ACTO 25 to 12500

ACTO 25

ACTO 400

Double acting hydraulic actuators

ACTO 25, 50, 100 and 200: rack and pinion kinematics

ACTO 400, 800 and 1600: scotch-yoke kinematics

ACTO 3200, 6400 and 12500: Rod and crank kinematic

Output torques up to 150000 Nm

Applications

- All sectors of market.

General information

- Designed for the operation of ¼ turn valves (butterfly valves, ball valves).
- The mounting plate is in accordance with ISO 5211 standard.
- Equipped with an interchangeable insert, they can be easily fitted on different valve shaft (square end, flat end, key....).
- In standard version, these actuators are equipped with a visual pointer (ACTO 25 to 12500) and with adjustable mechanical travel stops (ACTO 25 to 1600).
- Operation with biodegradable and non-flammable oil.

Protection

- They are hose and fine dust proof and are protected against accidental immersion effects (protection degree: IP 67).

External coating

- Standard:
  - Anti-corrosion primary coating (cataphoresis), thickness 15-25 µm, colour black
  - Anti-corrosion secondary coating by polyurethane paint, thickness 80-100 µm, colour dark grey RAL 7016.
- For submersible actuators:
  - Anti-corrosion primary coating (cataphoresis), thickness 15-25 µm, colour black
  - Anti-corrosion finition touch by bituminous epoxy paint, thickness 80-100 µm, colour black.

Working temperature range

- Standard:
  ACTO 25 to 1600: from –20° to +80° C
  ACTO 3200 to 12500: from –10° to +80° C
- Variant:
  ACTO 25 to 1600: from –20° to +120°C

Remarks

- Spare parts: Refer to the cards Kit ACTO.

Options

- Declutchable manual override (RMD),
- Emergency control by hydraulic hand pump.

General features

Designed for the operation of ¼ turn valves (butterfly valves, ball valves, …), the ACTO series of double acting hydraulic actuators develop output torques up to 150000 Nm.

The production range consists of 10 units:
- ACTO 25, ACTO 50, ACTO 100 and ACTO 200, based on rack and pinion kinematics, developing constant output torque, throughout the stroke,
- ACTO 400, ACTO 800 and ACTO 1600 based on scotch-yoke kinematics, developing variable torque well suited for operation of ¼ turn valves of larger size with significant hydrodynamic torque.
- ACTO 3200, ACTO 6400 and ACTO 12500 based on rod and crank kinematiks.

ACTO 25 to 1600: In standard version, these actuators can be submerged under 40 m of water (soft water or sea water), in crude oil or other products (protection degree equivalent to IP 68), when they are coupled in the tight way with the valve.
A construction specially designed for use in refined oil products (white products) is available.
ACTO 3200 to 12500: IP 67
They are equipped in standard version with two devices including adjustable travel stops, purging and hand pump connection (refer to page 7) and with a visual pointer.

Working temperature range:

Standard: from -20° C to + 80° C,
Variant: from -20° C to + 120° C: Please, consult us.

Output torques

Maximum oil pressure, 160 bar: For higher pressure, please consult us.
Due to the symmetry of the unit, the capacity of the opening and closing chambers are identical.

Actuator	Maximal allowable output torque in Nm	Output torque in Nm according to oil pressure			Chamber capacity in cm^3
		60 bar	90 bar	120 bar	
ACTO 25	280	125	187,5	250	39,5
ACTO 50	550	250	375	500	80,5
ACTO 100	1100	500	750	1000	156
ACTO 200	2200	1000	1500	2000	317
ACTO 400	4400	2790	4180	4400	964,6
ACTO 800	8800	5800	8700	8800	2037,4
ACTO 1600	17600	12000	17600	17600	4246,5
ACTO 3200	50000	40000	50000	50000	10178
ACTO 6400	125000	60000	90000	125000	15268
ACTO 12500	150000	143000	150000	150000	31855

Adaptation on valves

Due to their mounting plate according to ISO 5211 standard, they can be fitted directly onto any valve in accordance with this standard. They can also be fitted on other ¼ turn valves by means of an adaptation piece.
Equipped with an interchangeable insert, they can be easily mounted on different valve shaft end (square shaft end, flat shaft end, keyed shaft). They can be positioned in four positions, at intervals of 90°.

Actuator	ISO 5211 mounting plate*	Maximal allowable dimensions for the shaft			
		Driving by square	Driving by flat	Driving by key	Height
ACTO 25	F07 and F10	19	19	Please, consult us	35
ACTO 50	F10 and F12	27	27		45
ACTO 100	F12	36	36		55
ACTO 200	F14	50	46		65
ACTO 400	F16	60	55		80
ACTO 800	F16 and F25	70	75		95
ACTO 1600	F25 and F30	90	85		110
ACTO 3200	F30 and F35	130	-		180
ACTO 6400	F40 and F48	130	-		200
ACTO 12500	F48	140	-		250

* Direct adaptation onto identical mounting plate.
Adaptation by intermediate flange onto different plate (different size or shape).

Operation

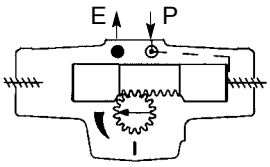
In standard version, the ACTO actuators are designed to ensure clockwise valve closure.

ACTO 25 to 200: rack and pinion kinematics

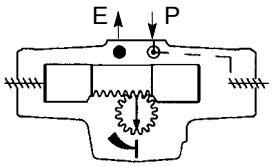
The rack and pinion kinematics develops constant output torque throughout the stroke.

