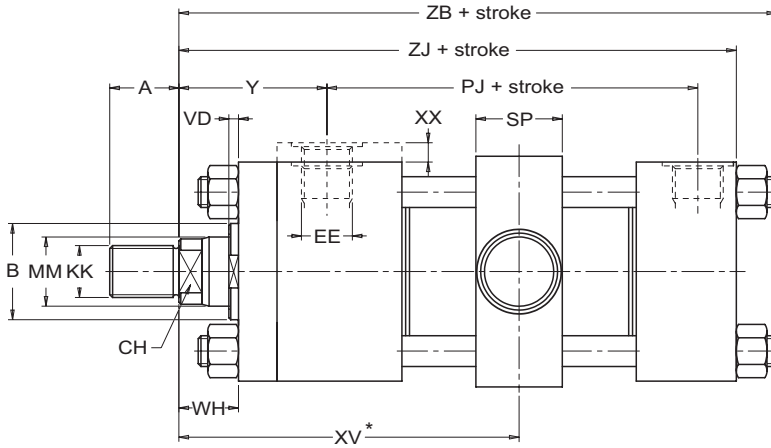
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 06 (ISO MT4)



Intermediate fixed trunnion



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	EE (BSP)	KK (Metric)	PJ	SP	TD ^{f8} Ø	TL	TM	UM	UW	VD	XV minimum	XV+stroke maximum	Y	WH	ZB _{max}	ZJ	Stroke minimum
25	12	14	24	9	5	1/4"	M10x1,25	54	20	12	10	48	68	45	6	80	69	50	15	121	114	11
	18	18	30	14			M14x1,5															
32	14	16	26	11	5	1/4"	M12x1,25	57	25	16	12	55	79	50	12	93	79	60	25	137	128	13
	18	18	30	14			M14x1,5								6							
	22	22	34	17			M16x1,5								12							
40	18	18	30	14	-	3/8"	M14x1,5	74	30	20	16	76	108	70	6	105	93	62	25	166	153	12
	22	22	34	17			M16x1,5								12							
	28	28	42	22			M20x1,5								10							
50	22	22	34	17	-	1/2"	M16x1,5	76	40	25	20	89	129	85	7	116	94	68	26	176	159	22
	28	28	42	22			M20x1,5								7							
	36	36	50	30			M27x2								10							
63	28	28	42	22	-	1/2"	M20x1,5	80	40	32	25	100	150	95	7	123	103	71	33	185	168	20
	36	36	50	30			M27x2								10							
	45	45	60	36			M33x2								14							
80	36	36	50	30	-	3/4"	M27x2	93	45	40	32	127	191	120	5	139	115	77	31	212	190	23
	45	45	60	36			M33x2								9							
	56	56	72	50			M42x2								9							
100	45	45	60	36	-	3/4"	M33x2	101	60	50	40	140	220	130	7	156	118	82	35	225	203	38
	56	56	72	50			M42x2								7							
	70	63	88	60			M48x2								10							
125	56	56	72	50	-	1"	M42x2	117	70	63	50	178	278	170	6	170	126	86	35	260	232	44
	70	63	88	60			M48x2								10							
	90	85	108	75			M64x3								10							
160	70	63	88	60	-	1"	M48x2	130	90	80	63	215	341	205	7	188	137	86	32	279	245	91
	90	85	108	80			M64x3								7							
	110	95	133	100			M80x3								7							
200	90	85	108	80	-	1" 1/4	M64x3	165	110	100	80	279	439	275	7	215	164	98	32	336	299	51
	110	95	133	100			M80x3								7							
	140	112	163	130			M100x3								7							

* Specify the dimension in case of order.

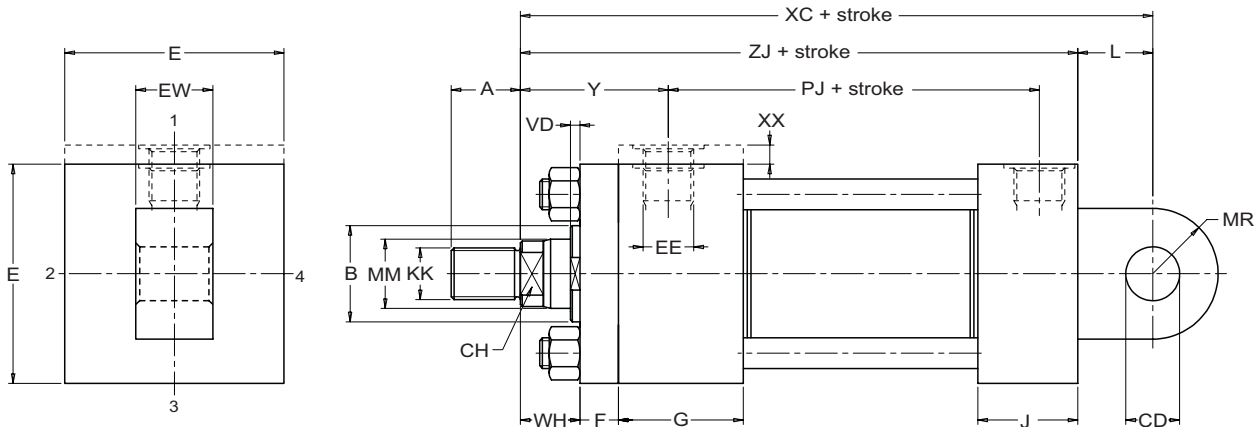
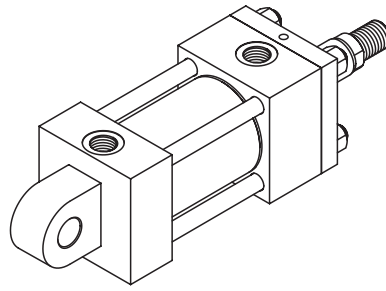
Unless otherwise specified, all dimensions are given in millimetres.



Rear clevis

Type 07

(ISO MP3)

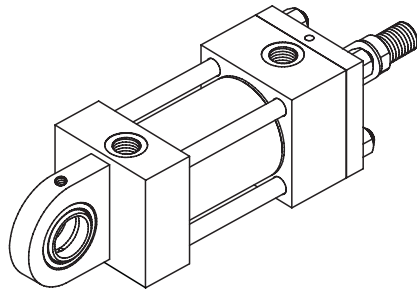


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	F	G	J	KK (Metric)	CD ^{H9} Ø	EW	L	MR _{max}	PJ	VD	WH	Y	XC	ZJ
25	12	14	24	9	5	40	1/4"	10	45	35	M10x1,25	10	12	13	12	54	6	15	50	127	114
	18	18	30	14							M14x1,5										
32	14	16	26	11	5	45	1/4"	10	45	36	M12x1,25	12	16	19	17	57	12	25	60	147	128
	18	18	30	14							M14x1,5						6				
	22	22	34	17							M16x1,5						12				
40	18	18	30	14	-	60	3/8"	10	55	45	M14x1,5	14	20	19	17	74	6	25	62	172	153
	22	22	34	17							M16x1,5						12				
	28	28	42	22							M20x1,5						10				
50	22	22	34	17	-	75	1/2"	15	55	45	M16x1,5	20	30	32	29	76	7	26	68	191	159
	28	28	42	22							M20x1,5						7				
	36	36	50	30							M27x2						10				
63	28	28	42	22	-	90	1/2"	15	55	45	M20x1,5	20	30	32	29	80	7	33	71	200	168
	36	36	50	30							M27x2						10				
	45	45	60	36							M33x2						14				
80	36	36	50	30	-	114	3/4"	20	65	52	M27x2	28	40	39	34	93	5	31	77	229	190
	45	45	60	36							M33x2						9				
	56	56	72	50							M42x2						9				
100	45	45	60	36	-	126	3/4"	22	69	55	M33x2	36	50	54	50	101	7	35	82	257	203
	56	56	72	50							M42x2						7				
	70	63	88	60							M48x2						10				
125	56	56	72	50	-	164	1"	22	78	71	M42x2	45	60	57	53	117	6	35	86	289	232
	70	63	88	60							M48x2						10				
	90	85	108	75							M64x3						10				
160	70	63	88	60	-	198	1"	25	86	63	M48x2	56	70	63	59	130	7	32	86	308	245
	90	85	108	80							M64x3						7				
	110	95	133	100							M80x3						7				
200	90	85	108	80	-	240	1" 1/4	25	103	80	M64x3	70	80	82	78	165	7	32	98	381	299
	110	95	133	100							M80x3						7				
	140	112	163	130							M100x3						7				

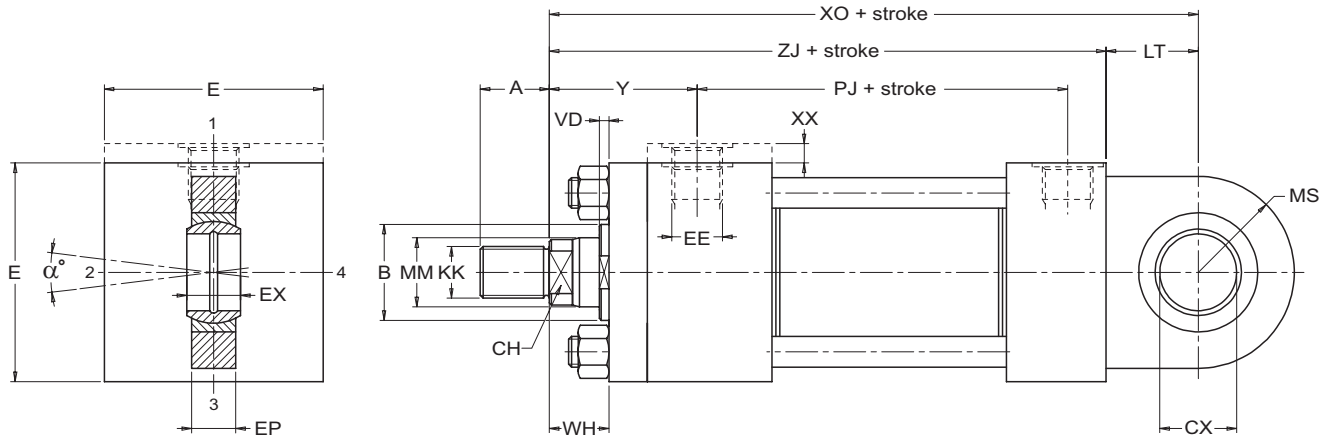
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 08 (ISO MP5)



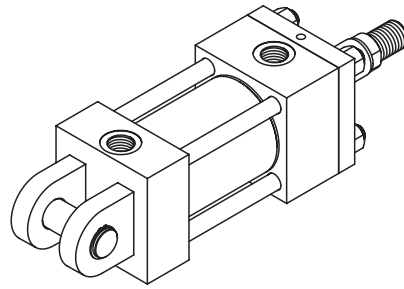
Rear spherical bearing



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	KK (Metric)	CX ^{H7} Ø	EP	EX	LT	MS _{max}	PJ	VD	XO	WH	Y	ZJ	α°
25	12	14	24	9	5	40	1/4"	M10x1,25	12	8	10	16	20	54	6	130	15	50	114	11
	18	18	30	14				M14x1,5												
32	14	16	26	11	5	45	1/4"	M12x1,25	16	11	14	20	22	57	12	148	25	60	128	10
	18	18	30	14				M14x1,5							6					
	22	22	34	17				M16x1,5							12					
40	18	18	30	14	-	60	3/8"	M14x1,5	20	13	16	25	29	74	6	178	25	62	153	9
	22	22	34	17				M16x1,5							12					
	28	28	42	22				M20x1,5							10					
50	22	22	34	17	-	75	1/2"	M16x1,5	25	17	20	31	33	76	7	190	26	68	159	7
	28	28	42	22				M20x1,5							7					
	36	36	50	30				M27x2							10					
63	28	28	42	22	-	90	1/2"	M20x1,5	30	19	22	38	40	80	7	206	33	71	168	6
	36	36	50	30				M27x2							10					
	45	45	60	36				M33x2							14					
80	36	36	50	30	-	114	3/4"	M27x2	40	23	28	48	50	93	5	238	31	77	190	7
	45	45	60	36				M33x2							9					
	56	56	72	50				M42x2							9					
100	45	45	60	36	-	126	3/4"	M33x2	50	30	35	58	62	101	7	261	35	82	203	6
	56	56	72	50				M42x2							7					
	70	63	88	60				M48x2							10					
125	56	56	72	50	-	164	1"	M42x2	60	38	44	72	80	117	6	304	35	86	232	6
	70	63	88	60				M48x2							10					
	90	85	108	75				M64x3							10					
160	70	63	88	60	-	198	1"	M48x2	80	47	55	92	100	130	7	337	32	86	245	6
	90	85	108	80				M64x3							7					
	110	95	133	100				M80x3							7					
200	90	85	108	80	-	240	1" 1/4	M64x3	100	57	70	116	120	165	7	415	32	98	299	6
	110	95	133	100				M80x3							7					
	140	112	163	130				M100x3							7					

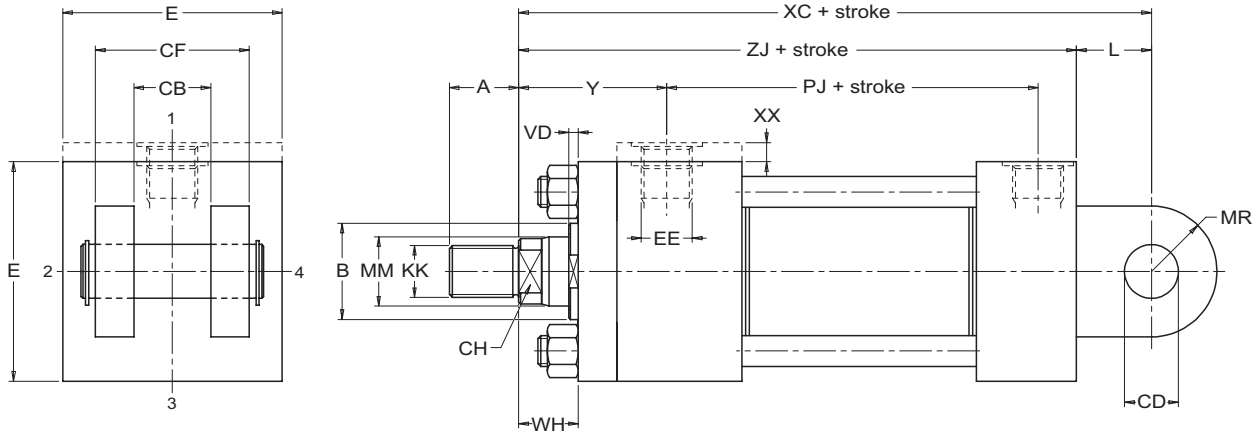
Unless otherwise specified, all dimensions are given in millimetres.

Cap fixed clevis



Type 09

(ISO MP1)

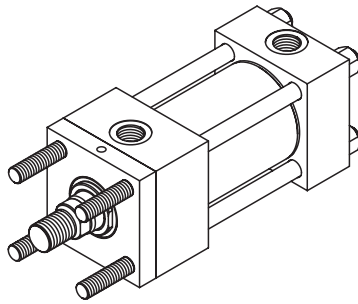


Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	EE (BSP)	KK (Metric)	CB	CD ^{H9} Ø	CF	E	L	MR _{max}	PJ	VD	WH	Y	XC	ZJ
25	12	14	24	9	5	1/4"	M10x1,25	12	10	24	40	13	12	54	6	15	50	127	114
	18	18	30	14			M14x1,5												
32	14	16	26	11	5	1/4"	M12x1,25	16	12	32	45	19	17	57	12	25	60	147	128
	18	18	30	14			M14x1,5								6				
	22	22	34	17			M16x1,5								12				
40	18	18	30	14	-	3/8"	M14x1,5	20	14	40	60	19	17	74	6	25	62	172	153
	22	22	34	17			M16x1,5								12				
	28	28	42	22			M20x1,5								10				
50	22	22	34	17	-	1/2"	M16x1,5	30	20	60	75	32	29	76	7	26	68	191	159
	28	28	42	22			M20x1,5								7				
	36	36	50	30			M27x2								10				
63	28	28	42	22	-	1/2"	M20x1,5	30	20	60	90	32	29	80	7	33	71	200	168
	36	36	50	30			M27x2								10				
	45	45	60	36			M33x2								14				
80	36	36	50	30	-	3/4"	M27x2	40	28	80	114	39	34	93	5	31	77	229	190
	45	45	60	36			M33x2								9				
	56	56	72	50			M42x2								9				
100	45	45	60	36	-	3/4"	M33x2	50	36	100	126	54	50	101	7	35	82	257	203
	56	56	72	50			M42x2								7				
	70	63	88	60			M48x2								10				
125	56	56	72	50	-	1"	M42x2	60	45	120	164	57	53	117	6	35	86	289	232
	70	63	88	60			M48x2								10				
	90	85	108	75			M64x3								10				
160	70	63	88	60	-	1"	M48x2	70	56	140	198	63	59	130	7	32	86	308	245
	90	85	108	80			M64x3								7				
	110	95	133	100			M80x3								7				
200	90	85	108	80	-	1" 1/4	M64x3	80	70	160	240	82	78	165	7	32	98	381	299
	110	95	133	100			M80x3								7				
	140	112	163	130			M100x3								7				

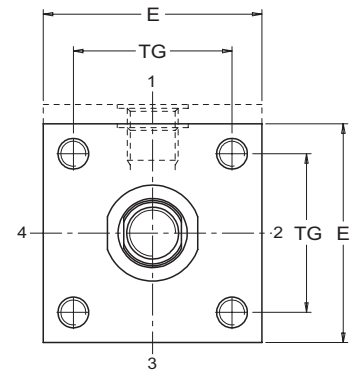
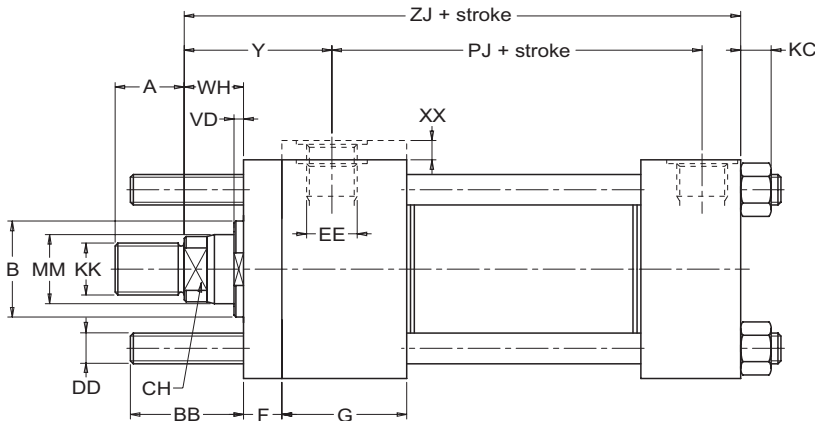
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 10 (ISO MX3)



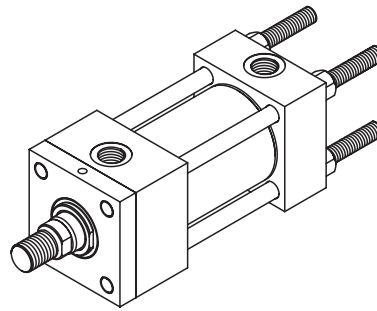
Extended front tie rods



Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	EE (BSP)	KK (Metric)	BB	DD (Metric)	E	F	G	WH	KC	PJ	TG	VD	Y	ZJ
25	12	14	24	9	5	1/4"	M10x1,25	19	M5x0,8	40	10	45	15	5	54	28,3	6	50	114
	18	18	30	14		M14x1,5													
32	14	16	26	11	5	1/4"	M12x1,25	24	M6x1	45	10	45	25	6	57	33,2	12	60	128
	18	18	30	14		M14x1,5	6												
	22	22	34	17		M16x1,5	12												
40	18	18	30	14	-	3/8"	M14x1,5	35	M8x1	60	10	55	25	8	74	41,7	6	62	153
	22	22	34	17		M16x1,5	12												
	28	28	42	22		M20x1,5	10												
50	22	22	34	17	-	1/2"	M16x1,5	46	M12x1,25	75	15	55	26	12	76	52,3	7	68	159
	28	28	42	22		M20x1,5	7												
	36	36	50	30		M27x2	10												
63	28	28	42	22	-	1/2"	M20x1,5	46	M12x1,25	90	15	55	33	12	80	64,3	7	71	168
	36	36	50	30		M27x2	10												
	45	45	60	36		M33x2	14												
80	36	36	50	30	-	3/4"	M27x2	59	M16x1,5	114	20	65	31	16	93	82,7	5	77	190
	45	45	60	36		M33x2	9												
	56	56	72	50		M42x2	9												
100	45	45	60	36	-	3/4"	M33x2	59	M16x1,5	126	22	69	35	16	101	96,9	7	82	203
	56	56	72	50		M42x2	7												
	70	63	88	60		M48x2	10												
125	56	56	72	50	-	1"	M42x2	81	M22x1,5	164	22	78	35	22	117	125,9	6	86	232
	70	63	88	60		M48x2	10												
	90	85	108	75		M64x3	10												
160	70	63	88	60	-	1"	M48x2	92	M27x2	198	25	86	32	27	130	154,9	7	86	245
	90	85	108	80		M64x3	7												
	110	95	133	100		M80x3	7												
200	90	85	108	80	-	1" 1/4	M64x3	115	M30x2	240	25	103	32	30	165	190,2	7	98	299
	110	95	133	100		M80x3	7												
	140	112	163	130		M100x3	7												

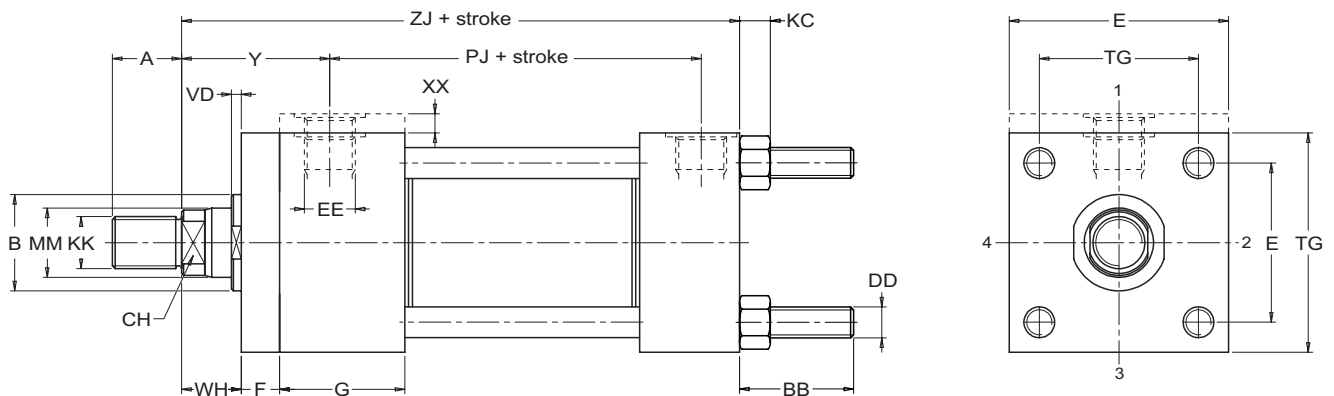
Unless otherwise specified, all dimensions are given in millimetres.

Extended rear tie rods



Type 11

(ISO MX2)

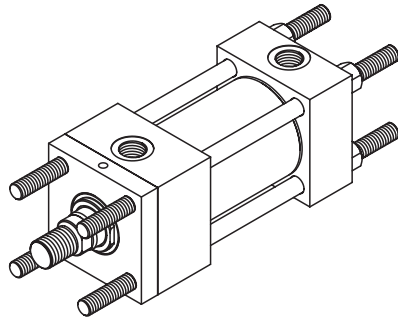


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	EE (BSP)	KK (Metric)	BB	DD (Metric)	E	F	G	WH	KC	PJ	TG	VD	Y	ZJ
25	12	14	24	9	5	1/4"	M10x1,25	19	M5x0,8	40	10	45	15	5	54	28,3	6	50	114
	18	18	30	14			M14x1,5												
32	14	16	26	11	5	1/4"	M12x1,25	24	M6x1	45	10	45	25	6	57	33,2	12	60	128
	18	18	30	14			M14x1,5										6		
	22	22	34	17			M16x1,5										12		
40	18	18	30	14	-	3/8"	M14x1,5	35	M8x1	60	10	55	25	8	74	41,7	6	62	153
	22	22	34	17			M16x1,5										12		
	28	28	42	22			M20x1,5										10		
50	22	22	34	17	-	1/2"	M16x1,5	46	M12x1,25	75	15	55	26	12	76	52,3	7	68	159
	28	28	42	22			M20x1,5										7		
	36	36	50	30			M27x2										10		
63	28	28	42	22	-	1/2"	M20x1,5	46	M12x1,25	90	15	55	33	12	80	64,3	7	71	168
	36	36	50	30			M27x2										10		
	45	45	60	36			M33x2										14		
80	36	36	50	30	-	3/4"	M27x2	59	M16x1,5	114	20	65	31	16	93	82,7	5	77	190
	45	45	60	36			M33x2										9		
	56	56	72	50			M42x2										9		
100	45	45	60	36	-	3/4"	M33x2	59	M16x1,5	126	22	69	35	16	101	96,9	7	82	203
	56	56	72	50			M42x2										7		
	70	63	88	60			M48x2										10		
125	56	56	72	50	-	1"	M42x2	81	M22x1,5	164	22	78	35	22	117	125,9	6	86	232
	70	63	88	60			M48x2										10		
	90	85	108	75			M64x3										10		
160	70	63	88	60	-	1"	M48x2	92	M27x2	198	25	86	32	27	130	154,9	7	86	245
	90	85	108	80			M64x3										7		
	110	95	133	100			M80x3										7		
200	90	85	108	80	-	1" 1/4	M64x3	115	M30x2	240	25	103	32	30	165	190,2	7	98	299
	110	95	133	100			M80x3										7		
	140	112	163	130			M100x3										7		

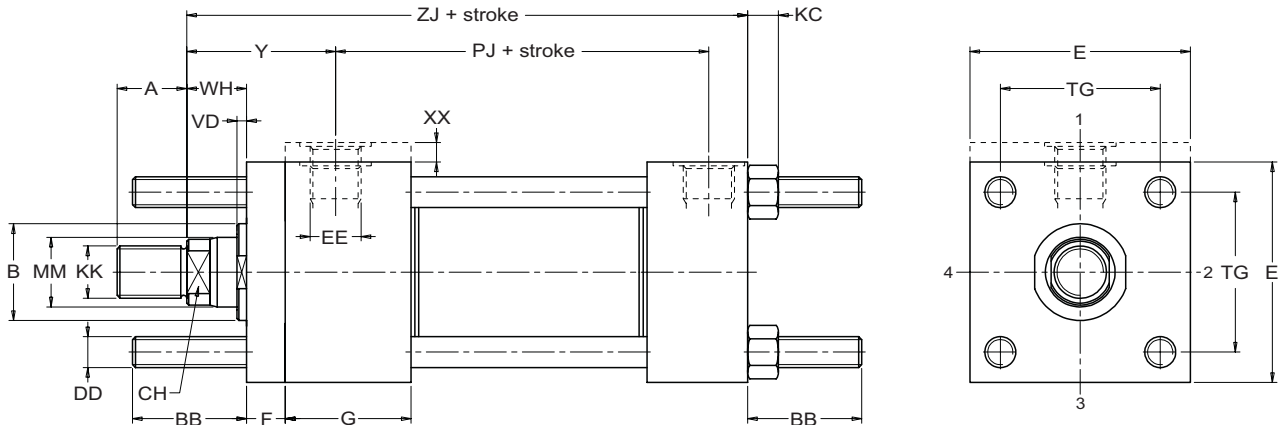
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 12 (ISO MX1)



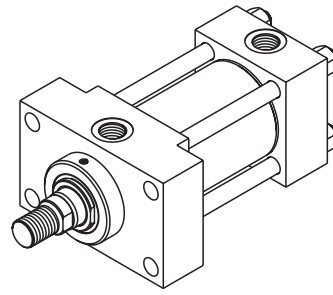
Tie rods extended on both ends



Bore Ø	MM Ø	A	B ^{FB} Ø	CH	XX	EE (BSP)	KK (Metric)	BB	DD (Metric)	E	F	G	WH	KC	PJ	TG	VD	Y	ZJ
25	12	14	24	9	5	1/4"	M10x1,25	19	M5x0,8	40	10	45	15	5	54	28,3	6	50	114
	18	18	30	14			M14x1,5												
32	14	16	26	11	5	1/4"	M12x1,25	24	M6x1	45	10	45	25	6	57	33,2	12	60	128
	18	18	30	14			M14x1,5										6		
	22	22	34	17			M16x1,5										12		
40	18	18	30	14	-	3/8"	M14x1,5	35	M8x1	60	10	55	25	8	74	41,7	6	62	153
	22	22	34	17			M16x1,5										12		
	28	28	42	22			M20x1,5										10		
50	22	22	34	17	-	1/2"	M16x1,5	46	M12x1,25	75	15	55	26	12	76	52,3	7	68	159
	28	28	42	22			M20x1,5										7		
	36	36	50	30			M27x2										10		
63	28	28	42	22	-	1/2"	M20x1,5	46	M12x1,25	90	15	55	33	12	80	64,3	7	71	168
	36	36	50	30			M27x2										10		
	45	45	60	36			M33x2										14		
80	36	36	50	30	-	3/4"	M27x2	59	M16x1,5	114	20	65	31	16	93	82,7	5	77	190
	45	45	60	36			M33x2										9		
	56	56	72	50			M42x2										9		
100	45	45	60	36	-	3/4"	M33x2	59	M16x1,5	126	22	69	35	16	101	96,9	7	82	203
	56	56	72	50			M42x2										7		
	70	63	88	60			M48x2										10		
125	56	56	72	50	-	1"	M42x2	81	M22x1,5	164	22	78	35	22	117	125,9	6	86	232
	70	63	88	60			M48x2										10		
	90	85	108	75			M64x3										10		
160	70	63	88	60	-	1"	M48x2	92	M27x2	198	25	86	32	27	130	154,9	7	86	245
	90	85	108	80			M64x3										7		
	110	95	133	100			M80x3										7		
200	90	85	108	80	-	1" 1/4	M64x3	115	M30x2	240	25	103	32	30	165	190,2	7	98	299
	110	95	133	100			M80x3										7		
	140	112	163	130			M100x3										7		

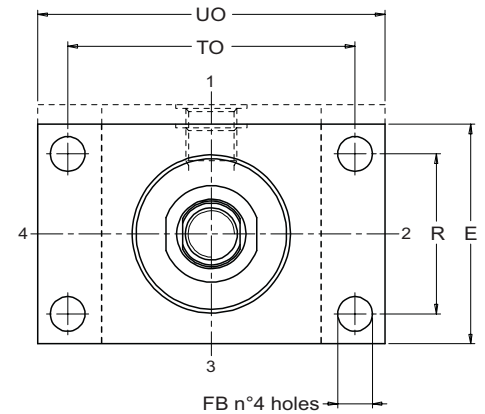
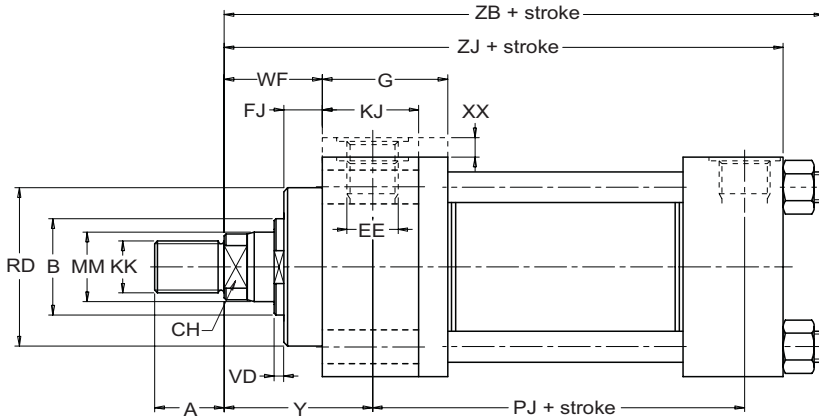
Unless otherwise specified, all dimensions are given in millimetres.

