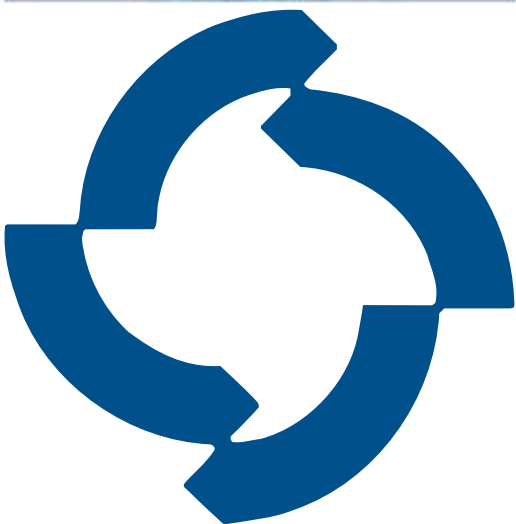


"OLGA-H" &
"OLGAS-H" SERIES

HYDRAULIC ACTUATORS
FOR HIGH PRESSURE SUPPLY



BIFFI

tyco *flow control*

| | |
|--|----------------|
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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.

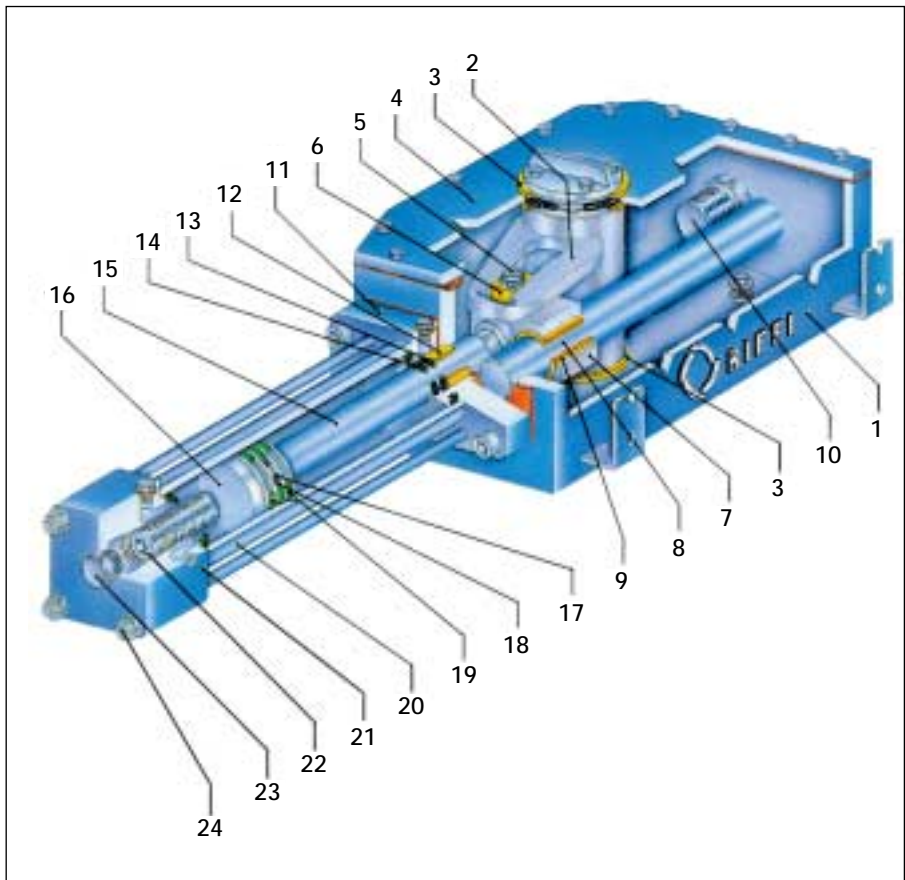
Simplicity, reliability and economy are at the top of the list of design parameters. The **OLGA-H** actuator is suitable for any quarter turn application such as ball, plug, butterfly valves or dampers, in both **On-Off** and **Modulating heavy duty** service.

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

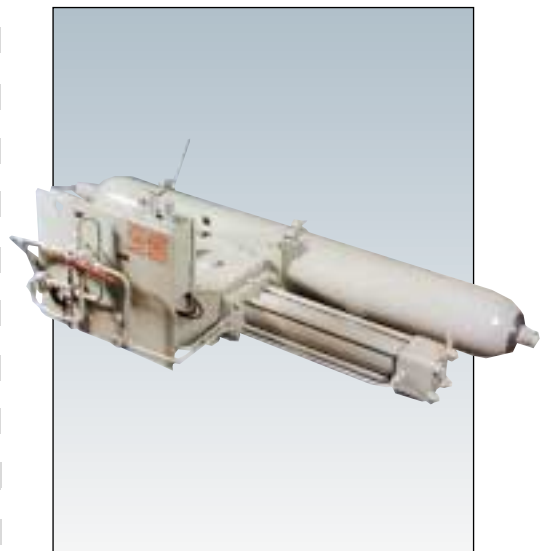
Output torques : up to 400000 Nm
Higher values with special versions

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) | | | Max allowable pressure (bar g) |
|---------|---------------------------|--------------------------|--------|--------|--------------------------------|
| | | at 0° | at 45° | at 90° | |
| 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

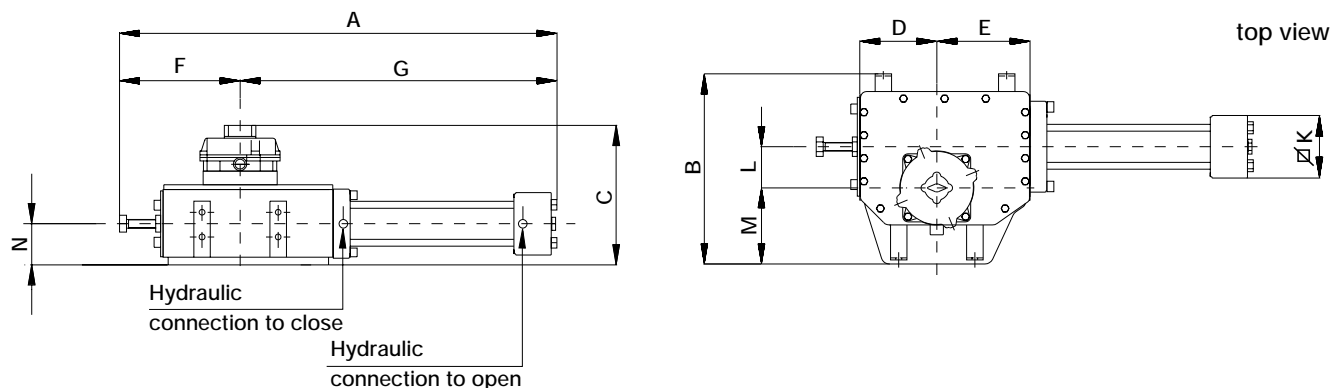
Output Torques for Symmetric Yoke Mechanism

| Model | Max operating torque (Nm) | Output torque (Nm/bar g) | | | Max allowable pressure (bar g) |
|---------|---------------------------|--------------------------|--------|--------|--------------------------------|
| | | at 0° | at 45° | at 90° | |
| 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.