Opening operation

Actuator/Valve closed

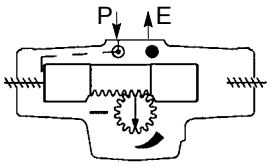


Actuator/Valve open

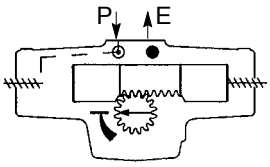


Closure operation

Actuator/Valve open



Actuator/Valve closed



ACTO 400 to 1600: yoke and slide kinematics

The yoke and slide kinematics develops variable output torque very well suited to the operation of ¼ turn valves with hydrodynamic torque.

The movement transmission is achieved by means of the piston system ①, the slide operating nut ②, the rolling pad ③ and the yoke ④.
The translation of the piston ① secured by the pressure in the actuator cylinder causes the linear travel of the operating nut ②.
This movement drives the sliding of the pads ③ in the slides of the operating nut ② and allows the rotation of the yoke ④ integral with the valve shaft.

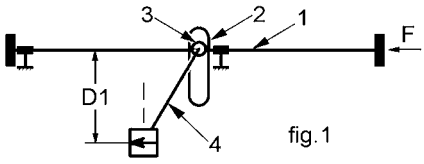


fig.1

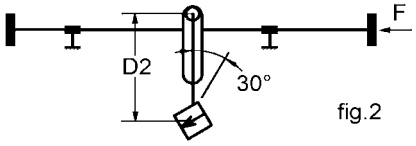


fig.2

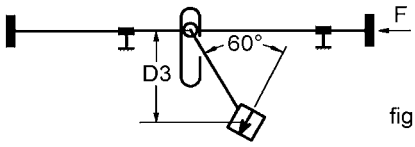


fig.3

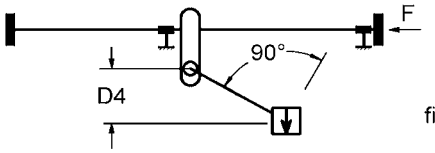
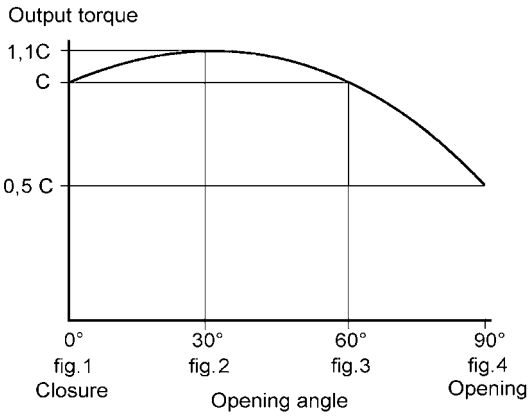


fig. 4

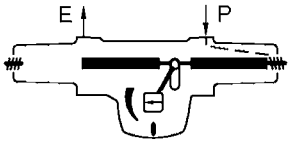
Curve of the yoke and slides kinematics



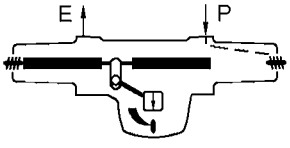
Output torque for F constant: C=FxD

Opening operation

Actuator/Valve closed

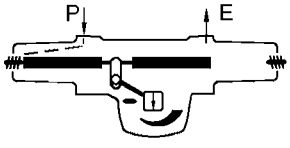


Actuator/Valve open

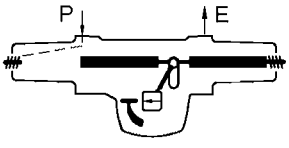


Closure operation

Actuator/Valve open



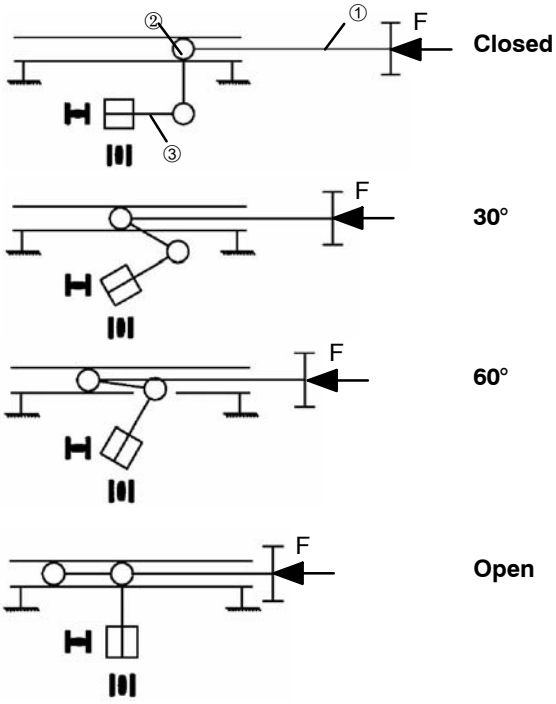
Actuator/Valve closed



ACTO 3200 to 12500: Rod and crank kinematic

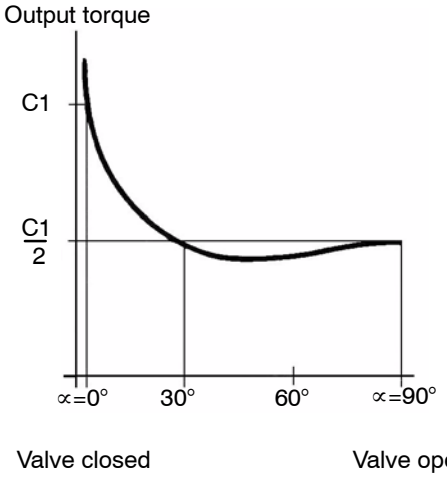
The rod and crank kinematics develops variable output torque very well suited to the operation of ¼ turn valves.