Head flange



Type 13

(ISO ME5)

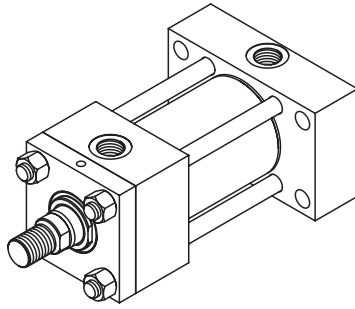


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	KK (Metric)	G	FB	FJ	KJ	PJ	RD ^{f8} Ø	R	TO	UO _{max}	VD	WF	Y	ZB _{max}	ZJ
25	12	14	24	9	5	40	1/4"	M10x1,25	45	5,5	10	35	54	38	27	51	64	6	25	50	121	114
	18	18	30	14				M14x1,5														
32	14	16	26	11	5	45	1/4"	M12x1,25	45	6,6	10	36	57	42	33	58	70	12	35	60	137	128
	18	18	30	14				M14x1,5										6				
	22	22	34	17				M16x1,5										12				
40	18	18	30	14	-	60	3/8"	M14x1,5	55	11	10	45	74	62	41	87	110	6	35	62	166	153
	22	22	34	17				M16x1,5										12				
	28	28	42	22				M20x1,5										10				
50	22	22	34	17	-	75	1/2"	M16x1,5	55	14	16	45	76	74	52	105	130	7	41	68	176	159
	28	28	42	22				M20x1,5										7				
	36	36	50	30				M27x2										10				
63	28	28	42	22	-	90	1/2"	M20x1,5	55	14	16	45	80	75	65	117	142	7	48	71	185	168
	36	36	50	30				M27x2						88				10				
	45	45	60	36				M33x2						88				14				
80	36	36	50	30	-	114	3/4"	M27x2	65	18	20	50	93	82	83	149	180	5	51	77	212	190
	45	45	60	36				M33x2						105				9				
	56	56	72	50				M42x2						105				9				
100	45	45	60	36	-	126	3/4"	M33x2	69	18	22	50	101	92	97	162	200	7	57	82	225	203
	56	56	72	50				M42x2						125				7				
	70	63	88	60				M48x2						125				10				
125	56	56	72	50	-	164	1"	M42x2	78	22	22	55	117	105	126	208	240	6	57	86	260	232
	70	63	88	60				M48x2						150				10				
	90	85	108	75				M64x3						150				10				
160	70	63	88	60	-	198	1"	M48x2	86	26	25	63	130	125	155	253	300	7	57	86	279	245
	90	85	108	80				M64x3						170				7				
	110	95	133	100				M80x3						170				7				
200	90	85	108	80	-	240	1" 1/4	M64x3	103	33	25	80	165	150	190	300	350	7	57	98	336	299
	110	95	133	100				M80x3						210				7				
	140	112	163	130				M100x3						210				7				

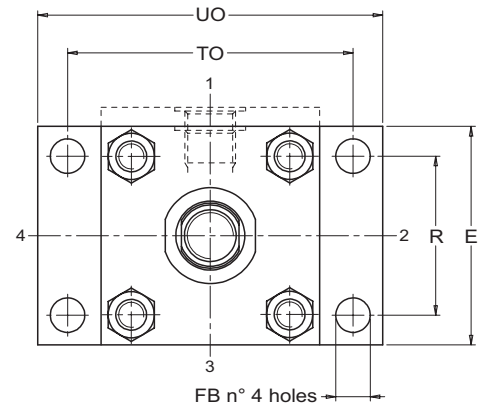
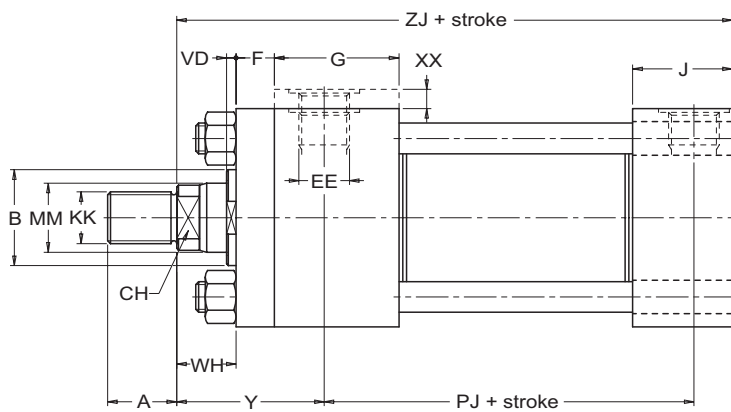
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 14 (ISO ME6)



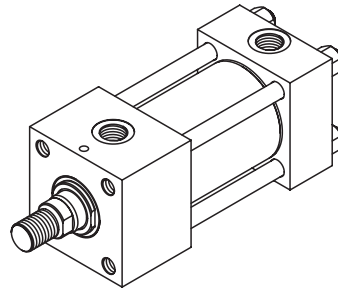
Cap flange



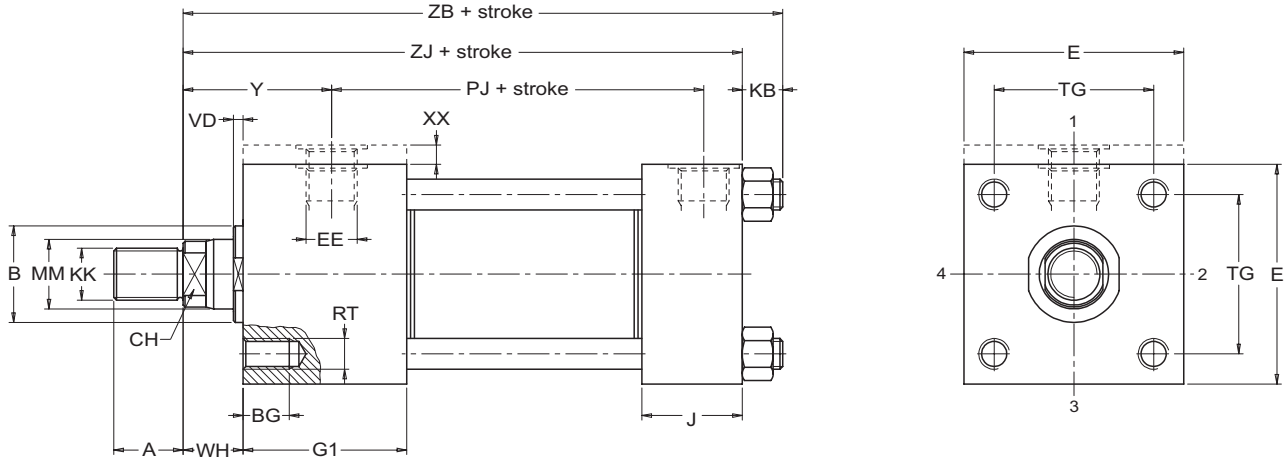
Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	F	FB	G	J	KK (Metric)	PJ	R	TO	UO _{max}	VD	WH	Y	ZJ
25	12	14	24	9	5	40	1/4"	10	5,5	45	35	M10x1,25	54	27	51	64	6	15	50	114
	18	18	30	14								M14x1,5								
32	14	16	26	11	5	45	1/4"	10	6,6	45	36	M12x1,25	57	33	58	70	12	25	60	128
	18	18	30	14								M14x1,5					6			
	22	22	34	17								M16x1,5					12			
40	18	18	30	14	-	60	3/8"	10	11	55	45	M14x1,5	74	41	87	110	6	25	62	153
	22	22	34	17								M16x1,5					12			
	28	28	42	22								M20x1,5					10			
50	22	22	34	17	-	75	1/2"	15	14	55	45	M16x1,5	76	52	105	130	7	26	68	159
	28	28	42	22								M20x1,5					7			
	36	36	50	30								M27x2					10			
63	28	28	42	22	-	90	1/2"	15	14	55	45	M20x1,5	80	65	117	142	7	33	71	168
	36	36	50	30								M27x2					10			
	45	45	60	36								M33x2					14			
80	36	36	50	30	-	114	3/4"	20	18	65	52	M27x2	93	83	149	180	5	31	77	190
	45	45	60	36								M33x2					9			
	56	56	72	50								M42x2					9			
100	45	45	60	36	-	126	3/4"	22	18	69	55	M33x2	101	97	162	200	7	35	82	203
	56	56	72	50								M42x2					7			
	70	63	88	60								M48x2					10			
125	56	56	72	50	-	164	1"	22	22	78	71	M42x2	117	126	208	240	6	35	86	232
	70	63	88	60								M48x2					10			
	90	85	108	75								M64x3					10			
160	70	63	88	60	-	198	1"	25	26	86	63	M48x2	130	155	253	300	7	32	86	245
	90	85	108	80								M64x3					7			
	110	95	133	100								M80x3					7			
200	90	85	108	80	-	240	1" 1/4	25	33	103	80	M64x3	165	190	300	350	7	32	98	299
	110	95	133	100								M80x3					7			
	140	112	163	130								M100x3					7			

Unless otherwise specified, all dimensions are given in millimetres.

Front screwed
tapped holes



Type **30**
(ISO MX5)

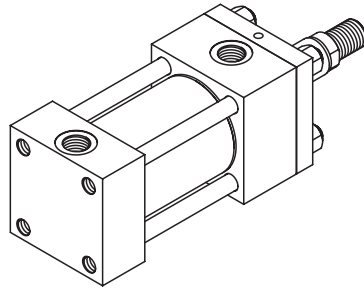


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	BG	E	EE (BSP)	G1	J	KB	KK (Metric)	PJ	RT (Metric)	TG	VD	WH	Y	ZB _{max}	ZJ
25	12	14	24	9	5	8	40	1/4"	55	35	7	M10x1,25	54	M5x0,8	28,3	6	15	50	121	114
	18	18	30	14								M14x1,5								
32	14	16	26	11	5	9	45	1/4"	55	36	9	M12x1,25	57	M6x1	33,2	12	25	60	137	128
	18	18	30	14								M14x1,5				6				
	22	22	34	17								M16x1,5				12				
40	18	18	30	14	-	12	60	3/8"	65	45	13	M14x1,5	74	M8x1,25	41,7	6	25	62	166	153
	22	22	34	17								M16x1,5				12				
	28	28	42	22								M20x1,5				10				
50	22	22	34	17	-	18	75	1/2"	70	45	17	M16x1,5	76	M12x1,75	52,3	7	26	68	176	159
	28	28	42	22								M20x1,5				7				
	36	36	50	30								M27x2				10				
63	28	28	42	22	-	18	90	1/2"	70	45	17	M20x1,5	80	M12x1,75	64,3	7	33	71	185	168
	36	36	50	30								M27x2				10				
	45	45	60	36								M33x2				14				
80	36	36	50	30	-	24	114	3/4"	85	52	22	M27x2	93	M16x2	82,7	5	31	77	212	190
	45	45	60	36								M33x2				9				
	56	56	72	50								M42x2				9				
100	45	45	60	36	-	24	126	3/4"	91	55	22	M33x2	101	M16x2	96,9	7	35	82	225	203
	56	56	72	50								M42x2				7				
	70	63	88	60								M48x2				10				
125	56	56	72	50	-	27	164	1"	100	71	28	M42x2	117	M22x2,5	125,9	6	35	86	260	232
	70	63	88	60								M48x2				10				
	90	85	108	75								M64x3				10				
160	70	63	88	60	-	32	198	1"	111	63	34	M48x2	130	M27x3	154,9	7	32	86	279	245
	90	85	108	80								M64x3				7				
	110	95	133	100								M80x3				7				
200	90	85	108	80	-	40	240	1" 1/4	128	80	37	M64x3	165	M30x3,5	190,2	7	32	98	336	299
	110	95	133	100								M80x3				7				
	140	112	163	130								M100x3				7				

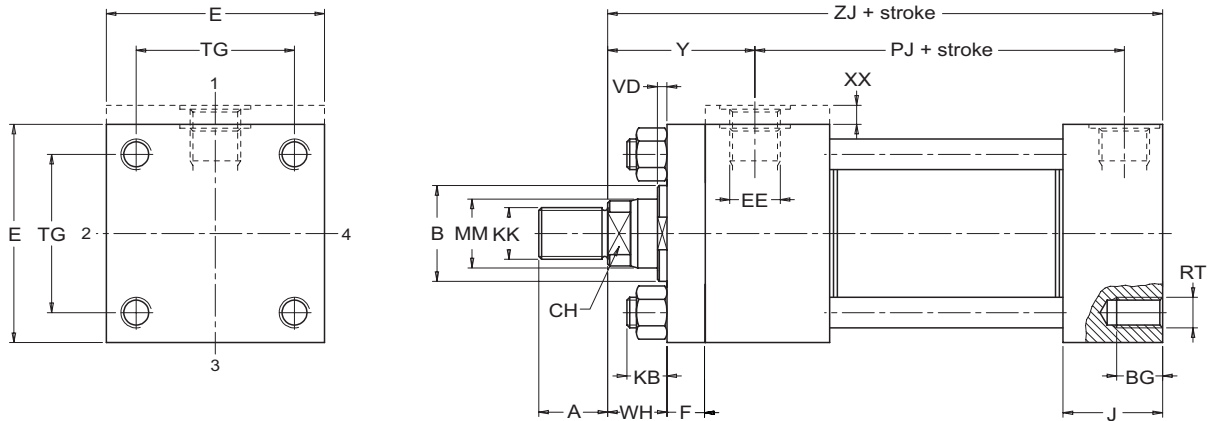
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Tipo **31**
(ISO MX6)



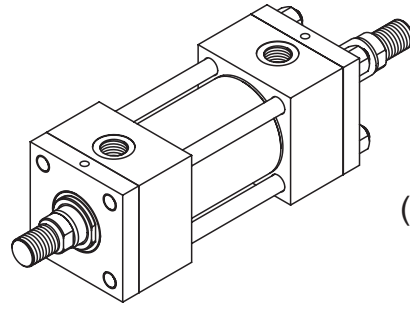
Rear screwed
tapped holes



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	BG	E	F	EE (BSP)	J	KB	KK (Metric)	PJ	RT (Metric)	TG	VD	WH	Y	ZB _{max}	ZJ
25	12	14	24	9	5	8	40	10	1/4"	35	7	M10x1,25	54	M5x0,8	28,3	6	15	50	121	114
	18	30	14	M14x1,5																
32	14	16	26	11	5	9	45	10	1/4"	36	9	M12x1,25	57	M6x1	33,2	12	25	60	137	128
	18	30	14	M14x1,5																
	22	34	17	M16x1,5																
40	18	18	30	14	-	12	60	10	3/8"	45	13	M14x1,5	74	M8x1,25	41,7	6	25	62	166	153
	22	34	17	M16x1,5																
	28	42	22	M20x1,5																
50	22	22	34	17	-	18	75	15	1/2"	45	17	M16x1,5	76	M12x1,75	52,3	7	26	68	176	159
	28	42	22	M20x1,5																
	36	50	30	M27x2																
63	28	28	42	22	-	18	90	15	1/2"	45	17	M20x1,5	80	M12x1,75	64,3	7	33	71	185	168
	36	50	30	M27x2																
	45	60	36	M33x2																
80	36	36	50	30	-	24	114	20	3/4"	52	22	M27x2	93	M16x2	82,7	5	31	77	212	190
	45	60	36	M33x2																
	56	72	50	M42x2																
100	45	45	60	36	-	24	126	22	3/4"	55	22	M33x2	101	M16x2	96,9	7	35	82	225	203
	56	72	50	M42x2																
	70	88	60	M48x2																
125	56	56	72	50	-	27	164	22	1"	71	28	M42x2	117	M22x2,5	125,9	6	35	86	260	232
	70	88	60	M48x2																
	90	108	75	M64x3																
160	70	63	88	60	-	32	198	25	1"	63	34	M48x2	130	M27x3	154,9	7	32	86	279	245
	90	85	108	80								M64x3								
	110	95	133	100								M80x3								
200	90	85	108	80	-	40	240	25	1" 1/4	80	37	M64x3	165	M30x3,5	190,2	7	32	98	336	299
	110	95	133	100								M80x3								
	140	112	163	130								M100x3								

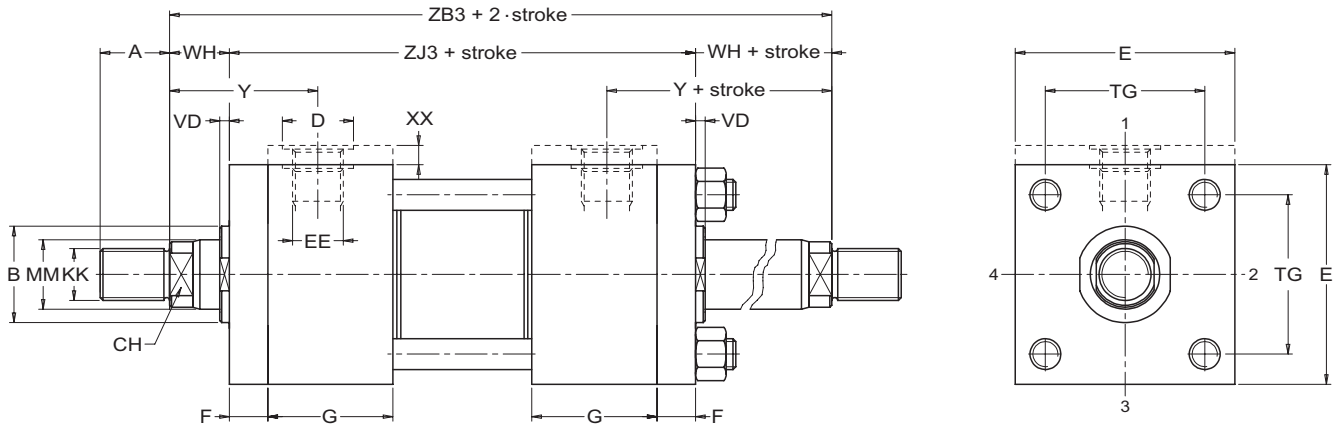
Unless otherwise specified, all dimensions are given in millimetres.

Double rod basic version



Type 00

(Not to ISO standards)



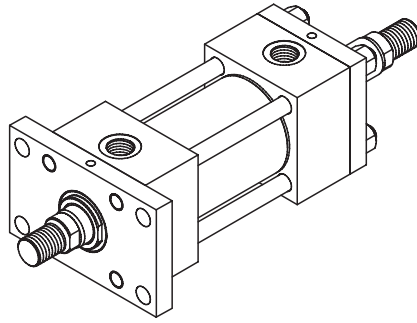
Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	D Ø	F	G	KK (Metric)	TG	VD	WH	Y	ZB3	ZJ3
25	12	14	24	9	5	40	1/4"	22	10	45	M10x1,25	28,3	6	15	50	149	119
	18	18	30	14							M14x1,5						
32	14	16	26	11	5	45	1/4"	22	10	45	M12x1,25	33,2	12	25	60	172	122
	18	18	30	14							M14x1,5		6				
	22	22	34	17							M16x1,5		12				
40	18	18	30	14	-	60	3/8"	25	10	55	M14x1,5	41,7	6	25	62	198	148
	22	22	34	17							M16x1,5		12				
	28	28	42	22							M20x1,5		10				
50	22	22	34	17	-	75	1/2"	30	15	55	M16x1,5	52,3	7	26	68	210	158
	28	28	42	22							M20x1,5		7				
	36	36	50	30							M27x2		10				
63	28	28	42	22	-	90	1/2"	30	15	55	M20x1,5	64,3	7	33	71	226	160
	36	36	50	30							M27x2		10				
	45	45	60	36							M33x2		14				
80	36	36	50	30	-	114	3/4"	37	20	65	M27x2	82,7	5	31	77	254	192
	45	45	60	36							M33x2		9				
	56	56	72	50							M42x2		9				
100	45	45	60	36	-	126	3/4"	37	22	69	M33x2	96,9	7	35	82	274	204
	56	56	72	50							M42x2		7				
	70	63	88	60							M48x2		10				
125	56	56	72	50	-	164	1"	47	22	78	M42x2	125,9	6	35	86	312	242
	70	63	88	60							M48x2		10				
	90	85	108	75							M64x3		10				
160	70	63	88	60	-	198	1"	47	25	86	M48x2	154,9	7	32	86	325	261
	90	85	108	80							M64x3						
	110	95	133	100							M80x3						
200	90	85	108	80	-	240	1" 1/4	54	25	103	M64x3	190,2	7	32	98	379	315
	110	95	133	100							M80x3						
	140	112	163	130							M100x3						

Unless otherwise specified, all dimensions are given in millimetres.

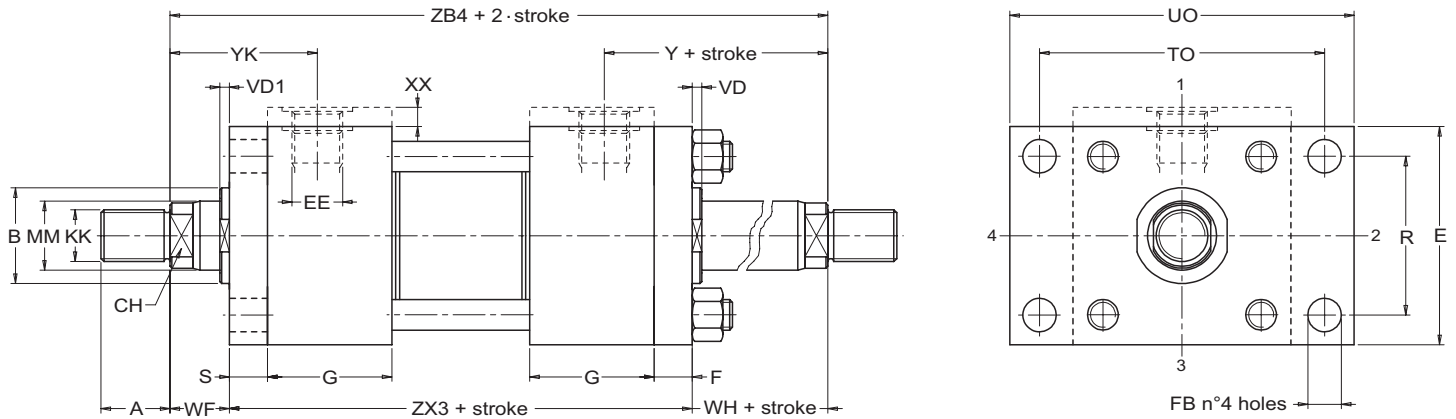
ISO 6020/2 A3 Series

Type 01

(Not to ISO standards)



Double rod rectangular front flange



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	FB Ø	F	G	KK (Metric)	R	S	TO	UO	VD	VD1	WF	YK	WH	Y	ZB4	ZX3
25	12	14	24	9	5	40	1/4"	5,5	10	45	M10x1,25	27	10	51	64	6	6	25	60	15	50	159	119
	18	18	30	14							M14x1,5												
32	14	16	26	11	5	45	1/4"	6,6	10	45	M12x1,25	33	10	58	70	12	12	35	70	25	60	182	122
	18	18	30	14							M14x1,5					6	6						
	22	22	34	17							M16x1,5					12	12						
40	18	18	30	14	-	60	3/8"	11	10	55	M14x1,5	41	12	87	110	6	4	35	74	25	62	210	150
	22	22	34	17							M16x1,5					12	10						
	28	28	42	22							M20x1,5					10	8						
50	22	22	34	17	-	75	1/2"	13,5	15	55	M16x1,5	52	15	105	130	7	7	41	83	26	68	225	158
	28	28	42	22							M20x1,5					7	7						
	36	36	50	30							M27x2					10	10						
63	28	28	42	22	-	90	1/2"	13,5	15	55	M20x1,5	65	18	117	140	7	4	48	89	33	71	244	163
	36	36	50	30							M27x2					10	7						
	45	45	60	36							M33x2					14	11						
80	36	36	50	30	-	114	3/4"	17,5	20	65	M27x2	83	20	149	180	5	5	51	97	31	77	274	192
	45	45	60	36							M33x2					9	9						
	56	56	72	50							M42x2					9	9						
100	45	45	60	36	-	126	3/4"	17,5	22	69	M33x2	97	25	162	190	7	4	57	107	35	82	299	207
	56	56	72	50							M42x2					7	4						
	70	63	88	60							M48x2					10	7						
125	56	56	72	50	-	164	1"	22	22	78	M42x2	126	25*	208	240	6	4	57	111	35	86	321	229
	70	63	88	60							M48x2					10	7						
	90	85	108	75							M64x3					10	6						
160	70	63	88	60	-	198	1"	26	25	86	M48x2	155	27**	253	300	7	5	57	113	32	86	352	263
	90	85	108	80							M64x3					7	5						
	110	95	133	100							M80x3					7	5						
200	90	85	108	80	-	240	1" 1/4	33	25	103	M64x3	190	27***	300	350	7	5	57	125	32	98	406	317
	110	95	133	100							M80x3					7	5						
	140	112	163	130							M100x3					7	5						

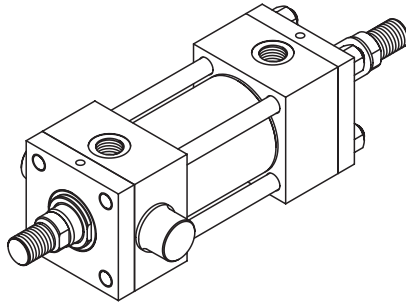
* Max 200 bar ** Max 150 bar *** Max 120 Bar

Unless otherwise specified, all dimensions are given in millimetres.