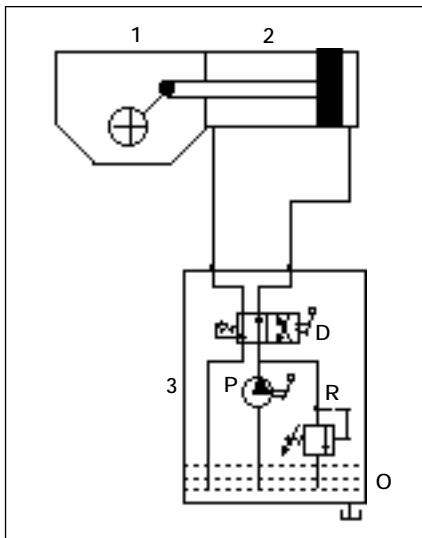
The compact hydraulic control unit mounted on the actuator consists of :

- 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

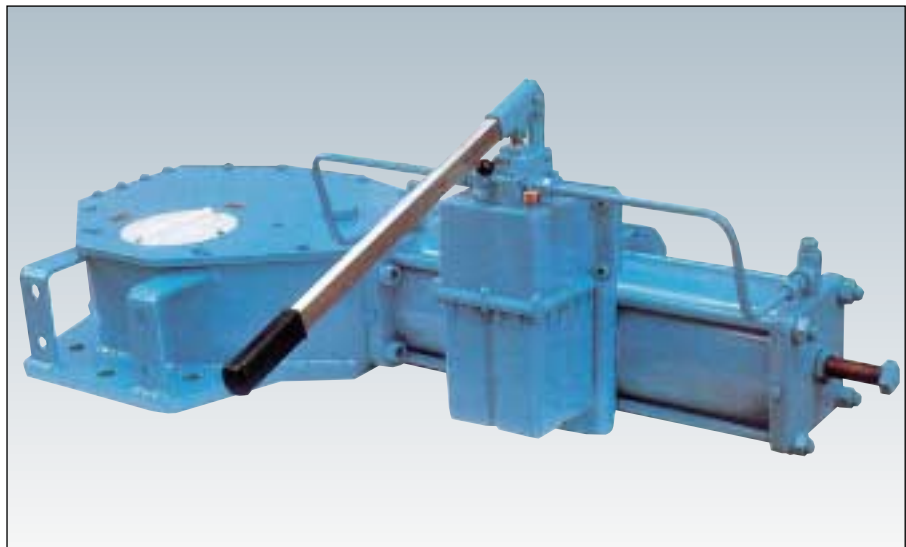
Accessories are available on request, for instance:

- 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

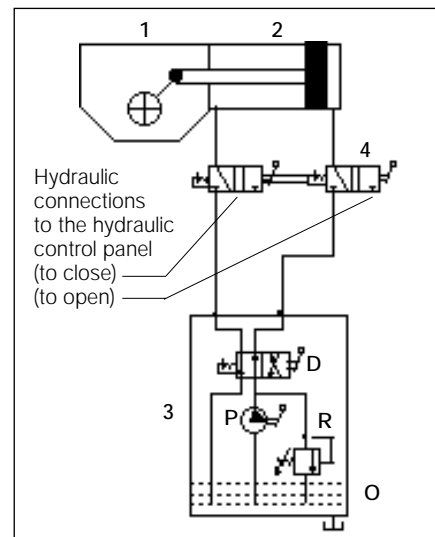
The OLGA-H actuators can have an emergency manual override in addition to the local and/or remote control panel which controls the oil supplied by a power pack for the "normal" actuator operation.

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.



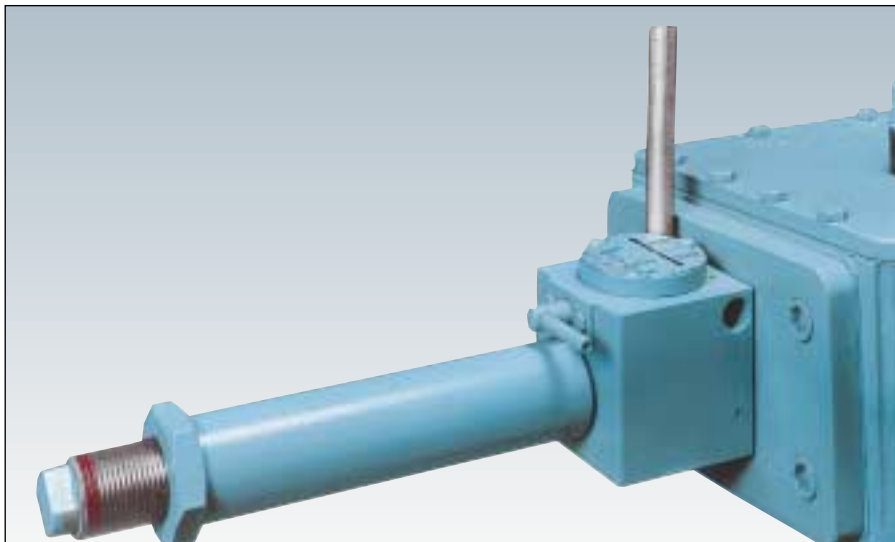
1. Scotch yoke mechanism
 2. Hydraulic cylinder
 3. Hydraulic manual override
 4. Hydraulic manual selector
- D= Directional control valve
P= Hand pump
R= Relief valve
O= Oil tank

Manual override type "MSJ"

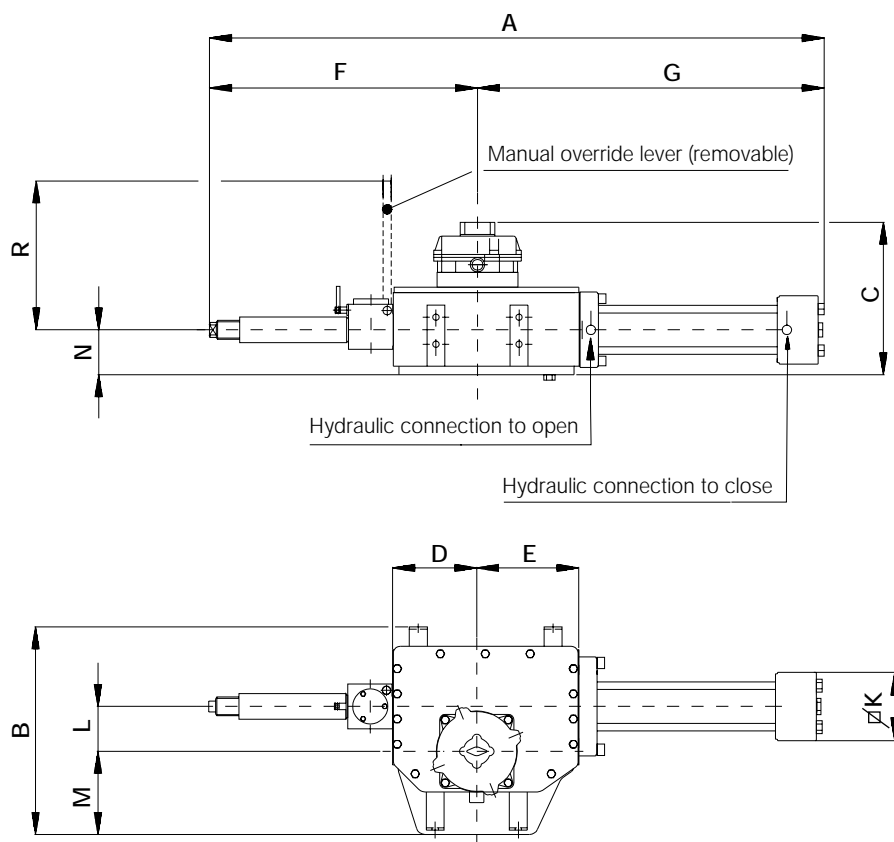
The MSJ jackscrew manual override can be supplied for OLGA-H actuators up to model 3. The override is mounted on the left side of the actuator, the jackscrew end is screwed into the guide block.

