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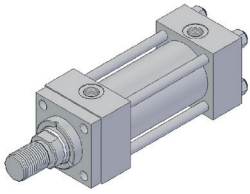
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ISO 6020/2 HYDRAULIC CYLINDERS WITH TIE-RODS

ISO 6020/2 hydraulic cylinders with tie-rods are suitable for a wide range of industrial applications, when a compact, highly reliable and easy-to-maintain product is required, thanks to the configuration with four high-strength tie-rods, the use of the best materials and technical choices guided by the great experience gained through the years.

TIE-RODS CYLINDERS SERIES

6

CD

The CD and DK series hydraulic cylinders are ISO 6020/2 tie-rods cylinders.

DK

They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke switches integrated in the cylinder heads, as well as many other special options. In addition, for applications in aggressive environments in contact with substances that promote corrosion, they are available with a chemical nickel-plated surface treatment.

TIE-RODS CYLINDERS SERIES WITH MAGNETIC SWITCHES

20

MD

The MD series hydraulic cylinders have the same technical features, dimensions and available options as the standard CD and DK series, but are equipped with a magnetic piston and stainless-steel tube.

One or more magnetic switches can be positioned along the tube, fixed to the tie-rods, to detect the passage of the piston in correspondence with the SR or SH switches. Special programmable sensors are available on request.

TIE-RODS SERVOCYLINDERS SERIES WITH POSITION TRANSDUCER

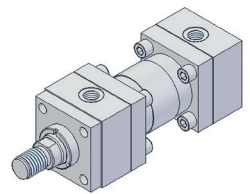
22

TD

The TD and TK series hydraulic servocylinders have the same technical features, dimensions and available options as the CD and DK series,

TK

but are equipped with a magnetostrictive linear position transducer for precise and continuous detection of the piston at any point in the servocylinder stroke. The external parts of the position transducer are protected against accidental impact during transport, installation and operation by a removable steel cover.



ISO 6020/2 HYDRAULIC CYLINDERS WITH COUNTERFLANGES

ISO 6020/2 hydraulic cylinders with counterflanges are suitable for a wide range of industrial applications, when a compact, highly reliable and easy-to-maintain product is required, thanks to the use of the best materials and technical choices based on years of experience.

HYDRAULIC CYLINDERS SERIES WITH COUNTERFLANGES

26

HD

The HD and HK series hydraulic cylinders are the basic version of the ISO 6020/2 counterflanges cylinders.

HK

They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke switches integrated in the cylinder heads, and many other special options.

HYDRAULIC SERVOCYLINDERS SERIES WITH COUNTERFLANGES AND POSITION TRANSDUCER

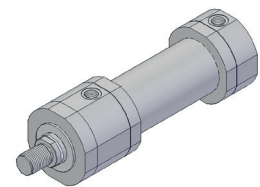
39

TH

The TH and TX series hydraulic servocylinders have the same technical features, dimensions and available options as the basic HD and

TX

HK series, but are equipped with a magnetostrictive linear position transducer for accurate and continuous detection of the piston at any point in the servocylinder stroke. The external parts of the position transducer are protected against accidental impacts during transport, installation and operation by a removable steel cover.



ISO 6022 HYDRAULIC CYLINDERS

ISO 6022 hydraulic cylinders are suitable for particularly heavy duty applications, in industrial applications where great robustness, high working pressures (up to 250 bar) and technical solutions that ensure durability and reliability even in difficult environments are required, thanks to the use of the best materials.

HEAVY DUTY CYLINDER SERIES

42

DP

The DP series hydraulic cylinders comply with ISO 6022. They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke switches integrated in the cylinder heads, and many other special options.

HEAVY DUTY SERVOCYLINDER SERIES WITH POSITION TRANSDUCER

53

TP

The TP series hydraulic servocylinders have the same technical features, dimensions and available options as the DP basic series, but are equipped with a magnetostrictive linear position transducer for precise and continuous detection of the piston at any point in the servocylinder stroke. The external parts of the position transducer are protected against accidental impact during transport, installation and operation by a removable steel cover.

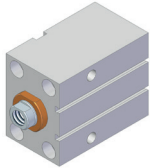
ACCESSORIES FOR ISO HYDRAULIC CYLINDERS

ROD END ACCESSORIES

56

ACCESSORIES FOR CYLINDER MOUNTING

58



COMPACT HYDRAULIC CYLINDERS

Compact double-acting hydraulic cylinders are suitable for industrial automation applications where a compact, highly modular construction is required also for heavy duty applications. Also available with built-in magnetic switches for piston position control.

LIGHT ALLOY COMPACT CYLINDER SERIES

60

RP Double-acting hydraulic cylinders in high-strength aluminium alloy with anti-wear treatment. Suitable for industrial automation in non-severe conditions, when a lightweight, compact and highly modular construction is required.

LIGHT ALLOY COMPACT CYLINDER SERIES WITH MAGNETIC SWITCHES

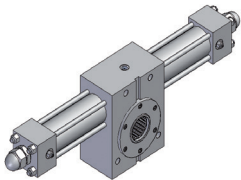
60

MP Double-acting hydraulic cylinders made of high-strength aluminium alloy with anti-wear treatment. One or more magnetic switches can be positioned along the prepared seats to detect the passage of the piston in correspondence with the SP switch. Special programmable sensors are available on request.

HEAVY DUTY COMPACT CYLINDER SERIES

60

RQ Heavy duty steel double-acting hydraulic cylinders. Suitable for industrial automation applications where a robust, compact and highly modular construction is required.



ROTARY ACTUATORS

Rotary actuators generate torque via a gear wheel and rack moved by a hydraulic cylinder. This solution simplifies the kinematics, is easy to maintain and are able to generate a braking torque at the end of the stroke comparable to the maximum torque of the cylinder thanks to adjustable brakes.

ROTARY ACTUATORS SERIES

66

HR Series rotary actuators are also available with a grooved shaft. Actuator rotation angle from 90° to 270°.

ROTARY ACTUATORS SERIES WITH MAGNETIC SWITCHES

70

MR The rotary actuators with position switch have a stainless-steel tube and magnetic piston. One or more magnetic switches can be positioned along the tube fixed to the tie-rods, to detect the passage of the piston in correspondence with the SR or SH switch. Special programmable sensors are available on request.



ISO 6020/2 hydraulic cylinders with tie-rods are suitable for a wide range of industrial applications, when a compact, highly reliable and easy-to-maintain product is required, thanks to the configuration with four high-strength tie-rods, the use of the best materials and technical choices guided by the great experience gained through the years.

The overall dimensions, mounting configurations and working pressure of 160 bar comply with ISO 6020/2. The cylinder can be provided with reliable end-of-stroke cushioning, equipped with a quick restart system and adjustable to suit the needs and loads to be cushioned. Available in various sealing configurations to suit the desired operating conditions and performance.

Before delivery, each cylinder is tested in accordance with ISO 10100 and we record these results in our systems to ensure product quality and performance. They can be equipped with various types of switches to detect the piston at the end of the stroke or in intermediate positions, or sensors to detect it continuously along the entire stroke. In addition, the cylinder can be equipped with a CETOP plate for the installation of a control valve with ISO 4401 mounting surfaces.

Spare parts are easy to find and are always available at our warehouse, with rapid support service to deal with any urgency. For strokes over 2000 mm, it is recommended to choose ISO 6020/2 hydraulic cylinders with counterflanges (see page 26).

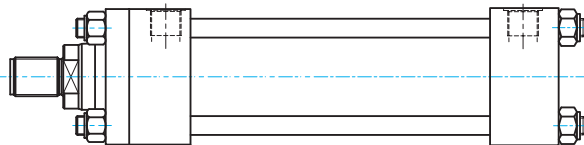


Standard	ISO 6020/2 - DIN 24554 - tie-rods		
Bore	mm	from 25 to 200	
Pressure	bar	operational 160	testing 240
Maximum stroke	mm	4000	
Fluid	Mineral hydraulic oil Phosphoric esters HFC-fluid		

TIE-RODS CYLINDERS SERIES

CD Bore from 25 to 100

DK Bore from 125 to 200

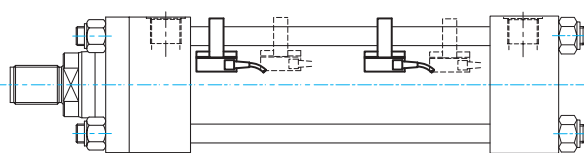


The CD and DK series hydraulic cylinders are the standard version of the ISO 6020/2 tie-rods cylinders. The technical features, dimensions, versions and options available are detailed on pages 7.

They are available in a wide variety of configurations, with rods in various materials, with CETOP plate for valve and with end-stroke switches integrated in the cylinder heads, as well as many other special options. In addition, for applications in aggressive environments in contact with substances that promote corrosion, they are available with a chemical nickel-plating surface treatment.

TIE-RODS CYLINDERS SERIES WITH MAGNETIC SWITCHES

MD Bore from 25 to 125



The MD series hydraulic cylinders have the same technical features, dimensions and available options as the standard CD and DK series, but are equipped with a magnetic piston and stainless-steel tube.

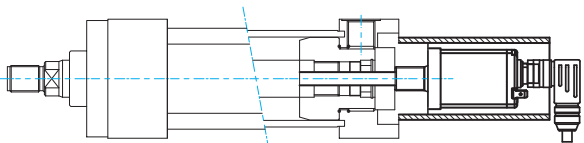
One or more magnetic switches can be positioned along the tube, fixed to the tie-rods, to detect the passage of the piston in correspondence with the SR or SH switch.

Special programmable sensors are available on request (see page 20).

TIE-RODS SERVOCYLINDERS SERIES WITH POSITION TRANSDUCER

TD Bore from 40 to 100

TK Bore from 125 to 200



The TD and TK series hydraulic servocylinders have the same technical features, dimensions and available options as the CD and DK series, but are equipped with a magnetostrictive linear position transducer (see page 22) for precise and continuous detection of the piston at any point in the servocylinder stroke.

The external parts of the position transducer are protected against accidental impact during transport, installation and operation by a removable steel cover.

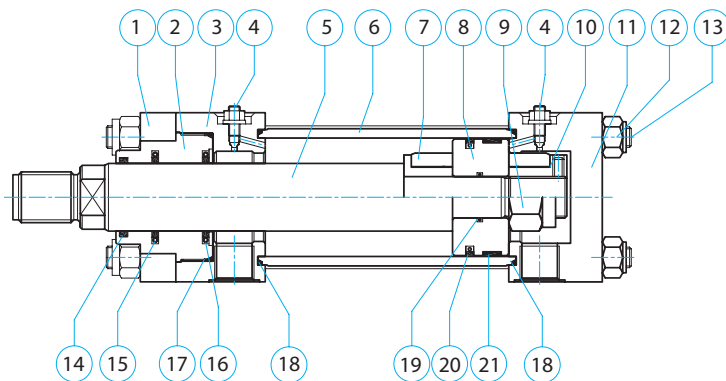


AVAILABLE SEALS

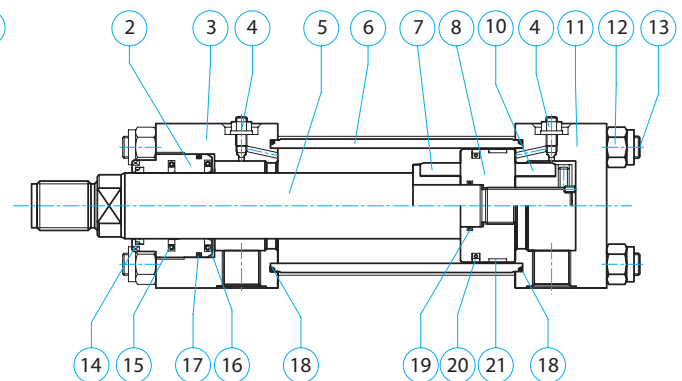
Seals code	Performances					Fluid		
	High sealing	Low friction	Max speed	Temp °C		Hydraulic oil	Phosphoric esters	HFC-Fluid
				Min	Max			
S	√		0.5 m/s	-20	+80	√		
L		√	1 m/s	-20	+80	√		
H		√	1 m/s	-20	+150	√	√	
G		√	1 m/s	-20	+80			√

For speeds and temperatures exceeding the indicated limits, please contact our technical department.

BORE 25-100



BORE 125-200



	Component	Material	Features
1	Closing flange	Steel	Bumished
2	Guide bushing	Bronze	
3	Front head	Steel	Bumished
4	Cushioning adj. + air bleed	Steel	
5	Piston rod	Chromeplated steel	Cr 25 µm ISO f7 - Ra 0.20 µm
6	Cylinder body	Steel	Honed H8 - Ra 0.40 µm
7	Front cushioning	Hardened steel	
8	Piston	Steel	
9	Rod self-locking nut	Steel	
10	Rear cushioning	Hardened steel	
11	Rear head	Steel	Bumished
12	Tie-rod self-locking nut	Steel	
13	Tie-rod	Alloy steel	Threaded rolled

The cylinders are equipped with a bronze guide bushing with wiper and double seal with high seal or low-friction.

The tie-rods are made of high-strength material and the thread is obtained by cold-rolling, to increase fatigue strength.

The original floating ring cushioning system guarantees perfect centring and performs the function of rapid opening for quick restart of the cylinder. Made of hardened steel guarantees a long service life, thanks to the steel housing of the cylinder head.

The screw adjustment system allows a precise adjustment of the cushioning effect and at the same time bleeding the air (see page 9).

	Component	Groove	Material			
			S	L	H	G
14	Rod wiper		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
15	First rod seal	ISO 7425/2	NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
16	Second rod seal	ISO 7425/2	PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
17	Head / bushing sealing		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE
18	Tube seal		NBR	NBR	Viton®	NBR
19	Internal piston seal		NBR	NBR	Viton®	NBR
20	External piston seal	ISO 7425/1	NBR + PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
21	Piston guide		Resin	Resin	Resin	Resin



SIZING AND FORCES

Dimension		Piston area		Force at 100 bar		Force at 160 bar		Tie-rods tightening torque
Bore mm	Rod mm	push cm ²	pull cm ²	push daN	pull daN	push daN	pull daN	Nm
25	12	4.9	3.8	491	378	785	604	5
	18		2.4		236		378	
32	14	8.0	6.5	804	650	1287	1040	9
	18		5.5		550		880	
	22		4.2		424		679	
40	18	12.6	10.0	1257	1002	2011	1603	20
	22		8.8		877		1402	
	28		6.4		641		1025	
50	22	19.6	15.8	1963	1583	3142	2533	70
	28		13.5		1348		2156	
	36		9.5		946		1513	
63	28	31.2	25.0	3117	2501	4988	4002	70
	36		21.0		2099		3359	
	45		15.3		1527		2443	
80	36	50.3	40.1	5027	4009	8042	6414	160
	45		34.4		3436		5498	
	56		25.6		2564		4102	
100	45	78.5	62.6	7854	6264	12566	10022	160
	56		53.9		5391		8626	
	70		40.1		4006		6409	
125	56	122.7	98.1	12272	9809	19635	15694	460
	70		84.2		8423		13477	
	90		59.1		5910		9456	
160	70	201.1	162.6	20106	16258	32170	26012	820
	90		137.4		13744		21991	
	110		106.0		10603		16965	
200	90	314.2	250.5	31416	25054	50265	40087	1150
	110		219.1		21913		35060	
	140		160.2		16022		25635	

STROKE

During testing, the cylinder stroke is checked, assuring compliance with the tolerance of 0/+2 mm as per ISO 8131.

For space requirements of the cylinder components or switches, the stroke cannot be less than a minimum value in some circumstances.

This problem can be overcome by inserting a spacer.

		Bore	25	32	40	50	63	80	100	125	160	200
Minimum stroke	CD/DK (mm)	Mounting H (ISO MT4)	5	10	10	15	25	30	40	50	65	75
		Others	0	0	0	0	0	0	0	0	0	0
	MD (mm)	Mounting H (ISO MT4)	47	55	55	62	70	75	84	95	-	-
		Others	25	28	24	22	20	15	14	5	-	-

OPERATIONAL LIFE-TIME

The cylinders are manufactured from high-quality materials and according to design guidelines validated by many years of experience with these products. Under ideal conditions, the cylinders are capable of working for millions of cycles requiring only regular basic maintenance and replacement of wear parts. The real application situations can subject cylinders to conditions that reduce their service life and would therefore be preferable to avoid.

The most frequent are:

- radial loads, generated by external forces or misalignments in fixing to machinery
- end-stroke impacts and external impulsive forces
- pressure peaks and water hammers;
- contaminated hydraulic fluid;
- over-temperatures, caused either by the environment or internal causes such as frequent cycles with short strokes, which prevent sufficient oil change.

Our technical department will be able to advise you on how best to prevent or reduce problems.



BUCKLING VERIFICATION

When the cylinder is pushing, it can be subject to buckling instability, depending on mounting, stroke and pushing force.

The graph illustrates the boundary working conditions for each rod. Stay below for optimal operation. The mounting of the cylinder determines the stroke factor FC. Multiplying the cylinder stroke CO by FC gives the ideal length LI. The value of LI, read on the vertical axis, meets the line corresponding to the diameter of the rod to be checked, identifying on the horizontal axis the maximum possible push.

If the actual thrust does not exceed this limit value, the verification is passed.

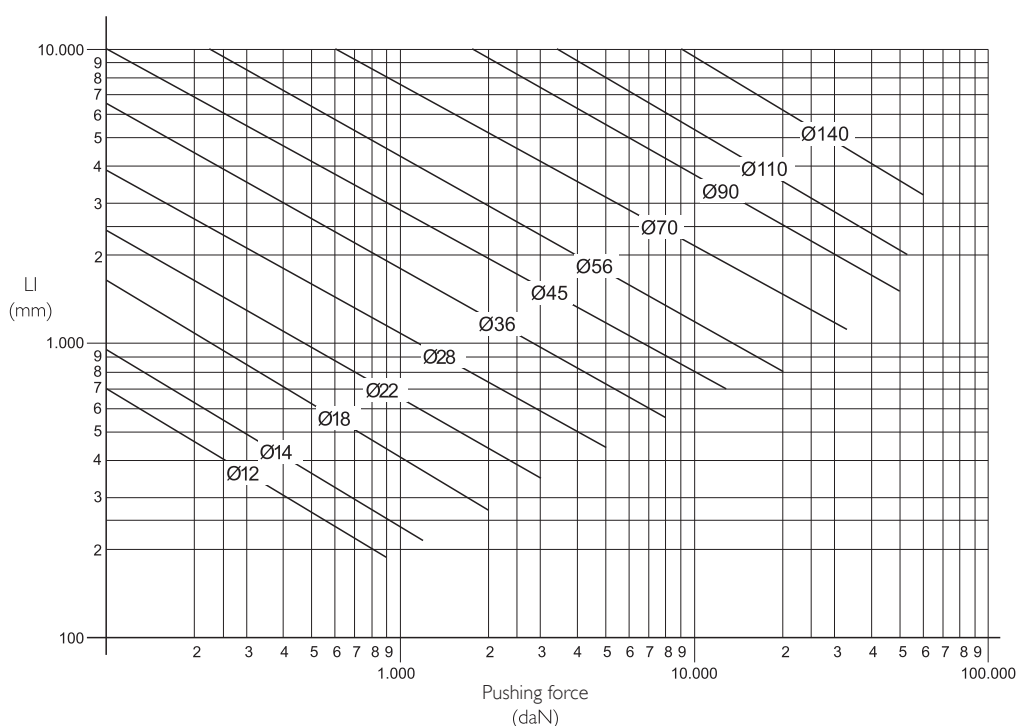
Spacers and rod extensions must be added to the stroke to obtain the CO value to be multiplied by FC.

MOUNTING

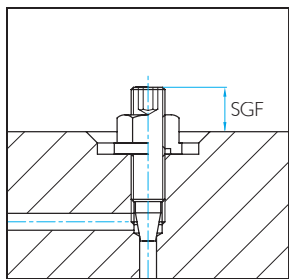
FC

ROD SELECTION CHART

X (MX5) A (ME5) R (MX3) Q (MX1)		0.7 2
B (ME6) S (MX2) T (MX6)		1.5 4
E (MS2)		0.7 2
G (MT1)		1
H (MT4)		1.5
C (MP3) D (MP5) L (MT2) M (MP1)		2



CUSHIONING ADJUSTMENT AND AIR BLEEDING



All the cushioned cylinders are equipped with a screw that allows the cushioning adjustment.

Slightly loosen the Seal-Lock® sealing nut, adjust the screw and tighten carefully.

The cushioning adjustment unit can also be used as an air bleeder by loosening the nut until the air has escaped.

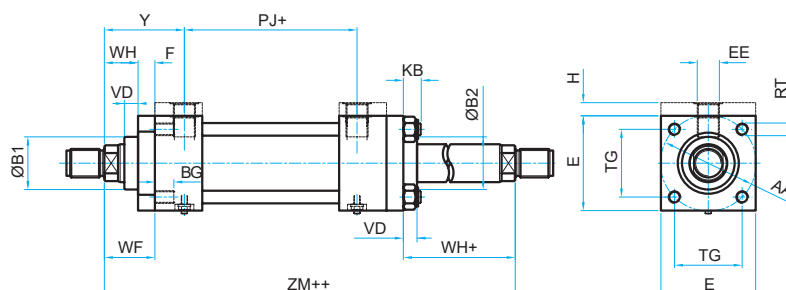
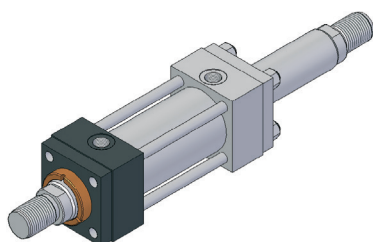
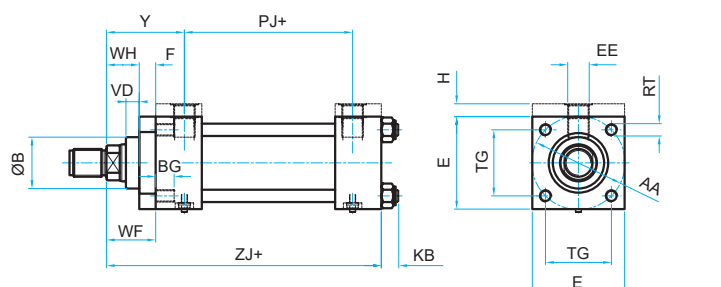
On cylinders with cushioning, if the stroke is shorter than the cushioning length, the cylinder is always cushioned.

Bore		25	32	40	50	63	80	100	125	160	200
Cushioning lenght	mm	12	14	23	21	21	28	28	26	30	44
Cushioning area	cm ²	1.8	3.5	5.5	8.3	13.8	23.8	38	56	99	151
SGF	mm	8	8	5	5	2	0	0	0	0	0

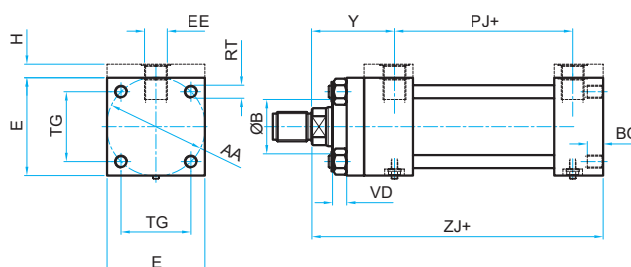


ISO MX5 - FRONT THREADED HOLES

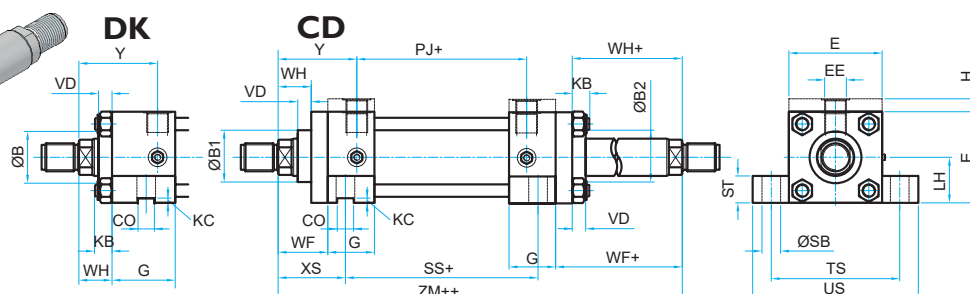
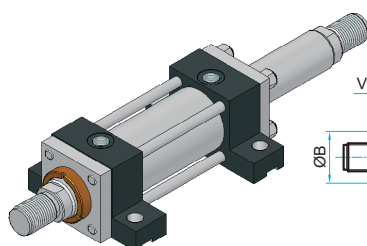
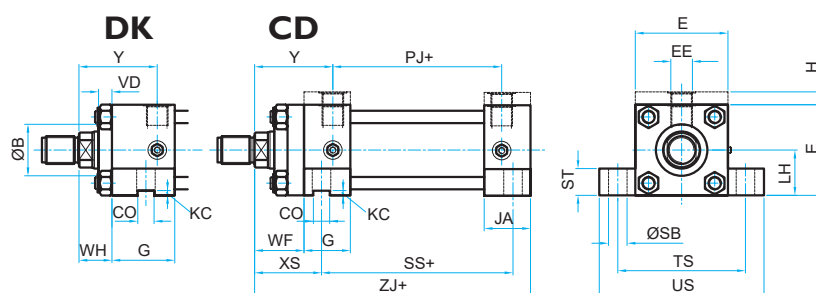
A 3D perspective view of a double-acting hydraulic cylinder. It features a central barrel with two ports on each end. The left end has a black mounting bracket with a threaded rod and a nut. The right end has a similar bracket with a nut. The cylinder is shown in a light gray color with a black end cap on the left.