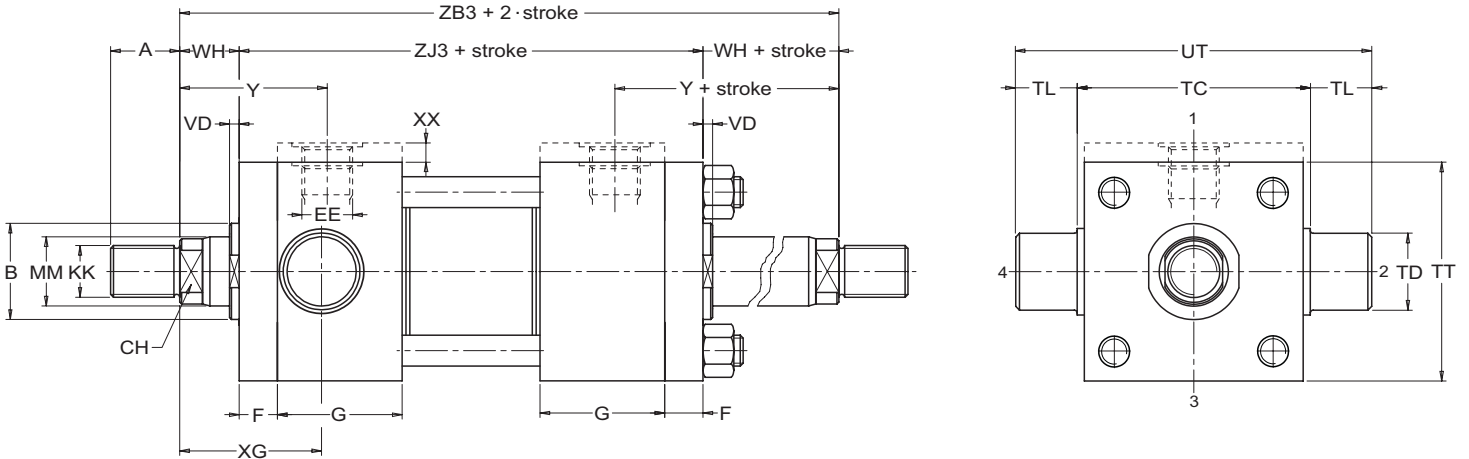


ISO 6020/2 A3 Series

Type 04 (ISO MT1)



Double rod head trunnion

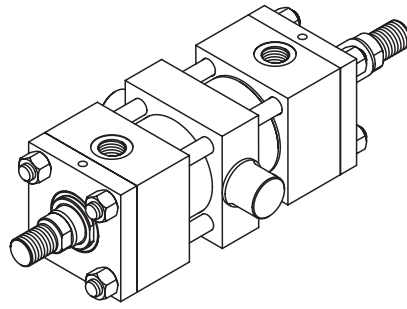


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	F	G	EE (BSP)	KK (Metric)	TC	TD ^{f8} Ø	TL	TT	UT	VD	XG	WH	Y	ZB3	ZJ3	
25	12	14	24	9	5	10	45	1/4"	M10x1,25	38	12	10	38	58	6	44	15	50	149	119	
	18	18	30	14					M14x1,5												
32	14	16	26	11	5	10	45	1/4"	M12x1,25	44	16	12	44	68	12	54	25	60	172	122	
	18	18	30	14					M14x1,5						6						
	22	22	34	17					M16x1,5						12						
40	18	18	30	14	-	10	55	3/8"	M14x1,5	63	20	16	60	95	6	57	25	62	198	148	
	22	22	34	17					M16x1,5						12						
	28	28	42	22					M20x1,5						10						
50	22	22	34	17	-	15	55	1/2"	M16x1,5	76	25	20	75	116	7	64	26	68	210	158	
	28	28	42	22					M20x1,5						7						
	36	36	50	30					M27x2						10						
63	28	28	42	22	-	15	55	1/2"	M20x1,5	89	32	25	88	139	7	70	33	71	226	160	
	36	36	50	30					M27x2						10						
	45	45	60	36					M33x2						14						
80	36	36	50	30	-	20	65	3/4"	M27x2	114	40	32	114	178	5	76	31	77	254	192	
	45	45	60	36					M33x2						9						
	56	56	72	50					M42x2						9						
100	45	45	60	36	-	-	69	3/4"	M33x2	127	50	40	126	207	7	71	35	82	274	204	
	56	56	72	50					M42x2						7						
	70	63	88	60					M48x2						10						
125	56	56	72	50	-	-	78	1"	M42x2	165	63	50	164	265	6	75	35	86	312	242	
	70	63	88	60					M48x2						10						
	90	85	108	75					M64x3						10						
160	70	63	88	60	-	-	86	1"	M48x2	203	80	63	198	329	7	75	32	86	325	261	
	90	85	108	80					M64x3						7						
	110	95	133	100					M80x3						7						
200	90	85	108	80	-	-	103	1" 1/4	M64x3	241	100	80	240	401	7	85	32	98	379	315	
	110	95	133	100					M80x3												7
	140	112	163	130					M100x3												7

Unless otherwise specified, all dimensions are given in millimetres.

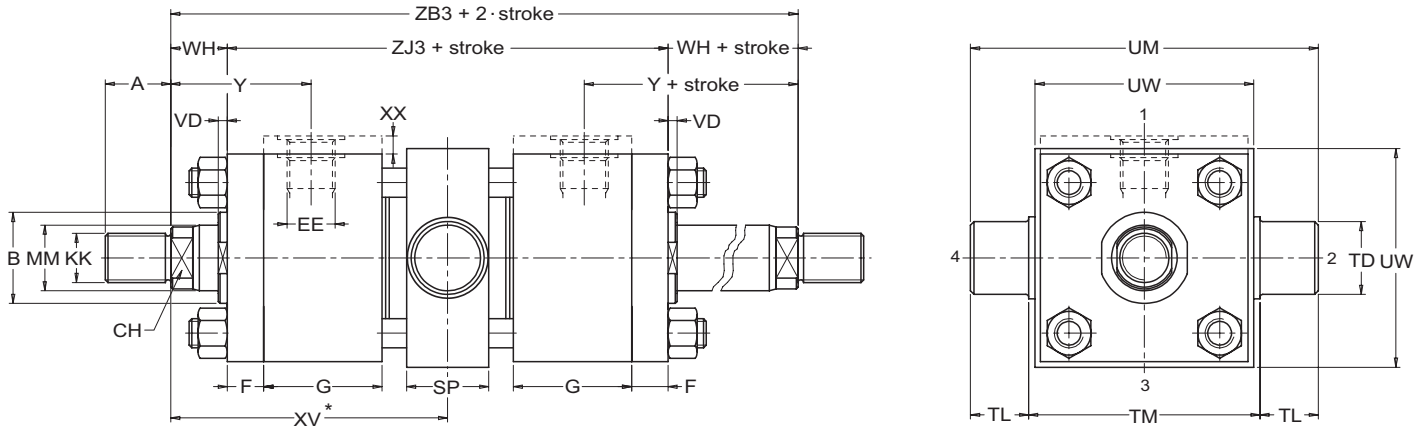


Double rod intermediate fixed trunnion



Type 06

(ISO MT4)



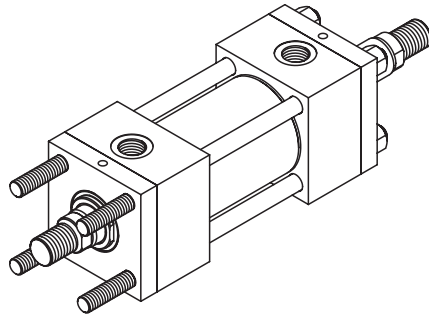
Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	F	G	EE (BSP)	KK (Metric)	SP	TD ^{f8} Ø	TL	TM	UM	UW	VD	XV minimum	XV+stroke maximum	WH	Y	ZB3	ZJ3	Stroke minimum
25	12	14	24	9	5	10	45	1/4"	M10x1,25	20	12	10	48	68	45	6	80	69	15	50	149	119	11
	18	18	30	14					M14x1,5														
32	14	16	26	11	5	10	45	1/4"	M12x1,25	25	16	12	55	79	50	12	93	79	25	60	172	122	13
	18	18	30	14					M14x1,5							6							
	22	22	34	17					M16x1,5							12							
40	18	18	30	14	-	10	55	3/8"	M14x1,5	30	20	16	76	108	70	6	105	93	25	62	198	148	12
	22	22	34	17					M16x1,5							12							
	28	28	42	22					M20x1,5							10							
50	22	22	34	17	-	15	55	1/2"	M16x1,5	40	25	20	89	129	85	7	116	94	26	68	210	158	22
	28	28	42	22					M20x1,5							7							
	36	36	50	30					M27x2							10							
63	28	28	42	22	-	15	55	1/2"	M20x1,5	40	32	25	100	150	95	7	123	103	33	71	226	160	20
	36	36	50	30					M27x2							10							
	45	45	60	36					M33x2							14							
80	36	36	50	30	-	20	65	3/4"	M27x2	45	40	32	127	191	120	5	139	115	31	77	254	192	23
	45	45	60	36					M33x2							9							
	56	56	72	50					M42x2							9							
100	45	45	60	36	-	22	69	3/4"	M33x2	60	50	40	140	220	130	7	156	118	35	82	274	204	38
	56	56	72	50					M42x2							7							
	70	63	88	60					M48x2							10							
125	56	56	72	50	-	22	78	1"	M42x2	70	63	50	178	278	170	6	170	142	35	86	312	242	44
	70	63	88	60					M48x2							10							
	90	85	108	75					M64x3							10							
160	70	63	88	60	-	25	86	1"	M48x2	90	80	63	215	341	205	7	188	137	32	86	325	261	91
	90	85	108	80					M64x3														
	110	95	133	100					M80x3														
200	90	85	108	80	-	25	103	1" 1/4	M64x3	110	100	80	279	439	275	7	215	164	32	98	379	315	51
	110	95	133	100					M80x3														
	140	112	163	130					M100x3														

* Specify the dimension in case of order.

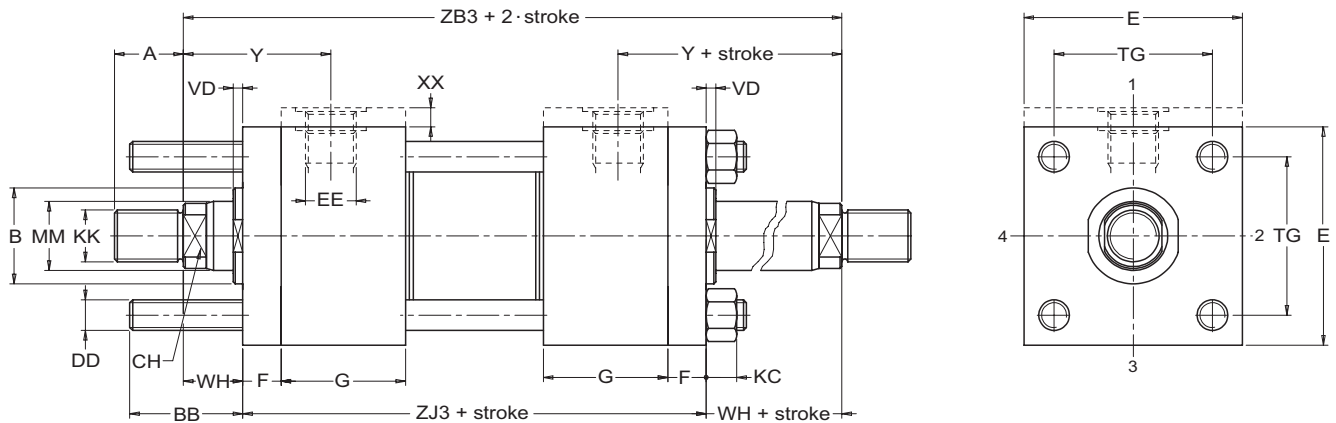
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 10 (ISO MX3)



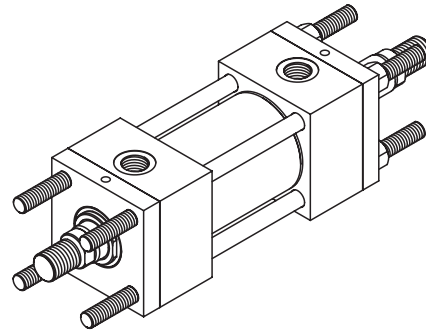
Double rod extended front tie rods



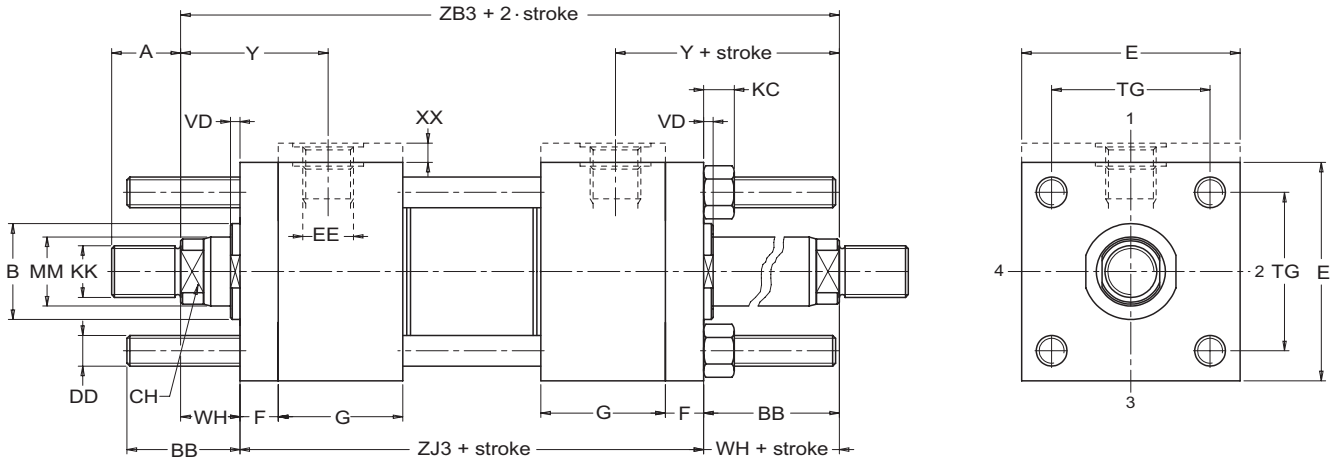
Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	EE (BSP)	KK (Metric)	BB	DD (Metric)	E	F	G	WH	KC	TG	VD	Y	ZB3	ZJ3
25	12	14	24	9	5	1/4"	M10x1,25	19	M5x0,8	40	10	45	15	5	28,3	6	50	149	119
	18	18	30	14			M14x1,5												
32	14	16	26	11	5	1/4"	M12x1,25	24	M6x1	45	10	45	25	6	33,2	12	60	172	122
	18	18	30	14			M14x1,5									6			
	22	22	34	17			M16x1,5									12			
40	18	18	30	14	-	3/8"	M14x1,5	35	M8x1	60	10	55	25	8	41,7	6	62	198	148
	22	22	34	17			M16x1,5									12			
	28	28	42	22			M20x1,5									10			
50	22	22	34	17	-	1/2"	M16x1,5	46	M12x1,25	75	15	55	26	12	52,3	7	68	210	158
	28	28	42	22			M20x1,5									7			
	36	36	50	30			M27x2									10			
63	28	28	42	22	-	1/2"	M20x1,5	46	M12x1,25	90	15	55	33	12	64,3	7	71	226	160
	36	36	50	30			M27x2									10			
	45	45	60	36			M33x2									14			
80	36	36	50	30	-	3/4"	M27x2	59	M16x1,5	114	20	65	31	16	82,7	5	77	254	192
	45	45	60	36			M33x2									9			
	56	56	72	50			M42x2									9			
100	45	45	60	36	-	3/4"	M33x2	59	M16x1,5	126	22	69	35	16	96,9	7	82	274	204
	56	56	72	50			M42x2									7			
	70	63	88	60			M48x2									10			
125	56	56	72	50	-	1"	M42x2	81	M22x1,5	164	22	78	35	22	125,9	6	86	312	242
	70	63	88	60			M48x2									10			
	90	85	108	75			M64x3									10			
160	70	63	88	60	-	1"	M48x2	92	M27x2	198	25	86	32	27	154,9	7	86	325	261
	90	85	108	80			M64x3									7			
	110	95	133	100			M80x3									7			
200	90	85	108	80	-	1" 1/4	M64x3	115	M30x2	240	25	103	32	30	190,2	7	98	379	315
	110	95	133	100			M80x3									7			
	140	112	163	130			M100x3									7			

Unless otherwise specified, all dimensions are given in millimetres.

Double rod extended
on both ends tie rods



Type **12**
(ISO MX1)

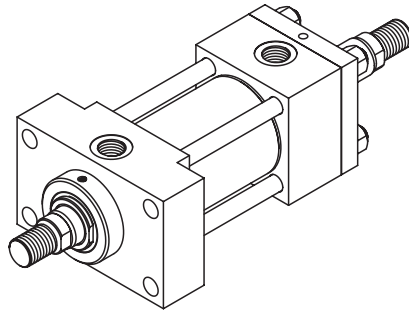


Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	EE (BSP)	KK (Metric)	BB	DD (Metric)	E	F	G	WH	KC	TG	VD	Y	ZB3	ZJ3
25	12	14	24	9	5	1/4"	M10x1,25	19	M5x0,8	40	10	45	15	5	28,3	6	50	149	119
	18	18	30	14			M14x1,5												
32	14	16	26	11	5	1/4"	M12x1,25	24	M6x1	45	10	45	25	6	33,2	12	60	172	122
	18	18	30	14			M14x1,5									6			
	22	22	34	17			M16x1,5									12			
40	18	18	30	14	-	3/8"	M14x1,5	35	M8x1	60	10	55	25	8	41,7	6	62	198	148
	22	22	34	17			M16x1,5									12			
	28	28	42	22			M20x1,5									10			
50	22	22	34	17	-	1/2"	M16x1,5	46	M12x1,25	75	15	55	26	12	52,3	7	68	210	158
	28	28	42	22			M20x1,5									7			
	36	36	50	30			M27x2									10			
63	28	28	42	22	-	1/2"	M20x1,5	46	M12x1,25	90	15	55	33	12	64,3	7	71	226	160
	36	36	50	30			M27x2									10			
	45	45	60	36			M33x2									14			
80	36	36	50	30	-	3/4"	M27x2	59	M16x1,5	114	20	65	31	16	82,7	5	77	254	192
	45	45	60	36			M33x2									9			
	56	56	72	50			M42x2									9			
100	45	45	60	36	-	3/4"	M33x2	59	M16x1,5	126	22	69	35	16	96,9	7	82	274	204
	56	56	72	50			M42x2									7			
	70	63	88	60			M48x2									10			
125	56	56	72	50	-	1"	M42x2	81	M22x1,5	164	22	78	35	22	125,9	6	86	312	242
	70	63	88	60			M48x2									10			
	90	85	108	75			M64x3									10			
160	70	63	88	60	-	1"	M48x2	92	M27x2	198	25	86	32	27	154,9	7	86	325	261
	90	85	108	80			M64x3									7			
	110	95	133	100			M80x3									7			
200	90	85	108	80	-	1" 1/4	M64x3	115	M30x2	240	25	103	32	30	190,2	7	98	379	315
	110	95	133	100			M80x3									7			
	140	112	163	130			M100x3									7			

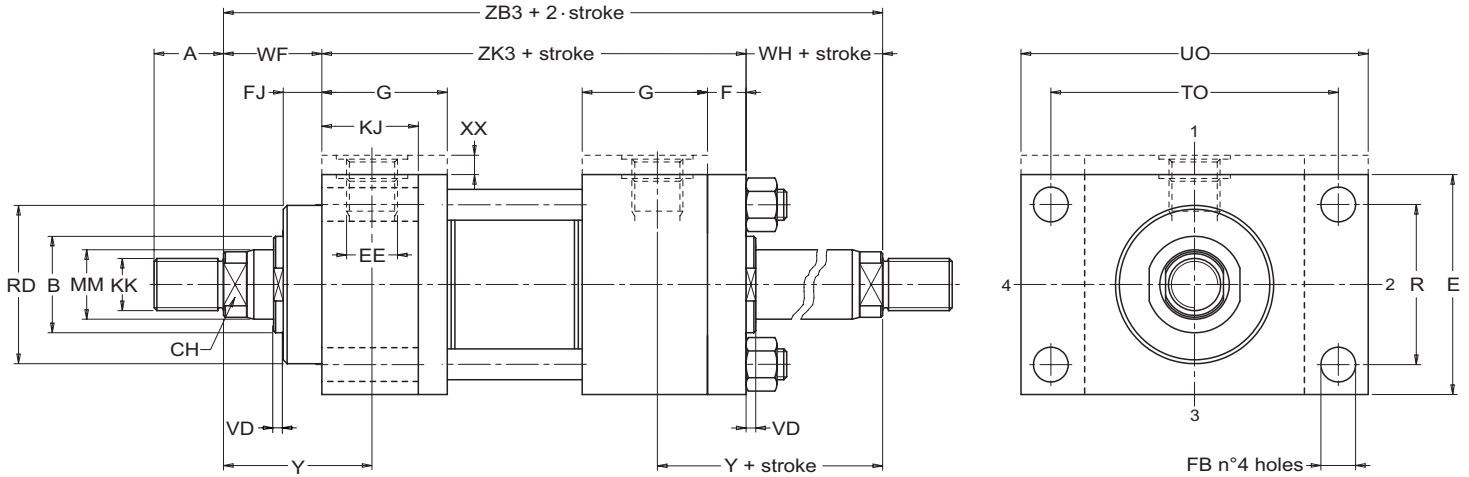
Unless otherwise specified, all dimensions are given in millimetres.

ISO 6020/2 A3 Series

Type 13 (ISO ME5)



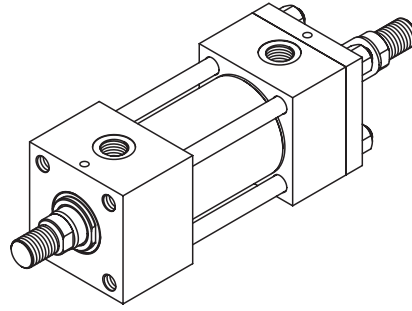
Double rod
head flange



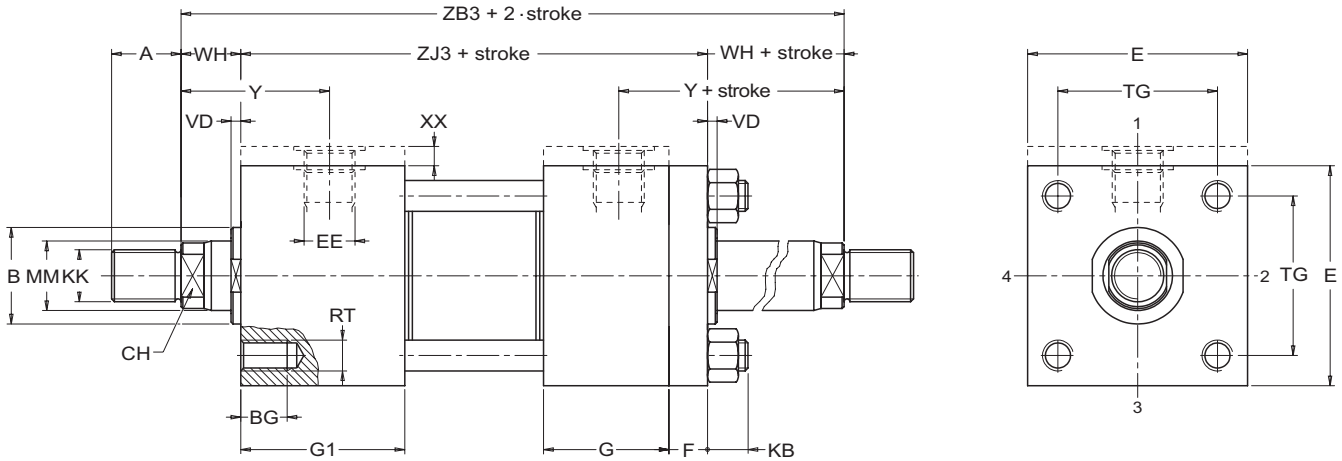
Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	E	EE (BSP)	KK (Metric)	F	G	FB	FJ	KJ	RD ^{f8} Ø	R	TO	UO _{max}	VD	WF	WH	ZB3	ZK3
25	12	14	24	9	5	40	1/4"	M10x1,25	10	45	5,5	10	35	38	27	51	64	6	25	15	149	109
	18	18	30	14				M14x1,5														
32	14	16	26	11	5	45	1/4"	M12x1,25	10	45	6,6	10	36	42	33	58	70	12	35	25	172	112
	18	18	30	14				M14x1,5										6				
	22	22	34	17				M16x1,5										12				
40	18	18	30	14	-	60	3/8"	M14x1,5	10	55	11	10	45	62	41	87	110	6	35	25	198	138
	22	22	34	17				M16x1,5										12				
	28	28	42	22				M20x1,5										10				
50	22	22	34	17	-	75	1/2"	M16x1,5	15	55	14	16	45	74	52	105	130	7	41	26	210	143
	28	28	42	22				M20x1,5										7				
	36	36	50	30				M27x2										10				
63	28	28	42	22	-	90	1/2"	M20x1,5	15	55	14	16	45	75	65	117	142	7	48	33	226	145
	36	36	50	30				M27x2						88								
	45	45	60	36				M33x2						88								
80	36	36	50	30	-	114	3/4"	M27x2	20	65	18	20	50	82	83	149	180	5	51	31	254	172
	45	45	60	36				M33x2						105								
	56	56	72	50				M42x2						105								
100	45	45	60	36	-	126	3/4"	M33x2	22	69	18	22	50	92	97	162	200	7	57	35	274	182
	56	56	72	50				M42x2						125								
	70	63	88	60				M48x2						125								
125	56	56	72	50	-	164	1"	M42x2	22	78	22	22	55	105	126	208	240	6	57	35	312	220
	70	63	88	60				M48x2						150								
	90	85	108	75				M64x3						150								
160	70	63	88	60	-	198	1"	M48x2	25	86	26	25	63	125	155	253	300	7	57	32	325	236
	90	85	108	80				M64x3						170								
	110	95	133	100				M80x3						170								
200	90	85	108	80	-	240	1" 1/4	M64x3	25	103	33	25	80	150	190	300	350	7	57	32	379	290
	110	95	133	100				M80x3						210								
	140	112	163	130				M100x3						210								

Unless otherwise specified, all dimensions are given in millimetres.

Front screwed
tapped holes



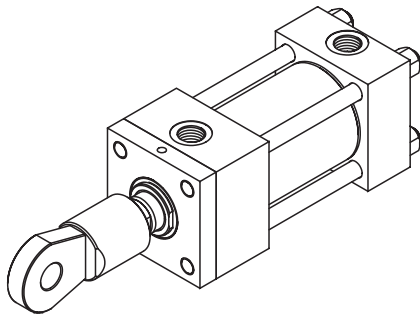
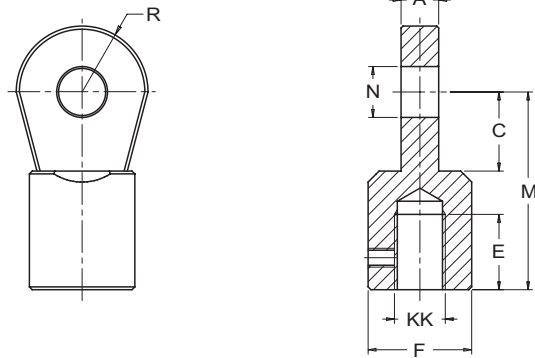
Type **30**
(ISO MX5)



Bore Ø	MM Ø	A	B ^{f8} Ø	CH	XX	BG	E	EE (BSP)	F	G	G1	KB	KK (Metric)	RT (Metric)	TG	VD	WH	Y	ZB3	ZJ3	
25	12	14	24	9	5	8	40	1/4"	10	45	55	7	M10x1,25	M5x0,8	28,3	6	15	50	149	119	
	18	18	30	14									M14x1,5								
32	14	16	26	11	5	9	45	1/4"	10	45	55	9	M12x1,25	M6x1	33,2	12	25	60	172	122	
	18	18	30	14									M14x1,5			6					
	22	22	34	17									M16x1,5			12					
40	18	18	30	14	-	12	60	3/8"	10	55	65	13	M14x1,5	M8x1,25	41,7	6	25	62	198	148	
	22	22	34	17									M16x1,5			12					
	28	28	42	22									M20x1,5			10					
50	22	22	34	17	-	18	75	1/2"	15	55	70	17	M16x1,5	M12x1,75	52,3	7	26	68	210	158	
	28	28	42	22									M20x1,5			7					
	36	36	50	30									M27x2			10					
63	28	28	42	22	-	18	90	1/2"	15	55	70	17	M20x1,5	M12x1,75	64,3	7	33	71	226	160	
	36	36	50	30									M27x2			10					
	45	45	60	36									M33x2			14					
80	36	36	50	30	-	24	114	3/4"	20	65	85	22	M27x2	M16x2	82,7	5	31	77	254	192	
	45	45	60	36									M33x2			9					
	56	56	72	50									M42x2			9					
100	45	45	60	36	-	24	126	3/4"	22	69	91	22	M33x2	M16x2	96,9	7	35	82	274	204	
	56	56	72	50									M42x2			7					
	70	63	88	60									M48x2			10					
125	56	56	72	50	-	27	164	1"	22	78	100	28	M42x2	M22x2,5	125,9	6	35	86	312	242	
	70	63	88	60									M48x2			10					
	90	85	108	75									M64x3			10					
160	70	63	88	60	-	32	198	1"	25	86	111	34	M48x2	M27x3	154,9	7	32	86	325	261	
	90	85	108	80									M64x3								7
	110	95	133	100									M80x3								
200	90	85	108	80	-	40	240	1" 1/4	25	103	128	37	M64x3	M30x3,5	190,2	7	32	98	379	315	
	110	95	133	100									M80x3								
	140	112	163	130									M100x3								

Unless otherwise specified, all dimensions are given in millimetres.