The translation of hydraulic actuator ① causes the translation of arm ②.
This translation movement is converted into a ¼ turn rotational movement of chuck ③, integral with the valve shaft.
This conversion movement is effected via the connecting rods whose length defines an exact and invariable position of the chuck during the closing operation.



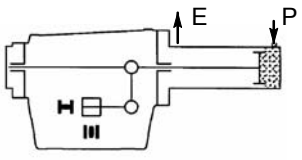
Curve of the rod and crank kinematics

With a constant force applied to the nut, the actuator output torque, fairly constant since ∝=90° (full opening of valve) up to ∝=30° increases towards infinite for total closure (∝=0°).
In practice, this torque is limited by the resistance of the mechanical assembly.
The torque C_1 is define as the nominal working torque.

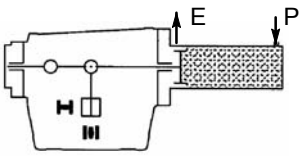


Opening operation

Actuator/ Valve closed

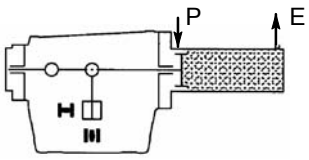


Actuator/ Valve open

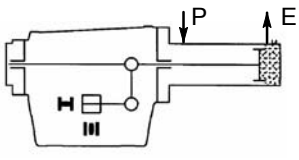


Closing operation

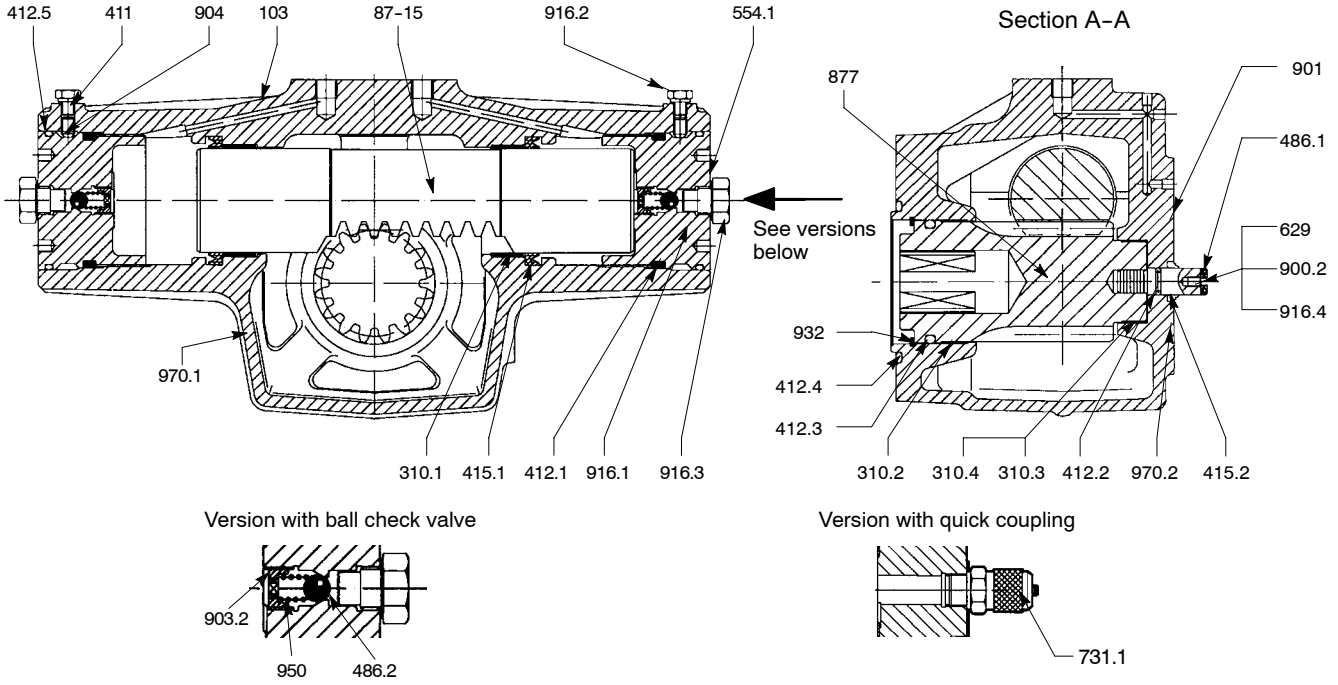
Actuator/ Valve open



Actuator/ Valve closed



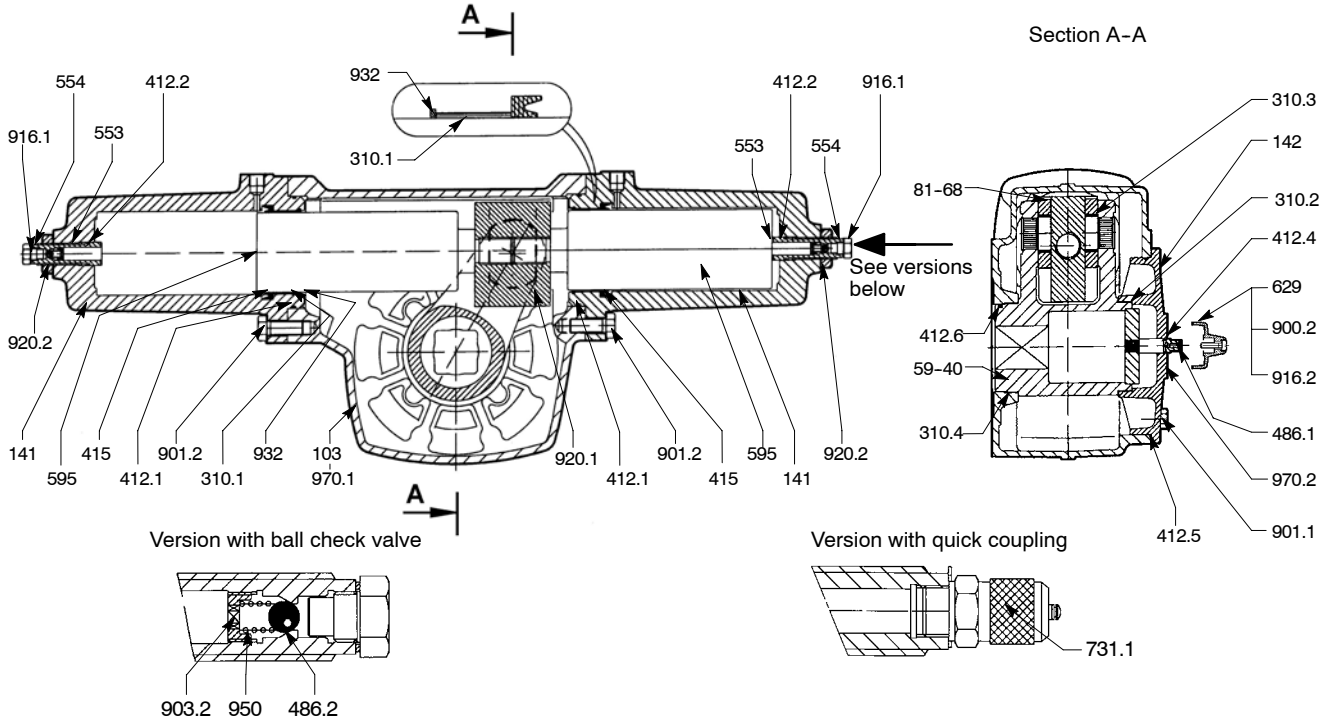
ACTO 25 to 200 – Construction



Item	Designation	Materials
103	Housing	ASTM A536 gr.60-40-18 * ductile iron
310.1	Self-lubricating bearing	Steel + bronze + PTFE
