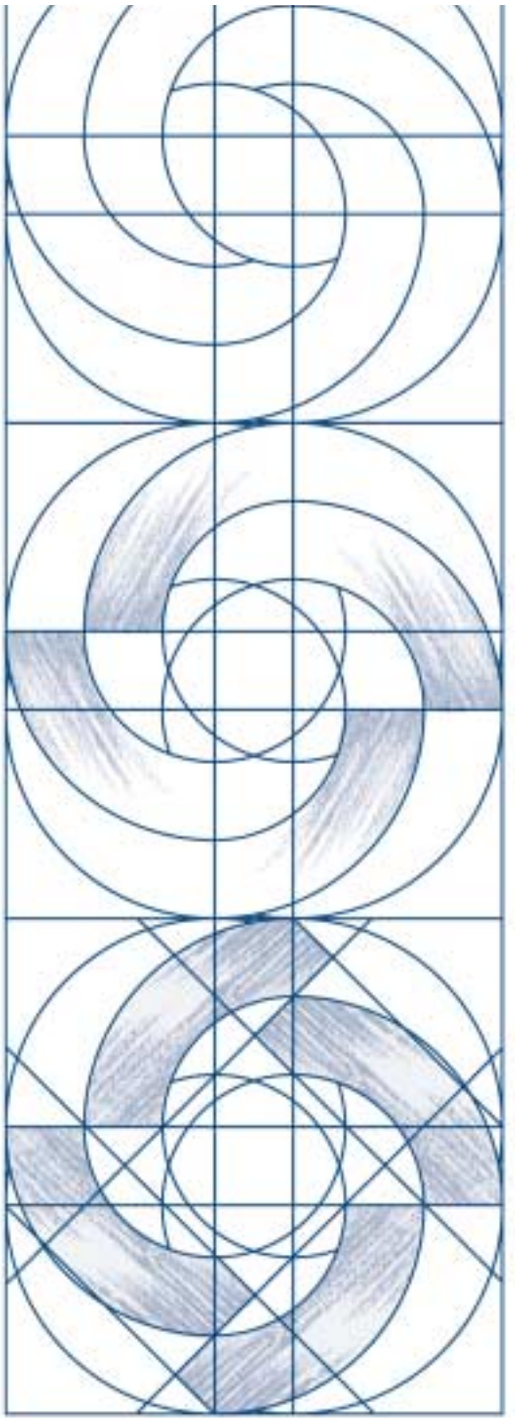


“OLGA-H” &
“OLGAS-H” SERIES

HYDRAULIC ACTUATORS
FOR HIGH PRESSURE SUPPLY

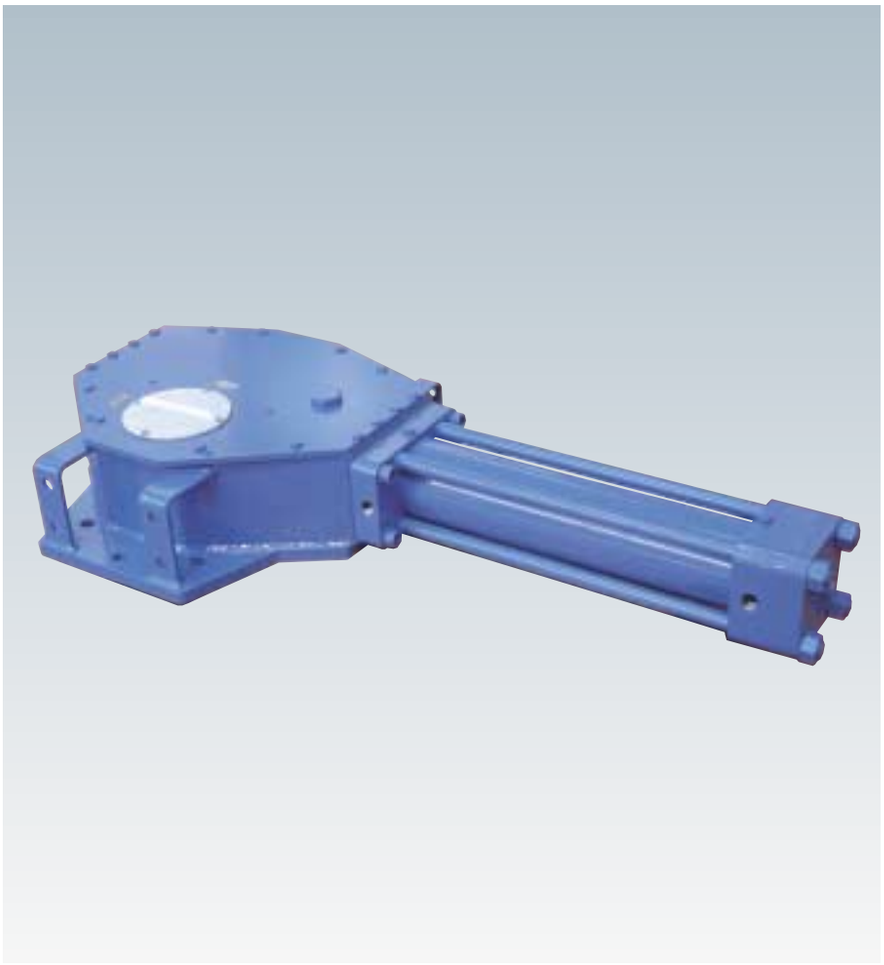
BIFFI

tyco flow control

Double acting OLGA-H actuator for 90° operation

General

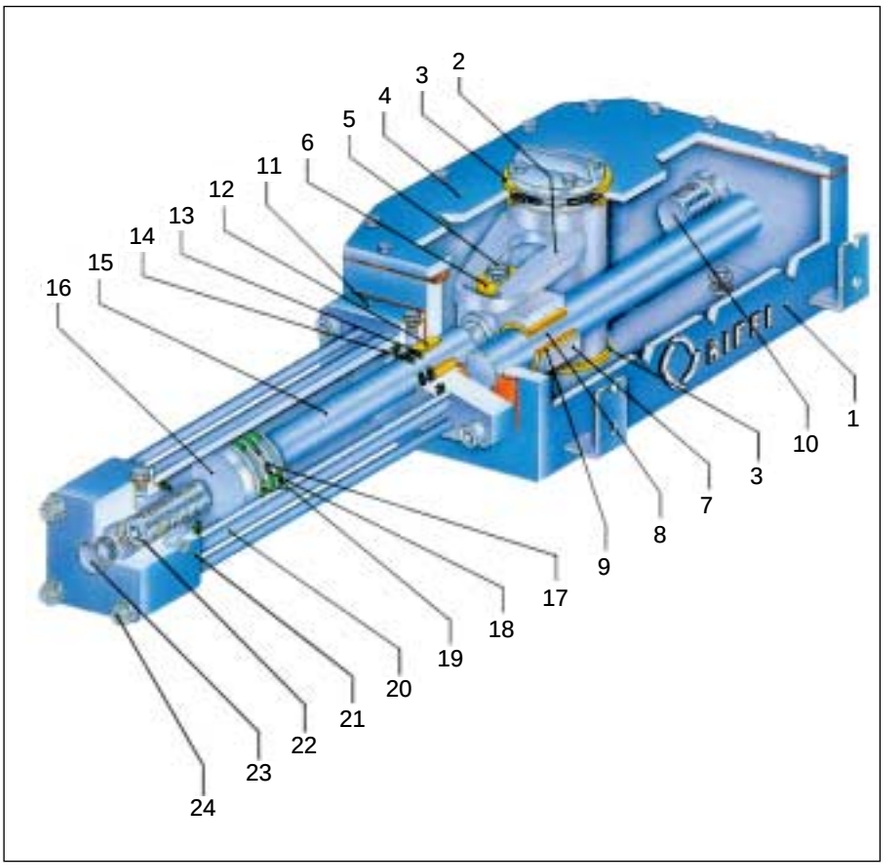
The OLGA-H high pressure hydraulic actuator series was engineered and is manufactured to provide maximum torque output with minimum supply pressure.
Simplicity, reliability and economy are at the top of the list of design parameters.
The OLGA-H actuator is suitable for any quarter turn application such as ball, plug, butterfly valves or dampers, in both On-Off and Modulating heavy duty service.



Features

- Totally enclosed, weatherproof housing in fabricated carbon steel for maximum strength
- Canted scotch yoke actuators are the proper solution to motorise the most common type of quarter-turn valves, due to their dedicated torque trend; they are suited to the larger valve sizes or for valves with high working pressure where high break away torques are required
- Symmetric scotch yoke actuators available for special applications
- External travel stops for precise angular stroke adjustment between 82° and 98°
- Hard chromium plated and polished guide bar and piston rod for corrosion resistance and minimal friction
- Bushings made of bronze or sintered bronze, charged with teflon, to provide minimal friction and extended service life
- Electroless nickel plated and polished cylinder for corrosion resistance and minimal friction
- Peculiarly designed piston seals consisting of a teflon U ring with a special elastomer centred into its sealing face, squeezed against the cylinder tube by an underlying O-ring: the combination of the three elements gives an effective seal, both with low and high oil pressure, with low friction and high sensitivity assuring long service life and preventing sticking problems
- Piston rod seals made two special design teflon rings in tandem precharged by O-rings for effective seals, both with low and high oil pressure, low friction and low hysteresis assuring long service life and preventing sticking problems
- Jackscrew or hand pump manual override available
- An extensive range of accessories is available:
  - limit switch boxes - explosionproof, intrinsically safe and/or weatherproof
  - limit switches can be provided in different types according to customer requirements
  - position transmitters - explosionproof, intrinsically safe and/or weatherproof
  - oil filters
  - solenoid valves - explosionproof, intrinsically safe and/or weatherproof
  - control units for modulating service:
    - electrohydraulic “step-by-step”
    - electrohydraulic proportional valves complete with electronic control panel
    - electrohydraulic servovalves
  - spool-type or poppet-type (no leakage) control valves
  - dump valves, flow regulators, relief valves
  - electric pressure switches
  - bladder-type or piston-type accumulators PED stamped. Accumulators in accordance with different codes on request
  - electrohydraulic power packs, with explosionproof and/or weatherproof protection, assembled on the actuator or separate from the actuator
  - terminals enclosures, pushbutton panels - explosionproof or intrinsically safe and/or weatherproof
- Special coatings for offshore or corrosive environments

Item	Name
1	Housing
2	Yoke
3	Yoke bushing
4	Cover
5	Guide block pin
6	Sliding block
7	Guide block
8	Guide block bushing
9	Guide bar
10	Travel stop screw
11	Cylinder head flange
12	Piston rod bushing
13	Piston rod O-ring
14	Piston rod seal ring
15	Piston rod
16	Piston
17	Piston O-ring
18	Piston seal ring
19	Piston guide sliding ring
20	Cylinder tube
21	Cylinder end flange
22	Travel stop screw
23	Plug
24	Tie rod



Technical data

Supply pressure : 352 bar g maximum (except where a different value of “Max allowable pressure” is listed in the performances table)

Supply fluid : hydraulic oil
Special versions for fire-resistant fluids

Ambient temperature : -30° C to +100° C
Special versions for service outside this range on request

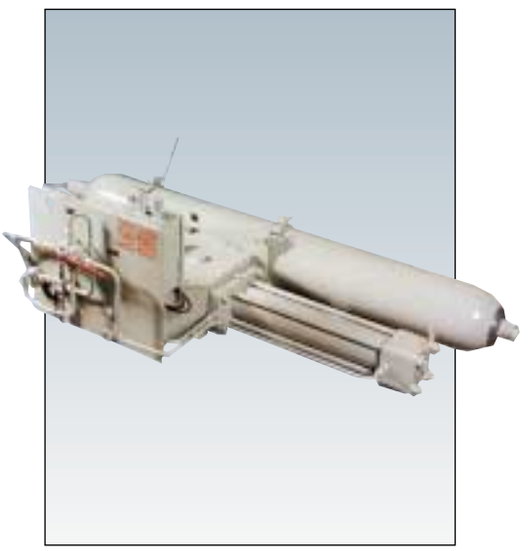
Output torques : up to 400000 Nm
Higher values with special versions

OLGA-H Actuators

Model	Oil displacement (litres)
0.3-35	0.15
0.3-40	0.20
0.3-50	0.30
0.3-60	0.45
0.9-50	0.35
0.9-60	0.50
0.9-70	0.70
0.9-85	1.1
1.5-60	0.65
1.5-70	0.85
1.5-85	1.3
3-70	1.4
3-85	2
3-95	2.5
3-110	3.4
6-95	2.9
6-110	3.9
6-125	4.6
6-135	5.8
14-125	5.4
14-135	6.2
14-145	7.3
14-175	10.6
14-200	13.8
18-145	8.4
18-175	12.2
18-200	15.9
32-175	14.3
32-200	18.6
32-235	25.6
50-200	20.7
50-235	28.6
50-300	46

Note

The oil displacement is the oil volume required for one actuator stroke (in opening or in closing)



Output Torques for Canted Yoke Mechanism

Model	Max operating torque (Nm)	Output torque (Nm/bar g) at 0°	at 45°	at 90°	Max allowable pressure (bar g)
0.3C-35	3000	10.7	3.8	5.2	352
0.3C-40	3000	15.6	5.5	7.6	352
0.3C-50	3000	27.3	9.6	13.3	352
0.3C-60	3000	38.7	13.6	18.9	352
0.9C-50	9000	31.6	11.1	15.4	352
0.9C-60	9000	44.7	15.8	21.8	352
0.9C-70	9000	60.1	21.2	29.3	352
0.9C-85	9000	84.3	29.7	41.1	265
1.5C-60	15000	56.5	19.9	27.6	352
1.5C-70	15000	76	26.8	37.1	352
1.5C-85	15000	106	37.7	52.2	352
3C-70	30000	125	44.4	61.4	352
3C-85	30000	176	62.4	86.4	352
3C-95	30000	233	82.4	114	352
3C-110	30000	301	106	147	265
6C-95	60000	273	96.3	133	352
6C-110	60000	353	124	172	352
6C-125	60000	482	170	235	282
6C-135	60000	578	204	282	246
14C-125	120000	527	186	257	352
14C-135	120000	631	222	308	352
14C-145	120000	744	262	363	352
14C-175	120000	1080	383	530	352
14C-200	120000	1408	496	688	352
18C-145	180000	805	284	393	352
18C-175	180000	1240	440	609	352
18C-200	180000	1620	572	792	352
32C-175	300000	1460	517	715	352
32C-200	300000	1900	671	929	352
32C-235	300000	2730	963	1330	282
50C-200	400000	2110	746	1030	352
50C-235	400000	3030	1070	1480	282
50C-300	400000	5030	1770	2460	211

Notes

- Max allowable pressure is the static pressure applicable to fully stroked actuator against the travel stops
- Angular positions: 0° Closed
  45° Intermediate
  90° Open

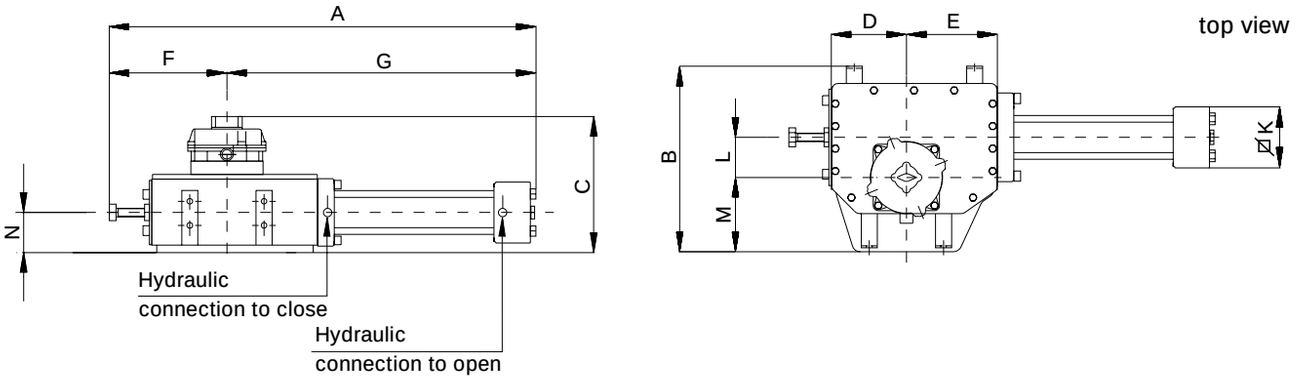
Output Torques for Symmetric Yoke Mechanism

Model	Max operating torque (Nm)	Output torque (Nm/bar g) at 0°	at 45°	at 90°	Max allowable pressure (bar g)
0.3S-35	3000	6.8	3.9	6.3	352
0.3S-40	3000	9.9	5.6	9.2	352
0.3S-50	3000	17.3	9.8	16	352
0.3S-60	3000	24.5	13.9	22.7	352
0.9S-50	9000	20	11.3	18.5	352
0.9S-60	9000	28	15.9	26	352
0.9S-70	9000	38.1	21.6	35.3	352
0.9S-85	9000	53.4	30.3	49.6	265
1.5S-60	15000	38.9	20.3	30.4	352
1.5S-70	15000	52.3	27.2	40.9	352
1.5S-85	15000	73.6	38.3	57.5	352
3S-70	30000	85.5	45.1	68.7	352
3S-85	30000	120	63.5	96.6	352
3S-95	30000	158	83.8	127	352
3S-110	30000	205	108	165	265
6S-95	60000	185	98	149	352
6S-110	60000	239	126	193	352
6S-125	60000	326	173	264	282
6S-135	60000	392	207	316	246
14S-125	120000	363	189	283	352
14S-135	120000	434	226	340	352
14S-145	120000	512	266	400	352
14S-175	120000	747	391	584	352
14S-200	120000	967	504	757	352
18S-145	180000	554	288	433	352
18S-175	180000	859	447	672	352
18S-200	180000	1110	581	872	352
32S-175	300000	995	526	800	352
32S-200	300000	1290	683	1040	352
32S-235	300000	1850	979	1490	282
50S-200	400000	1430	759	1150	352
50S-235	400000	2060	1080	1650	282
50S-300	400000	3380	1780	2720	211

Notes

- Max allowable pressure is the static pressure applicable to fully stroked actuator against the travel stops
- Angular positions: 0° Closed
  45° Intermediate
  90° Open