ISO MX6 - REAR THREADED HOLES



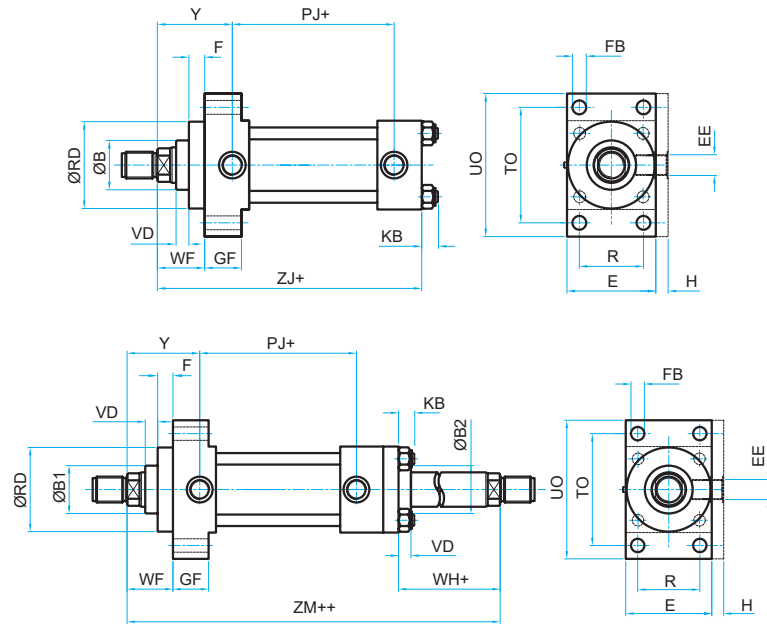
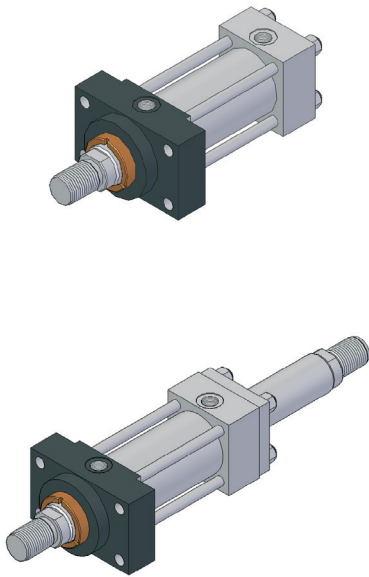
ISO MS2 - FEET





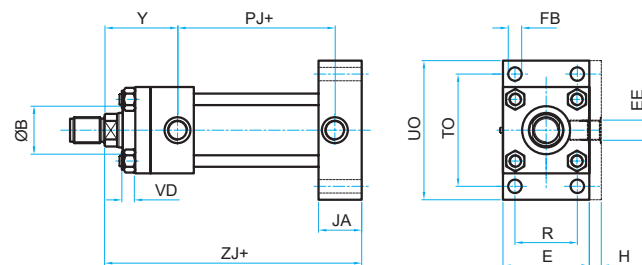
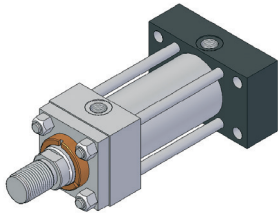
ISO ME5 - FRONT FLANGE

A



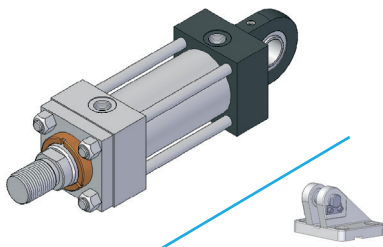
ISO ME6 - REAR FLANGE

B

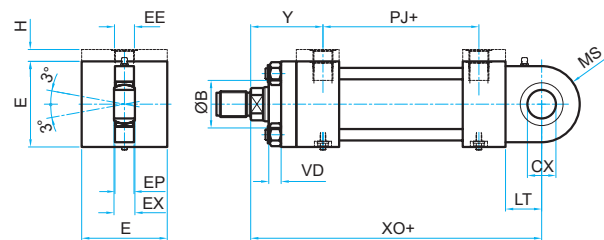


ISO MP5 - BALL JOINTED EYE

D

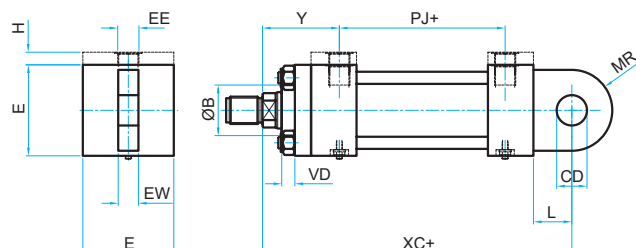
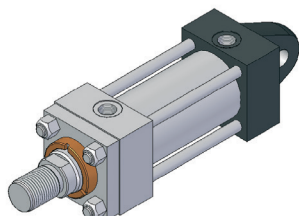


Accessory LD available on page 58



ISO MP3 - MALE CLEVIS

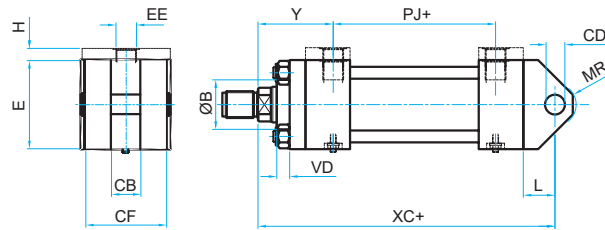
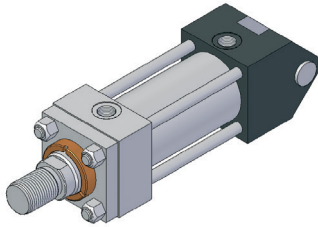
C





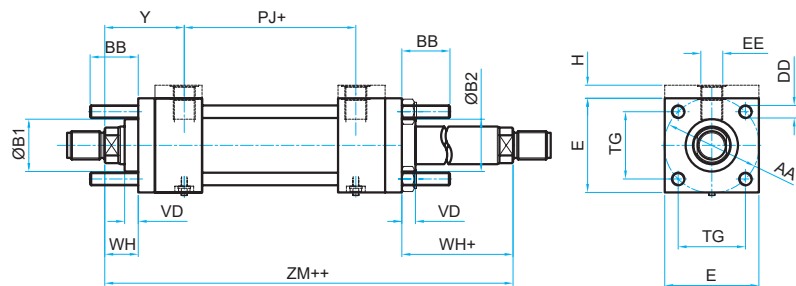
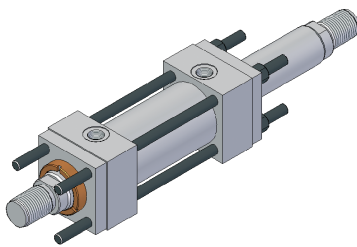
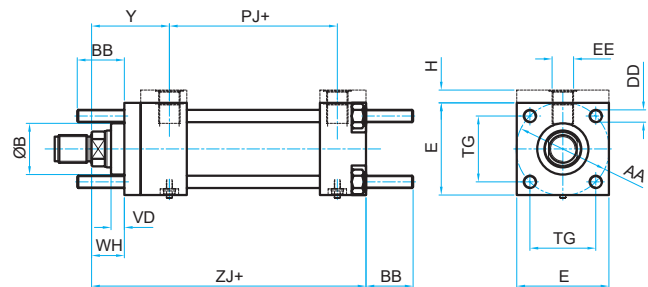
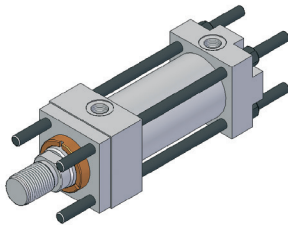
ISO MP1 - FEMALE CLEVIS

M



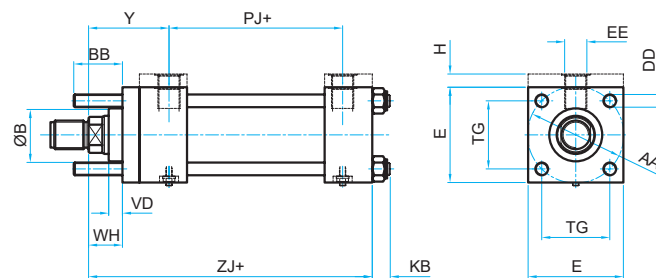
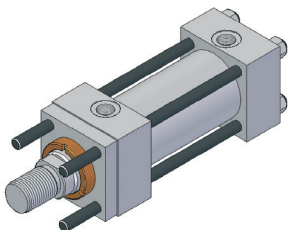
ISO MX1 - FRONT AND REAR EXTENDED TIE-RODS

Q



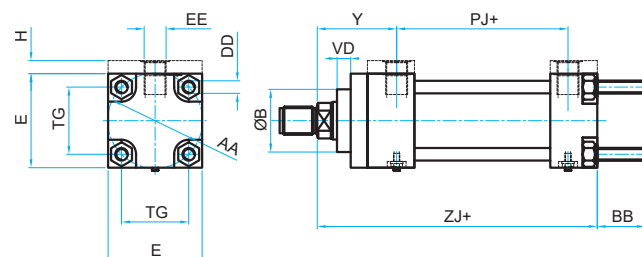
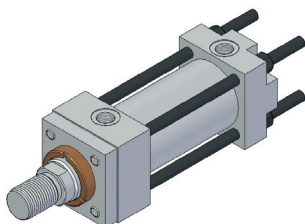
ISO MX3 - FRONT EXTENDED TIE-RODS

R



ISO MX2 - REAR EXTENDED TIE-RODS

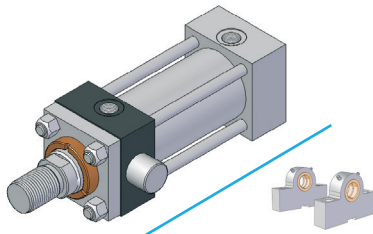
S



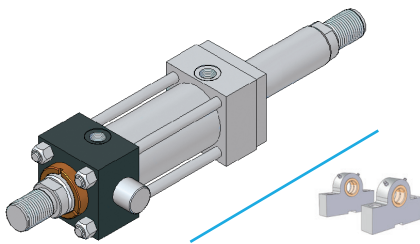
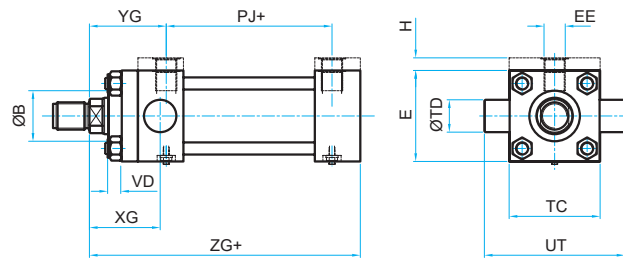


ISO MT1 - FRONT TRUNNIONS

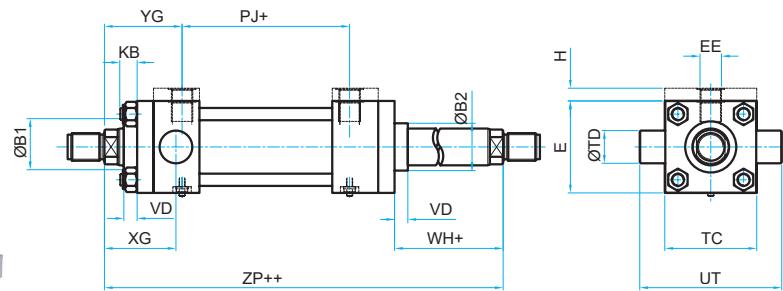
G



Accessory LK available on page 59

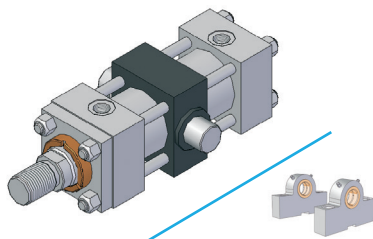


Accessory LK available on page 59

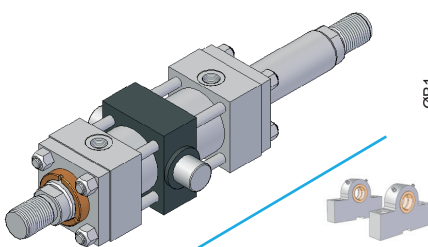
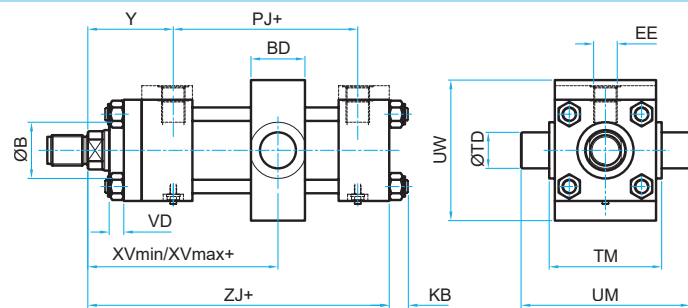


ISO MT4 - INTERMEDIATE TRUNNIONS

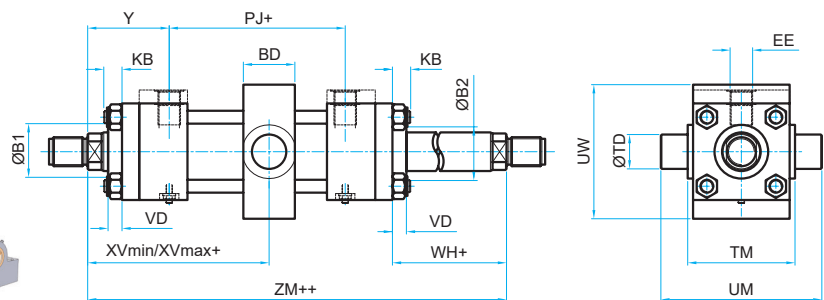
H



Accessory LK available on page 59

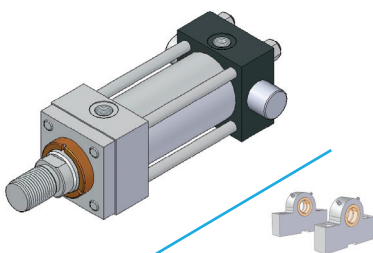


Accessory LK available on page 59

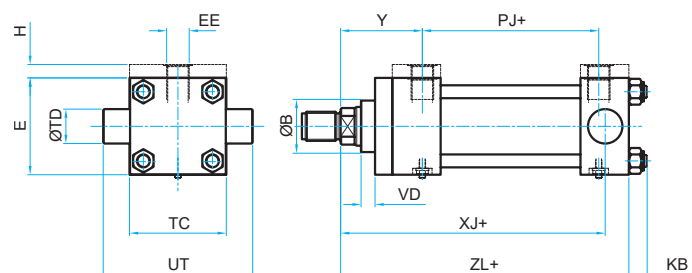


ISO MT2 - REAR TRUNNIONS

L



Accessory LK available on page 59





Bore	25		32			40			50			63			80			100			125			160			200		
Rod	12	18	14	18	22	18	22	28	22	28	36	28	36	45	36	45	56	45	56	70	56	70	90	70	90	110	90	110	140
B f9	24	30	26	30	34	30	34	42	34	42	50	42	50	60	50	60	72	60	72	88	72	88	108	88	108	133	108	133	163
AA	40		47			59			74			91			117			137			178			219			269		
BB	19		24			35			46			46			59			59			81			92			115		
BD	20		25			29			38			48			58			68			88			108			125		
BG	12		15			16			18			18			24			24			30			35			40		
CB	16(*)		16			20			30			30			40			50			64(*)			80(*)			80		
CD H9	10		12			14			20			20			28			36			45			56			70		
CF	40		45			60			74			90			110			130			164			200			240		
CO H8	-		-			12			12			16			16			16			20			30			40		
CX	12 ⁰ _{-0.008}		16 ⁰ _{-0.008}			20 ⁰ _{-0.012}			25 ⁰ _{-0.012}			30 ⁰ _{-0.012}			40 ⁰ _{-0.012}			50 ⁰ _{-0.012}			60 ⁰ _{-0.015}			80 ⁰ _{-0.015}			100 ⁰ _{-0.020}		
DD	M5x0.8		M6x1			M8x1			M12x1.25			M12x1.25			M16x1.5			M16x1.5			M22x1.5			M27x2			M30x2		
E max	40		45			60			75			90			115			130			165			200			245		
EE (page 16)	G 1/4"		G 1/4"			G 3/8"			G 1/2"			G 1/2"			G 3/4"			G 3/4"			G 1"			G 1"			G 1 1/4"		
EP	9		12			14			18			20			24			30			38			47			58		
EW h14	12		16			20			30			30			40			50			60			70			80		
EX	10 ⁰ _{-0.12}		14 ⁰ _{-0.12}			16 ⁰ _{-0.12}			20 ⁰ _{-0.12}			22 ⁰ _{-0.12}			28 ⁰ _{-0.12}			35 ⁰ _{-0.12}			44 ⁰ _{-0.15}			55 ⁰ _{-0.15}			70 ⁰ _{-0.20}		
F max	10		10			10			16			16			20			22			22			25			25		
FB H13	5.5		6.6			11			14			14			18			18			22			26			33		
G	32		35.5			46			45			45			52			55			87			95			117		
GF	25		25			38			38			38			45			45			58			58			76		
H	5		5			-			-			-			-			-			-			-			-		
JA	32		35.5			46			45			45			52			55			65			70			92		
KB	7		10			13			17			17			23			23			30			35			37		
KC	-		-			4			4.5			4.5			5			6			6			8			8		
L min	13		19			19			32			32			39			54			57			63			82		
LH h10	19		22			31			37			44			57			63			82			101			122		
LT min	16		20			25			31			38			48			58			72			92			116		
MR max	12		17			17			29			29			34			50			53			59			78		
MS max	20		22.5			29			33			40			50			62			80			100			120		
PJ	49+ (*)		47+ (*)			58+ (*)			62+ (*)			64+ (*)			77+ (*)			78+ (*)			117+			130+			165+		
R	27		33			41			52			65			83			97			126			155			190		
RD f8	38		42			62			74			88 (**)			105 (**)			125 (**)			150 (**)			170 (**)			210 (**)		
RT	M5		M6			M8			M12			M12			M16			M16			M22			M27			M30		
SB H13	6.5		9			11			14			18			18			26			26			33			39		
SS	73+		73+			98+			92+			86+			105+			102+			131+			130+			172+		
ST	8.5		12.5			12.5			19			26			26			32			32			38			44		
TC	38		44			63			76			89			114			127			165			203			241		
TD f8	12		16			20			25			32			40			50			63			80			100		
TG	28.3		33.2			41.7			52.3			64.3			82.7			96.9			125.9			154.9			190.2		
TM	48		55			76			89			100			127			140			178			215			279		
TO	51		58			87			105			117			149			162			208			253			300		
TS	54		63			83			102			124			149			172			210			260			311		
UM	68		79			108			129			150			191			220			278			341			439		
UO max	65		70			110			130			145			180			200			250			300			360		
US	72		84			103			127			161			186			216			254			318			381		
UT	58		68			95			116			139			178			207			265			329			401		
UW	45		50			70			90			100			130			140			180			215			300		
VD	6		12			12			9			13			9			10			9	10	10	10	10	7	10	7	7
WF	25		35			35			41			48			51			57			57			57			57		
WH	15		25			25			25			32			31			35			35			32			32		
XC	127+		147+			172+			191+			200+			229+			257+			289+			308+			381+		
XG	44		54			57			64			70			76			71			75			75			85		
XJ	95+ (*)		109+ (*)			131+ (*)			136+ (*)			146+ (*)			165+ (*)			177+ (*)			214+ (*)			227+ (*)			271+ (*)		
XO	130+		148+			178+			190+			206+			238+			261+			304+			337+			415+		
XS	33		45			45			54			65			68			79			79			86			92		
XV min/max	68 / 71+		84 / 79+			97 / 92+			106 / 94+			118 / 98+			133 / 108+			147 / 113+			167 / 122+			182 / 120+			212 / 144+		
Y	45 (*)		58 (*)			65 (*)			69 (*)			76 (*)			82 (*)			91 (*)			86			86			98		
YG	45 (*)		58 (*)			65 (*)			69 (*)			76 (*)			82 (*)			79 (*)			86			86			98		
ZG	114+		128+			153+			159+			168+			190+			191+			232+			245+			299+		
ZJ	114+		128+			153+			159+			168+			190+			203+			232+			245+			299+		
ZL	114+		128+			153+			159+			168+			190+			203+			254+			270+			324+		
ZM	139++		163++			188++			200++			216++			241++			260++			289++			302++			356++		
ZP	139++		163++			188++			200++			216++			241++			248++			289++			302++			356++		

(*) Dimension not compliant with ISO 6020/2

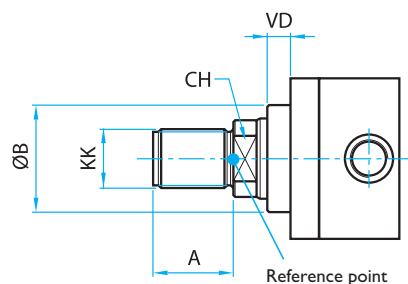
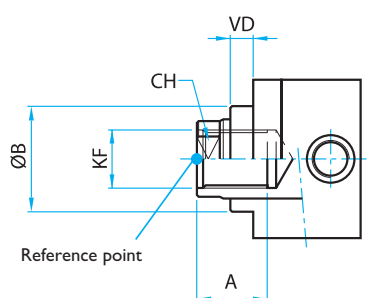
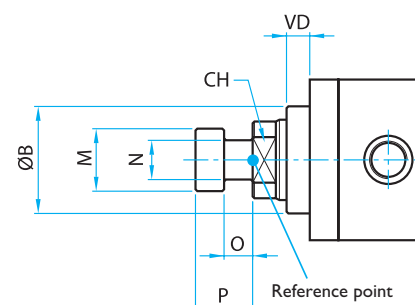
(**) Unified RD dimension, with reference to the bigger rod in compliance with ISO 6020/2. Smaller RD available on request.

+ = add the stroke

++ = add twice the stroke



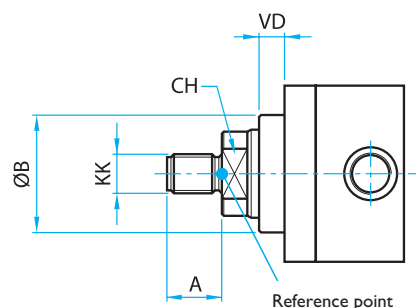
ROD END

- Male thread ISO 6020/2**SF** Female thread**ST** Floating joint

Rod	12	14	18	22	28	36	45	56	70	90	110	140
A	14	16	18	22	28	36	45	56	63	85	95	112
B f9	24	26	30	34	42	50	60	72	88	108	133	163
CH	10	10	15	19	22	30	36	46	60	75	95	120
KK	M10x1.25	M12x1.25	M14x1.5	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3	M100x3
KF	M8x1	M10x1.25	M12x1.25	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3	M100x3
M	11	13	16	18	22	28	35	45	56	70	106	136
N	6.5	8	10	11	14	18	22	28	35	45	65	70
O	5	6	7	8	10	13	16	20	25	35	35	45
P	10	12	14	16	20	25	32	40	50	70	70	90

For the ISO 6020/2 standard male rod end, ball-joint or clevis pin ends are available on page 56.

Different threads, lengths and rod extensions are available on request.

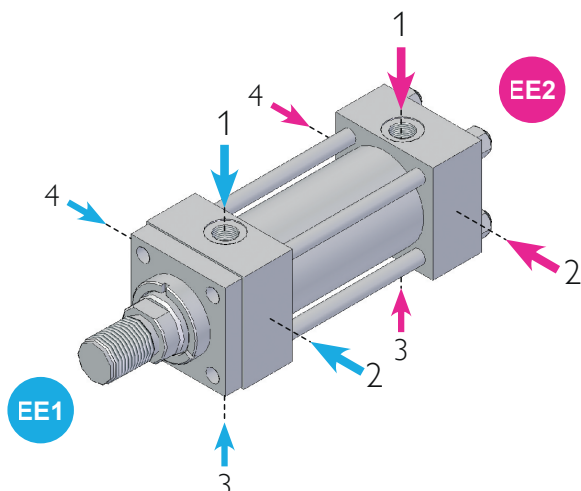
SL Male thread DIN 24554

Bore	25		32			40			50			63			80			100			125			160			200		
Rod	12	18	14	18	22	18	22	28	22	28	36	28	36	45	36	45	56	45	56	70	56	70	90	70	90	110	90	110	140
A	14		16			18			22			28			36			45			56			63			85		
B f9	24	30	26	30	34	30	34	42	34	42	50	42	50	60	50	60	72	60	72	88	72	88	108	88	108	133	108	133	163
CH	10	15	12	15	19	15	19	22	19	22	30	22	30	36	30	36	46	36	46	60	46	60	75	60	75	95	75	95	120
KK	M10x1.25		M12x1.25			M14x1.5			M16x1.5			M20x1.5			M27x2			M33x2			M42x2			M48x2			M64x3		
VD	6		12			12			9			13			9			10			9	10	10	10	10	7	10	7	7

For the SL rod end with male thread DIN 24554, ball-joint or clevis pin ends are available on page 56.



OIL PORTS



The standard configuration has the oil port in position 1 and the cushioning adjustment or air bleed on position 3, except for the fixing type E where they are in position 2.

Bore	Side	ISO 1179-1 (GAS)		SAE 3000	
		Standard	Oversize	Standard	Oversize
25	Front	G 1/4"	-	-	-
	Rear	G 1/4"	G 3/8"	-	-
32	Front	G 1/4"	-	-	-
	Rear	G 1/4"	G 3/8"	-	-
40	Front	G 3/8"	-	-	-
	Rear	G 3/8"	G 1/2"	-	-
50	Front	G 1/2"	-	-	-
	Rear	G 1/2"	G 3/4"	-	-
63	Front	G 1/2"	-	-	-
	Rear	G 1/2"	G 3/4"	-	-
80	Front	G 3/4"	-	3/4"	1"
	Rear	G 3/4"	G 1"	3/4"	1"
100	Front	G 3/4"	-	3/4"	1"
	Rear	G 3/4"	G 1"	3/4"	1"
125	Front	G 1"	G 1 1/4"	1"	1 1/4"
	Rear	G 1"	G 1 1/4"	1"	1 1/4"
160	Front	G 1"	G 1 1/4"	1"	1 1/4"
	Rear	G 1"	G 1 1/4"	1"	1 1/4"
200	Front	G 1 1/4"	G 1 1/2"	1 1/4"	1 1/2"
	Rear	G 1 1/4"	G 1 1/2"	1 1/4"	1 1/2"

ROD MATERIAL

-	CK45 chromeplated steel
RRX	Chromeplated Stainless steel
RRB	Hardened and tempered chromeplated steel
RRK	Nikrom steel
RRH	Hardened chromeplated steel

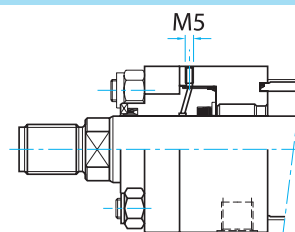
The cylinder rod is made of high-quality chrome-plated ground steel to reduce seal wear and achieve the best sealing performance over time.

The standard version is made of CK45 steel.

For special requirements regarding resistance to corrosion, mechanical stress and wear, stainless steel, Nikrom-coated, hardened and tempered steel or hardened steel rods are available.

BUSHING DRAIN

- SD** Stroke longer than 2000 mm and high-speed movement can generate a build-up of fluid between the wiper and the rod guide bushing seal. The cylinder can be equipped with a bushing drain port to allow excess fluid to be removed and returned to the tank. The drain port is normally located on the side opposite the oil port and must be connected to an atmospheric pressure tank.



METAL WIPER

- RM** The metal wiper is particularly suitable for keeping extraneous particles, even small ones, outside the cylinder in the surrounding operating environment, thanks to the perfect adhesion between the scraper and the cylinder rod. Recommended in environments with a high quantity of small dust particles.

HIGH SEALING AND LOW FRICTION PISTON FOR HEAD BALANCING CYLINDERS

- BL** A special version of the piston is available for applications where high sealing and high free-flowing performance are required at the same time: e.g. load balancing cylinders, applications with closed circuits or with different fluids (oil/air), etc. Please consult our technical department to verify the applicability of this solution.

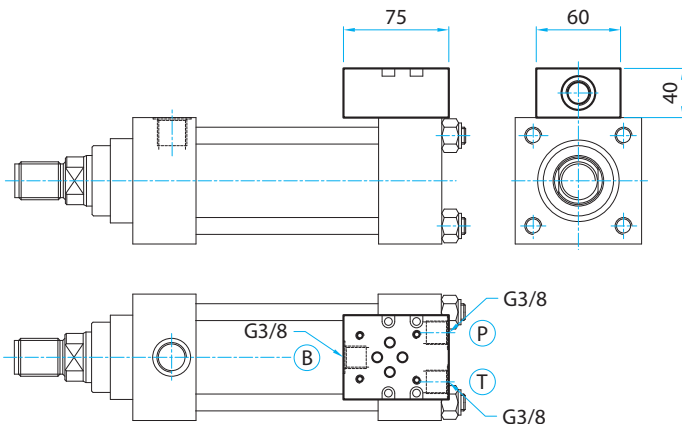
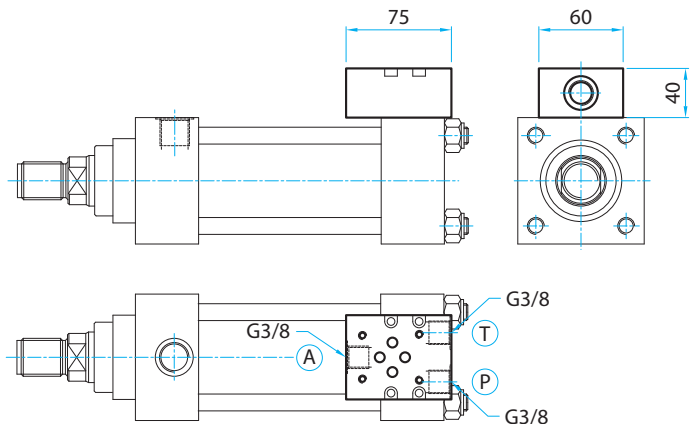
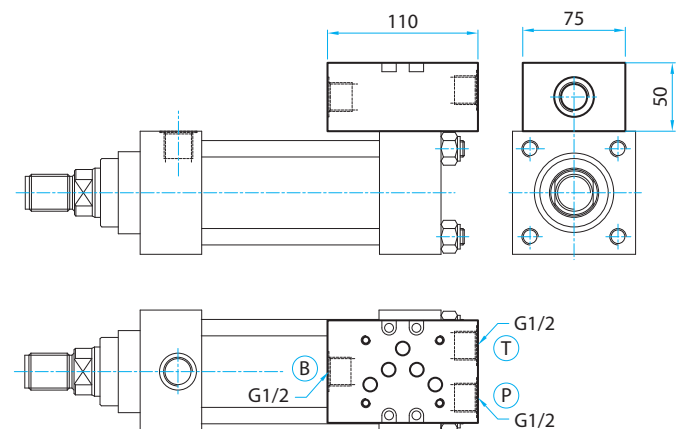
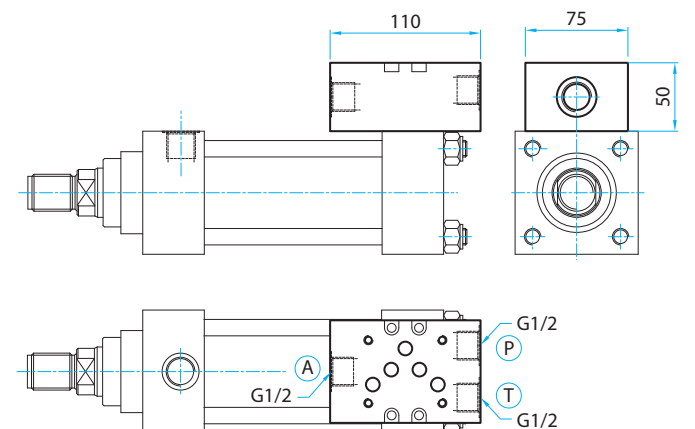
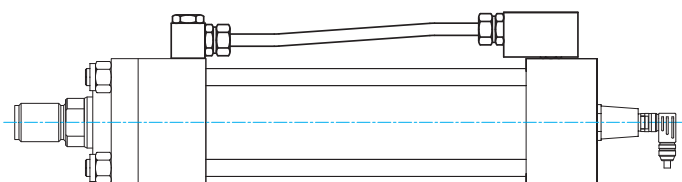
PISTON FOR HEAVY DUTY APPLICATIONS

- PQ** A special version of the piston is available for heavy duty applications, where shocks and impulsive forces cannot be avoided in any way and their damaging effects on cylinder life must be limited. In these cases we recommend the use of this piston in combination with a hardened and tempered steel piston rod. Please consult our technical department to verify the applicability of this solution.

**CETOP PLATES FOR ISO 4401 VALVES**

CETOP plates with ISO 4401 mounting surfaces allow fixing a four-way control valves to reduce oil volumes between the cylinder and the valve, achieving better control accuracy.

They are mounted directly on the rear head of the cylinder by means of a nipple and four screws, which ensure stable attachment even in the case of continuous vibrations. They are often chosen in combination with the use of position transducers for absolute and precise detection of the rod. On request, the cylinder can be supplied with the connection tube to the front end fitted.

