

Servoactuators for Testing applications



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Features

- Technology performance comparison
- Modular configuration
- Customer specific configuration
- Related items: HPU and HSM manifold
- Accessories: swivel clevis, position transducer, load cell, spiral washer



Ordering code

01		02	03		04	05	06	07	08	09	10	11		12		13		14		15		16	17		18
SA	-			-								-		/		/		-		-			-		

01	Hydraulic Servoactuator	SA
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Technological type

02	Industrial with low friction seals	A
	Hydrodynamic, servo quality, external drain	B
	Hydrostatic, servo quality, external drain and cushion pockets	C

Rod type

03	Single rod	S
	Double rod, symmetrical	D

On board servoblock - servovalve model

04	Moog G761 / MTS 252.X series (ISO 10372-04-04-0-92)	M
	Bosch Rexroth (Cetop 3 / ISO 4401-03-02-0-05)	R3
	Bosch Rexroth (Cetop 5 / ISO 4401-05-05-0-05) – with measuring output for control spool	R5

On board servoblock – number of places for servovalve

05	No. 1 place for servovalve	S1
	No. 2 places for servovalve	S2
	No. 3 places for servovalve	S3
	No. 4 places for servovalve	S4

On board servoblock – number of blind plates in place of servovalve

06	Without	B0
	No. 1 blind plate	B1
	No. 2 blind plates	B2
	No. 3 blind plates	B3
	No. 4 blind plates	B4

On board servoblock –servovalve nominal flow (pressure differential $\Delta p = 70$ bar)

07	Moog G761 / MTS 252.X	Specify flow
	- 4 – 10 – 19 – 38 – 63 l/min	Q...
	Bosch Rexroth (Cetop 3)	
	- 2 – 5 – 10 – 15 – 20 – 25 l/min	Q...
	Bosch Rexroth (Cetop 5) - with measuring output for control spool	
	- 5 – 10 – 20 – 30 – 45 – 60 – 75 – 90 l/min	Q...

On board servoblock - stabilizer orifice between servovalve ports A-B

08	Without	No code
	Only predisposition (M8x1 blind plug)	NBL
	Orifice (specify diameter size: 08= 0,8 mm; 1,0= 1 mm, ...)	NXX



01		02	03		04	05	06	07	08	09	10	11		12		13		14		15		16	17		18
SA	-			-									-		/		/		-		-			-	

On board servoblock – peak-pressure relief valves on servovalve ports A-B (nominal size 6)

09	Without	No code
	Relief valve discharge line in A-B cross-connection	AB
	Relief valve discharge line in T	TT

On board servoblock – by-pass on/off electro-valve between servovalve ports A-B (nominal size 6)

10	Without	No code
	Normally closed (24Vdc – 30W)	NC
	Normally open (24Vdc – 30W)	NO

On board servoblock – diaphragm accumulators

11	Without	No code
	0,7 l accumulators on lines P and T	AC

Rod diameter

12	See table 2	XXX
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Piston diameter

13	See table 2	XXX
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Working stroke

14	See table 2 (braking stroke as standard)	XXX (*)
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Types of mounting

15	Self-aligning clevis at rod end (add option “AB” for anti-backlash type)”	FB (/AB)
	Self-aligning clevis at base (add option “AB” for anti-backlash type)”	RB (/AB)
	Front + rear self-aligning clevis (add option “AB” for anti-backlash type)”	BB (/AB)
	Trunnion mounting	TM
	Frontal round flange	RF
	Foot mounting (horizontal Omega clamping, front and rear side)	FM
	Vertical column at bottom side	VC

Sensors - Internal position transducer

16	Without	No code
	Magnetostrictive SSI	MS
	LVDT	LV

Sensors - Compression/Tension Load Cell

17	No code	No code
	6-wire / 2 mV/V (specify desired full scale in kN, example: LC50= ± 50 kN)	LC...

Actuator body painting

18	Without (delivered with black burnishing)	BR
	Customer specification (specify RAL code, semi-gloss)	

At order, specify accessories in clear text.

(*) braking stroke provided as standard only for technological type B and C, for type A braking stroke available on request.



Ordering examples

SA-BD-M S2 B1 Q20 N08 AB NO AC-050/064/100-BB/AB-MS LC50-5010

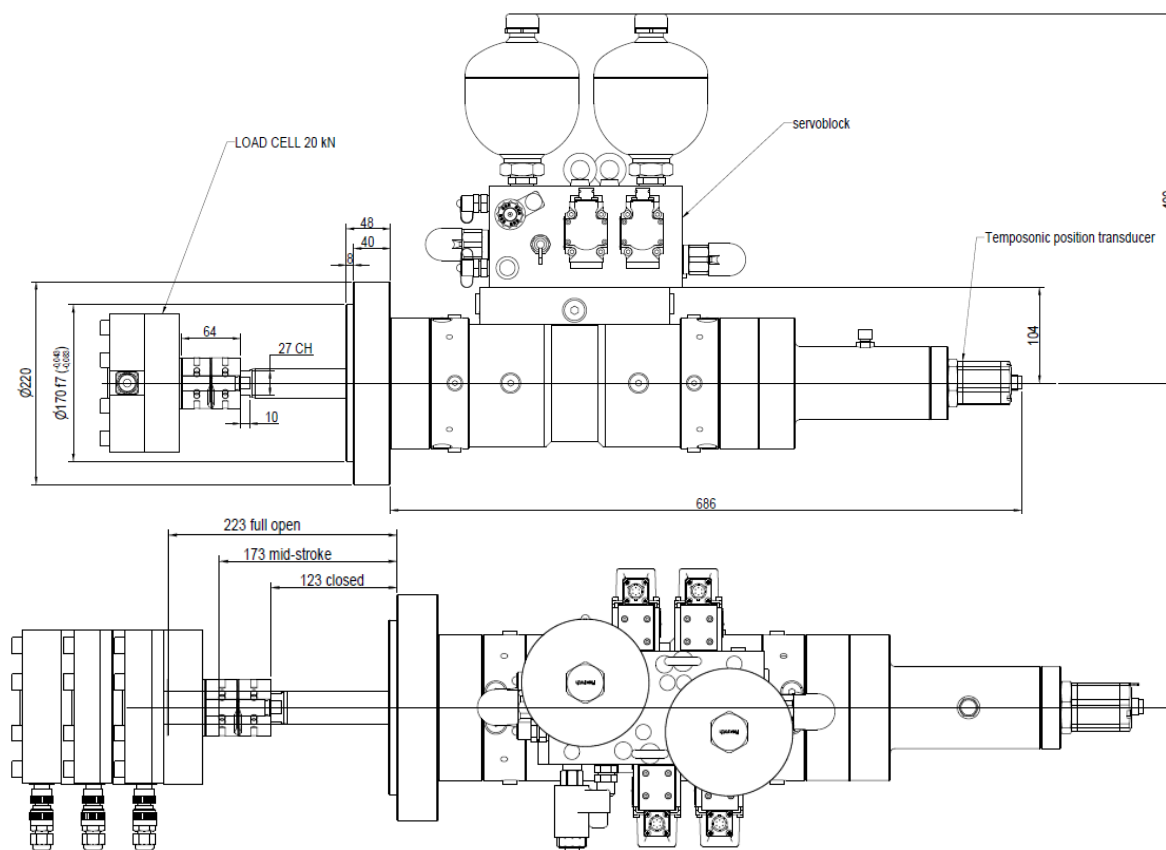
B	Technological type	Hydrodynamic, servo quality, external drain
D	Rod type	Double rod, symmetrical
M	On board servoblock - servovalve model	Moog G761 / MTS 252.X series (ISO 10372-04-04-0-92)
S2	On board servoblock – number of places for servovalve	No. 2 places for servovalve
B1	On board servoblock – number of blind plates in place of servovalve	No. 1 blind plate
Q19	On board servoblock –servovalve nominal flow	19 l/min each servovalve
N08	On board servoblock – stabilizer orifice between servovalve ports A-B	Orifice diameter 0,8 mm
AB	On board servoblock – peak-pressure relief valves on servovalve ports A-B	Relief valve discharge line in A-B cross-connection
NO	On board servoblock – by-pass on/off electro-valve between servovalve ports A-B	Normally open
AC	On board servoblock – diaphragm accumulators	0,7 l accumulators on lines P and T
050	Rod diameter	50 mm
064	Piston diameter	64 mm
150	Working stroke	150 mm + braking stroke 15 mm both sides (as per table 1); total mechanical stroke: 180mm
BB/AB	Types of mounting	Rod end + base self-aligning clevis, anti-backlash type
MS	Sensors - Internal position transducer	Magnetostrictive sensor, SSI output signal
LC50	Sensors - Compression/Tension Load Cell	Tension/Compression load cell, rated load 50kN
5010	Actuator body painting	RAL 5010, semi-gloss

Customer specific configurations are available on request, please get in contact with us.



SA-CD-R3 S4 B0 Q30 AB NO AC-032/054/100-RF-MS LC20-BR

C	Technological type	Hydrostatic, servo quality, external drain
D	Rod type	Double rod, symmetrical
R3	On board servoblock - servovalve model	Bosch Rexroth (Cetop 3 / ISO 4401-03-02-0-05)
S4	On board servoblock – number of places for servovalve	No. 4 places for servovalve
B0	On board servoblock – number of blind plates in place of servovalve	Without
Q30	On board servoblock –servovalve nominal flow	30 l/min each servovalve
	On board servoblock – stabilizer orifice between servovalve ports A-B	Without
AB	On board servoblock – peak-pressure relief valves on servovalve ports A-B	Relief valve discharge line in A-B cross-connection
NO	On board servoblock – by-pass on/off electro-valve between servovalve ports A-B	Normally open
AC	On board servoblock – diaphragm accumulators	0,7 l accumulators on lines P and T
032	Rod diameter	50 mm
054	Piston diameter	64 mm
100	Working stroke	100 mm + braking stroke 15 mm both sides (as per table 2); total mechanical stroke: 130mm
RF	Types of mounting	Frontal round flange
MS	Sensors - Internal position transducer	Magnetostrictive sensor, SSI output signal
LC20	Sensors - Compression/Tension Load Cell	Tension/Compression load cell, rated load 20kN
BR	Actuator body painting	Burnishing





Accessories (*see details at page 33*)

Accessories can be ordered with servoactuators or independently as spare parts, here below standard accessories, customer specific types are available on request:

- Self-aligning swivel clevis at rod end (frontal),
- Anti-backlash swivel clevis,
- Standard servoblock,
- Position transducer,
- Load cell,
- Spiral washer.

NOTE

Available on request, specify accessories in clear text.

Main features

Whenever high-fidelity closed-loop position/force control is required, high-performance actuator becomes an essential part of a testing machine, a

comparative overview of main types of technologies available can be found in figures below.

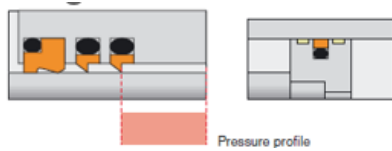
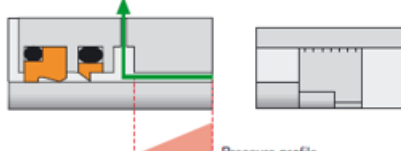
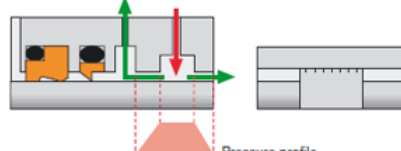
A		B		C	
Industrial Actuator with low friction seals		Hydrodynamic Servoactuator		Hydrostatic Servoactuator	
					
	A	B	C		
Bearing	Slide bearing	Hydrostatic plain gap storage bearing	Hydrostatic pocket bearing		
Operating pressure	320 bar	320 bar	320 bar		
Seals	Pressure loaded	Pressure relieved	Pressure relieved		
Friction	Pressure dependent, transverse force dependent	Pressure independent, transverse force dependent	Pressure independent, transverse force independent		
Absorption of transverse forces	Restricted	Restricted	High absorption of transverse forces		
Max. frequency	5 Hz	Limited by servovalve	Limited by servovalve		
Max. Velocity	1 m/s	20 m/s	20 m/s		
Sealing concept rod	Low friction / Pressure-loaded	Gap sealing / Pressure compensated	Gap sealing / Pressure compensated		
Sealing concept piston	Low friction Pressure-loaded	Gap sealing	Gap sealing		
Wear behaviour	Less than industry standard	Low-wear	Very low-wear		
Leakage port	No	Available	available		
Piston-rod design	One-piece	One-piece	One-piece		
Position Transducer	Magnetostrictive or LVDT				
Load cell	6-wire – 2mV/V				