Overall dimensions



Dimensions in mm

Model	A	B	C	D	E	F	G	⌀K	L	M	N	Hydraulic connection NPT	Weight (Kg)
0.3*-35	754	319	279	136	151	222	532	75	70	119	70	1/2	43
0.3*-40	754	319	279	136	151	222	532	75	70	119	70	1/2	43
0.3*-50	773	319	279	136	151	222	551	90	70	119	70	1/2	47
0.3*-60	796	319	279	136	151	222	574	100	70	119	70	1/2	51
0.9*-50	840	413	303	160	190	245	595	90	80	170	83	1/2	58
0.9*-60	863	413	303	160	190	245	618	100	80	170	83	1/2	63
0.9*-70	932	413	303	160	190	245	687	120	80	170	83	1/2	81
0.9*-85	932	413	303	160	190	245	687	125	80	170	83	1/2	86
1.5*-60	990	469	343	187	227	293	697	100	100	185	100	1/2	100
1.5*-70	1022	469	343	187	227	293	729	120	100	185	100	1/2	117
1.5*-85	1022	469	343	187	227	293	729	125	100	185	100	1/2	122
3*-70	1360	586	351	285	330	391	969	120	160	215	106	1/2	193
3*-85	1360	586	351	285	330	391	969	125	160	215	106	1/2	198
3*-95	1458	586	351	285	330	391	1067	155	160	215	106	3/4	237
3*-110	1495	586	351	285	330	391	1104	170	160	215	106	3/4	245
6*-95	1551	740	414	327	379	430	1121	155	185	260	140	3/4	380
6*-110	1588	740	414	327	379	430	1158	170	185	260	140	3/4	388
6*-125	1648	740	414	327	379	430	1218	190	185	260	140	3/4	408
6*-135	1648	740	414	327	379	430	1218	200	185	260	140	3/4	418
14*-125	1770	873	527	376	435	496	1274	190	200	330	193	3/4	630
14*-135	1770	873	527	376	435	496	1274	200	200	330	193	3/4	650
14*-145	1850	873	527	376	435	496	1354	250	200	330	193	3/4	695
14*-175	1850	873	527	376	435	496	1354	280	200	330	193	3/4	775
14*-200	2020	873	527	376	435	496	1424	310	200	330	193	3/4	850
18*-145	1980	880	511	424	492	565	1415	250	230	330	196	3/4	850
18*-175	1980	880	511	424	492	565	1415	280	230	330	196	3/4	925
18*-200	2050	880	511	424	492	565	1485	310	230	330	196	3/4	1000
32*-175	2260	1055	583	505	585	610	1650	280	270	395	232	3/4	1480
32*-200	2280	1055	583	505	585	610	1670	310	270	395	232	3/4	1550
32*-235	2290	1055	583	505	585	610	1680	345	270	395	232	3/4	1650
50*-200	2520	1092	584	548	633	700	1820	310	300	387	233	3/4	1700
50*-235	2520	1092	584	548	633	700	1820	345	300	387	233	3/4	1830
50*-300	2560	1092	584	548	633	700	1860	450	300	387	233	1	2000

Notes

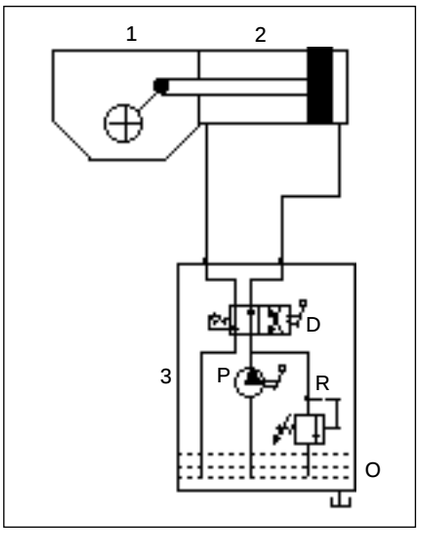
1. * Add C for canted yoke, S for symmetric yoke (i.e. 0.3C-35)
2. Dimensions and weights given are with oil and without optional bracket or adaptor flange
3. For mounting flange details see separate coupling dimensions leaflet

Local manual control

The OLGA-H actuators can only have the hydraulic manual override for the operation.
The compact hydraulic control unit mounted on the actuator consists of :
- hand pump
- directional control valve to select the “to open” or “to close” actuator operation
- relief valve to prevent the oil pressure delivered by the hand pump from exceeding the maximum allowable value
- oil tank

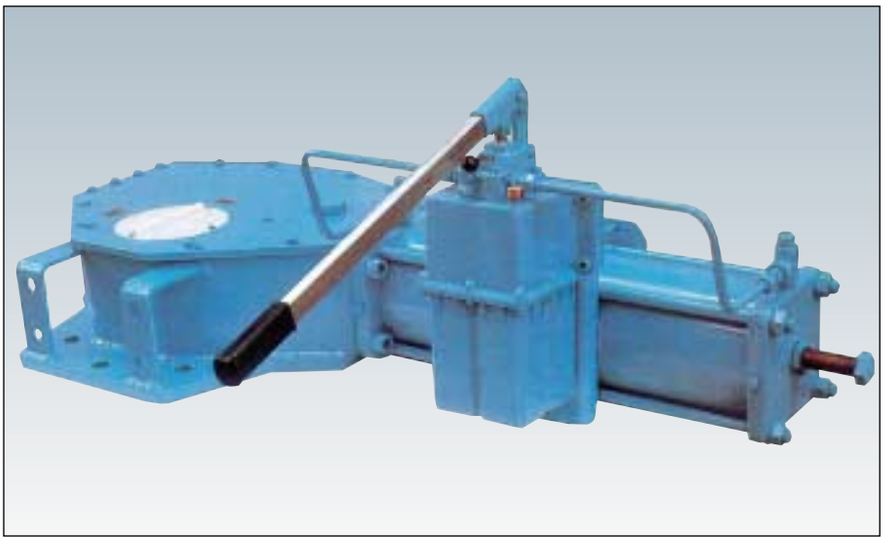
Accessories are available on request, for instance:
- dual pilot operated check valve
- bladder-type or piston-type accumulator delivered by the hand pump from exceeding the maximum allowable value

On request the emergency manual override can be included in the power pack.



1. Scotch yoke mechanism
2. Hydraulic cylinder
3. Hydraulic manual override

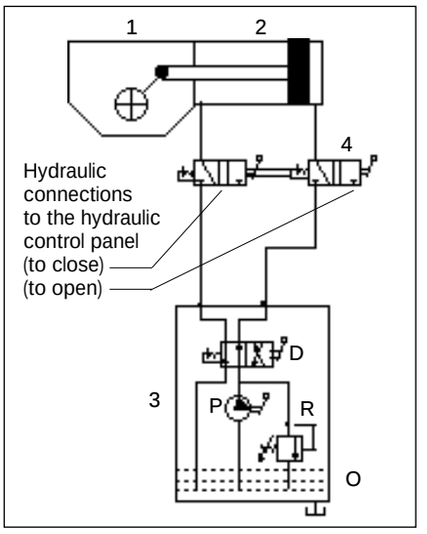
D= Directional control valve
P= Hand pump
R= Relief valve
O= Oil tank



Emergency manual override

The OLGA-H actuators can have an emergency manual override in addition to the local and/or remote control panel which controls the oil supplied by a power pack for the “normal” actuator operation.
The emergency manual override, mounted on the actuator, consists of a hydraulic manual override and a hydraulic manual selector to choose actuator “Normal operation” with oil supply from a power pack, or the “Emergency manual operation”.
The compact hydraulic manual override consists of:
- hand pump
- directional control valve to select the “to open” or “to close” operation by hand pump
- relief valve to prevent the oil pressure delivered by the hand pump from exceeding the maximum allowable value

On request the emergency manual override can be included in the power pack.

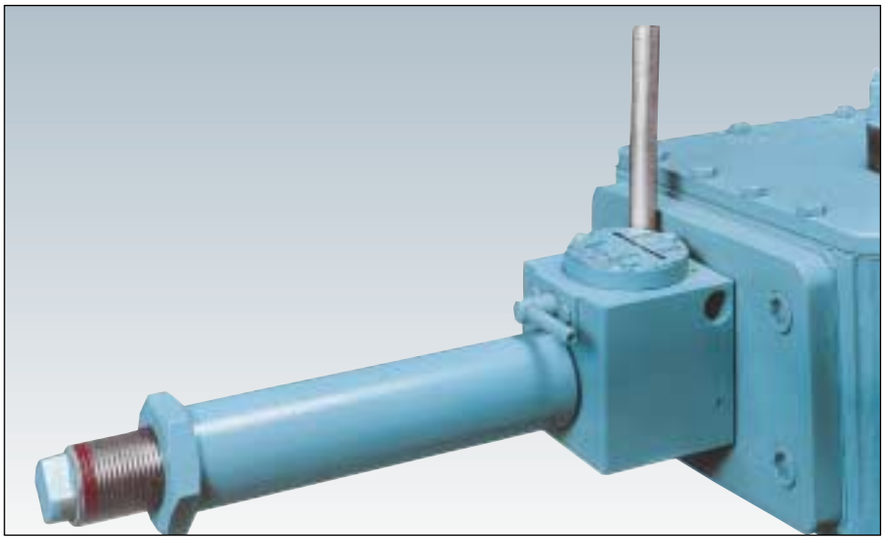


1. Scotch yoke mechanism
2. Hydraulic cylinder
3. Hydraulic manual override
4. Hydraulic manual selector

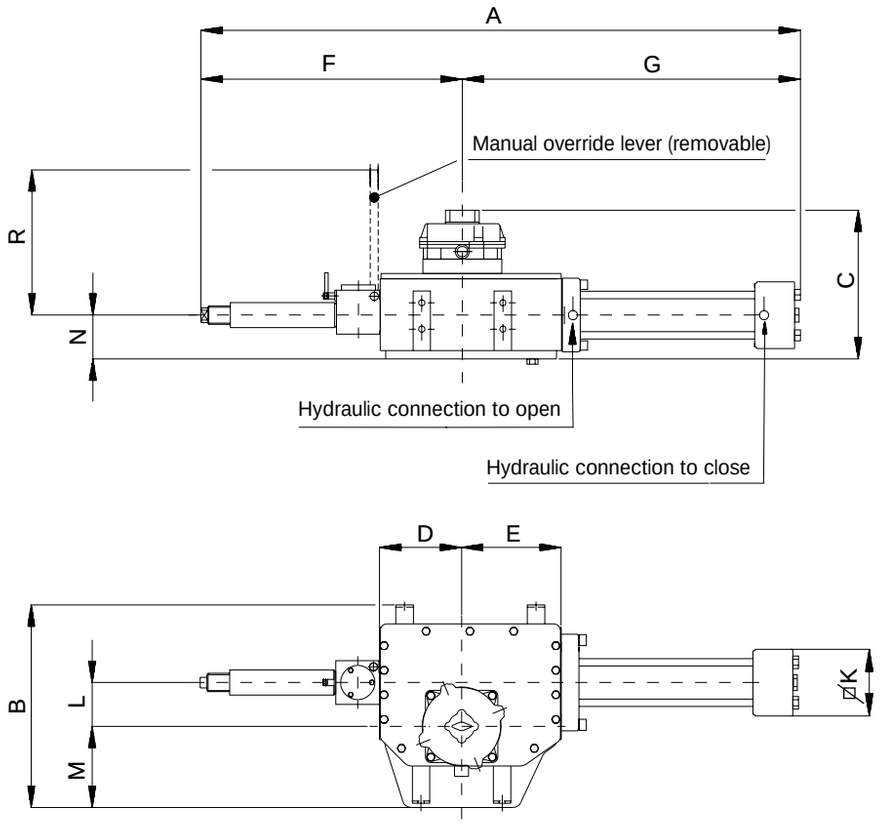
D= Directional control valve
P= Hand pump
R= Relief valve
O= Oil tank

Manual override type “MSJ”

The MSJ jackscrew manual override can be supplied for OLGA-H actuators up to model 3. The override is mounted on the left side of the actuator, the jackscrew end is screwed into the guide block.
A bronze split screw nut is mounted inside the body. By rotating the engagement lever, the screw nut is engaged with the jackscrew.
When the screw nut is engaged with the jackscrew manual operation follows by rotating the body of the screw container by a lever.



Overall dimensions for manual override type MSJ



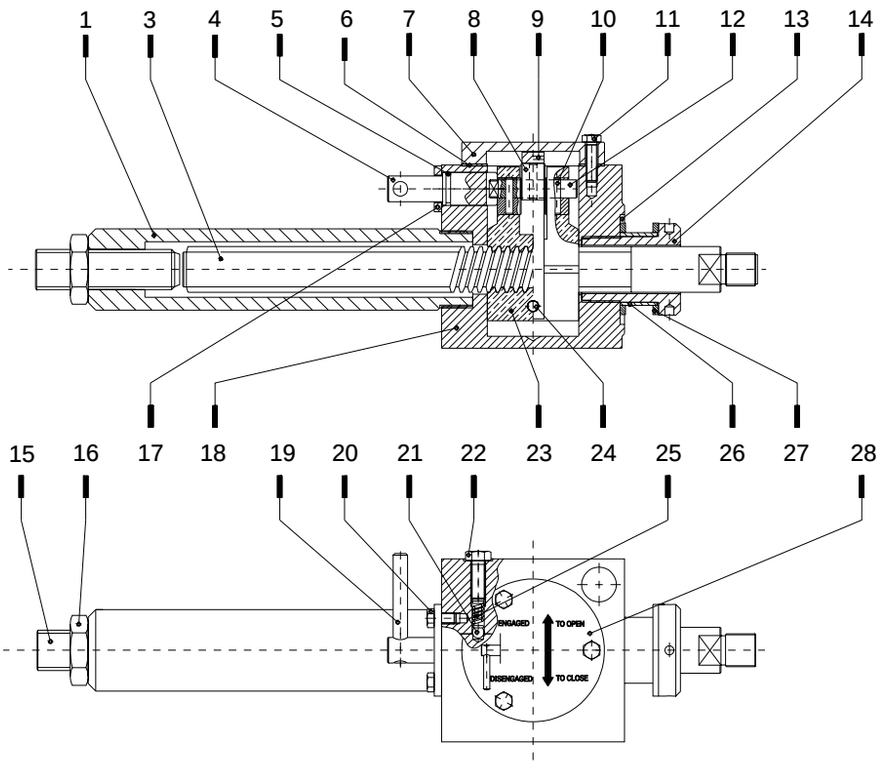
Dimensions in mm

Model	A	B	C	D	E	F	G	Ø K	L	M	N	R	Jackscrew turns per stroke	Hydraulic connection NPT	Weight (Kg)
0.3⁎ - 35-MSJ	1019	319	279	136	151	487	532	75	70	119	70	437	30	1/2	54
0.3⁎ - 40-MSJ	1019	319	279	136	151	487	532	75	70	119	70	437	30	1/2	54
0.3⁎ - 50-MSJ	1038	319	279	136	151	487	551	90	70	119	70	437	30	1/2	58
0.3⁎ - 60-MSJ	1061	319	279	136	151	487	574	100	70	119	70	437	30	1/2	62
0.9⁎ - 50-MSJ	1106	413	303	160	190	511	595	90	80	170	83	437	35	1/2	69
0.9⁎ - 60-MSJ	1129	413	303	160	190	511	618	100	80	170	83	437	35	1/2	74
0.9⁎ - 70-MSJ	1198	413	303	160	190	511	687	120	80	170	83	437	35	1/2	92
0.9⁎ - 85-MSJ	1198	413	303	160	190	511	687	125	80	170	83	437	35	1/2	97
1.5⁎ - 60-MSJ	1293	469	343	187	227	596	697	100	100	185	100	627	35	1/2	114
1.5⁎ - 70-MSJ	1325	469	343	187	227	596	729	120	100	185	100	627	35	1/2	131
1.5⁎ - 85-MSJ	1325	469	343	187	227	596	729	125	100	185	100	627	35	1/2	136
3⁎ - 70-MSJ◆	1886	586	351	285	330	917	969	120	160	215	106	627	56	1/2	210
3⁎ - 85-MSJ◆	1886	586	351	285	330	917	969	125	160	215	106	627	56	1/2	215
3⁎ - 95-MSJ◆	1984	586	351	285	330	917	1067	155	160	215	106	627	56	3/4	251
3⁎ - 110-MSJ◆	2021	586	351	285	330	917	1104	170	160	215	106	627	56	3/4	262

Notes

1. ⁎ Add C for canted yoke, S for symmetric yoke (i.e. 0.3C - 35-MSJ)
2. ◆ Max operating torque with jackscrew manual override is 19000 Nm
3. Dimensions and weights given are without optional bracket or adaptor flange

Mechanical manual override

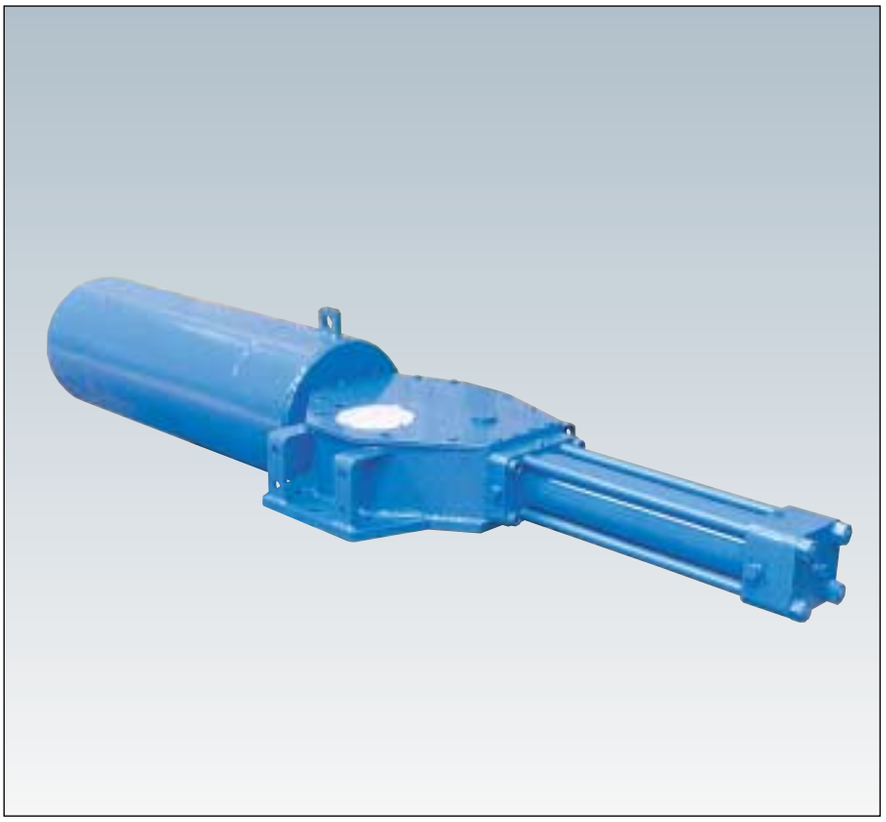


Materials specification

Item	Name	Material	Equivalence to U.S. standards	Q.ty	
1	Protection pipe	Carbon steel	API 5LX gr X52	1	
3	Jackscrew	Carbon steel	AISI SAE 1040	1	
4	Engagement lever pin	Stainless steel	ASTM A479 Type 304	1	
5	O-ring	Fluorosilicon rubber		1	•
6	Cover gasket	Fibre		1	•
7	Cover	Carbon steel	ASTM A283 gr D	1	
8	Cam	Alloy steel	AISI SAE 9840	3	
9	Fork	Carbon steel	AISI SAE 1040	1	
10	Spring pin	Stainless steel	ASTM A479 Type 302	3	
11	Screw	Carbon steel	AISI SAE 1040	3	
12	Screw nut operating cam	Alloy steel	AISI SAE 9840	1	
13	O-ring	Fluorosilicon rubber		1	•
14	Thrust block ring nut	Alloy steel	AISI SAE 9840	1	
15	Travel stop screw	Carbon steel	AISI SAE 1040	1	
16	Nut	Carbon steel	ASTM A194 gr 2	1	
17	Flange	Carbon steel	ASTM A283 gr D	1	
18	Body	Carbon steel	ASTM A283 gr D	1	
19	Spring pin	Spring steel	ASTM A29 gr 4047	1	
20	Screw	Carbon steel	AISI SAE 1040	2	
21	Ball	Stainless steel	ASTM A479 Type 304	1	
22	Screw	Carbon steel	AISI SAE 1040	1	
23	Screw nut	Bronze	ASTM B427 Alloy UNS No. C90800	1	
24	Pin	Carbon steel	AISI SAE 1040	1	
25	Spring	Spring steel	ASTM A29 gr 9254	1	
26	Bush	Bronze	ASTM B427 Alloy UNS No. C90800	1	
27	Thrush shoulder washer	Bronze	ASTM B427 Alloy UNS No. C90800	2	
28	Operating instruction plate	Aluminium	ASTM B221 Alloy 6351	1	

• Recommended spare parts

Spring return OLGAS-H actuator for 90° operation



General

The OLGAS-H high pressure hydraulic spring return actuator series was engineered and is manufactured to provide fail safe operation for any quarter turn application such as ball, plug, butterfly valves or dampers, in both On-Off and Modulating heavy duty service.
Simplicity, reliability and economy are at the top of the list of design parameters.
The spring module incorporates up to four springs, fully encapsulated in a factory-welded cartridge. This ensures safety to personnel and ease of assembly.