310.2	Self-lubricating bearing	Stainless steel + PTFE
310.3	Self-lubricating bearing	Stainless steel + PTFE (ACTO 25, 50 and 100 actuators)
310.4	Self-lubricating bearing	Stainless steel + PTFE (ACTO 200 actuator only)
411	Sealing washer	Copper
412.1	O-Ring	Nitrile
412.2	O-Ring	Nitrile **
412.3	O-Ring	Nitrile **
412.4	O-Ring	Nitrile * *(ACTO 50, 100 and 200 actuators)
412.5	O-Ring	Nitrile **
415.1	Lip seal ring	Nitrile
415.2	Lip seal ring	Nitrile **
486.1	Ball	Stainless steel
486.2	Ball	Stainless steel
554.1	Washer	Stainless steel A4
629	Pointer	Polyamide 6-6 + treatment against U.V. rays
731.1	Quick coupling	Stainless steel type 316
87-15	Rack	Treated steel
877	Pinion + pointer	Treated steel + Stainless steel
900.2	Cheese head screw	Stainless steel A4
901	Hexagon head screw	Stainless steel A4
903.2	Plug	Bronze
904	Socket screw	Steel
916.1	Cylinder cover	Steel + cataphoresis coating
916.2	Plug	Stainless steel A4
916.3	Check valve plug	Stainless steel A4
916.4	Protection plug	Polyethylene
932	Ring	Phosphated steel
950	Check valve spring	Steel
970.1	Identity plate	Stainless steel
970.2	Position plate	Stainless steel

* GGG 40.3 ductile iron on request
** VITON® for version submersible in white oil products.