Figure 1: Actuators main qualitative features

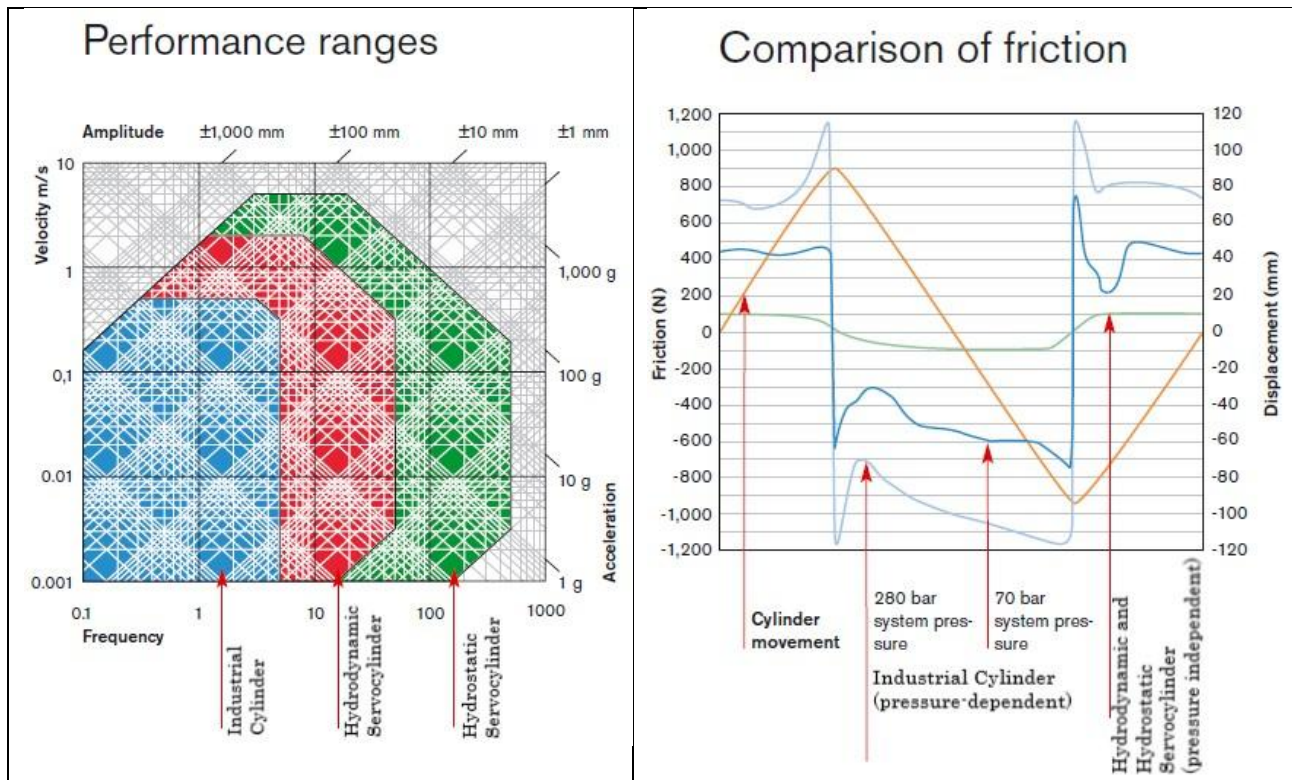


Figure 2: Performance ranges and qualitative friction comparison

Most typical actuators used in a testing machine are of Hydrodynamic and Hydrostatic kind, since both can give the utmost reliability in terms of control accuracy, main benefits can be summarized as follows:

- high speed admissible,
- very low speed smoothly controlled,
- very low dynamic friction,

- stick-slip free.

Additionally, an Hydrostatic Servocylinder is equipped with **hydrostatic pocket bearings**, which allow the actuator to sustain also higher side loads radially applied to cylinder rod, in figure below it is displayed the basic concept of how external force can be balanced.

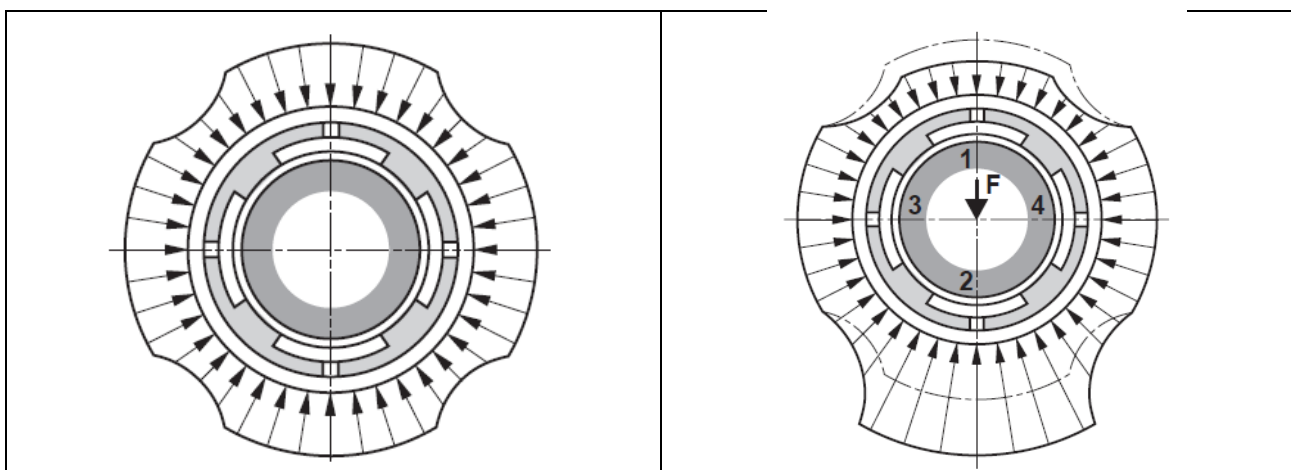


Figure 3: Sectional view of cylinder rod, hydrostatic pockets and pressure distribution with and without external Force



Radial load F pushes cylinder rod to choke the pocket bearing on the opposite side, so creating an asymmetrical pressure distribution, which can compensate for the external force.

In some case hydrostatic pocket bearings can be replaced with low-friction rigid bearings.

WARINING

Characteristics described above are of qualitative type, the purpose is to provide general indication for a proper selection of actuator technology, it must be taken into consideration that real performance depends on specific working conditions of the whole systems where the actuator will be embodied.

Do not hesitate to get in contact with us for any support in systems and engineering analysis.

Hydraulic data and related items

Hydraulic data	
Working fluid	HLP ISO VG 32 / 46, other fluids on request: MIL-PRF-5606 / -83282 / -87257, Skydrol)
Max working pressure	320 bar
Max hydrostatic pocket pressure	280 bar
Temperature range	+30°C...+ 65 °C
Oil contamination rate	15/13/10 ISO 4406 © (4 NAS 1638) or better
Drain line	Admissible back-pressure < 3 bar

Table 1: Hydraulic data

NOTE:

For different working conditions, please get in contact with us.

Related items

At purpose to feed servoactuator with proper oil flow, it is recommended to use an Hydraulic Power Unit (HPU), which can supply conditioned and clean fluid, and an Hydraulic Service Manifold (HSM), which can distribute and control smooth and bump-less Off/Low/High pressure stages to servoactuator, connecting lines P-T-PIL-DR; for further details please make reference to following data sheets:

- IS-EN00326_Silence and Modular Hydraulic Power Unit, closed layout
- IS-EN00426_Modular Hydraulic Power Unit, open layout
- IS-EN00124_Hydraulic Service Manifold



Figure 4: Silence HPU and HSM Manifold

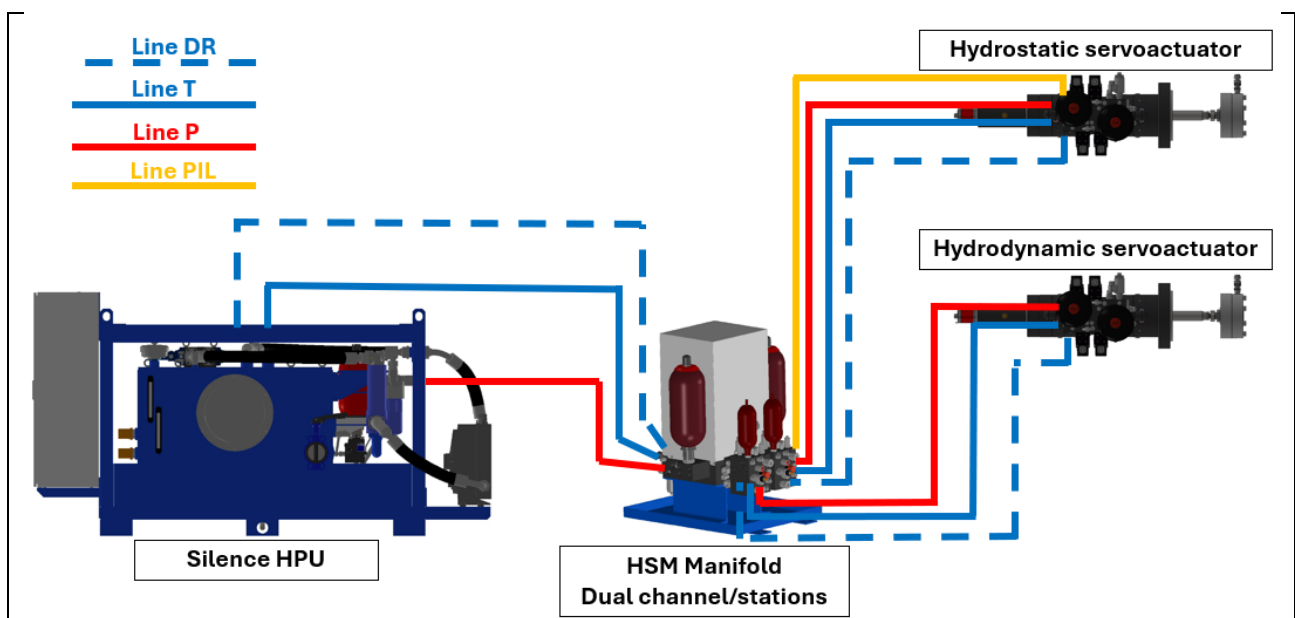


Figure 5: Logic diagram of hydraulic system



Preferential size:

(customized size available on request, both mill-type and tie-rod type compatible with MTS dimensions)