Features

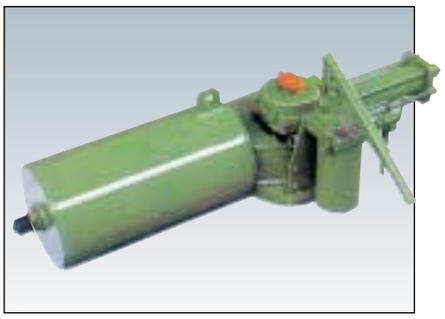
- Totally enclosed, weatherproof housing in fabricated carbon steel for maximum strength
- Canted scotch yoke actuators are the proper solution to motorise the most common type of quarter turn valves, due to their dedicated torque trend; they are suited to the larger valve sizes or for valves with high working pressure where high break away torques are required
- Symmetric scotch yoke actuators available for special applications
- External travel stops for precise angular stroke adjustment between 82° and 98°
- Hard chromium plated and polished guide bar and piston rod for corrosion resistance and minimal friction
- Bushings made of bronze or sintered bronze, charged with teflon, to provide minimal friction and extended service life
- Electroless nickel plated and polished cylinder for corrosion resistance and minimal friction
- Peculiarly designed piston seals consisting of a teflon U ring with a special elastomer centred into its sealing face, squeezed against the cylinder tube by an underlying O-ring: the combination of the three elements gives an effective seal, both with low and high oil pressure, with low friction and high sensitivity assuring long service life and preventing sticking problems
- When also the cylinder chamber, head flange side, is filled with oil due to special applications, the piston rod seal is made by two special design teflon rings in tandem precharged by O-rings for effective seal, both with low and high oil pressure, low friction and low hysteresis assuring long service life and preventing sticking problems
- Hand pump manual override available
- Spring module to provide fail safe operation
- The spring return pack incorporates up to four springs, fully encapsulated in a factory-welded cartridge: this ensures safety to personnel and simplifies assembly
- The spring action can be easily changed in the field from to close in to open or viceversa (modular design)
- An extensive range of accessories is available:
  - limit switch boxes - explosionproof, intrinsically safe and/or weatherproof
  - limit switches can be provided in different types according to customer requirements
  - position transmitters - explosionproof, intrinsically safe and/or weatherproof
  - oil filters
  - solenoid valves - explosionproof, intrinsically safe and/or weatherproof
  - control units for modulating service:
    - electrohydraulic “step-by-step”
    - electrohydraulic proportional valves complete with electronic control panel
    - electrohydraulic servovalves
  - spool-type or poppet-type (no leakage) control valves
  - dump-valves, flow regulators, relief valves
  - electric pressure switches
  - bladder-type or piston-type accumulators PED stamped. Accumulators in accordance with different codes on request
  - electrohydraulic power packs, with explosionproof and/or weather proof protection, assembled on the actuator or separate from the actuator
  - terminals enclosures, pushbutton panels - explosionproof or intrinsically safe and/or weatherproof
- Special coatings for offshore or corrosive environments
- Special versions with built-in dump valve and damper for “quick spring operation”

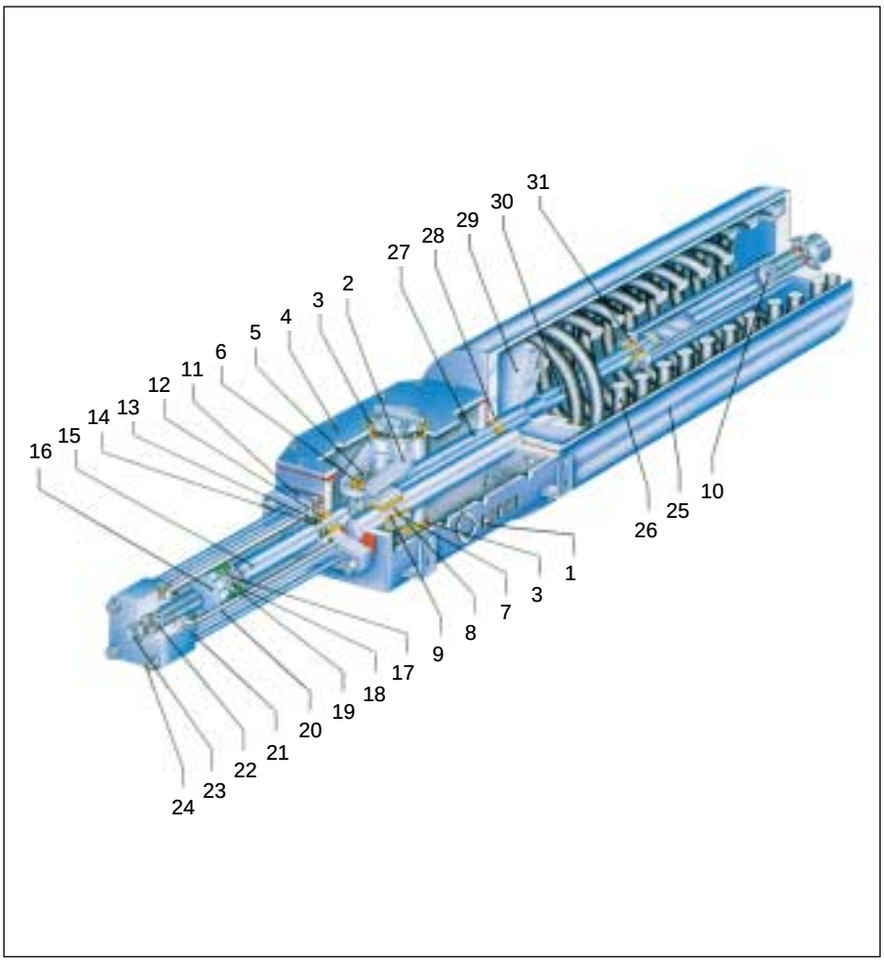
OLGAS-H Actuators

Model	Oil displacement (litres)
0.3-0150-60	0.45
0.3-0150-50	0.30
0.3-0150-40	0.20
0.3-0150-35	0.15
0.9-0200-85	1.10
0.9-0200-70	0.70
0.9-0200-60	0.50
0.9-0200-50	0.35
0.9-0350-85	1.10
0.9-0350-70	0.70
0.9-0350-60	0.50
0.9-0350-50	0.35
0.9-0400-85	1.10
0.9-0400-70	0.70
0.9-0400-60	0.50
0.9-0400-50	0.35
0.9-0700-85	1.10
0.9-0700-70	0.70
0.9-0700-60	0.50
0.9-0700-50	0.35
1.5-1100-85	1.30
1.5-1100-70	0.85
1.5-1100-60	0.65
1.5-1200-85	1.30
1.5-1200-70	0.85
1.5-1200-60	0.65
3-2000-110	3.4
3-2000-95	2.5
3-2000-85	2.0
3-2000-70	1.4
6-2500-135	5.8
6-2500-125	4.6
6-2500-110	3.9
6-2500-95	2.9
6-3800-135	5.8
6-3800-125	4.6
6-3800-110	3.9
6-3800-95	2.9
14-5400-200	13.8
14-5400-175	10.6
14-5400-145	7.3
14-5400-135	6.2
14-5400-125	5.4
14-8300-200	13.8
14-8300-175	10.6
14-8300-145	7.3
14-8300-135	6.2
14-8300-125	5.4
18-9600-200	15.9
18-9600-175	12.2
18-9600-145	8.4
18-9800-200	15.9
18-9800-175	12.2
18-9800-145	8.4

Note

The oil displacement is the oil volume required for one actuator stroke (in opening or in closing)





Item	Name
1	Housing
2	Yoke
3	Yoke bushing
4	Cover
5	Guide block pin
6	Sliding block
7	Guide block
8	Guide bar
9	Guide block bushing
10	Travel stop screw
11	Cylinder head flange
12	Piston rod bushing
13	Piston rod O-ring
14	Piston rod seal ring
15	Piston rod
16	Piston
17	Piston O-ring
18	Piston seal ring
19	Piston guide sliding ring
20	Cylinder tube
21	Cylinder end flange
22	Travel stop screw
23	Plug
24	Tie rod
25	Spring container
26	Spring
27	Container rod
28	Container rod bushing
29	Spring thrust flange
30	Guide rod
31	Guide rod bushing

Technical data

Supply pressure:		352 bar g maximum (except where a different value of “Max allowable pressure” is listed in the performances table)
Supply fluid	:	hydraulic oil Special versions for fire-resistant fluids
Ambient temperature	:	-30° C to +100° C Special versions for service outside this range on request
Spring ending torques	:	from 390 up to 80000 Nm Higher values with special versions

Output Torques for Spring to Close Canted Yoke Mechanism (in daNm)

	Spring torque			Operating supply pressure (bar g)																				
				60			100			140			180			220			260			300		
Model	SET	SRT	SST	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET
0.3-0150-60-CL	82	44	75	168	49	58																		
0.3-0150-50-CL	82	44	75				208	64	80															
0.3-0150-40-CL	82	45	75				103	21	21	177	52	63	249	82	106									
0.3-0150-35-CL	82	45	75							116	27	29	173	51	61	231	74	93						
0.9-0200-85-CL	106	58	100	476	164	218																		
0.9-0200-70-CL	107	59	100	287	90	112	553	194	262															
0.9-0200-60-CL	107	59	100	182	47	53	377	125	163	572	201	272												
0.9-0200-50-CL	107	59	100				228	66	79	363	119	155	499	173	231	634	226	307						
0.9-0350-85-CL	204	111	188	378	104	121																		
0.9-0350-70-CL	205	111	189				455	135	164															
0.9-0350-60-CL	205	111	189				279	64	65	474	143	175	669	220	285									
0.9-0350-50-CL	205	111	189							265	57	57	401	114	134	536	168	210	671	221	286			
0.9-0400-85-CL	273	136	222	309	76	82	699	232	303															
0.9-0400-70-CL	274	136	222				386	108	126	652	213	275												
0.9-0400-60-CL	274	136	222							405	116	136	600	193	246									
0.9-0400-50-CL	274	136	222										332	86	95	467	140	171	603	194	248			
0.9-0700-85-CL	362	188	313				612	173	203															
0.9-0700-70-CL	363	189	314							563	153	176												
0.9-0700-60-CL	363	189	314										512	133	1470	699	211	256						
0.9-0700-50-CL	363	189	314													379	72	72	514	134	148	650	188	224
1.5-1100-85-CL	535	326	579							1190	308	341												
1.5-1100-70-CL	536	327	580										971	215	217									
1.5-1100-60-CL	536	327	580													817	130	130	1060	255	269			
1.5-1200-85-CL	728	395	670							999	229	236												
1.5-1200-70-CL	729	396	671										779	112	112	1114	278	301						
1.5-1200-60-CL	729	396	671																871	164	164	1120	280	303
3-2000-110-CL	1160	596	987				2260	682	836															
3-2000-95-CL	1160	596	987				1390	329	344	2410	742	921												
3-2000-85-CL	1160	597	988							1700	457	519	2490	784	981									
3-2000-70-CL	1160	598	989										1330	305	313	1890	534	627	2440	755	940			
6-2500-135-CL	1730	862	1410	1880	448	472	4290	1410	1830															
6-2500-125-CL	1730	863	1410				3440	1070	1350															
6-2500-110-CL	1730	863	1410				2270	609	692	3870	1250	1600												
6-2500-95-CL	1730	863	1410							2440	681	791	3640	1160	1460	4830	1630	2140						
6-3800-135-CL	2570	1200	1900				3450	1040	1280															
6-3800-125-CL	2580	1200	1900				2590	697	792	4670	1520	1960												
6-3800-110-CL	2580	1200	1900							3030	873	1040	4630	1510	1940									
6-3800-95-CL	2580	1200	1900										2800	781	908	3990	1260	1580						
14-5400-200-CL	3710	1820	2950	4960	1380	16100																		
14-5400-175-CL	3710	1820	2950				7360	2340	2970															
14-5400-145-CL	3710	1820	2950				3880	947	1010	6930	2170	2720	9970	3370	4440									
14-5400-135-CL	3720	1820	2950							5520	1610	1930	8160	2650	3420									
14-5400-125-CL	3720	1820	2950							4200	1080	1180	6460	1980	2460	8720	2880	3730						
14-8300-200-CL	4840	2350	3790	3840	677	677	9640	3090	3950															
14-8300-175-CL	4840	2350	3790				6240	1740	2030															
14-8300-145-CL	4840	2350	3790							5810	1570	1790	8860	2790	3510									
14-8300-135-CL	4840	2350	3790							4400	979	992	7040	2060	2480	9680	3110	3970						
14-8300-125-CL	4840	2350	3790										5340	1380	1520	7600	2290	2800	9860	3180	4080			
18-9600-200-CL	6500	3590	6120				10130	2480	2650															
18-9600-175-CL	6500	3590	6120							11340	2980	3320												
18-9600-145-CL	6510	3590	6230										9250	2100	2150	12750	3550	4120						
18-9800-200-CL	8030	4510	7750							14990	4090	4620												
18-9800-175-CL	8040	4510	7750							9810	1550	1550	14910	3940	4420									
18-9800-145-CL	8050	4520	7760													11220	2340	2340	14720	3860	4320			

Notes

- Angular positions: 0° Closed
  45° Intermediate
  90° Open

- SET : Spring Ending Torque to close (0°)
  SRT : Spring Running Torque (45°)
  SST : Spring Starting Torque to close (90°)
  OST : Oil Starting Torque to open (0°)
  ORT : Oil Running Torque (45°)
  OET : Oil Ending Torque to open (90°)

Output Torques for Spring to Open Canted Yoke Mechanism (in daNm)

	Spring torque			Operating supply pressure (bar g) 60			100			140			180			220			260			300		
Model	SST	SRT	SET	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST
0.3-0150-60-OP	139	37	42	106	53	87																		
0.3-0150-50-OP	139	37	42				150	69	108															
0.3-0150-40-OP	140	37	42				33	26	51	116	57	92	199	86	133									
0.3-0150-35-OP	140	37	42							48	32	59	112	55	90	176	78	121	239	101	152			
0.9-0200-85-OP	178	46	51	426	172	256																		
0.9-0200-70-OP	179	46	51	217	99	154	512	203	298															
0.9-0200-60-OP	179	46	51	100	56	97	317	134	203	533	210	308												
0.9-0200-50-OP	179	46	51				151	75	122	302	128	195	452	182	269	602	235	342						
0.9-0350-85-OP	337	88	98	231	121	202	666	275	414															
0.9-0350-70-OP	338	88	98				317	152	243	612	256	387												
0.9-0350-60-OP	338	88	98				122	81	148	338	159	254	551	235	358									
0.9-0350-50-OP	338	88	98							107	75	141	257	130	214	407	184	287	558	237	361	699	290	434
0.9-0400-85-OP	399	113	133	155	93	165	590	249	377															
0.9-0400-70-OP	400	113	133				241	125	206	536	230	350												
0.9-0400-60-OP	400	113	133							262	132	217	479	209	322	695	286	428						
0.9-0400-50-OP	400	113	133										181	103	177	331	157	250	482	210	324	632	264	397
0.9-0700-85-OP	562	153	175				390	198	327															
0.9-0700-70-OP	562	153	175							336	179	301	631	284	445									
0.9-0700-60-OP	562	153	175										279	158	273	496	236	379	699	313	484			
0.9-0700-50-OP	562	153	175													132	104	201	282	159	274	432	214	348
1.5-1100-85-OP	1020	238	246							659	372	640	1190	570	908									
1.5-1100-70-OP	1020	238	246										414	282	520	787	418	702	1160	552	884			
1.5-1100-60-OP	1020	238	246													243	217	437	517	320	570	790	419	704
1.5-1200-85-OP	1190	310	344							452	294	536	1000	494	804									
1.5-1200-70-OP	1190	310	344										207	202	416	580	341	598	952	477	780			
1.5-1200-60-OP	1190	310	344																242	215	466	584	343	600
3-2000-110-OP	1750	480	551				1640	767	1220															
3-2000-95-OP	1750	480	551				669	417	747	1800	827	1300												
3-2000-85-OP	1750	480	551							1010	543	916	1920	869	1360									
3-2000-70-OP	1750	480	551										608	395	718	1220	620	1020	1840	840	1320	2460	1060	1620
6-2500-135-OP	2500	704	824	927	570	1010	3600	1530	2320															
6-2500-125-OP	2500	704	824				2660	1190	1860	4960	2010	2980												
6-2500-110-OP	2500	704	824				1360	729	1220	3140	1360	2100	4920	1990	2960									
6-2500-95-OP	2500	704	824							1550	799	1320	2880	1270	1970	4210	1740	2620						
6-3800-135-OP	3390	1020	1240				2510	1170	1870															
6-3800-125-OP	3390	1020	1240				1560	833	1400	3860	1650	2530												
6-3800-110-OP	3390	1020	1240							2040	1010	1640	3820	1640	2510									
6-3800-95-OP	3390	1020	1240										1780	9160	1510	3110	1390	2160	4440	1860	2810			
14-5400-200-OP	5250	1500	1780	3160	1620	2680	9600	3910	5830															
14-5400-175-OP	5250	1500	1780	908	790	1580	5830	2570	3980															
14-5400-145-OP	5250	1500	1780				1970	1190	2100	5350	2400	3750	8730	3600	5400									
14-5400-135-OP	5250	1500	1780				851	768	1550	3780	1840	2990	6720	2890	4420	9650	3920	5850						
14-5400-125-OP	5250	1500	1780							2320	1320	2270	4830	2220	3500	7340	3110	4720	9850	4000	5950			
14-8300-200-OP	6730	1940	2310	1340	1070	2080	7780	3390	5230															
14-8300-175-OP	6730	1940	2310				4010	2050	3380	8930	3800	5790												
14-8300-145-OP	6740	1940	2310							3540	1880	3150	6920	3090	4800	9990	4290	6450						
14-8300-135-OP	6740	1940	2310							1960	1300	2390	4890	2370	3820	7820	3410	5250						
14-8300-125-OP	6740	1940	2310										3010	1690	2900	5520	2590	4120	8030	3480	5350			
18-8600-200-OP	10690	2710	2960				5320	3160	5540	12710	5820	9160												
18-8600-175-OP	10690	2710	2960							6650	3640	6200	12320	5680	8960									
18-8600-145-OP	10700	2710	2960										4340	2790	5060	8220	4210	6960	12110	5600	8860			
18-9800-200-OP	13530	3370	3650							9220	4940	8330												
18-9800-175-OP	13540	3380	3650							3160	2700	5370	8820	4800	8140	14480	6840	10900						
18-9800-145-OP	13540	3380	3650													4730	3290	6140	8620	4720	8040	12500	6130	9930