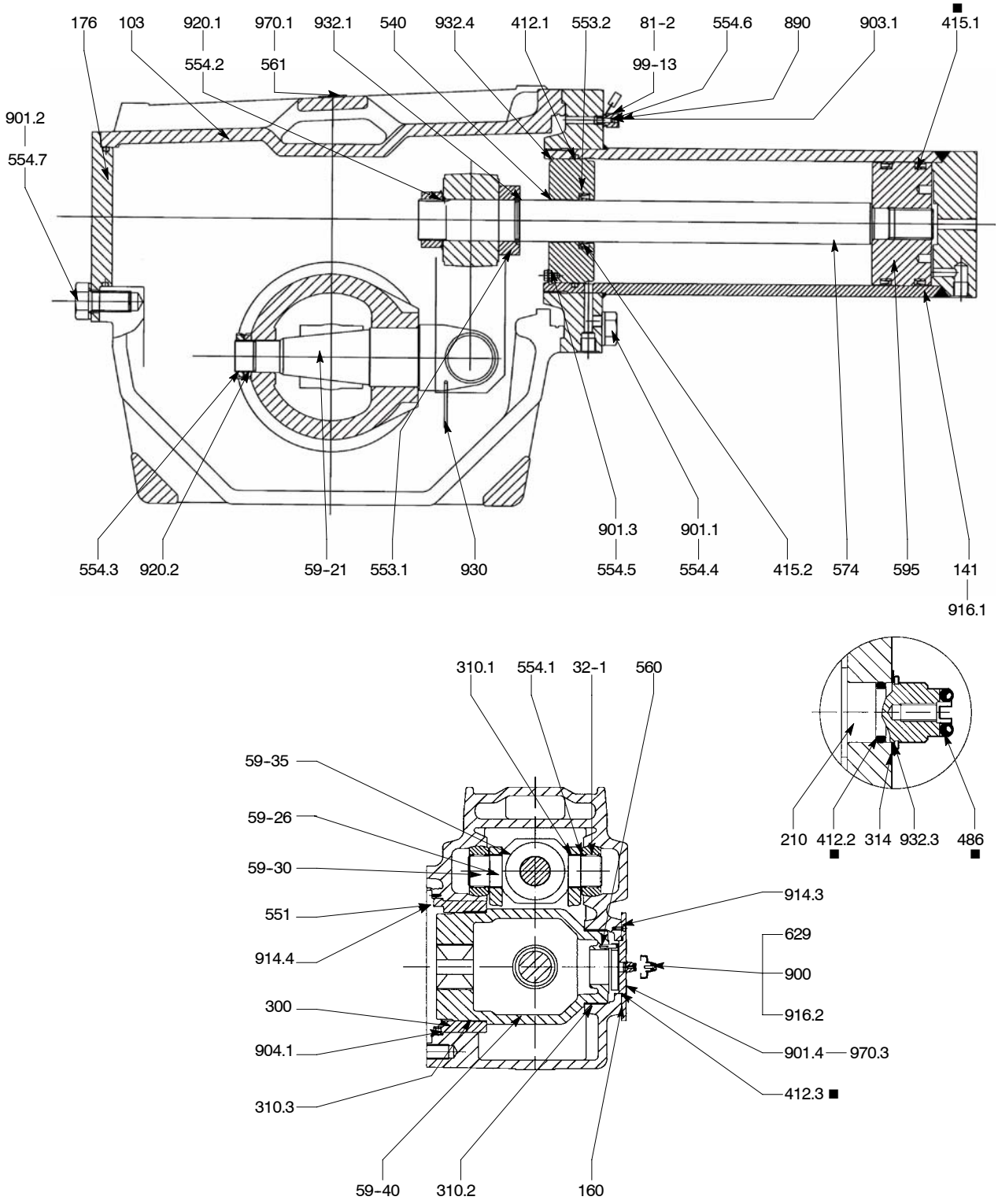
ACTO 400 to 1600 – Construction



Item	Designation	Materials
103	Housing	JL 1040(1) cast iron or JS 1030(2) ductile iron
141	Cylinder	ASTM A536 gr.60-40-18 ductile iron
142	Cover	JL 1040(1) cast iron or JS 1030(2) ductile iron
310.1	Self-lubricating bearing	Stainless steel + PTFE
310.2	Self-lubricating bearing	Stainless steel + PTFE
310.3	Self-lubricating bearing	Stainless steel + PTFE (ACTO 800 and 1600 actuators only)
310.4	Self-lubricating bearing	Stainless steel + PTFE
412.1	O-Ring	Nitrile *
412.2	O-Ring	Nitrile *
412.4	O-Ring	Nitrile *
412.5	O-Ring	Nitrile *
412.6	O-Ring	Nitrile *
415	Leap seal ring	Nitrile
486.1	Ball	Stainless steel
486.2	Ball	Stainless steel
553	Thrust insert	Stainless steel type 316
554.1	Washer	Stainless steel A4
595	Piston	Steel
59-40	Chuck + pointer shaft	JS 1030(2) ductile iron + stainless steel
629	Pointer **	Polyamide 6-6 + treatment against U.V. rays
731.1	Quick coupling	Stainless steel type 316
81.68	Pressure pad	Nitrured steel
900.2	Cheese head screw **	Stainless steel A4
901.1	Hexagon head screw	Stainless steel A4
901.2	Hexagon head screw	Stainless steel A4
903	Plug	Bronze
916.1	Check valve plug	Stainless steel A4
916.2	Protection plug **	Polyethylene
920.1	Operating nut	JS 1060(3) ductile iron
920.2	Hexagon nut	Stainless steel A4
932	Ring	Stainless steel
950	Check valve spring	Treated steel
970	Identity plate	Stainless steel
970.2	Position plate	Stainless steel

* VITON® for version submersible in white oil products.
** In case of actuator with visual signalisation.