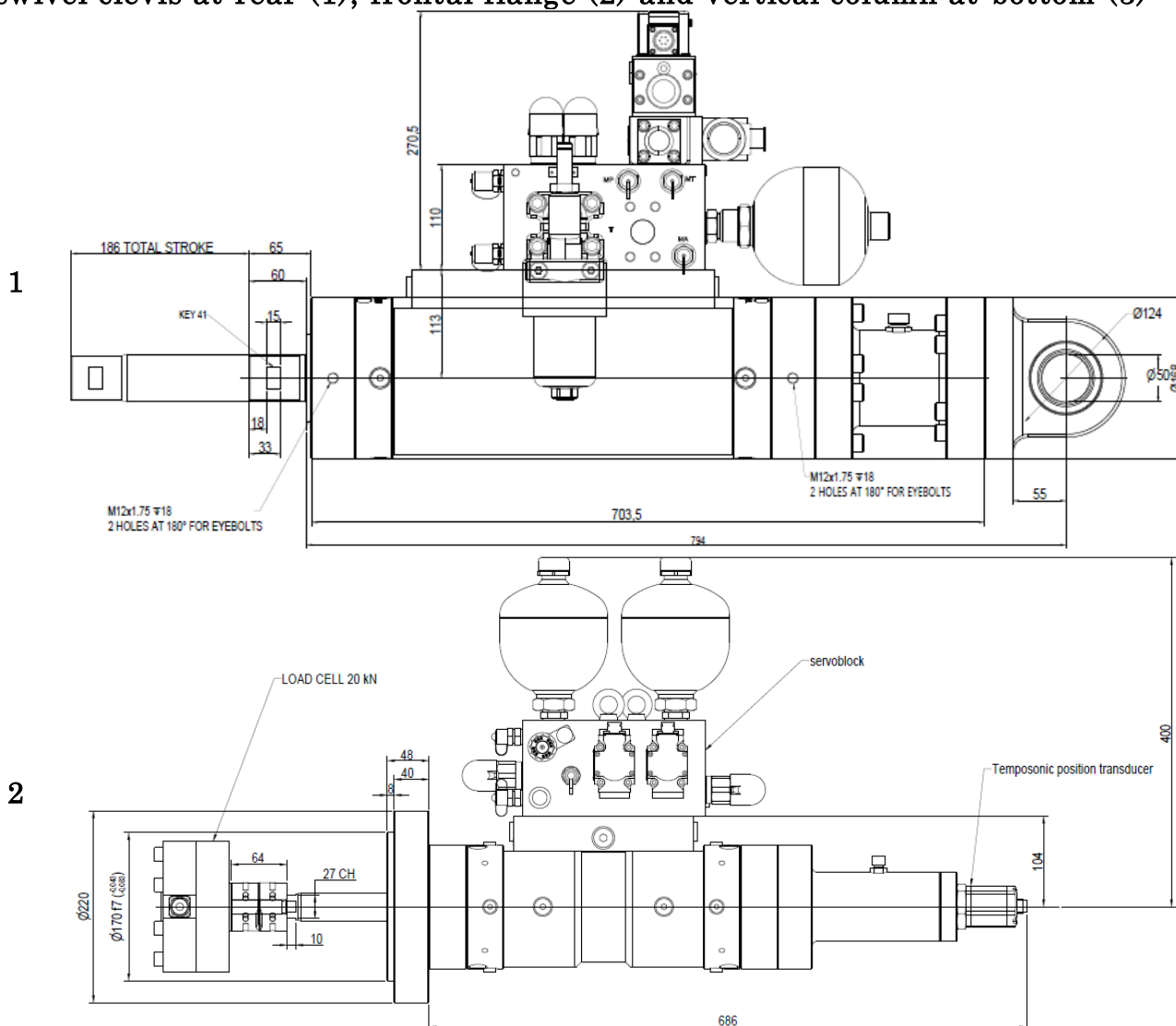


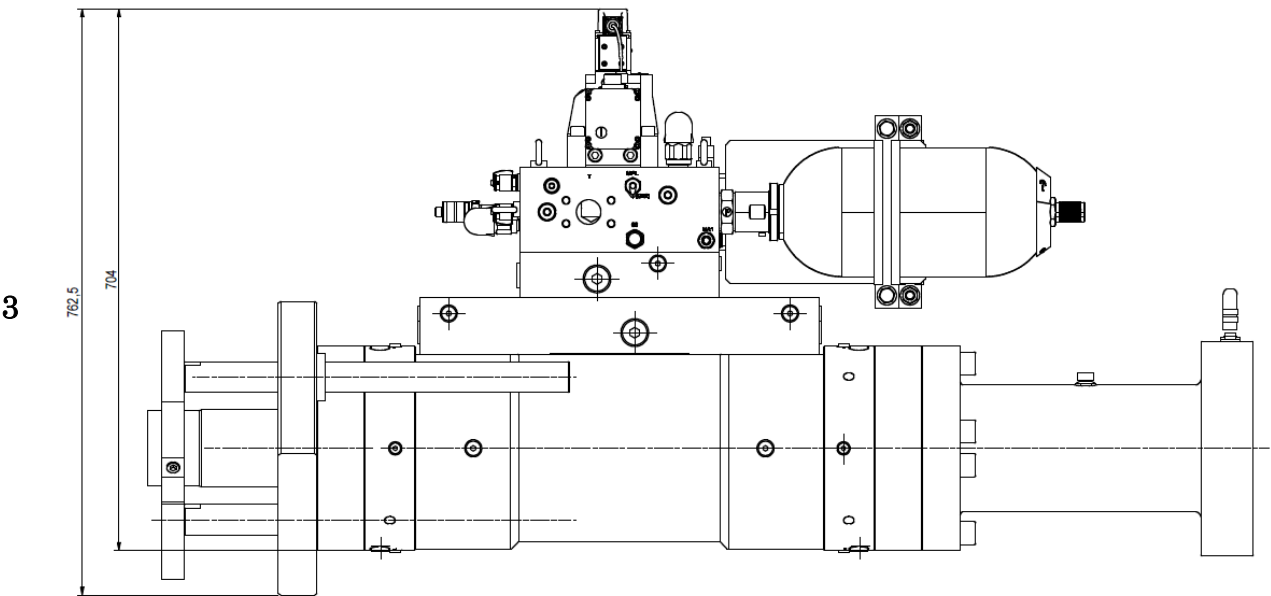
Rod diameter [mm]	Piston diameter [mm]	Working stroke [mm]	Braking stroke (both sides) [mm]
32	36 - 44 - 48 - 54 - 55	50 - 100 - 150 - 200 - 250 - 300	15
40	47-51-54-57-59-63-68-70	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450	15
50	59-62-64-67-73-76-80-87	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	15
63	70-75-77-81-85-95-102-107-110	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	20
80	90-95-98-101-107-113-117-127-137-142-148-150	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	20
100	115-121-128-139-154-161-169-170	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	22,5
125	140-143-149-158-168-176-185-200-217-220	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	22,5
160	181-187-196-204-211-220-225-237-253-260	100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	25
200	240-243-251-256-269-280-299-320-330	100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500	25

Table 2: Preferential size

Drawings - mounting type examples:

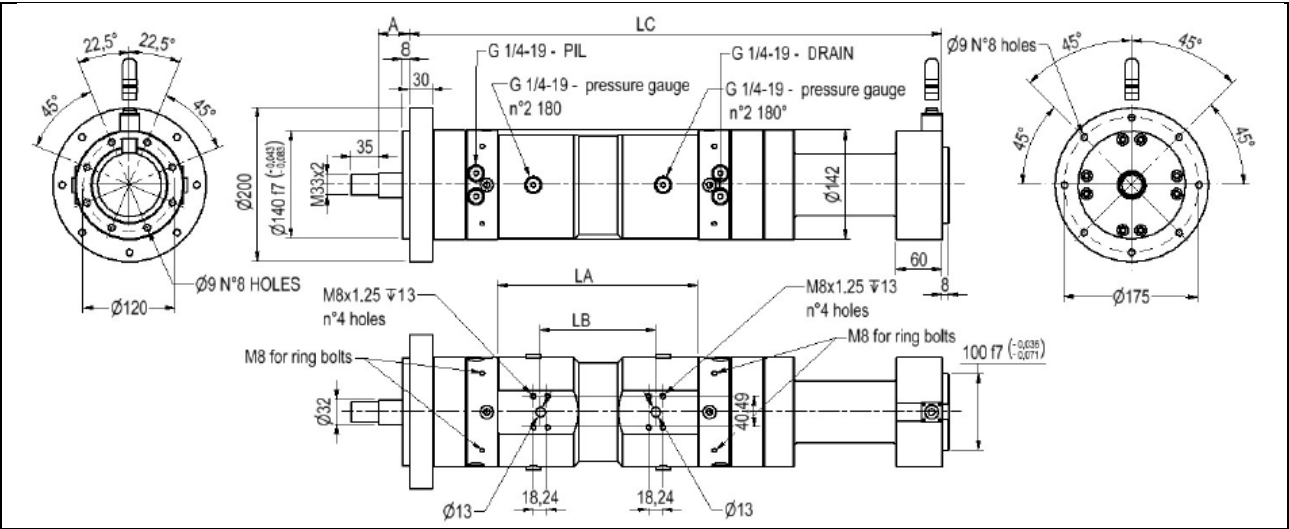
swivel clevis at rear (1), frontal flange (2) and vertical column at bottom (3)





Drawings

Rod diameter 32 mm, with Temposonics position transducer
(dimensions in mm)

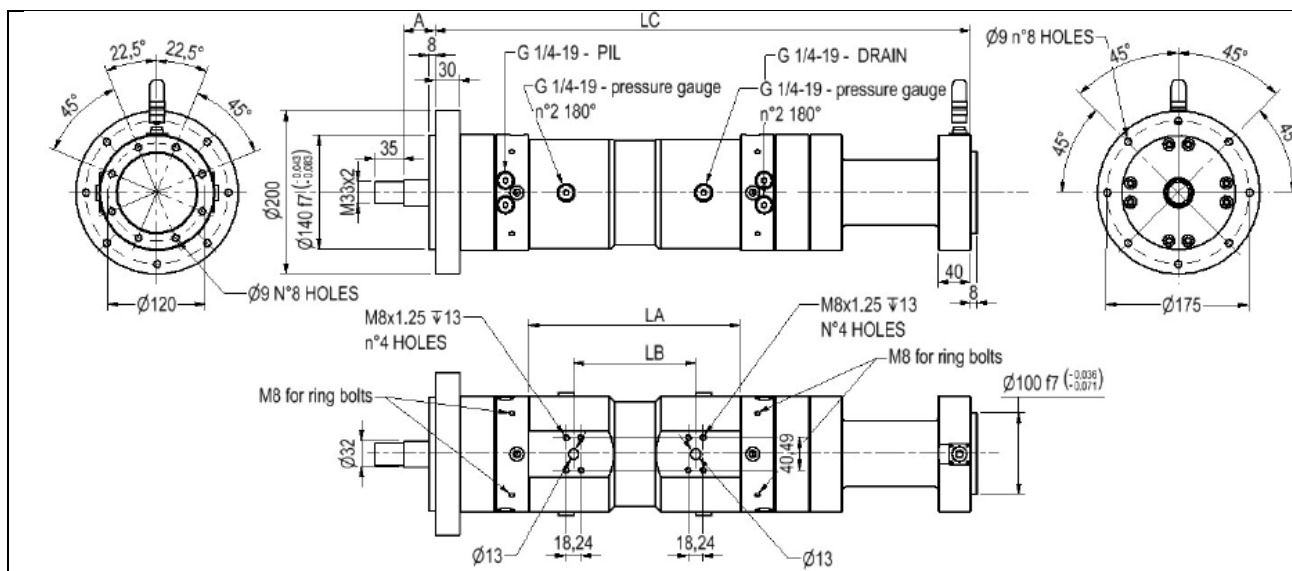


Bore [mm]					Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
36	44	48	54	55	50	30	593	100	210
					100		693	150	260
					150		793	200	310
					200		893	250	360
					250		993	300	410
					300		1093	350	460

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 32 mm, with LVDT position transducer (dimensions in mm)



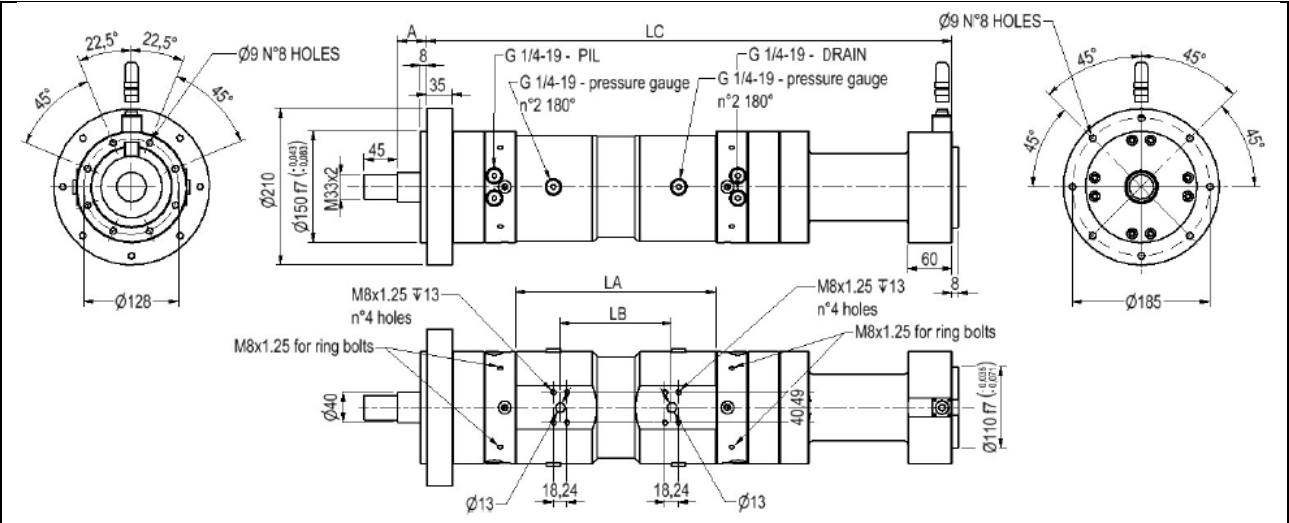
Bore [mm]					Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
36	44	48	54	55	50	30	558	100	210
					100		658	150	260
					150		758	200	310
					200		858	250	360
					250		958	300	410
					300		1058	350	460

NOTE



- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension “A” can be defined by the customer.
- Depending on model of position transducer, “LC” dimension may change slightly.