Notes

- Angular positions: 0° Closed
  45° Intermediate
  90° Open

- SST : Spring Starting Torque to open (0°)
  SRT: Spring Running Torque (45°)
  SET : Spring Ending Torque to open (90°)
  OET: Oil Ending Torque to close (0°)
  ORT: Oil Running Torque (45°)
  OST: Oil Starting Torque to close (90°)

Output Torques for Spring to Close Symmetric Yoke Mechanism (in daNm)

	Spring torque			Operating supply pressure (bar g) 50			100			150			200			250			300			350		
Model	SET	SRT	SST	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET	OST	ORT	OET
0.3S-0150-60-CL	57	44	93	74	34	40	207	119	192															
0.3S-0150-50-CL	57	43	93				126	67	99	218	126	204												
0.3S-0150-40-CL	57	44	93				60	24	24	119	63	91	177	100	158	236	138	225						
0.3S-0150-35-CL	57	44	93							77	36	44	122	65	95	167	94	147	2120	1220	1980	249	151	247
0.9S-0200-85-CL	73	57	123	231	130	204	538	325	555															
0.9S-0200-70-CL	74	57	124	133	67	91	341	200	329	550	332	567												
0.9S-0200-60-CL	74	57	124				231	130	203	384	227	378	537	324	552	690	421	699						
0.9S-0200-50-CL	74	57	124				137	70	96	244	138	217	350	205	339	456	273	460	562	340	582	669	408	699
0.9S-0350-85-CL	141	109	233	165	70	76	472	268	427															
0.9S-0350-70-CL	141	109	233				275	142	201	483	275	439	691	408	677									
0.9S-0350-60-CL	141	109	233				164	69	75	317	170	250	470	268	425	623	365	600						
0.9S-0350-50-CL	141	109	233							177	78	90	283	148	211	389	216	333	496	284	454	602	351	575
0.9S-0400-85-CL	184	134	273				429	241	378															
0.9S-0400-70-CL	185	134	273				232	114	152	440	248	390	648	381	628									
0.9S-0400-60-CL	185	134	273							274	142	201	427	240	376	580	337	551						
0.9S-0400-50-CL	185	134	273										240	120	162	346	188	283	453	256	405	559	324	526
0.9S-0700-85-CL	247	185	386				367	183	247	675	380	598												
0.9S-0700-70-CL	247	185	386							379	190	259	587	324	497									
0.9S-0700-60-CL	247	185	387										366	182	245	519	281	420	672	378	594			
0.9S-0700-50-CL	247	185	386													285	129	152	391	198	274	498	267	395
1.5S-1100-85-CL	377	309	630							887	387	487												
1.5S-1100-70-CL	378	310	630										767	315	371	1050	487	646						
1.5S-1100-60-CL	378	310	630													674	256	281	884	385	483	1090	511	685
1.5S-1200-85-CL	510	380	730							757	310	364	1180	562	770									
1.5S-1200-70-CL	510	380	730										636	234	248	920	410	524	1190	58	799			
1.5S-1200-60-CL	510	380	731																753	307	361	963	434	563
3S-2000-110-CL	806	577	1100				1500	723	994															
3S-2000-95-CL	806	577	1100				915	365	412	1770	888	1260												
3S-2000-85-CL	807	578	1100							1260	578	755	1950	992	1440									
3S-2000-70-CL	808	579	1100										1060	459	560	1532	740	1020	2000	1020	1490	2470	1300	1950
6S-2500-135-CL	1200	838	1570				2850	1480	2180	4880	2690	4190												
6S-2500-125-CL	1200	839	1570				2280	1130	1600	4020	2170	3340												
6S-2500-110-CL	1200	840	1570				1500	659	823	2840	1470	2160	4190	2270	3500									
6S-2500-95-CL	1200	839	1570							1810	853	1140	2820	1460	2140	3820	2050	3140	4830	2650	4140			
6S-3800-135-CL	1770	1170	2120				2290	1100	1520	4310	2320	3530												
6S-3800-125-CL	1780	1180	2120				1710	753	943	3450	1800	2680												
6S-3800-110-CL	1780	1180	2120							2270	1090	1500	3620	1900	2840	4960	2700	4180						
6S-3800-95-CL	1780	1180	2120										2250	1080	1480	3250	1680	2480	4260	2280	3480			
14S-5400-200-CL	2580	1760	3220	2360	885	956	7290	3820	5720															
14S-5400-175-CL	2580	1770	3220				4980	2460	3480	8760	4680	7120												
14S-5400-145-CL	2590	1770	3220				2620	1050	1200	5210	2600	3700	7800	4120	6200	9990	5640	8700						
14S-5400-135-CL	2590	1770	3220							4180	1980	2710	6420	3310	4880	8670	4630	7050						
14S-5400-125-CL	2590	1770	3220							3210	1410	1780	5140	2550	3640	7070	3690	5490	9000	4820	7350			
14S-8300-200-CL	3370	2280	4140				6520	3250	4640															
14S-8300-175-CL	3370	2280	4140				4210	1880	2400	7990	4110	6040												
14S-8300-145-CL	3370	2280	4140							4440	2010	2620	7030	3550	5120	9630	5070	7620						
14S-8300-135-CL	3370	2280	4140							3400	1390	1630	5650	2730	3800	7900	4060	5970	9990	5380	8140			
14S-8300-125-CL	3370	2280	4140										4370	1970	2560	6300	3110	4410	8220	4250	6270	9990	5380	8130
18S-9600-200-CL	4580	3450	6690				6800	2720	3130	12470	6120	8600												
18S-9600-175-CL	4580	3460	6690							8480	3750	4760	12830	6330	8950									
18S-9600-145-CL	4590	3460	6700										7390	3080	3700	10370	4870	6580	13350	6640	9450			
18S-9800-200-CL	5640	4320	8450							11420	5110	6570												
18S-9800-175-CL	5640	4320	8450							7440	2650	2730	11780	5330	6920									
18S-9800-145-CL	5650	4330	8450													9320	3840	4550	12300	5640	7420	14990	7410	10300

Notes

- Angular positions: 0° Closed
  45° Intermediate
  90° Open

- SET : Spring Ending Torque to close (0°)
  SRT : Spring Running Torque (45°)
  SST : Spring Starting Torque to close (90°)
  OST : Oil Starting Torque to open (0°)
  ORT : Oil Running Torque (45°)
  OET : Oil Ending Torque to open (90°)

Output Torques for Spring to Open Symmetric Yoke Mechanism (in daNm)

	Spring torque			Operating supply pressure (bar g) 50			100			150			200			250			300			350		
Model	SST	SRT	SET	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST	OET	ORT	OST
0.3S-0150-60-OP	83	40	51	43	35	80	191	120	217															
0.3S-0150-50-OP	83	40	51				100	69	133	203	127	229												
0.3S-0150-40-OP	84	40	51							92	64	126	158	102	187	224	139	248						
0.3S-0150-35-OP	84	40	51							46	37	83	96	66	130	147	95	177	197	124	223			
0.9S-0200-85-OP	107	50	61	208	134	248	552	330	568															
0.9S-0200-70-OP	107	50	62	98	71	146	331	205	362	565	337	579												
0.9S-0200-60-OP	107	50	62				208	134	248	379	232	407	551	329	565									
0.9S-0200-50-OP	107	50	62				103	74	150	222	142	261	341	210	371	460	277	482	579	345	592	698	413	699
0.9S-0350-85-OP	202	95	118	90	80	186	435	277	506															
0.9S-0350-70-OP	202	95	119				214	151	300	447	284	516												
0.9S-0350-60-OP	202	95	119				90	78	185	261	178	344	433	276	503	604	373	662						
0.9S-0350-50-OP	202	95	119							104	87	198	223	156	309	342	224	419	461	292	530	581	360	640
0.9S-0400-85-OP	241	120	163				386	249	461															
0.9S-0400-70-OP	241	121	163				165	123	255	399	257	472	633	389	688									
0.9S-0400-60-OP	241	121	163							213	151	299	385	248	458	556	346	617						
0.9S-0400-50-OP	241	121	163										175	128	264	294	197	374	413	265	485	532	332	595
0.9S-0700-85-OP	337	163	213				267	196	405															
0.9S-0700-70-OP	338	164	213							279	203	416	513	337	632									
0.9S-0700-60-OP	338	164	213							93	93	244	265	195	403	436	294	562	608	391	699			
0.9S-0700-50-OP	338	164	213													174	142	319	293	198	407	413	280	539
1.5S-1100-85-OP	689	266	295							558	406	771	1030	655	1140									
1.5S-1100-70-OP	690	267	296										423	334	666	743	505	916	1060	673	1170			
1.5S-1100-60-OP	690	267	296													318	277	584	554	404	768	789	529	952
1.5S-1200-85-OP	804	338	410							415	329	656	888	580	1030									
1.5S-1200-70-OP	805	339	410													601	428	802	921	597	1050			
1.5S-1200-60-OP	805	339	410													176	176	469	411	327	653	647	453	837
3S-2000-110-OP	1160	519	658				1130	752	1360	2430	1440	2400												
3S-2000-95-OP	1160	519	658				475	397	832	1440	915	1610	2400	1430	2380									
3S-2000-85-OP	1160	520	659							863	608	1140	1630	1020	1760	2410	1430	2390						
3S-2000-70-OP	1170	520	660										643	489	967	1170	770	1390	1690	1050	1810	2210	1330	2230
6S-2500-135-OP	1650	756	981				2480	1520	2600	4750	2720	4440												
6S-2500-125-OP	1660	756	983				1830	1180	2080	3780	2210	3660												
6S-2500-110-OP	1660	757	984				952	705	1370	2460	1510	2590	3970	2310	3810									
6S-2500-95-OP	1660	757	983							1310	898	1660	2430	1500	2570	3560	2090	3480	4680	2690	4390			
6S-3800-135-OP	2250	1080	1480				1740	1150	2090	4010	2360	3930												
6S-3800-125-OP	2250	1080	1480				1090	806	1570	3040	1850	3150	4980	2880	4720									
6S-3800-110-OP	2250	1080	1480							1720	1150	2080	3230	1950	3300	4740	2750	4510						
6S-3800-95-OP	2250	1080	1480										1690	1130	2060	2820	1730	2970	3940	2330	3870	4990	2920	4780
14S-5400-200-OP	3550	1610	2100	1110	973	2070	6640	3890	6400															
14S-5400-175-OP	3550	1610	2100				4050	2530	4360	8280	4750	7670												
14S-5400-145-OP	3550	1610	2100				1390	1130	2290	4300	2670	4560	7210	4190	6830	9990	5700	9100						
14S-5400-135-OP	3550	1610	2100							3140	2060	3660	5660	3380	5630	8180	4690	7610						
14S-5400-125-OP	3550	1610	2100							2060	1490	2810	4220	2630	4500	6390	3760	6190	8550	4880	7880			
14S-8300-200-OP	4550	2080	2730				5390	3340	5730															
14S-8300-175-OP	4550	2080	2730				2800	1980	3690	7040	4210	7000												
14S-8300-145-OP	4560	2080	2740							3060	2120	3890	5970	3640	6170	8880	5160	8440						
14S-8300-135-OP	4560	2080	2740							1900	1500	2990	4420	2830	4960	6940	4150	6940	9460	5470	8910			
14S-8300-125-OP	4560	2080	2740										2980	2080	3830	5140	3210	5520	7300	4340	7210	9460	5470	8900
18S-9600-200-OP	7180	2960	3510				3780	3020	6060	10140	6390	11040												
18S-9600-175-OP	7190	2960	3510							5670	4040	7540	10540	6600	11350									
18S-9600-145-OP	7190	2960	3510										4440	3380	6580	7780	5150	9200	11130	6900	11810	14470	8650	14430
18S-9800-200-OP	9120	3710	4350							7740	5440	10090	14100	8780	14990									
18S-9800-175-OP	9120	3720	4350							3280	3030	6600	8140	5650	10410	13010	8210	14210						
18S-9800-145-OP	9130	3720	4360										2040	2040	5630	5390	4180	8250	8730	5960	10860	12070	7720	13480

Notes

- Angular positions: 0° Closed
  45° Intermediate
  90° Open

- SST : Spring Starting Torque to open (0°)
  SRT: Spring Running Torque (45°)
  SET : Spring Ending Torque to open (90°)
  OET: Oil Ending Torque to close (0°)
  ORT: Oil Running Torque (45°)
  OST: Oil Starting Torque to close (90°)

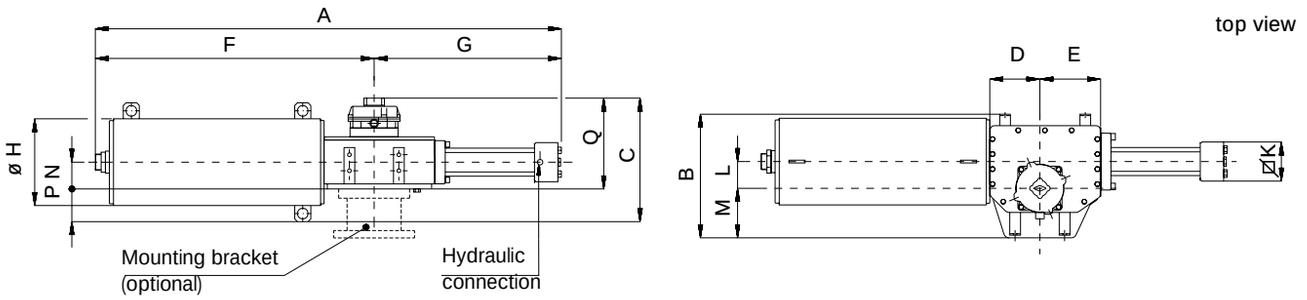
Maximum Operating Torque/Maximum Allowable Pressure

Model	Max operating torque (Nm)	Max allowable pressure (bar g)
0.3-0150-60	3000	290
0.3-0150-50	3000	352
0.3-0150-40	3000	352
0.3-0150-35	3000	352
0.9-0200-85	9000	340
0.9-0200-70	9000	352
0.9-0200-60	9000	352
0.9-0200-50	9000	352
0.9-0350-85	9000	340
0.9-0350-70	9000	352
0.9-0350-60	9000	352
0.9-0350-50	9000	352
0.9-0400-85	9000	340
0.9-0400-70	9000	352
0.9-0400-60	9000	352
0.9-0400-50	9000	352
0.9-0700-85	9000	340
0.9-0700-70	9000	352
0.9-0700-60	9000	352
0.9-0700-50	9000	352
1.5-1100-85	15000	352
1.5-1100-70	15000	352
1.5-1100-60	15000	352
1.5-1200-85	15000	352
1.5-1200-70	15000	352
1.5-1200-60	15000	352
3-2000-110	30000	300
3-2000-95	30000	352
3-2000-85	30000	352
3-2000-70	30000	352
6-2500-135	60000	310
6-2500-125	60000	352
6-2500-110	60000	352
6-2500-95	60000	352
6-3800-135	60000	310
6-3800-125	60000	352
6-3800-110	60000	352
6-3800-95	60000	352
14-5400-200	120000	232
14-5400-175	120000	300
14-5400-145	120000	352
14-5400-135	120000	352
14-5400-125	120000	352
14-8300-200	120000	232
14-8300-175	120000	300
14-8300-145	120000	352
14-8300-135	120000	352
14-8300-125	120000	352
18-9600-200	180000	310
18-9600-175	180000	352
18-9600-145	180000	352
18-9800-200	180000	310
18-9800-175	180000	352
18-9800-145	180000	352

Notes

- Max allowable pressure is the static pressure applicable to fully stroked actuator against travel stop
- Add S to the model number to identify actuators with symmetric yoke (i.e. 0.3S-0150-60)
- Add -CL or -OP to the model number to identify spring to close or spring to open (i.e. 0.3-0150-60-CL)

Overall dimensions for spring to close actuators

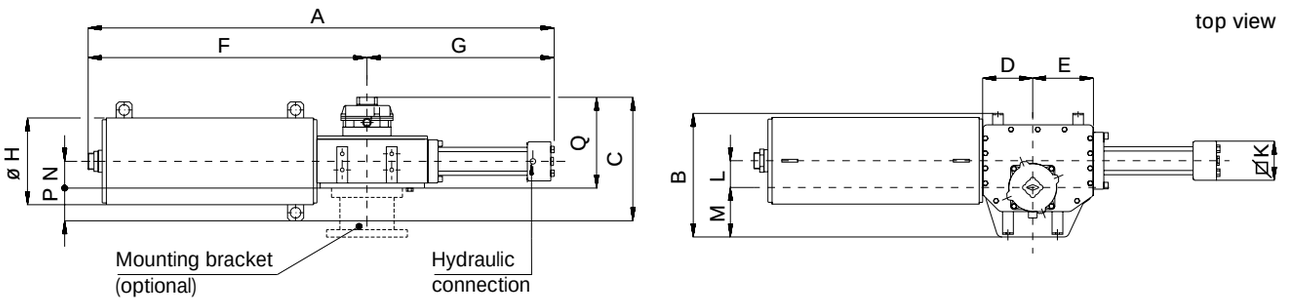


Models 0.3 to 3 (Dimensions in mm)

Model	A	B	C	D	E	F	G	ø H	⍁K	L	M	N	P	Q	Hydraulic connect. NPT	Weight (Kg)
0.3-0150-60-CL	1339	319	314	136	151	765	574	210	100	70	119	70	35	279	1/2	84
0.3-0150-50-CL	1316	319	314	136	151	765	551	210	90	70	119	70	35	279	1/2	80
0.3-0150-40-CL	1297	319	314	136	151	765	532	210	75	70	119	70	35	279	1/2	76
0.3-0150-35-CL	1297	319	314	136	151	765	532	210	75	70	119	70	35	279	1/2	76
0.9-0200-85-CL	1544	413	353	160	190	857	687	265	125	80	170	83	50	303	1/2	173
0.9-0200-70-CL	1544	413	353	160	190	857	687	265	120	80	170	83	50	303	1/2	168
0.9-0200-60-CL	1475	413	353	160	190	857	618	265	100	80	170	83	50	303	1/2	150
0.9-0200-50-CL	1452	413	353	160	190	857	595	265	90	80	170	83	50	303	1/2	145
0.9-0350-85-CL	1597	413	383	160	190	910	687	325	125	80	170	83	80	303	1/2	207
0.9-0350-70-CL	1597	413	383	160	190	910	687	325	120	80	170	83	80	303	1/2	202
0.9-0350-60-CL	1528	413	383	160	190	910	618	325	100	80	170	83	80	303	1/2	184
0.9-0350-50-CL	1505	413	383	160	190	910	595	325	90	80	170	83	80	303	1/2	180
0.9-0400-85-CL	1531	413	383	160	190	844	687	325	125	80	170	83	80	303	1/2	202
0.9-0400-70-CL	1531	413	383	160	190	844	687	325	120	80	170	83	80	303	1/2	197
0.9-0400-60-CL	1462	413	383	160	190	844	618	325	100	80	170	83	80	303	1/2	178
0.9-0400-50-CL	1439	413	383	160	190	844	595	325	90	80	170	83	80	303	1/2	174
0.9-0700-85-CL	1558	413	383	160	190	871	687	325	125	80	170	83	80	303	1/2	224
0.9-0700-70-CL	1558	413	383	160	190	871	687	325	120	80	170	83	80	303	1/2	220
0.9-0700-60-CL	1489	413	383	160	190	871	618	325	100	80	170	83	80	303	1/2	200
0.9-0700-50-CL	1466	413	383	160	190	871	595	325	90	80	170	83	80	303	1/2	196
1.5-1100-85-CL	1692	493	451	187	227	963	729	415	125	100	185	100	108	343	1/2	368
1.5-1100-70-CL	1692	493	451	187	227	963	729	415	120	100	185	100	108	343	1/2	349
1.5-1100-60-CL	1660	493	451	187	227	963	697	415	100	100	185	100	108	343	1/2	335
1.5-1200-85-CL	1791	473	431	187	227	1062	729	375	125	100	185	100	88	343	1/2	341
1.5-1200-70-CL	1791	473	431	187	227	1062	729	375	120	100	185	100	88	343	1/2	322
1.5-1200-60-CL	1759	473	431	187	227	1062	697	375	100	100	185	100	88	343	1/2	308
3-2000-110-CL	2684	586	453	285	330	1580	1104	415	170	160	215	106	102	351	3/4	646
3-2000-95-CL	2647	586	453	285	330	1580	1067	415	155	160	215	106	102	351	3/4	633
3-2000-85-CL	2549	586	453	285	330	1580	969	415	125	160	215	106	102	351	1/2	610
3-2000-70-CL	2549	586	453	285	330	1580	969	415	120	160	215	106	102	351	1/2	595