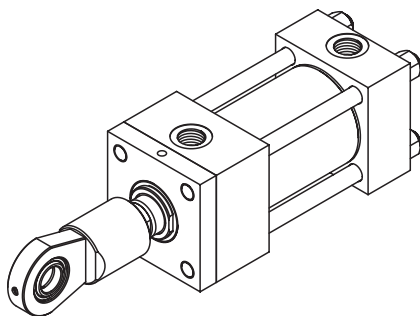
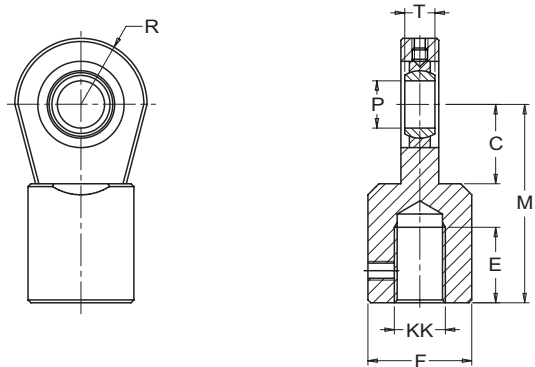
Rod eye



Rod	KK (Metric)	A ⁻⁰ _{-0,05}	N ^{H8} ∅	C	M	E _{min}	F _{max} ∅	R _{max}	Code	
12	A	M10x1,25	10	10	25	60	23	30	20	0603025601
14	B	M12x1,25	12	12	25	60	23	30	20	0603032601
18	D	M14x1,5	12	14	25	60	23	30	20	0603025602
22	F	M16x1,5	16	16	30	70	28	40	25	0603032602
28	H	M20x1,5	20	20	35	90	33	45	30	0603040602
36	L	M27x2	25	25	42	105	40	55	35	0603050603
45	M	M33x2	32	32	50	118	50	65	40	0603063603
56	P	M42x2	40	40	60	135	60	75	50	0603080603
70	R	M48x2	50	50	70	170	75	90	60	0603100603
90	T	M64x3	63	63	85	205	95	120	70	0603125603
110	V	M80x3	80	80	110	275	120	160	100	0603160603
140	Z	M100x3	100	100	125	320	125	170	120	0603200603

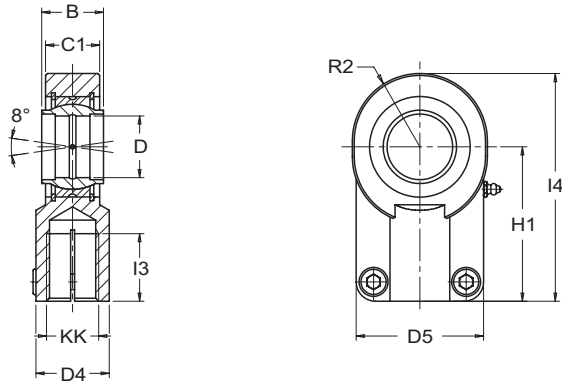
All dimensions are given in millimetres.

Rod eye with spherical bearing



Rod	KK (Metric)	C	M	E _{min}	F _{max} ∅	R _{max}	P ∅	T	Code	
12	A	M10x1,25	25	60	23	30	20	10 ^{+0,008} ₊₀	9 ⁻⁰ _{-0,12}	0603025604
14	B	M12x1,25	25	60	23	30	20	12 ^{+0,008} ₊₀	10 ⁻⁰ _{-0,12}	0603032604
18	D	M14x1,5	25	60	23	30	20	12 ^{+0,008} ₊₀	10 ⁻⁰ _{-0,12}	0603025605
22	F	M16x1,5	30	70	28	40	25	16 ^{+0,008} ₊₀	14 ⁻⁰ _{-0,12}	0603032605
28	H	M20x1,5	35	90	33	45	30	20 ^{+0,010} ₊₀	16 ⁻⁰ _{-0,12}	0603040605
36	L	M27x2	42	105	40	55	35	25 ^{+0,010} ₊₀	20 ⁻⁰ _{-0,12}	0603050606
45	M	M33x2	50	118	50	65	40	30 ^{+0,010} ₊₀	22 ⁻⁰ _{-0,12}	0603063606
56	P	M42x2	60	135	60	75	50	40 ^{+0,012} ₊₀	28 ⁻⁰ _{-0,12}	0603080606
70	R	M48x2	70	170	75	90	60	50 ^{+0,012} ₊₀	35 ⁻⁰ _{-0,12}	0603100606
90	T	M64x3	85	205	95	120	70	60 ^{+0,015} ₊₀	44 ⁻⁰ _{-0,15}	0603125606
110	V	M80x3	110	275	120	160	100	80 ^{+0,015} ₊₀	55 ⁻⁰ _{-0,15}	0603160606
140	Z	M100x3	125	320	125	170	120	100 ^{+0,015} ₊₀	70 ⁻⁰ _{-0,15}	0603200606

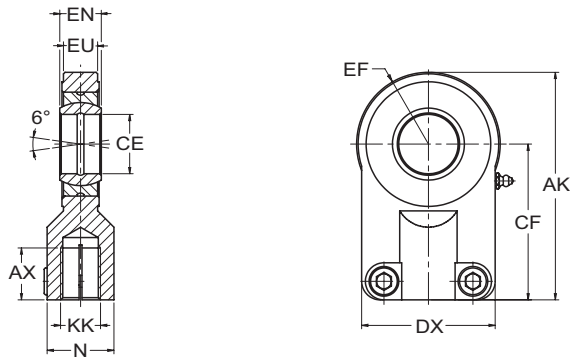
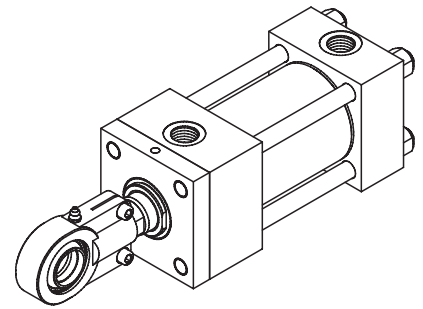
All dimensions are given in millimetres.



Rod eye with spherical bearing (ISO 6982/DIN 24338)

Rod	KK (Metric)	B ^{h12}	C1	D ^{H7} Ø	R2	D4	D5 _{max}	H1	I3 _{min}	I4	Code	
12	A	M10x1,25	14	10,5	10	14	15	19	43	20	57	0205004000010
14	B	M12x1,25	12	11	12	16	16	32	38	17	54	0205004000012
18	D	M14x1,5	16	13	16	20	21	40	44	19	64	0205004000016
22	F	M16x1,5	20	17	20	23,5	25	47	52	23	75	0205004000020
28	H	M20x1,5	25	22	25	29	30	54	65	29	96	0205004000025
36	L	M27x2	32	28	32	35,5	38	66	80	37	118	0205004000032
45	M	M33x2	40	33	40	45	47	80	97	46	146	0205004000040
56	P	M42x2	50	41	50	54,5	58	96	120	57	179	0205004000050
70	R	M48x2	63	53	63	68	70	114	140	64	211	0205004000063
90	T	M64x3	80	67	80	85	90	148	180	86	270	0205004000080
110	V	M80x3	100	85	100	105,5	110	178	210	96	322	0205004000100
140	Z	M100x3	125	103	125	132,5	135	200	260	113	405	0205004000125

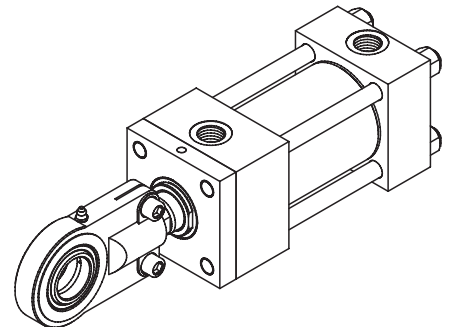
All dimensions are given in millimetres.



Rod eye with spherical bearing (ISO 8133/DIN 24555)

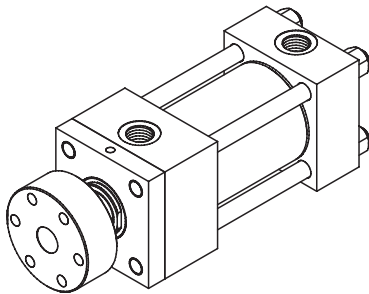
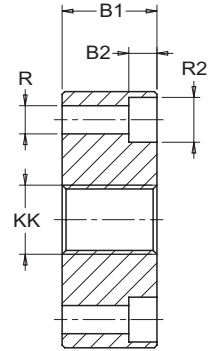
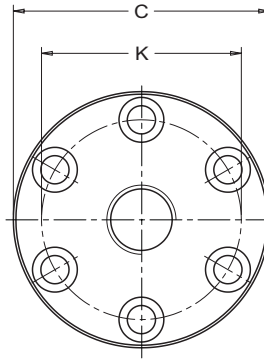
Rod	KK (Metric)	EN	EU	CE Ø	EF _{max}	N _{max}	DX	CF ^{js13}	AK	AX _{min}	Code	
12	A	M10x1,25	10 ⁻⁰ _{-0,12}	8	12 ⁻⁰ _{-0,008}	16	17	40	42	58	15	0205003000012
14	B	M12x1,25	14 ⁻⁰ _{-0,12}	11	16 ⁻⁰ _{-0,008}	21	21	45	48	69	17	0205003000016
18	D	M14x1,5	16 ⁻⁰ _{-0,12}	13	20 ⁻⁰ _{-0,010}	25	25	55	58	83	19	0205003000020
22	F	M16x1,5	20 ⁻⁰ _{-0,12}	17	25 ⁻⁰ _{-0,010}	31	30	62	68	99	23	0205003000025
28	H	M20x1,5	22 ⁻⁰ _{-0,12}	19	30 ⁻⁰ _{-0,010}	38	36	80	85	123	29	0205003000030
36	L	M27x2	28 ⁻⁰ _{-0,12}	23	40 ⁻⁰ _{-0,012}	48	45	90	105	153	37	0205003000040
45	M	M33x2	35 ⁻⁰ _{-0,15}	30	50 ⁻⁰ _{-0,012}	58	55	105	130	188	46	0205003000050
56	P	M42x2	44 ⁻⁰ _{-0,15}	38	60 ⁻⁰ _{-0,015}	75	68	134	150	225	57	0205003000060
70	R	M48x2	55 ⁻⁰ _{-0,15}	47	80 ⁻⁰ _{-0,015}	97,5	78	156	185	282,5	64	0205003000080
90	T	M64x3	70 ⁻⁰ _{-0,20}	57	100 ⁻⁰ _{-0,020}	117,5	100	190	240	357,5	86	0205003000100

All dimensions are given in millimetres.



ISO 6020/2 A3 Series

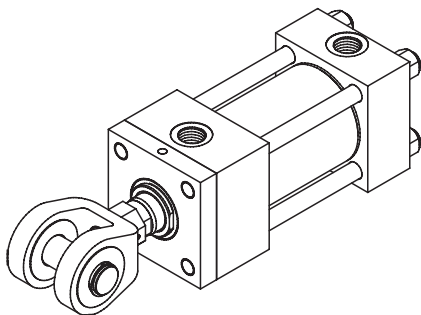
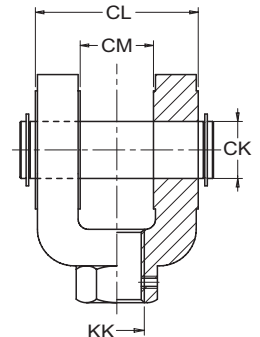
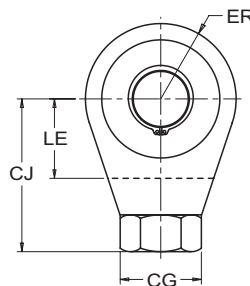
Rod end accessory (ISO 8132)



Rod	KK (Metric)	B1	B2	C Ø	K Ø	R x N° Ø Q.ty	R2 Ø	Code
14 B	M12x1,25	17	6,8	56	40	6,6 4	11	0205031000025
18 D	M14x1,5	19	9	63	45	9 4	14,5	0205031000032
22 F	M16x1,5	23	9	72	54	9 6	14,5	0205031000040
28 H	M20x1,5	29	9	82	63	9 6	14,5	0205031000050
36 L	M27x2	37	11	100	78	11 6	17,5	0205031000063
45 M	M33x2	46	13	120	95	13,5 8	20	0205031000080
56 P	M42x2	57	17,5	150	120	17,5 8	26	0205031000100
70 R	M48x2	64	21,5	190	150	22 8	33	0205031000125
90 T	M64x3	86	25	230	180	26 8	40	0205031000160

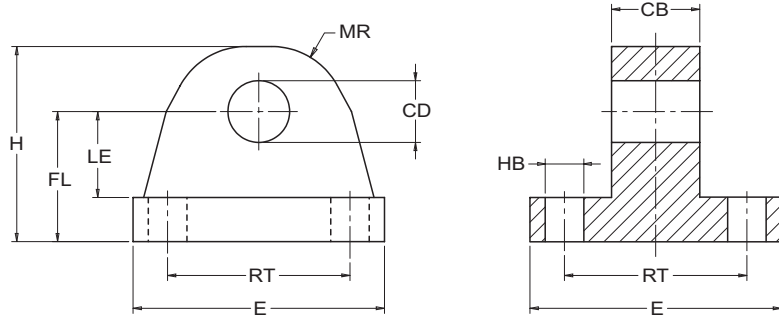
All dimensions are given in millimetres.

Fork joint hinge with pin (ISO 8133)



Rod	KK (Metric)	CK ^{f8} Ø	CL _{max}	CM ^{b12}	CJ ^{js13}	LE _{min}	ER _{max}	CG	Code
12 A	M10x1,25	10	24	12	32	13	12	19	0205007000010
14 B	M12x1,25	12	32	16	36	19	17	21	0205007000012
18 D	M14x1,5	14	40	20	38	19	17	21	0205007000014
22 F	M16x1,5	20	60	30	54	32	29	32	0205007000016
28 H	M20x1,5	20	60	30	60	32	29	32	0205007000020
36 L	M27x2	28	80	40	75	39	34	40	0205007000027
45 M	M33x2	36	100	50	99	54	50	56	0205007000033
56 P	M42x2	45	120	60	113	57	53	56	0205007000042
70 R	M48x2	56	140	70	126	63	59	75	0205007000048
90 T	M64x3	70	160	80	168	83	78	95	0205007000064
110 V	M80x3	70	160	80	168	83	78	95	0205007000080
140 Z	M100x3	100	230	100	250	90	95	160	0205007000100

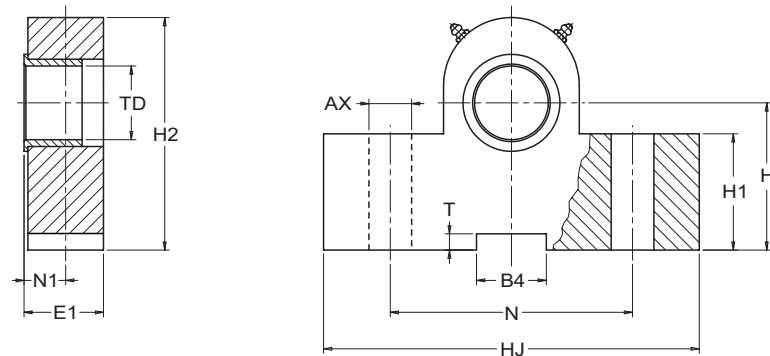
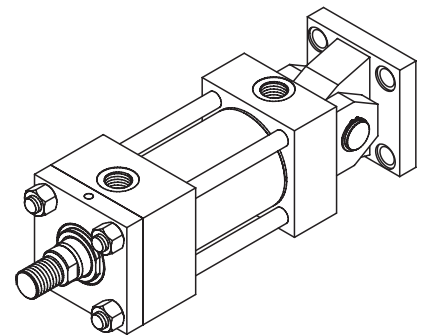
All dimensions are given in millimetres.



Vertical male counterhinge

Bore	CB ^{h13}	CD ^{H9} Ø	E _{max}	FL ^{js4}	H	HB Ø	LE _{min}	MR _{max}	RT	Code
25	12	10	40	23	33,4	5,5	13	12	28,3	0603025095
32	16	12	45	29	43,7	6,5	19	17	32,2	0603032095
40	20	14	60	29	43,7	9	19	17	41,7	0603040095
50	30	20	75	48	73	13,5	32	29	52,3	0603050095
63	30	20	90	48	73	13,5	32	29	64,3	0603063095
80	40	28	114	59	88,5	17,5	39	34	82,7	0603080095
100	50	36	126	79	122,3	17,5	54	50	96,9	0603100095
125	60	45	164	87	133	24	57	53	125,9	0603125095
160	70	56	198	103	154	30	63	59	154,9	0603160095
200	80	70	240	132	199,5	33	82	78	190,2	0603200095

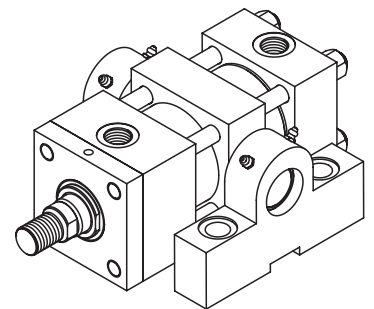
All dimensions are given in millimetres.



Trunnion mounting block (ISO 8132)

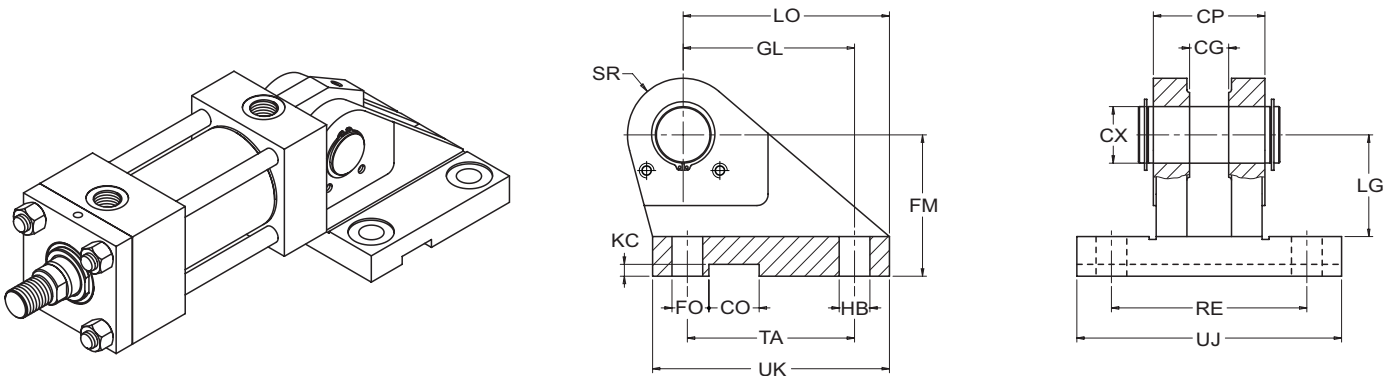
Bore	AX ^{H13} Ø	H ^{js13}	H1	H2 _{max}	TD ^{H7}	HJ	E1	N	N1	B4 ^{N9}	T ^{+0,3} +0	Code
25	9	34	25	49	12	63	17	40	8	10	3,3	0205033000025
32	11	40	30	59	16	80	21	50	10	16	4,3	0205033000032
40	11	45	38	69	20	90	21	60	10	16	4,3	0205033000040
50	13,5	55	45	80	25	110	26	80	12	25	5,4	0205033000050
63	17,5	65	52	100	32	150	33	110	15	25	5,4	0205033000063
80	22	76	60	120	40	170	41	125	16	36	8,4	0205033000080
100	26	95	75	140	50	210	51	160	20	36	8,4	0205033000100
125	33	112	85	177	63	265	61	200	25	50	11,4	0205033000125
160	39	140	112	220	80	325	81	250	31	50	11,4	0205033000160

All dimensions are given in millimetres.



ISO 6020/2 A3 Series

Male hinge support with spherical bearing (DIN 24556)



Bore	CX ^{h6} Ø	CP	CG ^{+0,3} +0,1 Ø	FM ^{js11}	LG _{min}	LO	SR _{max}	UJ	UK	GL	TA	RE	FO	CO	N9 ^{+0,3} KC ⁺⁰	HB	Code
25	12	30	10	40	28	56	12	75	60	46	40	55	16	10	3,3	9	0205032000025
32	16	40	14	50	37	74	16	95	80	61	55	70	18	16	4,3	11	0205032000032
40	20	50	16	55	39	80	20	120	90	64	58	85	20	16	4,3	13,5	0205032000040
50	25	60	20	65	48	98	25	140	110	78	70	100	22	25	5,4	15,5	0205032000050
63	30	70	22	85	62	120	30	160	135	97	90	115	24	25	5,4	17,5	0205032000063
80	40	80	28	100	72	148	40	190	170	123	120	135	24	36	8,4	22	0205032000080
100	50	100	35	125	90	190	50	240	215	155	145	170	35	36	8,4	30	0205032000100
125	60	120	44	150	108	225	60	270	260	187	185	200	35	50	11,4	39	0205032000125
160	80	160	55	190	140	295	80	320	340	255	260	240	35	50	11,4	45	0205032000160
200	100	200	70	210	150	335	100	400	400	285	300	300	35	63	12,4	48	0205032000200

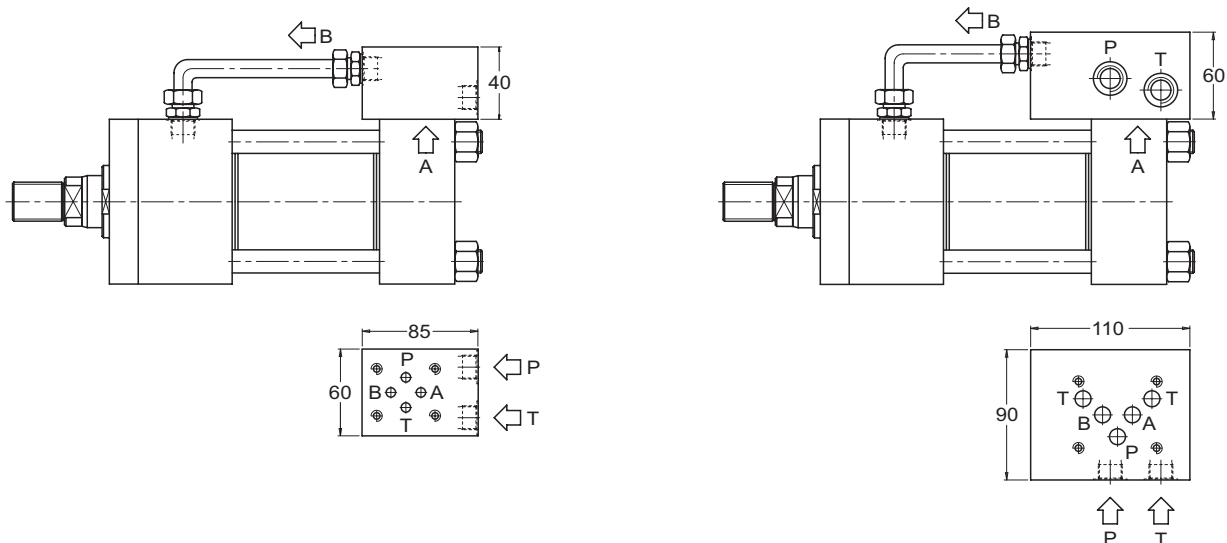
All dimensions are given in millimetres.

Cetop 03 and Cetop 05 plates for incorporated valves

A3 series cylinders built to ISO 6020/2 standards can be supplied on request from bore 40 upwards with Cetop 03 and Cetop 05 plates for mounting piloting valves directly onto the cylinder.

The minimum strokes required for installation are 100 mm for the Cetop 03 plate and 150 mm for the Cetop 05 plate; for lower stroke measurements, suitable spacers can be supplied on request.

For more detailed information on this subject, please contact our Technical Department.



Cetop 03 plate (3/8" BSP P and T couplings)

Cetop 05 plate (3/4" BSP P and T couplings)



Cylinders with magnetic sensors

The M3 series CMB hydraulic cylinders to ISO 6020/2 standards are designed to take Reed magnetic or Hall effect sensors attached to the tie-rods which are adjustable lengthways.

The switching signal generated by these types of sensors is used to effect movements in any position, both intermediate and in the proximity of the piston end-of-stroke device and can be used in many types of sequencers and programmable controllers.

The sensor switch trips when the piston enters the so-called "switching area" which may be as wide as 30 ÷ 40 mm depending on the speed of the piston and cylinder bore. This means that if the Customer considers maximum repeatability of the cylinder position reading at the end of stroke of fundamental importance for his application, we recommend the use of inductive sensors in the place of magnetic ones.

The cylinder tube and piston of these cylinders are constructed of stainless steel, used because of its amagnetic properties which do not alter the magnetic field generated by the plastoferrite ring housed inside the piston. The following bores are available for cylinders equipped with these sensors:

25	32	40	50	63	80	100	125
----	----	----	----	----	----	-----	-----

Reed magnetic sensors

The Reed magnetic sensors that we supply as standard contain a normally open contact (N.O.) incorporated in a small sealed polyamide container.

As the piston approaches, the sensor contact is influenced by the magnetic field created during switching. The closure of the contact persists for the whole duration of the presence of the piston while, as it moves away the magnetic field ceases to exist and therefore also the force lines that maintain the contact between the two metal bars, switching the circuit as a consequence.

This type of sensor has a long electric life and high switching power which enables it to control loads directly. CMB do not recommend the use of these types of sensors in applications where there are inductive or capacitive loads or high peaks in voltage, which would compromise the reliability and repeatability of the reading.

Hall effect magnetic sensors

Hall effect magnetic sensors measure the variation in voltage generated by the piston's transit around a Hall effect electronic semi-conductor normally open (N.O.) type PNP or NPN submerged inside a small hermetic polyamide container.

This type of sensor has a practically infinite electrical life (far greater than that of Reed sensors as there are no moving parts inside it), has high sensitivity and switching reliability.

These devices cannot be used to directly pilot a power load but only to provide the switching signal (pure contact).

Ordering magnetic sensors

Standard M3 series cylinders are supplied without sensors. To order the cylinder complete with sensors and connectors installed, the type and quantity of sensors must be specified on the order, along with information given in the following table:

Ordering code	Description
0299001000004	Reed sensor without connector (bores 25 e 32)
0299001000001	Reed sensor with connector (bores 40, 50, 63, 80, 100 e 125)
0299001000002	PNP type Hall effect sensor (without connector)
0299001000003	NPN type Hall effect sensor (without connector)

Mounting brackets

The sensors can be applied to any side of the cylinder using suitable brackets made of glass fibre charged nylon which are fixed to a tie-rod and prevent the sensor from moving while it is in function.

The mounting brackets are not supplied together with the sensor and must be ordered separately indicating the quantity and identification code as follows:

Ordering code	Description
0299002000001	Sensor mounting bracket

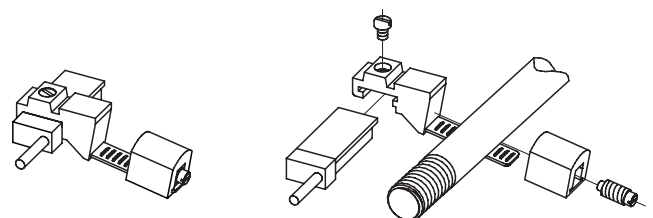


Fig. 1 - Example of Reed sensor mounted without connector

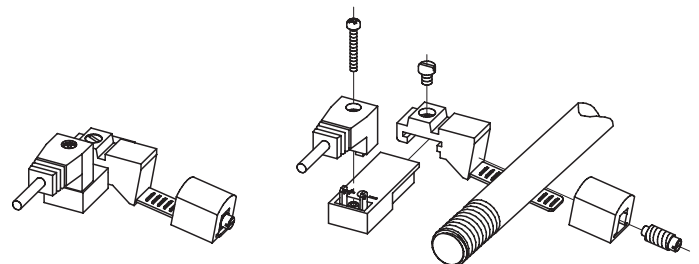


Fig. 2 - Example of Reed sensor mounted with connector

Limits to the use of M3 series

Hydraulic cylinders equipped with magnetic sensors must be supplied with a working pressure (without peaks) lower than 160 bar.