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



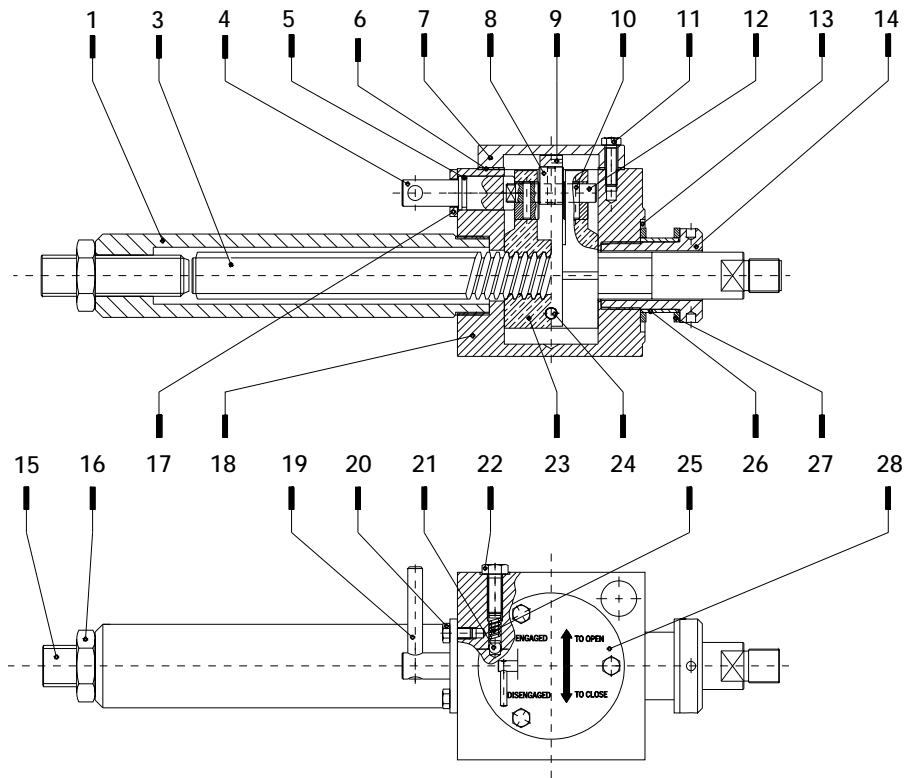
Dimensions in mm

| Model | A | B | C | D | E | F | G | $\varnothing K$ | 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"

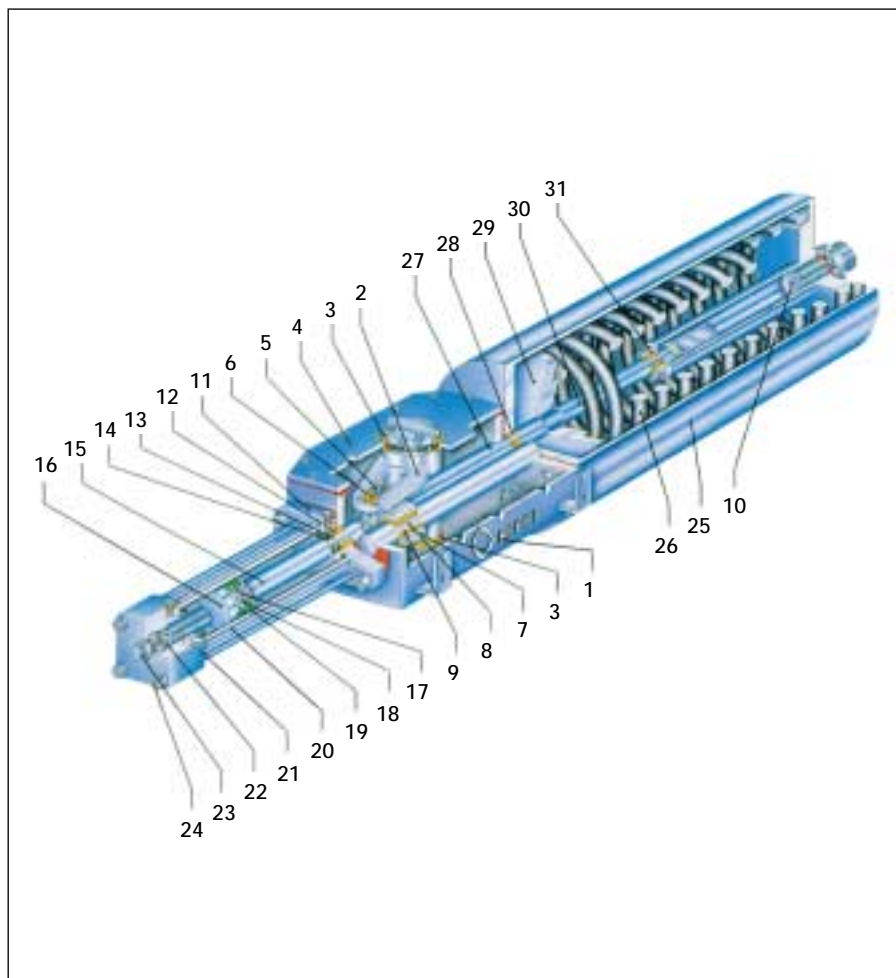
- **electrohydraulic proportional valves** complete with electronic control panel
- electrohydraulic **servovalves**
- spool-type or poppet-type (no leakage) **control valves**
- **dump-valves, flow regulators, relief valves**
- electric **pressure switches**
- bladder-type or piston-type **accumulators** 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 **dampers** 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)

| Model | Spring torque | | | Operating supply pressure (bar g) | | | | | | | | | | | | | | | | | | | | |
|----------------|---------------|------|------|-----------------------------------|------|-------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|------|-----|-----|
| | | | | 60 | | | 100 | | | 140 | | | 180 | | | 220 | | | 260 | | | 300 | | |
| | 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)

| Model | Spring torque | | | Operating supply pressure (bar g) | | | | | | | | | | | | | | | | | | | | | |
|----------------|---------------|------|------|-----------------------------------|------|------|------|------|------|-------|------|------|-------|------|------|-------|------|-------|-------|------|------|-------|------|------|--|
| | | | | 60 | | | 100 | | | 140 | | | 180 | | | 220 | | | 260 | | | 300 | | | |
| | 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)

| Model | Spring torque | | | Operating supply pressure (bar g) | | | | | | | | | | | | | | | | | | | | |
|-----------------|---------------|------|------|-----------------------------------|-----|-----|------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|-------|
| | | | | 50 | | | 100 | | | 150 | | | 200 | | | 250 | | | 300 | | | 350 | | |
| | 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)

| Model | Spring torque | | | Operating supply pressure (bar g) | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---------------|------|------|-----------------------------------|-----|------|------|------|------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|--|--|--|
| | | | | 50 | | | 100 | | | 150 | | | 200 | | | 250 | | | 300 | | | 350 | | | | | |
| | 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°)