ACTO 3200 to 12500 – Construction



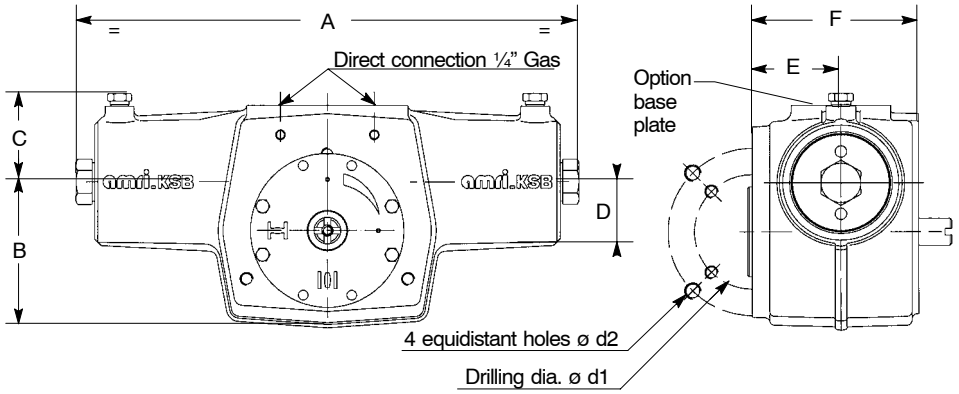
■ Parts included in the spare parts kit

ACTO 3200 to 12500 – Construction

Item	Designation	Materials
103	Housing	JS 1030 ductile iron
141	Cylinder	ASTM A536 gr.60-40-18 ductile iron
160	Cover	JS 1030 ductile iron
176	Bottom	Steel
210	Shaft	Steel
300	Bearing	Stainless steel + PTFE
310.1	Self-lubricating	Stainless steel + PTFE
310.2	Self-lubricating	Stainless steel + PTFE
310.3	Self-lubricating	Stainless steel + PTFE
314	Thrust bearing	Stainless steel
32-1	Needle	Treated steel
412.1	O-Ring	Nitrile
412.2	O-Ring	Nitrile
412.3	O-Ring	Nitrile
415.1	Leap seal ring	Nitrile
415.2	Leap seal ring	Nitrile
486	Ball	Stainless steel
540	Bush	Phosphated steel
551	Space washer	Steel
553.1	Arm thrust	Phosphated steel
553.2	Thrust	Stainless steel type 316
554.1	Washer	Treated steel
554.2	Locking washer	Treated steel
554.3	Locking washer	Treated steel
554.4	Plain washer	Treated steel
554.5	Plain washer	Stainless steel
554.6	Washer	Stainless steel
554.7	Plain washer	Stainless steel
560	Grooved pin	Stainless steel
561	Grooved nail	Stainless steel
574	Rod	Treated steel
595	Piston	Steel
59-21	Fork	Steel
59-26	Connection rod	Steel
59-30	Roller	Steel
59-35	Arm	Steel
59-40	Chuck	Steel
629	Pointer	Polyamide
81-2	Wire	Inox
890	Embase	bronze
900	Hexagon head screw	Stainless steel A4
901.1	Hexagon head screw	Stainless steel A4
901.2	Hexagon head screw	Stainless steel A4
901.3	Hexagon head screw	Stainless steel A4
901.4	Hexagon head screw	Stainless steel A4
903.1	Threaded plug	Nitrile
904.1	Grub screw	Steel
914.3	Hexagon socket head screw	Stainless steel A4
914.4	Screw	Stainless steel A2-70
916.1	Protection plug	Polyethylene
916.2	Protection plug	Polyethylene
920.1	Hexagon nut	JS 1060 ductile iron
920.2	Nut with notches	Steel
930	Retainer	Stainless steel
932.1	Ring	Stainless steel
932.3	Spring retaining ring	Stainless steel
932.4	Ring	Stainless steel
970.1	Identity plate	Stainless steel
970.3	Position plate	Stainless steel
99-13	Label	Stainless steel

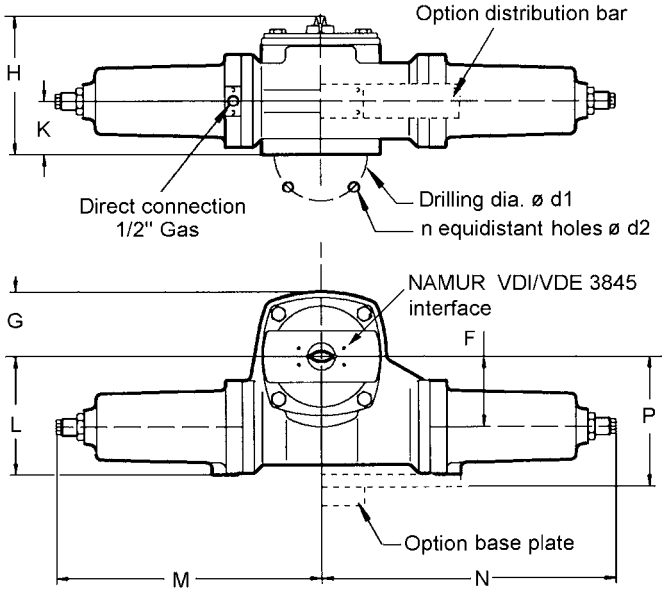
Dimensions (mm) and weight (kg)

ACTO 25 to 200



Type	A	B	C	D	E	F	ISO 5211 interface ref.	ø d1	ø d2	Weight
ACTO 25	311	90	47	30	54	121	F07	70	M8	13,0
							F10	102	M10	
ACTO 50	367	107	61	38	72	151	F10	102	M10	19,5
							F12	125	M12	
ACTO 100	429	132	73	50	100	187	F12	125	M12	33,5
ACTO 200	538	165	88	64	110	213	F14	140	M16	63,0