Rod diameter 40 mm, with Temposonics position transducer
(dimensions in mm)



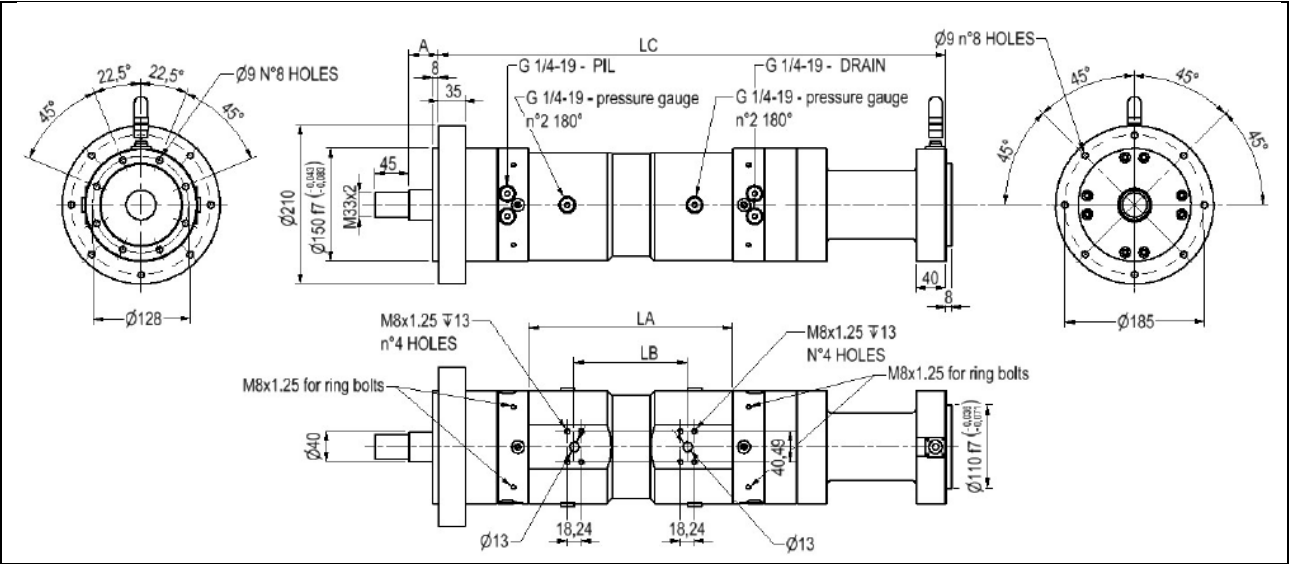
Bore [mm]								Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
47	51	54	57	59	63	68	70	50	30	608	220	100
								100		708	150	270
								150		808	200	320
								200		908	250	370
								250		1008	300	420
								300		1108	350	470
								350		1208	400	520
								400		1308	450	570
								450		1408	500	620



NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension “A” can be defined by the customer.
- Depending on model of position transducer, “LC” dimension may change slightly.

Rod diameter 40 mm, with LVDT position transducer
(dimensions in mm)

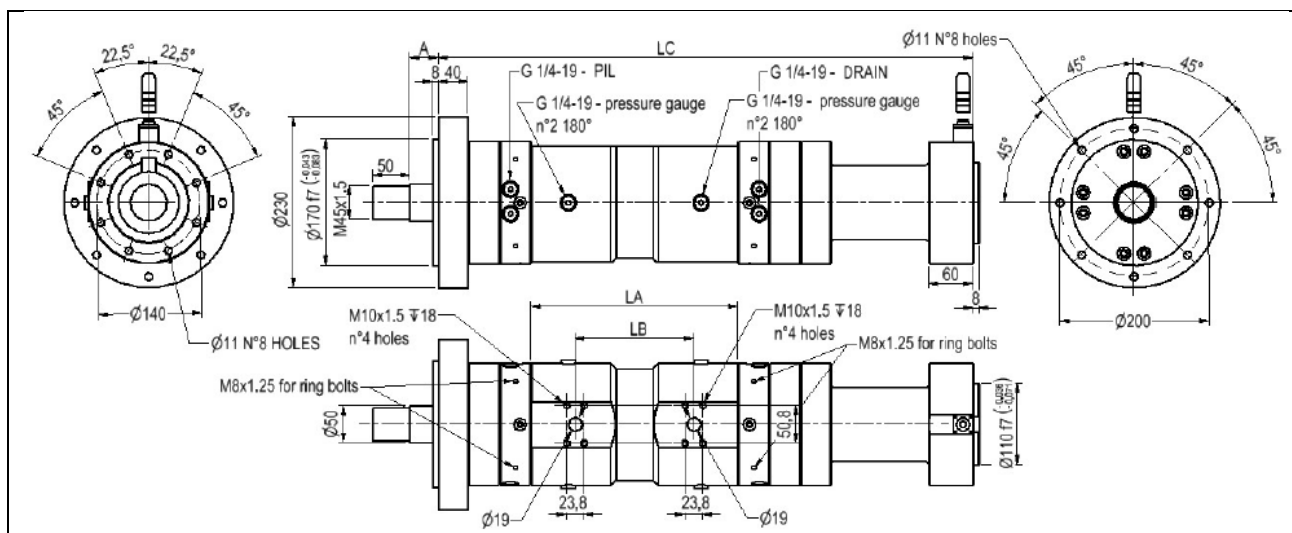


Bore [mm]								Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
47	51	54	57	59	63	68	70	50	30	573	220	100
								100		673	150	270
								150		773	200	320
								200		873	250	370
								250		973	300	420
								300		1073	350	470
								350		1173	400	520
								400		1273	450	570
								450		1373	500	620

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 50 mm, with Temposonics position transducer (dimensions in mm)



Bore [mm]								Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
59	62	64	67	73	76	80	87	50	30	623	110	230
								100		723	160	280
								150		823	210	330
								200		923	260	380
								250		1023	310	430
								300		1123	360	480
								350		1223	410	530
								400		1323	460	580
								450		1423	510	630
								500		1523	560	680



								500		1488	560	680
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NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.

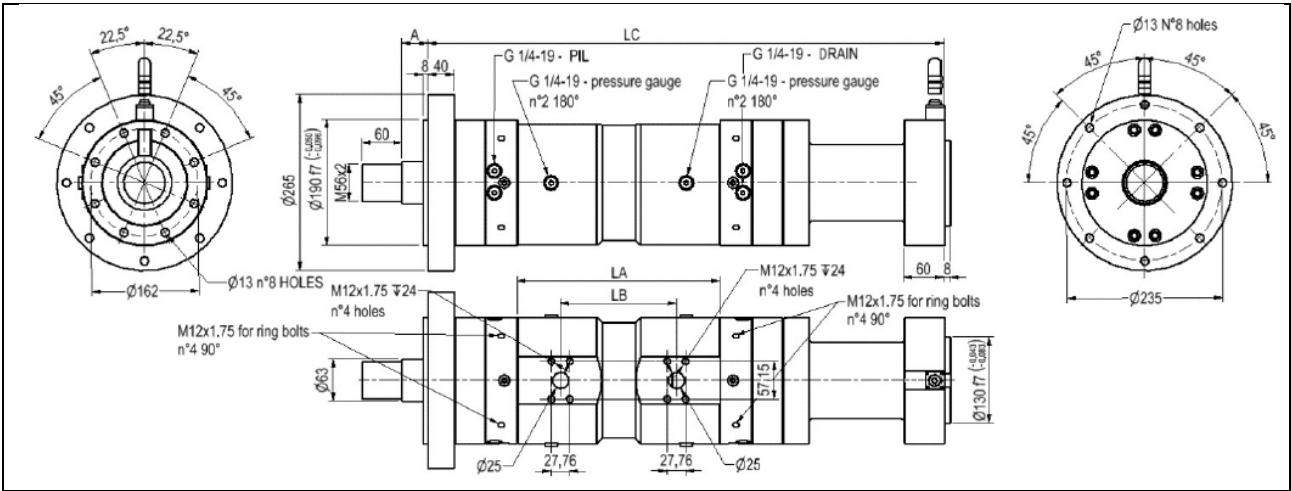
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.

- Rear column work also as adapter for optional rear self-aligning clevis.

- Dimension “A” can be defined by the customer.

- Depending on model of position transducer, “LC” dimension may change slightly.

Rod diameter 63 mm, with Temposonics position transducer
(dimensions in mm)

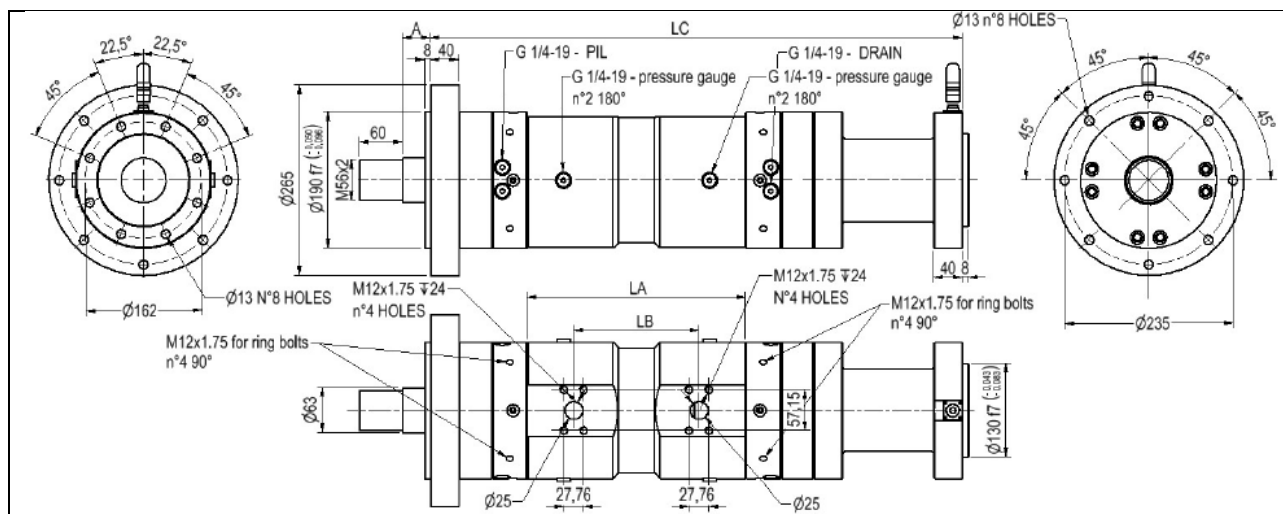


Bore [mm]									Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
70	75	77	81	85	95	102	107	110	50	40	678	125	255
									100		778	175	305
									150		878	225	355
									200		978	275	405
									250		1078	325	455
									300		1178	375	505
									350		1278	425	555
									400		1378	475	605
									450		1478	525	655
									500		1578	575	705

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 63 mm, with LVDT position transducer (dimensions in mm)



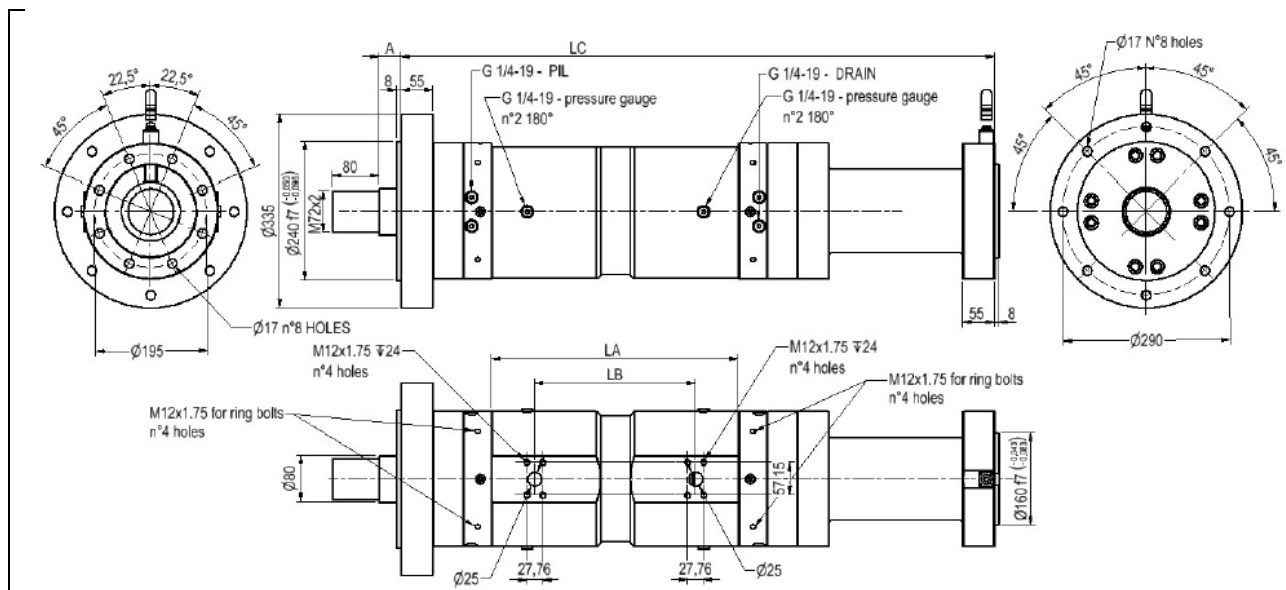
Bore [mm]									Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
70	75	77	81	85	95	102	107	110	50	40	643	125	255
									100		743	175	305
									150		843	225	355
									200		943	275	405
									250		1043	325	455
									300		1143	375	505
									350		1243	425	555
									400		1343	475	605
									450		1443	525	655
									500		1543	575	705