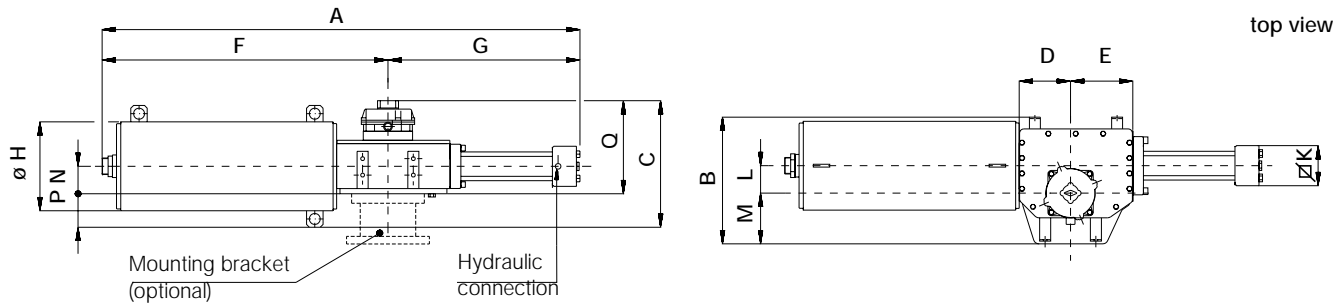
Maximum Operating Torque/Maximum Allowable Pressure

| 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

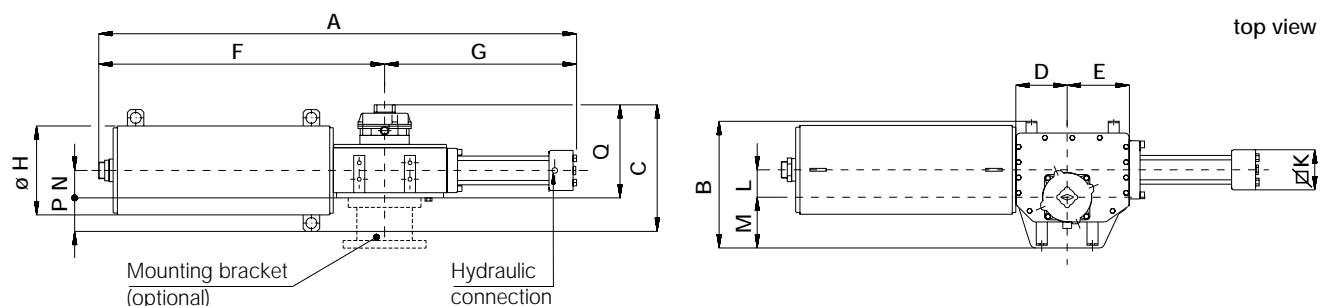


Models 0.3 to 3 (Dimensions in mm)

| Model | A | B | C | D | E | F | G | øH | ∅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



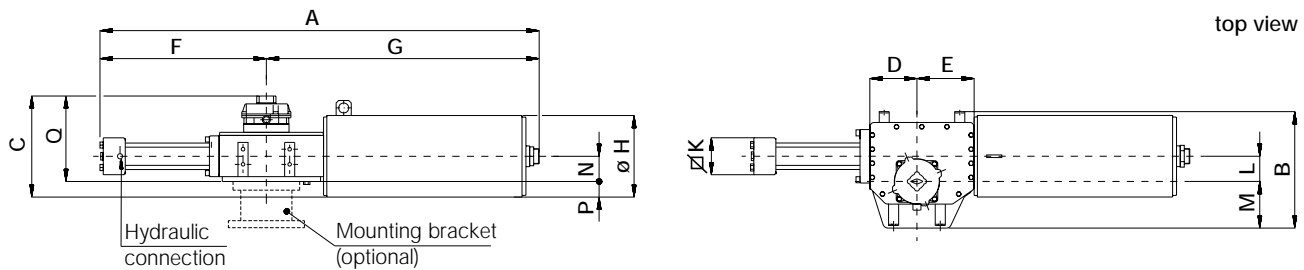
Models 6 to 18 (Dimensions in mm)

| 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

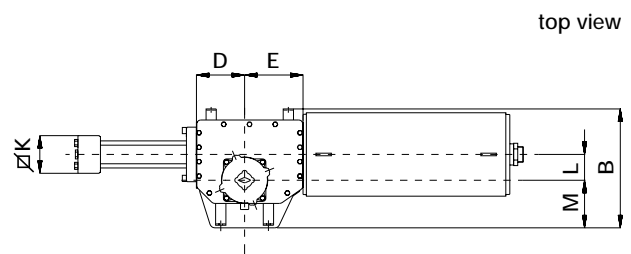
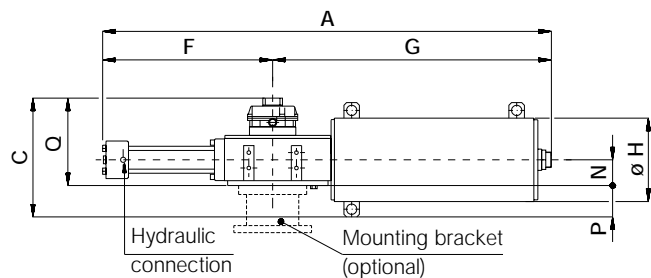


Models 0.3 to 3 (Dimensions in mm)

| Model | A | B | C | D | E | F | G | ØH | ∅K | 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 | øH | ∅K | L | M | N | P | Q | Hydraulic connect. Weight | |
|----------------|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|---------------------------|------|
| | | | | | | | | | | | | | | | NPT | (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

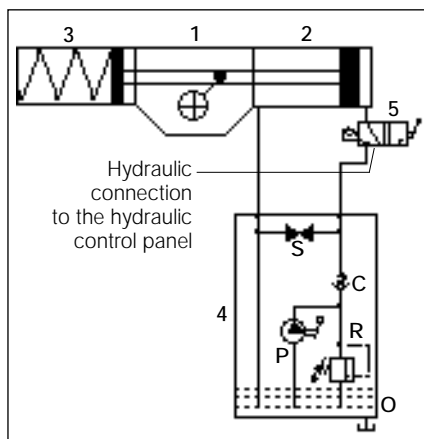
The OLGAS-H actuators can have an emergency manual override in addition to the local and/or remote control panel which controls the oil supplied by a power pack for the "normal" actuator operation.

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.