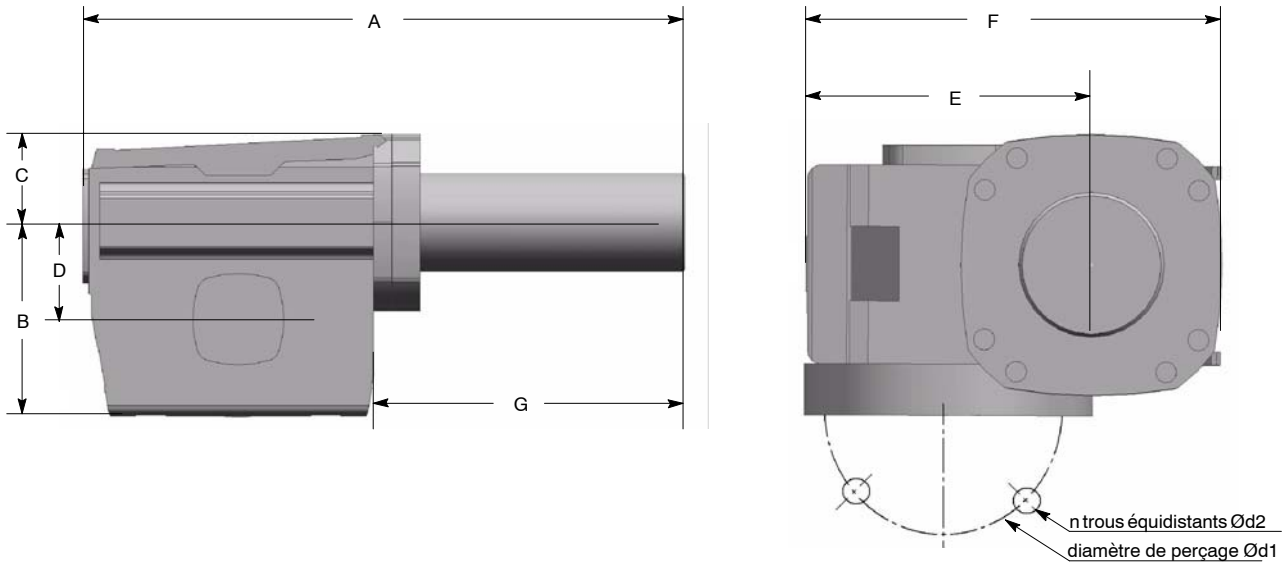
ACTO 400 to 1600



Type	F	G	H	K	L	M	N	P	ISO 5211 interface ref.	ø d1	ø d2	n	Weight
ACTO 400	125	115	246	95	210	471	523	237	F16	165	M20	4	95
ACTO 800	140	154,5	280	108,5	248	525	585	275	F16	165	M20	4	160
									F25	254	M16	8	
ACTO 1600	180	180	330	130	320	653	728	347	F25	254	M16	8	328
									F30	298	M20	8	

Dimensions (mm) and weight (kg)

ACTO 3200 to 12500



Type	A	B	C	D	E	F	G	ISO 5211 interface ref.	ø d1	ø d2	n	Weight
ACTO 3200	1292	415	176	200	220	407	593	F30	248	20	4	580
								F35	356	30	4	
ACTO 6400	1769	575	235	300	280	538	810	F40	406	36	8	1240
								F48	483	36	12	
ACTO 12500	Please, consult us											

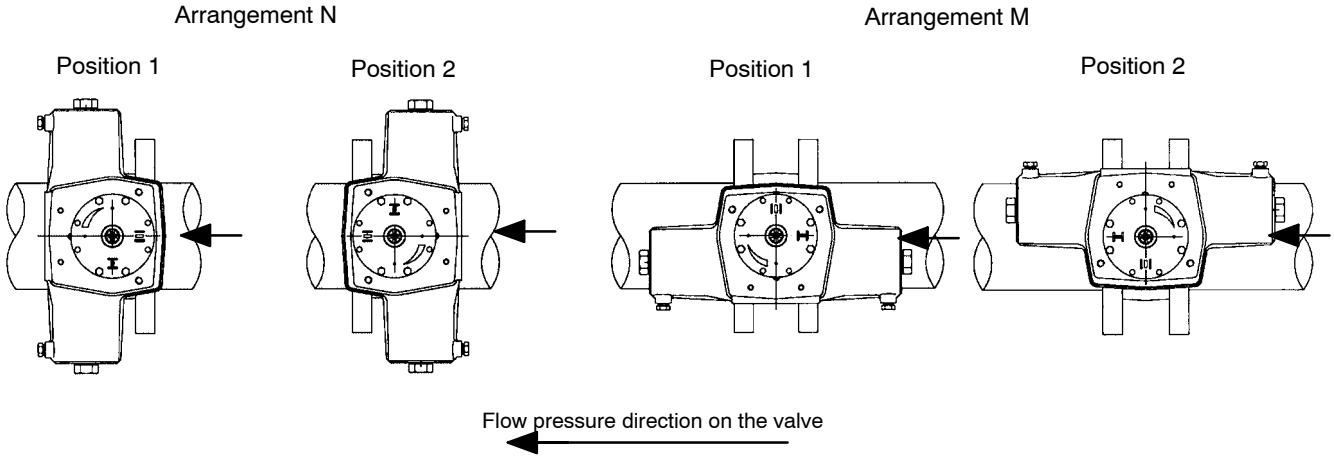
Mounting on valves

The actuator can be positioned in four positions, at intervals of 90°.