NOTE



- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

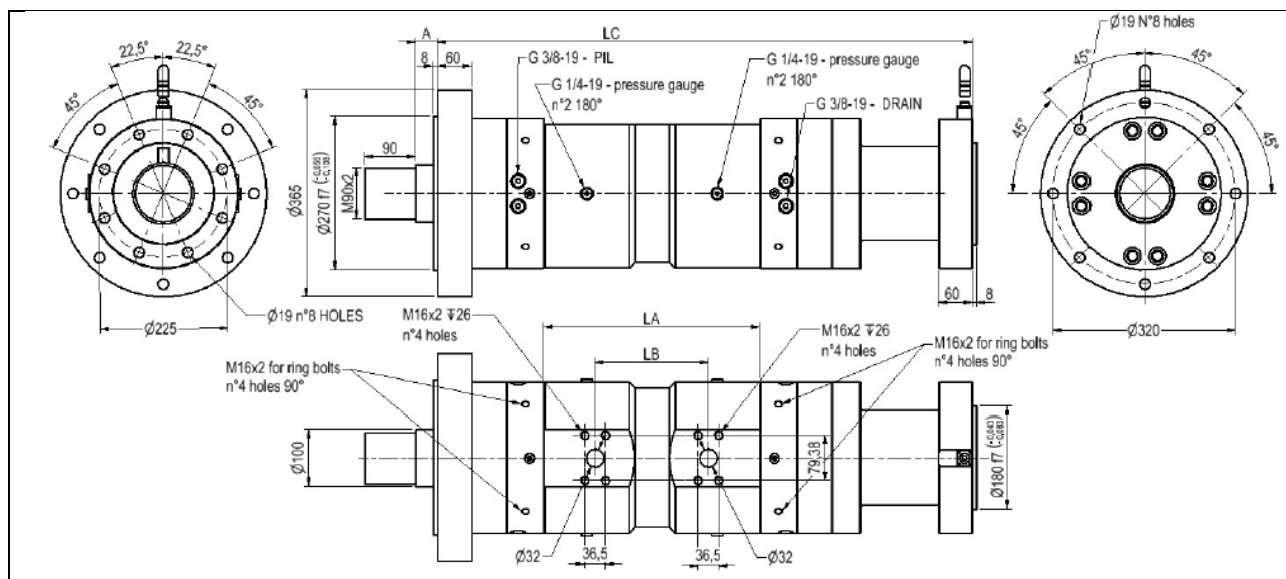
Rod diameter 80 mm, with Temposonics position transducer (dimensions in mm)



Bore [mm]											Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
90	95	98	101	107	113	117	127	137	142	148	50	40	732	130	280
											100		832	180	330
											150		932	230	380
											200		1032	280	430
											250		1132	330	480
											300		1232	380	530
											350		1332	430	580
											400		1432	480	630
											450		1532	530	680
											500		1632	580	730

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 100 mm, with Temposonics position transducer (dimensions in mm)



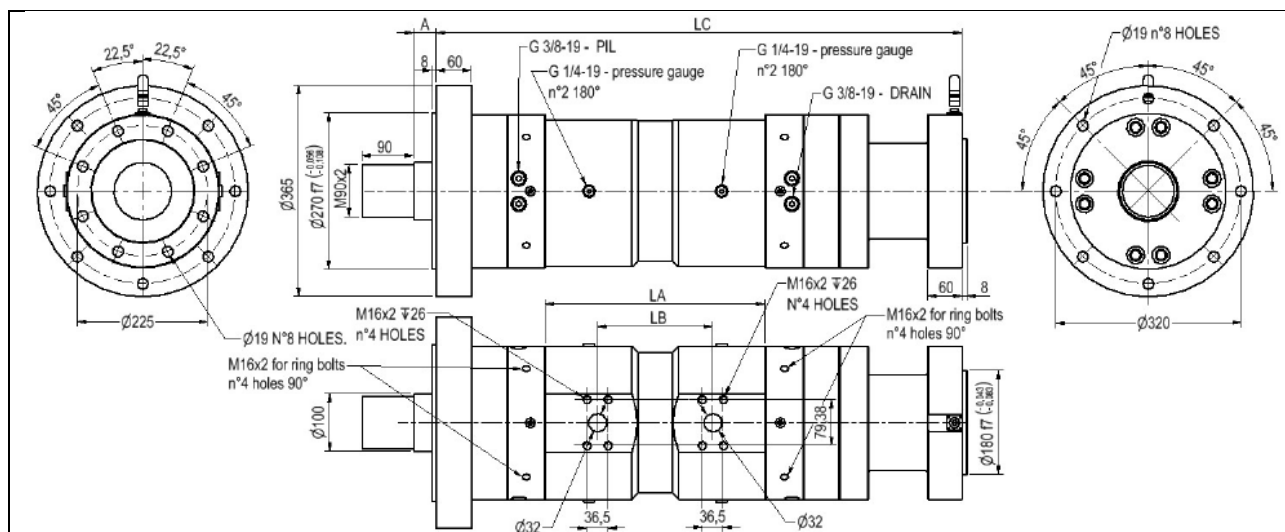
Bore [mm]								Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
115	121	128	139	154	161	169	170	50	45	845	150	331
								100		945	200	381
								150		1045	250	431
								200		1145	300	481
								250		1245	350	531
								300		1345	400	581
								350		1445	450	631
								400		1545	500	681
								450		1645	550	731
								500		1745	600	781

NOTE



- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 100 mm, with LVDT position transducer (dimensions in mm)



Bore [mm]								Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
115	121	128	139	154	161	169	170	50	45	810	150	331
								100		910	200	381
								150		1010	250	431
								200		1110	300	481
								250		1210	350	531
								300		1310	400	581
								350		1410	450	631
								400		1510	500	681
								450		1610	550	731
								500		1710	600	781

NOTE

[illegible]

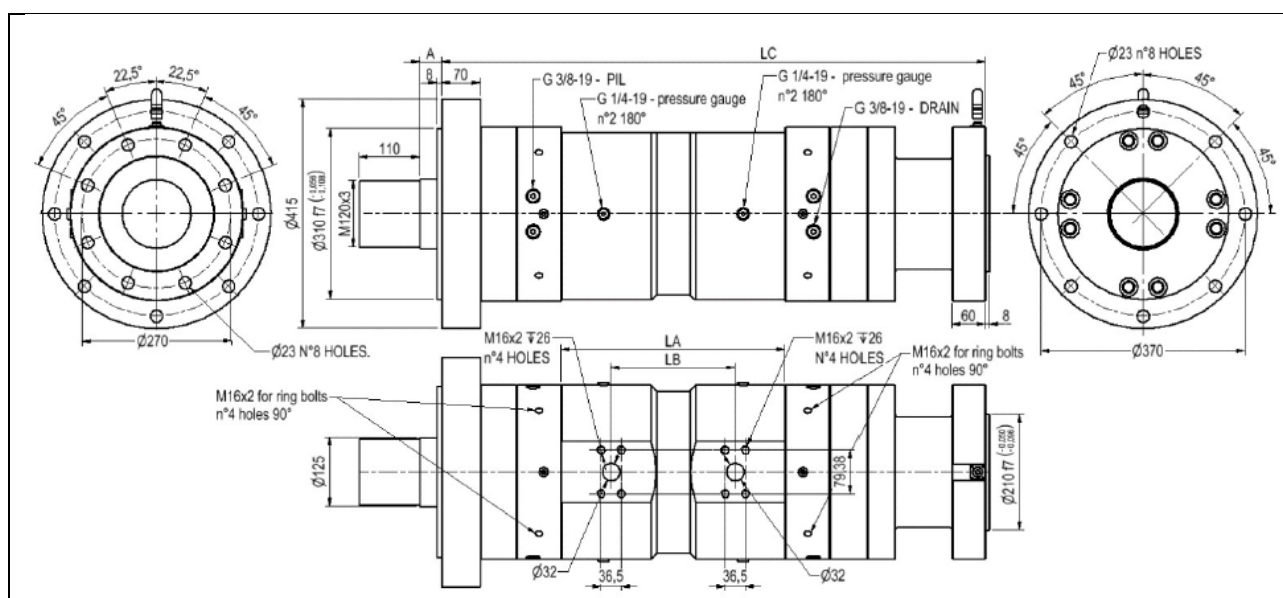
Bore [mm]										Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
140	143	149	158	168	176	185	200	217	220	50	45	917	175	356
										100		1017	225	406
										150		1117	275	456
										200		1217	325	506
										250		1317	375	556
										300		1417	425	606
										350		1517	475	656
										400		1617	525	706
										450		1717	575	756
										500		1817	625	806



NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 125 mm, with LVDT position transducer (dimensions in mm)



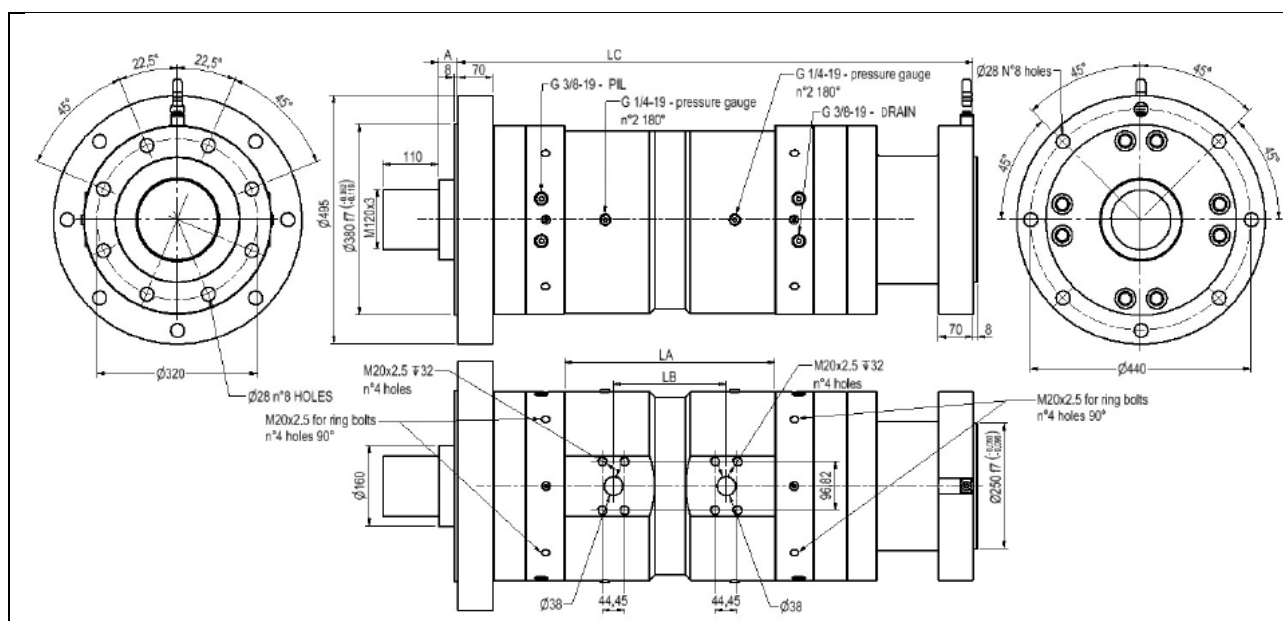
Bore [mm]										Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
140	143	149	158	168	176	185	200	217	220	50	45	883	175	356
										100		983	225	406
										150		1083	275	456
										200		1183	325	506
										250		1283	375	556
										300		1383	425	606
										350		1483	475	656
										400		1583	525	706
										450		1683	575	756
										500		1783	625	806



NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 160 mm, with Temposonics position transducer (dimensions in mm)