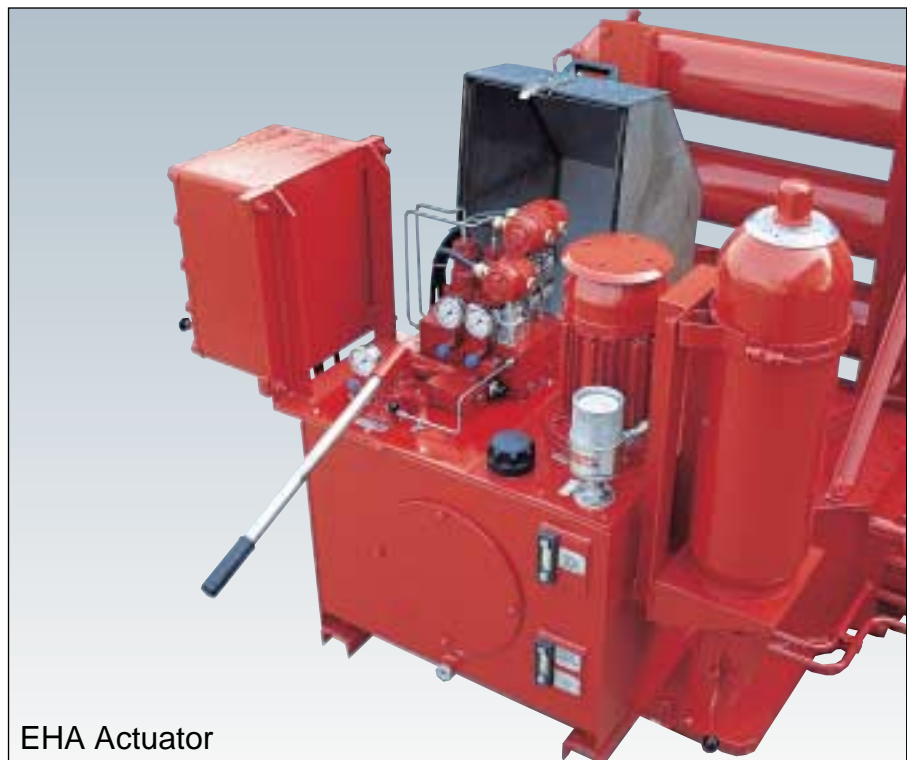
On request the emergency manual override can be included in the power pack.



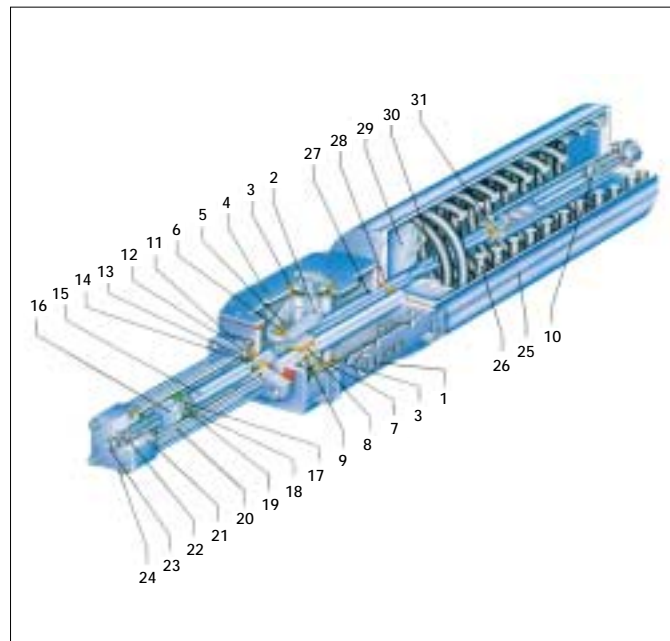
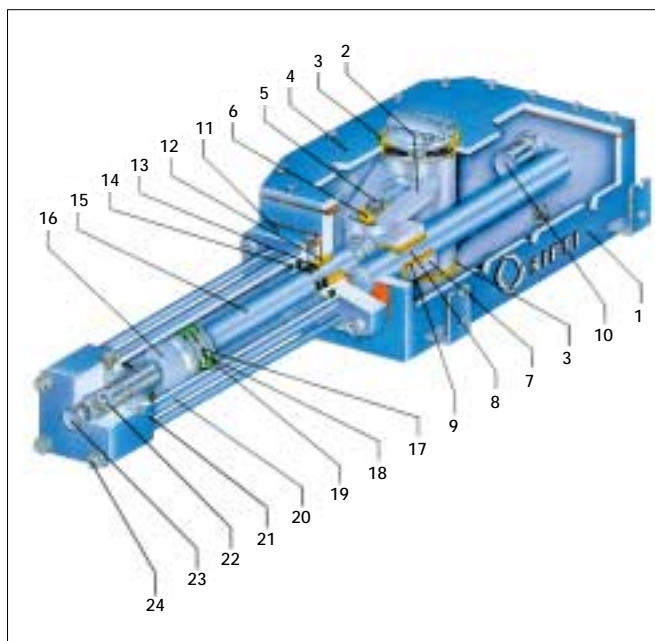
1. Scotch yoke mechanism
 2. Hydraulic cylinder
 3. Spring cartridge
 4. Hydraulic manual override
 5. Hydraulic manual selector
- S= Stop valve
C= Check valve
P= Hand pump
R= Relief valve
O= Oil tank