CETOP 3 PLATES FOR ISO 4401-03 NG6 VALVES (for bores 40 to 125)**BV3-A** Rear side through port A**BV3-B** Rear side through port B**CETOP 5 PLATES FOR ISO 4401-05 NG10 VALVES (for bores 50 to 200)****BV5-A** Rear side through port A**BV5-B** Rear side through port B**TBV** Connection pipe to front head (on request)

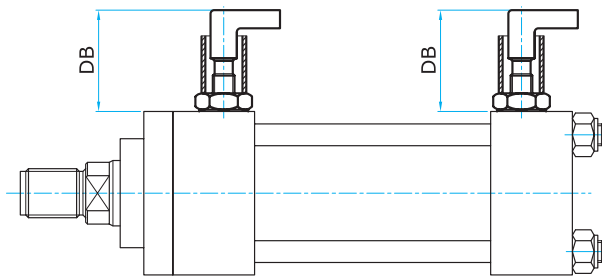
On request, it is possible to supply the cylinder already equipped with the connection pipe to the front head.

**TIE-ROD HYDRAULIC CYLINDERS WITH PROXIMITY SWITCHES**

The CD and DK series cylinders can be equipped with proximity switches integrated in the cylinder heads, for detecting the position of the piston at the end of the stroke, on one or both sides. The switch generates a magnetic field and it is able to detect the change resulting from the approaching of the cushioning bushing.

The switches are mounted on the cylinder head, usually in position 4, and are protected from accidental impact by a solid steel cover (see page 16).

For reasons of space, the application of switches is not possible for bores 25 and 32.



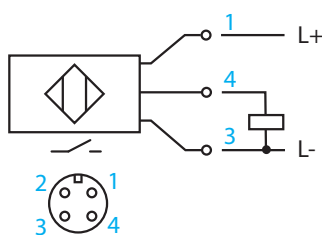
Bore	DB max (mm)
40	85
50	80
63	80
80	70
100	60
125	65
160	55
200	50

SPV	Front side switch option
SPZ	Rear side switch option
SPK	Front and rear side switches option

The switches are made of stainless steel and are supplied correctly mounted in the cylinder and tested before delivery.

The switch is supplied with a 5 meter PUR cable with M12 connector.

The output signal is regulated by a 'normally open' contact.

**Switch technical features**

Operating temperature	-25°C / +120°C
Maximum pressure	500 bar
Protection grade	IP69k
Connector	S4
Hysteresis	<= 15%
Repeatability	<= 5%
Wiring	3 wires
Switching function	Normally open
Output signal	PNP
Rated operational voltage	24 V DC
Rated operational current	200 mA
Supply voltage	10 / 36 V DC

**TIE-RODS CYLINDERS WITH NICKEL-PLATING TREATMENT**

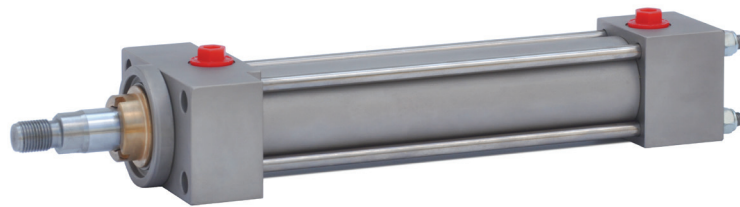
Nickel-plated hydraulic cylinders with chrome-plated stainless-steel rod, according to ISO 6020/2.

Suitable for use in aggressive environments, in contact with substances that promote corrosion, as an alternative to cylinders made entirely of stainless steel. Available in a variety of mountings including ME5, ME6, MS2 and, MP5, in all seals configurations and selectable options for all CD/DK/MD series tie-rods cylinders (see from page 7) depending on desired operating conditions and performance.

All cylinders are tested before delivery in accordance with ISO 10100.

NK

Nickel-plated cylinder option

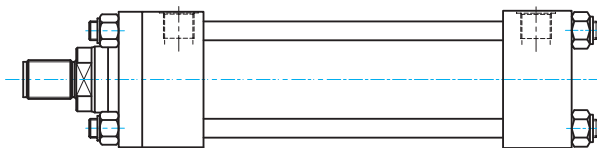
**Nickel-plating performances**

Nickel thickness	20µm
Corrosion resistance	1200 hours in salt spray rating 10

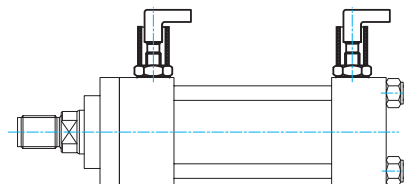
High adhesion and uniformity of the nickel layer

Low environmental impact

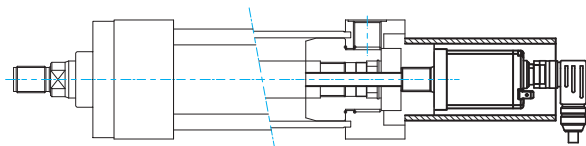
No heavy metals and ammonia



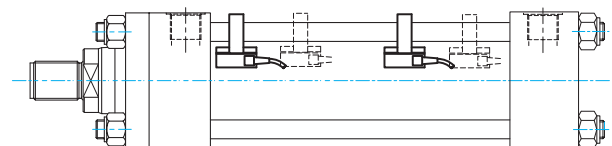
CD - DK series standard tie-rods hydraulic cylinder.



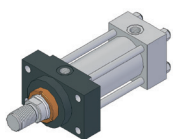
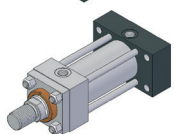
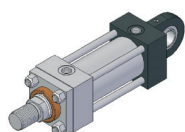
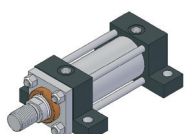
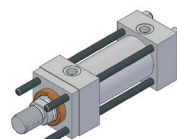
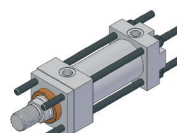
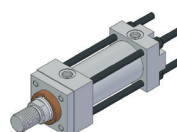
Cylinder with switches integrated in the heads, for end-of-stroke detection piston stroke.



TD - TK series servocylinder with position transducer for precise and continuous detection of the piston position.



Switches attached to cylinder rods, with stainless steel tube and magnetic piston for detection at various positions along the stroke.

AVAILABLE MOUNTINGS**A** - ISO ME5
FRONT FLANGE**B** - ISO ME6
REAR FLANGE**D** - ISO MP5
BALL JOINTED EYE**E** - ISO MS2
FEET**R** - ISO MX3
FRONT EXTENDED TIE-RODS**Q** - ISO MX1
FRONT AND REAR EXTENDED TIE-RODS**S** - ISO MX2
REAR EXTENDED TIE-RODS



TIE-RODS CYLINDERS WITH MAGNETIC SWITCHES



The MD series hydraulic cylinders have the same technical features, dimensions and available options as the basic CD and DK series, but are equipped with a magnetic piston and stainless-steel tube. One or more magnetic switches fixed to the tie-rods can be positioned along the tube to detect the passage of the piston near the SR or SH switch. Special programmable sensors are available on request.

Voltage and current values must never exceed the values given in the table.

Current peaks can be caused by capacitive charges (e.g. cables longer than 3 m).

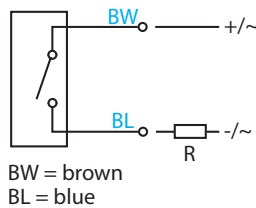
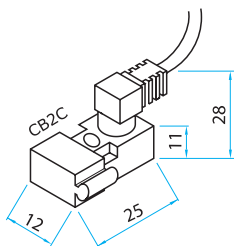
Voltage peaks can be caused by inductances (e.g. relays, solenoid valves, contactors, etc.).

Magnetic distortions can be caused by ferrous masses (e.g. cylinder seats inside moulds) or by the presence of strong magnetic fields (e.g. electric motors, coils, inverters, etc.).

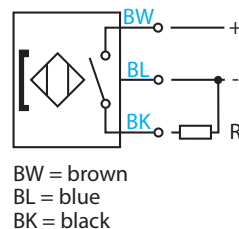
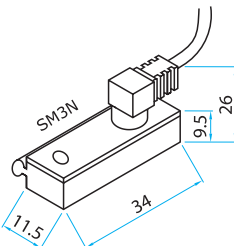
For space reasons of the switch components, check that the cylinder stroke is longer than a minimum value (see page 8).

False contacts can occur in the presence of strong vibrations.

The SR and SH type switches are able to detect the passage of the magnetic piston underneath them, closing the electrical circuit. They are fastened to the tie-rods using the STA/STB/STC/STD brackets.

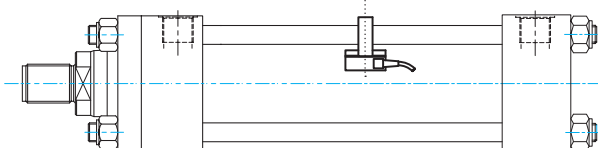
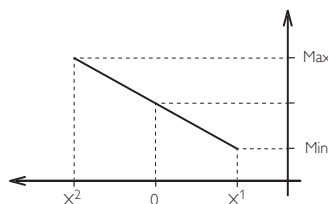
SR REED switches

Voltage	3-110 V AC/DC
Max current (at 25°C)	0.3 A
Switch on time	0.5 ms
Switch off time	0.5 ms
Electric life	10 ⁷ pulse
Protecting rating	IP 67 EN60529
Operating temperature	-10 / +70 °C
Visual signal	LED
Cable	2 × 0.25 mm ²
Cable length	5 m

SH PNP magnetoresistive switches

Voltage	6-30 V DC
Max current (at 25°C)	0.25 A
Switch on time	0.5 ms
Switch off time	0.5 ms
Electric life	10 ⁷ pulse
Protecting rating	IP 67 EN60529
Operating temperature	-10 / +70 °C
Visual signal	LED
Cable	3 × 0.25 mm ²
Cable length	5 m

TIE-RODS CYLINDERS WITH SPECIAL SENSORS



On request, by contacting our technical department, special sensors are available that can detect the piston within a programmable range, continuously providing its position via a digital output signal.

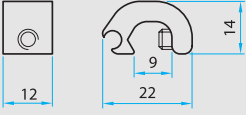
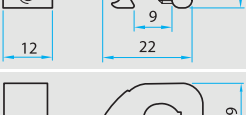
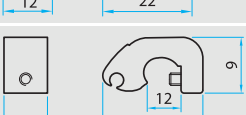
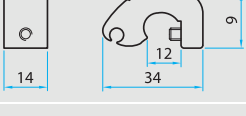
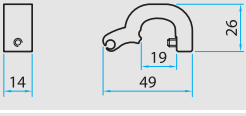
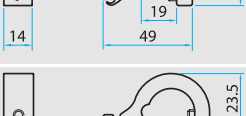
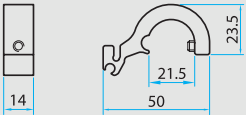
It is also possible to programme the closing of the circuit in two intervals within the reading range, which can also be modified via software on board the machine. The digital connection allows the sensors to send several operating parameters, such as the working temperature.

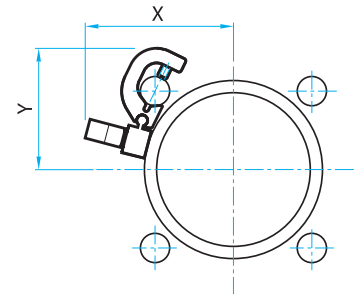
They are attached to the tie-rods by means of special brackets.



TIE-RODS CYLINDERS WITH MAGNETIC SWITCHES

Brackets for mounting SR and SH type switches.

Bore	X	Y	Bracket	
25	43	26	STA	
32	45	28		
40	50	32		
50	56	44	STB	
63	61	50		
80	71	57	STC	
100	78	64		
125	95	80	STD	



SWITCHES ORDERING CODE COMPOSITION

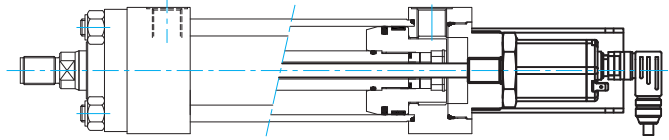
Switch + mounting bracket.
Can also be ordered separately.

Type	Switch	Bracket	Bore
REED	SR	STA	25 - 32 - 40
PNP	SH	STB	50 - 63
		STC	80 - 100
		STD	125

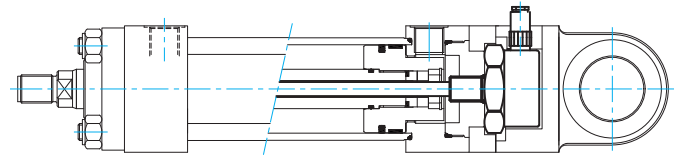
Special sensors are available
on request by contacting
our technical department.

**TIE-RODS SERVOCYLINDERS WITH POSITION TRANSDUCER**

ISO 6020/2 servocylinders with tie-rods, TD and TK series, are equipped with an electronic transducer that detects the absolute position of the rod.



Version with external transducer for mountings A, E, G, H, L, R, X.

Version with internal transducer for mountings B, C, D, M, Q, S, T.
To be requested to our technical department

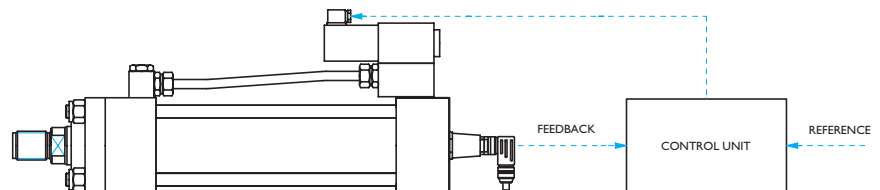
In all versions with an external transducer, the protruding parts of the electronics are completely protected from accidental impacts by a steel protection firmly fastened to the servocylinder.

The servocylinders of the TD and TK series are equipped with a bronze guide bushing and low-friction seals to optimise performance at both high and low speeds, avoiding stick-slip problems.

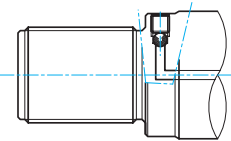
Positioning accuracy is determined by two elements: the resolution of the transducer and the servocylinder control system.

The servocylinders can be equipped with CETOP plates for ISO 4401 valves, which allow the direct fitting on board the servocylinder of:

- ON/OFF solenoid valves
- Proportional solenoid valves
- Servovalves



This configuration combined with a CONTROL UNIT ensures optimal hydraulic rigidity, which significantly improves response time, repeatability and positioning accuracy.



For servocylinders to function correctly, it is essential that they are perfectly purged of air in the servocylinder during installation. For this reason, these servocylinders, in addition to the air bleeds on the heads, have an air bleed at the top of the piston rod that allows the air in the chamber that houses the transducer to escape.

The special position of this air bleed allows operation without removing the rod from its housing.



The TD and TK series servocylinders are equipped with a non-contact absolute linear position transducer to ensure maximum durability and reliability of the measuring system.

The transducers use magnetostrictive technology, which enables high performance over a wide range of lengths, with various mounting options and analogue (0-10V, 4-20mA) or digital output signals (SSI, CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK).

The transducer is supplied with a 90° or straight connector, depending on how it is installed on the servocylinder (see drawings on previous page). As an alternative, on demand, it is available without connector, with direct output with flexible cable.

Features	Analogic output		Digital output	
	MV	MA	MS	MD
Transducer type	Magnetostrictive		Magnetostrictive	
Output	0-10 V	4-20 mA	SSI (Synchronous Serial Interface)	CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK
Supply voltage	24V DC (-15 / +20%)		24V DC (-15 / +20%)	
Temperature	-40 °C / +80 °C		-40 °C / +85 °C	-40 °C / +75 °C
Max stroke	4000 mm		4000 mm	
Resolution	Infinite		0,1 µm	0,5 - 2 µm
Linearity	< ± 0,02 % F.S. (Min ± 50 µm)		< ± 0,01 % F.S. (Min ± 50 µm)	
Repeatability	< ± 0,001 % F.S. (Min ± 2,5 µm)		< ± 0,001 % F.S. (Min ± 2,5 µm)	
Hysteresis	< 4 µm		< 4 µm	
Current drain	100 mA typical		100 mA typical	
Speed	2 m/s		2 m/s	
Protection	IP67		IP67	



CODE COMPOSITION

The entry fields for the example values are mandatory.

	Bore	Type
Standard	25 / 100	CD
	125 / 200	DK
Magnetic	25 / 125	MD

Special version ⁽¹⁾ **SX**

	Bore	Rod
MD	CD	25
		32
		40
		50
		63
		80
	DK	100
		125
		160
		200

Second rod

	ISO 6020/2	DIN 24554	Mounting
See mounting list from page 10			
Front threaded holes	MX5		X
Rear threaded holes	MX6		T
Feet	MS2	MS2	E
Front flange	ME5	ME5	A
Rear flange	ME6	ME6	B
Ball jointed eye	MP5	MP5	D
Male clevis	MP3		C
Female clevis	MP1		M
Front and rear extended tie-rods	MX1		Q
Front extended tie-rods	MX3		R
Rear extended tie-rods	MX2		S
Front trunnions	MT1		G
Intermediate trunnions ⁽²⁾	MT4	MT4	H
Rear trunnions	MT2		L

Options (see from page 16)

Air bleed

- No air bleed
- SV** Front only
- SZ** Rear only
- SK** Front and rear

Rod end (see page 15)

- Male thread
- SF** Female thread
- ST** Floating joint
- SL** Male thread DIN 24554

Seals (see page 7)

- S** High sealing
- L** Low friction
- H** Viton®
- G** HFC-fluid

Spacer

- For stroke from 0 to 1000
- SJ 50** from 1000 to 1500
- SJ 100** from 1500 to 2000
- SJ 150** from 2000 to 3000
- SJ 200** over 3000

Stroke in mm

Adjustable cushioning

- Not cushioned
- V** Front only
- Z** Rear only
- K** Front and rear

Only for MD cylinders (see page 20)

Quantity

Type

Switch

SR REED 24-110 V AC/DC

SH PNP 24 V DC

Special switches are available on request by contacting our technical department.

(1) Indicate SX whenever the cylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable. (see list of available options from page 16)

(2) For H mounting (MT4), enter 'XV' at the end of the code followed by the value of dimension XV (see page 13 and page 14).



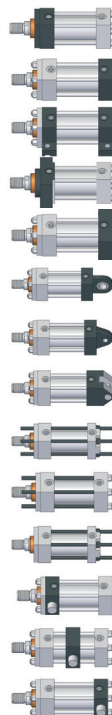
CODE COMPOSITION

The entry fields for the example values are mandatory.

	TD		MA	50	/	28	/		A	500		L						
Bore	Type																	Options (see from page 16)
40 / 100	TD																	Plate for valve (see page 17)
125 / 200	TK																	BV3-A CETOP 3
																		BV3-B ISO 4401-03 NG6
																		BV5-A CETOP 5
																		BV5-B ISO 4401-05 NG10
Special version ⁽¹⁾	SX																	Air bleed
Transducer																		- No air bleed
Magnetostrictive																		SV Front only
																		SZ Rear only
																		SK Front and rear
																		Rod end (see page 15)
																		- Male thread
																		SF Female thread
																		ST Floating joint
																		SL Male thread DIN 24554
																		Seals (see page 7)
																		L Low friction
																		H Viton®
																		G HFC-fluid
																		Spacer
																		- For stroke from 0 to 1000
																		SJ 50 from 1000 to 1500
																		SJ 100 from 1500 to 2000
																		SJ 150 from 2000 to 3000
																		SJ 200 over 3000
																		Stroke in mm

Contact our technical department, for the second rod

See mounting list from page 10	ISO 6020/2	DIN 24554	Mounting
Front threaded holes	MX5		X
Rear threaded holes	MX6		T
Feet	MS2	MS2	E
Front flange	ME5	ME5	A
Rear flange	ME6	ME6	B
Ball jointed eye	MP5	MP5	D
Male clevis	MP3		C
Female clevis	MP1		M
Front and rear extended tie-rods	MX1		Q
Front extended tie-rods	MX3		R
Rear extended tie-rods	MX2		S
Front trunnions	MT1		G
Intermediate trunnions ⁽²⁾	MT4	MT4	H
Rear trunnions	MT2		L



(1) Indicate SX whenever the servocylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable. (see list of available options from page 16)

(2) For H mounting (MT4), enter 'XV' at the end of the code followed by the value of dimension XV. (see page 13 and page 14)

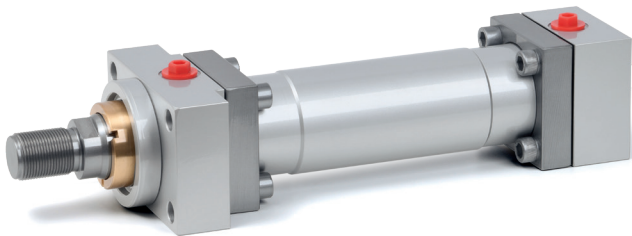
Interactive online coding wizard available at www.confortinet.com



ISO 6020/2 hydraulic cylinders with counterflanges are suitable for a wide range of industrial applications, when a compact, highly reliable and easy-to-maintain product is required, thanks to the use of the best materials and technical choices based on years of experience.

The special configuration with counterflanges and high-strength screws makes them particularly suitable for applications with long strokes. In these cases, in fact, while maintaining the same overall dimensions of a cylinder with tie-rods, this configuration is more stable because it does not require the presence of excessively long tie-rods. The overall dimensions and the mounting configurations comply with ISO 6020/2, while the working pressure can rise up to 210 bar. The cylinder can be provided with reliable end-of-stroke cushioning, equipped with a quick restart system and adjustable to suit the needs and loads to be cushioned. Available in various sealing configurations to suit the desired operating conditions and performance. Before delivery, each cylinder is tested in accordance with ISO 10100 and we record these results in our systems to ensure product quality and performance. They can be equipped with various types of switches to detect the piston at the end of its stroke or with position transducers for continuous detection along the entire stroke. In addition, the cylinder can be equipped with a CETOP plate for the installation of a control valve with ISO 4401 mounting surfaces.

Spare parts are easy to find and are always available at our warehouse, with rapid support service to deal with any urgency.

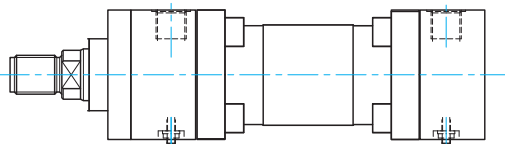


Standard	ISO 6020/2 - DIN 24554 - with counterflanges		
Bore	mm	from 50 to 200	
Pressure	bar	operational 210	testing 315
Maximum stroke	mm	4000	
Fluid	Mineral hydraulic oil Phosphoric esters HFC-fluid		

HYDRAULIC CYLINDERS SERIES WITH COUNTERFLANGES

HD Bore from 50 to 100

HK Bore from 125 to 200



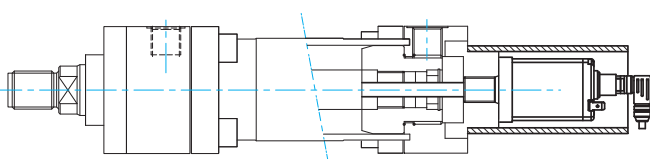
The HD and HK series hydraulic cylinders are the basic version of the ISO 6020/2 counter-flange cylinders. The technical features, dimensions, and available versions and options are detailed from page 27.

They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke sensors integrated in the cylinder heads, and many other special options.

HYDRAULIC SERVOCYLINDERS SERIES WITH COUNTERFLANGES AND POSITION TRANSDUCER

TH Bore from 50 to 100

TX Bore from 125 to 200



The TH and TX series hydraulic servocylinders have the same technical features, dimensions and available options as the basic HD and HK series, but are equipped with a magnetostrictive linear position transducer (see page 39) for accurate and continuous detection of the piston at any point in the servocylinder stroke.

The external parts of the position transducer are protected against accidental impacts during transport, installation and operation by a removable steel cover.

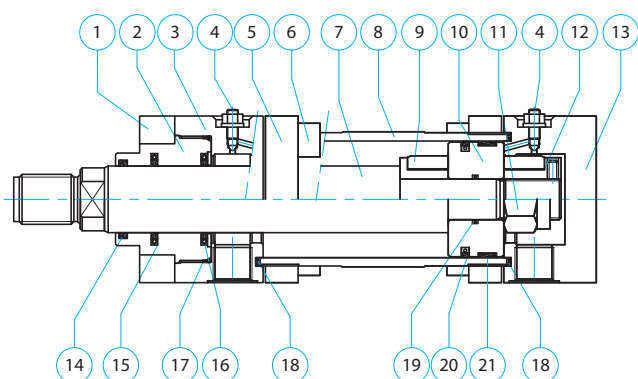


AVAILABLE SEALS

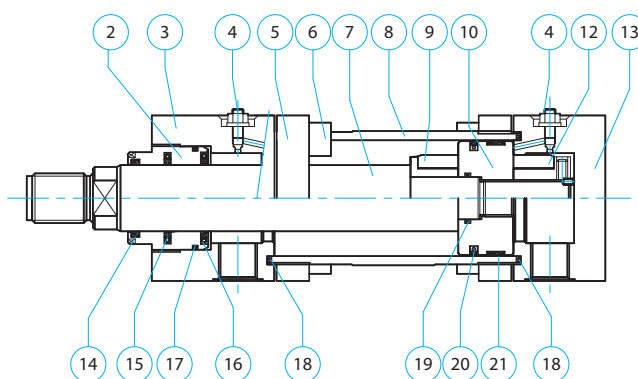
Seals code	Performances					Fluid		
	High sealing	Low friction	Max speed	Temp °C		Hydraulic oil	Phosphoric esters	HFC-fluid
				Min	Max			
S	√		0.5 m/s	-20	+80	√		
L		√	1 m/s	-20	+80	√		
H		√	1 m/s	-20	+150	√	√	
G		√	1 m/s	-20	+80			√

For speeds and temperatures exceeding the indicated limits, please contact our technical department.

BORE 50-100



BORE 125-200



	Component	Material	Features
1	Closing flange	Steel	Burnished
2	Guide bushing	Bronze	
3	Front head	Steel	Burnished
4	Cushioning adjusting + air bleed	Steel	
5	Counterflange	Steel	Burnished
6	Closing screw	Steel	Burnished
7	Piston rod	Chromeplated steel	Cr 25 µm ISO f7 - Ra 0.20 µm
8	Cylinder body	Steel	Honed H8 - Ra 0.40 µm
9	Front cushioning	Hardened steel	
10	Piston	Steel	
11	Rod self-locking nut	Steel	
12	Rear cushioning	Hardened steel	
13	Rear head	Steel	Burnished

The cylinders are equipped with a bronze guide bushing with wiper and double seal with high seal or low-friction.

The counterflanges are fixed to the heads by means of high-strength screws.

The original floating ring cushioning system guarantees perfect centring and performs the function of rapid opening for quick restart of the cylinder. Made of hardened steel guarantees a long service life, thanks to the steel housing of the cylinder head.

The screw adjustment system allows a precise adjustment of the cushioning effect and at the same time bleeding the air (see page 29).

	Component	Groove	Material			
			S	L	H	G
14	Rod wiper		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
15	First rod seal	ISO 7425/2	NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
16	Second rod seal	ISO 7425/2	PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
17	Head / bushing sealing		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE
18	Tube seal		NBR	NBR	Viton®	NBR
19	Internal piston seal		NBR	NBR	Viton®	NBR
20	External piston seal	ISO 7425/1	NBR + PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
21	Piston guide		Resin	Resin	Resin	Resin



SIZING AND FORCES

Dimension		Piston area		Force at 100 bar		Force at 210 bar		Screws tightening torque
Bore mm	Rod mm	push cm ²	pull cm ²	push daN	pull daN	push daN	pull daN	Nm
50	22	19.6	15.8	1963	1583	4123	3325	70
	28		13.5		1348		2830	
	36		9.5		946		1986	
63	28	31.2	25.0	3117	2501	6546	5253	70
	36		21.0		2099		4409	
	45		15.3		1527		3206	
80	36	50.3	40.1	5027	4009	10556	8418	160
	45		34.4		3436		7216	
	56		25.6		2564		5383	
100	45	78.5	62.6	7854	6264	16493	13153	160
	56		53.9		5391		11321	
	70		40.1		4006		8412	
125	56	122.7	98.1	12272	9809	25771	20599	460
	70		84.2		8423		17689	
	90		59.1		5910		12411	
160	70	201.1	162.6	20106	16258	42223	34141	820
	90		137.4		13744		29863	
	110		106.0		10603		22266	
200	90	314.2	250.5	31416	25054	65973	52614	1150
	110		219.1		21913		46016	
	140		160.2		16022		33646	

STROKE

During testing, the cylinder stroke is checked, assuring compliance with the tolerance of 0/+2 mm as per ISO 8131.

For space requirements of the cylinder components or switches, the stroke cannot be less than a minimum value in some circumstances. This problem can be overcome by inserting a spacer.

	Bore	50	63	80	100	125	160	200
Minimum stroke	HD/HK (mm)	75	75	90	115	120	190	200

OPERATIONAL LIFE-TIME

The cylinders are manufactured from high-quality materials and according to design guidelines validated by many years of experience with these products. Under ideal conditions, the cylinders are capable of working for millions of cycles requiring only regular basic maintenance and replacement of wear parts.

The real application situations can subject cylinders to conditions that reduce their service life and would therefore be preferable to avoid.