Notes

- Dimensions and weights given are with oil and without optional bracket or adaptor flange
- For mounting flange details see separate coupling dimensions leaflet
- Add S to the model number to identify actuators with symmetric yoke (i.e. 0.3S-0150-60-CL)
- The air breather in the head flange has the same NPT size of the hydraulic connection



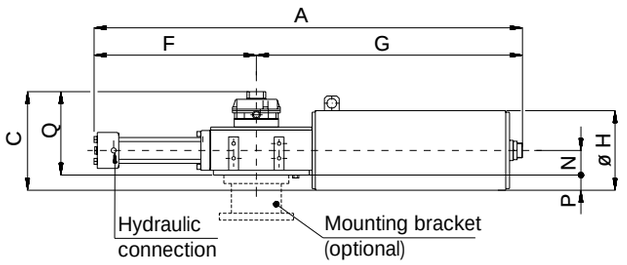
Models 6 to 18 (Dimensions in mm)

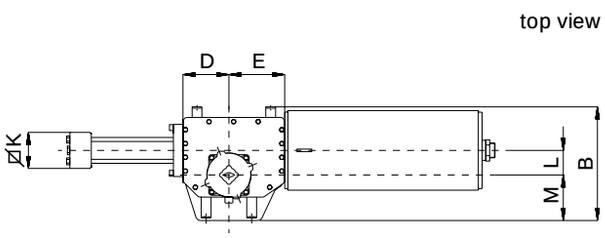
Model	A	B	C	D	E	F	G	ø H	⌀ K	L	M	N	P	Q	Hydraulic connect. NPT	Weight (Kg)
6-2500-135-CL	3124	740	466	327	379	1906	1218	383	200	185	260	140	52	414	3/4	884
6-2500-125-CL	3124	740	466	327	379	1906	1218	383	190	185	260	140	52	414	3/4	870
6-2500-110-CL	3064	740	466	327	379	1906	1158	383	170	185	260	140	52	414	3/4	851
6-2500-95-CL	3027	740	466	327	379	1906	1121	383	155	185	260	140	52	414	3/4	841
6-3800-135-CL	3356	740	547	327	379	2138	1218	545	200	185	260	140	133	414	3/4	1397
6-3800-125-CL	3356	740	547	327	379	2138	1218	545	190	185	260	140	133	414	3/4	1384
6-3800-110-CL	3296	740	547	327	379	2138	1158	545	170	185	260	140	133	414	3/4	1364
6-3800-95-CL	3259	740	547	327	379	2138	1121	545	155	185	260	140	133	414	3/4	1354
14-5400-200-CL	3464	873	698	376	435	2040	1424	545	310	200	295	193	150	527	3/4	1860
14-5400-175-CL	3394	873	698	376	435	2040	1354	545	280	200	295	193	150	527	3/4	1790
14-5400-145-CL	3394	873	698	376	435	2040	1354	545	250	200	295	193	150	527	3/4	1710
14-5400-135-CL	3314	873	698	376	435	2040	1274	545	200	200	295	193	150	527	3/4	1670
14-5400-125-CL	3314	873	698	376	435	2040	1274	545	190	200	295	193	150	527	3/4	1650
14-8300-200-CL	3538	873	698	376	435	2114	1424	545	310	200	295	193	150	527	3/4	1910
14-8300-175-CL	3468	873	698	376	435	2114	1354	545	280	200	295	193	150	527	3/4	1840
14-8300-145-CL	3468	873	698	376	435	2114	1354	545	250	200	295	193	150	527	3/4	1760
14-8300-135-CL	3388	873	698	376	435	2114	1274	545	200	200	295	193	150	527	3/4	1720
14-8300-125-CL	3388	873	698	376	435	2114	1274	545	190	200	295	193	150	527	3/4	1700
18-9600-200-CL	4172	940	749	427	495	2687	1485	580	310	230	340	196	184	541	3/4	2840
18-9600-175-CL	4102	940	749	427	495	2687	1415	580	280	230	340	196	184	541	3/4	2750
18-9600-145-CL	4102	940	749	427	495	2687	1415	580	250	230	340	196	184	541	3/4	2670
18-9800-200-CL	4172	940	749	427	495	2687	1485	580	310	230	340	196	184	541	3/4	3050
18-9800-175-CL	4102	940	749	427	495	2687	1415	580	280	230	340	196	184	541	3/4	2970
18-9800-145-CL	4102	940	749	427	495	2687	1415	580	250	230	340	196	184	541	3/4	2900

Notes

- Dimensions and weights given are with oil and without optional bracket or adaptor flange
- For mounting flange details see separate coupling dimensions leaflet
- Add S to the model number to identify actuators with symmetric yoke (i.e. 6S-2500-135-CL)
- The air breather in the head flange has the same NPT size of the hydraulic connection

Overall dimensions for spring to open actuators



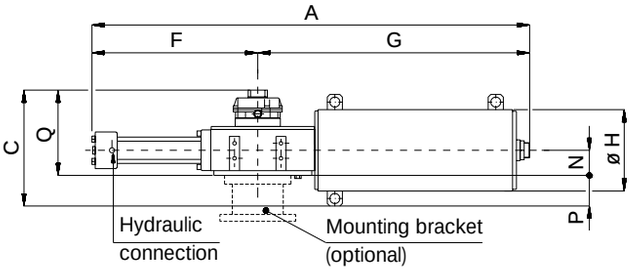


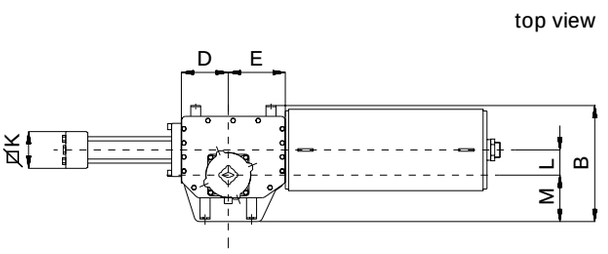
Models 0.3 to 3 (Dimensions in mm)

Model	A	B	C	D	E	F	G	ø H	ØK	L	M	N	P	Q	Hydraulic connect. NPT	Weight (Kg)
0.3-0150-60-OP	1339	319	314	136	151	559	780	210	100	70	119	70	35	279	1/2	84
0.3-0150-50-OP	1316	319	314	136	151	536	780	210	90	70	119	70	35	279	1/2	80
0.3-0150-40-OP	1297	319	314	136	151	517	780	210	75	70	119	70	35	279	1/2	76
0.3-0150-35-OP	1297	319	314	136	151	517	780	210	75	70	119	70	35	279	1/2	76
0.9-0200-85-OP	1544	413	353	160	190	657	887	265	125	80	170	83	50	303	1/2	173
0.9-0200-70-OP	1544	413	353	160	190	657	887	265	120	80	170	83	50	303	1/2	168
0.9-0200-60-OP	1475	413	353	160	190	588	887	265	100	80	170	83	50	303	1/2	150
0.9-0200-50-OP	1452	413	353	160	190	565	887	265	90	80	170	83	50	303	1/2	145
0.9-0350-85-OP	1597	413	383	160	190	657	940	325	125	80	170	83	80	303	1/2	207
0.9-0350-70-OP	1597	413	383	160	190	657	940	325	120	80	170	83	80	303	1/2	202
0.9-0350-60-OP	1528	413	383	160	190	588	940	325	100	80	170	83	80	303	1/2	184
0.9-0350-50-OP	1505	413	383	160	190	565	940	325	90	80	170	83	80	303	1/2	180
0.9-0400-85-OP	1531	413	383	160	190	657	874	325	125	80	170	83	80	303	1/2	202
0.9-0400-70-OP	1531	413	383	160	190	657	874	325	120	80	170	83	80	303	1/2	197
0.9-0400-60-OP	1462	413	383	160	190	588	874	325	100	80	170	83	80	303	1/2	178
0.9-0400-50-OP	1439	413	383	160	190	565	874	325	90	80	170	83	80	303	1/2	174
0.9-0700-85-OP	1558	413	383	160	190	657	901	325	125	80	170	83	80	303	1/2	224
0.9-0700-70-OP	1558	413	383	160	190	657	901	325	120	80	170	83	80	303	1/2	220
0.9-0700-60-OP	1489	413	383	160	190	588	901	325	100	80	170	83	80	303	1/2	200
0.9-0700-50-OP	1466	413	383	160	190	565	901	325	90	80	170	83	80	303	1/2	196
1.5-1100-85-OP	1692	493	451	187	227	689	1003	415	125	100	185	100	108	343	1/2	368
1.5-1100-70-OP	1692	493	451	187	227	689	1003	415	120	100	185	100	108	343	1/2	349
1.5-1100-60-OP	1660	493	451	187	227	657	1003	415	100	100	185	100	108	343	1/2	335
1.5-1200-85-OP	1791	473	431	187	227	689	1102	375	125	100	185	100	88	343	1/2	341
1.5-1200-70-OP	1791	473	431	187	227	689	1102	375	120	100	185	100	88	343	1/2	322
1.5-1200-60-OP	1759	473	431	187	227	657	1102	375	100	100	185	100	88	343	1/2	308
3-2000-110-OP	2684	586	453	285	330	1059	1625	415	170	160	215	106	102	351	3/4	646
3-2000-95-OP	2647	586	453	285	330	1022	1625	415	155	160	215	106	102	351	3/4	633
3-2000-85-OP	2549	586	453	285	330	924	1625	415	125	160	215	106	102	351	1/2	610
3-2000-70-OP	2549	586	453	285	330	924	1625	415	120	160	215	106	102	351	1/2	595

Notes

- Dimensions and weights given are with oil and without optional bracket or adaptor flange
- For mounting flange details see separate coupling dimensions leaflet
- Add S to the model number to identify actuators with symmetric yoke (i.e. 0.3S-0150-60-OP)
- The air breather in the head flange has the same NPT size of the hydraulic connection





Models 6 to 18 (Dimensions in mm)

Model	A	B	C	D	E	F	G	ø H	⌀K	L	M	N	P	Q	Hydraulic connect. NPT	Weight (Kg)
6-2500-135-OP	3124	740	466	327	379	1166	1958	383	200	185	260	140	52	414	3/4	884
6-2500-125-OP	3124	740	466	327	379	1166	1958	383	190	185	260	140	52	414	3/4	870
6-2500-110-OP	3064	740	466	327	379	1106	1958	383	170	185	260	140	52	414	3/4	851
6-2500-95-OP	3027	740	466	327	379	1069	1958	383	155	185	260	140	52	414	3/4	841
6-3800-135-OP	3356	740	547	327	379	1166	2190	545	200	185	260	140	133	414	3/4	1397
6-3800-125-OP	3356	740	547	327	379	1166	2190	545	190	185	260	140	133	414	3/4	1384
6-3800-110-OP	3296	740	547	327	379	1106	2190	545	170	185	260	140	133	414	3/4	1364
6-3800-95-OP	3259	740	547	327	379	1069	2190	545	155	185	260	140	133	414	3/4	1354
14-5400-200-OP	3464	873	698	376	435	1365	2099	545	310	200	295	193	150	527	3/4	1860
14-5400-175-OP	3394	873	698	376	435	1295	2099	545	280	200	295	193	150	527	3/4	1790
14-5400-145-OP	3394	873	698	376	435	1295	2099	545	250	200	295	193	150	527	3/4	1710
14-5400-135-OP	3314	873	698	376	435	1215	2099	545	200	200	295	193	150	527	3/4	1670
14-5400-125-OP	3314	873	698	376	435	1215	2099	545	190	200	295	193	150	527	3/4	1650
14-8300-200-OP	3538	873	698	376	435	1365	2173	545	310	200	295	193	150	527	3/4	1910
14-8300-175-OP	3468	873	698	376	435	1295	2173	545	280	200	295	193	150	527	3/4	1840
14-8300-145-OP	3468	873	698	376	435	1295	2173	545	250	200	295	193	150	527	3/4	1760
14-8300-135-OP	3388	873	698	376	435	1215	2173	545	200	200	295	193	150	527	3/4	1720
14-8300-125-OP	3388	873	698	376	435	1215	2173	545	190	200	295	193	150	527	3/4	1700
18-9600-200-OP	4172	940	749	427	495	1417	2755	580	310	230	340	196	184	541	3/4	2840
18-9600-175-OP	4102	940	749	427	495	1347	2755	580	280	230	340	196	184	541	3/4	2750
18-9600-145-OP	4102	940	749	427	495	1347	2755	580	250	230	340	196	184	541	3/4	2670
18-9800-200-OP	4172	940	749	427	495	1417	2755	580	310	230	340	196	184	541	3/4	3050
18-9800-175-OP	4102	940	749	427	495	1347	2755	580	280	230	340	196	184	541	3/4	2970
18-9800-145-OP	4102	940	749	427	495	1347	2755	580	250	230	340	196	184	541	3/4	2900

Notes

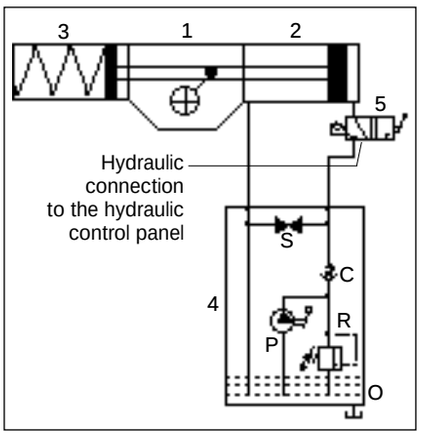
- Dimensions and weights given are with oil and without optional bracket or adaptor flange
- For mounting flange details see separate coupling dimensions leaflet
- Add S to the model number to identify actuators with symmetric yoke (i.e. 6S-2500-135-OP)
- The air breather in the head flange has the same NPT size of the hydraulic connection

Emergency manual override

The OLGAS-H actuators can have an emergency manual override in addition to the local and/or remote control panel which controls the oil supplied by a power pack for the “normal” actuator operation.
The emergency manual override mounted on the actuator, consists of a hydraulic manual override and a hydraulic manual selector to choose the actuator “Normal operation”, with oil supply from a power pack, or the “Emergency manual operation”.
The compact hydraulic manual override consists of:

- hand pump to deliver oil from the tank to the actuator cylinder to control the actuator operation against the spring
- stop valve which allows the connection of the actuator cylinder to the oil tank to control the actuator operation by spring
- relief valve to prevent the oil pressure delivered by the hand pump from exceeding the maximum allowable value
- oil tank.

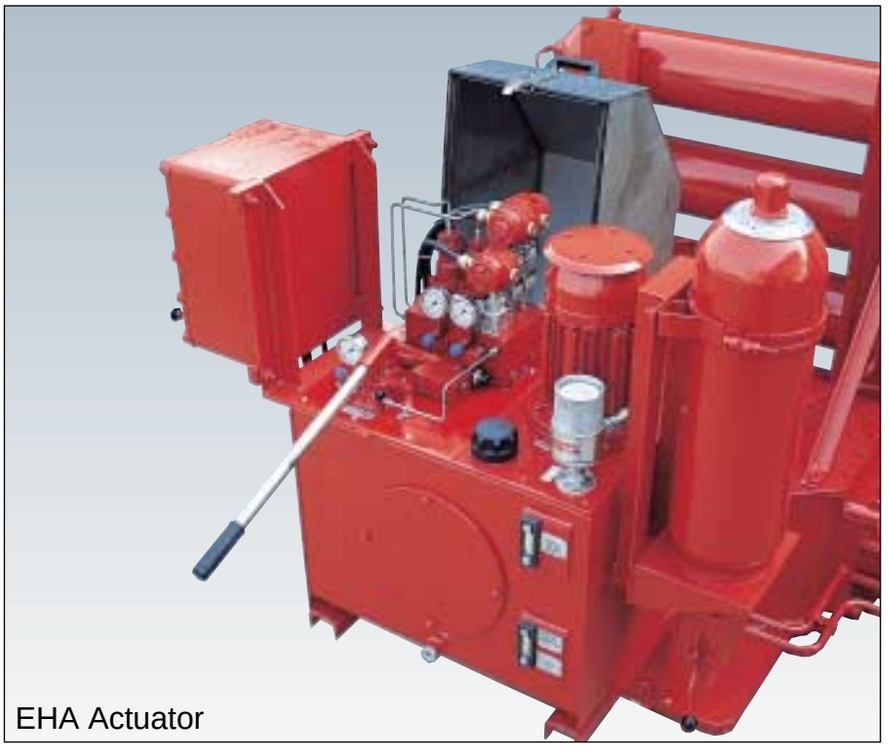
On request the emergency manual override can be included in the power pack.