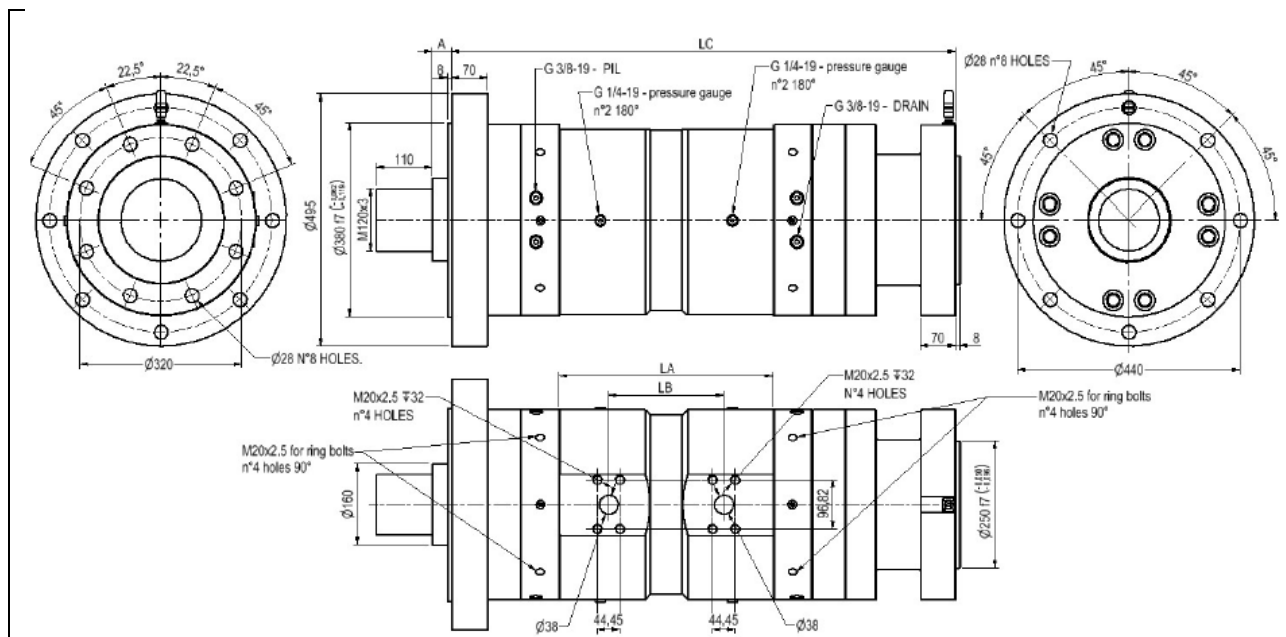


Bore [mm]										Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
181	187	196	204	211	220	225	237	253	260	/	50	/	/	/
										100		1028	225	420
										150		1128	275	470
										200		1228	325	520
										250		1328	375	570
										300		1428	425	620
										350		1528	475	670
										400		1628	525	720
										450		1728	575	770
										500		1828	625	820

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 160 mm, with LVDT position transducer (dimensions in mm)

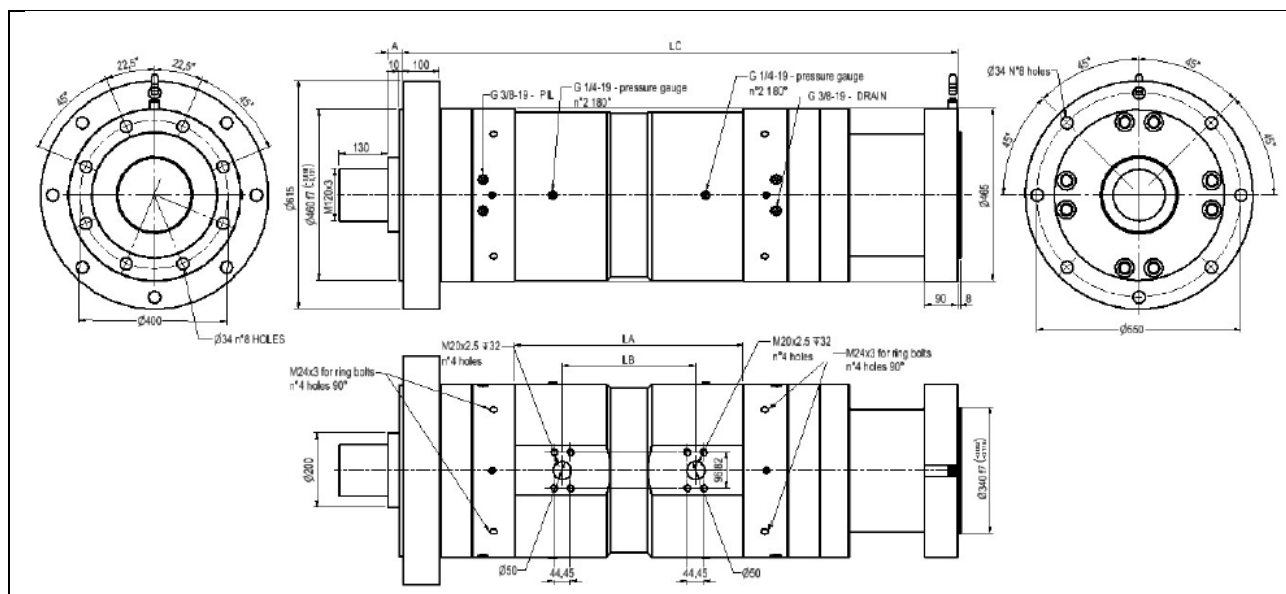


Bore [mm]										Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
181	187	196	204	211	220	225	237	253	260	/	50	/	/	/
										100		993	225	420
										150		1093	275	470
										200		1193	325	520
										250		1293	375	570
										300		1393	425	620
										350		1493	475	670
										400		1593	525	720
										450		1693	575	770
										500		1793	625	820

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

Rod diameter 200 mm, with Temposonics position transducer (dimensions in mm)



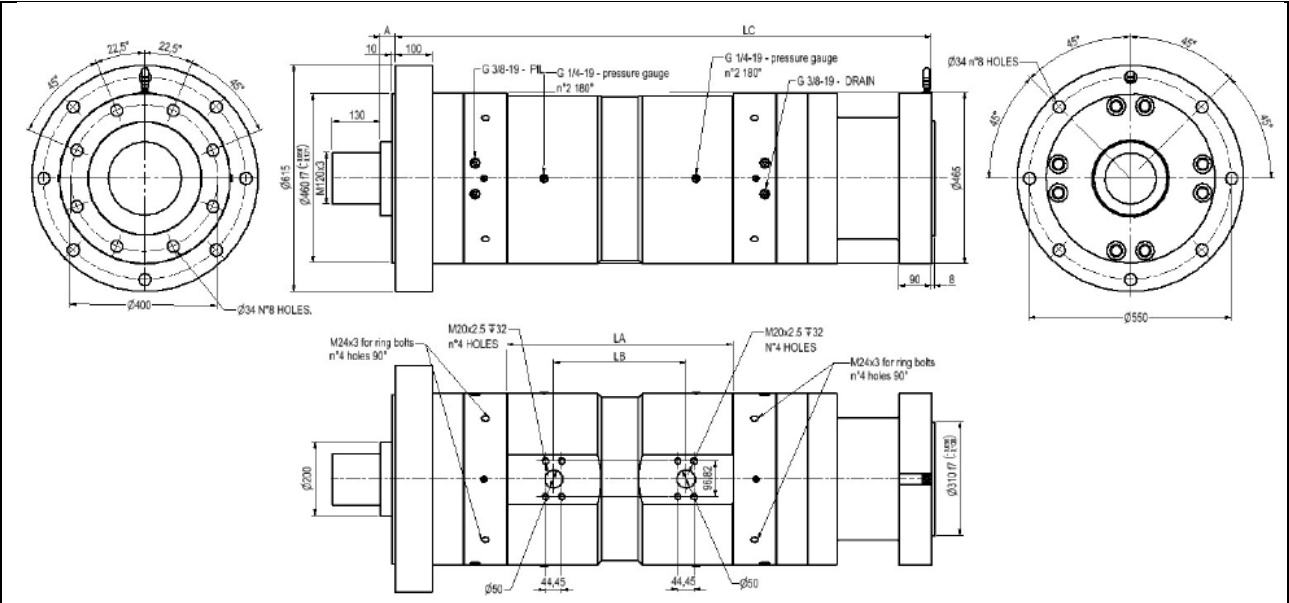
Bore [mm]									Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
240	243	251	256	269	280	299	320	330	/	50	/	/	/
									100		1293	260	515
									150		1393	310	565
									200		1493	360	615
									250		1593	410	665
									300		1693	460	715
									350		1793	510	765
									400		1893	560	815
									450		1993	610	865
									500		2093	660	915

NOTE



- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension “A” can be defined by the customer.
- Depending on model of position transducer, “LC” dimension may change slightly.

Rod diameter 200 mm, with LVDT position transducer
(dimensions in mm)

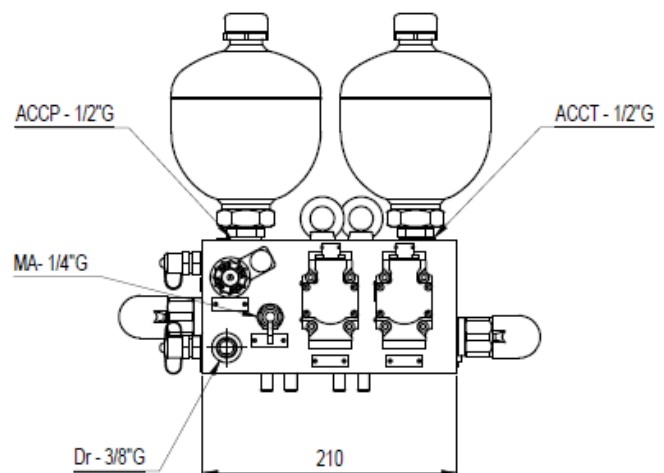
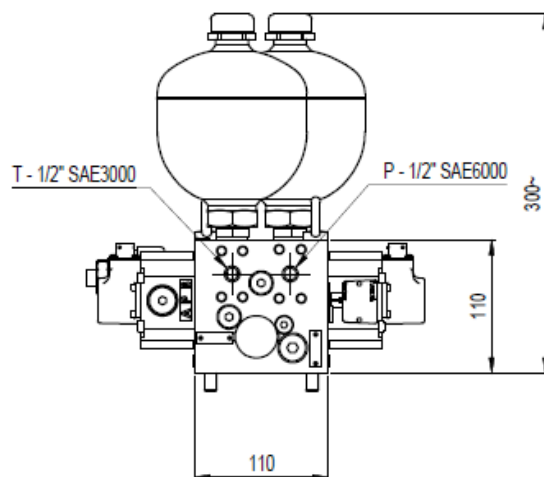
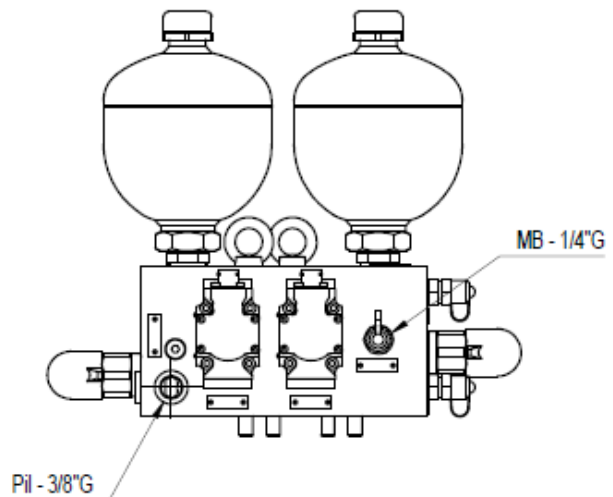
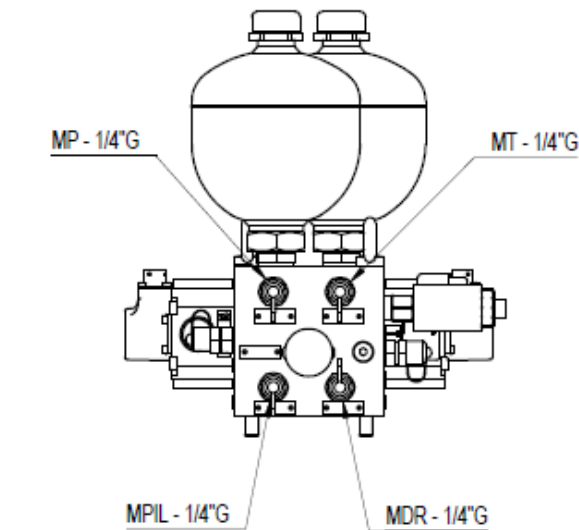


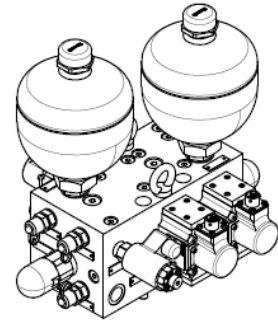
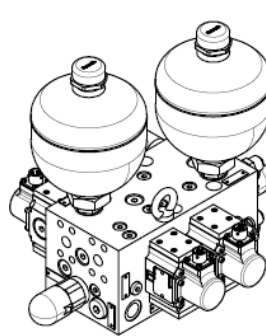
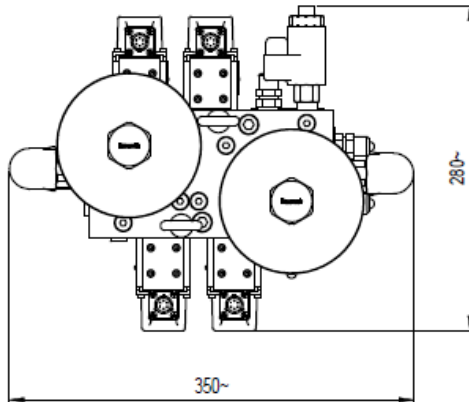
Bore [mm]									Working stroke [mm]	Total brake cushioning [mm]	LC [mm]	LB [mm]	LA [mm]
240	243	251	256	269	280	299	320	330	/	50	/	/	/
									/		/	/	/
									150		1358	310	565
									200		1458	360	615
									250		1558	410	665
									300		1658	460	715
									350		1758	510	765
									400		1858	560	815
									450		1958	610	865
									500		2058	660	915

NOTE

- Actuators are shown without servoblock in fully closed position, including total brake cushioning.
- Actuators are shown with frontal flange and vertical column at bottom, drawings with self-aligning clevis available on request.
- Rear column work also as adapter for optional rear self-aligning clevis.
- Dimension "A" can be defined by the customer.
- Depending on model of position transducer, "LC" dimension may change slightly.