The most frequent are:

- radial loads, generated by external forces or misalignments in fixing to machinery
- end-stroke impacts and external impulsive forces
- pressure peaks and water hammers;
- contaminated hydraulic fluid;
- over-temperatures, caused either by the environment or internal causes such as frequent cycles with short strokes, which prevent sufficient oil change.

Our technical department will be able to advise you on how best to prevent or reduce problems.



BUCKLING VERIFICATION

When the cylinder is pushing, it can be subject to buckling instability, depending on mounting, stroke and pushing force.

The graph illustrates the boundary working conditions for each rod. Stay below for optimal operation.

The mounting of the cylinder determines the stroke factor FC. Multiplying the cylinder stroke CO by FC gives the ideal length LI.

The value of LI, read on the vertical axis, meets the line corresponding to the diameter of the rod to be checked, identifying on the horizontal axis the maximum possible push.

If the actual thrust does not exceed this limit value, the verification is passed.

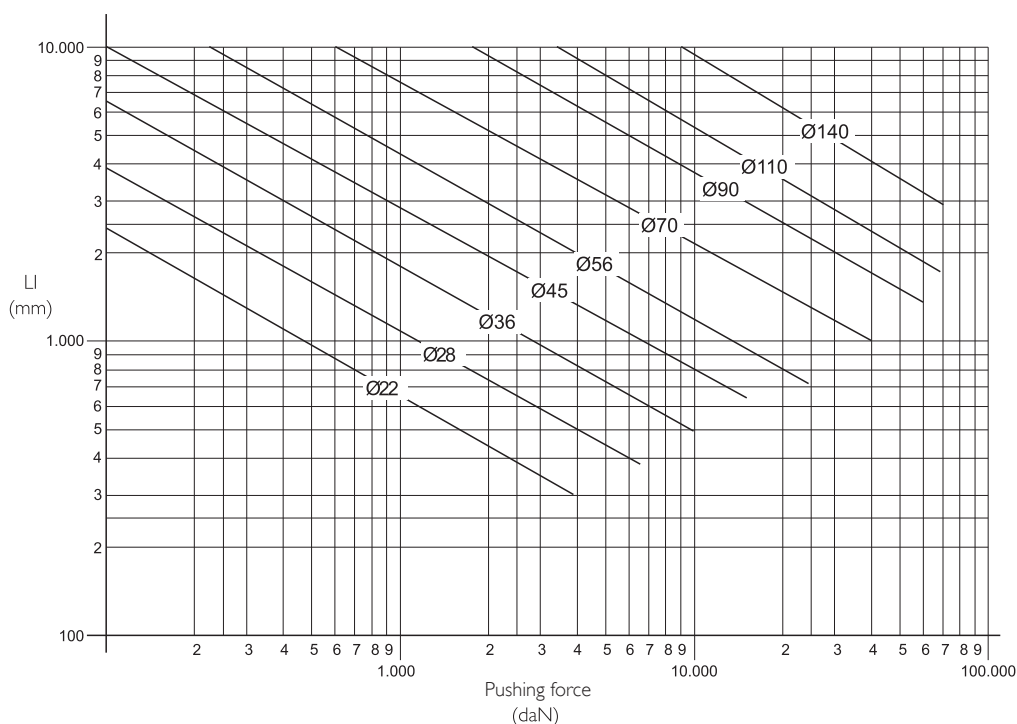
Spacers and rod extensions must be added to the stroke to obtain the CO value to be multiplied by FC.

MOUNTING

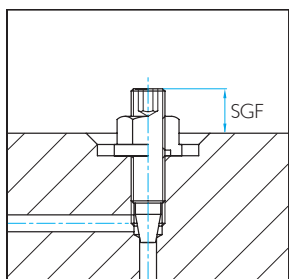
FC

ROD SELECTION CHART

X (MX5) A (ME5)		0.7
		2
B (ME6) T (MX6)		1.5
		4
E (MS2)		0.7
		2
G (MT1)		1
C (MP3) D (MP5) L (MT2) M (MP1)		2



CUSHIONING ADJUSTMENT AND AIR BLEEDING



All the cushioned cylinders are equipped with a screw that allows the cushioning adjustment.

Slightly loosen the Seal-Lock® sealing nut, adjust the screw and tighten carefully.

The cushioning adjustment unit can also be used as an air bleeder by loosening the nut until the air has escaped.

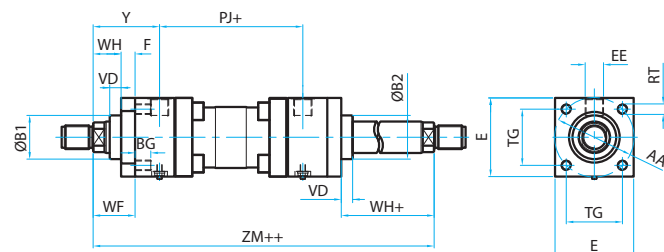
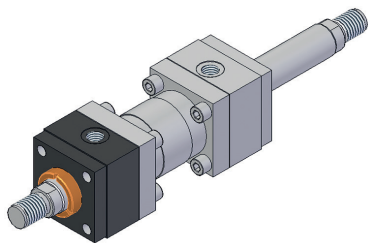
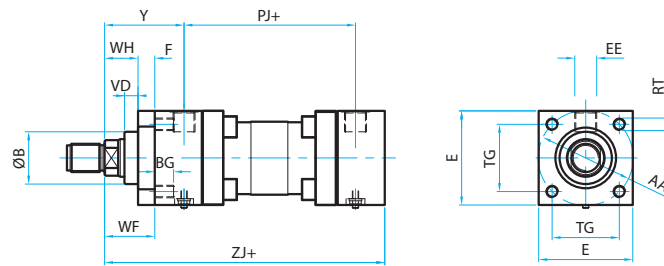
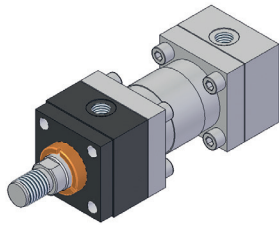
On cylinders with cushioning, if the stroke is shorter than the cushioning length, the cylinder is always cushioned.

Bore		50	63	80	100	125	160	200
Cushioning length	mm	21	21	28	28	26	30	44
Cushioning area	cm ²	8.3	13.8	23.8	38	56	99	151
SGF	mm	5	2	0	0	0	0	0



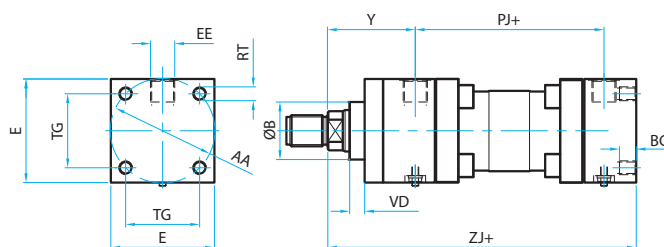
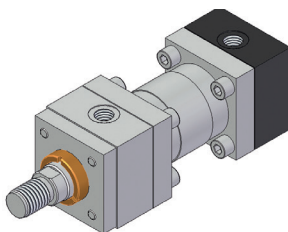
ISO MX5 - FRONT THREADED HOLES

X



ISO MX6 - REAR THREADED HOLES

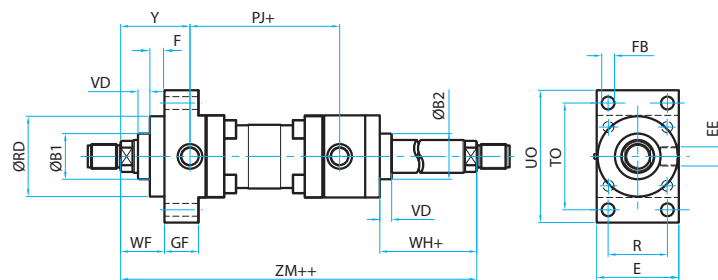
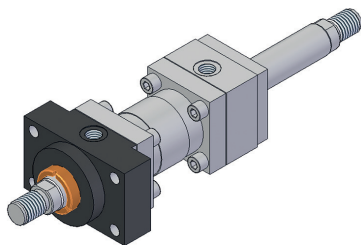
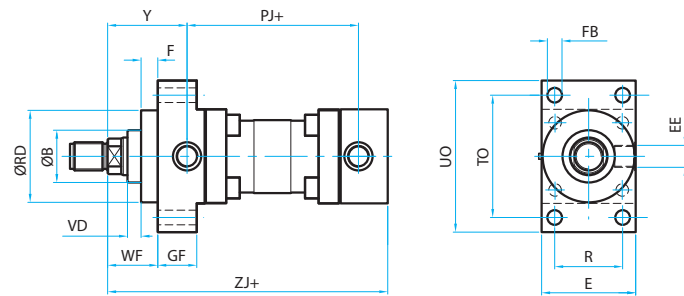
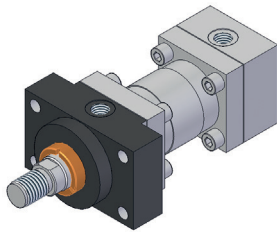
T





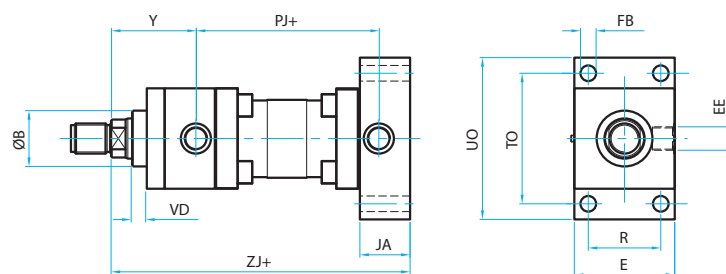
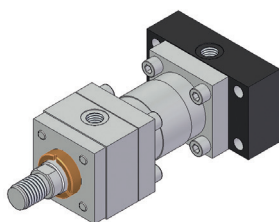
ISO ME5 - FRONT FLANGE

A



ISO ME6 - REAR FLANGE

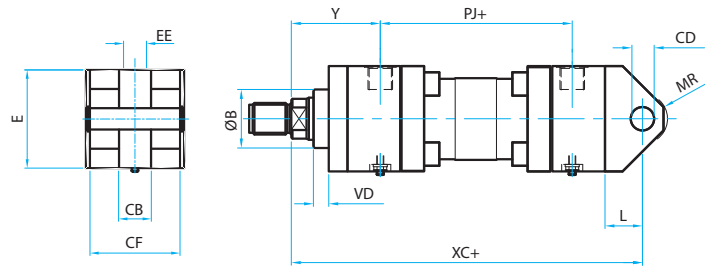
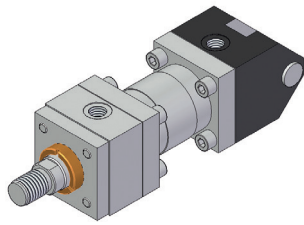
B





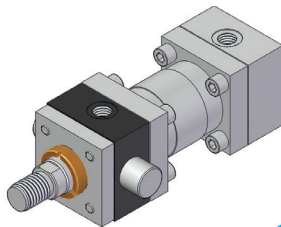
ISO MP1 - FEMALE CLEVIS

M

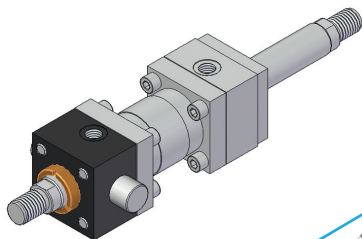
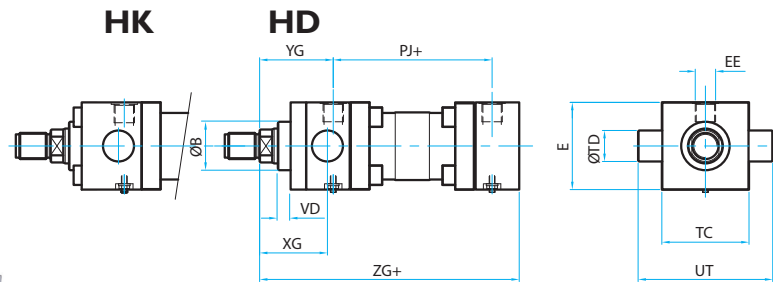


ISO MT1 - FRONT TRUNNIONS

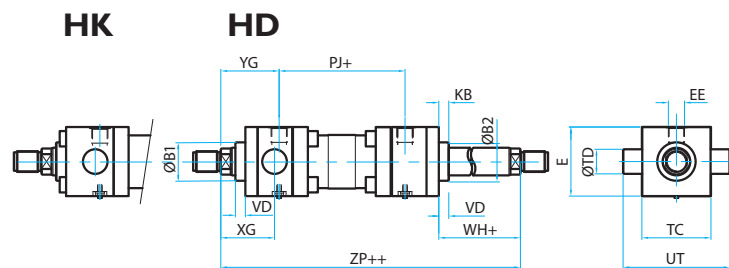
G



Accessory LK available on page 59

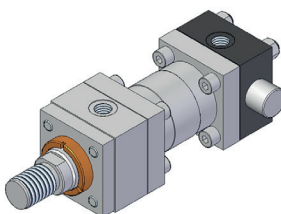


Accessory LK available on page 59

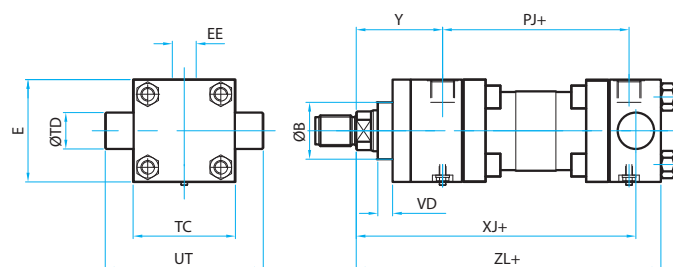


ISO MT2 - REAR TRUNNIONS

L



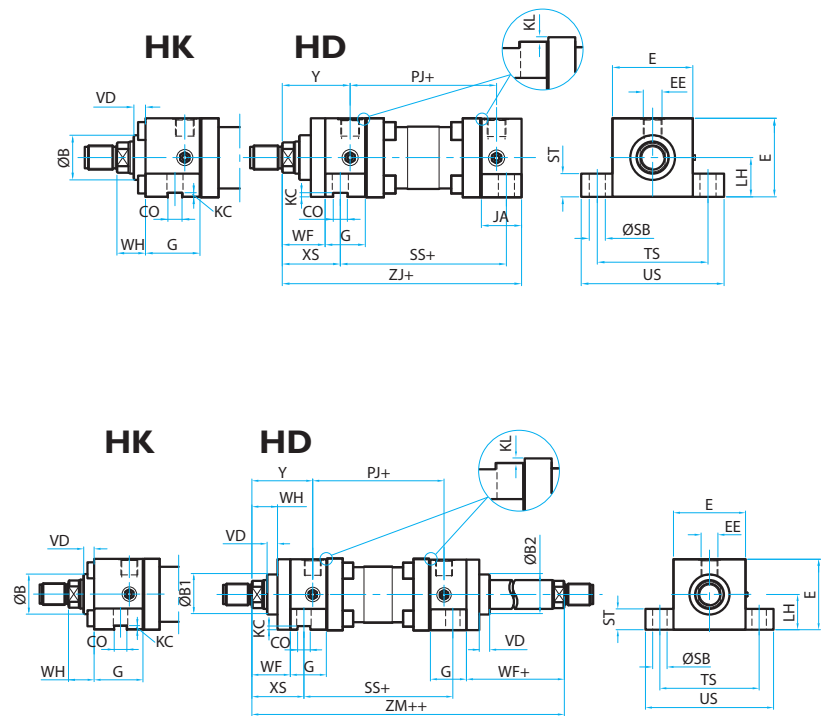
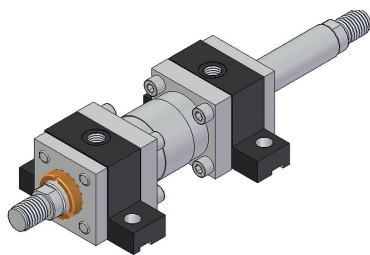
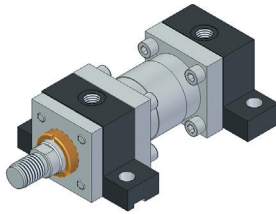
Accessory LK available on page 59





ISO MS2 - FEET

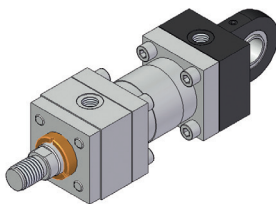
E



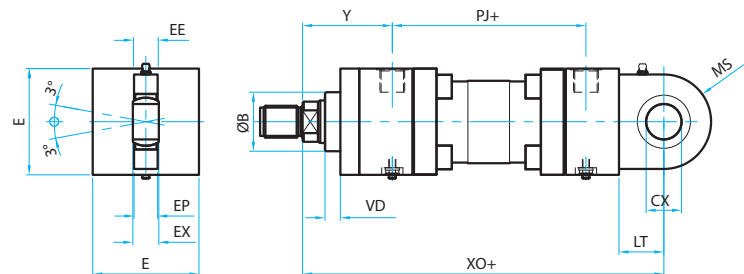
The counterflange is protruding from the base of the foot (see dimension KL)

ISO MP5 - BALL JOINTED EYE

D

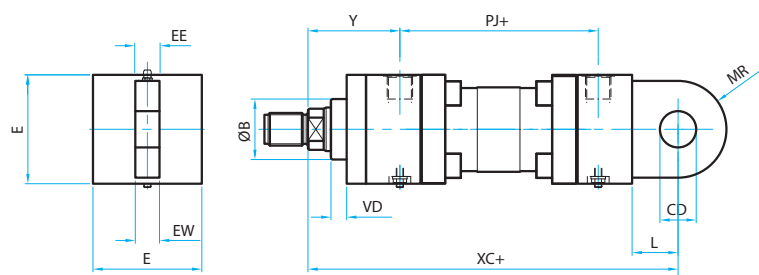
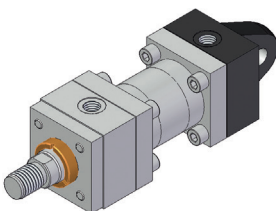


Accessory LD available on page 58



ISO MP3 - MALE CLEVIS

C

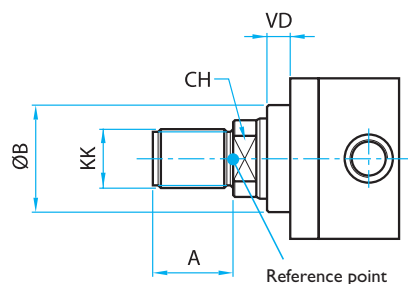
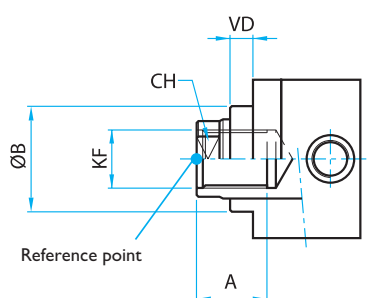
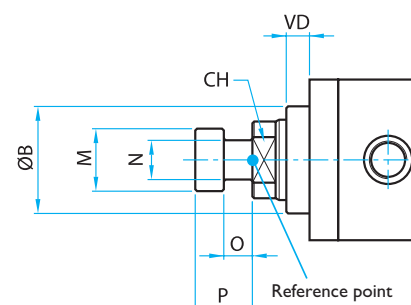




Bore	50			63			80			100			125			160			200		
Rod	22	28	36	28	36	45	36	45	56	45	56	70	56	70	90	70	90	110	90	110	140
B f9	34	42	50	42	50	60	50	60	72	60	72	88	72	88	108	88	108	133	108	133	163
AA	74			91			117			137			178			219			269		
BD	38			48			58			68			88			108			125		
BG	18			18			24			24			30			35			40		
CB	30			30			40			50			64(*)			80(*)			80		
CD H9	20			20			28			36			45			56			70		
CF	74			90			110			130			164			200			240		
CO H8	12			16			16			16			20			30			40		
CX	25 ⁰ _{-0.012}			30 ⁰ _{-0.012}			40 ⁰ _{-0.012}			50 ⁰ _{-0.012}			60 ⁰ _{-0.015}			80 ⁰ _{-0.015}			100 ⁰ _{-0.020}		
DD	M12x1.25			M12x1.25			M16x1.5			M16x1.5			M22x1.5			M27x2			M30x2		
E max	75			90			115			130			165			200			245		
EE (page 36)	G 1/2"			G 1/2"			G 3/4"			G 3/4"			G 1"			G 1"			G 1 1/4"		
EP	18			20			24			30			38			47			58		
EW h14	30			30			40			50			60			70			80		
EX	20 ⁰ _{-0.12}			22 ⁰ _{-0.12}			28 ⁰ _{-0.12}			35 ⁰ _{-0.12}			44 ⁰ _{-0.15}			55 ⁰ _{-0.15}			70 ⁰ _{-0.20}		
F max	16			16			20			22			22			25			25		
FB H13	14			14			18			18			22			26			33		
G	45			45			52			55			87			95			117		
GF	38			38			45			45			58			58			76		
JA	45			45			52			55			65			70			92		
KC	4.5			4.5			5			6			6			8			8		
KL	1			2			2			6			3			1			5		
L min	32			32			39			54			57			63			82		
LH h10	37			44			57			63			82			101			122		
LT min	31			38			48			58			72			92			116		
MR max	29			29			34			50			53			59			78		
MS max	33			40			50			62			80			100			120		
PJ	62+ (*)			64+ (*)			77+ (*)			78+ (*)			117+			130+			165+		
R	52			65			83			97			126			155			190		
RD f8	74			88 (**)			105 (**)			125 (**)			150 (**)			170 (**)			210 (**)		
RT	M12			M12			M16			M16			M22			M27			M30		
SB H13	14			18			18			26			26			33			39		
SS	92+			86+			105+			102+			131+			130+			172+		
ST	19			26			26			32			32			38			44		
TC	76			89			114			127			165			203			241		
TD f8	25			32			40			50			63			80			100		
TG	52.3			64.3			82.7			96.9			125.9			154.9			190.2		
TO	105			117			149			162			208			253			300		
TS	102			124			149			172			210			260			311		
UO max	130			145			180			200			250			300			360		
US	127			161			186			216			254			318			381		
UT	116			139			178			207			265			329			401		
UW	90			100			130			140			180			215			300		
VD	9			13			9			10			9	10	10	10	10	7	10	7	7
WF	41			48			51			57			57			57			57		
WH	25			32			31			35			35			32			32		
XC	191+			200+			229+			257+			289+			308+			381+		
XG	64			70			76			71			75			75			85		
XJ	136+ (*)			146+ (*)			165+ (*)			177+ (*)			214+ (*)			227+ (*)			271+ (*)		
XO	190+			206+			238+			261+			304+			337+			415+		
XS	54			65			68			79			79			86			92		
Y	69 (*)			76 (*)			82 (*)			91 (*)			86			86			98		
YG	69 (*)			76 (*)			82 (*)			79 (*)			86			86			98		
ZG	159+			168+			190+			191+			232+			245+			299+		
ZJ	159+			168+			190+			203+			232+			245+			299+		
ZL	159+			168+			190+			203+			254+			270+			324+		
ZM	200++			216++			241++			260++			289++			302++			356++		
ZP	200++			216++			241++			248++			289++			302++			356++		



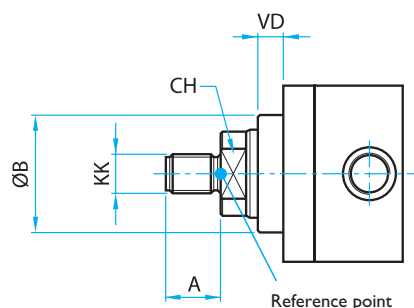
ROD END

- Male thread ISO 6020/2**SF** Female thread**ST** Floating joint

Rod	22	28	36	45	56	70	90	110	140
A	22	28	36	45	56	63	85	95	112
B f9	34	42	50	60	72	88	108	133	163
CH	19	22	30	36	46	60	75	95	120
KK	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3	M100x3
KF	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3	M100x3
M	18	22	28	35	45	56	70	106	136
N	11	14	18	22	28	35	45	65	70
O	8	10	13	16	20	25	35	35	45
P	16	20	25	32	40	50	70	70	90

For the ISO 6020/2 standard male rod end, ball-joint or clevis pin ends are available on page 56.

Different threads, lengths and rod extensions are available on request.

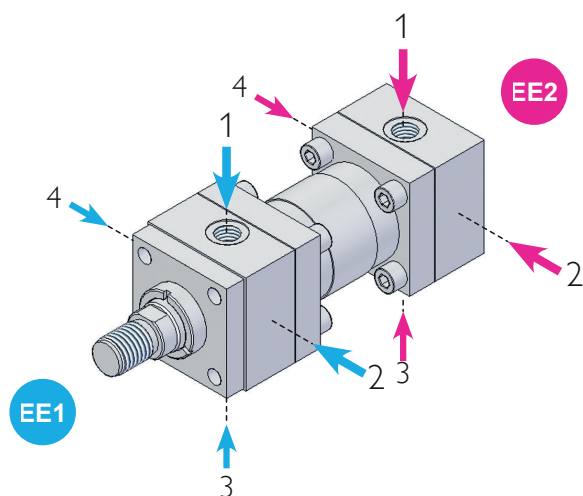
SL Male thread DIN 24554

Bore	50			63			80			100			125			160			200		
Rod	22	28	36	28	36	45	36	45	56	45	56	70	56	70	90	70	90	110	90	110	140
A	22	28	36	28	36	45	36	45	56	45	56	70	56	70	90	70	90	110	90	110	140
B f9	34	42	50	42	50	60	50	60	72	60	72	88	72	88	108	88	108	133	108	133	163
CH	19	22	30	22	30	36	30	36	46	36	46	60	46	60	75	60	75	95	75	95	120
KK	M16x1.5	M20x1.5	M27x2	M20x1.5	M27x2	M33x2	M27x2	M33x2	M42x2	M33x2	M42x2	M48x2	M42x2	M48x2	M64x3	M48x2	M64x3	M80x3	M64x3	M80x3	M100x3
VD	9	13	17	13	17	21	9	13	17	10	14	18	9	13	17	10	14	18	10	14	18

For the SL rod end with male thread DIN 24554, ball-joint or clevis pin ends are available on page 56.



OIL PORTS



Bore	Side	ISO 1179-1 (GAS)		SAE 3000	
		Standard	Overize	Standard	Overize
50	Front	G 1/2"	-	-	-
	Rear	G 1/2"	G 3/4"	-	-
63	Front	G 1/2"	-	-	-
	Rear	G 1/2"	G 3/4"	-	-
80	Front	G 3/4"	-	3/4"	1"
	Rear	G 3/4"	G 1"	3/4"	1"
100	Front	G 3/4"	-	3/4"	1"
	Rear	G 3/4"	G 1"	3/4"	1"
125	Front	G 1"	G 1 1/4"	1"	1 1/4"
	Rear	G 1"	G 1 1/4"	1"	1 1/4"
160	Front	G 1"	G 1 1/4"	1"	1 1/4"
	Rear	G 1"	G 1 1/4"	1"	1 1/4"
200	Front	G 1 1/4"	G 1 1/2"	1 1/4"	1 1/2"
	Rear	G 1 1/4"	G 1 1/2"	1 1/4"	1 1/2"

The standard configuration has the oil port in position 1 and the cushioning adjustment or air bleed on position 3, except for the mounting type E where they are in position 2.

ROD MATERIAL

-	CK45 chromeplated steel
RRX	Chromeplated Stainless steel
RRB	Hardened and tempered chromeplated steel
RRK	Nikrom steel
RRH	Hardened chromeplated steel

The cylinder rod is made of high-quality chrome-plated ground steel to reduce seal wear and achieve the best sealing performance over time.

The standard version is made of CK45 steel.

For special requirements regarding resistance to corrosion, mechanical stress and wear, stainless steel, Nikrom-coated, hardened and tempered steel or hardened steel rods are available.

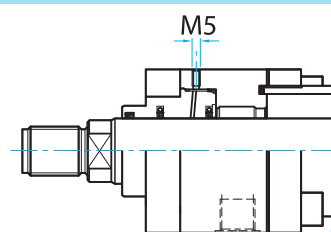
BUSHING DRAIN

SD

Stroke longer than 2000 mm and high-speed movement can generate a build-up of fluid between the wiper and the rod guide bushing seal.

The cylinder can be equipped with a bushing drain port to allow excess fluid to be removed and returned to the tank.

The drain port is normally located on the side opposite the oil port and must be connected to an atmospheric pressure tank.



METAL WIPER

RM

The metal wiper is particularly suitable for keeping extraneous particles, even small ones, outside the cylinder in the surrounding operating environment, thanks to the perfect adhesion between the scraper and the cylinder rod.

Recommended in environments with a high quantity of small dust particles.

HIGH SEALING AND LOW FRICTION PISTON FOR HEAD BALANCING CYLINDERS

BL

A special version of the piston is available for applications where high sealing and high free-flowing performance are required at the same time: e.g. load balancing cylinders, applications with closed circuits or with different fluids (oil/air), etc. Please consult our technical department to verify the applicability of this solution.

PISTON FOR HEAVY DUTY APPLICATIONS

PQ

A special version of the piston is available for heavy duty applications, where shocks and impulsive forces cannot be avoided in any way and their damaging effects on cylinder life must be limited.