EHAS actuator



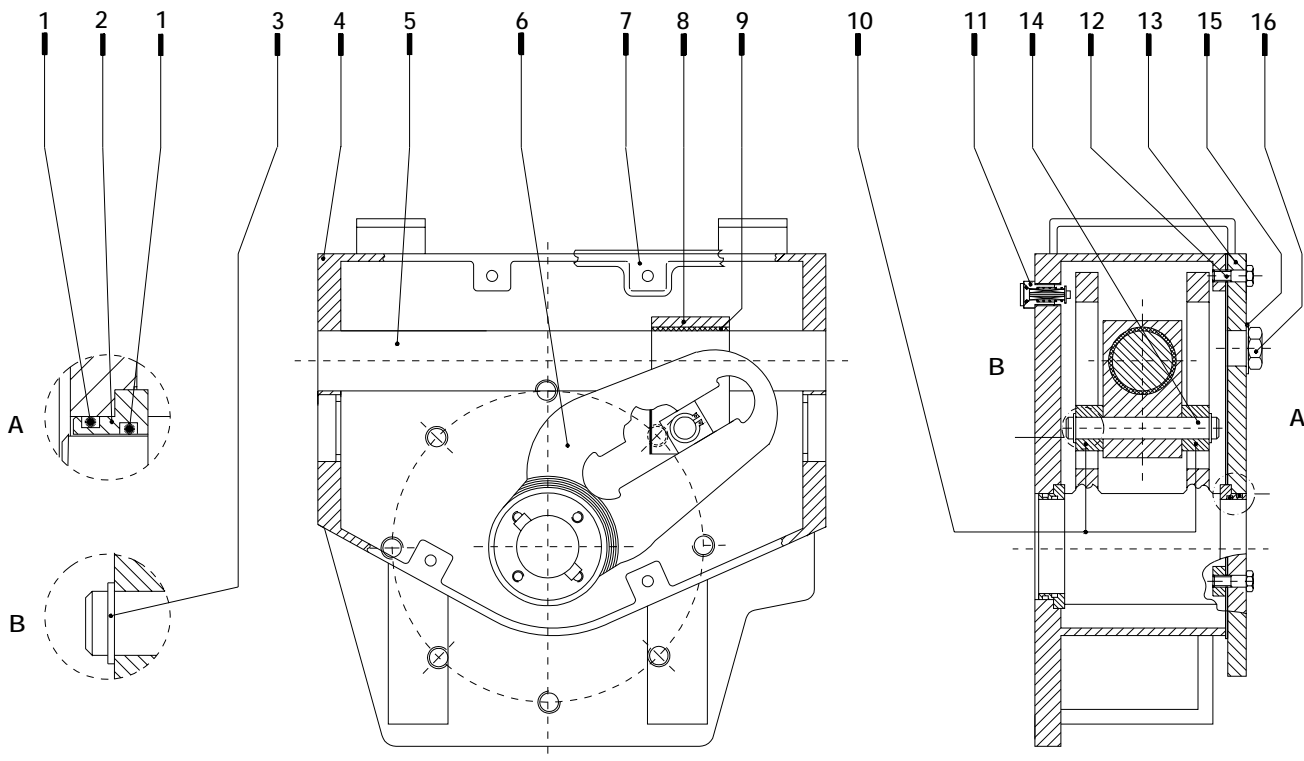
EHA Actuator



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

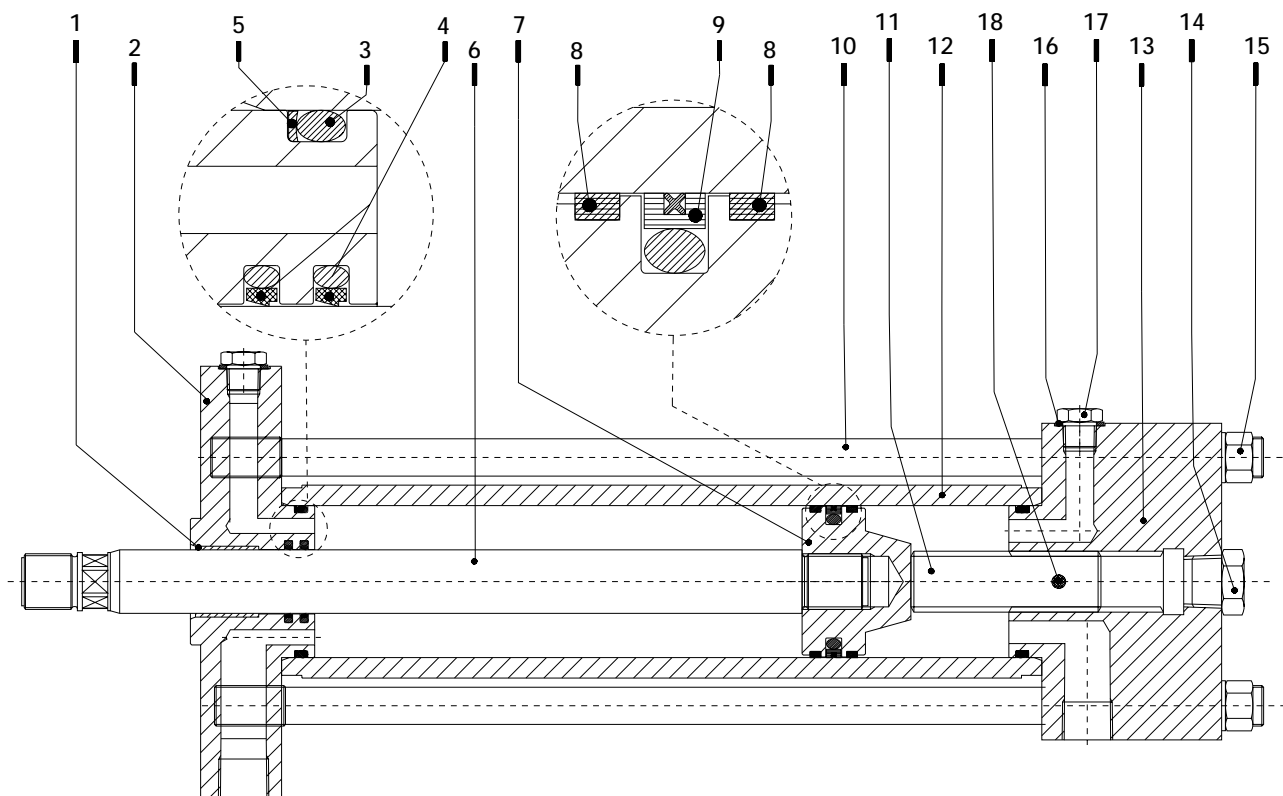


Materials specification

| 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

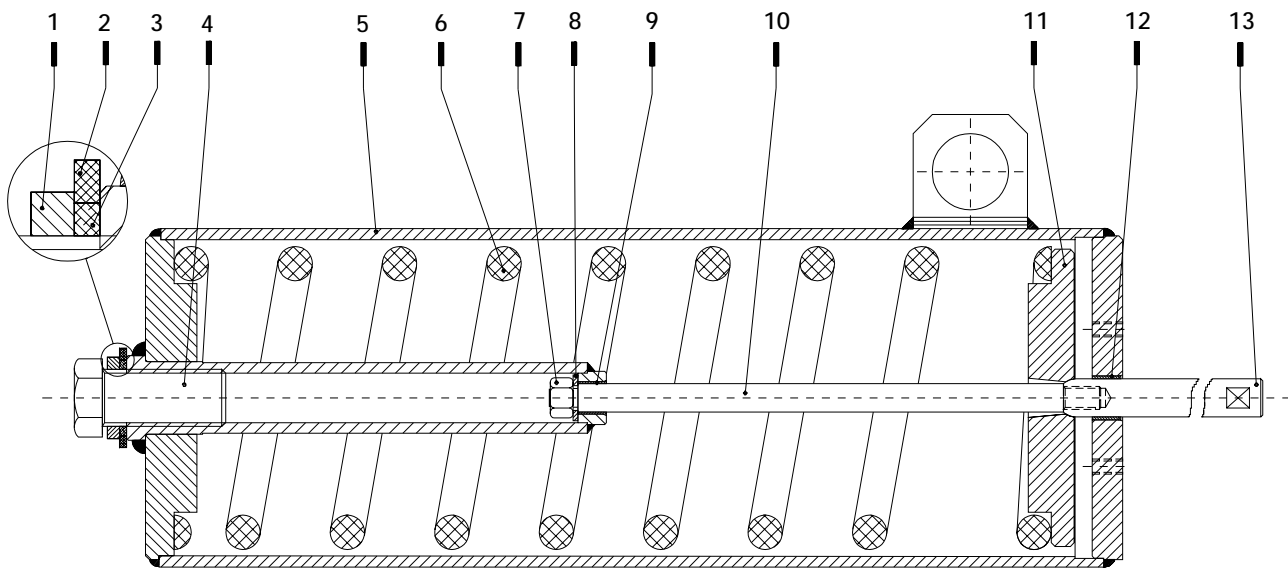


Materials specification

| 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

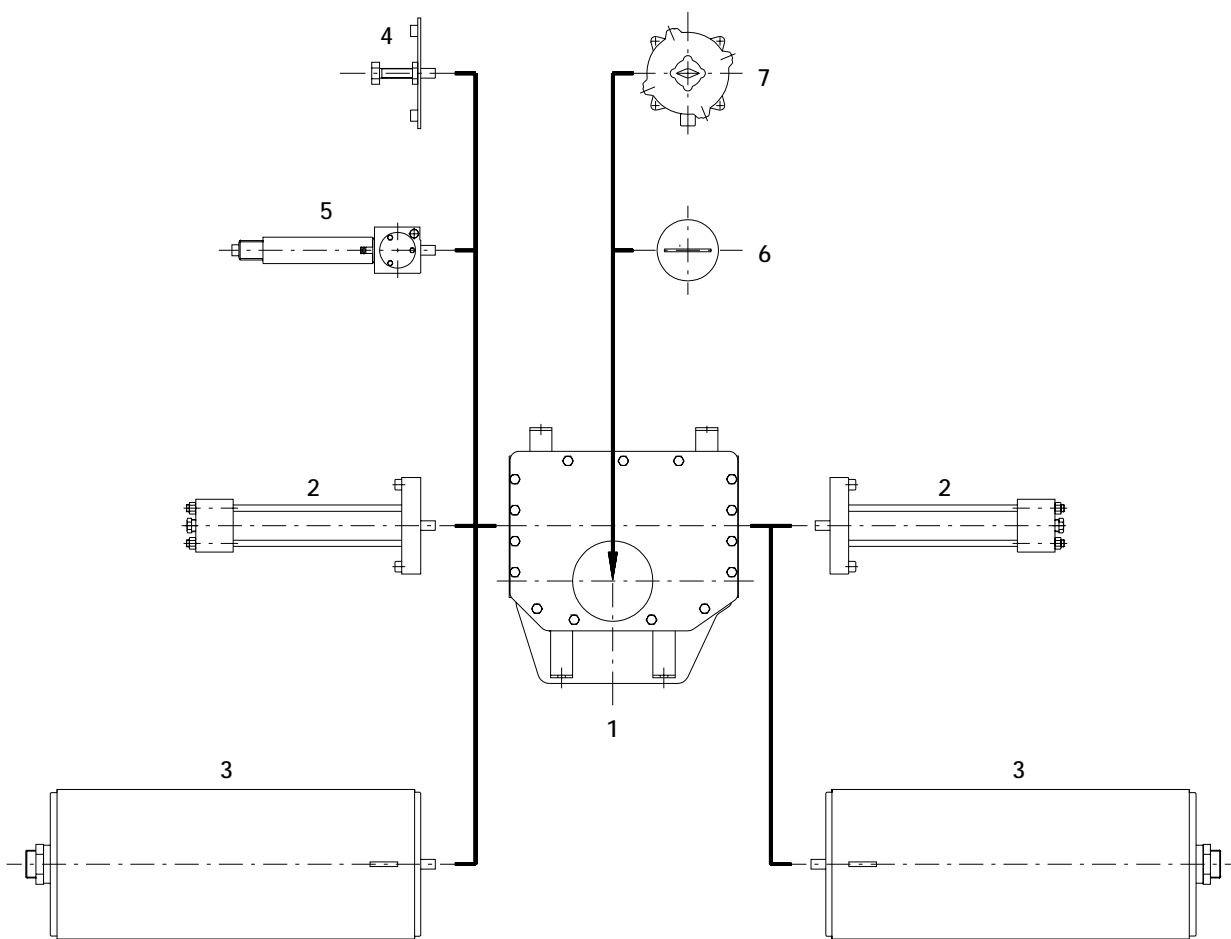


Materials specification

| 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

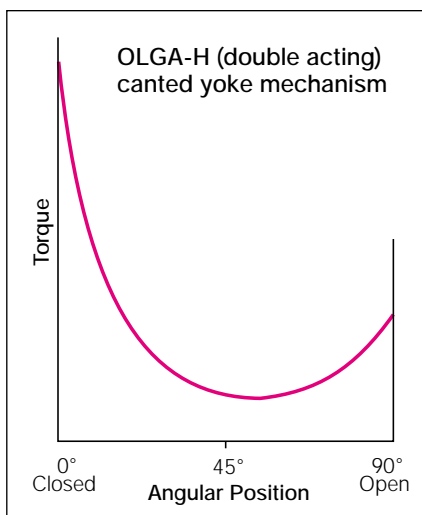
Actuator sizing general criteria

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



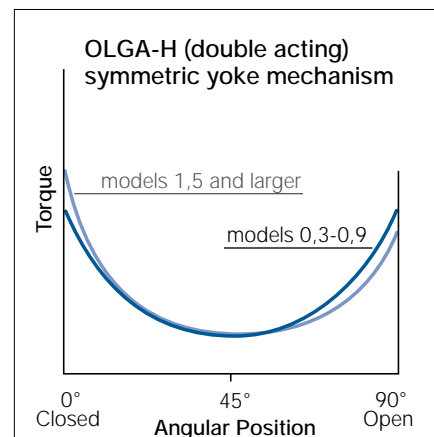
Canted scotch yoke mechanism is utilised as a standard since its output torque characteristic is in general more suited to overcome the required valve torque throughout the 90° stroke.

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



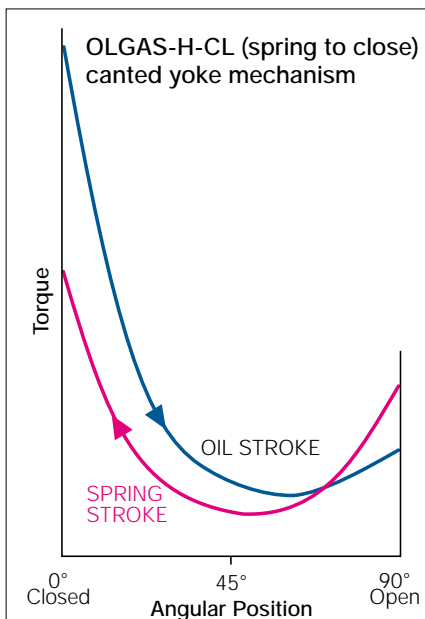
Symmetric scotch yoke mechanism is available on request as a special. The torque output characteristics generated are more suited to applications where:

- 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