In order to guarantee maximum reliability and repeatability of readings, CMB recommends the M3 series cylinder is not to be used as a mechanical locking device but that at least 15 ÷ 20 mm of stroke more than necessary is always to be added to prevent the head or cap from being magnetised, particularly in uses in which the piston remains in the end of stroke position for long periods of time. M3 series cylinders can be supplied with fluoroelastomer seals (identified by the letter **V**) suitable for use with aggressive hydraulic fluids but not at working temperatures over 70°C.

Technical features of Reed sensors

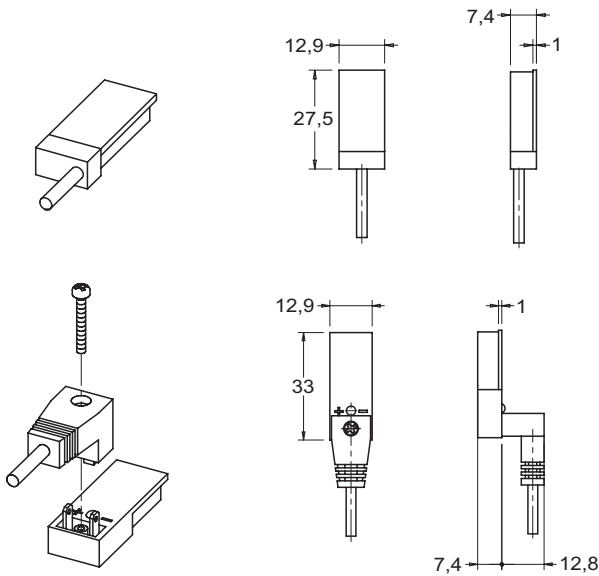


Fig. 3 – Reed sensor space requirements

Description	Readings	
	02990010000004	02990010000001
Ordering code	02990010000004	02990010000001
Sensor version	Reed	Reed
Type of contact	N.O.	N.O.
Maximum power rating	10 W	50 W
Maximum voltage	130 V ac/dc	250 V ac/dc
Minimum voltage	3 V ac/dc	3 V ac/dc
Fall in voltage	2,5 V	2,5 V
Max current	300 mA	1000 mA
Wiring	2 wires	2 wires
Cable cross-section	0,25 mm ²	0,25 mm ²
Connection	Wire (L=2 m)	Wire (L=2 m)
Varistor	-	250 V
Sheath material	PVC	PVC
Contact indication	Red Led	Red Led
Connector	-	Angled at 90°

Wiring diagram



Technical features of PNP Hall effect sensors

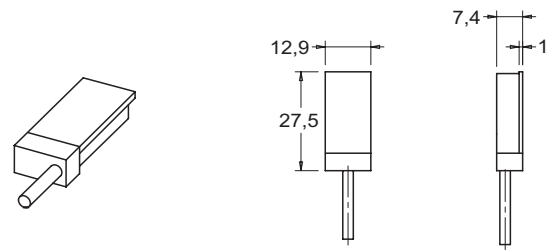


Fig. 4 - Hall effect sensor space requirements

Description	Readings
Ordering code	02990010000002
Sensor version	Hall effect
Type of contact	N.O.
Type	PNP
Maximum voltage	30 V dc
Minimum voltage	10 V dc
Fall in voltage	0,5 V dc
Max current	200 mA
Wiring	3 wires
Cable cross-section	0,14 mm ²
Connection	Wire (L=2 m)
Sheath material	PVC
Contact indication	Red Led

Wiring diagram



Technical features of NPN Hall effect sensors

Description	Readings
Ordering code	02990010000003
Sensor version	Hall effect
Type of contact	N.O.
Type	NPN
Maximum voltage	30 V dc
Minimum voltage	10 V dc
Fall in voltage	0,5 V dc
Max current	200 mA
Wiring	3 wires
Cable cross-section	0,14 mm ²
Connection	Wire (L=2 m)
Sheath material	PVC
Contact indication	Red Led

Wiring diagram



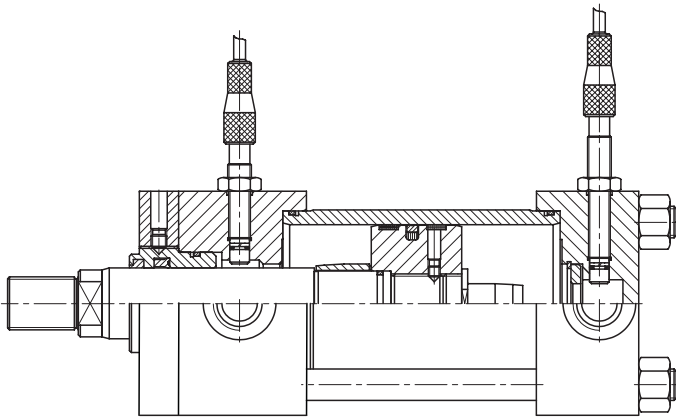
Inductive proximity sensors

The end-of-stroke sensors use technology of the Hall effect inductive type for reading and can be mounted both on the head and the cap as long as the mounting and other types of connection present on the same side allow for this in accordance with information given in Table 19 on page 60. The following bores are available:

40	50	63	80	100	125	160	200
----	----	----	----	-----	-----	-----	-----

The sensors can be applied to all mounting types of cylinders and to both heads except for bores 40 and 50, which present the following limitations:

- 04 (ISO MT1) - available only on the cap
- 05 (ISO MT2) - available only on the head
- 13 (ISO ME5) - available only on the cap
- 14 (ISO ME6) - available only on the head



The working principle of the inductive proximity sensor is based on the interaction of the metal conductors with their own alternative electromagnetic field.

When the piston arrives at the end of stroke, the sensor detects the presence of the conductor material of which the cushion is made and gives the signal for movement to be performed.

The cylinders must therefore necessarily be provided with cushion in proximity of the sensor.

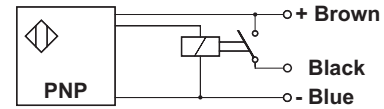
The end-of-stroke sensors installed on CMB cylinders are tested to work correctly in temperatures ranging from -20°C to +70°C, are not influenced by vibrations and can be supplied on request with steel guards covering the outer part of the sensor.

Cylinders equipped with inductive sensors can also be fitted with fluoroelastomer seals (identified by the letter **V**) exclusively for use with aggressive hydraulic fluids and not for use at high temperatures.

Features of inductive sensors

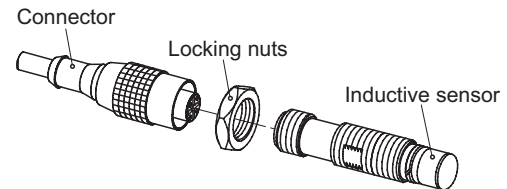
CMB ISO 6020/2 A3 series cylinders with end of stroke sensors are supplied with PNP type inductive sensors (the charge is connected to the supply positive) and with outlet of the normally open type (N.O.).

These devices cannot be used to directly pilot a power load but only to provide the switching signal (pure contact).



Inductive sensor technical specifications:

- Sensor screw thread: M12x1
- Coupling torque: 15 Nm
- Reading signal space: 1÷1,2 mm
- Working voltage: 10÷30 V CC
- Current capacity: 200 mA
- Working frequency: 1000 Hz
- Circuit protection: si
- Max. pressure: 500 bar
- Repeatability accuracy: < 5%



CMB supplies straight connectors without LED (code **02990030000003**) as standard together with inductive sensors. These present the following technical features:

- connector: M12 pre-cabled - IP68
- cable type: with 3 x 0,34 mm² leads
- cable length: 3 mt.
- cable material: polyurethane (oil resistant)

90° angled connectors with LED are available as an optional, enabling the dismantling space and outer overall dimensions of the cylinder to be reduced to which however the steel guards cannot be applied; when placing an order, specify the quantity followed by the following code:

- **02990030000001** - 90° angled connector

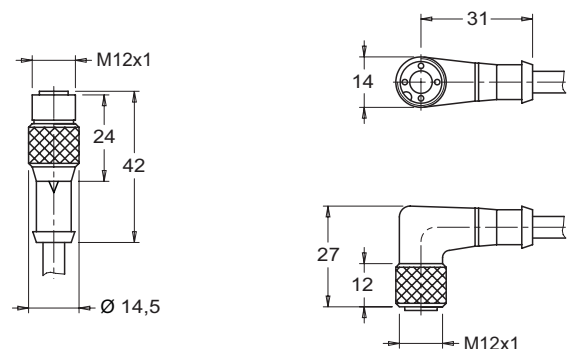


Fig. 5 - Straight and 90° angled connector space requirements

Introduction to T3 series cylinders

T3 series ISO 6020/2 hydraulic cylinders are hydraulic actuators designed to take linear position transducers and return the rod to its starting position.

These hydraulic devices combined with a magnetostrictive transducer and suitable electronic conditioning enable a reliable, accurate and compact control system to be achieved which allows for great flexibility of use in all types of applications.

T3 series cylinders are fitted as standard with air bleeds on the head and cap to enable air present in the rod cavity in which the transducer wave guide is housed to be released. This range of cylinders is equipped with a special piston which allows the cylinder to be fitted with cushioning on the side of the cap even when a linear transducer is present. The following bores are available for cylinders fitted with magnetostrictive transducers:

		Bore							
		40	50	63	80	100	125	160	200
Rod	-	-	-	28	36	45	56	70	90
	-	28	36	45	56	70	90	110	140
	28	36	45	56	70	90	110	140	

On request, special protective covers can be produced to cover the exposed part of the transducer.

Mounting type

T3 series cylinders are available for all the mounting types except for the pivot mounting versions.

For special applications however, CMB can also supply these mounting types as a custom-built product. For more detailed information, please contact our Technical Department.

Magnetostrictive transducer

A magnetostrictive transducer is a device made up of a special alloy pipe through which a connector solidly fixed to the cap of the cylinder is threaded and along which a permanent magnet inside the piston slides.

The measuring process begins with a short electrical impulse emitted by the lead head which is transmitted at a constant speed along the wave guide until it reaches the position reader (permanent magnet), which causes it to invert due its magnetostrictive effect.

The time for the wave to carry out the return trip from its original point to the signal emitter is directly proportional to the distance present between the position reader (therefore the position of the piston) and the emitter.

The absence of sliding contact elements between the moving parts of the transducer guarantees a long working life reducing all kinds of maintenance to a minimum. The transducer can easily be removed from its housing without having to dismantle the cylinder.

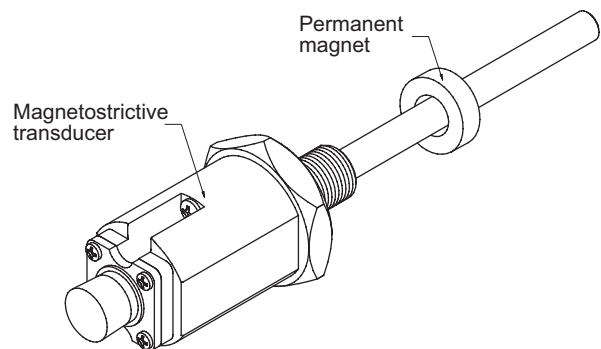


Fig. 6 – Magnetostrictive transducer complete with permanent magnet

Types of output signals available

CMB offers a wide range of magnetostrictive transducers equipped with conversion electronics that provide three different types of output signal:

- **Linear-analog**
- **Serial-Synchronous (SSI)**
- **Can-Bus**
- **Profibus-DP**

The **Linear-analog** output provides an analog signal which can be leak voltage or current; leak current outputs are preferable to voltage outputs when electrical disturbances are present which may distort the signal.

With the **Sincrono-Seriale (SSI)** output, the position of the permanent magnet along the stretch being measured is transmitted directly to the controller or electronic axis adjustment circuits using SSI input by means of a train of synchronised clock impulses.

Can-Bus and **Profibus-DP** are types of digital data transmission produced using controllers fitted with a module at the head connected to the various devices present on the machine (actuators with linear transducers, drive systems, sensors etc.) by means of a quite normal two-way adaptor. These transducers are different because they have two different types of output signal: Can-Bus according to ISO 11898 specifications and Profibus-DP according to ISO 74498 specifications.

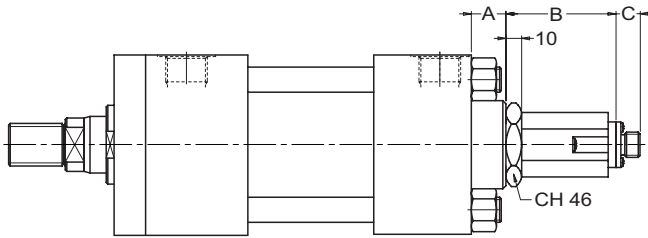
In order to increase the efficiency of the actuator, software functions can be implemented in the transducers with Can-Bus and Profibus-DP output, which enable not only the position readings and piston speeds to be determined but also movement profile and speed to be measured.

CE mark

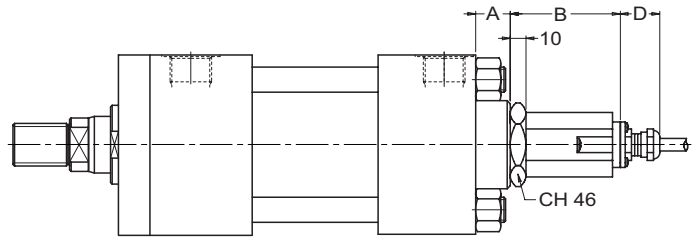
All magnetostrictive transducers and sensors (both magnetic and inductive) supplied by CMB respect the electromagnetic compatibility requirements of standard **EN 60 947-5-2** appendix ZA.

The CE mark applied to the connectors and electronic devices supplied by us indicates that the products marketed comply with the requirements of **CEE 89/336/CEE** directive (directive **EMV**) and relevant legislation.

Rear dimensions of transducer with flying connector



Rear dimensions of transducer integral cable



Types and dimensions of connectors

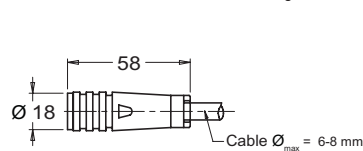
CMB hydraulic cylinders equipped with magnetostrictive transducers can be supplied with four models of connectors to be ordered separately (connection cable not supplied). Models with 6 pins are used exclusively for Analog-linear transducers and Can-Bus while those with 7 pins are used for the SSI:

- Code **02990060000001** - 6 pins DIN metal connector with direct female coupling
- Code **02990060000002** - 6 pins DIN metal connector with 90° square, adjustable direction female coupling
- Code **02990060000003** - 7 pins DIN metal connector with direct female coupling
- Code **02990060000004** - 7 pins DIN metal connector with 90° square, adjustable direction female coupling

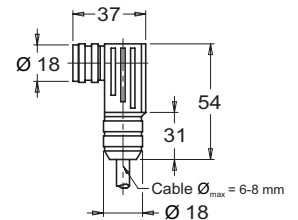
Chart showing dimensions of magnetostrictive transducers:

Bore	A	B		C _{max}	D _{max}
		Linear analogic	SSI, Can-Bus e Profibus-DP		
40	28	65	83,5*	13	20
50	30				
63	20				
80	22				
100	18				
125	9				
160	24				
200	24				

* To add 10 millimeter with electrical stroke greater of 3500 millimeter



6 or 7 pins DIN metal connector with direct



7 pins DIN metal connector with 90° square, adjustable direction female coupling

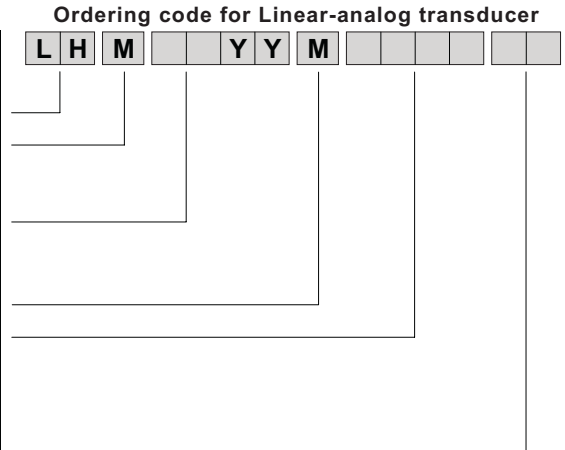
Technical features of Linear-analog transducer

Features

Measured variable	Displacement
Measuring range	50 - 1650 mm
Output signal voltage	0 ... + 10 V e + 10 V ... 0 V Load resistance $R_L \geq 5 \text{ k}\Omega$
Output signal current	4 ... 20 mA e 20 ... 4 mA 0 ... 20 mA e 20 ... 0 mA Load resistance $R_L \geq 100 \text{ }\Omega$
Resolution	Infinite
Linearity tolerance	$\leq \pm 0,05 \%$ F.S. (minimum $\pm 50 \mu\text{m}$)
Repeatability	$\leq \pm 0,001 \%$ F.S. (minimum $\pm 2,5 \mu\text{m}$)
Hysteresis	$\leq 20 \mu\text{m}$
Connection type	Integrated connector or cable
Input voltage	24 V d.c. ($\pm 25 \%$)
Current drain	80 mA typical
Ripple	$\leq 1 \%$ peak to peak
Temperature coefficient	70 ppm/° C typical (valid for output signal voltage only) 90 ppm/° C typical (valid for output current signal only)
Operating temperature	- 40° C ... + 65° C
Mounting position	Any orientation
Magnet speed	Any
Sensor head	Aluminium diecasting housing
Sensor rod with flange	Stainless steel
Pressure rating	350 bar (530 Bar peak pressure)
Protection degree	IP 67 (Rod, flange) IP 65 (Sensor head)
Threaded flange	M 18 x 1,5
Magnet type	GF plastic with permanent magnets

Ordering code for Linear-analog transducer

Features	Description	Code
Transducer type	Linear-analog with rod housing	LH
Flange type	Threaded flange M 18 x 1,5 (standard)	M
Connection type	Screw connector with 6 pins	D0
	PVC cable 1,5 mt.	R0
	10 mt. PVC cable, with or without connector (specify cable length and connector)	RX
Metering unit	Millimeters	M
Measuring range	Standard from 50 to 1650 mm	-
Output	0 ... 10 V e 10 ... 0 V	V0
	4 ... 20 mA	A0
	20 ... 4 mA	A1
	0 ... 20 mA	A2
	20 ... 0 mA	A3
	Start/Stop (ask the builder)	R0



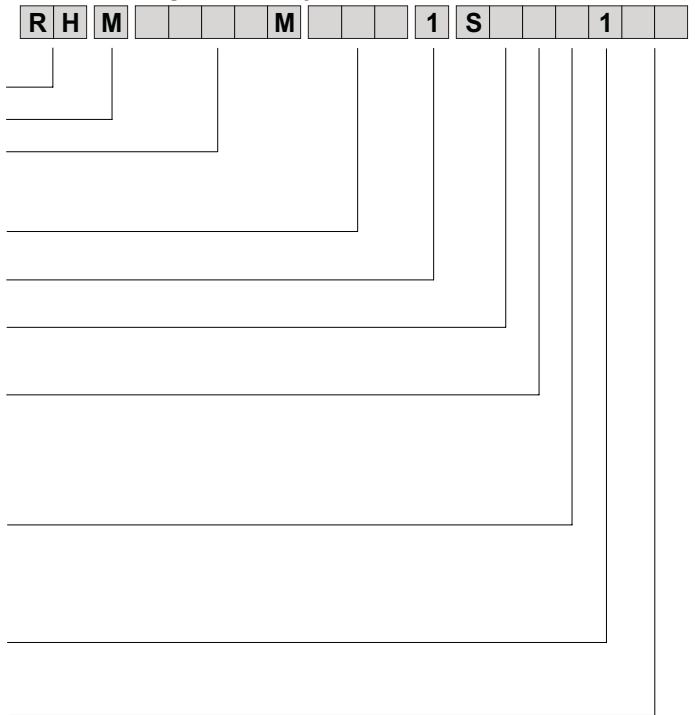
Technical features of SSI, Can-Bus and Profibus-DP transducers

Features	
Measured variable (SSI transducer)	Position
Measured variable (Can-Bus e Profibus-DP transducer)	Displacement and position
Measuring range	25 - 6000 mm
Output signal (SSI transducer)	SSI (Synchronous Serial Interface) - RS 422/485 Standard
Output signal (Can-Bus transducer)	Can-Bus system according ISO 11898
Output signal (Profibus-DP transducer)	Profibus-DP system according ISO 74498
Data format (SSI transducer)	Binary or Gray encodes
Data length (SSI transducer)	25 o 24 bit (on request)
Data format (Can-Bus transducer)	CAN Base 2.0 A
Data format (Profibus-DP transducer)	Profibus-DP (EN 50 170)
Resolution (SSI and Can-Bus transducer)	2 µm maximum
Resolution (trasduttore Profibus-DP)	5 µm maximum
Baud Rate (trasduttore Can-Bus)	Selectable: 1000, 500, 250 e 125 Kbit/sec.
Linearity tolerance (uncorrected)	< ± 0,01 % F.S. (minimum ± 40 µm) independent of external temperature influence
Repeatability	< ± 0,001 % F.S. (minimum ± 2,5 µm)
Hysteresis	< 4 µm
Connection type	Integrated connector or cable
Input voltage	24 V d.c. (+ 20 % / - 15%)
Current drain (SSI transducer)	70 mA typical
Current drain (Can-Bus and Profibus-DP transducer)	90 mA typical
Ripple	< 1 % peak to peak
Temperature coefficient	< 15 ppm/° C
Electric strength	500 V (D.C. ground to machine ground)
Operating temperature	- 40° C ... + 75° C
EMC-Test	DIN IEC 801-4 / type 4 / CE qualified
Shock rating	100 g (single hit) / IEC-Standard 68-2-27
Vibration rating	5 g / 10 -150 Hz / IEC-Standard 68-2-6
Mounting position	Any orientation
Magnet speed	Any
Electronic head	Aluminium diecasting housing
Sensor rod with flange	Stainless steel
Pressure rating	350 bar (530 Bar peak pressure)
Protection degree	IP 67 (if mating connector is correctly fitted)
Threaded flange	M 18 x 1,5
Magnet type	GF plastic with permanent magnets

Ordering code for Synchronous-Serial transducer

Features	Description	Code
Transducer type	Synchronous-Serial (SSI) with rod housing	RH
Flange type	Threaded flange M 18 x 1,5 (standard)	M
Measuring range	Standard from 25 to 6000 mm	-
Connection type	Screw connector with 7 pins	D70
	10 mt. PVC cable, with or without connector (specify cable length and connector)	P02
Input voltage	+ 24 V d.c.	1
Data length	25 bit	1
	24 bit	2
Data format	Binary	B
	Gray	G
Resolution	0,005 mm	1
	0,01 mm	2
	0,05 mm	3
	0,1 mm	4
	0,02 mm	5
	0,002 mm	6
Performance	Standard	1
Options	Measuring direction forward	00
	Measuring direction reverse	01
	Measuring direction forward, synchronized measurement	02

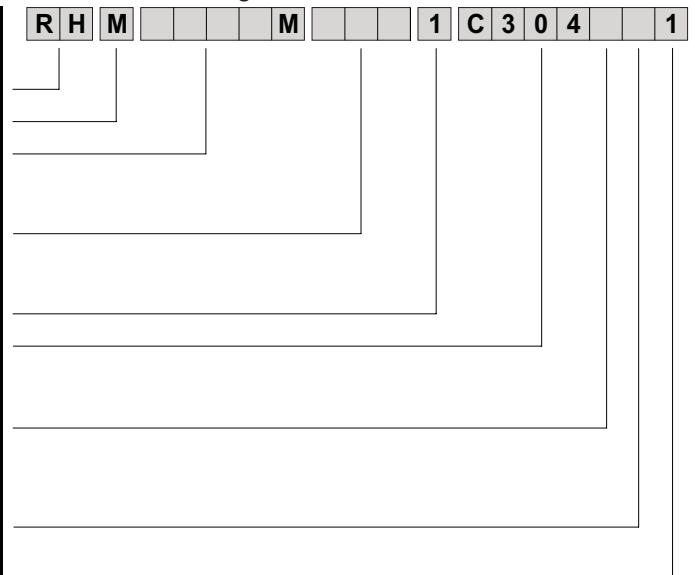
Ordering code for Synchronous-Serial transducer



Ordering code for Can-Bus transducer

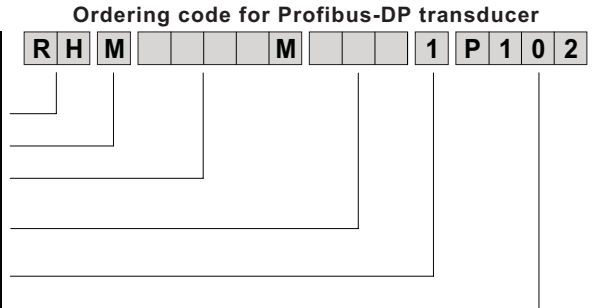
Features	Description	Code
Transducer type	Can-Bus with rod housing	RH
Flange type	Threaded flange M 18 x 1,5 (standard)	M
Measuring range	Standard from 25 to 6000 mm	-
Connection type	Screw connector with 6 pins	D60
	Connectors (2) IN/OUT-Bus	D62
	10 mt. PVC cable, with or without connector (specify cable length and connector)	P02
Input voltage	+ 24 V d.c.	1
Protocollo	Can-Open protocol	304
Baud rate	1000 KBit/s	1
	500 KBit/s	2
	250 KBit/s	3
	125 KBit/s	4
Resolution	5 µm (Standard)	1
	2 µm	2
Cycle time	Standard	1

Ordering code for Can-Bus transducer



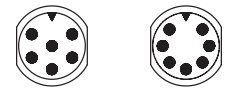
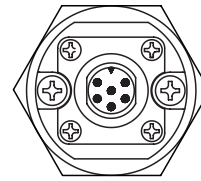
Ordering code for Profibus-DP transducer

Features	Description	Code
Transducer type	Profibus-DP with rod housing	RH
Flange type	Threaded flange M 18 x 1,5 (standard)	M
Measuring range	Standard from 25 to 6000 mm	-
Connection type	Screw connector with 4 pins	D52
	Screw connector with 6 pins	D63
Input voltage	+ 24 V d.c.	1
Output	Profibus-DP (standard)	P102



Electrical connections

T3 series CMB hydraulic cylinders come complete with all the manufacturer's technical documentation regarding the identification and wiring of transducer connectors. For all further technical information regarding the installation and/or electrical connection of transducers, contact our Technical Department.



External view 6 or 7 pins connection

Storage and maintenance

To guarantee the cylinders a long life, CMB recommends you follow the following maintenance rules extremely carefully:

- Store the cylinders in a closed, dry environment in a vertical position with the rod pointing upwards to reduce the chance of corrosion taking place inside due to condensation.
- The rod, screw threads, centres and all the accessories applied to the rod and cap must be protected not only from aggressive agents but also from knocks which could compromise their proper working.
- The protective caps fitted on the connections must not be removed until the time of installation in order to prevent dirt and/or foreign bodies from entering the cylinder.
- After installation, periodically check the cylinder to make sure there are no traces of oil due to the seals wearing out or any damage to mechanical parts. If there are, provide for their replacement as soon as possible.
- When in function, make sure the rod does not rotate around its own axis. In the event that rotation becomes necessary, remove supply pressure and proceed with the operation.
- The seals kits supplied by CMB as well as spare parts must be stocked in a dry environment and direct contact with sources of heat and direct exposure to sunlight must be avoided.
- If it becomes necessary to re-mount the cylinders, tighten the tie-rod nuts diagonally, applying a gradual coupling torque until the maximum value given in the chart is reached (values refer to dry threads):

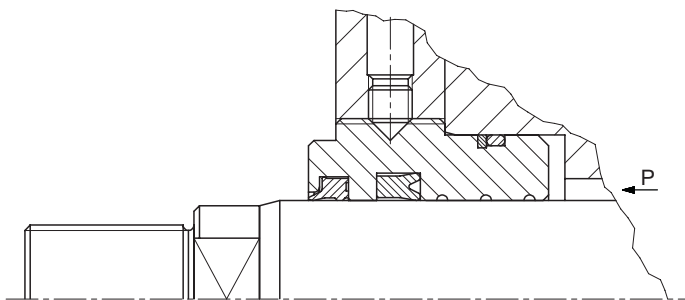
Bore (mm)	25	32	40	50	63	80	100	125	160	200
Tie-rod	M5x0,8	M6x1	M8x1	M12x1,25	M12x1,25	M16x1,5	M16x1,5	M22x1,5	M27x2	M30x2
Coupling torque (Nm)	5	9	20	70	70	160	160	450	820	1150

Replacing bush seals

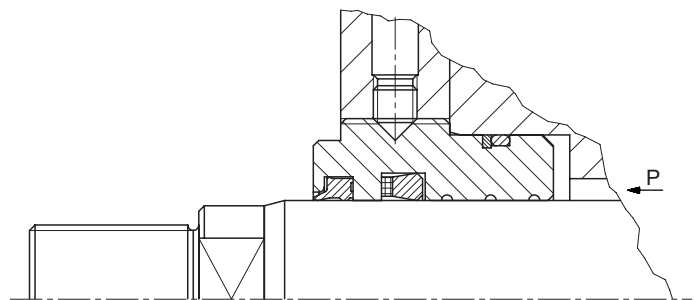
The presence of leaking fluid in proximity of the bush means that the seals need replacing.