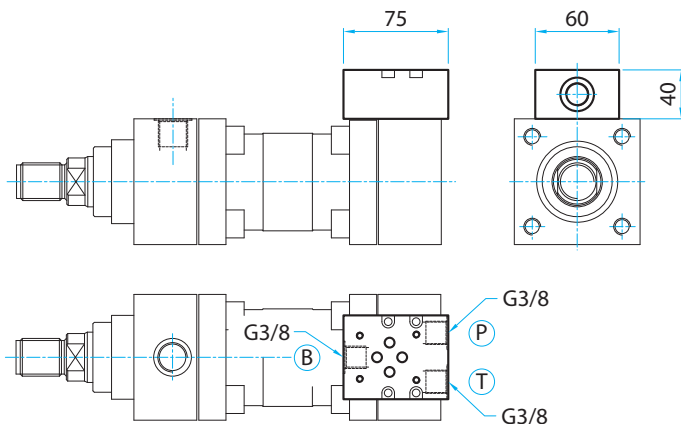
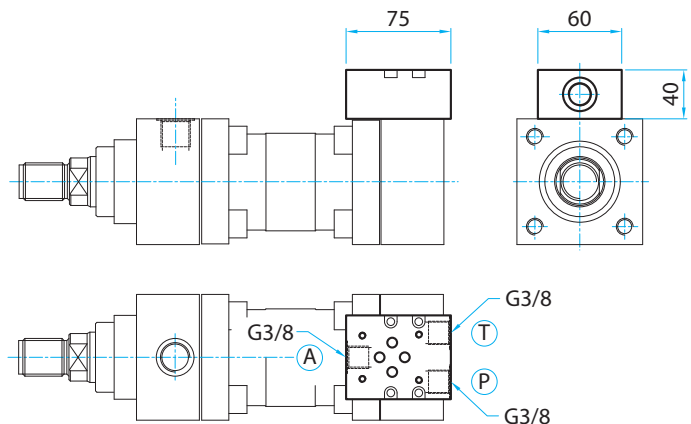
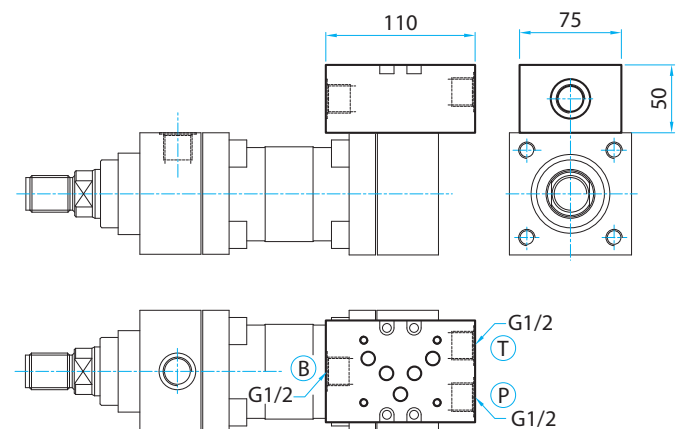
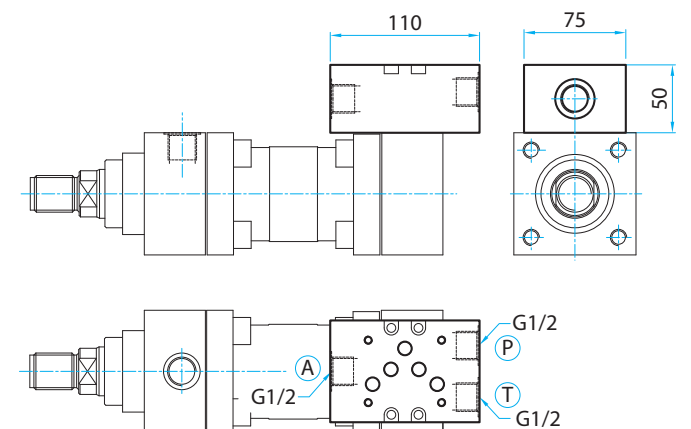
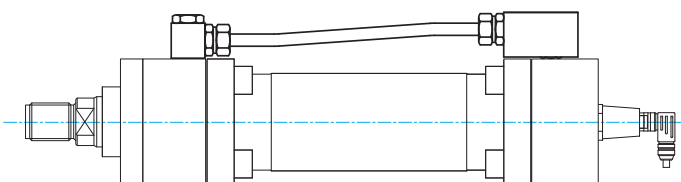
In these cases, we recommend the use of this piston in combination with a hardened and tempered steel piston rod.

Please consult our technical department to verify the applicability of this solution.

**CETOP PLATES FOR ISO 4401 VALVES**

CETOP plates with ISO 4401 mounting surfaces allow fixing a four-way control valves to reduce oil volumes between the cylinder and the valve, achieving better control accuracy.

They are mounted directly on the rear head of the cylinder by means of a nipple and four screws, which ensure stable attachment even in the case of continuous vibrations. They are often chosen in combination with the use of position transducers for absolute and precise detection of the rod. On request, the cylinder can be supplied with the connection tube to the front end fitted.

CETOP 3 PLATES FOR ISO 4401-03 NG6 VALVES (for bores from 50 to 125)**BV3-A** Rear side through port A**BV3-B** Rear side through port B**CETOP 5 PLATES FOR ISO 4401-05 NG10 VALVES (for bores from 50 to 200)****BV5-A** Rear side through port A**BV5-B** Rear side through port B**TBV** Connection pipe to front head (on request)

On request, it is possible to supply the cylinder already equipped with the connection pipe to the front head.

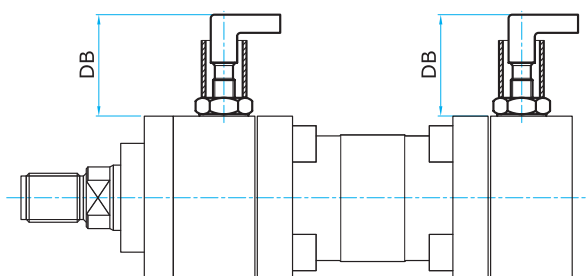


HYDRAULIC CYLINDERS WITH COUNTERFLANGES AND PROXIMITY SWITCHES

The HD and HK series cylinders can be equipped with proximity switches integrated in the cylinder heads, for detecting the position of the piston at the end of the stroke, on one or both sides.

The switches generates a magnetic field and it is able to detect the change resulting from the approaching of the cushioning bushing.

The switches are mounted on the cylinder head, usually in position 4, and are protected from accidental impact by a solid steel cover (see page 36).



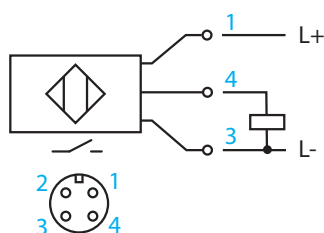
Bore	DB max (mm)
50	80
63	80
80	70
100	60
125	65
160	55
200	50

SPV	Front side switch option
SPZ	Rear side switch option
SPK	Front and rear side switches option

The switches are made of stainless steel and are supplied correctly mounted in the cylinder and tested before delivery.

The switches is supplied with a 5 meter PUR cable with M12 connector.

The output signal is regulated by a "normally open" contact.



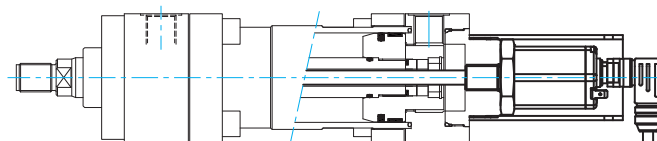
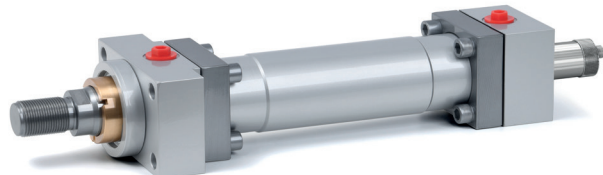
Switch technical features

Operating temperature	-25°C / +120°C
Maximum pressure	500 bar
Protection grade	IP69k
Connector	S4
Hysteresis	<= 15%
Repeatability	<= 5%
Wiring	3 wires
Switching function	Normally open
Output signal	PNP
Rated operational voltage	24 V DC
Rated operational current	200 mA
Supply voltage	10 / 36 V DC

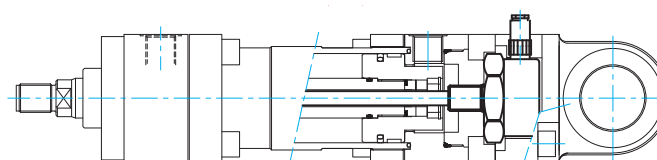


HYDRAULIC SERVOCYLINDERS WITH COUNTERFLANGES AND POSITION TRANSDUCER

ISO 6020/2 servocylinders are available both with counterflanges (TH and TX version) and with tie-rods (TD and TK version see page 22). The servocylinders are equipped with an electronic transducer that detects the absolute position of the rod.



Compatible with cylinders with A, E, G, L, X mountings.



Version with internal transducer for mountings B, C, D, M.
To be requested to our technical department

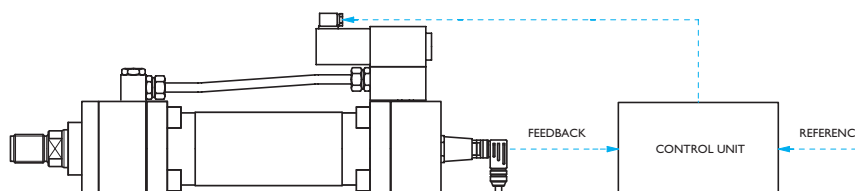
In all versions with an external transducer, the protruding parts of the electronic device are completely protected from accidental impacts by a steel protection firmly fastened to the servocylinder.

The servocylinders of the TH and TX series are equipped with a bronze guide bushing and low-friction seals to optimise performance at both high and low speeds, avoiding stick-slip problems.

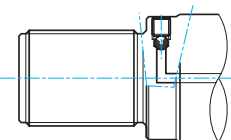
Positioning accuracy is determined by two elements: the resolution of the transducer and the cylinder control system.

The servocylinders can be equipped with CETOP plates for ISO 4401 valves, which allow the direct fitting on board the servocylinder of:

- ON/OFF solenoid valves
- Proportional solenoid valves
- Servovalves



This configuration combined with a CONTROL UNIT ensures optimal hydraulic rigidity, which significantly improves response time, repeatability and positioning accuracy.



For servocylinders to function correctly, it is essential that they are perfectly purged of air in the servocylinder during installation. For this reason, these servocylinders, in addition to the air bleeds on the heads, have an air bleed at the top of the piston rod that allows the air in the chamber that houses the transducer to escape.

The special position of this air bleed allows operation without removing the rod from its housing.

The linear absolute position transducer operates non-contact, ensuring maximum durability and reliability of the measuring system.

The transducers use magnetostrictive technology, which enables high performance over a wide range of lengths, with various mounting options and analogue (0-10V, 4-20mA) or digital output signals (SSI, CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK).

The transducer is supplied with a 90° or straight connector, depending on how it is installed on the servocylinder.

As an alternative, on demand, it is available without connector, with direct output with flexible cable.

Features	Analogic output		Digital output	
	MV	MA	MS	MD
Transducer type	Magnetostrictive		Magnetostrictive	
Output	0-10 V	4-20 mA	SSI (Synchronic Serial Interface)	CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK
Supply voltage	24V DC (-15 / +20%)		24V DC (-15 / +20%)	
Temperature	-40 °C / +80 °C		-40 °C / +85 °C	-40 °C / +75 °C
Max stroke	4000 mm		4000 mm	
Resolution	Infinite		0,1 µm	0,5 - 2 µm
Linearity	< ± 0,02 % F.S. (Min ± 50 µm)		< ± 0,01 % F.S. (Min ± 50 µm)	
Repeatability	< ± 0,001 % F.S. (Min ± 2,5 µm)		< ± 0,001 % F.S. (Min ± 2,5 µm)	
Hysteresis	< 4 µm		< 4 µm	
Current drain	100 mA typical		100 mA typical	
Speed	2 m/s		2 m/s	
Protection	IP67		IP67	



CODE COMPOSITION

The entry fields for the example values are mandatory

HD **50** / **28** / **A** **500** **S** **SX**

Standard

Bore	Type
50 / 100	HD
125 / 200	HK

Special version ⁽¹⁾ **SX**

Bore **Rod**

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

Options (see from page 36)

Air bleed

-	No air bleed
SV	Front
SZ	Rear
SK	Front + Rear

Rod end (see page 35)

-	Male thread
SF	Female thread
ST	Floating joint
SL	Male thread DIN 24554

Seals (see page 27)

S	High sealing
L	Low friction
H	Viton®
G	HFC-fluid

Spacer

-	For stroke from 0 to 1000
SJ 50	from 1000 to 1500
SJ 100	from 1500 to 2000
SJ 150	from 2000 to 3000
SJ 200	over 3000

Stroke in mm

Adjustable cushioning

-	Not cushioned
V	Front
Z	Rear
K	Front + Rear

Second rod

See mounting list from page 30	ISO 6020/2	DIN 24554	Mounting
Front threaded holes	MX5		X
Rear threaded holes	MX6		T
Feet	MS2	MS2	E
Front flange	ME5	ME5	A
Rear flange	ME6	ME6	B
Ball jointed eye	MP5	MP5	D
Male clevis	MP3		C
Female clevis	MP1		M
Front trunnions	MT1		G
Rear trunnions	MT2		L

(1) Indicate SX whenever the cylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable. (see list of available options from page 36)



CODE COMPOSITION

The entry fields for the example values are mandatory.

Example code: **TH** **MA** **80** / **56** / **A** **500** **L** **BV3-A** **SJ 50**

Bore | **Type**

50 / 100	TH
125 / 200	TX

Special version ⁽¹⁾ | **SX**

Transducer

Magnetostriuctive	MV MA MS MD
-------------------	--

Bore | **Rod**

TH	50	28 36
	63	28 36 45
	80	36 45 56
	100	45 56 70
TX	125	56 70 90
	160	70 90 110
	200	90 110 140

Options (see from page 36)

Plate for valve (see page 37)

BV3-A	CETOP 3
BV3-B	ISO 4401-03 NG6
BV5-A	CETOP 5
BV5-B	ISO 4401-05 NG10

Air bleed

-	No air bleed
SV	Front
SZ	Rear
SK	Front + Rear

Rod end (see page 35)

-	Male thread
SF	Female thread
ST	Floating joint
SL	Male thread DIN 24554

Seals (see page 27)

L	Low friction
H	Viton®
G	HFC-fluid

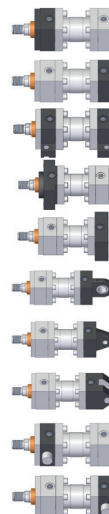
Spacer

-	For stroke from 0 to 1000
SJ 50	from 1000 to 1500
SJ 100	from 1500 to 2000
SJ 150	from 2000 to 3000
SJ 200	over 3000

Stroke in mm

Contact our technical department, for the second rod

See list of mountings from page 30	ISO 6020/2	DIN 24554	Mounting
Front threaded holes	MX5		X
Rear threaded holes	MX6		T
Feet	MS2	MS2	E
Front flange	ME5	ME5	A
Rear flange	ME6	ME6	B
Ball jointed eye	MP5	MP5	D
Male clevis	MP3		C
Female clevis	MP1		M
Front trunnions	MT1		G
Rear trunnions	MT2		L

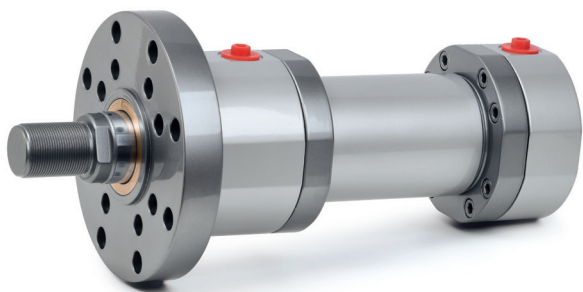


(1) Indicate SX whenever the servocylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable.
(see list of available options from page 36)



ISO 6022 hydraulic cylinders are suitable for particularly heavy duty applications, in industrial applications where great robustness, high working pressures (up to 250 bar) and technical solutions that ensure durability and reliability even in difficult environments are required, thanks to the use of the best materials.

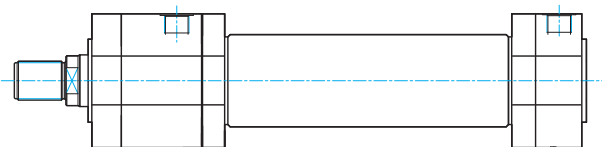
The overall dimensions and the mounting configurations comply with ISO 6022. The cylinder can be provided with reliable end-of-stroke cushioning, equipped with a quick restart system and adjustable to suit the needs and loads to be cushioned. The cylinder is equipped with a long bronze rod guide bushing and double bronze guides on the piston to offer the best performance even under unexpected radial loads. Available in various sealing configurations to suit the desired operating conditions and performance. Before delivery, each cylinder is tested in accordance with ISO 10100 and we record these results in our systems to ensure product quality and performance. They can be equipped with various types of sensors to detect the piston at the end of the stroke or in intermediate positions, or continuously along the entire stroke. In addition, the cylinder can be equipped with a CETOP plate for the installation of a control valve with ISO 4401 mounting surfaces. Spare parts are easy to find and are always available at our warehouse, with rapid support service to deal with any urgency.



Standard	ISO 6022 - DIN 24333		
Bore	mm	from 50 to 200	
Pressure	bar	operational 250	testing 375
Maximum stroke	mm	6000	
Fluid	Mineral hydraulic oil Phosphoric esters HFC-fluid		

HEAVY DUTY CYLINDER SERIES

DP Bore from 50 to 200



The DP series hydraulic cylinders comply with ISO 6022 standard. Technical characteristics, dimensions, and available versions and options are detailed from page 43. They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke sensors integrated in the cylinder heads, and many other special options.

HEAVY DUTY SERVOCYLINDER SERIES WITH POSITION TRANSDUCER

TP Bore from 50 to 200



The TP series hydraulic servocylinders have the same technical features, dimensions and available options as the DP basic series, but are equipped with a magnetostrictive linear position transducer (see page 53) for precise and continuous detection of the piston at any point in the servocylinder stroke. The external parts of the position transducer are protected against accidental impact during transport, installation and operation by a removable steel cover.

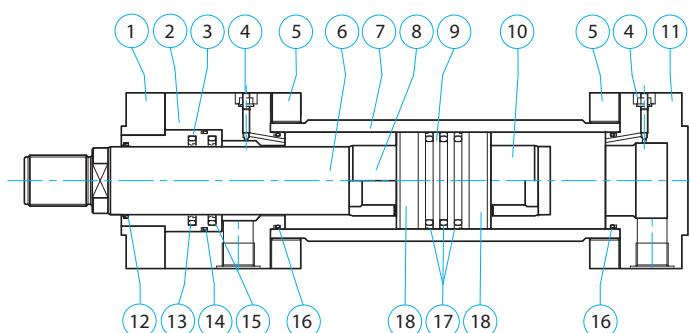


AVAILABLE SEALS

Seals code	Performances					Fluid		
	High sealing	Low friction	Max speed	Temp °C		Hydraulic oil	Phosphoric esters	HFC-fluid
				Min	Max			
S	√		0.5 m/s	-20	+80	√		
L		√	1 m/s	-20	+80	√		
H		√	1 m/s	-20	+150	√	√	
G		√	1 m/s	-20	+80			√

For speeds and temperatures exceeding the indicated limits, please contact our technical department.

BORE 50-200



The cylinders are equipped with a bronze guide bushing with a wiper and a double seal with high or low friction.

	Component	Material	Features
1	Closing flange	Steel	
2	Front head	Steel	
3	Guide bushing	Bronze	
4	Cushioning adjusting + air bleed	Steel	
5	Counterflange	Steel	
6	Piston rod	Hardened and tempered chromeplated steel	Cr 25 µm ISO f7 - Ra 0.20 µm
7	Cylinder body	Steel	Honed H8 - Ra 0.40 µm
8	Front cushioning	Hardened steel	
9	Piston	Steel	
10	Rear cushioning	Hardened steel	
11	Rear head	Steel	

The original floating ring cushioning system guarantees perfect centring and performs the function of rapid opening for quick restart of the cylinder.
Made of hardened steel guarantees a long service life, thanks to the steel housing of the cylinder head.

The screw adjustment system allows a precise adjustment of the cushioning effect and at the same time bleeding the air (see page 45).

	Component	Groove	Material			
			S	L	H	G
12	Rod wiper		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
13	First rod seal	ISO 7425/2	PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
14	Head / bushing sealing		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE
15	Second rod seal	ISO 7425/2	NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
16	Tube seal		NBR	NBR	Viton®	NBR
17	External piston seals	ISO 7425/1	NBR + PTFE + PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
18	Piston guide		Bronze	Bronze	Bronze	Bronze



SIZING AND FORCES

Dimension		Piston area		Force at 100 bar		Force at 250 bar		Screws tightening torque
Bore mm	Rod mm	push cm ²	pull cm ²	push kN	pull kN	push kN	pull kN	Nm
50	32	19.6	11.6	20	12	49	29	30
	36		9.5		9		24	
63	40	31.2	18.6	31	19	78	47	50
	45		15.3		15		38	
80	50	50.3	30.6	50	31	126	77	80
	56		25.6		26		64	
100	63	78.5	47.4	79	47	196	118	125
	70		40.1		40		100	
125	80	122.7	72.5	123	72	307	181	250
	90		59.1		59		148	
140	90	153.9	90.3	154	90	385	226	250
	100		75.4		75		188	
160	100	201.1	122.5	201	123	503	306	300
	110		106		106		265	
200	125	314.2	191.4	314	191	785	479	480
	140		160.2		160		401	

STROKE

During testing, the cylinder stroke is checked, assuring compliance with the tolerance of 0/+2 mm as per ISO 8135.

For space requirements of the cylinder components or switches, the stroke cannot be less than a minimum value in some circumstances.

This problem can be overcome by inserting a spacer.

	Bore		50	63	80	100	125	140	160	200
Minimum stroke	DP (mm)	Mounting H (ISO MT4)	80	100	120	145	175	190	190	200
		Other	0	0	0	0	0	0	0	0

OPERATIONAL LIFE-TIME

The cylinders are manufactured from high-quality materials and according to design guidelines validated by many years of experience with these products. Under ideal conditions, the cylinders are capable of working for millions of cycles requiring only regular basic maintenance and replacement of wear parts.

The real application situations can subject cylinders to conditions that reduce their service life and would therefore be preferable to avoid.

The most frequent are:

- radial loads, generated by external forces or misalignments in fixing to machinery
- end-stroke impacts and external impulsive forces
- pressure peaks and water hammers;
- contaminated hydraulic fluid;
- over-temperatures, caused either by the environment or internal causes such as frequent cycles with short strokes, which prevent sufficient oil change.

Our technical department will be able to advise you on how best to prevent or reduce problems.



BUCKLING VERIFICATION

When the cylinder is pushing, it can be subject to buckling instability, depending on mounting, stroke and pushing force. The graph illustrates the boundary working conditions for each rod. Stay below for optimal operation. The mounting of the cylinder determines the stroke factor FC. Multiplying the cylinder stroke CO by FC gives the ideal length LI. The value of LI, read on the vertical axis, meets the line corresponding to the diameter of the rod to be checked, identifying on the horizontal axis the maximum possible push. If the actual thrust does not exceed this limit value, the verification is passed.

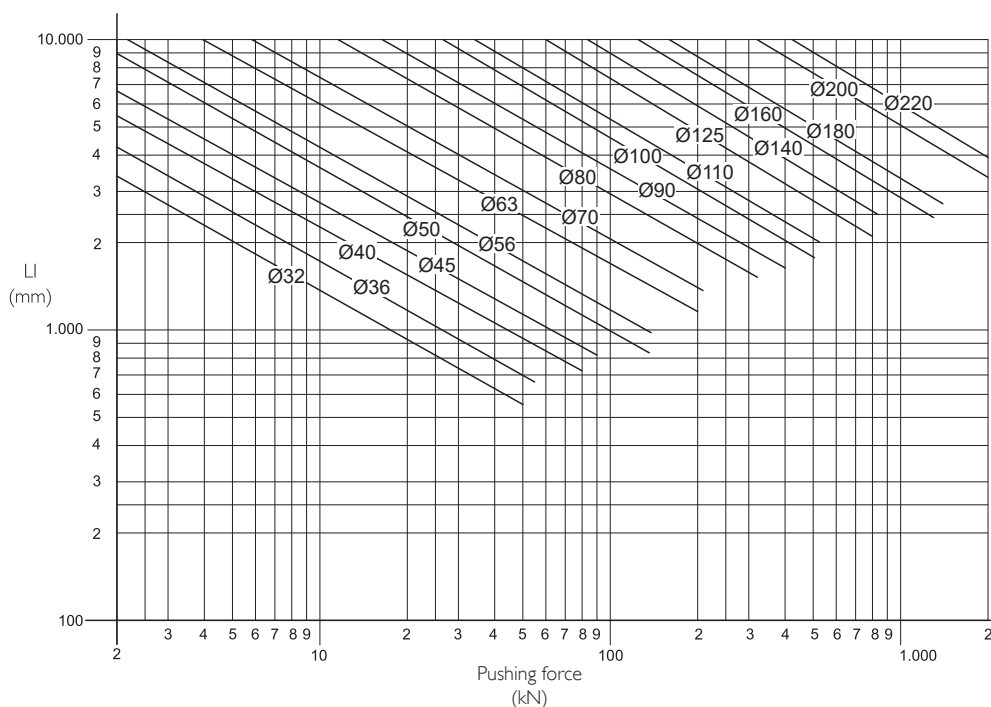
Spacers and rod extensions must be added to the stroke to obtain the CO value to be multiplied by FC.

MOUNTING

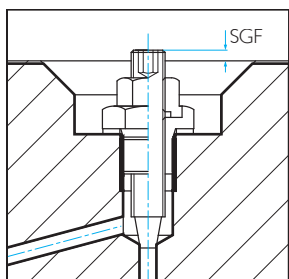
FC

A (MF3)		0.7
		2
B (MF4)		1.5
		4
E (MS2)		0.7
		2
H (MT4)		1.5
C (MP4) D (MP6) R (MP3) S (MP5)		2

ROD SELECTION CHART



CUSHIONING ADJUSTMENT AND AIR BLEEDING



All the cushioned cylinders are equipped with a screw that allows the cushioning adjustment.

Slightly loosen the Seal-Lock® sealing nut, adjust the screw and tighten carefully.

The cushioning adjustment unit can also be used as an air bleeder by loosening the nut until the air has escaped.

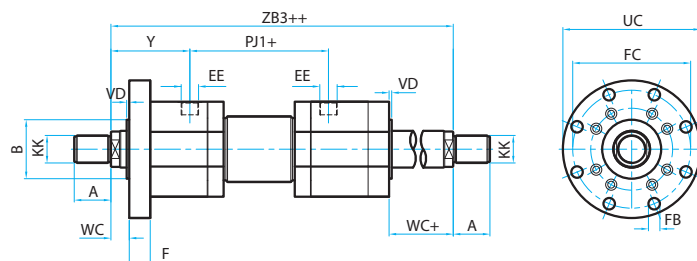
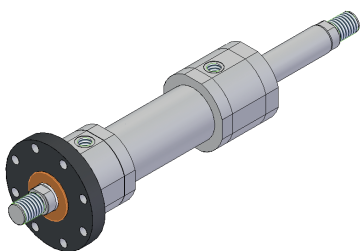
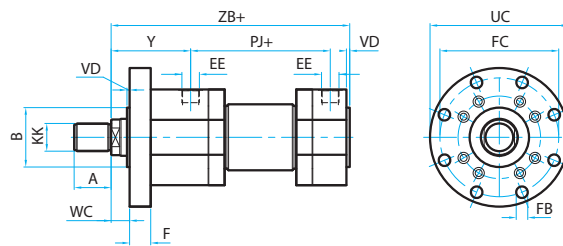
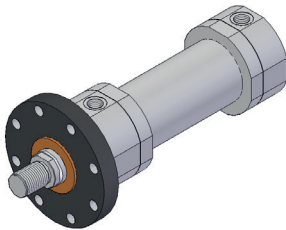
On cylinders with cushioning, if the stroke is shorter than the cushioning length, the cylinder is always cushioned.