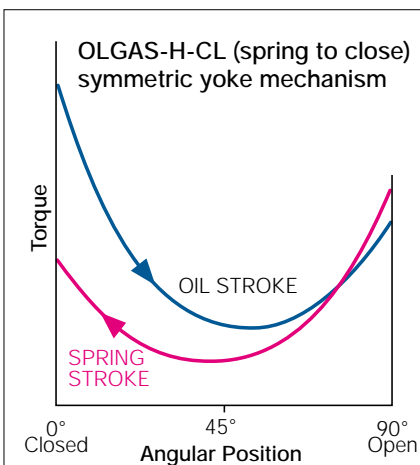
The canted scotch yoke mechanism is utilised as a standard as the output torque characteristics, of both oil and spring operation, are in general more suited to overcome the required valve torque throughout the 90° stroke.

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

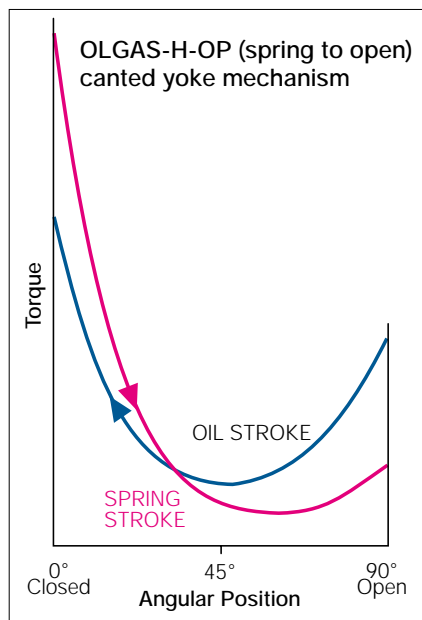
- Check that the “oil starting torque” of actuator, with minimum supply pressure, exceeds the valve “break to open torque” with maximum differential pressure
- Check that the “spring starting torque” of actuator exceeds the valve “break to close torque” with maximum working pressure in the pipeline
- 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

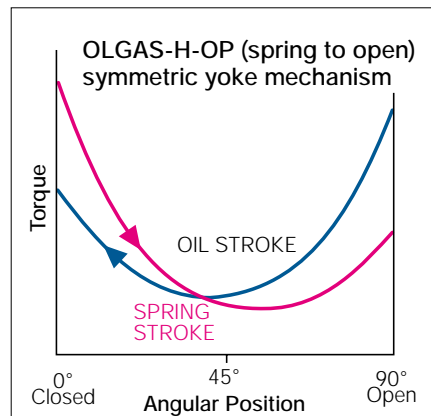


The canted scotch yoke mechanism is utilised as a standard as the output torque characteristics, of both oil and spring operation, are in general more suited to overcome the required valve torque throughout the 90° stroke. For actuator sizing the following comparisons between the valve data, including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