On board servoblock – example – size depends on configuration
(dimensions in mm)





On board servoblock:

Valve block can be configured step-by-step, selecting among following options:

- servovalve model
- number of places for servovalve
- number of blind plates in place of servovalve
- servovalve nominal flow
- stabilizer orifice between servovalve ports A-B
- peak-pressure relief valves on servovalve ports A-B
- by-pass on/off electro-valve between servovalve ports A-B
- diaphragm accumulators

each line P-T-A-B-PIL-DR is also equipped with a measuring point (minimess) for diagnostics.

Available on request:

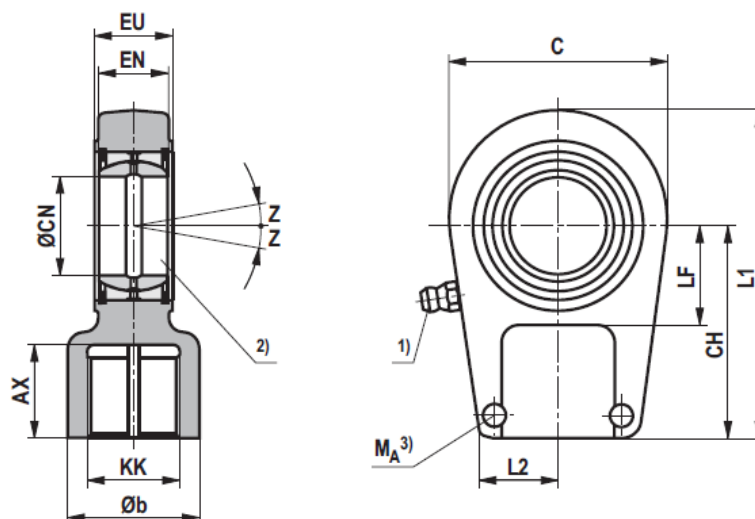
- passive and active load abort function,
- pressure relief valves to protect against maximum static and dynamic load,
- nozzle stabilizer.
- other functions on customer specification.

NOTE

Customized solutions are available on request.

Accessories

Self-aligning swivel clevis at head (frontal side) (dimensions in mm)



Ø rod	Type	Co (5) [kN]	Fadm (6) [kN]	AX min	Ø b max	C	CH	Ø CN (2)	EN	EU-0.4	KK
40	CGA22	106	38,2	23	33	64	60	30-0.010	22-0.12	28	M22x1,5
50	CGA28	153	55,1	29	41	78	70	35-0.012	25-0.12	30	M28x1,5
63	CGA35	250	90	36	50	94	85	40-0.012	28-0.12	35	M35x1,5
80	CGA45	365	131,4	46	62	116	105	50-0.012	35-0.12	40	M45x1,5
100	CGA58	400	144	59	76	130	130	60-0.015	44-0.15	50	M58x1,5
125	CGA65	540	194,4	66	87	154	150	70-0.015	49-0.15	55	M65x1,5
160	CGA100	980	352,8	101	125	206	210	90-0.020	60-0.20	65	M100x2
200	CGA120	1700	612	125	155	266	265	110-0.020	70-0.20	80	M120x3

Ø rod	Type	L1	L2 max	LF	Z	Clamping screws ISO 4762-10.9	MA [Nm] (3)	m [kg] (4)
40	CGA22	94	26	30	6°	M8	30	0,7
50	CGA28	112	34	38	6°	M10	54	1,1
63	CGA35	135	39	45	7°	M10	59	2,0



80	CGA45	168	46	55	6°	M12	100	3,3
100	CGA58	200	61	65	6°	M16	250	5,5
125	CGA65	232	66	75	6°	M16	250	8,6
160	CGA100	323	91	90	5°	M20	490	21,5
200	CGA120	407,5	111	115	6°	M24	840	40,7

- (1) Grease nipple, cone head form A according to DIN 71412; not applicable to option “maintenance-free spherical bearing”,
- (2) Related bolt Ø m6;
Related bolt Ø j6 with option “maintenance-free spherical bearing”
- (3) MA = tightening torque
- (4) m = weight of swivel head in kg
- (5) C0 = static load rating of the swivel head
- (6) Fadm = max. admissible load of the swivel head with oscillatory or alternating loads

WARNING:

The specified dimensions are maximum values and may differ depending on the manufacturer.

The following values are excluded: CH, CN, EN, EU, KK

The swivel head must always be screwed against the shoulder of the piston rod and secured against loosening!



Anti-backlash swivel clevis, full completed (base and rod end) – tilting rotation $\pm 5^\circ$



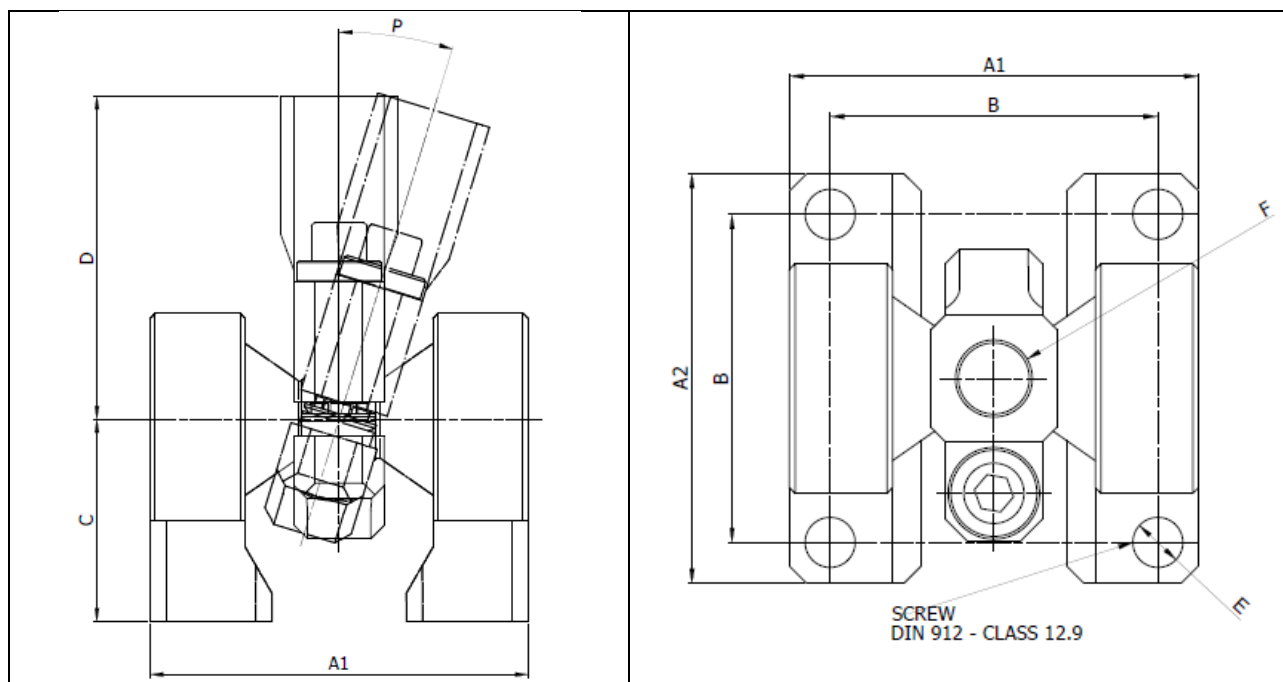
JOINT MODEL	Internal diameter [mm]	Maximum admissible dynamic load [kN]
SGN 25	25	145
SGN 30	30	170
SGN 50	50	350
SGN 70	70	600
SGN 90	90	910
SGN 110	110	1400
SGN 130	130	1800

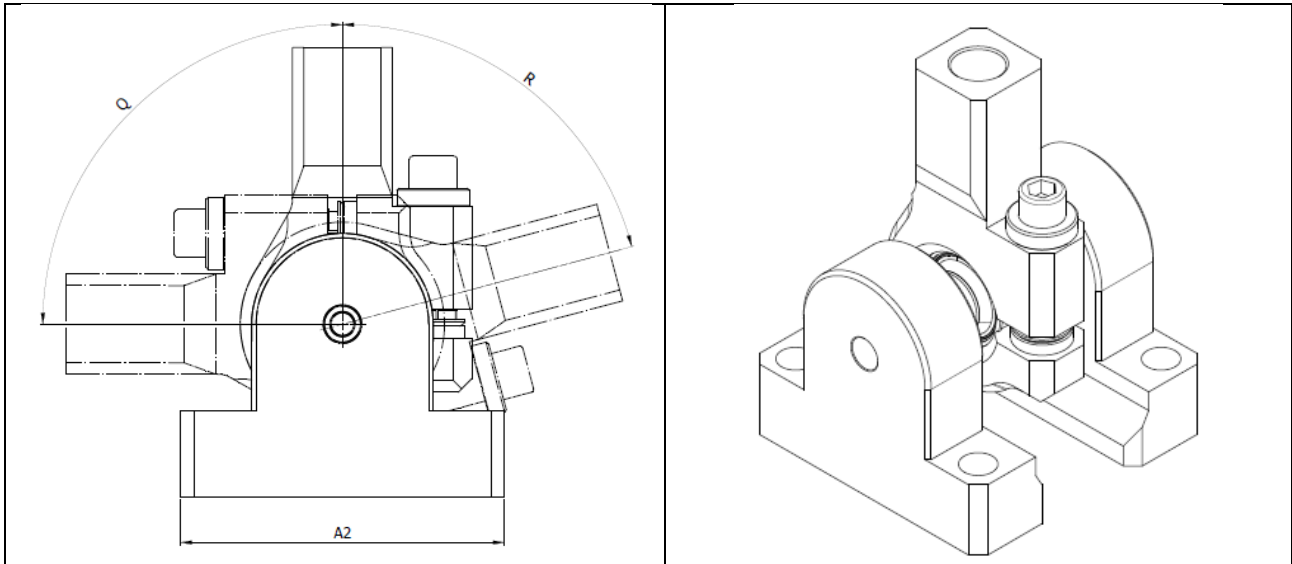
SGN 150	150	2250
SGN 180	180	4000

NOTE:

Specify size and mounting position (base / rod end) on request.

Anti-backlash swivel clevis, wide tilting and swivel rotation - rod end swivel
(dimensions in mm)