Bore		50	63	80	100	125	140	160	200
Cushioning length	mm	32	32	40	40	40	46	46	65
Cushioning area	cm ²	8.2	13.8	23.8	37.8	56	67	99	151
SGF	mm	5	4	5	2	0	0	0	0



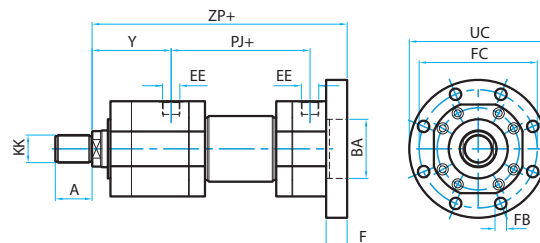
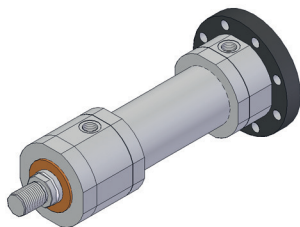
ISO MF3 - FRONT FLANGE

A



ISO MF4 - REAR FLANGE

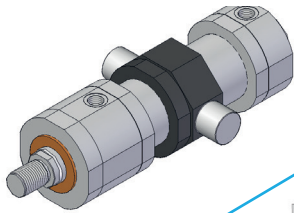
B



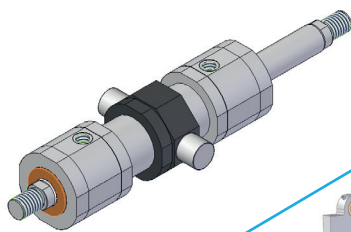
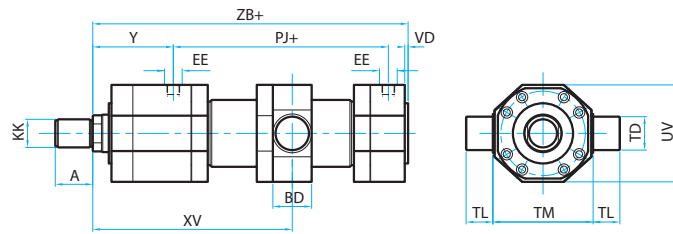


ISO MT4 - INTERMEDIATE TRUNNIONS

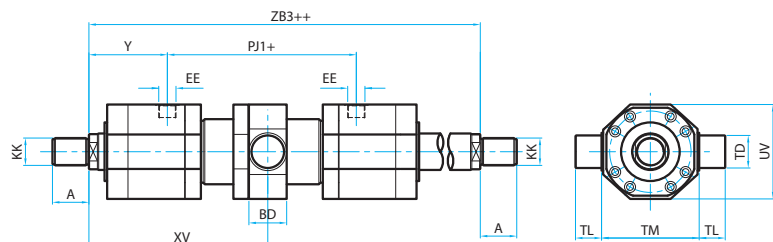
H



Accessory LK available on page 59

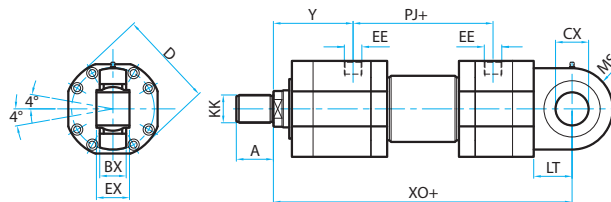
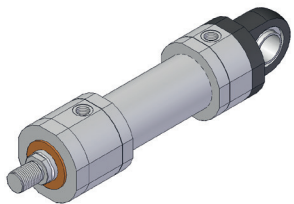


Accessory LK available on page 59



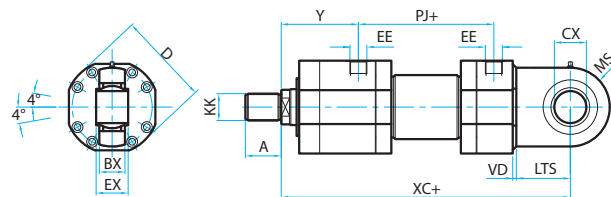
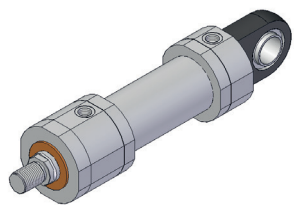
ISO MP6 - DISMOUNTABLE CLEVIS WITH BALL JOINTED EYE

D



ISO MP5 - EXTENDED WELDED CLEVIS WITH BALL JOINTED EYE

S

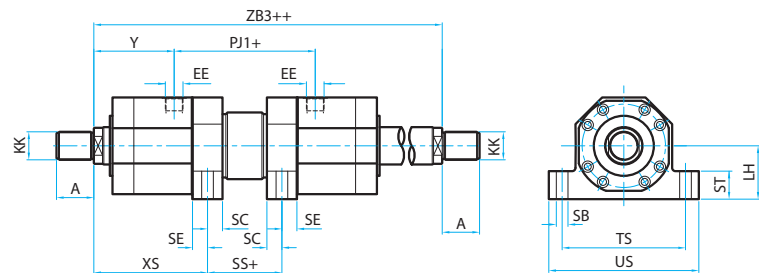
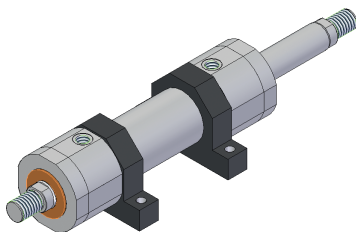
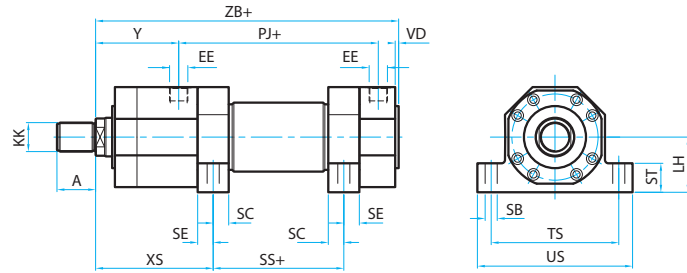
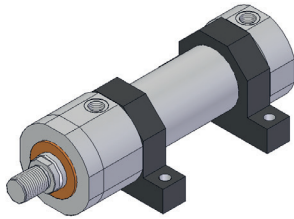




ISO MS2* - FEET

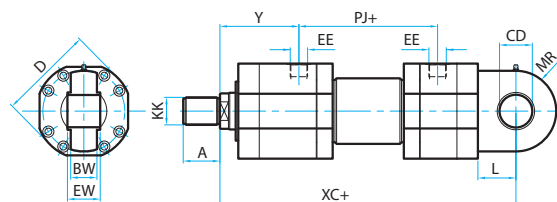
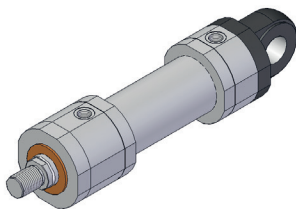
(*) not included in the ISO norm

E



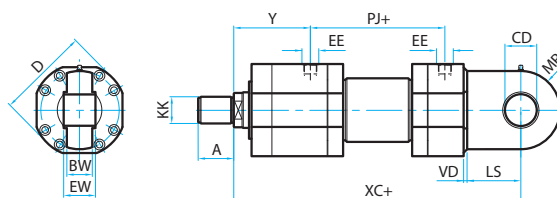
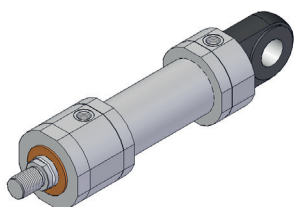
ISO MP4 - DISMOUNTABLE CLEVIS

C



ISO MP3 - EXTENDED WELDED CLEVIS

R





Bore	50	63	80	100	125	140*	160	200
B f8	63	75	90	110	132	145	160	200
BA F8	63	75	90	110	132	145	160	200
BD	38	48	58	73	88	98	108	133
BW	27	35	40	52	60	65	84	102
BX	27	35	40	52	60	65	84	102
CD H9	32	40	50	63	80	90	100	125
CX H7	32	40	50	63	80	90	100	125
D max	105	124	148	177	207	255	270	330
EW	32	40	50	63	80	90	100	125
EX	32	40	50	63	80	90	100	125
EE (page 50)	G 1/2"	G 3/4"	G 3/4"	G 1"	G 1"	G 1 1/4"	G 1 1/4"	G 1 1/4"
F	25	28	32	36	40	40	45	56
FB	8 x Ø 13.5	8 x Ø 13.5	8 x Ø 17.5	8 x Ø 22	8 x Ø 22	8 x Ø 26	8 x Ø 26	8 x Ø 33
FC	132	150	180	212	250	300	315	385
L	40	50	63	71	90	115	112	160
LS	61	74	90	102	124	150	150	206
LT	40	50	63	71	90	115	112	160
LTS	61	74	90	102	124	150	150	206
LH h10	60	68	80	95	115	135	145	170
MR	38	50	61.5	71	90	113	112	145
MS	38	50	61.5	71	90	113	112	145
PJ	120+	136+	156+	172+	205+	208+	235+	278+
PJ1	120+	136+	156+	172+	214+	208+	240+	280+
SB	11	13.5	17.5	22	26	30	33	40
SC	15.5	17.5	22.5	27.5	30	35.5	37.5	45
SE	15.5	17.5	22.5	27.5	30	35.5	37.5	45
ST	32	37	42	52	62	77	77	87
SS	55+	55+	55+	55+	60+	61+	79+	90+
TD f8	32	40	50	63	80	90	100	125
TL	25	32	40	50	63	70	80	100
TM	112	125	150	180	224	265	280	335
TS	135	155	185	220	270	325	340	405
UC	155	175	210	250	290	340	360	440
US	160	185	225	265	325	390	405	480
UV	105	124	145	168	205	248	270	330
VD	4	4	5	5	6	5	7	10
WC	22	25	28	32	36	36	40	45
XC	305+	348+	395+	442+	520+	580+	617+	756+
XO	305+	348+	395+	442+	520+	580+	617+	756+
XS	130	147.5	170.5	192.5	230	254.5	265.5	315
Y	98	107	120	134	153	181	185	221
ZB	244+	274+	305+	340+	396+	430+	467+	550+
ZB3	315++	350++	396++	440++	520++	570++	610++	720++
ZP	265+	298+	332+	371+	430+	465+	505+	569+

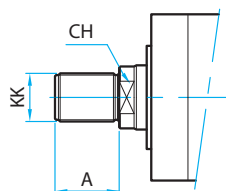
(*) not included in the ISO norm

+ = add the stroke

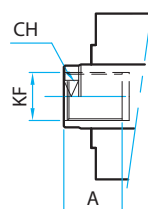
++ = add twice the stroke

ROD END

- Male thread ISO 6022



SF Female thread



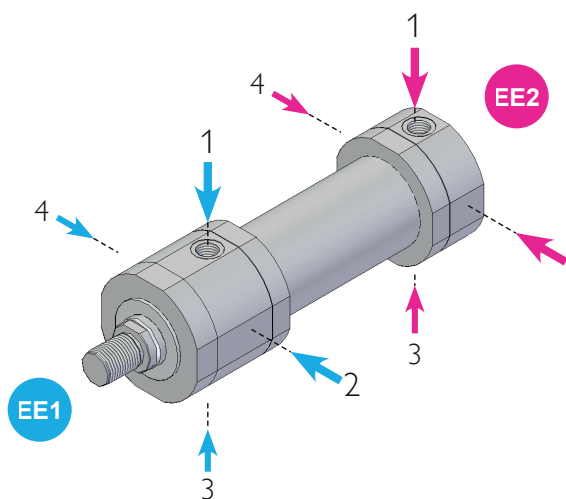
Bore	50		63		80		100		125		140		160		200	
Rod	32	36	40	45	50	56	63	70	80	90	90	100	100	110	125	140
CH	28	30	34	36	43	46	52	60	65	75	75	85	85	95	110	120
Standard	A	36	36	45	45	56	56	63	63	85	85	90	90	95	112	112
	KK	M27x2	M27x2	M33x2	M33x2	M42x2	M42x2	M48x2	M48x2	M64x3	M64x3	M72x3	M72x3	M80x3	M80x3	M100x3
Female	A	28	36	36	45	45	56	63	63	85	85	90	90	95	95	112
	KF	M20x1.5	M27x2	M27x2	M33x2	M33x2	M42x2	M48x2	M48x2	M64x3	M64x3	M72x3	M72x3	M80x3	M80x3	M100x3

For the ISO 6022 standard male rod end, ball-joint or clevis pin ends are available on page 56.

Different threads, lengths and rod extensions are available on request.



OIL PORTS



Bore	ISO 1179-1 (GAS)		SAE 3000		SAE 6000	
	Standard	Oversize	Standard	Oversize	Standard	Oversize
50	G 1/2"	G 3/4"	-	-	-	-
63	G 3/4"	G 1"	1/2"	-	1/2"	-
80	G 3/4"	G 1"	1/2"	-	1/2"	-
100	G 1"	G 1 1/4"	3/4"	1"	3/4"	1"
125	G 1"	G 1 1/4"	3/4"	1"	3/4"	1"
140	G 1 1/4"	G 1 1/2"	1"	1 1/4"	1"	1 1/4"
160	G 1 1/4"	G 1 1/2"	1"	1 1/4"	1"	1 1/4"
200	G 1 1/4"	G 1 1/2"	1"	1 1/4"	1"	1 1/4"

The standard configuration has the oil port in position 1 and the cushioning adjustment or air bleed on position 3.

ROD MATERIAL

-	Hardened and tempered chromeplated steel
RRX	Chromeplated Stainless steel
RRK	Nikrom steel
RRH	Hardened chromeplated steel

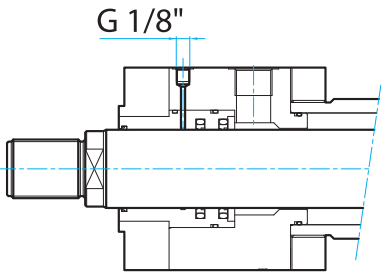
The cylinder rod is made of high-quality chrome-plated ground steel to reduce seal wear and achieve the best sealing performance over time.

The standard version is hardened and tempered chrome-plated steel. For special requirements regarding resistance to corrosion, mechanical stress and wear, stainless steel, Nikrom-coated, hardened steel rods are available.

BUSHING DRAIN

SD Stroke longer than 2000 mm and high-speed movement can generate a build-up of fluid between the wiper and the rod guide bushing seal.

The cylinder can be equipped with a bushing drain port to allow excess fluid to be removed and returned to the tank. The drain port is normally located on the side opposite the oil port and must be connected to an atmospheric pressure tank.



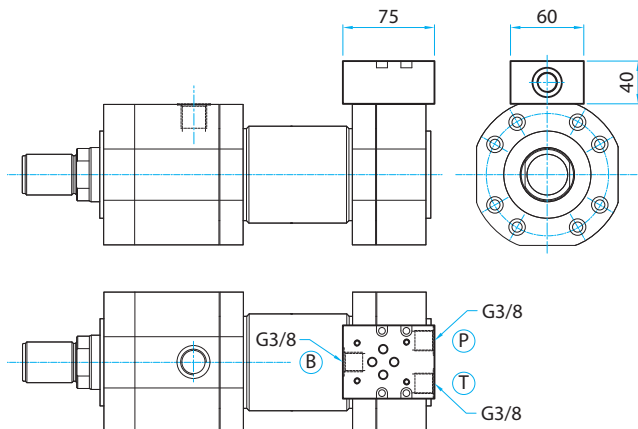
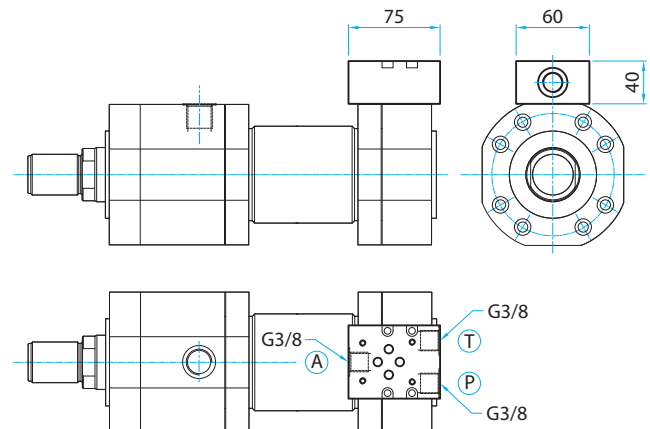
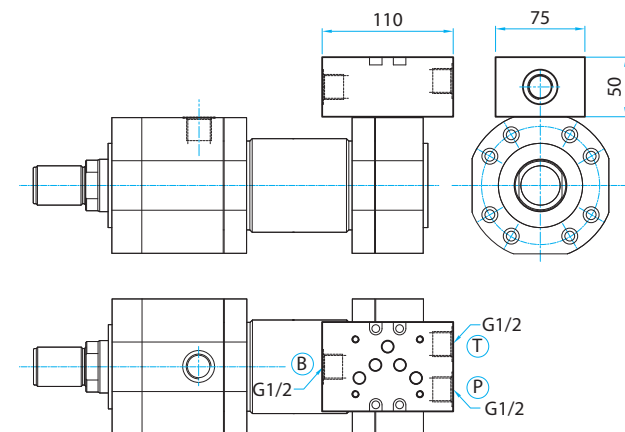
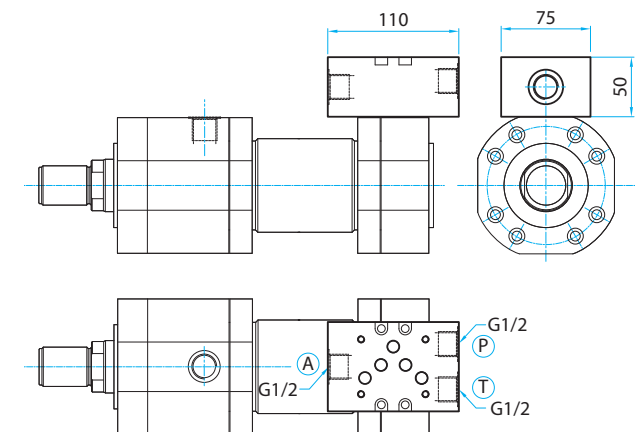
METAL WIPER

RM The metal wiper is particularly suitable for keeping extraneous particles, even small ones, outside the cylinder in the surrounding operating environment, thanks to the perfect adhesion between the scraper and the cylinder rod. Recommended in environments with a high quantity of small dust particles.

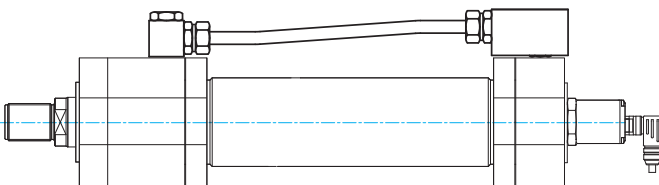
**CETOP PLATES FOR ISO 4401 VALVES**

CETOP plates with ISO 4401 mounting surfaces allow fixing a four-way control valves to reduce oil volumes between the cylinder and the valve, achieving better control accuracy.

They are mounted directly on the rear head of the cylinder by means of a nipple and four screws, which ensure stable attachment even in the case of continuous vibrations. They are often chosen in combination with the use of position transducers for absolute and precise detection of the rod. On request, the cylinder can be supplied with the connection tube to the front end fitted.

CETOP 3 PLATES FOR ISO 4401-03 NG6 VALVES (for bores from 80 to 125)**BV3-A** Rear side through port A**BV3-B** Rear side through port B**CETOP 5 PLATES FOR ISO 4401-05 NG10 VALVES (for bores from 100 to 200)****BV5-A** Rear side through port A**BV5-B** Rear side through port B

It cannot be fitted on cylinders with B mounting (ISO MF4 rear flange)

TBV Connection pipe to front head (on request)

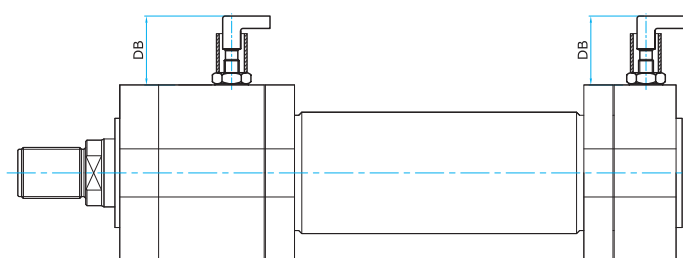
On request, it is possible to supply the cylinder already equipped with the connection pipe to the front head.

**HEAVY DUTY CYLINDERS WITH PROXIMITY SWITCHES**

The DP Series cylinders can be equipped with proximity switches integrated in the cylinder heads, for detecting the position of the piston at the end of the stroke, on one or both sides.

The switches generate a magnetic field and it is able to detect the change resulting from the approaching of the cushioning bushing.

The switches are mounted on the cylinder head, usually in position 4, and are protected from accidental impact by a solid steel cover (see page 50).



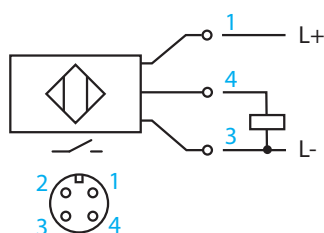
Bore	DB max (mm)
50	80
63	80
80	70
100	60
125	65
160	55
200	50

SPV	Front side switch option
SPZ	Rear side switch option
SPK	Front and rear side switches option

The switches are made of stainless steel and are supplied correctly mounted in the cylinder and tested before delivery.

The sensor is supplied with a 5 meter PUR cable with M12 connector.

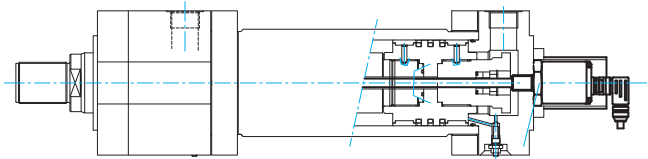
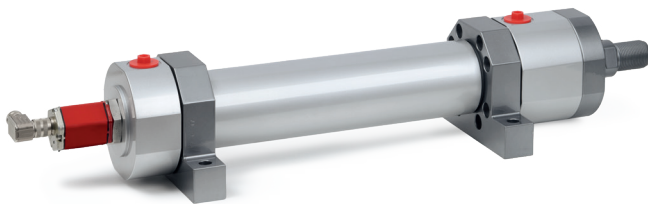
The output signal is regulated by a 'normally open' contact.

**Switch technical features**

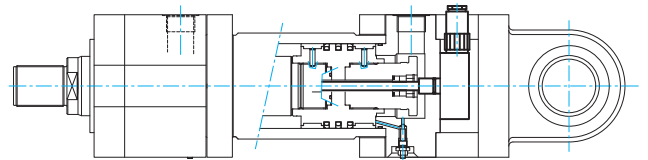
Operating temperature	-25°C / +120°C
Maximum pressure	500 bar
Protection grade	IP69k
Connector	S4
Hysteresis	<= 15%
Repeatability	<= 5%
Wiring	3 wires
Switching function	Normally open
Output signal	PNP
Rated operational voltage	24 V DC
Rated operational current	200 mA
Supply voltage	10 / 36 V DC

**HEAVY DUTY SERVOCYLINDERS WITH POSITION TRANSDUCER**

ISO 6022 servocylinders TP series are equipped with an electronic transducer that detects the absolute position of the rod.



Suitable for servocylinder with mountings A, E, H, B.



Version with internal transducer for mountings C, D, R, S.
To be requested to our technical department.

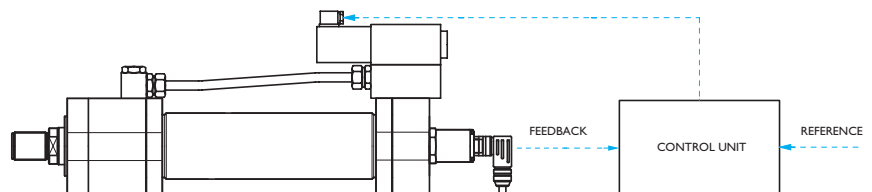
In all versions with an external transducer, the protruding parts of the electronic device are completely protected from accidental impacts by a steel protection firmly fastened to the servocylinder.

The servocylinders of the TP series are equipped with a bronze guide bushing and low-friction seals to optimise performance at both high and low speeds, avoiding stick-slip problems.

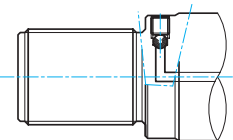
Positioning accuracy is determined by two elements: the resolution of the transducer and the servocylinder control system.

The servocylinders can be equipped with CETOP plates for ISO 4401 valves, which allow the direct fitting on board the servocylinder of:

- ON/OFF solenoid valves
- Proportional solenoid valves
- Servovalves



This configuration combined with a CONTROL UNIT ensures optimal hydraulic rigidity, which significantly improves response time, repeatability and positioning accuracy.



For servocylinders to function correctly, it is essential that they are perfectly purged of air in the servocylinder during installation. For this reason, these servocylinders, in addition to the air bleeds on the heads, have an air bleed at the top of the piston rod that allows the air in the chamber that houses the transducer to escape.

The special position of this air bleed allows operation without removing the rod from its housing.

The linear absolute position transducer operates non-contact, ensuring maximum durability and reliability of the measuring system.

The transducers use magnetostrictive technology, which enables high performance over a wide range of lengths, with various mounting options and analogue (0-10V, 4-20mA) or digital output signals (SSI, CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK).

The transducer is supplied with a 90° or straight connector, depending on how it is installed on the servocylinder.

As an alternative, on demand, it is available without connector, with direct output with flexible cable.

Features	Analogic output		Digital output	
	MV	MA	MS	MD
Trasducer type	Magnetostrictive		Magnetostrictive	
Output	0-10 V	4-20 mA	SSI (Synchronic Serial Interface)	CANbus, DeviceNet, Profibus, EtherCAT®, EtherNet/IP™, PROFINET, POWERLINK
Supply voltage	24V DC (-15 / +20%)		24V DC (-15 / +20%)	
Temperature	-40 °C / +80 °C		-40 °C / +85 °C	-40 °C / +75 °C
Max stroke	4000 mm		4000 mm	
Resolution	Infinte		0,1 µm	0,5 - 2 µm
Linearity	< ± 0,02 % F.S. (Min ± 50 µm)		< ± 0,01 % F.S. (Min ± 50 µm)	
Repeatability	< ± 0,001 % F.S. (Min ± 2,5 µm)		< ± 0,001 % F.S. (Min ± 2,5 µm)	
Hysteresis	< 4 µm		< 4 µm	
Current drain	100 mA typique		100 mA typique	
Speed	2 m/s		2 m/s	
Protection	IP67		IP67	



CODE COMPOSITION

The entry fields for the example values are mandatory.

DP **125** / **90** / **A** **500** **S**

Type

DPSpecial version ⁽¹⁾**SX**

Bore	Rod
50	32 36
63	40 45
80	50 56
100	63 70
125	80 90
140	90 100
160	100 110
200	125 140

Second rod

Stroke in mm

Options (see from page 50)

Air bleed

-	No air bleed
SV	Front
SZ	Rear
SK	Front + Rear

Rod end (see page 49)

-	 Male thread
SF	 Female thread

Seals (see page 43)

S	High sealing
L	Low friction
H	Viton®
G	HFC-fluid

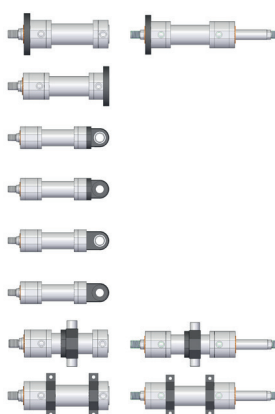
Spacer

-	For stroke from 0 to 1500
SJ 50	from 1500 to 2000
SJ 100	from 2000 to 3000
SJ 150	over 3000

Adjustable cushioning

-	 Not cushioned
V	 Front
Z	 Rear
K	 Front + Rear

See mounting list from page 46	ISO 6022	Mounting
Front flange	MF3	A
Rear flange	MF4	B
Dismountable clevis with ball jointed eye	MP6	D
Dismountable clevis	MP4	C
Extended welded clevis with ball jointed eye	MP5	S
Extended welded clevis	MP3	R
Intermediate trunnions ⁽²⁾	MT4	H
Feet ⁽³⁾	MS2	E



(1) Indicate SX whenever the cylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable. (see list of available options from page 50)

(2) For H mounting (MT4), enter 'XV' at the end of the code followed by the value of dimension XV (see page 47).

(3) Not included in the ISO norm



CODE COMPOSITION

The entry fields for the example values are mandatory.

TP **MA** **80** / **56** / **A** **500** **L**

Type

TPSpecial version ⁽¹⁾**SX**

Transducer

Magnetostrictive

MV
MA
MS
MD

Bore

Rod

50**32****63****40****80****50****100****63****125****80****140****90****160****100****200****125****140**

Options (see from page 50)

Plate for valve (see page 51)

BV3-A

CETOP 3

BV3-B

ISO 4401-03 NG6

BV5-A

CETOP 5

BV5-B

ISO 4401-05 NG10

Air bleed

-

No air bleed

SV

Front

SZ

Rear

SK

Front + Rear

Rod end (see page 49)

-

Male thread

SF

Female thread

Seals (see page 43)

L

Low friction

H

Viton®

G

HFC-fluid

Spacer

-

For stroke from 0 to 1500

SJ 50

from 1500 to 2000

SJ 100

from 2000 to 3000

SJ 150

over 3000

Stroke in mm

Adjustable cushioning

-

Not cushioned

V

Front

Z

Rear

K

Front + Rear

For the second rod, please contact our technical department.

See mounting list from page 46

ISO 6022

Mounting

Front flange

MF3

A

Rear flange

MF4

B

Dismountable clevis with ball jointed eye

MP6

D

Dismountable clevis

MP4

C

Extended welded clevis with ball jointed eye

MP5

S

Extended welded clevis

MP3

RIntermediate trunnions ⁽²⁾

MT4

HFeet ⁽³⁾

MS2

E

(1) Indicate SX whenever the servocylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable.
(see list of available options from page 50)

(2) For H mounting (MT4), enter 'XV' at the end of the code followed by the value of dimension XV
(see page 47)

(3) Not included in the ISO norm

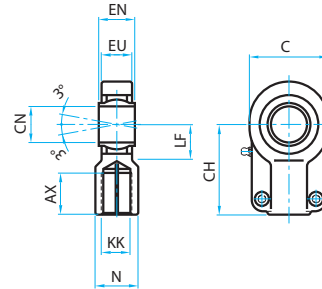
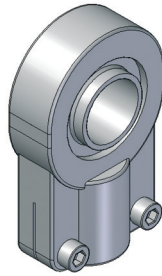


ROD END ACCESSORIES

CS Rod end with spherical eye

ISO 6982 - ISO 8132

Suitable for cylinders with standard rod end.