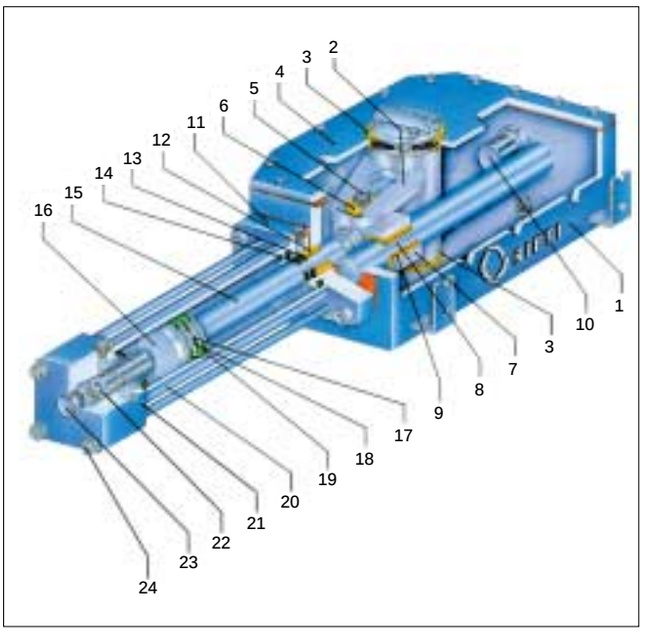
1. Scotch yoke mechanism
2. Hydraulic cylinder
3. Spring cartridge
4. Hydraulic manual override
5. Hydraulic manual selector

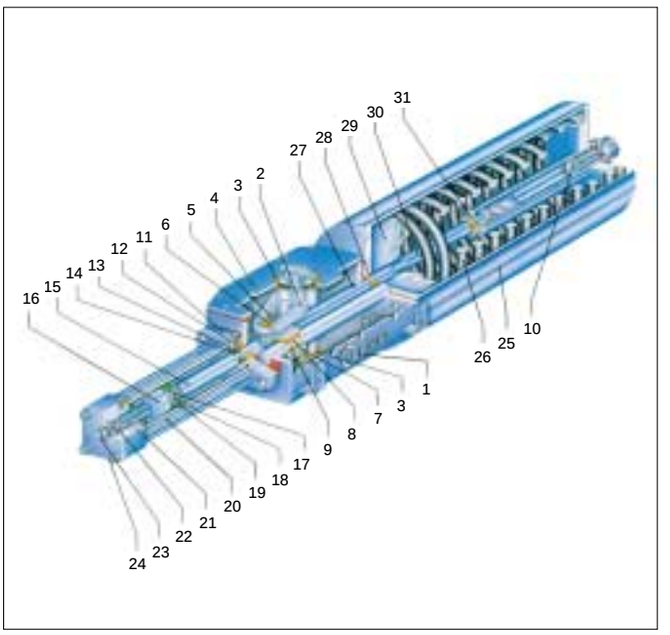
S= Stop valve
C= Check valve
P= Hand pump
R= Relief valve
O= Oil tank

EHAS actuator



EHA Actuator

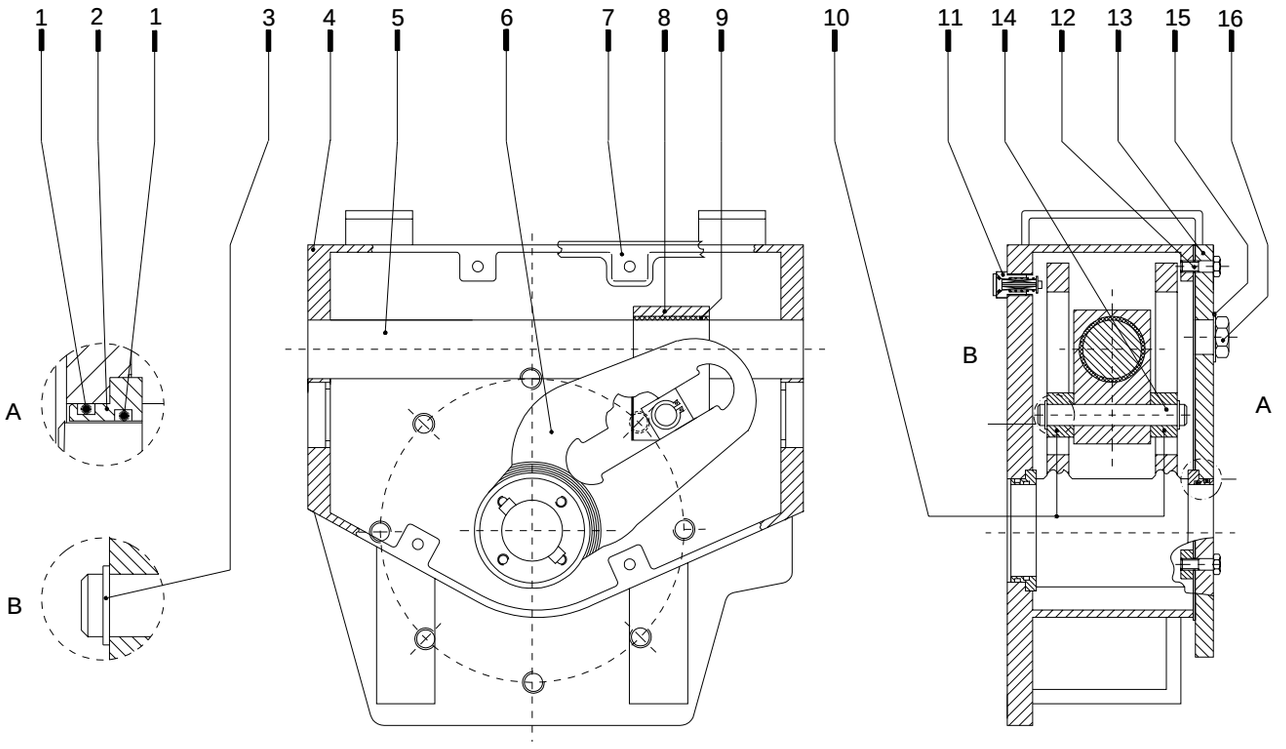




Materials specification

Item	Name	Material	Equivalence to U.S. standards
1	Housing	Carbon steel	ASTM A537 cl.1 + ASTM A283 gr D
2	Yoke	Carbon steel	API 5LX gr X52 (C<0.2%) + ASTM A537 cl.1
3	Yoke bushing	Bronze	ASTM B427 Alloy UNS No. C90800
4	Cover	Carbon steel	ASTM A283 gr D
5	Guide block pin	Alloy steel	AISI SAE 9840
6	Sliding block	Bronze	ASTM B427 Alloy UNS No C90800
7	Guide block	Carbon steel	ASTM A537 cl.1
8	Guide bar	Alloy steel (Chromium plated)	AISI SAE 9840
9	Guide block bushing	Steel + Bronze + Teflon	
10	Travel stop screw	Carbon steel	AISI SAE 1040
11	Cylinder head flange	Carbon steel	ASTM A283 gr D
12	Piston rod bushing	Steel + Bronze + Teflon	
13	Piston rod O-ring	Nitrile rubber	
14	Piston rod seal ring	Teflon	
15	Piston rod	Alloy steel (Chromium plated)	AISI SAE 9840
16	Piston	Carbon steel	ASTM A283 gr D
17	Piston O-ring	Nitrile rubber	
18	Piston seal ring	Teflon + Rubber	
19	Piston guide sliding ring	Teflon + Graphite	
20	Cylinder tube	Carbon steel (Nickel plated)	API 5XL gr X52
21	End flange	Carbon steel	ASTM A283 gr D
22	Travel stop screw	Carbon steel	AISI SAE 1040
23	Plug	Carbon steel	AISI SAE 1040
24	Tie rod	Alloy steel	AISI SAE 9840
25	Spring container	Carbon steel	ASTM A283 gr D + ASTM A106 gr B
26	Spring	Carbon steel	ASTM A29 gr 9254
27	Container rod	Alloy steel (Chromium plated)	AISI SAE 9840
28	Container rod bushing	Steel + Bronze + Teflon	
29	Spring thrust flange	Carbon steel	ASTM A283 gr D
30	Guide rod	Alloy steel (Chromium plated)	AISI SAE 9840
31	Guide rod bushing	Steel + Bronze + Teflon	

Scotch Yoke Mechanism

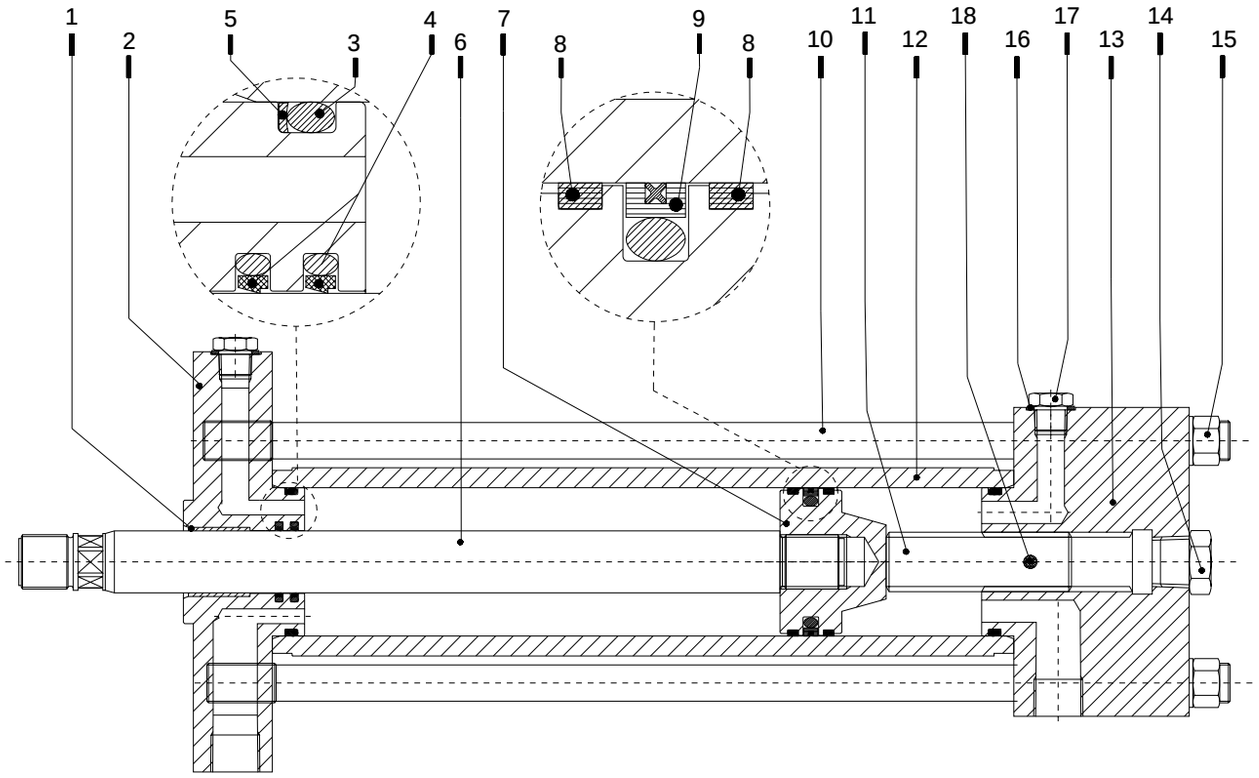


Materials specification

Item	Name	Material	Equivalence to U.S. standards	Q.ty
1	O-ring	NBR		4 •
2	Yoke bushing	Bronze	ASTM B427 Alloy UNS No. C90800	2
3	Retainer ring	Stainless steel	ASTM A479 Type 302	2
4	Housing	Carbon steel	ASTM A537 cl1+ASTM A283 gr D	1
5	Guide bar	Alloy steel	AISI SAE 9840 (chromium plated)	1
6	Yoke	Carbon steel	API 5LX gr X52 (C<0.2%)+ASTM A537 cl 1	1
7	Cover gasket	Fibre		1 •
8	Guide block	Carbon steel	ASTM A537 cl 1	1
9	Bushing	Steel+Bronze+Teflon		1
10	Sliding block	Bronze	ASTM B427 Alloy UNS No. C90800	2
11	Vent valve	Stainless steel	ASTM A479 Type 304	1 •
12	Screw	Carbon steel	AISI SAE 1040	16
13	Cover	Carbon steel	ASTM A283 gr D	1
14	Guide block pin	Alloy steel	AISI SAE 9840	1
15	Washer	Copper		1
16	Inspection plug	Carbon steel	AISI SAE 1040	1

• Recommended spare parts

Hydraulic cylinder for OLGA-H/OLGAS-H actuators

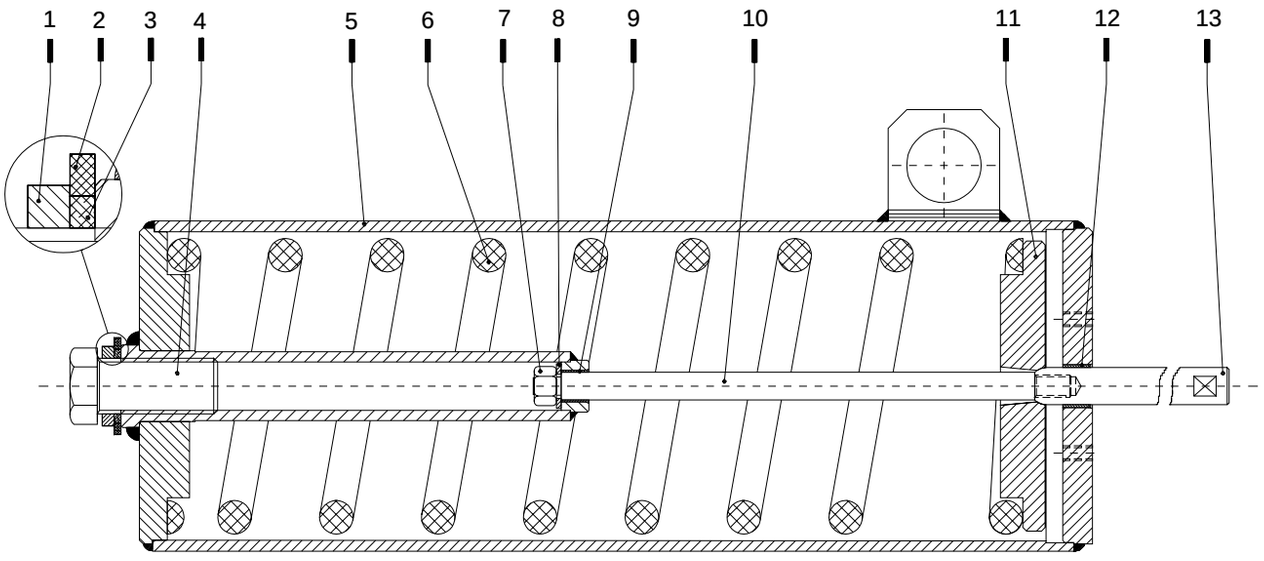


Materials specification

Item	Name	Material	Equivalence to U.S. standards	Q.ty	
1	Piston rod bushing	Steel + bronze + teflon		1	
2	Head flange	Carbon steel	ASTM A283 gr D	1	
3	O-ring	NBR		2	•
4	Piston rod seal ring	Teflon + graphite + NBR		2	•
5	Back-up ring	NBR		2	•
6	Piston rod	Chromium plated alloy steel	AISI SAE 9840 (Chromium plated)	1	
7	Piston	Carbon steel	ASTM A283 gr D	1	
8	Guide sliding ring for piston	Teflon + graphite		2	•
9	Piston seal ring	Teflon + graphite + NBR		1	•
10	Tie rod	Alloy steel	AISI SAE 9840	4	
11	Stop setting screw	Carbon steel	AISI SAE 1040	1	
12	Cylinder tube	Nickel plated carbon steel	API 5LX gr X52 (Nickel plated)	1	
13	End flange	Carbon steel	ASTM A283 gr D	1	
14	Plug	Carbon steel	AISI SAE 1040	3	
15	Nut	Carbon steel	ASTM A194 gr 2	4	
16	Washer	Copper		4	
17	Plug	Carbon steel	AISI SAE 1040	4	
18	Friction bar	Nylon		1	

• Recommended spare parts

Spring cartridge for OLGAS-H actuator

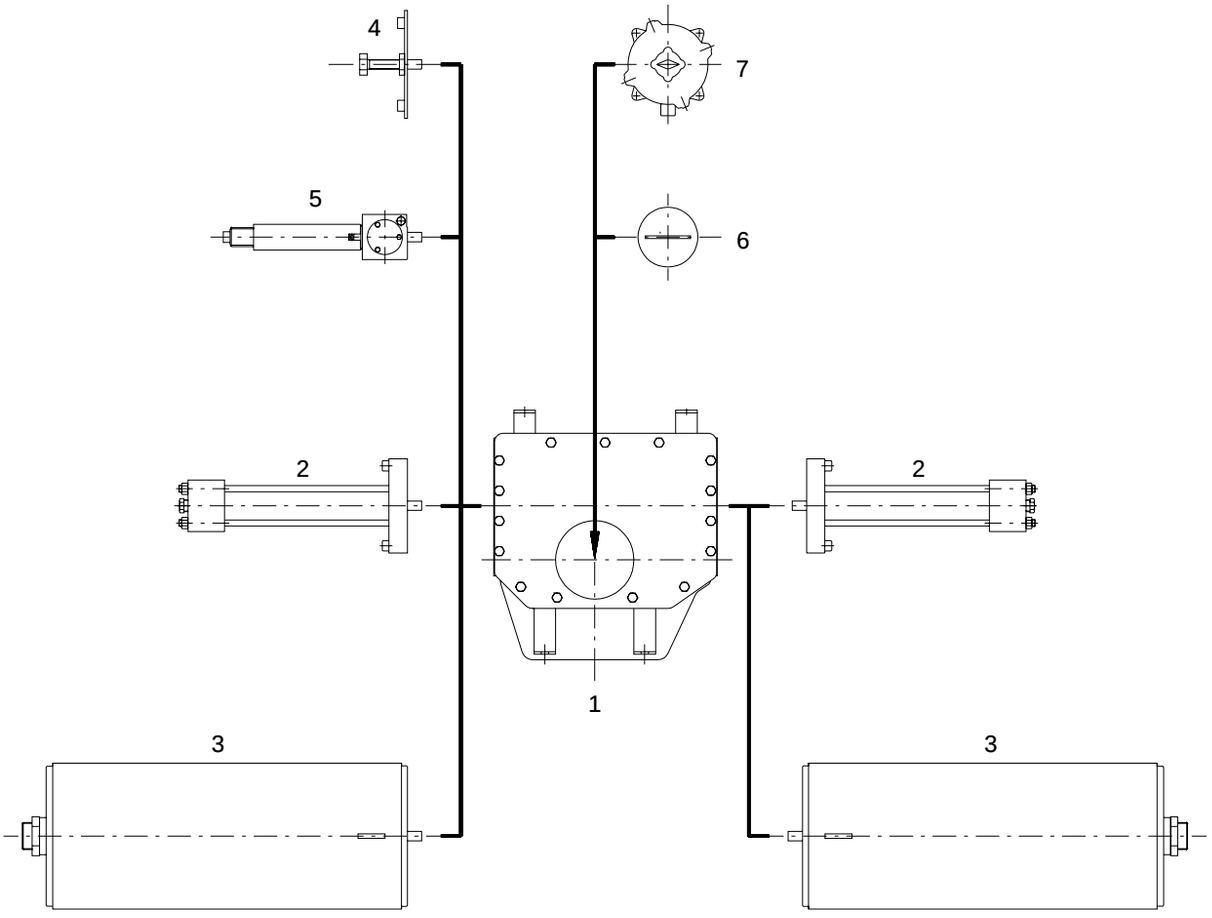


Materials specification

Item	Name	Material	Equivalence to U.S. standards	Q.ty	
1	Nut	Carbon steel	ASTM A194 gr 2	1	
2	Washer	Carbon steel	AISI SAE 1040	1	
3	Sealing washer	PVC		1	•
4	Travel stop screw	Carbon steel	AISI SAE 1040	1	
5	Spring container	Carbon steel	ASTM A283 gr D + ASTM A106 gr B	1	
6	Spring	Carbon steel	ASTM A29 gr 9254	1	
7	Nut	Carbon steel	ASTM A194 gr 2	1	
8	Shoulder washer	Carbon steel	AISI SAE 1040	1	
9	Guide rod bushing	Steel + Bronze + Teflon		1	
10	Guide rod	Alloy steel (chromium plated)	AISI SAE 9840	1	
11	Spring thrust flange	Carbon steel	ASTM A283 gr D	1	
12	Container rod bushing	Steel + Bronze + Teflon		1	
13	Container rod	Alloy steel (chromium plated)	AISI SAE 9840	1	

• Recommended spare parts

Main configuration assembly



Item	Name
1	Scotch yoke mechanism
2	Hydraulic cylinder
3	Spring container
4	Travel stop screw
5	Manual override type “MSJ”
6	Local position indicator
7	Electric limit switch box

Valve data required

Break to open torque
Required torque to move the valve away from its closed position under the full differential pressure. This torque value must take into account the possible sticking effect which could affect the valve if it is closed for a long time.