To replace these, dismantle the mechanical parts and worn out seals making sure you follow the recommendations given below very carefully, remembering that in many cases poor functioning is due exclusively to the seals not being fitted properly:

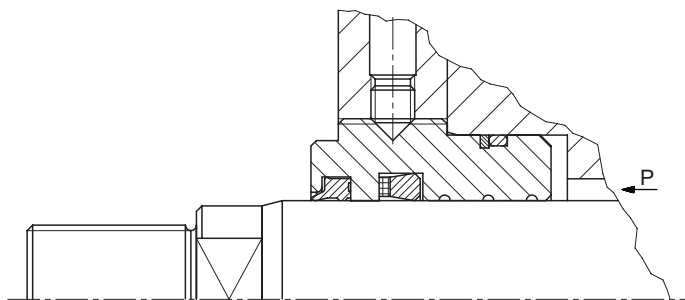
- Remove the supply pressure and drain off the remaining hydraulic fluid present in the cylinder chamber.
- Unscrew the retention grub screw and dismantle the flange bush, sliding it along the rod to extract it.
- After dismantling the worn-out seals, wash the bush carefully so that it is perfectly clean, making sure it is free from all metal particles and that there is no scoring or surface flaws of any kind on it; if these are present, replace it by requesting the spare part from CMB.
- Lubricate the new seals and bush using the same hydraulic fluid used in the installation or another type of compatible fluid.
- Carefully check the direction the seals lie in with respect to the direction the hydraulic thrust fluid works in as highlighted in the figures below.



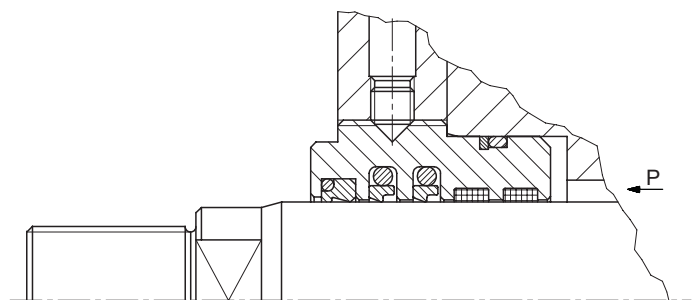
Standard bush



Bush for water and glycol mixtures



Bush for high temperatures and/or aggressive fluids

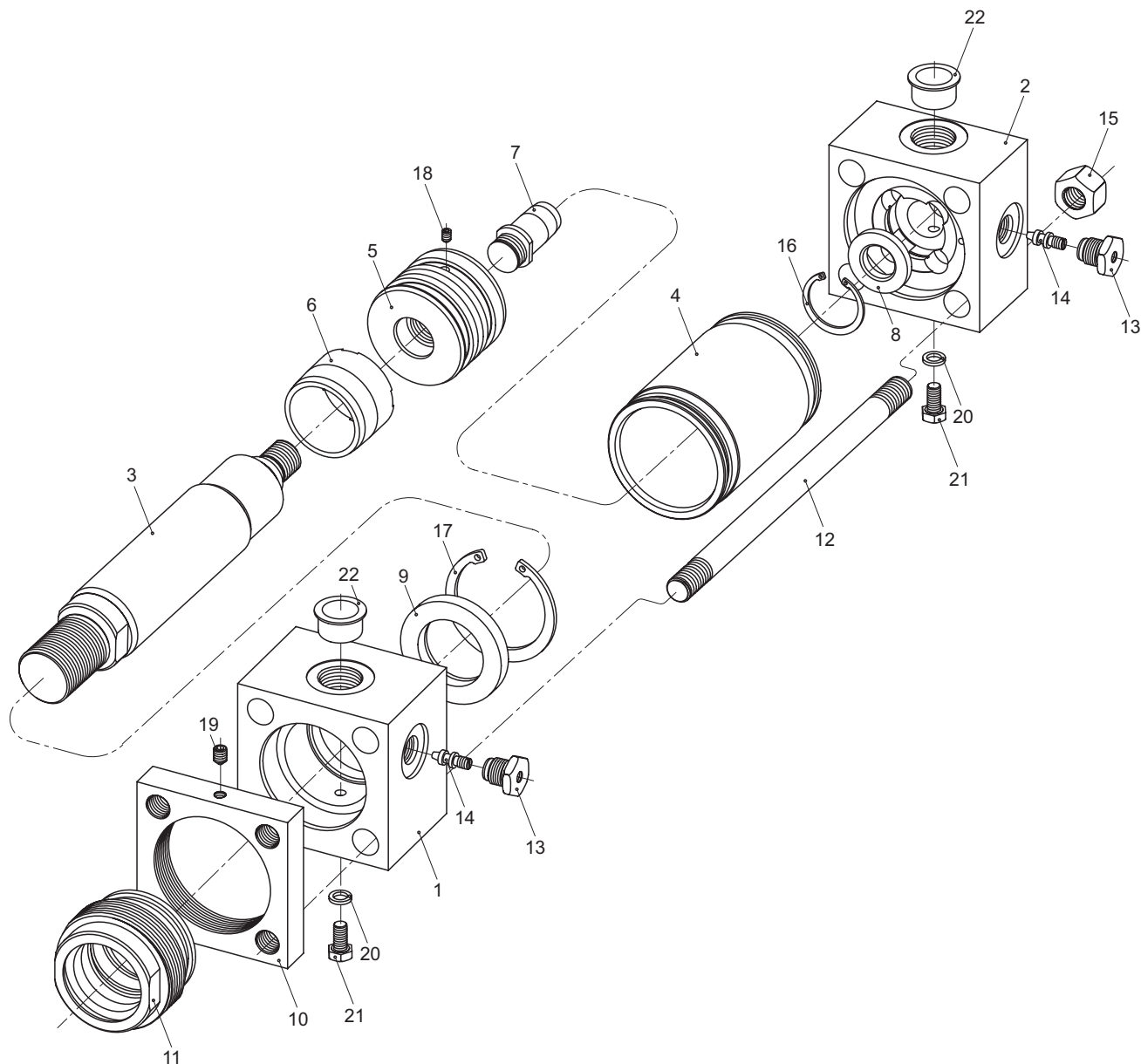


Low friction bush

- Install the seals in the bush, fitting them evenly without the use of metal tools with sharp edges making sure the seals do not remain deformed for long periods of time.
- When mounting the bush, be careful not to damage the seals by these coming into contact with the rod thread screw and rotate the bush to facilitate fitting it onto the rod.
- Slide the bush along the rod and screw it down into the flange locking it into position using the retention grub screw.

ISO 6020/2 A3 Series

Exploded view showing A3 series cylinders mechanical spare parts

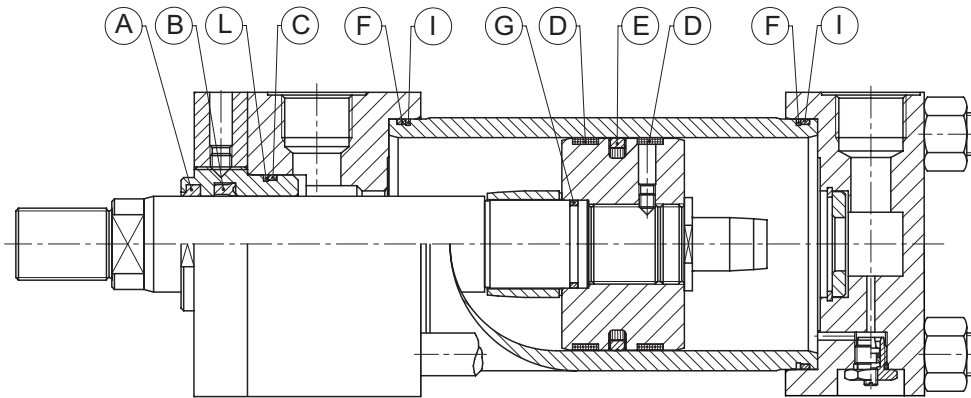


Tab.1 - Mechanical spare parts for A3 series cylinders

Pos.	Description	Notes
1	Head	-
2	Cap	-
3	Rod	-
4	Cylinder tube	-
5	Piston	-
6	Front cushioning sleeve	Only if fitted with cushion
7	Rear cushioning sleeve	Only if fitted with cushion
8	Rear cushioning bush	Only if fitted with cushion
9	Front cushioning bush	Bores 160 and 200 only if fitted with cushion
10	Flange plate	-
11	Rod bushing	-

Pos.	Description	Notes
12	Tie rod	-
13	Cushion needle valve cartridge	Only if fitted with cushion
14	Adjustment cushioning screw	Only if fitted with cushion
15	Nut	-
16	Rear cushioning elastic ring	Only if fitted with cushion
17	Front cushioning elastic ring	Bores 160 and 200 only if fitted with cushion
18	Grub screw locking piston	-
19	Grub screw locking rod bushing	-
20	Copper washer	Only if fitted with air bleeds
21	Air bleeds screw	Only if fitted with air bleeds
22	Screw thread protection cap	-

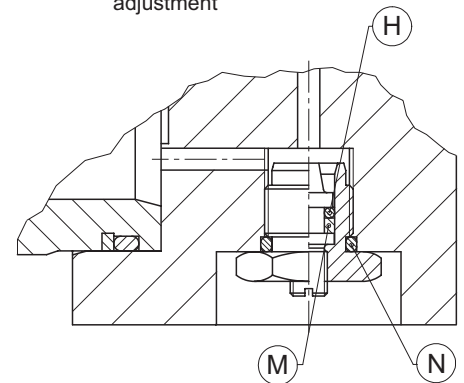
Spare seals kit for standard A3 series cylinders and for A3 series with inductive sensors



Tab.2 - Spare seals kit for standard A3 series cylinders and for A3 series with inductive sensors

Pos.	Description	Notes
A	Scraper	-
B	Rod seal	-
C	Rod bushing O-Ring	Excluding bores 25, 32, 40 (rods 18 and 28)
D	Guide ring	-
E	Piston seal	-
F	Tube cylinder O-Ring	-
G	Piston O-Ring	-
H	Cushioning screw O-Ring	Only if fitted with cushion
I	Tube cylinder O-Ring back up washer	-
L	Rod bushing O-Ring back up washer	Excluding bores 25, 32, 40 (rods 18 and 28)
M	Cushioning screw O-Ring back up washer	Only if fitted with cushion
N	Cushioning needle valve cartridge O-Ring back up washer	Only if fitted with cushion

Detail showing cushioning adjustment



The following tables describe the procedure for ordering complete spare seals kit:

Tab.3 - Complete seals kit for standard A3 series cylinders and for A3 series with inductive sensors

Features	Description	Code
Kit series	Complete seals kit for A3 series cylinders compliant with ISO 6020/2 standards and for A3 series with inductive sensors	K3
Bore	Specify bore in mm	-
Rod	Rod diameter 12 mm (bore 25)	A
	Rod diameter 14 mm (bore 32)	B
	Rod diameter 18 mm (bores 25, 32 and 40)	D
	Rod diameter 22 mm (bores 32, 40 and 50)	F
	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100, 125 and 160)	R
	Rod diameter 90 mm (bores 125, 160 and 200)	T
	Rod diameter 110 mm (bores 160 and 200)	V
	Rod diameter 140 mm (bore 200)	Z
Seals type	Normal (Nitrile rubber, Polyurethane)	0
	High temperature and/or aggressive fluid (Fluoroelastomer, PTFE charged bronze)	1*
	Water and glycol mixtures (nitrile rubber, PTFE charged bronze)	7
	Low friction (nitrile rubber, PTFE charged bronze)	9

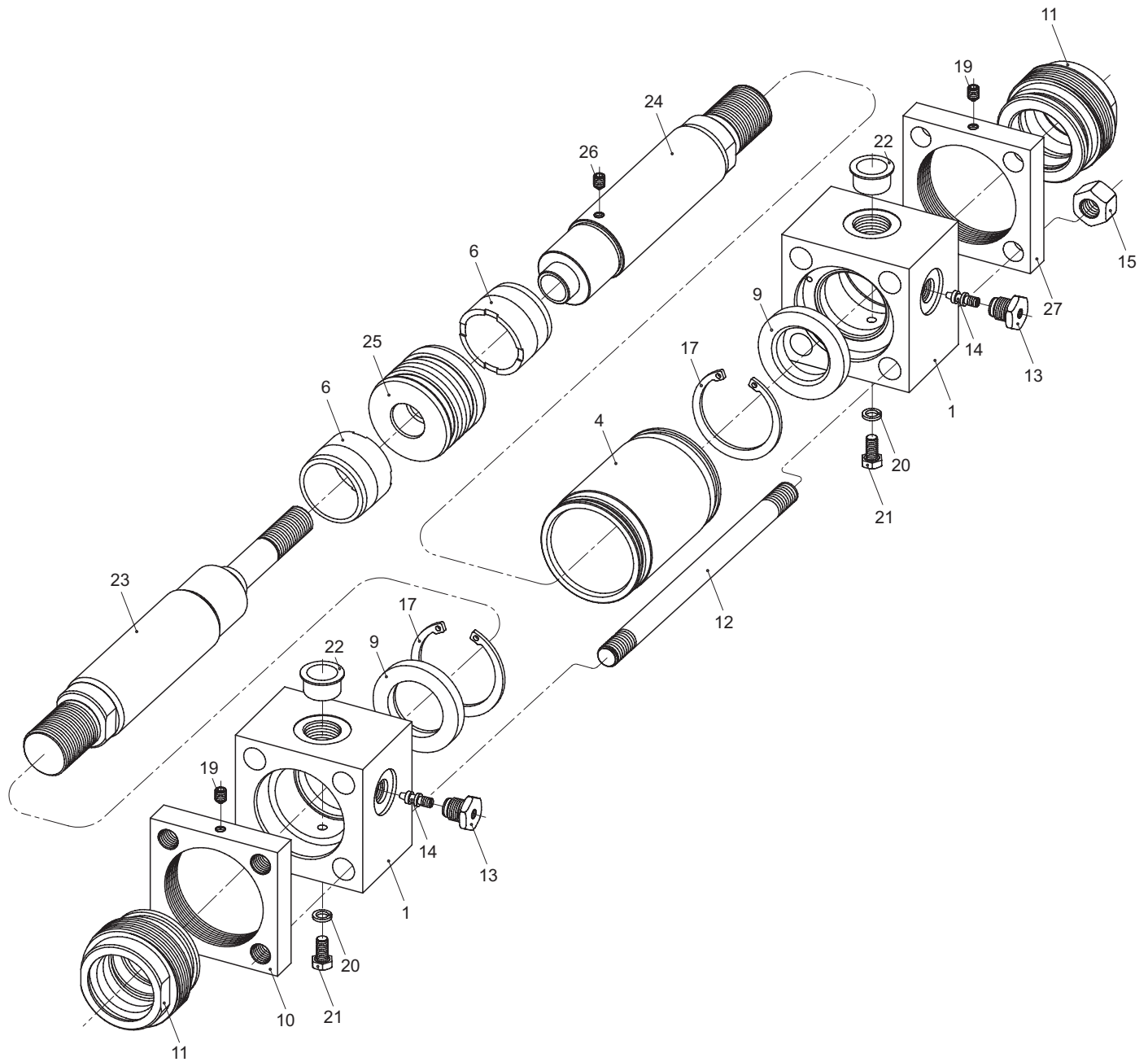
Seals ordering code

K3 000 A 0

* Maximum working temperature for A3 series cylinders equipped with inductive sensors: 70 °C

ISO 6020/2 A3 Series

Exploded view showing mechanical spare parts for A3 series double rod cylinders

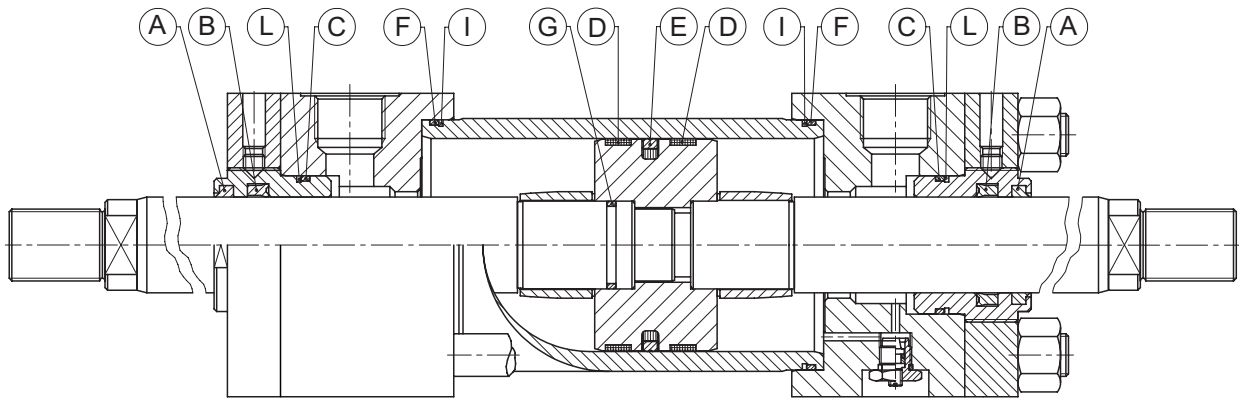


Tab.4 - Mechanical spare parts for A3 series double rod cylinders

Pos.	Description	Notes
1	Head	-
4	Cylinder tube	-
6	Front cushioning sleeve	Only if fitted with cushion
9	Front cushioning bush	Bores 160 and 200 only if fitted with cushion
10	Flange plate	-
11	Rod bushing	-
12	Tie rod	-
13	Cushion needle valve cartridge	Only if fitted with cushion
14	Adjustment cushioning screw	Only if fitted with cushion
15	Nut	-

Pos.	Description	Notes
17	Front cushioning elastic ring	Bores 160 and 200 only if fitted with cushion
19	Grub screw locking rod bushing	-
20	Copper washer	Only if fitted with cushion
21	Air bleeds screw	Only if fitted with cushion
22	Screw thread protection cap	-
23	Front rod	-
24	Rear rod	-
25	Piston	-
26	Grub screw locking rod	-
27	Flange plate with through holes	-

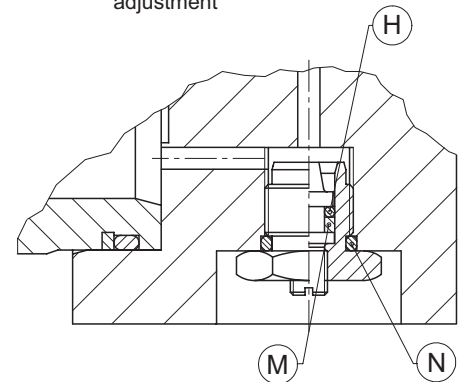
Spare seals kit for standard A3 series double rod cylinders and for A3 series double rod with inductive sensors



Tab.5 - Spare seals kit for standard A3 series double rod cylinders and for A3 series double rod with inductive sensors

Pos.	Description	Notes
A	Scraper	-
B	Rod seal	-
C	Rod bushing O-Ring	Excluding bores 25, 32, 40 (rods 18 and 28)
D	Guide ring	-
E	Piston seal	-
F	Tube cylinder O-Ring	-
G	Piston O-Ring	-
H	Cushioning screw O-Ring	Only if fitted with cushion
I	Tube cylinder O-Ring back up washer	-
L	Rod bushing O-Ring back up washer	Excluding bores 25, 32, 40 (rods 18 and 28)
M	Cushioning screw O-Ring back up washer	Only if fitted with cushion
N	Cushioning needle valve cartridge O-Ring back up washer	Only if fitted with cushion

Detail showing cushioning adjustment



The following tables describe the procedure for ordering complete spare seals kit:

Tab.6 - Complete seals kit for standard A3 series double rod cylinders and for A3 series double rod with inductive sensors

Features	Description	Code
Kit series	Complete seals kit for A3 series double rod cylinders compliant with ISO 6020/2 standards and for A3 series double rod with inductive sensors	K3
Bore	Specify bore in mm	-
Rod	Rod diameter 12 mm (bore 25)	A
	Rod diameter 14 mm (bore 32)	B
	Rod diameter 18 mm (bores 25, 32 and 40)	D
	Rod diameter 22 mm (bores 32, 40 and 50)	F
	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100, 125 and 160)	R
	Rod diameter 90 mm (bores 125, 160 and 200)	T
	Rod diameter 110 mm (bores 160 and 200)	V
	Rod diameter 140 mm (bore 200)	Z
Seals type	Normal (Nitrile rubber, Polyurethane)	2
	High temperature and/or aggressive fluid (Fluoroelastomer, PTFE charged bronze)	3*
	Water and glycol mixtures (nitrile rubber, PTFE charged bronze)	8
	Low friction (nitrile rubber, PTFE charged bronze)	10

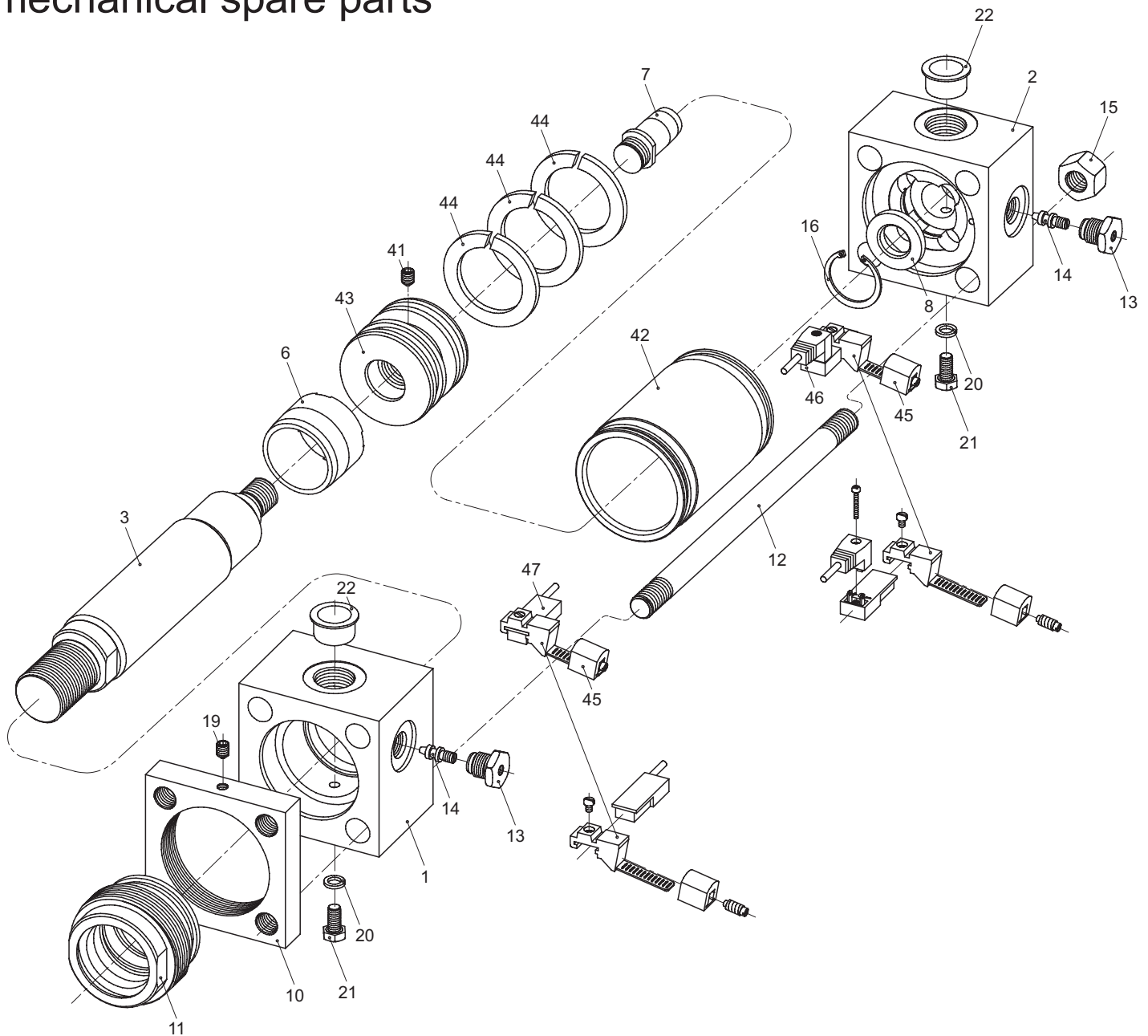
Seals ordering code

K3 **000** **A** **0**

* Maximum working temperature for A3 series double rod cylinders equipped with inductive sensors: 70 °C

ISO 6020/2 A3 Series

Exploded view showing M3 series cylinders mechanical spare parts



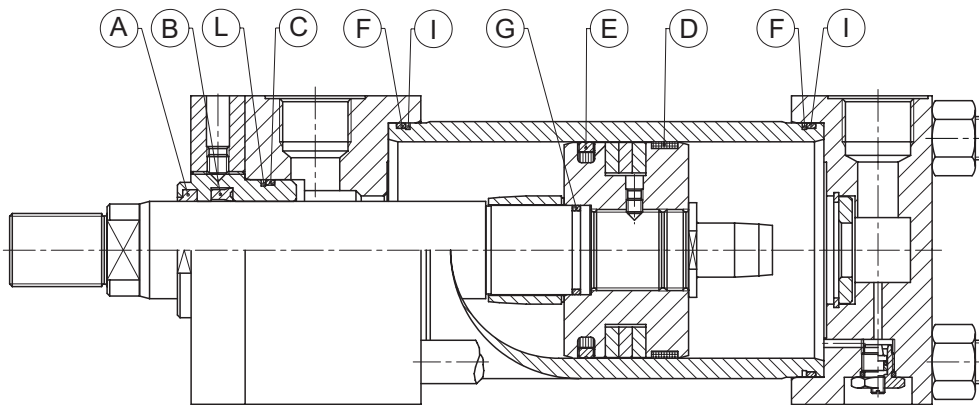
Tab.7 - Mechanical spare parts for M3 series cylinders

Pos.	Description	Notes
1	Head	-
2	Cap	-
3	Rod	-
6	Front cushioning sleeve	Only if fitted with cushion
7	Rear cushioning sleeve	Only if fitted with cushion
8	Rear cushioning bush	Only if fitted with cushion
10	Flange plate	-
11	Rod bushing	-
12	Tie rod	-
13	Cushion needle valve cartridge	Only if fitted with cushion
14	Adjustment cushioning screw	Only if fitted with cushion
15	Nut	-

Pos.	Description	Notes
16	Rear cushioning elastic ring	Only if fitted with cushion
19	Grub screw locking rod bushing	-
20	Copper washer	Only if fitted with air bleeds
21	Air bleeds screw	Only if fitted with air bleeds
22	Screw thread protection cap	-
41	Grub screw locking piston	-
42	Cylinder tube	-
43	Piston	-
44	Plastoferrite magnet ¹	-
45	Sensor mounting bracket	-
46	Reed magnetic sensor with connector	Bores 40, 50, 63, 80, 100 e 125
47	Reed magnetic sensor with connector	Bores 25 e 32

¹ Variable amount depending on the bore

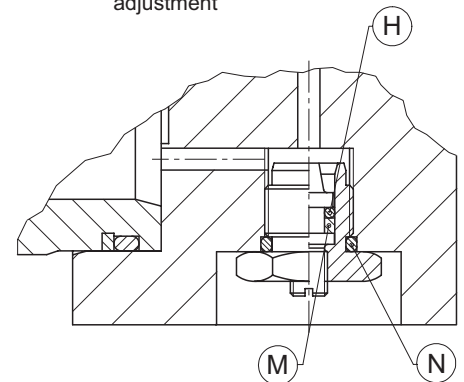
Spare seals kit for M3 series cylinders



Tab.8 - Spare seals kit for standard M3 series cylinders

Pos.	Description	Notes
A	Scraper	-
B	Rod seal	-
C	Rod bushing O-Ring	Excluding bores 25, 32, 40 (rods 18 and 28)
D	Guide ring	-
E	Piston seal	-
F	Tube cylinder O-Ring	-
G	Piston O-Ring	-
H	Cushioning screw O-Ring	Only if fitted with cushion
I	Tube cylinder O-Ring back up washer	-
L	Rod bushing O-Ring back up washer	Excluding bores 25, 32, 40 (rods 18 and 28)
M	Cushioning screw O-Ring back up washer	Only if fitted with cushion
N	Cushioning needle valve cartridge O-Ring back up washer	Only if fitted with cushion