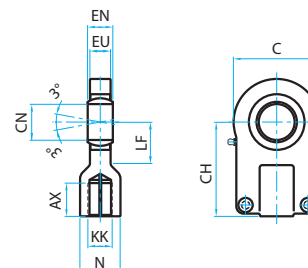
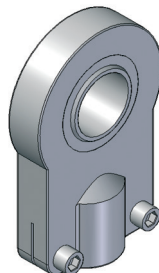
Code	CS 12125	CS 1415	CS 1615	CS 2015	CS 272	CS 332	CS 422	CS 482	CS 643	CS 723	CS 803	CS 1003	CS 1254	CS 1604
AX	17	19	23	29	37	46	57	64	86	91	96	113	126	161
C	32	40	47	58	70	89	108	132	168	185	212	264	326	418
CH	38	44	52	65	80	97	120	140	180	195	210	260	310	390
CN	12	16	20	25	32	40	50	63	80	90	100	125	160	200
EN	12	16	20	25	32	40	50	63	80	90	100	125	160	200
EU	10,5	13	17	21	27	32	40	52	66	72	85	103	130	167
KK	M12x1.25	M14x1.5	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M72x3	M80x3	M100x3	M125x4	M160x4
LF	14	18	22	27	32	41	50	62	78	85	98	120	150	195
N	16	21	25	30	38	47	58	70	90	100	110	135	165	215
Weight (Kg)	0.11	0.20	0.36	0.62	1.16	2.16	3.84	7.24	13.20	17.50	28	46.40	81	174

Load														
Static (KN)	24.5	36.5	48	78	114	204	310	430	695	750	1060	1430	2200	3650
Dynamic (KN)	10.8	17.6	30	48	67	100	156	255	400	490	610	950	1370	2120

TS Rod end with spherical eye

ISO 8133 - DIN 24555

Suitable for cylinders with standard rod end.



Code	TS 10125	TS 12125	TS 1415	TS 1615	TS 2015	TS 272	TS 332	TS 422	TS 482	TS 643
AX	15	17	19	23	29	37	46	57	64	86
C	32	42	50	62	76	96	116	150	195	235
CH	42	48	58	68	85	105	130	150	185	240
CN	12	16	20	25	30	40	50	60	80	100
EN	10	14	16	20	22	28	35	44	55	70
EU	8	11	13	17	19	23	30	38	47	57
KK	M10x1.25	M12x1.25	M14x1.5	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3
LF	18	22	28	34	38	48	62	74	98	122
N	17	21	25	30	36	45	55	68	78	100
Weight (Kg)	0.13	0.23	0.39	0.70	1.22	2.14	3.96	7.26	14.60	25.40

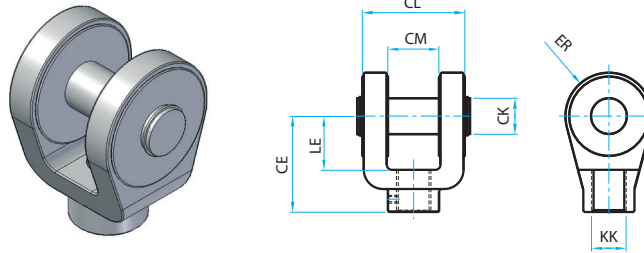
Load										
Static (KN)	17	28.5	42.5	67	108	156	245	380	585	865
Dynamic (KN)	10.8	21.1	30	48	62	100	156	245	400	610



ROD END ACCESSORIES

CF Rod end with clevis and pin

ISO 8133



Code	CF 10125	CF 12125	CF 1415	CF 1615	CF 2015	CF 272	CF 332	CF 422	CF 482	CF 643	CF 803
CE	32	36	38	54	60	75	99	113	126	168	168
CK H9/f8	10	12	14	20	20	28	36	45	56	70	70
CL	24	32	40	60	60	80	100	120	140	160	160
CM	12	16	20	30	30	40	50	60	70	80	80
ER	12	17	17	29	29	34	50	53	59	78	78
KK	M10x1.25	M12x1.25	M14x1.5	M16x1.5	M20x1.5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3
LE	13	19	19	32	32	39	54	57	63	83	83
Weight (Kg)	0.10	0.18	0.25	0.88	0.92	1.90	4.92	6.52	10.04	19.50	19.50

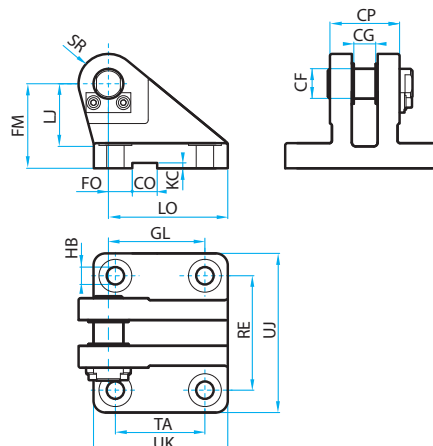
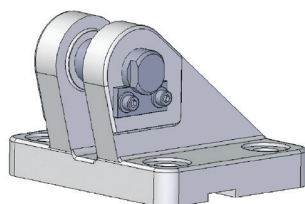
Load											
Static (KN)	10	12.5	20	32	50	80	125	200	320	500	500



ACCESSORIES FOR CYLINDER MOUNTING

LD Female clevis bracket in angle

ISO 8133 - DIN 24556



Suitable for cylinders ISO 6020/2 with D mounting.

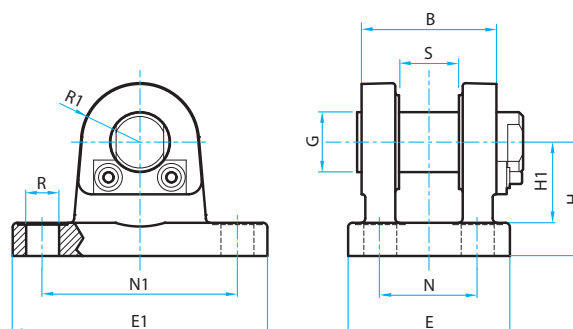
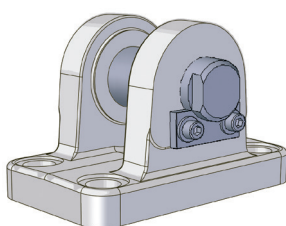
Code	LD 25	LD 32	LD 40	LD 50	LD 63	LD 80	LD 100	LD 125	LD 160	LD 200
CF K7/f6	12	16	20	25	30	40	50	60	80	100
CG	10	14	16	20	22	28	35	44	55	70
CO N9	10	16	16	25	25	36	36	50	50	63
CP h14	30	40	50	60	70	80	100	120	160	200
FM js11	40	50	55	65	85	100	125	150	190	210
FO js14	16	18	20	22	24	24	35	35	35	35
GL js13	46	61	64	78	97	123	155	187	255	285
HB	9	11	13.5	15.5	17.5	22	30	39	45	48
KC	3.3	4.3	4.3	5.4	5.4	8.4	8.4	11.4	11.4	12.4
LJ	29	38	40	49	63	73	92	110	142	152
LO	56	74	80	98	120	148	190	225	295	335
RE js13	55	70	85	100	115	135	170	200	240	300
SR	12	16	20	25	30	40	50	60	80	100
TA js13	40	55	58	70	90	120	145	185	260	300
UJ	75	95	120	140	160	190	240	270	320	400
UK	60	80	90	110	135	170	215	260	340	400

Load

Static (KN)	8	12.5	20	32	50	80	125	200	320	500
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FD Female straight clevis bracket

ISO 8132



Suitable for cylinders ISO 6022 with C, D, K, S mountings.

Code	FD 50	FD 63	FD 80	FD 100	FD 125	FD 160
B	70	90	110	140	170	210
E	85	108	130	160	210	260
E1	143	170	220	270	320	400
G H9/f8	32	40	50	63	80	100
H	65	76	95	112	140	180
H1	43	52	65	75	95	120
N	50	65	80	100	125	160
N1	110	130	170	210	250	315
R	17.5	22	26	33	39	45
R1	32	40	50	63	80	100
S	32	40	50	63	80	100

Load

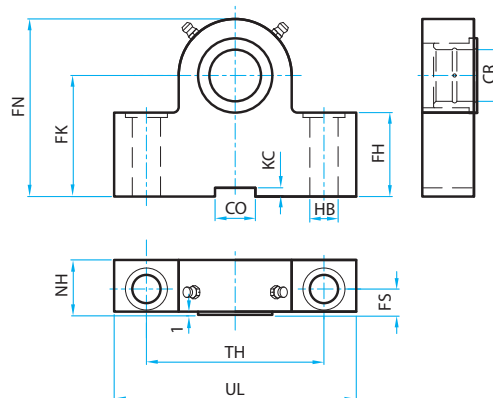
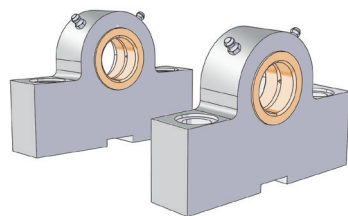
Static (KN)	50	80	125	200	320	500
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ACCESSORIES FOR CYLINDER MOUNTING

LK Pair of trunnion brackets

ISO 8132



Suitable for cylinders ISO 6020/2 with G, H, L mounting
and for cylinders ISO 6022 with H mounting.

Code	LK 25	LK 32	LK 40	LK 50	LK 63	LK 80	LK 100	LK 125	LK 160
CO N9	10	16	16	25	25	36	36	50	50
CR H7	12	16	20	25	32	40	50	63	80
FH	25	30	38	45	52	60	75	85	112
FK js12	34	40	45	55	65	76	95	112	140
FN	49	59	69	80	100	120	140	177	220
FS js14	8	10	10	12	15	16	20	25	31
HB	9	11	11	13.5	17.5	22	26	33	39
KC	3.3	4.3	4.3	5.4	5.4	8.4	8.4	11.4	11.4
NH	17	21	21	26	33	41	51	61	81
TH js14	40	50	60	80	110	125	160	200	250
UL	63	80	90	110	150	170	210	265	325

Load									
Static (KN)	8	12.5	20	32	50	80	125	200	320



Compact double-acting hydraulic cylinders are suitable for industrial automation applications where a compact and highly modular construction is required also for heavy duty applications.

Also available with built-in magnetic sensors to control the piston position or with anti-rotation device and external mechanical limit switches to control the end positions of the rod.



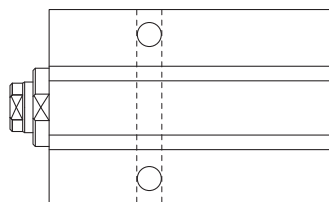
	Light alloy		Heavy duty application
Material	Special aluminium alloy		Steel
Bore mm	from 25 to 63	from 80 to 100	from 25 to 100
Operational pressure bar	160	100	250
Standard strokes mm	20 - 50 - 80 - 100 (other strokes on request)		

For piston speeds above 0.1 m/s, it is recommended to limit the stroke externally, avoiding the piston hitting the bushing or rear cap.

Pressure peaks, shocks and cyclic stresses can reduce the life of the aluminium alloy RP cylinder. In such cases, we recommend that you consider using steel RQ cylinders.

LIGHT ALLOY COMPACT CYLINDER SERIES

RP

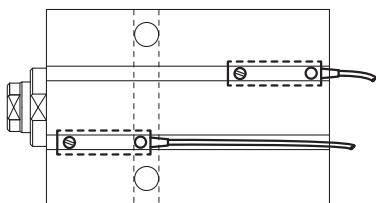


Double-acting hydraulic cylinders in high-strength aluminium alloy with anti-wear treatment.

Suitable for industrial automation in non-severe conditions, when a lightweight, compact and highly modular construction is required.

LIGHT ALLOY COMPACT CYLINDER SERIES WITH MAGNETIC SWITCHES

MP

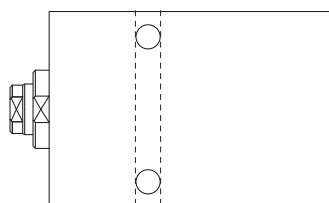


Double-acting hydraulic cylinders made of high-strength aluminium alloy with anti-wear treatment.

One or more magnetic switches can be positioned along the prepared seats to detect the passage of the piston in correspondence with SP switch. Special programmable sensors are available on request.

HEAVY DUTY COMPACT CYLINDER SERIES

RQ



Heavy duty steel double-acting hydraulic cylinders. Suitable for industrial automation applications where a robust, compact and highly modular construction is required.

Also available in version with anti-rotation device and external mechanical limit switches to control the end positions of the rod.

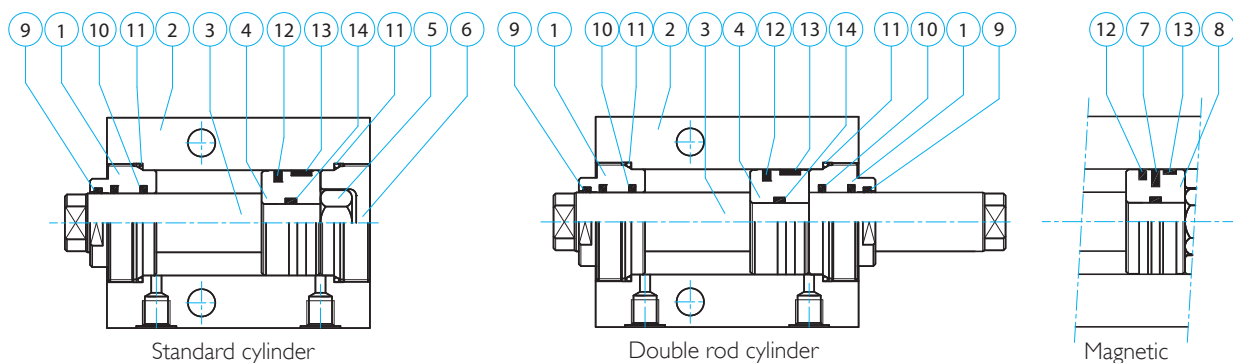
AVAILABLE SEALS

Seals code		Performances					Fluid		
		High sealing	Low friction	Max speed	Temp °C		Hydraulic oil	Phosphoric esters	HFC-fluid
					Min	Max			
Only for RP and MP	S	√		0.5 m/s	-20	+80	√		
	L		√	1 m/s	-20	+80	√		
	H		√	1 m/s	-20	+150	√	√	
	G		√	1 m/s	-20	+80			√

For speeds and temperatures exceeding the indicated limits, please contact our technical department.



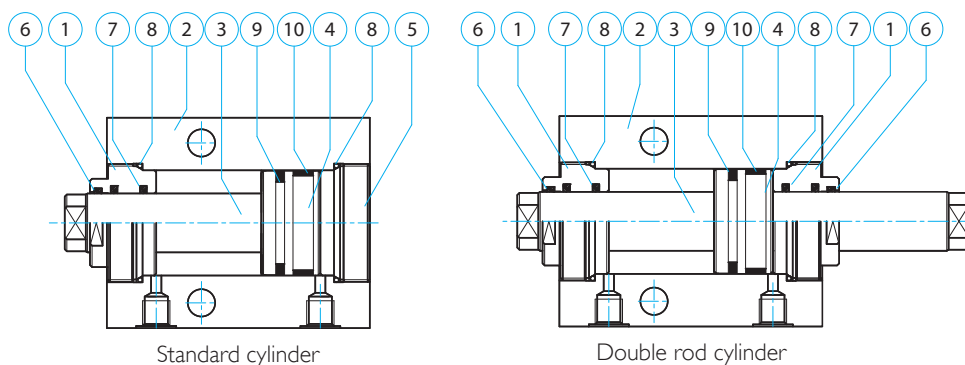
RP/MP SERIES – LIGHT ALLOY



Component		Material	
1	Guide bushing	Bronze	
2	Cylinder body	Special aluminium alloy	
3	Rod	Chromeplated steel	
4	Piston	Steel	
5	Rod nut	Steel	
6	Rear cap	Steel	
7	Magnet		
8	Magnetic piston (MP)	Stainless steel	

	Component	Groove	Material			
			S	L	H	G
9	Rod wiper		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
10	Rod's double seal	ISO 7425/2	NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
11	Body seal		NBR + PTFE	NBR + PTFE	Viton® + PTFE	NBR + PTFE
12	External piston seal	ISO 7425/1	NBR + PU	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
13	Piston guide		Resin	Resin	Resin	Resin
14	Internal piston seal		NBR	NBR	Viton®	NBR

RQ SERIES – FOR HEAVY DUTY APPLICATIONS

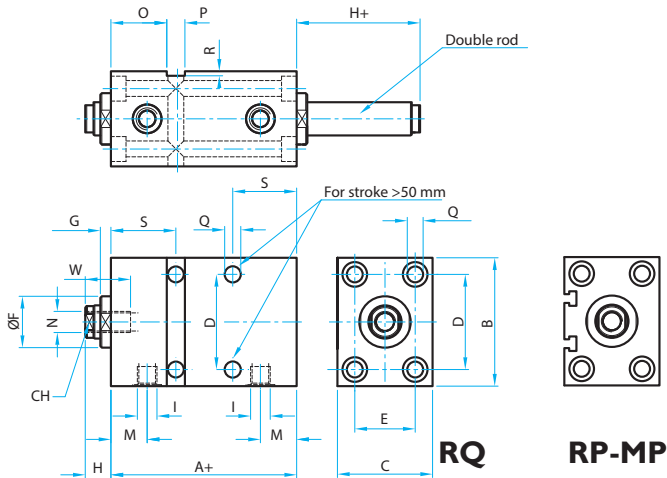


Component		Material	
1	Guide bushing	Bronze	
2	Cylinder body	Steel	
3	Rod	Chromeplated steel	
4	Piston	Steel	
5	Rear cap	Steel	

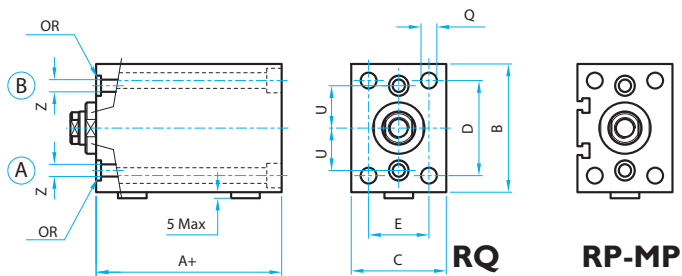
	Component	Groove	Material		
			L	H	G
6	Rod wiper		NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
7	Rod's double seal	ISO 7425/2	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
8	Body seal		NBR + PTFE	Viton® + PTFE	NBR + PTFE
9	Piston seal	ISO 7425/1	NBR + PTFE	Viton® + PTFE	NBR + PTFE CG
10	Piston guide		Resin	Resin	Resin



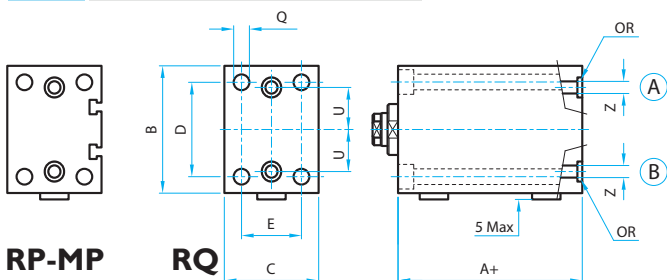
OIL PORTS

X Threaded oil ports

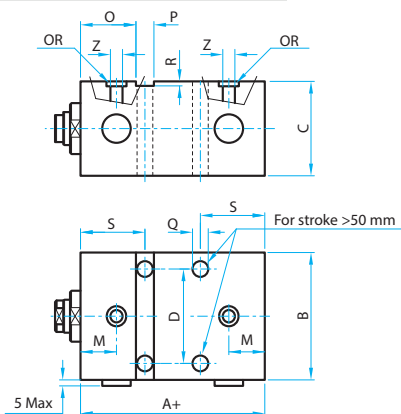
Bore	25	32	40	50	63	80	100
Rod	18	22	22	28	28	36	45
A	57+	60+	73+	75+	85+	100+	110+
B	65	75	85	100	115	140	170
C	45	55	63	75	90	110	140
CH	15	19	19	22	22	30	36
D	50	55	63	76	90	110	135
E	30	35	40	45	55	75	95
F f8	32	34	34	42	50	60	72
G	6.5	8	7	8	7	7	8
H	14	15	17	20	20	20	25
I	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 1/2"	G 1/2"
M	17	18	23.5	23.5	26	30	35
N	M10	M12	M14	M20	M20	M27	M33
O	32	34	37	37.5	47.5	50	60
P 8 ¹	10	12	12	15	15	20	20
Q	8.5	10.5	10.5	13	13	17	17
R	2	3	3	5	5	5	5
S	37	40	43	45	55	60	70
W	23	23	30	30	30	40	50

A Front oil ports with OR

Bore	25	32	40	50	63	80	100
A	57+	60+	73+	75+	85+	100+	110+
B	65	75	85	100	115	140	170
C	45	55	63	75	90	110	140
D	50	55	63	76	90	110	135
E	30	35	40	45	55	75	95
OR	OR106 (610)	OR106 (610)	OR106 (610)	OR108 (611)	OR108 (611)	OR108 (611)	OR108 (611)
Q	8.5	10.5	10.5	13	13	17	17
U	25.5	30	32.5	40	47.5	59	70
Z	4	4	5	7	7	7	7

A Pulling force**B** Pushing force**B** Rear oil ports with OR

Bore	25	32	40	50	63	80	100
A	57+	60+	73+	75+	85+	100+	110+
B	65	75	85	100	115	140	170
C	45	55	63	75	90	110	140
D	50	55	63	76	90	110	135
E	30	35	40	45	55	75	95
OR	OR106 (610)	OR106 (610)	OR106 (610)	OR108 (611)	OR108 (611)	OR108 (611)	OR108 (611)
Q	8.5	10.5	10.5	13	13	17	17
U	25.5	30	32.5	40	47.5	59	70
Z	4	4	5	7	7	7	7

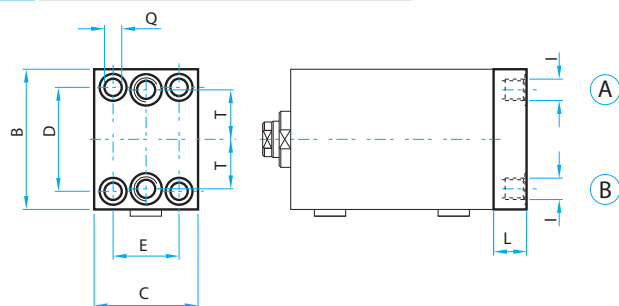
A Pulling force**B** Pushing force**E** Lateral oil ports with OR

Bore	25	32	40	50	63	80	100
A	57+	60+	73+	75+	85+	100+	110+
B	65	75	85	100	115	140	170
C	45	55	63	75	90	110	140
D	50	55	63	76	90	110	135
M	17	18	23.5	23.5	26	30	35
O	32	34	37	37.5	47.5	50	60
OR	OR106 (610)	OR106 (610)	OR106 (610)	OR108 (611)	OR108 (611)	OR108 (611)	OR108 (611)
P 8 ¹	10	12	12	15	15	20	20
Q	8.5	10.5	10.5	13	13	17	17
R	2	3	3	5	5	5	5
S	37	40	43	45	55	60	70
Z	4	4	5	7	7	7	7



OPTIONS

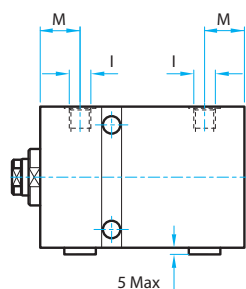
BU Connection plate for "B" version



Bore	25	32	40	50	63	80	100
B	65	75	85	100	115	140	170
C	45	55	63	75	90	110	140
D	50	55	63	76	90	110	135
E	30	35	40	45	55	75	95
I	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 1/2"	G 1/2"
L	20	20	20	24	30	30	30
Q	8.5	10.5	10.5	13	13	17	17
T	16	20	30	37	40	50	65

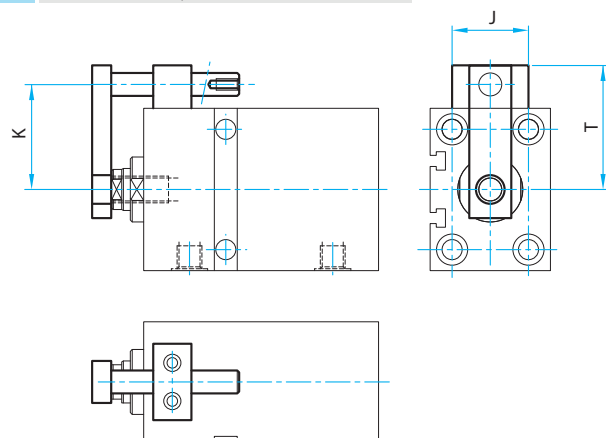
(A) Pulling force (B) Pushing force

AS Additional connections on opposite side



Bore	25	32	40	50	63	80	100
I	G 1/4"	G 1/4"	G 1/4"	G 1/4"	G 3/8"	G 1/2"	G 1/2"
M	17	18	23.5	23.5	26	30	35

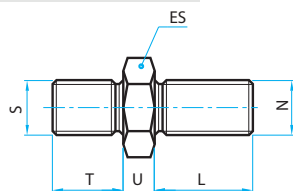
AR Antirotation system



Bore	25	32	40	50	63	80	100
J	40	40	40	40	40	40	50
K	45	50	55	62.5	70	82.5	97.5
T	55	60	65	72.5	80	92.5	107.5

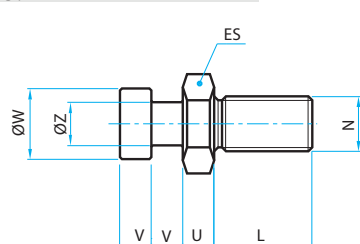
ROD END ACCESSORIES

EM Male rod end



Bore	25	32	40	50	63	80	100
Code	EM10	EM12	EM14	EM20	EM20	EM27	EM33
ES	17	19	22	30	30	36	46
L	20	20	25	30	30	40	50
N	M10	M12	M14	M20	M20	M27	M33
S	M10x1.25	M12x1.25	M14x1.5	M20x1.5	M20x1.5	M27x2	M33x2
T	14	16	18	28	28	36	45
U	6	7	8	9	9	12	14

ET Floating joint

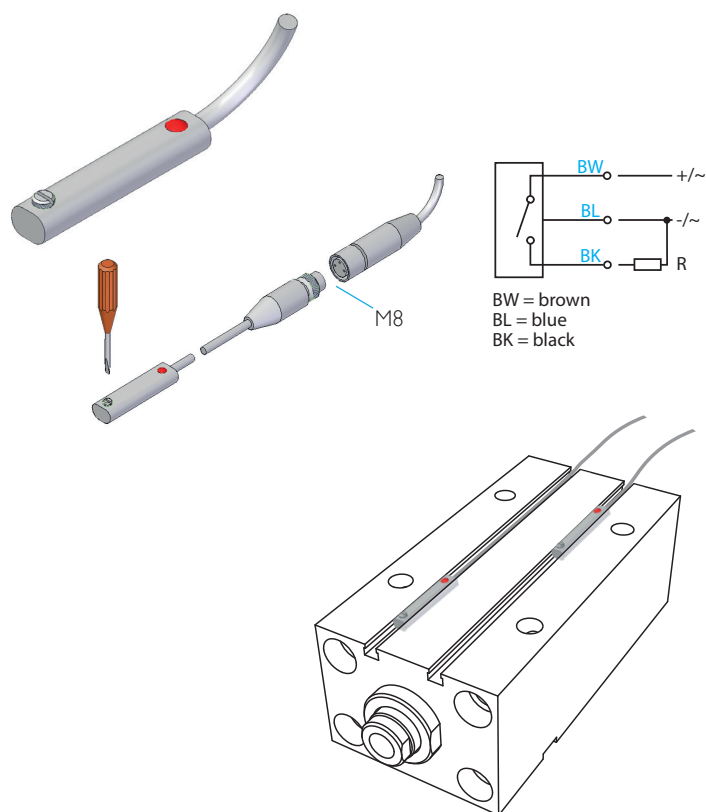


Bore	25	32	40	50	63	80	100
Code	ET10	ET12	ET14	ET20	ET20	ET27	ET33
ES	17	19	22	30	30	36	46
L	20	20	25	30	30	40	50
N	M10	M12	M14	M20	M20	M27	M33
U	6	7	8	9	9	12	14
V	7	8	8	10	10	12.5	16
W	16	18	18	22	22	28	35
Z	10	11	11	14	14	18	22



MAGNETIC SWITCHES

SP REED switches



Magnetic switches detect the moment the piston passes under them, closing the electric circuit.

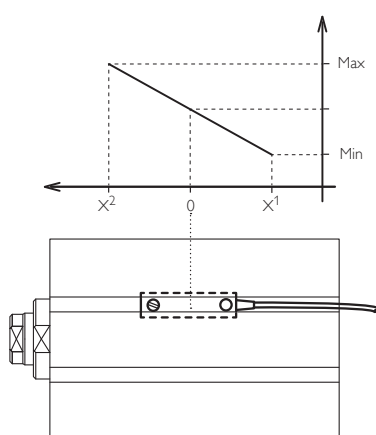
Voltage	3-30 V AC/DC
Max current (at 25°C)	0.2 A
Switch on time	0.5 ms
Switch off time	0.5 ms
Electric life	10 ⁷ pulse
Protecting rating	IP 67 EN60529
Operating temperature	-10 / +70 °C
Visual signal	LED
Cable	3 x 0.25 mm ²
Cable length	5 m

Voltage and current values must never exceed the values given in the table. Current peaks can be caused by capacitive loads (e.g. cables longer than 3 m). Voltage peaks can be caused by inductances (e.g. relays, solenoid valves, contactors, etc.).