Reseating torque
Required torque to close the valve under the full differential pressure.

Break to close torque
Required torque to move the valve away from its open position with maximum working pressure in the pipeline. This torque value can be high in the case of “double block and bleed” ball valves.

End to open torque
Required torque to fully open the valve.

Running torque
Required torque to actuate the valve in opening and in closing without differential pressure along the angular stroke except the fully open and fully closed positions where the required torques are those listed above.

Dynamic torque
Required torque to actuate the valve in opening under the medium flow through the valve. This torque value is high particularly on modulating service and when the medium speed and specific gravity are high.
The angular position where the dynamic torque occurs has to be defined.

Safety factor
It is essential to confirm if the above torque values include a safety factor. Depending on the valve application additional safety factors may have to be considered over and above those recommended.

Maximum allowable stem torque
Maximum torque the valve stem can withstand.

Valve stem dimensions

Operating conditions data required

- Supply medium pressure range (minimum, normal, maximum)
- Type of actuator: double acting or spring return to close or spring return to open
- On-Off or Modulating service
- Frequency of operation and required operating times

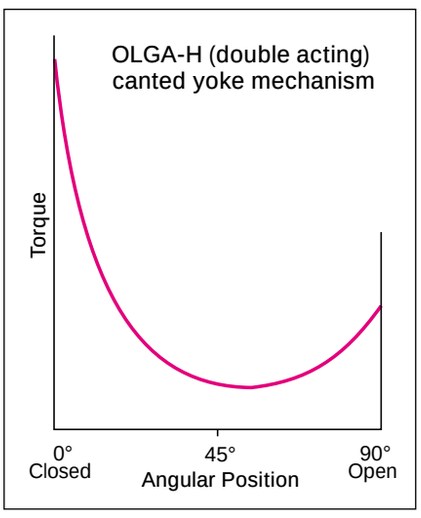
Actuator sizing general criteria

A safety factor must be included during sizing if not included in the figures supplied by the valve manufacturer.
The safety factor value has to be defined as a function of the valve type and size, of the working condition and of the operating time. The safety factor is usually included in the range from 1.2 to 1.5: higher values have to be employed in the case of extreme working conditions (for instance in case of low temperature, dirty and/or high viscosity medium, very infrequent operation, modulating service, short operating time).
The output torques values listed in the performance tables of actuators do not include a safety factor but are the minimum guaranteed torques.

Sizing of OLGA-H double acting actuators

OLGA-H actuators come in two versions, the standard one with canted scotch yoke mechanism and as a special with symmetric scotch yoke mechanism.

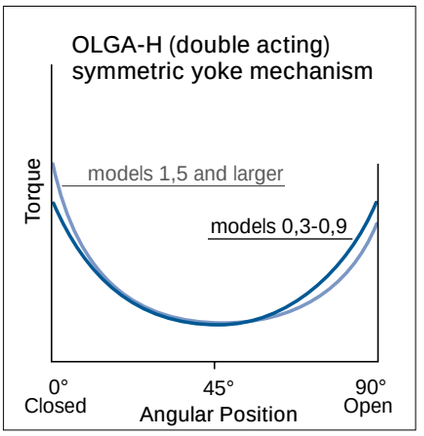
Sizing of OLGA-H actuators with canted scotch yoke mechanism



Canted scotch yoke mechanism is utilised as a standard since its output torque characteristic is in general more suited to overcome the required valve torque throughout the 90° stroke.
For actuator sizing the following comparisons between the valve data, including safety factors, and the actuator data have to be performed.

- Check that the actuator output torque to open at 0° (closed valve position), with minimum supply pressure, exceeds the valve “break to open torque” with maximum differential pressure
- Check that the actuator output torque to close at 90° (open valve position), with minimum supply pressure, exceeds the valve “break to close torque” with maximum working pressure in the pipeline
- Check that the actuator output torque at 45° (intermediate position), with minimum supply pressure, exceeds the valve “running torque”
- Where a valve “dynamic torque” is present, check that this torque value is overridden by the actuator output torque at 45° (intermediate position), with minimum supply pressure.
  For a more accurate sizing BIFFI should be consulted
- Check that the valve stem dimensions are within the accepted values of the actuator selected size, unless an adaptor is required for other dimensional reasons
- During operation the actuator provides, along its full travel, only a torque equal to the required valve torque. No problems will occur if the actuator output torque, as listed in the performance table, exceeds the valve maximum allowable stem torque.
  But if there is the possibility that the valve stops along its stroke, due to abnormal conditions, it is necessary to check that the actuator output torque, with the maximum supply pressure, does not exceed the valve maximum allowable stem torque and the actuator maximum operating torque

Sizing of OLGA-H actuators with symmetric scotch yoke mechanism



Symmetric scotch yoke mechanism is available on request as a special. The torque output characteristics generated are more suited to applications where:

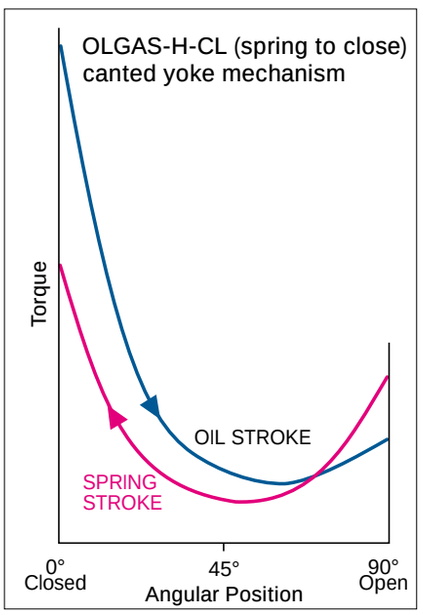
- the valve “break to close torque” is higher than the 50% of “break to open torque”: this happens for example in the case of “double block and bleed” ball valves
- the valve “running torque” is higher than the 40% of “break to open torque” while utilising the canted yoke mechanism the actuator output torque is higher than the valve and/or actuator maximum allowable torque e.g. in the case of abnormal functioning or when the specifications require to consider this occurrence.

The checks that have to be performed for actuator sizing are the same as for canted scotch yoke mechanism.

Sizing of OLGAS-H single acting actuators

OLGAS-H single acting spring return actuators can be supplied as spring to close (OLGAS-H-CL) or spring to open (OLGAS-H-OP).

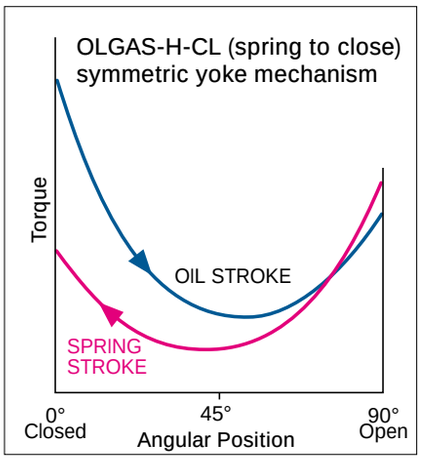
Sizing of OLGAS-H-CL spring to close actuators with canted scotch yoke mechanism



The canted scotch yoke mechanism is utilised as a standard as the output torque characteristics, of both oil and spring operation, are in general more suited to overcome the required valve torque throughout the 90° stroke.
For actuator sizing the following comparisons between the valve data, including safety factors, and the actuator data have to be performed.

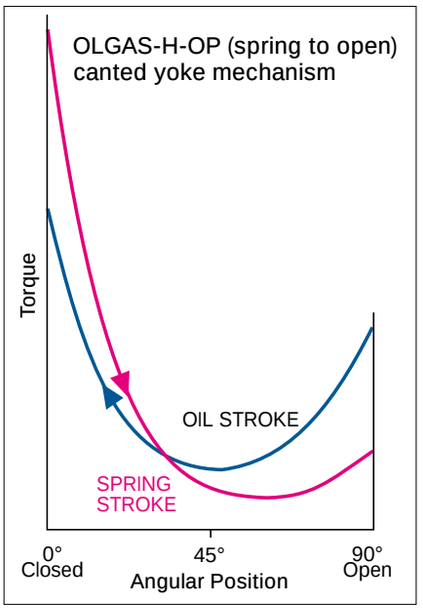
- Check that the “spring ending torque” of actuator exceeds the valve “reseating torque” with maximum differential pressure
- Check that the “oil starting torque” of actuator, with minimum supply pressure, exceeds the valve “break to open torque” with maximum differential pressure
- Check that the “spring starting torque” of actuator exceeds the valve “break to close torque” with maximum working pressure in the pipeline
- Check that the “oil ending torque” of actuator, with minimum supply pressure, exceeds the valve “end to open torque”
- Check that both the “spring running torque” and the “oil running torque”, with minimum supply pressure, of the actuator exceed the valve “running torque”
- Where a valve “dynamic torque” is present, check that it is overridden by the actuator “oil running torque”, with minimum supply pressure.
  For a more accurate sizing BIFFI should be consulted
- Check that the valve stem dimensions are within the accepted values of the actuator selected size, unless an adaptor is required for other dimensional reasons
- When required, since there is the possibility that the valve stops during its stroke due to abnormal conditions, it is necessary to check that the actuator “spring output torque” and the “oil output torque”, with maximum supply pressure, do not exceed the valve maximum allowable stem torque and the actuator maximum operating torque

Sizing of OLGAS-H-CL spring to close actuators with symmetric scotch yoke mechanism



The symmetric scotch yoke mechanism is a special version that can be utilised when more suited to the required valve torque throughout the 90° stroke. E.g. when the valve “break to close torque” is higher than the “reseating torque”. The checks that have to be performed for actuator sizing are the same as for canted scotch yoke mechanism.

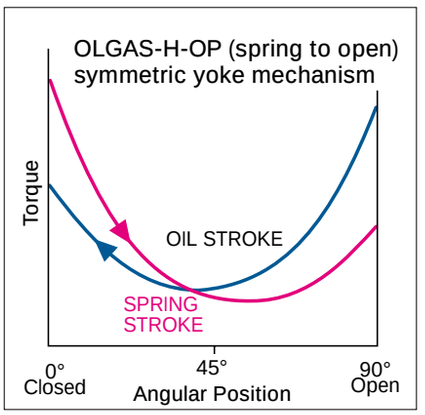
Sizing of OLGAS-H-OP spring to open actuators with canted scotch yoke mechanism



The canted scotch yoke mechanism is utilised as a standard as the output torque characteristics, of both oil and spring operation, are in general more suited to overcome the required valve torque throughout the 90° stroke.
For actuator sizing the following comparisons between the valve data, including safety factors, and the actuator data have to be performed.

- Check that the “oil ending torque” of actuator, with minimum supply pressure, exceeds the valve “reseating torque”, with maximum differential pressure
- Check that the “spring starting torque” of actuator exceeds the valve “break to open torque” with maximum differential pressure
- Check that the “oil starting torque” of actuator, with minimum supply pressure, exceeds the valve “break to close torque” with maximum working pressure in the pipeline
- Check that the “spring ending torque” of actuator exceeds the valve “end to open torque”
- Check that both the “spring running torque” and the “oil running torque”, with minimum supply pressure, exceed the valve “running torque”
- Where a valve “dynamic torque” is present, check that it is overridden by the actuator “spring running torque”. For a more accurate sizing BIFFI should be consulted
- Check that the valve stem dimensions are within the accepted values of actuator selected size, unless an adaptor is required for other dimensional reason
- When required, since there is the possibility that the valve stops during its stroke due to abnormal conditions, it is necessary to check that the actuator “spring output torque” and the “oil output torque”, with maximum supply pressure, do not exceed the valve maximum allowable stem torque and the actuator maximum operating torque

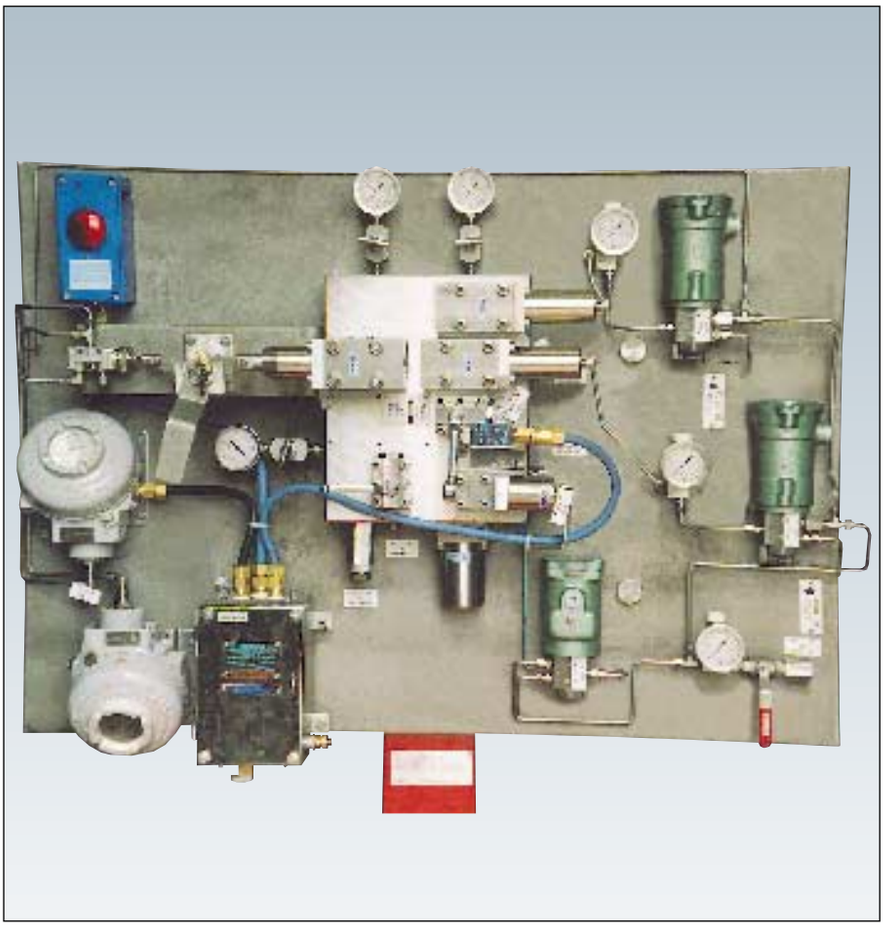
Sizing of OLGAS-H-OP spring to open actuators with symmetric scotch yoke mechanism



The symmetric scotch yoke mechanism is a special version that can be utilised when more suited to the required valve torque throughout the 90° stroke.
E.g. the valve “break to close torque” is higher than the “reseating torque”.
The checks that have to be performed for actuator sizing are the same as for canted yoke mechanism.

General

BIFFI has the ability to apply advanced engineering technology to the design and manufacture of hydraulic controls and accessories.
The experience and the knowledge acquired in the actuator industry allow BIFFI to meet with the highest requirements for control modes and operating conditions by correct selection of schematics, components, materials and protection treatment.
The actuator service can be On-Off or Modulating. Actuator control can be local or remote by electric, or hydraulic signals.
The control system can include devices for automatic operation or stay put in case of emergency conditions (electric or hydraulic supply failure, high temperature, low or high pipeline pressure etc.).
The control systems have where is possible a "manifold design":
the components are connected by a flange to the manifold or assembled into the cavities machined into the manifold.
This allows to have a very "compact" unit to reduce the number of connections by fittings and pipes and then to make the assembly and disassembly of each component easier, and to minimise the risk of oil leakage also in case the system undergoes strong vibrations.
Control systems can be supplied as panel mount or enclosed into a weatherproof cabinet.
Control systems can be supplied separate or assembled onto the actuator.
The actuator housing has dedicated supports for the mounting of control systems and accessories.



Main components of the control system

- Stop valves, needle valves, check valves
- Oil filter (bypass, visual and/or electric clogging indication on request)
  Filter element type and filtration degree depending on working conditions
- Bladder-type or piston-type accumulators PED 87/23/EC stamped. Accumulators in accordance with different codes on request. Nitrogen back-up bottles for transfer barrier accumulators
- Solenoid valves, manual valves, hydraulic or pneumatic pilot valves
- Electro hydraulic proportional valves
- Electro hydraulic servovalves
- Electronic solenoid valve drivers for modulating service
- Dump valves, flow regulators, relief valves
- Dual pilot operated check valves
- Pressure gauges
- Hydraulic manifold
- Electric pressure switches
- Terminal enclosures

Features for on-off service

The standard components of hydraulic control systems have carbon steel or cast iron bodies. Stainless steel versions can be supplied.
- The standard components of hydraulic control systems are proper to operate with hydraulic mineral oil containing the necessary additives (anti-wear, anti-frothing, anti-oxidation agents). Special versions for fire resistant fluids
- The standard directional control valves are spool type. Poppet type (no leakage) valves are available
- Solenoid valves, flow regulators, relief valves, dump valves can be cartridge-type and assembled into the manifold cavities
- The electric component enclosures can have explosionproof and/or weatherproof protection.
  The explosionproof enclosures are in accordance with ATEX 94/9/EC or CENELEC Standards EN 50014 and EN 50018. Enclosures in accordance with UL or CSA Standards can be supplied. Components suitable for use in intrinsically safe circuits are available
- Terminals enclosures with increased safety protection are available
- The hydraulic connections are in carbon steel pipe and fittings as standard; stainless steel can be supplied on request
- Standard weatherproof cabinets for control systems are in carbon steel. Stainless steel can be supplied on request
- Please note that OLGA-H and OLGAS-H actuators with on-board E/H power pack are respectively called EHA and EHAS

Features for modulating service

A very important application for hydraulic actuators is modulating service. This is a frequent application in power plants, platforms, on ships, docks, chemical plants and, more generally, in industrial plants on steam, water, oil and gas lines, where it is necessary to regulate the flow of a fluid inside a pipe. Modulating actuators are also often used for quick emergency operation: closing (stop valve) or opening (vent valve, by-pass valve).
This application is especially frequent on adduction lines for steam or gas to the turbine and for water to the condenser, where it is necessary for the valve to operate in a very short time in case of emergency.
The experience and knowledge Biffi acquired in the field of modulating actuators satisfy the Customers' strictest specifications and the severest working conditions through suitable calculation procedures, a correct selection of functional schematics, components, materials and protection treatments.
The hydraulic actuators utilized for modulating service can either be double acting (OLGA and OLGA/H) or spring return (OLGAS and OLGAS/H). Spring return actuators are generally utilized when quick emergency operation is necessary.