Detail showing cushioning adjustment

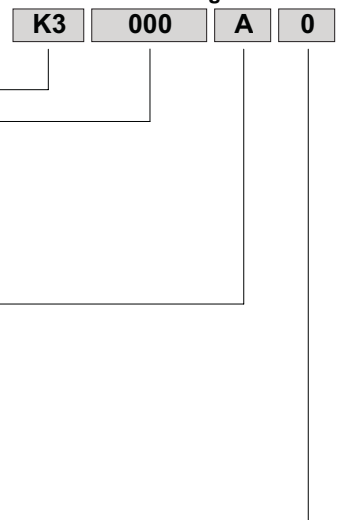


The following tables describe the procedure for ordering complete spare seals kit:

Tab.9 - Complete seals kit for M3 series cylinders

Features	Description	Code
Kit series	Complete seals kit for M3 cylinders compliant with ISO 6020/2 standards	K3
Bore	Specify bore in mm	-
Rod	Rod diameter 12 mm (bore 25)	A
	Rod diameter 14 mm (bore 32)	B
	Rod diameter 18 mm (bores 25, 32 and 40)	D
	Rod diameter 22 mm (bores 32, 40 and 50)	F
	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100 and 125)	R
	Rod diameter 90 mm (bore 125)	T
Seals type	Normal (Nitrile rubber, Polyurethane)	4
	High temperature and/or aggressive fluid (Fluoroelastomer, PTFE charged bronze)	16*
	Water and glycol mixtures (nitrile rubber, PTFE charged bronze)	14
	Low friction (nitrile rubber, PTFE charged bronze)	11

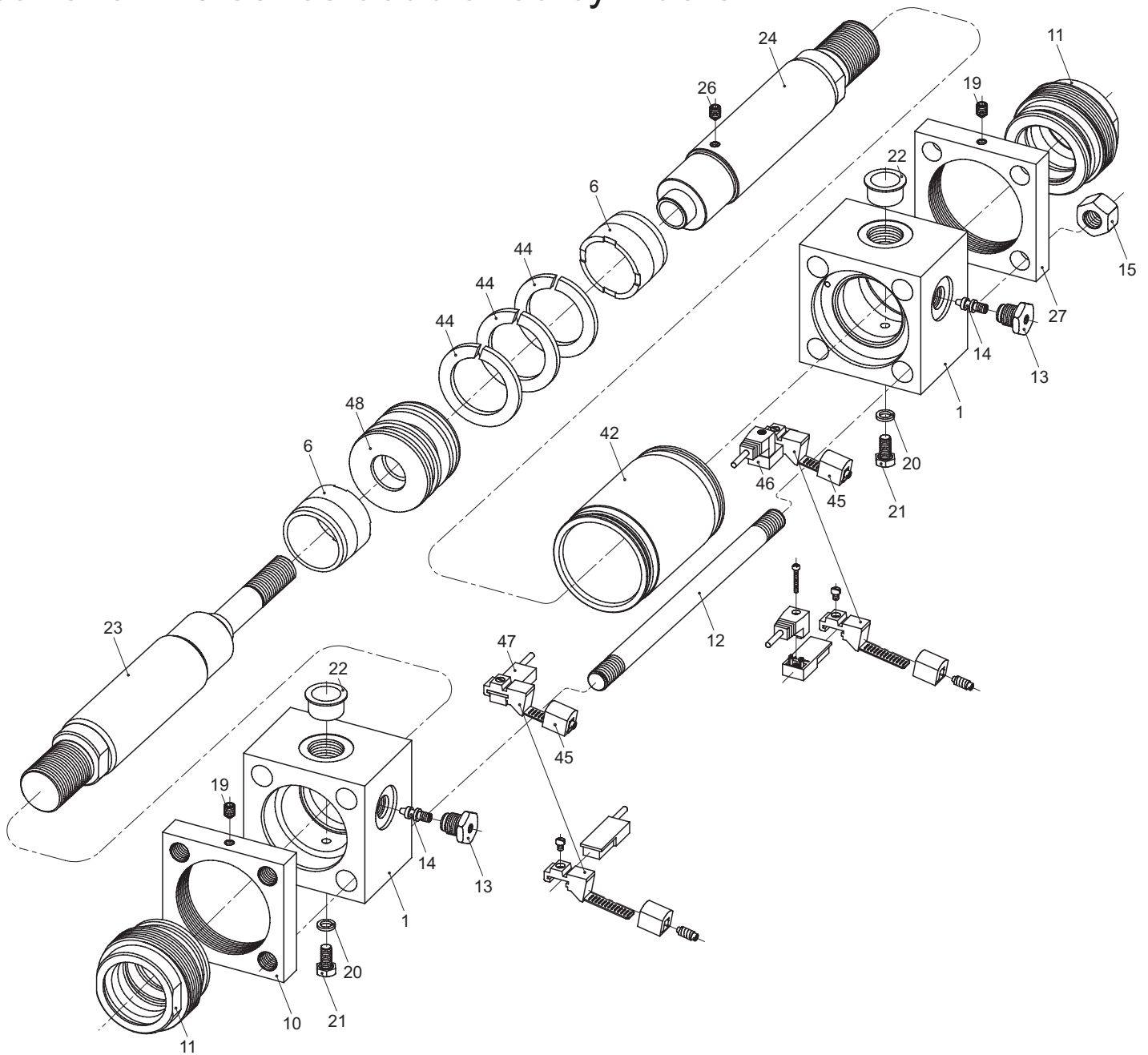
Seals ordering code



* Maximum working temperature for sensors: 70 °C

ISO 6020/2 A3 Series

Exploded view showing mechanical spare parts for M3 series double rod cylinders



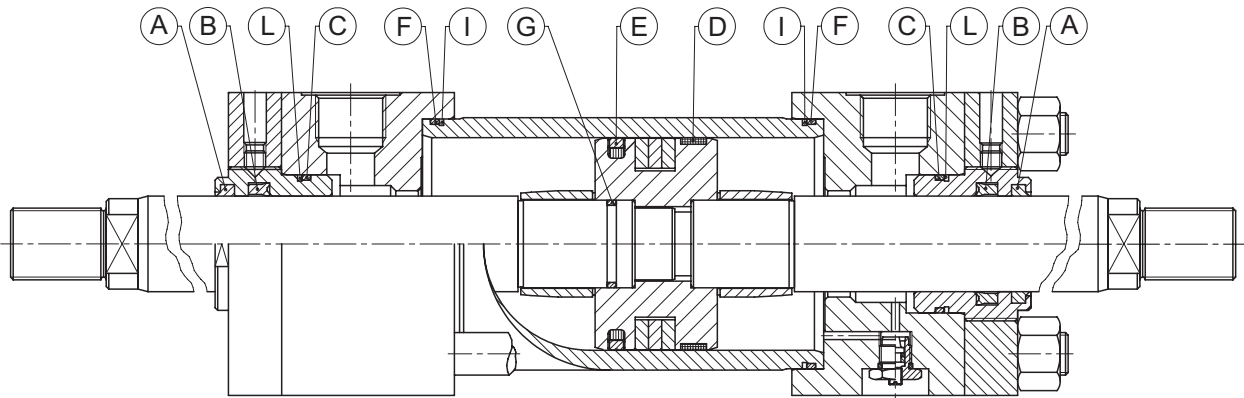
Tab.10 - Mechanical spare parts for M3 series double rod cylinders

Pos.	Description	Notes
1	Head	-
6	Front cushioning sleeve	Only if fitted with cushion
10	Flange plate	-
11	Rod bushing	-
12	Tie rod	-
13	Cushion needle valve cartridge	Only if fitted with cushion
14	Adjustment cushioning screw	Only if fitted with cushion
15	Nut	-
19	Grub screw locking rod bushing	-
20	Copper washer	Only if fitted with air bleeds
21	Air bleeds screw	Only if fitted with air bleeds

Pos.	Description	Notes
22	Screw thread protection cap	-
23	Front rod	-
24	Rear rod	-
26	Grub screw locking rod	-
27	Flange plate with through holes	-
42	Cylinder tube	-
44	Plastoferrite magnet [!]	-
45	Sensor mounting bracket	-
46	Reed magnetic sensor with connector	Bores 40, 50, 63, 63, 80, 100 e 125
47	Reed magnetic sensor with connector	Bores 25 e 32
48	Piston	-

[!] Variable amount depending on the bore

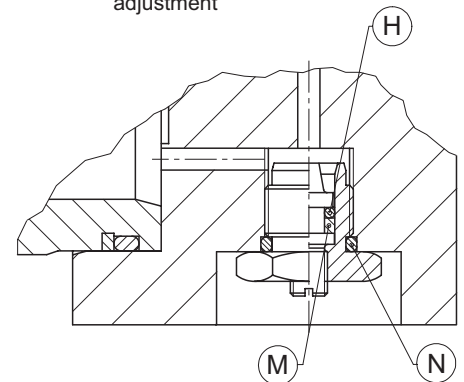
Spare seals kit for M3 series double rod cylinders



Tab. 11 - Spare seals kit for M3 series double rod cylinders

Pos.	Description	Notes
A	Scraper	-
B	Rod seal	-
C	Rod bushing O-Ring	Excluding bores 25, 32, 40 (rods 18 and 28)
D	Guide ring	-
E	Piston seal	-
F	Tube cylinder O-Ring	-
G	Piston O-Ring	-
H	Cushioning screw O-Ring	Only if fitted with cushion
I	Tube cylinder O-Ring back up washer	-
L	Rod bushing O-Ring back up washer	Excluding bores 25, 32, 40 (rods 18 and 28)
M	Cushioning screw O-Ring back up washer	Only if fitted with cushion
N	Cushioning needle valve cartridge O-Ring back up washer	Only if fitted with cushion

Detail showing cushioning adjustment



The following tables describe the procedure for ordering complete spare seals kit:

Tab. 12 - Complete seals kit for M3 series double rod cylinders

Features	Description	Code
Kit series	Complete seals kit for M3 double rod cylinders compliant with ISO 6020/2 standards	K3
Bore	Specify bore in mm	-
Rod	Rod diameter 12 mm (bore 25)	A
	Rod diameter 14 mm (bore 32)	B
	Rod diameter 18 mm (bores 25, 32 and 40)	D
	Rod diameter 22 mm (bores 32, 40 and 50)	F
	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100 and 125)	R
Rod diameter 90 mm (bore 125)	T	
Seals type	Normal (Nitrile rubber, Polyurethane)	5
	High temperature and/or aggressive fluid (Fluoroelastomer, PTFE charged bronze)	17*
	Water and glycol mixtures (nitrile rubber, PTFE charged bronze)	15
	Low friction (nitrile rubber, PTFE charged bronze)	12

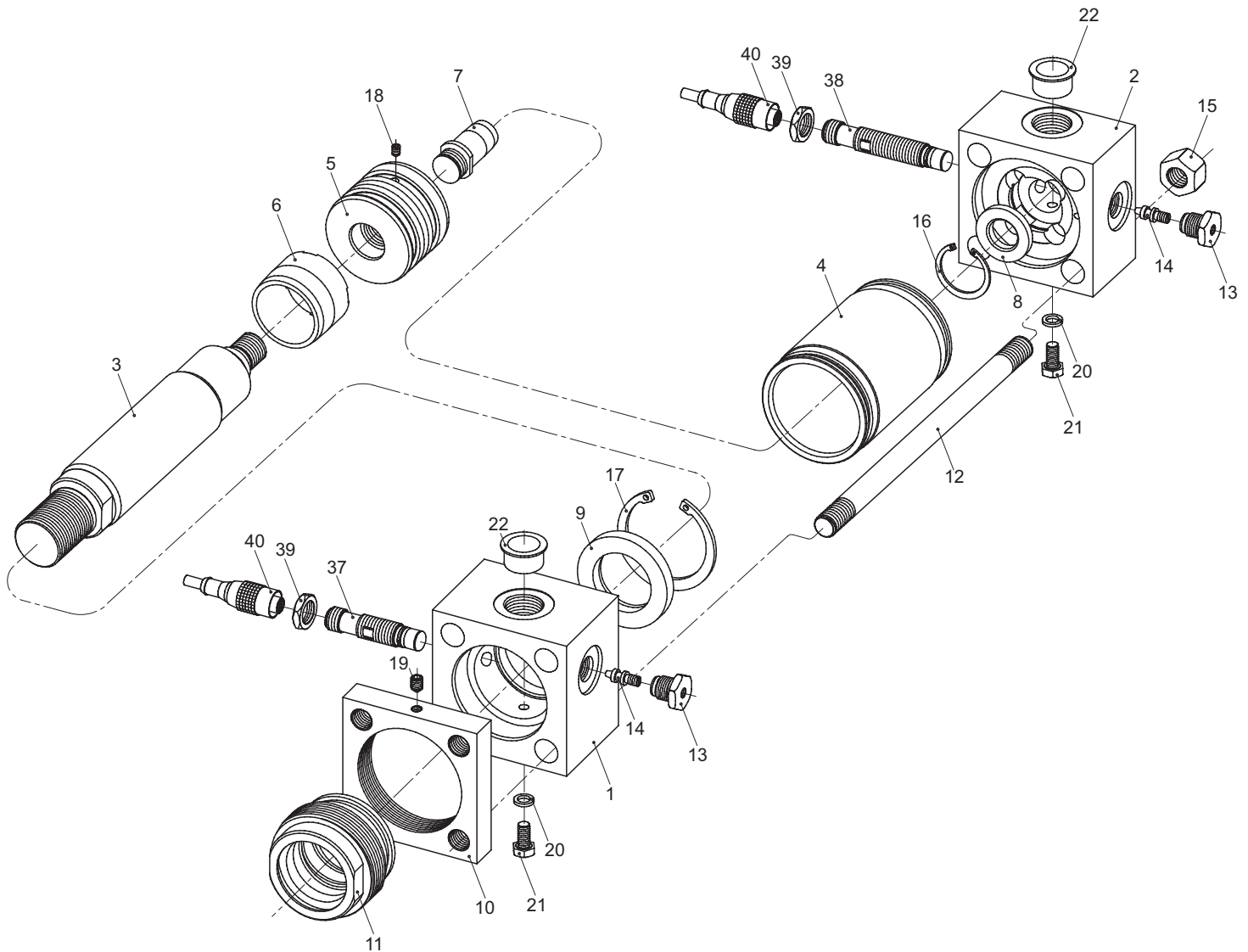
Seals ordering code

K3 000 A 0

* Maximum working temperature for sensors: 70 °C

ISO 6020/2 A3 Series

Exploded view showing mechanical spare parts for A3 series cylinders with inductive sensors

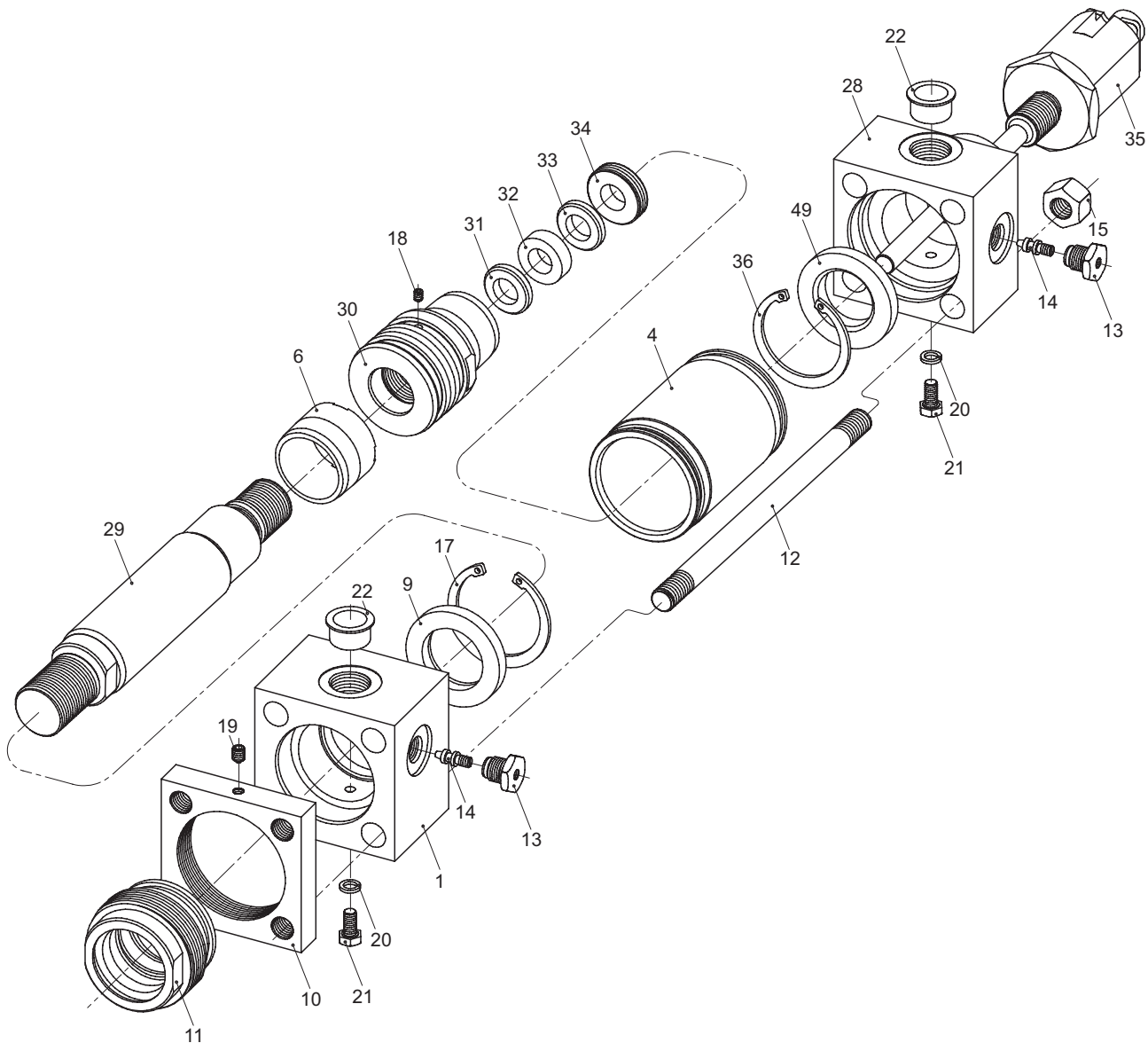


Tab.13 - Mechanical spare parts for A3 series cylinders with inductive sensors

Pos.	Description	Notes
1	Head	-
2	Cap	-
3	Rod	-
4	Cylinder tube	-
5	Piston	-
6	Front cushioning sleeve	-
7	Rear cushioning sleeve	-
8	Rear cushioning bush	-
9	Front cushioning bush	Bores 160 and 200
10	Flange plate	-
11	Rod bushing	-
12	Tie rod	-
13	Cushion needle valve cartridge	-

Pos.	Description	Notes
14	Adjustment cushioning screw	-
15	Nut	-
16	Rear cushioning elastic ring	-
17	Front cushioning elastic ring	Bores 160 and 200
18	Grub screw locking piston	-
19	Grub screw locking rod bushing	-
20	Copper washer	Only if fitted with air bleeds
21	Air bleeds screw	Only if fitted with air bleeds
22	Screw thread protection cap	-
37	Head inductive sensor	-
38	Cap inductive sensor	-
39	Nut locking sensor into position	-
40	Connector	-

Exploded view showing T3 series cylinders mechanical spare parts



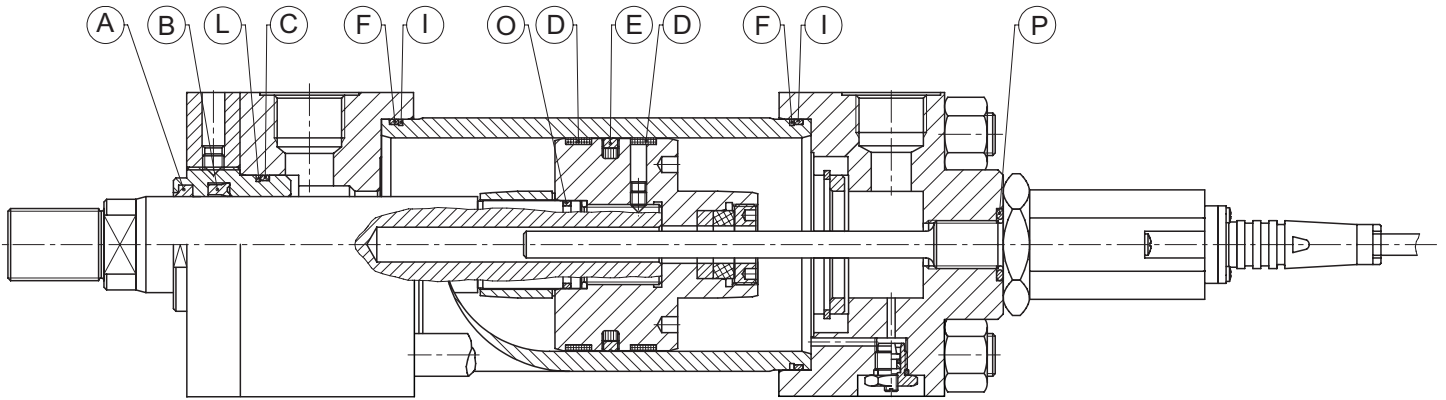
Tab.14 - Mechanical spare parts for T3 series cylinders

Pos.	Description	Notes
1	Head	-
4	Cylinder tube	-
6	Front cushioning sleeve	Only if fitted with cushion
9	Front cushioning bush	Bores 160 and 200 only if fitted with cushion
10	Flange plate	-
11	Rod bushing	-
12	Tie rod	-
13	Cushion needle valve cartridge	Only if fitted with cushion
14	Adjustment cushioning screw	Only if fitted with cushion
15	Nut	-
17	Front cushioning elastic ring	Alesaggi 160 e 200 only if fitted with cushion
18	Grub screw locking piston	-
19	Grub screw locking rod bushing	-

Pos.	Description	Notes
20	Copper washer	-
21	Air bleeds screw	-
22	Screw thread protection cap	-
28	Cap for linear transducer	-
29	Rod for linear transducer	-
30	Piston for linear transducer	-
31	Amagnetic front spacer	-
32	Toroidal positioning magnet	-
33	Amagnetic rear spacer	Bores 40 and 50
34	Ring locking magnet	-
35	Linear position transducer	Optional (supplied only on request)
36	Rear cushioning elastic ring	Bores 63,80,100,125,160 and 200 only if fitted with cushion
49	Rear cushioning bush	Bores 63,80,100,125,160 and 200 only if fitted with cushion

ISO 6020/2 A3 Series

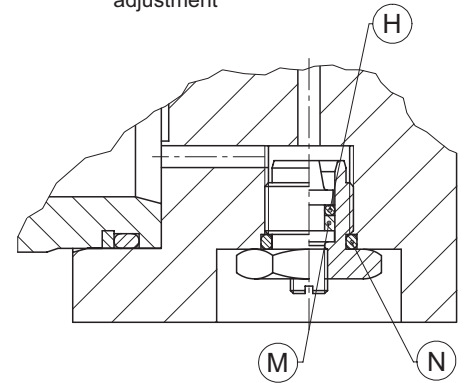
Spare seals kit for T3 series cylinders



Tab. 15 - Spare seals kit for T3 series cylinders

Pos.	Description	Notes
A	Scraper	-
B	Rod seal	-
C	Rod bushing O-Ring	-
D	Guide ring	-
E	Piston seal	-
F	Tube cylinder O-Ring	-
O	Piston O-Ring	-
H	Cushioning screw O-Ring	Only if fitted with cushion
I	Tube cylinder O-Ring back up washer	-
L	Rod bushing O-Ring back up washer	-
M	Cushioning screw O-Ring back up washer	Only if fitted with cushion
N	Cushioning needle valve cartridge O-Ring back up washer	Only if fitted with cushion
P	Position transducer O-Ring	-

Detail showing cushioning adjustment



The following tables describe the procedure for ordering complete spare seals kit:

Tab. 16 - Complete seals kit for T3 series (designed to take magnetostrictive transducer)

Features	Description	Code
Kit series	Complete seals kit for T3 cylinders compliant with ISO 6020/2 standards	K3
Bore	Specify bore in mm	-
Rod	Rod diameter 28 mm (bores 40, 50 and 63)	H
	Rod diameter 36 mm (bores 50, 63 and 80)	L
	Rod diameter 45 mm (bores 63, 80 and 100)	M
	Rod diameter 56 mm (bores 80, 100 and 125)	P
	Rod diameter 70 mm (bores 100, 125 and 160)	R
	Rod diameter 90 mm (bores 125, 160 and 200)	T
	Rod diameter 110 mm (bores 160 and 200)	V
	Rod diameter 140 mm (bore 200)	Z
Seals type	Normal (Nitrile rubber, Polyurethane)	19
	High temperature and/or aggressive fluid (Fluoroelastomer, PTFE charged bronze)	18*
	Water and glycol mixtures (nitrile rubber, PTFE charged bronze)	6
	Low friction (nitrile rubber, PTFE charged bronze)	13

Seals ordering code

K3 000 A 0

* Maximum working temperature: 70 °C

Weights of the A3 series

Note the bore, diameter of rod, mounting type and stroke, the total weight of the cylinder is calculated by adding the weight in Kg according to mounting type at blank stroke to the weight for each 10 mm of stroke, multiplied by the stroke in cm.

Bore Ø mm	Rod Ø mm	Weight in Kg according to the mounting type at blank stroke								Weight for every 10 mm of stroke
		01	02	03	13 - 14	04 - 05	06	07 - 08 - 09	00 - 10 - 11 - 12 - 30 - 31	
25	12	1,3	1,3	1,3	1,4	1,4	1,5	1,4	1,2	0,04
	18									0,06
32	14									0,06
	18	1,8	1,8	1,8	1,9	1,7	1,9	1,9	1,6	0,07
	22									0,08
40	18									0,1
	22	4	4,3	3,9	4,6	3,9	4,6	4,2	3,7	0,11
	28	4,1	4,3	4	4,7	4	4,7	4,3	3,8	0,12
50	22	6,4	6,8	6,4	7,2	6,3	7,9	7,1	5,9	0,14
	28	6,5	6,9	6,5	7,2	6,4	8	7,2	6	0,17
	36	6,6	7	6,6	7,3	6,5	8,1	7,3	6,1	0,18
63	28	9,1	10	9,7	10	8,8	10,5	10,1	8,5	0,19
	36	9,2	10,1	9,8	10,1	8,9	10,6	10,3	8,6	0,22
	45	9,3	10,2	9,9	10,2	9,1	10,7	10,4	8,7	0,26
80	36	17,2	18,7	17,2	18,8	16,6	19	19,5	16	0,27
	45	17,4	18,9	17,4	19	16,7	19,8	19,6	16,2	0,32
	56	17,5	19	17,6	19,1	16,9	21,8	19,8	16,3	0,39
100	45	23,6	25,9	23	25	22,8	26	28,1	22	0,4
	56	24,1	26,4	24	25,5	23,1	27	28,5	22,5	0,48
	70	24,1	26,9	25	26	23,4	28	29	23	0,58
125	56	44	48,1	44	47,5	42,5	48	53	41,5	0,65
	70	45	49,1	44,5	48	43	49	54	42,5	0,76
	90	46,5	50,6	45	49	44	50	55	44	0,96
160	70	73,3	79,6	72	79	70,9	84	89,5	69	1
	90	74,3	80,6	73	80	72	85	91	70	1,2
	110	75,3	81,6	74	81	72,5	86	92	71	1,4
200	90	127,6	136,8	128,5	137	127	152	157	122	1,6
	110	128,6	137,8	129,7	139	128,5	153	158	123	1,8
	140	129,6	139,8	131	140	129,5	155	159	124	2,2

Single-acting cylinders

CMB cylinders are supplied as standard with double-acting function.

They may however be used as single-acting cylinders by feeding the cylinder from just one side of the piston and delegating the task of repositioning the rod to an outside load when the feeding pressure ceases to work. The unused connection must be connected to a source of external lubrication to allow lubricated air in and out of the chamber not supplied with hydraulic oil.

Double rod cylinders

Double rod cylinders are produced using two separate rods, one screwed onto the end of the other.

As a consequence of this type of connection, on all double rod cylinders, the rod into which the other one is screwed is inevitably less resistant.

For identification purposes, the stronger rod is marked at

the end with the letter "M". CMB recommends the use of the weaker rod only for less demanding applications.

Standard and large-sized connections

The cylinders in the A3 series are supplied with BSP screw-threaded cylindrical connections with housing for sealing washers.

In the event that it is necessary to use oil inlets different from the ones illustrated in the sizing tables of this catalogue, larger-sized connections, SAE flange couplings and screw threading not covered by ISO 6020/2 standards are available. For further information, contact our Technical Department.

Choice of diameter of rod

To guarantee sufficient resistance at peak loading, cylinder rods undergoing certain conditions of pushing force must be checked following the calculation procedure given below:

- Establish the mounting type and most suitable rod connection to be used for the application the cylinder is to be used for. Using the table below (Tab.17), establish the stroke factor corresponding to the conditions the cylinder is to work in.
- Calculate the basic length by multiplying the working stroke by the stroke factor determined above.
- Determine the push force by multiplying the total cross-section of the cylinder by the working pressure or by using Table 18 on page 59.
- On the diagram in Fig. 7 on page 58, find the intersection point between the coordinates relating to the pushing force and the basic length.
- The rod diameter to be chosen is the one given by the curve immediately above the previously found intersection point.
- Rods of smaller diameter than the one given by the diagram do not ensure sufficient mechanical resistance.