Magnetic distortions may be caused by ferrous masses (e.g. cylinder seats inside moulds) or by the presence of strong magnetic fields (e.g. electric motors, coils, inverters, etc.).

False contacts can occur in the event of strong vibrations.

COMPACT CYLINDERS WITH SPECIAL SENSORS



On request, by contacting our technical department, special sensors are available that can detect the piston within a programmable range, continuously providing its position via a digital output signal.

It is also feasible to program the closing of the circuit in two intervals within the reading range, which can also be modified via software on board the machine.

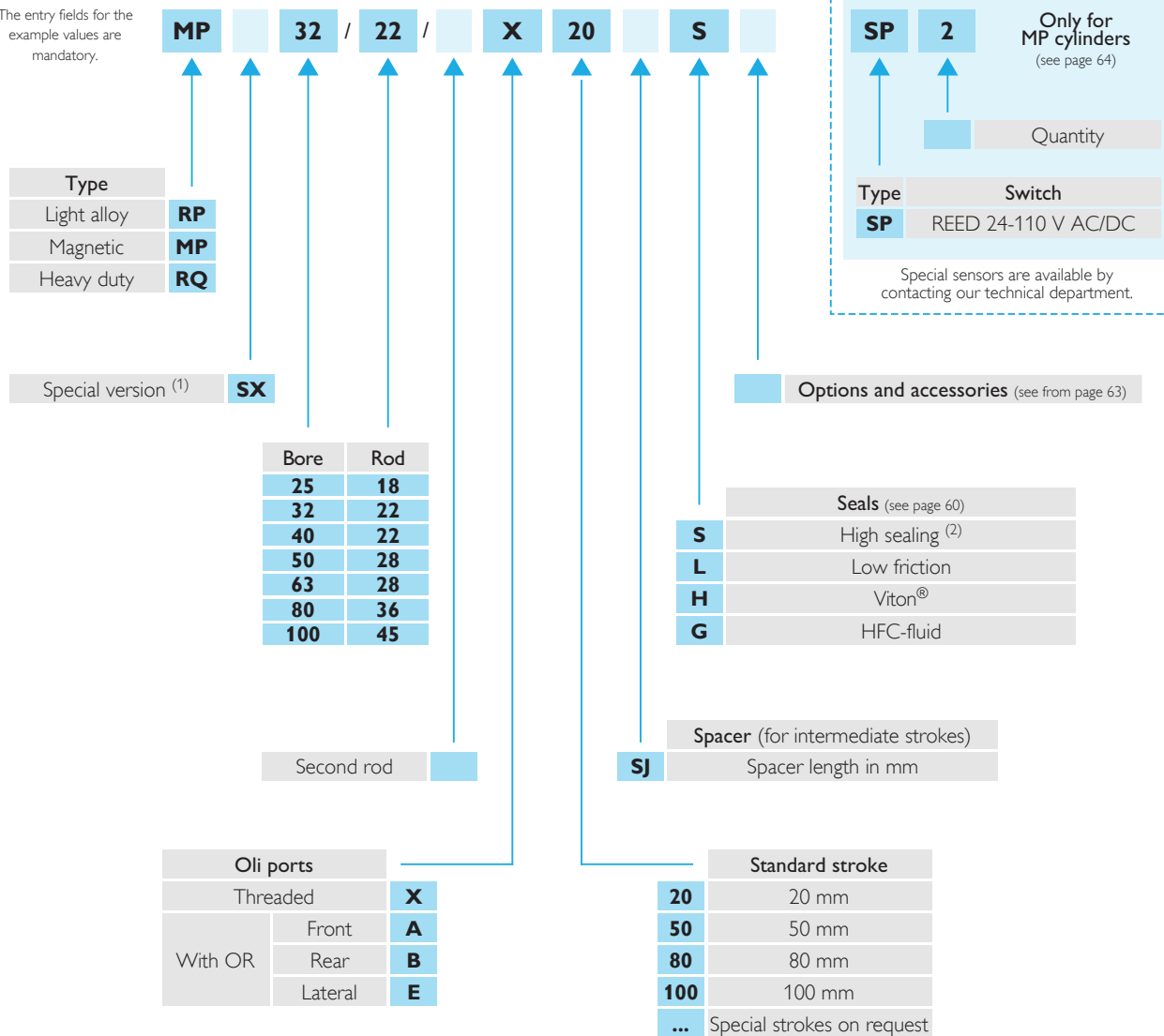
The digital connection allows the sensors to send numerous operating parameters, such as the working temperature.

They are particularly suitable for compact short-stroke hydraulic cylinders; only one sensor needs to be mounted instead of two.



CODE COMPOSITION

The entry fields for the example values are mandatory.



(1) Indicate SX whenever the cylinder has special requests or executions by filling in the options section of the code, followed by our drawing number, if any.
(See list of available options and accessories from page 63).

(2) Available for RP and MP cylinders only.



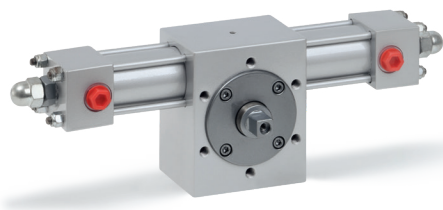
Rotary actuators generate a torque through a cog wheel and a rack moved by an hydraulic cylinder.

This solution simplifies the kinematic and it is easy to maintain; the actuators are capable of generating cushioning torque at the end of the stroke, comparable to the maximum torque of the cylinder, through adjustable cushioning.

End-stroke adjusters allow the system to be in phase with an adjustment range of +/- 5°.

Magnetic piston versions are also available for use with magnetic proximity switches along the entire piston stroke.

All cylinders are tested before delivery in accordance with ISO 10100.



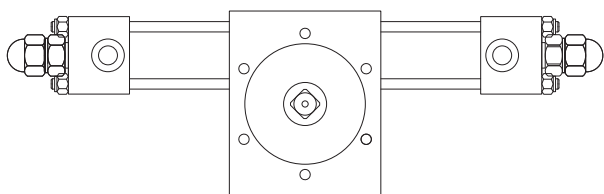
		HR 32/32	HR 40/70	HR 63/96
Maximum operating torque	daNm	6	40	120
Operating pressure	bar	50	100	100
Peak pressure	bar	80	140	140
Bore		32	40	63
Weight per actuator with 180° rotation angle	Kg	4.8	12.5	43
Specific stroke	mm/°	0.28	0.61	0.83

Specific stroke for each degree of rotation.

For example, an angle of 180°, the stroke will result in $0.61 \times 180 = 110$ mm

ROTARY ACTUATORS SERIES

HR

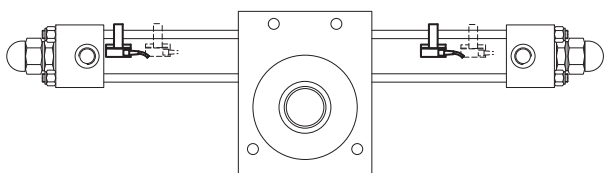


Standard HR series rotary actuators are also available with grooved shaft.
Angle of rotation of actuators from 90° to 270°.

Specifications, options and ordering codes see from page 67.

ROTARY ACTUATORS SERIES WITH MAGNETIC SWITCHES

MR



The rotary actuators with INOX tube and magnetic piston for detection at various positions along their stroke by switches attached to the tie-rods.
Special programmable sensors are available on request.

Technical features, options and ordering codes see from page 70.

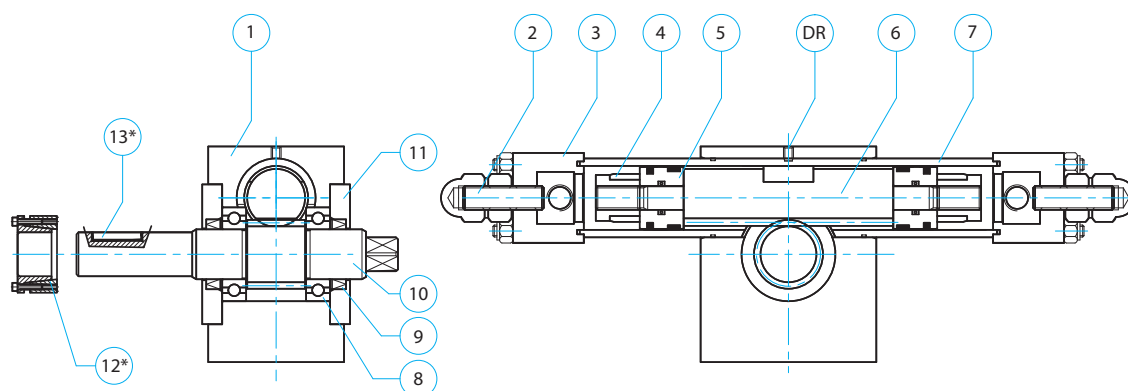
AVAILABLE SEALS

Seals code	Performance					Fluid		
	High sealing	Low friction	Max speed	Temp °C		Hydraulic oil	Phosphoric esters	HFC-fluid
				Min	Max			
S	√		0.5 m/s	-20	+80	√		
L		√	1 m/s	-20	+80	√		
H		√	1 m/s	-20	+150	√	√	
G		√	1 m/s	-20	+80			√

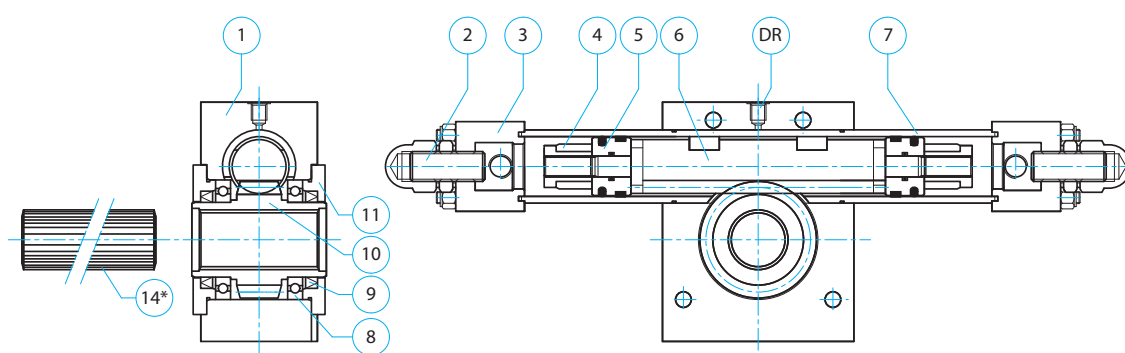
For speeds and temperatures exceeding the indicated limits, please contact our technical department.



HR 32/32



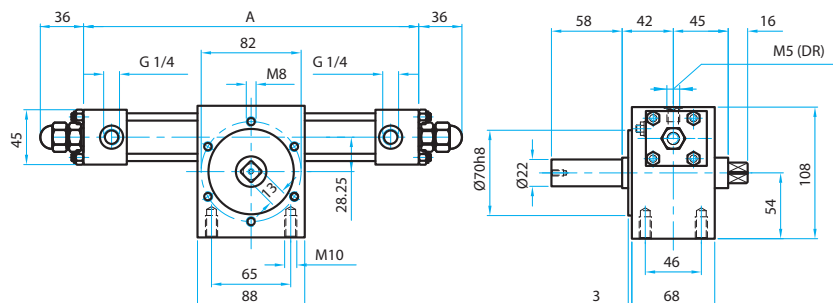
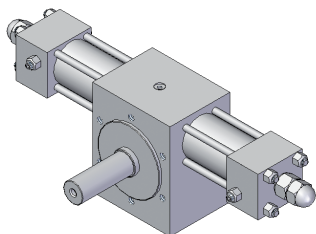
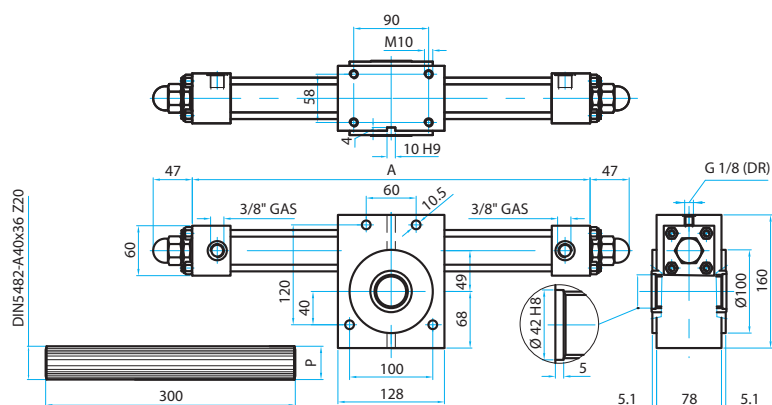
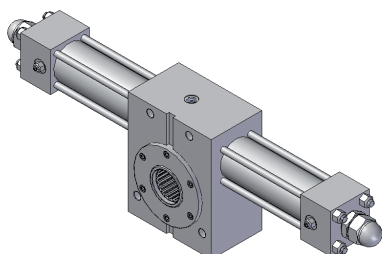
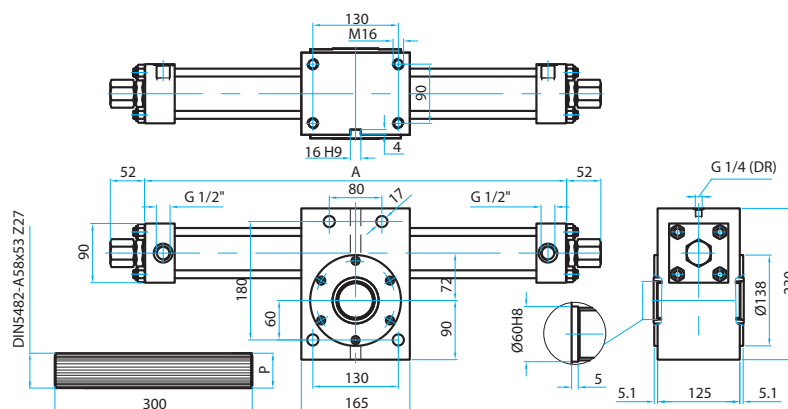
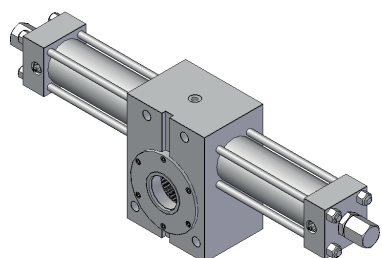
HR 40/70 - HR 63/96



	Component	Material
1	Body	Special aluminium alloy
2	Stroke adjuster $\pm 5^\circ$	Steel
3	Head	Steel
4	Cushioning	Hardened steel
5	Piston	Steel
6	Rack	Alloy steel
7	Tube	Steel
8	Ball bearing	
9	Roating shaft seal	NBR
10	Cogwheel with shaft	Alloy steel
11	Closing flange	Steel
12*	Shaft clamp (ON REQUEST)	
13*	Shaft keyseat (ON REQUEST)	
14*	Grooved shaft (ON REQUEST)	
DR	Drainage	

It is mandatory to connect the drainage (DR) to the tank to allow free drainage of the excess fluids that may accumulate during normal operation.

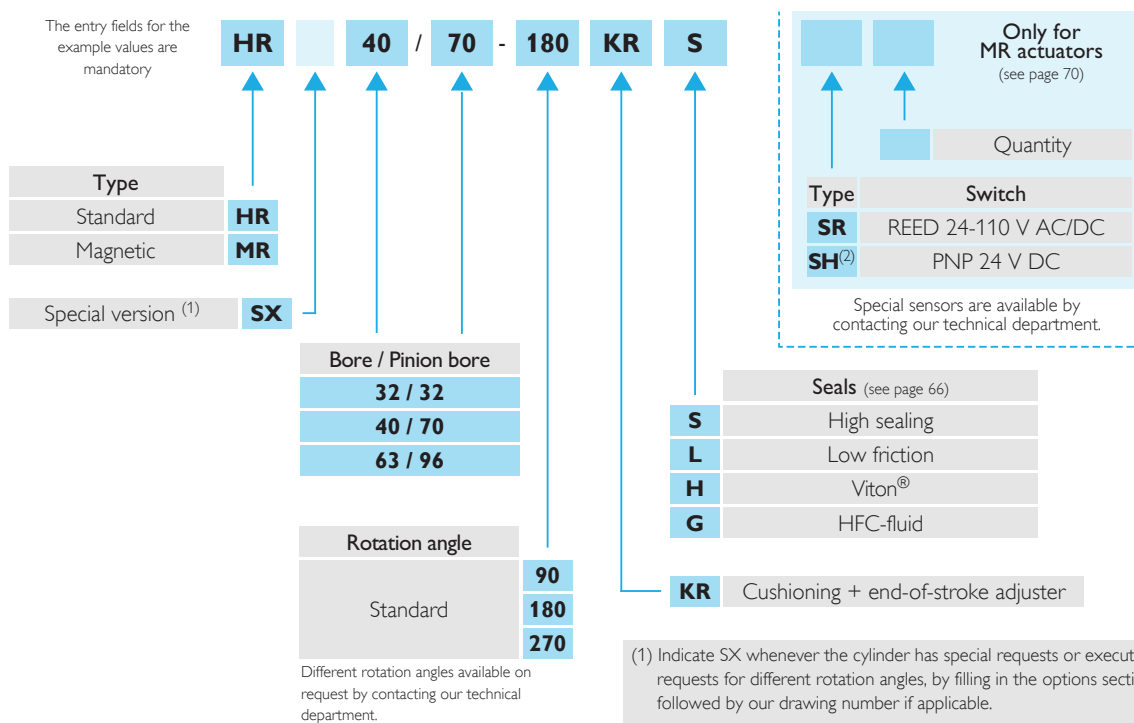
HR 32/32

**HR 40/70****HR 63/96**

	Dimension (A) for angle of rotation		
Type	90°	180°	270°
HR 32/32	222	272	322
HR 40/70	368	478	587
HR 63/96	462	510	760



CODE COMPOSITION

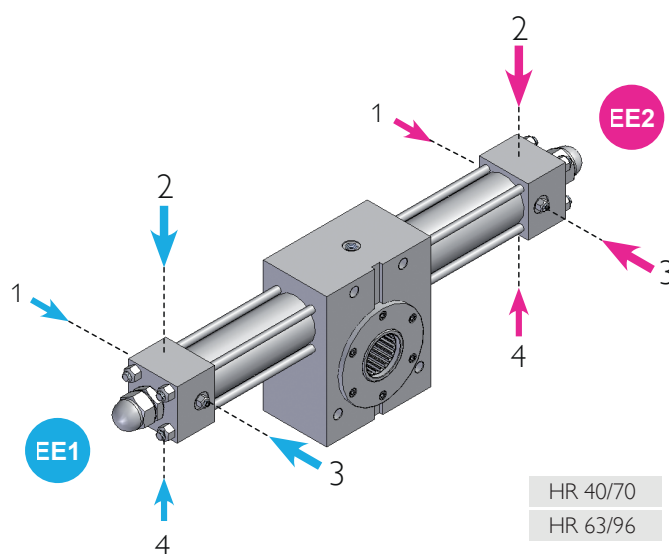
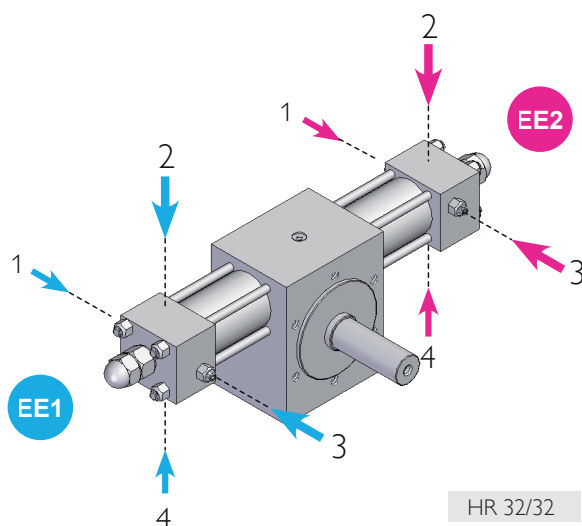


Interactive online coding wizard available at www.confortinet.com

ACCESSORIES - GROOVED SHAFT

Z 20	Shaft DIN 5482-A40x36 for HR 40	Length = 300 mm
Z 27	Shaft DIN 5482-A58x53 for HR 63	

OIL PORTS

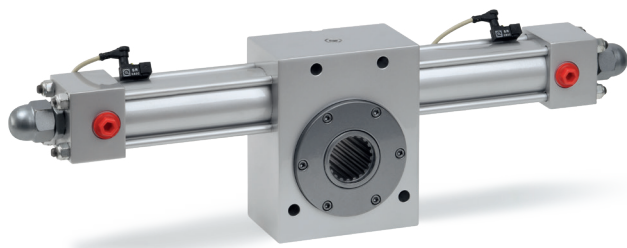


Bore / Pinion bore	ISO 1179-1 (GAS)
32 / 32	G 1/4"
40 / 70	G 3/8"
63 / 96	G 1/2"

In the standard configuration, the oil ports are in position 1 and the cushioning adjustment screws in position 3



ROTARY ACTUATORS SERIES WITH MAGNETIC SWITCHES

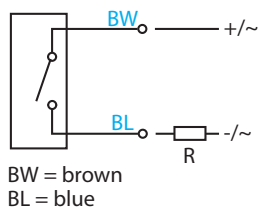
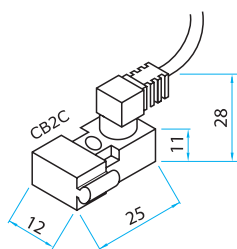


The MR series hydraulic actuators have the same technical features, dimensions and available options as the basic HR series, but are equipped with a magnetic piston and stainless-steel tube. One or more magnetic switches can be positioned along the tube, fixed to the tie-rods, to detect the passage of the piston at the SR or SH switches. Special programmable sensors are available on request.

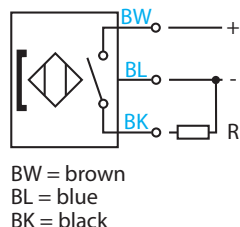
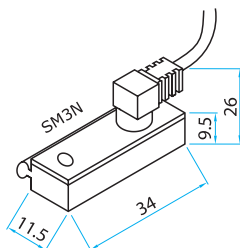
Voltage and current values must never exceed the values given in the table.
Current peaks can be caused by capacitive loads (e.g. cables longer than 3 m).
Voltage peaks can be caused by inductances (e.g. relays, solenoid valves, contactors, etc.).

Magnetic distortions may be caused by ferrous masses (e.g. cylinder seats inside moulds) or by the presence of strong magnetic fields (e.g. electric motors, coils, inverters, etc.).
For space requirements, the SH switch cannot be used on MR 32/32 -90° actuators.
False contacts can occur in the event of strong vibrations.

The SR and SH type switches are able to detect the passage of the magnetic piston underneath them, closing the circuit. They are attached to the tie-rods using the STA/STB brackets.

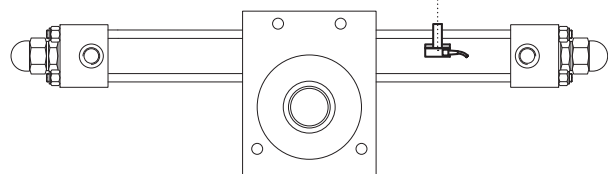
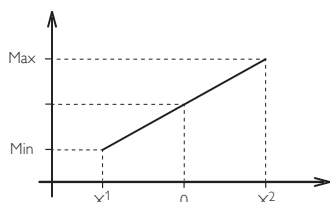
SR REED switches

Voltage	3-110 V AC/DC
Max current (at 25°C)	0.3 A
Switch on time	0.5 ms
Switch off time	0.5 ms
Electric life	10 ⁷ pulse
Protecting rating	IP 67 EN60529
Operating temperature	-10 / +70 °C
Visual signal	LED
Cable	2 × 0.25 mm ²
Cable length	5 m

SH PNP magnetoresistive switches

Voltage	6-30 V DC
Max current (at 25°C)	0.25 A
Switch on time	0.5 ms
Switch off time	0.5 ms
Electric life	10 ⁷ pulse
Protecting rating	IP 67 EN60529
Operating temperature	-10 / +70 °C
Visual signal	LED
Cable	3 × 0.25 mm ²
Cable length	5 m

ROTARY ACTUATORS SERIES WITH SPECIAL SENSORS



On request, by contacting our technical department, special sensors are available that can detect the piston within a programmable range, continuously providing its position via a digital output signal.

It is also feasible to program the closing of the circuit in two intervals within the reading range, which can also be modified via software on board the machine.

The digital connection allows the sensors to send numerous operating parameters, such as the working temperature.

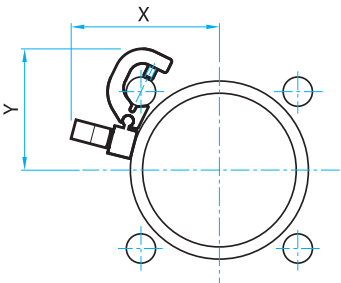
They are fastened to the tie-rods by means of special brackets.



ROTARY ACTUATORS SERIES WITH MAGNETIC SWITCHES

Brackets for mounting SR and SH type switches.

Bore	X	Y	Bracket	
32	45	28	STA	
40	50	32		
63	61	50	STB	

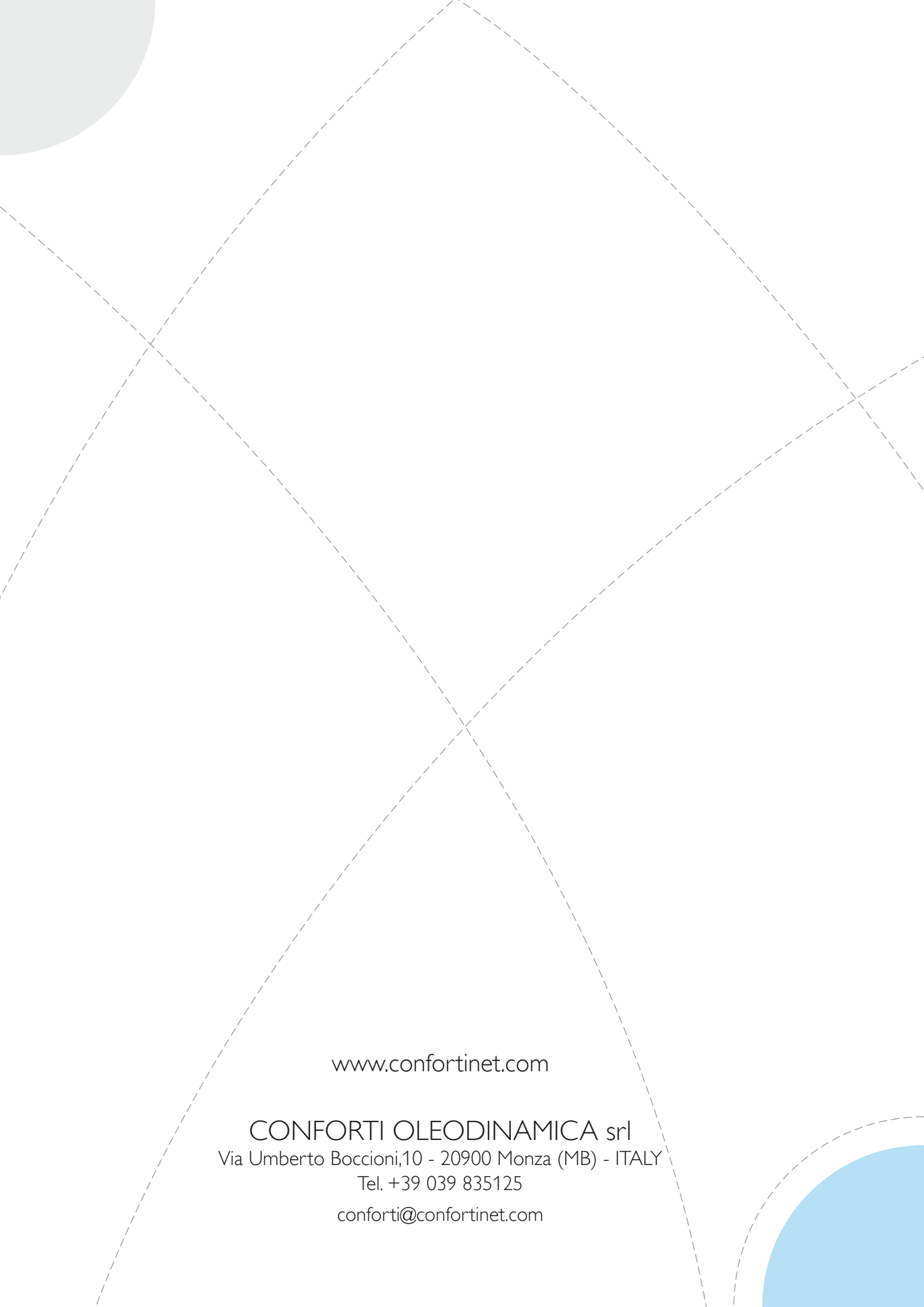


SWITCHES ORDERING CODE COMPOSITION

Switch + mounting bracket.
Can also be ordered separately.

Type	Switch		Bracket	Bore
REED	SR	↑	STA	32 - 40
PNP	SH		STB	63

Special sensors are available by contacting our technical department.



www.confortinet.com

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