Control systems classification

The hydraulic control systems used for modulating actuators can be classified according to three basic types:
Step by step: the hydraulic unit controlling the actuator movement consists in poppet-type solenoid valves mounted in a manifold. The actuator has two operation speed possibilities: "high speed" when the error is high, "low speed" when the error is small.
This avoids all hunting problems. Both "high" and "low" speed are adjustable by way of flow regulators in the manifold.
An electronic control panel, especially designed by BIFFI, compares the valve position signal with the reference signal coming from the process regulator and, according to the the position error, operates the relevant solenoid valves for actuation and speed selection.
The "step-by-step" control system is generally used in case the modulating service is neither continuous nor heavy.
The system is simple, requiring no high oil filtering degree and no supply oil flow while keeping the valve in the requested modulating position, because the solenoid valves are poppet-type (with no oil drain).
By proportional valve: the actuator movement is controlled by a proportional valve the features of which are defined according to the requested performance and the applicable Customers' specifications (orifice dimensions, number of solenoids, integral transducer, shape of spool).
The proportional valve is controlled by a suitable electronic card according to the electric control signal coming from the positioner and to the electric feed-back signal of the valve spool transducer.
Generally BIFFI also supplies the electronic positioner controlling the actuator operation by way of the proportional valve and its electronic driver. The positioner compares the electric control signal coming from the plant regulator with the electric signal given by the valve position transmitter mounted on the actuator, and sends suitable input signals to the proportional valve electronic driver.
By servo-valve: the actuator movement is controlled by a servo-valve the features of which are defined according to the requested performance and the applicable Customers' specifications (orifice dimensions, number of coils, type of feed-back).
The servo-valve controls actuator operation in accordance with the electric control signal coming from the positioner. BIFFI can also supply an electronic positioner to control actuator operation by comparing the electric control signal coming from the plant regulator with the electric signal coming from the valve position transmitter mounted on the actuator.

Integration with electronics

The vast and long experience in the field of electronic control units (positioners) and signal units (position transmitters) for modulating actuators allows BIFFI to meet with the highest requirements for control modes and operating conditions through the correct selection of schematics, components and materials.
The electronic units are especially designed and manufactured for "on field" service in the severest conditions (low and/or high ambient temperature, vibrations, aggressive atmosphere, peculiar electric supply with special values and variation range).
For this reason high-performance and special construction electronic components are utilized, which are assembled in accordance with procedures ensuring perfect functioning in the severest working conditions on field.
The use of microprocessors and digital techniques for positioning units allows to supply the positioner/actuator assembly with the possibility for otherwise impossible performances.
It increases positioning precision since it is possible to optimize speed control, to define the frequency response, to program the acceleration and deceleration ramps, to more efficiently select the type of position regulator most suitable to the service (P or PI or PID).
Using a microprocessor allows to control the actuator by way of a digital communication serial line or Fieldbus, and also allows connection to an auxiliary computer for start-up adjustments and routine operational tests. It is also possible to use an IR remote control. The system also allows fine defect diagnostics, which will definitely ease maintenance operations and permit to plan a preventive maintenance of the unit with a view to the "intelligent actuator" more and more Customers now require.
Furthermore - using microprocessors allows the acquisition, processing and storage of other plant process data which do not depend on the actuator (e.g., pressure, temperature, etc.) but are measured locally, and their re-transmission to the central control unit.

BIFFI's respect for the severest Customers' specifications gave way to the development of a deep knowledge of all protection methods by way of galvanic separators, insulators, transient suppressors. The electrical components can be supplied either weatherproof or explosionproof, in accordance with the norms specified in the plant.

General

BIFFI has the ability to apply advanced engineering technology to the design and manufacture of hydraulic power packs, in order to meet with the highest requirements for operating modes and working conditions by a correct selection of schematics, components, materials and protection treatment.
The energy supply for the power pack operation can be electric (direct current or alternate current) and/or pneumatic (low pressure or high pressure).
Hand pump manual override available on request for oil supply to the actuator in case of energy supply failure.
The power pack components can be supplied panel mounted or enclosed into a weatherproof cabinet. Sunshade is also available on request. Power pack can be supplied separate or assembled onto the actuator (if the dimensions and the weight allow so).

Main components of the power pack

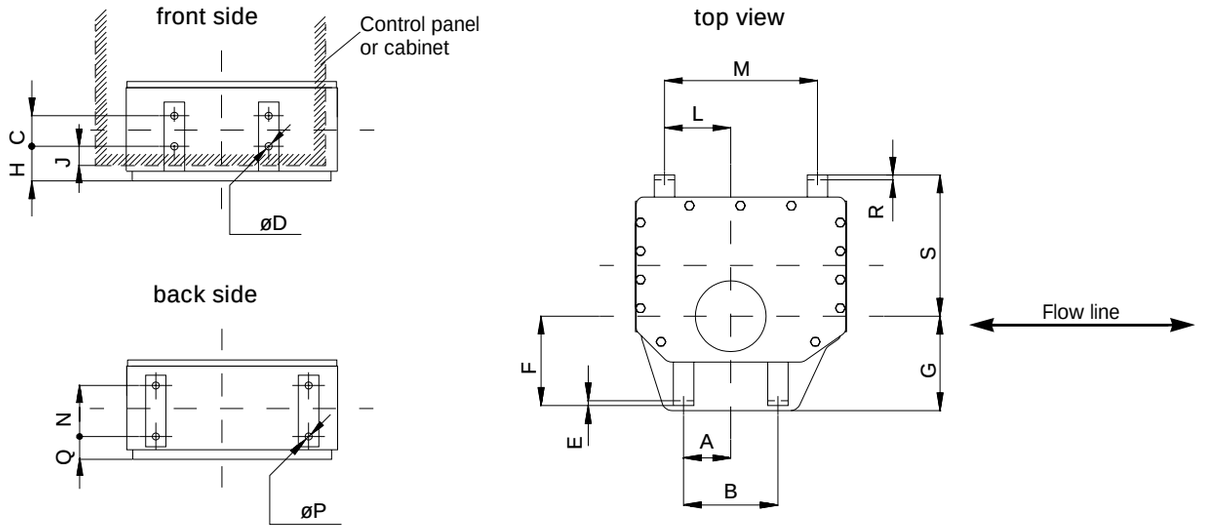
- Oil tank with fillercap and drain plug
- Visual oil level indicator
- Electric level switch
- Electric thermostat
- Suction oil filters
- Delivery oil filters (bypass, visual and/or electric clogging indicator on request). Filter element type and filtration degree depending on working conditions
- Hydraulic rotating pumps
- Electric or pneumatic motors
- Pneumo-hydraulic pressure intensifier
- Hand pump, directional control valve
- Relief valves, flow regulators, check valves
- Stop valves, needle valves
- Pressure gauges
- Hydraulic manifold
- Bladder type or piston type accumulators PED stamped. Accumulators in accordance with different codes on request. Nitrogen back-up bottles for transfer barrier accumulators
- Electric pressure switches
- Electric control panel
- Terminals enclosure

Features

- The standard oil tank is in carbon steel or aluminium (small sizes). Stainless steel versions can be supplied
- The standard rotating pumps are external gear type with aluminium body (cast iron version can be supplied). For higher working pressure and/or to have variable displacement vane pumps and radial or axial piston pumps are available
- Standard components of power packs are proper to operate with hydraulic mineral oil containing the necessary additives (anti-wear, anti-frothing, anti-oxidation agents). Special versions for fire resistant fluids
- Valve bodies and manifold are in carbon steel or cast iron. Stainless steel versions can be supplied
- Relief valves, flow regulators, check valves, stop valves can be cartridge type and assembled into the manifold cavities
- The electric components enclosures can have explosionproof and/or weatherproof protection.

The explosionproof enclosures are in accordance with ATEX 94/9/EC or ENELEC Standards EN 50014 and EN 50018. Enclosures in accordance with UL or CSA Standards can be supplied. Components suitable for use in intrinsically safe circuits are available
- Terminal enclosures with increased safety protection are available
- The hydraulic connections are in carbon steel pipe and fittings as standard; stainless steel can be supplied on request
- Standard weatherproof cabinets are in carbon steel; stainless steel can be supplied on request

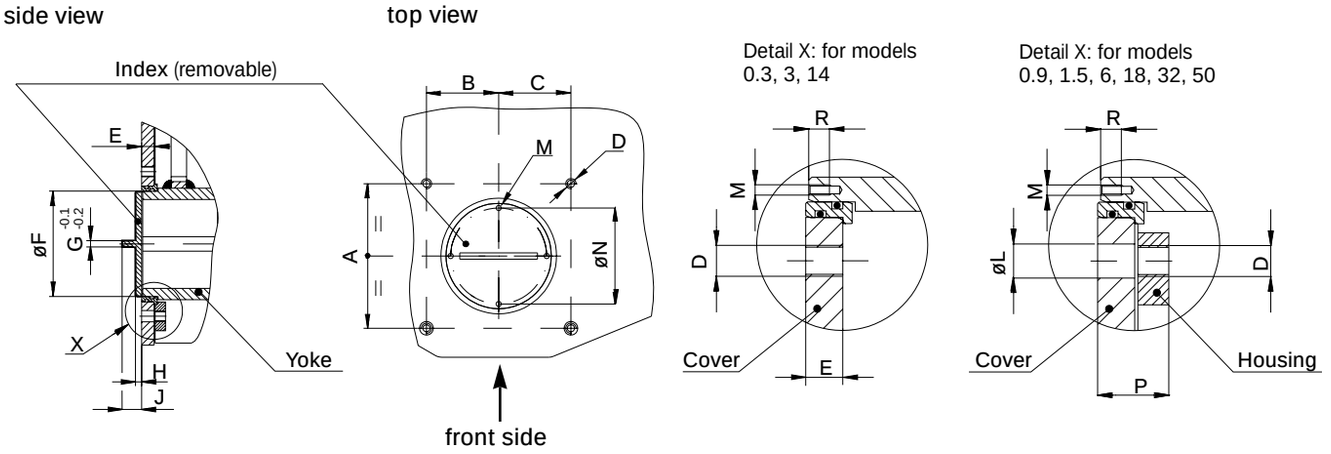
Mounting holes of housing



Dimensions in mm

Model	A	B	C	øD	E	F	G	H	J	L	M	N	øP	Q	R	S
0.3	77.5	155	60	14	5	113	119	37	12	92	200	60	14	36	5	200
0.9	92.5	185	60	14	5	155	170	61	35	85	200	60	14	48	5	243
1.5	92.5	185	60	14	5	175	185	62	35	130	300	100	14	45	5	284
3	117.5	235	85	23	8	203	215	57	25	230	500	100	14	54	5	371
6	137	455	115	23	8	248	260	59	22	224	500	100	14	87	8	480
14	315	630	200	27	10	227	330	97	55	220	500	170	27	99	8	543
18	315	630	200	27	10	235	340	72	32	306	680	215	27	80	10	600
32	315	630	200	27	10	385	395	72	32	414	890	215	27	149	10	660
50	387.5	860	250	30	12	372	387	77	35	473	1030	215	27	163	10	1072

Mounting holes of cover and yoke



Dimensions in mm

Model	A	B	C	D	E	øF	G	H	J	øL	M	øN	P	R
0.3	140	70	70	No. 4 x M10	10	84	6	6	19	-	No. 4 x M4	76	-	7
0.9	140	70	70	No. 4 x M10	12	102	6	6	19	11	No. 4 x M4	93	22	7
1.5	140	70	70	No. 4 x M10	12	133	6	6	19	11	No. 4 x M5	122	22	7
3	160	127	136	No. 4 x M16	12	184	6	6	19	-	No. 4 x M6	171	-	10
6	160	127	136	No. 4 x M16	13	232	6	6	19	16.5	No. 4 x M6	216	30	10
14	160	127	136	No. 4 x M16	16	232	6	6	19	-	No. 4 x M6	216	-	10
18	314	109	109	No. 4 x M16	18	255	6	6	16	16.5	No. 4 x M6	240	35	10
32	314	109	109	No. 4 x M16	16	265	6	6	16	16.5	No. 4 x M6	250	33	10
50	280.6	138.5	138.5	No. 4 x M20	18	295	6	6	16	20.5	No. 4 x M6	278	46	10

The index is shown for actuator in end position (fully open or closed)

Your enquiries for hydraulic actuators can be efficiently processed when you supply the information requested on this page.
Please use this page as guidance when sending your enquiries; if you need assistance, directly contact our offices.

Applicable documents

Customer requisition n°
.....

Data sheet
.....

Valve data

Manufacturer
.....
Model .....Type .....
Size: ND .....☐ mm ☐ inches
Class .....
Max diff. pressure ..... ☐ bar g
☐ PSI
Medium .....
Service ☐ on-off ☐ modulating

Valve required torques
☐ Nm ☐ Lbs-in
safety factor: included .....% ☐ not incl.
break to open (0°) .....
break to close (90°) .....
end to close (0°) .....
end to open (90°) .....
running .....
dynamic torque (at.....°) .....
max allowable .....

Stem size
diameter/square side .....mm
height .....mm
key dimension ..... x .....mm
Coupling dimensions
customer's drawing .....
Installation
pipe axis: ☐ vertical ☐ horizontal
valve stem: ☐ vertical ☐ horizontal
cylinder axis: ☐ parallel ☐ perpendicular to the pipe axis

notes .....
.....
.....
.....
.....

Actuator data

Actuator type
☐ double acting
☐ single acting spring to close
☐ single acting spring to open

Supply
☐ mineral oil ☐ .....
viscosity .....cSt at ..... ☐ °C ☐ °F
oil type/brand .....
connections size: ..... ☐ ISO 7/1 Rp
☐ NPT
☐ .....
Oil supply pressure: ☐ bar g
☐ PSI
min ..... normal ..... max .....

Operating time (sec)
opening: from ..... to .....
closing: from ..... to .....
Ambient temperature
min ..... max ..... ☐ °C ☐ °F
Environment conditions
.....
Required painting cycle
.....
Manual override:

Notes

.....
.....
.....
.....
.....

Valve position signaling

Electric limit switches
open q.ty ..... closed q.ty .....
intermediate q.ty .....
Supply voltage ..... ☐ DC
..... ☐ AC ..... Hz
load:
resistive ..... Amps
lamps ..... Amps
inductive ..... Amps
Cam actuated
☐ SPDT ☐ sealed ☐ sealed under inert gas
☐ gold contact ☐ DPDT ☐ .....
Proximity
☐ inductive
☐ magnetic ☐ NO ☐ NC ☐ SPDT
type/manufacturer .....

Electric position transmitter
☐ 4-20 mA output signal ☐ contact type
☐ contactless type ☐ .....
☐ resistive from ..... to ..... Ohm
☐ .....
type/manufacturer .....
notes .....
.....
.....
.....
.....
.....
.....
.....
.....

.....

Local position indicator
☐ standard
☐ special .....

Enclosure
Protection degree
☐ weatherproof IP.....
☐ explosionproof .....
.....
☐ intrinsically safe .....
code: ☐ CENELEC ☐ .....
Material
☐ alum. (std) ☐ cast iron ☐ .....
Cable entries
q.ty ..... size .....

Control system

On-off service
☐ by electric signal
☐ by local manual control
☐ .....
1 signal ☐ to close ☐ to open
2 signals ☐ to close ☐ to open
Control signal:
voltage ..... ☐ DC
..... ☐ AC ..... Hz
notes .....
.....
.....

Modulating service
☐ by electric signal ..... mA (closed valve)
..... mA (open valve)
☐ .....
.....

Control system reset
☐ automatic ☐ local manual
☐ remote .....
☐ after any closing operation
☐ after any opening operation
☐ after emergency operation only

Emergency action
☐ closing operation
☐ opening operation
☐ stay in position
☐ for hydraulic supply failure
☐ .....
☐ for low pressure in the process line
☐ for high pressure in the process line
☐ for electric supply failure
for electric control signal
☐ failure
☐ present from remote control station
☐ .....

Control system components

Solenoid valves
Body material
☐ carbon steel/cast iron
☐ stainless steel
☐ .....
Action
☐ direct ☐ servopiloted
Coil enclosure protection
☐ weatherproof IP .....
☐ explosionproof .....
.....
☐ intrinsically safe .....
code: ☐ CENELEC ☐ ATEX
Coil enclosure material
☐ aluminium ☐ cast iron/steel
☐ .....
Function
☐ NC ☐ NO ☐ .....
Supply voltage ..... ☐ DC
..... ☐ AC ..... Hz
Max consumed power .....☐ W ☐ VA
notes .....
.....

Pipe and fittings
☐ carbon steel
☐ 316 stainless steel
☐ .....
notes .....
.....

Junction box
Protection degree
☐ weatherproof IP .....
☐ explosionproof .....
☐ intrinsically safe .....
☐ increased safety .....
code: ☐ CENELEC ☐ .....
Material
☐ aluminium ☐ cast iron ☐ GRP
☐ stainless steel ☐ .....
Cable entries
☐ q.ty ..... size .....

Customer operating diagram .....
Customer wiring diagram .....

notes .....
Control system valves
type ☐ spool ☐ poppet ☐ .....
body material ☐ carbon steel/cast iron
☐ stainless steel ☐ .....
notes .....
.....

Control system assembling
☐ on panel:
panel material ☐ carbon steel (std)
☐ stainless steel
☐ into cabinet:
cabinet material ☐ carbon steel (std)
☐ stainless steel
notes .....
.....
.....
.....
.....
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.....
.....

Accumulator

type ☐ bladder ☐ piston ☐ .....
no. of strokes .....
starting pressure ..... ☐ bar g ☐ PSI
code:
☐ PED
☐ ASME VIII Div.1 not stamped
☐ .....

design pressure ..... ☐ bar g ☐ PSI
design temperature ..... ☐ °C ☐ °F
accessories .....
.....
.....
.....
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notes .....
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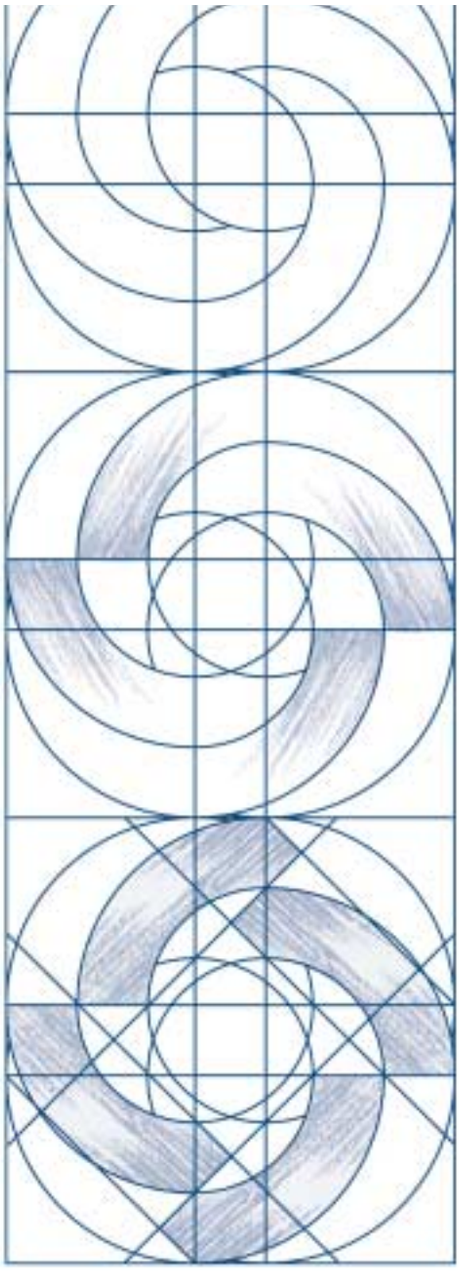

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tyco flow control

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