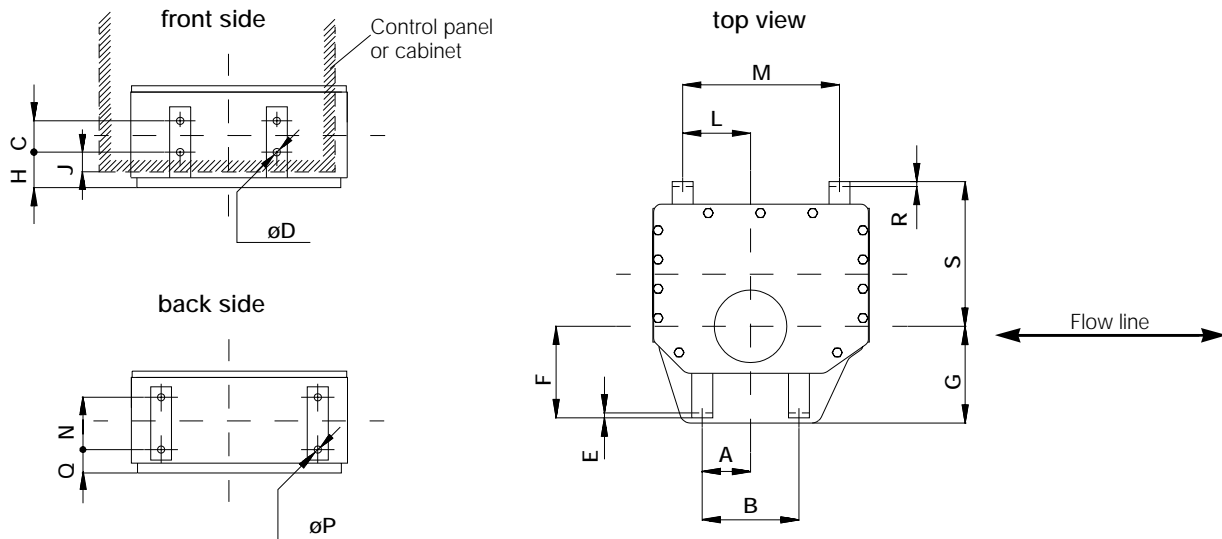


Features

- 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



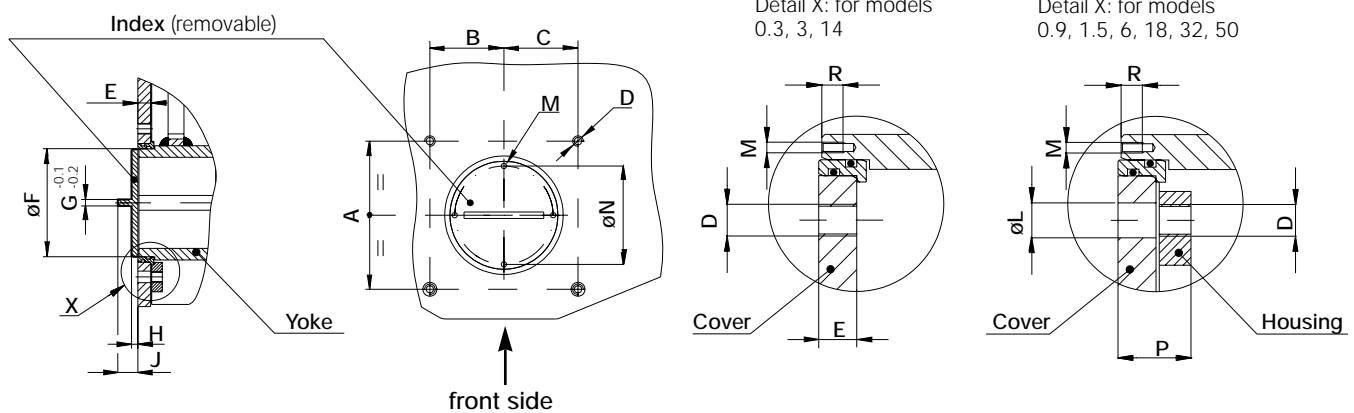
Dimensions in mm

| Model | A | B | C | ϕD | E | F | G | H | J | L | M | N | ϕP | 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

side view

top view



Dimensions in mm

| Model | A | B | C | D | E | ϕF | G | H | J | ϕL | M | ϕN | 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)

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

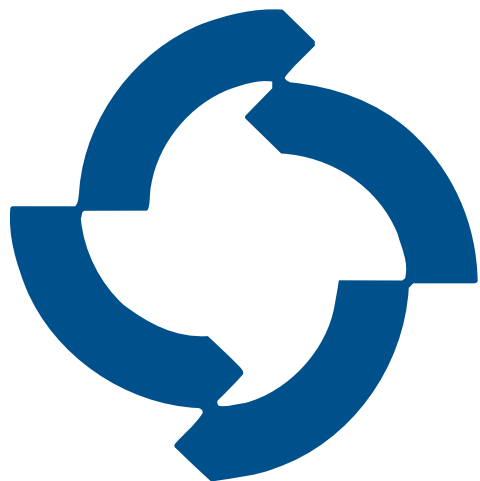
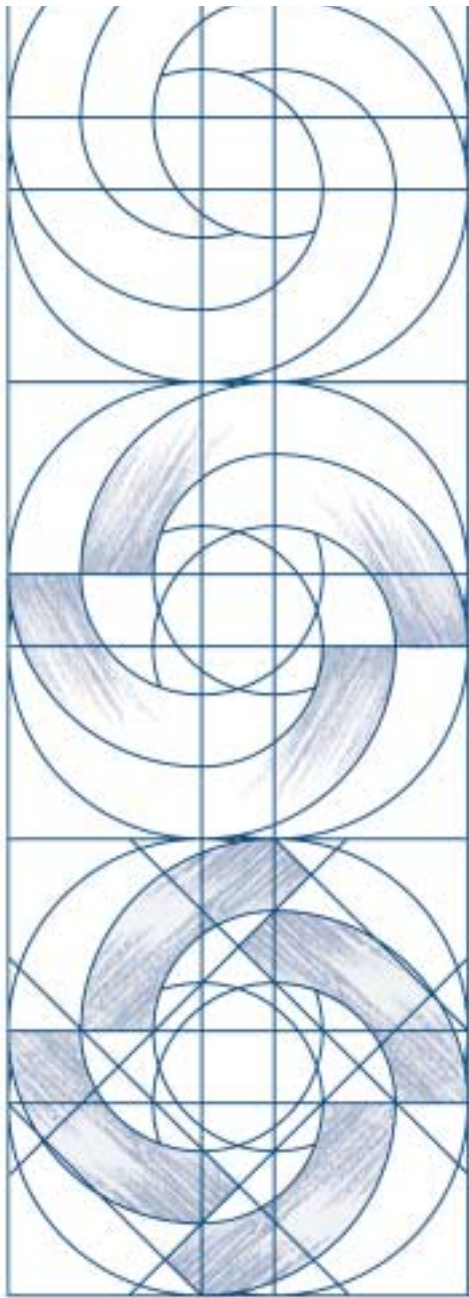
notes

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

notes



BIFFI

tyco *flow control*

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