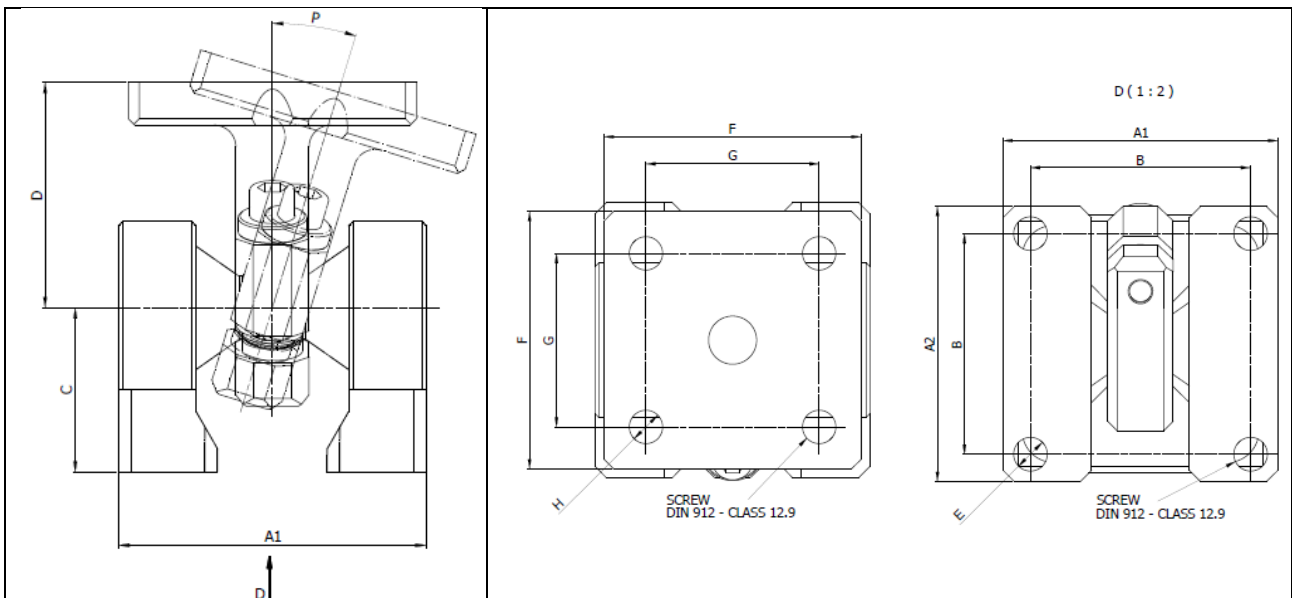


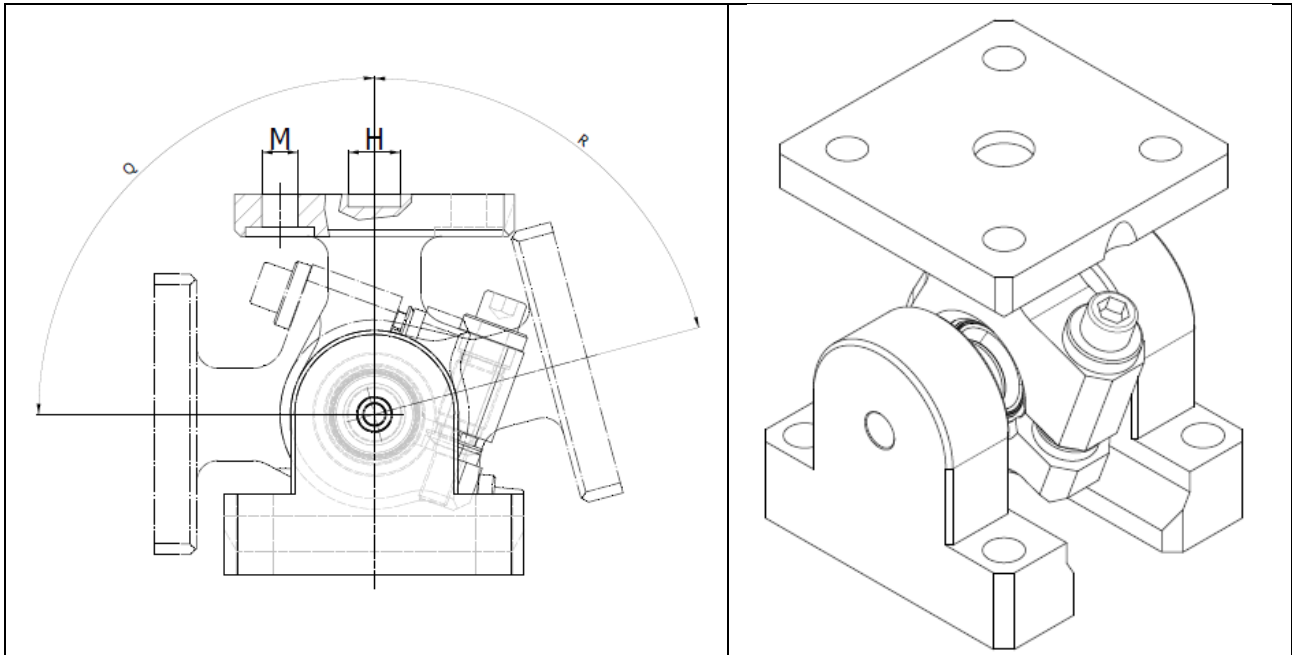


Size	A1	A2	B	C	D	E	F	P	Q	R
25 kN	83,6	85,8	63,6	73	73	10,7	M12x1,25	±7°	90°	90°
70 kN	142,7	142,7	114,3	76,2	121,9	17,5	M27x2	±17°	90°	75°
160 kN	196,9	187,5	146,1	101,6	162	17,5	M27x2	±17°	80°	90°
340 kN	238	231,6	184,1	139,7	215,9	26,9	M36x2	±14°	90°	75°
500 kN	314,5	317,5	241,3	152,5	320,5	33,65	M52x2	±6°	90°	30°
750 kN	346,2	355,6	279,4	206,4	339,7	34,8	TBD	±7°	90°	30°
1000 kN	406,4	406,4	298,4	241,3	412,7	43,9	TBD	±8°	90°	30°

Attention: *All dimensions are reference values only.*

Anti-backlash swivel clevis, wide tilting and swivel rotation – **base swivel**
(dimensions in mm)



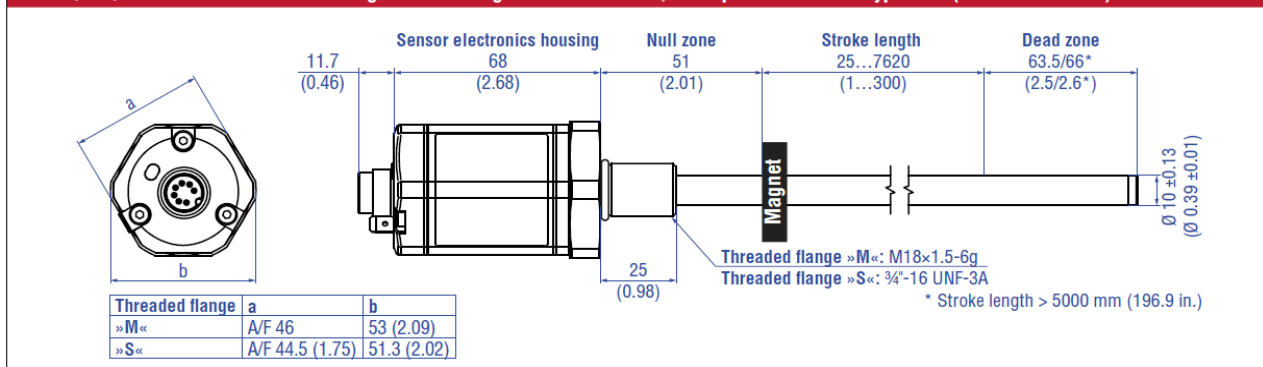


Size	A1	A2	B	C	D	E	F	G	H	P	Q	R
25 kN	83,6	85,8	63,6	47,6	79,4	10,7	88,9	62,9	10,3	±7°	90°	90°
70 kN	142,7	142,7	114,3	76,2	104,7	17,5	133,4	89,9	17,3	±17°	90°	75°
160 kN	196,9	187,5	146,1	101,6	136,7	17,5	139,7	89,9	16,8	±17°	80°	90°
340 kN	238	231,6	184,1	139,7	177,8	26,9	203,2	135,1	23	±14°	90°	75°
500 kN	314,5	317,5	241,3	152,4	254	33,65	TBD	TBD	TBD	±6°	90°	30°
750 kN	346,2	355,6	279,4	206,4	250,1	34,8	TBD	TBD	TBD	±7°	90°	30°
1000 kN	406,4	406,4	298,4	241,3	304,8	43,9	TBD	TBD	TBD	±8°	90°	30°

Attention: *All dimensions are reference values only.*

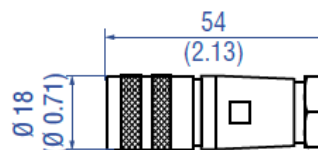
Position transducer – standard (Temposonics model with connector D70)
(dimensions in mm)

RH5-M/S-A/-V – RH5 with threaded flange M18×1.5-6g or ¼"-16 UNF-3A, example: Connection type D70 (connector outlet)



CONNECTOR WIRING

D70		
Signal + power supply		
M16 male connector	Pin	Function
 View on sensor	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+12...30 VDC (± 20 %)
	6	DC Ground (0 V)
	7	Not connected



M16 female connector (7 pin), straight
Part no. 370 624

Material: Zinc nickel plated
Termination: Solder
Contact insert: Silver plated
Cable clamp: PG9
Cable Ø: 6...8 mm (0.24...0.31 in.)
Operating temperature:
-40...+100 °C (-40...+212 °F)
Ingress protection: IP65/IP67
(correctly fitted)
Fastening torque: 0.7 Nm

Standard SSI protocol	
Mode	Measuring direction forward, synchronous mode 1
Data length	25 bit
Format	Gray
Resolution	1 μ m

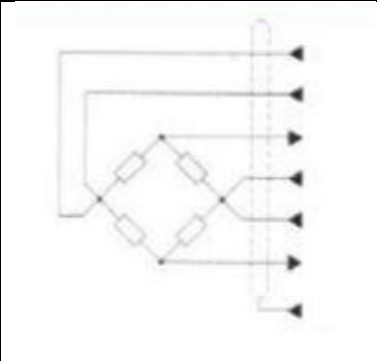
NOTE

Customer specific position transducer models are available on request.

Load cell - standard (dimensions in mm)

Nominal load (Tension/Compression)	0... ± 1000 kN
Nominal sensitivity	2mV/V (1mV/V per fatigue cycles)
No. of extensimeter bridges	1...2
Calibration tolerance	$< \pm 0,1$ %
Deflection at maximum load	0,35 mm
Combined error	$\pm 0,03$ % F.S.
Repeatability	$\pm 0,02$ % F.S.
Return to zero over 30 min	$\pm 0,02$ % F.S.
Creep at nominal load over 30 minutes	$\pm 0,03$ %
Limit load	150 %
Breaking load	> 300 %
Limit dynamic load	50 %

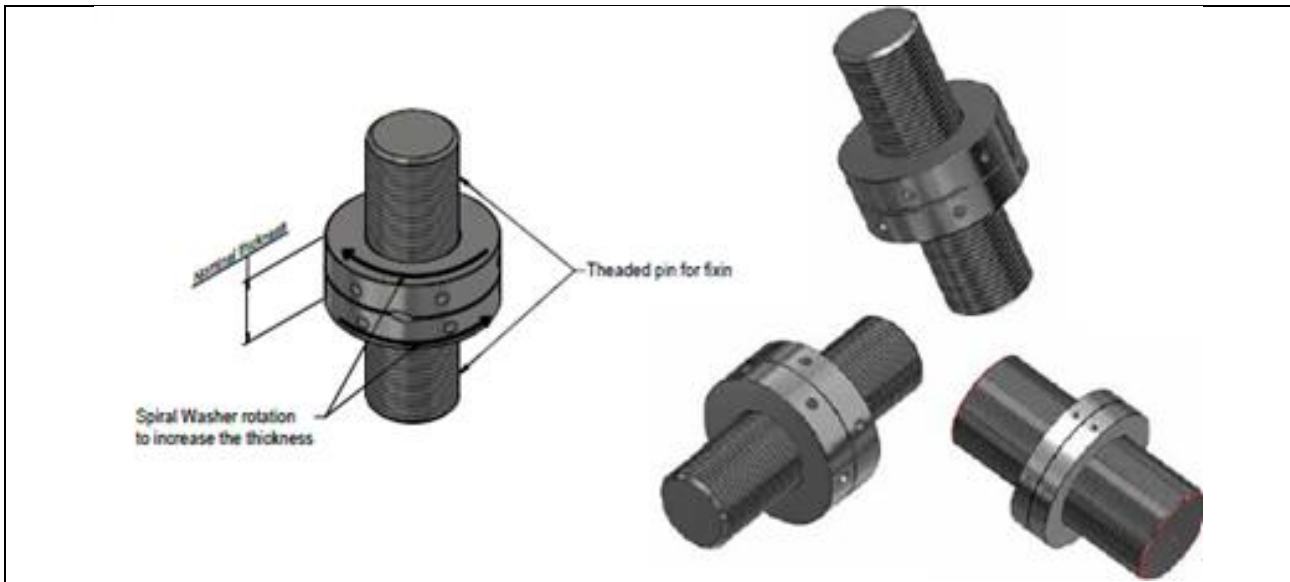
Protection class EN 60529	IP 67
Cell material	Stainless steel 17.4 PH
Temperature effect	
- on zero	± 0,005 %
- on sensivity	± 0,005 %
Reference temperature	+20 °C
Operating temperature	-10°C...+50°C
Storage temperature	-10°C...+50°C
Input resistance	700 ± 20 Ohm
Output resistance	700 ± 5 Ohm
Insulation resistance	> 5000 MOhm
Zero balance	±1% F.S.
Recommended supply voltage	10 V
Normal supply voltage	5...15V
Maximum supply voltage	15V

		OUTPUT	WIRING
		Excitation + Sense + Output + Excitation - Sense - Output -	Rosso / red Blu / Blue Verde / Green Nero / Black Marrone / Brown Bianco / White

NOTE
Customer specific load cell models are available on request, among the other:

- HBK,
- Interface,
- Kistler.

Spiral washer
(dimensions in mm)



Force [kN]	Diameter ID [mm]	Diameter OD [mm]	Threading	Side pin diameter [mm]
25	12	41	M12x1,25	4
100	27	66	M27x2	6
250	36	92	M36x2	6
500	52	130	M52x2	10
1000	76	178	M76x2	10

Spiral washers can produce double benefit and namely:

- avoid backlash during through-zero cyclic loading,
- increase service life of rod end mechanical junction.

To achieve this purpose, all spiral washer must be preloaded during mounting to a load slightly higher than required test load.

NOTE:

[Available on request](#)

Contacts

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