Spacers

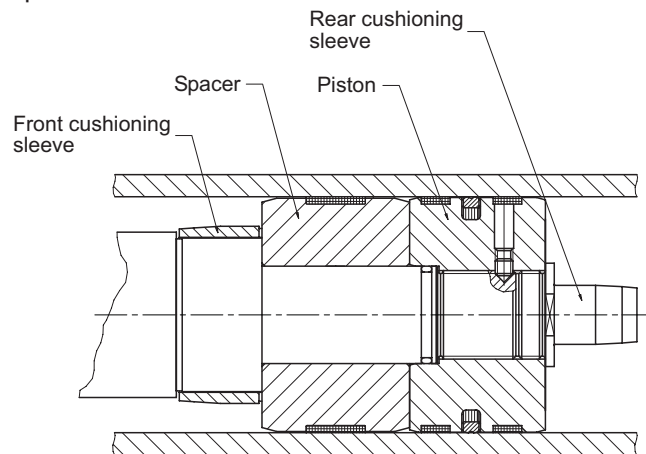
Spacers prevent the piston from hitting against the head when the rod is completely extended and guarantee the presence of a space that can be varied by the number of limiting devices inserted between the piston and cylinder head.

This enables the lever arm present between the bush and piston to be increased, thereby increasing as a consequence the rigidity of the rod. The number of spacers to be used depends on the loading conditions and the mounting style, set out in the right-hand column of the diagram in Fig. 7; each spacer has a length of 50 mm.

Remember that the dimensions of the cylinder are increased by 50 mm multiplied by the number of spacers used with respect to the figures given in the support tables. If the number of spacers required falls in the grey area, please consult our Technical Department so that a more specific cylinder can be designed to your requirements.

Example of code: **A3125R2250P04/4**

Cylinder to ISO 6020/2 standards - bore 125 - rod 70 - working stroke 2250 - cushioning on both ends - head trunnion (ISO MT1) - N° 4 spacers (L=50x4=200 mm). The quotas ZB, ZJ and PJ obtained from the support tables must be increased by 200 mm due to the presence of four spacers.

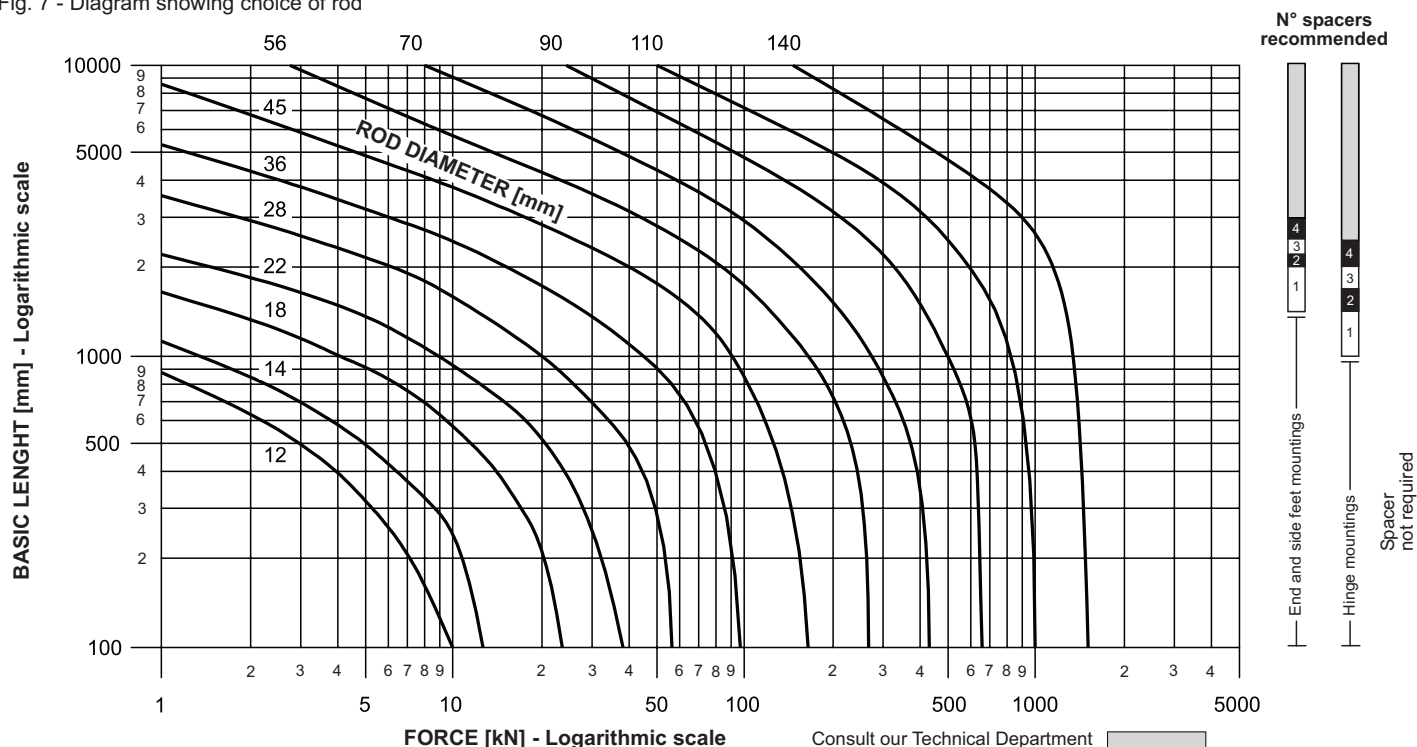


Tab. 17 - Stroke factor choice table

Mounting style	Rod connection	Mounting	Stroke factor
01,10,12,13,30	Fixed and supported		2
	Fixed and rigidly guided		0,5
	Jointed and rigidly guided		0,7
02,11,14,31	Fixed and supported		4
	Fixed and rigidly guided		1
	Jointed and rigidly guided		1,5
04	Jointed and rigidly guided		1

Mounting style	Rod connection	Mounting	Stroke factor
05,07,08,09	Jointed and supported		4
	Jointed and rigidly guided		2
03	Fixed and supported		2
	Fixed and rigidly guided		0,5
	Jointed and rigidly guided		0,7
06	Jointed and supported		3
	Jointed and rigidly guided		1,5

Fig. 7 - Diagram showing choice of rod



Theoretical velocities

The drawing in Fig.8 represents the conventional hydraulic diagram of a cylinder: note how the fluid alternately feeds the front chamber through the 4/2 distributor when the rear chamber is discharging and vice versa.

The theoretical speeds generated by the cylinder can be obtained from the following correlations:

Rod speed when pushing:

$$V_s = \frac{Q \cdot 1000}{A_p \cdot 60}$$

Rod speed when pulling:

$$V_t = \frac{Q \cdot 1000}{A_a \cdot 60}$$

dove:

V_s = Rod pushing speed in m/s

V_t = Rod pulling speed in m/s

Q = Flow rate in l/min

A_p = Piston area in mm^2

A_a = Annular area in mm^2

A_s = Rod area in mm^2

Q_d = Flow rate through directional control valve in l/min

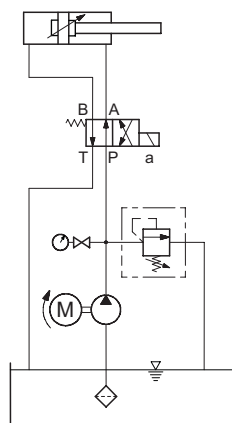


Fig. 8

The drawing in Fig.9 represents the diagram of the regenerative hydraulic circuit of a cylinder.

This diagram finds application in systems which require high speeds combined with relatively low degrees of force: note that the ring chamber is always in communication with the pump while the total chamber is connected alternately by means of the 4/2 distributor to the pump and therefore the rod protrudes by the difference in the areas or on discharge and therefore the rod reenters.

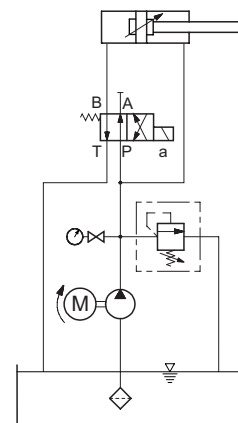


Fig. 9

The theoretical speeds generated by the cylinder can be obtained from the following correlations:

Rod speed when pushing:

$$V_s = \frac{Q \cdot 1000}{A_s \cdot 60}$$

Rod speed when pulling:

$$V_t = \frac{Q \cdot 1000}{A_a \cdot 60}$$

In installations with a regenerating circuit the distributor must be correctly sized. The capacity transiting through the distributor is calculated as follows:

$$Q_d = \frac{V_s \cdot A_p \cdot 60}{1000}$$

Theoretical forces developed by the cylinder

When choosing a hydraulic cylinder, it is necessary to check that on the installation the nominal pressure values indicated for this series of products are not exceeded. These for continuous service are equal to 160 bar even if the sizing of the cylinders allows maximum working peaks of 250 bar to be achieved for short periods of time. Having established the load and working pressure, and after having determined the most suitable diameter of the rod to guarantee resistance at peak loads (see pages 57 and 58), the cylinder bore may be chosen from the table below by identifying the working pressure and the closest pushing or pulling force generated to the one required.

Tab. 18 - Theoretical forces developed by the cylinder

Bore Ø mm	Rod Ø mm	Working Area		25 bar **		50 bar **		75 bar **		100 bar **		150 bar **		200 bar **		250 bar **								
		Push	Pull	Push	Pull	Push	Pull	Push	Pull	Push	Pull	Push	Pull	Push	Pull	Push	Pull							
		mm ²	mm ²	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*	kN*						
25	12	490,87	377,78	1,23	0,945	2,46	1,89	3,68	0,2835	4,91	3,78	7,37	5,67	9,82	7,56	12,28	9,45							
	18		236,40															0,59	1,18	0,177	2,36	3,54	4,72	5,9
32	14	804,25	650,31	2,01	1,625	4,02	3,25	6,03	0,4875	8,04	6,50	12,06	9,75	16,08	13	20,1	16,25							
	18		549,78															1,3725	2,745	0,4118	5,49	8,235	10,98	13,725
	22		424,11															1,06	2,12	0,318	4,24	6,36	8,48	10,6
40	18	1256,64	1002,17	3,14	2,505	6,29	5,01	9,43	0,7515	12,57	10,02	18,86	15,03	25,14	20,04	31,43	25,05							
	22		876,51															2,19	4,38	0,657	8,76	13,14	17,52	21,9
	28		640,88															1,6025	3,205	0,4808	6,41	9,615	12,82	16,025
50	22	1963,49	1583,36	4,91	3,9575	9,82	7,915	14,72	1,1873	19,63	15,83	29,45	23,745	39,26	31,66	49,08	39,575							
	28		1347,74															3,37	6,74	1,011	13,48	20,22	26,96	33,7
	36		945,62															2,365	4,73	0,7095	9,46	14,19	18,92	23,65
63	28	3117,24	2501,49	7,79	6,2525	15,19	12,505	23,37	1,8758	31,17	25,01	46,76	37,515	62,34	50,02	77,93	62,525							
	36		2099,37															5,2475	10,495	1,5743	20,99	31,485	41,98	52,475
	45		1526,81															3,8175	7,635	1,1453	15,27	22,905	30,54	38,175
80	36	5026,54	4008,67	12,57	10,023	25,14	20,045	37,70	3,0068	50,27	40,09	75,04	60,135	100,54	80,18	125,68	100,23							
	45		3436,11															8,59	17,18	2,577	34,36	51,54	68,72	85,9
	56		2563,54															6,41	12,82	1,923	25,64	38,46	51,28	64,1
100	45	7853,98	6263,55	19,64	15,66	39,27	31,32	58,90	4,698	78,54	62,64	117,81	93,96	157,08	125,28	196,35	156,6							
	56		5390,97															13,478	26,955	4,0433	53,91	80,865	107,82	134,78
	70		4005,53															10,015	20,03	3,0045	40,06	60,09	80,12	100,15
125	56	12271,84	9808,93	30,68	24,523	61,36	49,045	92,04	7,3568	122,72	98,09	184,08	147,14	245,44	196,18	306,8	245,23							
	70		8423,39															21,058	42,115	6,3173	84,23	126,35	168,46	210,58
	90		5910,12															14,775	29,55	4,4325	59,1	88,65	118,2	147,75
160	70	20106,18	16257,73	50,27	40,645	100,53	81,29	150,80	12,194	201,06	162,58	301,59	243,87	402,12	325,16	502,65	406,45							
	90		13744,46															34,36	68,72	10,308	137,44	206,16	274,88	343,6
	110		10602,87															26,508	53,015	7,9523	106,03	159,05	212,06	265,08
200	90	31415,90	25054,18	78,54	62,635	157,08	125,27	235,62	18,791	314,16	250,54	471,24	375,81	628,32	501,08	785,4	626,35							
	110		21912,59															54,783	109,57	16,435	219,13	328,7	438,26	547,83
	140		16022,11															40,055	80,11	12,017	160,22	240,33	320,44	400,55

* 1kN = 98,067 Kg_f

** 1bar = 100000 Pa

Cushioning cones length

Bore Ø	Front cushioning cone length	Rear cushioning cone length
25	17	17
32	17	17
40	28	26
50	28	26
63	28	26

Bore Ø	Front cushioning cone length	Rear cushioning cone length
80	28	28
100	30	31
125	30	30
160	38	38
200	45	55

All dimensions are given in millimetres.

End of stroke cushioning

End of stroke cushioning is provided by optional braking devices available for all bores and recommended to control deceleration at the end of stroke of the load applied to the rod when the piston speed exceeds 0.1 m/s. End of stroke braking is in all circumstances recommended because it reduces peaks in pressure and thrust transmitted through the installation thereby guaranteeing greater resistance of the cylinder to fatigue as well as of the hydraulic devices connected to the installation.

Cushioning can be provided to the head and cap or both sides without the size of the cylinder being altered. The braking speed is adjustable by means of needle valves provided with a safety anti-expulsion system to prevent the adjustment needle from being inadvertently removed from the cartridge during adjustment operations.

In comparison with cylindrical and conical cushioning systems present on the market, CMB uses special cushioning cones with 3 tapers, sized to absorb the energy developed during the end of stroke braking in a constant way, thereby drastically reducing thrust and guaranteeing progressive braking action, bringing the pressure states in the chamber up to a value that provides ideal cushioning.

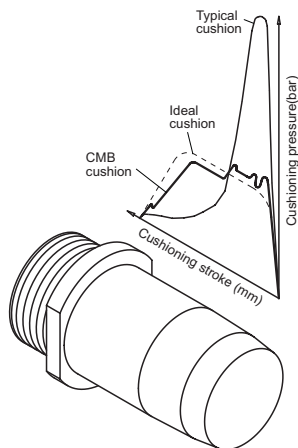


Fig. 10 - Theoretical pressure states in the braking chamber

Position of connections

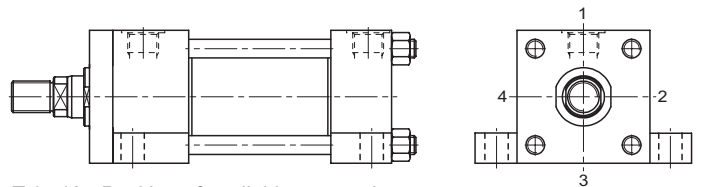
In table 19 at the bottom of the page, the standard positions of the input connections (**P**), end of stroke braking (**R**), air bleeds (**S**) and inductive sensors (**K**), depending on the mounting type chosen, are highlighted in bold print. In the event that rotated positions are required, this must be specified during the ordering stage, indicating in the order code the letter corresponding to the type of connection (**P,R,S** or **K**) to be rotated with respect to the standard followed by the new position side (**1,2,3** or **4**) of the head and cap respectively consistent with the sides available in the table. In the event that no specification is made in the order code, the connections will be the standard ones highlighted in the table.

Example of code: **A3080P0400P02/CF**

Cylinder compliant with ISO 6020/2 - bore 80 - rod 56 - stroke 400 - rectangular rear flange (not in line to ISO) - oil feeding inlets standard position side 1 (see table below) - standard position cushioning side 3 (see table below) - standard position air bleeds side 4 (see table below) - standard position front and rear inductive sensor side 2 (see table below).

Example of code: **A3050L0200P09/CE R23S42K03**

Cylinder compliant with ISO 6020/2 - bore 50 - rod 36 - stroke 200 - cap fixed clevis (MP1) – oil feeding inlets standard position side 1 - cushioning side 2 on head and side 3 on cap - air bleeds side 4 on head and side 2 on cap - inductive sensor side 3 only on cap.



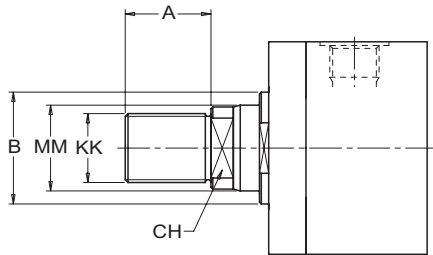
Tab. 19 - Position of available connections

		Mounting styles																	
		00 - 01 - 02		03		04		05		06 - 07 - 08 - 09 - 10 - 11 - 12				13		14		30 - 31	
		Head	Cap	Head	Cap	Head	Cap	Head	Cap	Head	Cap	Head	Cap	Head	Cap	Head	Cap		
Oil port P	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	2	2	-	-	-	2	2	-	2	2	2	2	2	2	2	2	2		
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
	4	4	-	-	-	4	4	-	4	4	4	4	4	4	4	4	4		
Braking adjustment R	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1		
	2	2	2	2	-	2	2	-	2	2	-	2	2	-	2	2	2		
	3	3	-	-	3	3	3	3	3	3	3	3	3	3	3	3	3		
	4	4	4	4	-	4	4	-	4	4	-	4	4	-	4	4	4		
Air bleeds S	1	1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1		
	2	2	2	2	-	2	2	-	2	2	-	2	2	-	2	2	2		
	3	3	-	-	3	3	3	3	3	3	3	3	3	3	3	3	3		
	4	4	4	4	-	4	4	-	4	4	-	4	4	-	4	4	4		
Inductive sensors K	1	1	-	-	-	1	1	-	1	1	1	1	1	1	1	1	1		
	2	2	2	2	-	2	2	-	2	2	2	2	2	2	2	2	2		
	3	3	-	-	3*	3	3	3*	3	3	3	3	3	3	3	3	3		
	4	4	4	4	-	4	4	-	4	4	4	4	4	4	4	4	4		

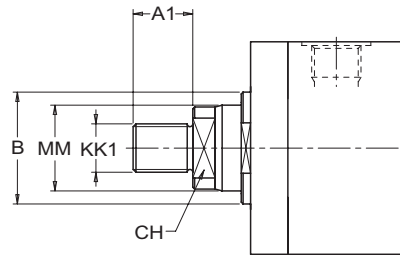
* Available from bore 63 inclusive

DIMENSIONS OF ROD ENDS

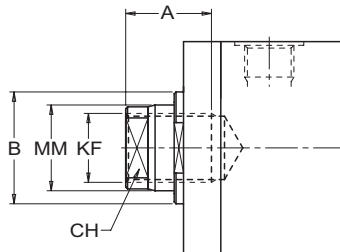
Standard thread rod end



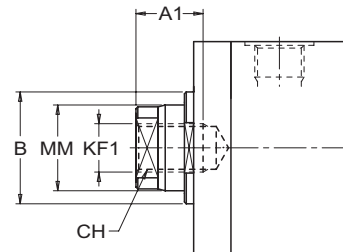
Style x: light male thread rod end



Style w: female thread rod end



Style y: Light female thread rod end



Bore Ø	MM Ø	A	A1	B ^{f8} Ø	CH	KK (Metric)	KK1 (Metric)	KF (Metric)	KF1 (Metric)
25	12	14	14	24	9	M10x1,25	M10x1,25	M8x1	M8x1
	18	18	14	30	14	M14x1,5	M10x1,25	M12x1,25	M8x1
32	14	16	16	26	11	M12x1,25	M12x1,25	M10x1,25	M10x1,25
	18	18	14	30	14	M14x1,5	M10x1,25	M12x1,25	M8x1
	22	22	16	34	17	M16x1,5	M12x1,25	M16x1,5	M10x1,25
40	18	18	14	30	14	M14x1,5	M10x1,25	M12x1,25	M8x1
	22	22	16	34	17	M16x1,5	M12x1,25	M16x1,5	M10x1,25
	28	28	18	42	22	M20x1,5	M14x1,5	M20x1,5	M12x1,25
50	22	22	16	34	17	M16x1,5	M12x1,25	M16x1,5	M10x1,25
	28	28	18	42	22	M20x1,5	M14x1,5	M20x1,5	M12x1,25
	36	36	22	50	30	M27x2	M16x1,5	M27x2	M16x1,5
63	28	28	18	42	22	M20x1,5	M14x1,5	M20x1,5	M12x1,25
	36	36	22	50	30	M27x2	M16x1,5	M27x2	M16x1,5
	45	45	28	60	36	M33x2	M20x1,5	M33x2	M20x1,5
80	36	36	22	50	30	M27x2	M16x1,5	M27x2	M16x1,5
	45	45	28	60	36	M33x2	M20x1,5	M33x2	M20x1,5
	56	56	36	72	50	M42x2	M27x2	M42x2	M27x2
100	45	45	28	60	36	M33x2	M20x1,5	M33x2	M20x1,5
	56	56	36	72	50	M42x2	M27x2	M42x2	M27x2
	70	63	45	88	60	M48x2	M33x2	M48x2	M33x2
125	56	56	36	72	50	M42x2	M27x2	M42x2	M27x2
	70	63	45	88	60	M48x2	M33x2	M48x2	M33x2
	90	85	56	108	75	M64x3	M42x2	M64x3	M42x2
160	70	63	45	88	60	M48x2	M33x2	M48x2	M33x2
	90	85	56	108	80	M64x3	M42x2	M64x3	M42x2
	110	95	63	133	100	M80x3	M48x2	M80x3	M48x2
200	90	85	56	108	80	M64x3	M42x2	M64x3	M42x2
	110	95	63	133	100	M80x3	M48x2	M80x3	M48x2
	140	112	85	163	130	M100x3	M64x3	M100x3	M64x3

All dimensions are given in millimetres.

KatCMB

KatCMB is the new multi-media technical catalogue produced by CMB to simplify the composition of codes and drawing up of cylinder designs to ISO 6020/2 and ISO 6022 standards.

As well as guiding the Customer in the choice and composition of cylinder codes, the programme is able to generate CAD drawings which may be imported and if necessary customised by means of various CAD applications thanks to the DXF graphic interchange file.

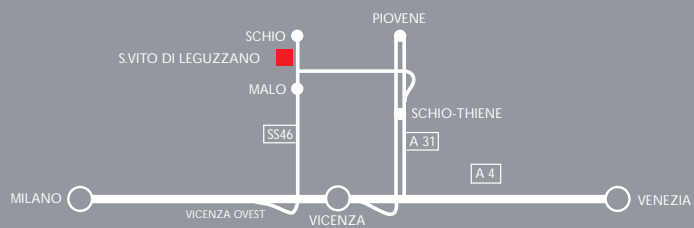
To request **KatCMB** or obtain more detailed information about the product, contact our Marketing Service.

Index

	Page
PRESENTATION AND COMPOSITION OF CYLINDER CODES	
Presentation and technical features.....	1
How to order a CMB A3 series cylinder.....	2
Seals and hydraulic fluids.....	3
Mountings choice for the A3 series.....	4
Main categories of mounting types.....	4
Side foot mounting.....	4
End mounting.....	4
Hinge mounting.....	4
Double rod cylinders mounting.....	4
TYPES OF MOUNTING FOR SINGLE-ROD CYLINDERS	
Basic version (not to ISO standards).....	5
Rectangular front flange (not to ISO standards).....	6
Rectangular rear flange (not to ISO standards).....	7
Side foot (ISO MS2).....	8
Head trunnion (ISO MT1).....	9
Cap trunnion (ISO MT2).....	10
Intermediate fixed trunnion (ISO MT4).....	11
Rear clevis (ISO MP3).....	12
Rear spherical bearing (ISO MP5).....	13
Cap fixed clevis (ISO MP1).....	14
Extended front tie rods (ISO MX3).....	15
Extended rear tie rods (ISO MX2).....	16
Extended on both ends tie rods (ISO MX1).....	17
Head flange (ISO ME5).....	18
Cap flange (ISO ME6).....	19
Front screwed tapped holes (ISO MX5).....	20
Rear screwed tapped holes (ISO MX6).....	21
TYPES OF MOUNTING FOR DOUBLE-ROD CYLINDERS	
Double rod basic version (not to ISO standards).....	22
Double rod rectangular front flange (not to ISO standards).....	23
Double rod side foot (ISO MS2).....	24
Double rod head trunnion (ISO MT1).....	25
Double rod intermediate fixed trunnion (ISO MT4).....	26
Double rod extended front tie rods (ISO MX3).....	27
Double rod extended on both ends tie rods (ISO MX1).....	28
Double rod head flange (ISO ME5).....	29
Front screwed tapped holes (ISO MX5).....	30
ACCESSORIES	
Rod eye.....	31
Rod eye with spherical bearing.....	31
Rod eye with spherical bearing (ISO 6982/DIN 24338).....	32
Rod eye with spherical bearing (ISO 8133/DIN 24555).....	32
Rod end accessory (ISO 8132).....	33
Fork joint hinge with pin (ISO 8133).....	33
Vertical male counterhinge.....	34
Trunnion mounting block (ISO 8132).....	34
Male hinge support with spherical bearing (DIN 24556).....	35
Cetop 03 and Cetop 05 plates for incorporated valves.....	35
CYLINDERS WITH MAGNETIC SENSORS	
Cylinders with magnetic sensors.....	36
Reed magnetic sensors.....	36
Hall effect magnetic sensors.....	36
Ordering magnetic sensors.....	36
Mounting brackets.....	36
Limits to the use of M3 series.....	37
Technical features of Reed sensors.....	37
Wiring diagram of Reed sensors.....	37

Index

	Page
Technical features of NPN and PNP Hall effect sensors.....	37
Wiring diagram of NPN and PNP Hall effect sensors.....	37
CYLINDERS WITH INDUCTIVE SENSORS	
Inductive proximity sensors.....	38
Features of inductive sensors.....	38
CYLINDERS WITH MAGNETOSTRICTIVE TRANSDUCER	
Introduction to T3 series cylinders.....	39
Mounting type.....	39
Magnetostrictive transducer.....	39
Types of output signals available.....	39
CE mark.....	39
Rear dimensions of transducer with flying connector.....	40
Rear dimensions of transducer integral cable.....	40
Types and dimensions of connector.....	40
Technical features of Linear-analog transducer.....	40
Ordering code for Linear-analog transducer.....	41
Technical features of SSI, Can-Bus and Profibus-DP transducers.....	41
Ordering code for Synchronous-Serial transducer.....	42
Ordering code for Can-Bus transducer.....	42
Ordering code for Profibus-DP transducer.....	43
Electrical connections.....	42
STORAGE AND MAINTENANCE OF CYLINDERS	
Storage and maintenance.....	43
Replacing bush seals.....	44
EXPLODED VIEWS SHOWING MECHANICAL PARTS AND SEALS	
Exploded view showing A3 series cylinders mechanical spare parts.....	45
Spare seals kit for standard A3 series cylinders and for A3 series with inductive sensors.....	46
Exploded view showing mechanical spare parts for A3 series double rod cylinders.....	47
Spare seals kit for standard A3 series double rod cylinders and for A3 series double rod with inductive sensors.....	48
Exploded view showing M3 series cylinders mechanical spare parts.....	49
Spare seals kit for M3 series cylinders.....	50
Exploded view showing mechanical spare parts for M3 series double rod cylinders.....	51
Spare seals kit for M3 series double rod cylinders.....	52
Exploded view showing mechanical spare parts for A3 series double rod cylinders with inductive sensors.....	53
Exploded view showing T3 series cylinders mechanical spare parts.....	54
Spare seals kit for standard T3 series cylinders.....	55
CHOICE AND SIZING OF CYLINDERS	
Weights of the A3 series.....	56
Single-acting cylinders.....	56
Double rod cylinders.....	56
Standard and large-sized connections.....	56
Choice of diameter of rod.....	57
Spacers.....	57
Theoretical velocities.....	58
Theoretical forces developed by the cylinder.....	59
Cushioning cones length.....	59
End of stroke cushioning.....	60
Position of connections.....	60
Dimensions of rod ends.....	61
KatCMB - multi-media technical catalogue.....	62



CMB S.r.l. - Via Vicenza, 17
36030 S.Vito di Leguzzano (VI) Italy
Tel +39 0445 519555 r.a.
Fax +39 0445 519481
www.cmbcilindri.com
info@cmb-cil.com