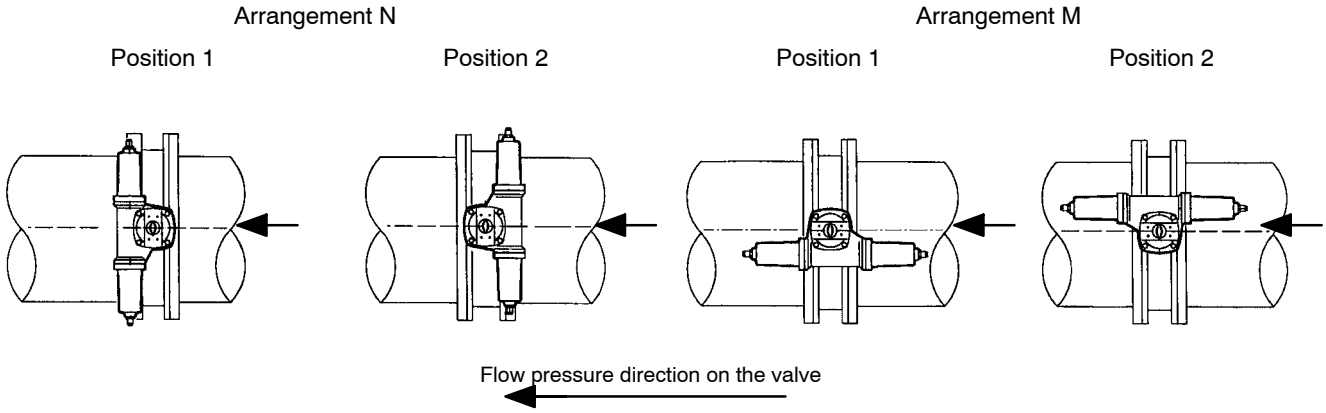
When the actuator is supplied on a valve and unless otherwise stated on the order, the actuator is mounted according to the arrangement N position1.

If the actuator is equipped with a declutchable manual override, the actuator is mounted in accordance with the arrangement M position 2.

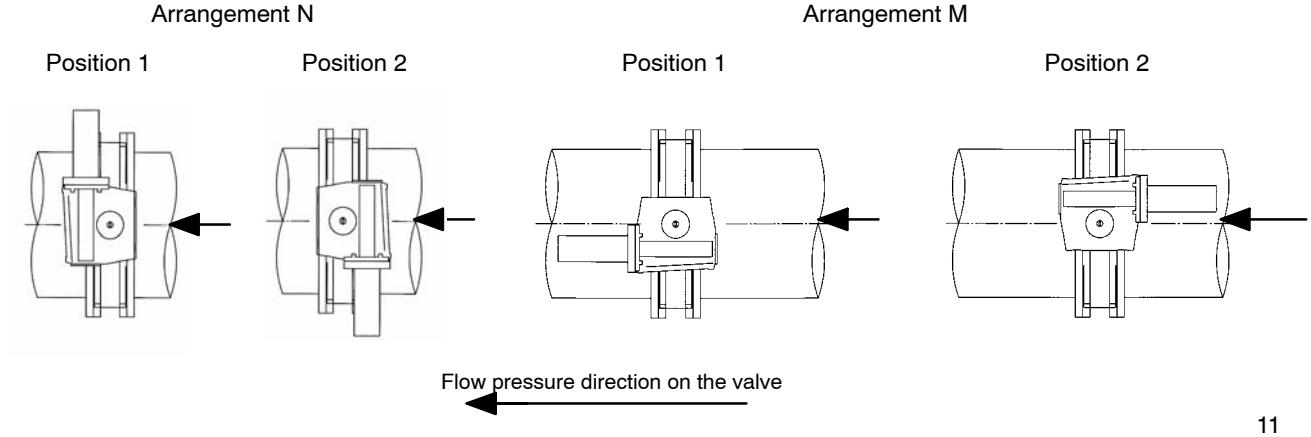
ACTO 25 to 200



ACTO 400 to 1600



ACTO 3200 to 12500



Device adjustable travel stops, purging and hand pump connection: ACTO 25 to 1600 application

The ACTO hydraulic actuators are equipped, at each cylinder end, with a special device allowing the three following functions :

- mechanical adjustable travel stops on open and closed positions. The adjustment range is ± 2° for ACTO 25 to 200 actuators and ± 2,5° for ACTO 400 to 1600 actuators. These travel stops are factory adjusted during the fitting of the actuator on the valve,
- purging of the cylinder chambers,
- connection of an emergency control by hydraulic hand pump.

2 versions are available for the draining and hydraulic hand pump connection functions (see pages 4 and 5):
- version with ball check valve,
- version with quick coupling.

External coating - Protection

Standard protection:
- anti-corrosion primary coating (cataphoresis), thickness 15-25 μm.
- anti-corrosion secondary coating by polyurethane paint, thickness 80-100 μm, colour dark grey RAL 7016.
  This protection has been tested in our laboratories for use in saline fog, according to NFX 41-002 standard.

Submersible actuators :
- anti-corrosion primary coating (cataphoresis), thickness 15-25 μm.
- anti-corrosion finition touch by bituminous epoxy paint, thickness 80-100 μm, colour black.
  This protection has been tested in our laboratories for use in saline fog, according to NFX 41-002 standard.

Other protections :
On request, other coatings can be made in accordance with customer specifications. Please consult us.

Version suited for immersion in refined petroleum products: “clean oils”: please consult us.

Characteristics of the cataphoresis primer

The cataphoretic paint coating is obtained from an aqueous solution paint type acting as an electrolyte.
The paint particles have the ability to migrate on the part to be protected and to sediment thereon as uniform protective layers.

This EPOXY type organic coating has a thickness in the range of 15 to 25 μm and ensures excellent corrosion resistance with:
- Excellent chemical inertness and outstanding corrosion resistance (neutral salt spray test per NFX 41-002),
- Good solvent resistance, good insulation resistance,
- Good mechanical properties,...

This flexible coating can withstand scratches and impacts.

Oil characteristics

Mineral oil, biodegradable and non-flammable (HFA - HFB - HFC).
Viscosity: 10 cst (mm^2/sec) to 100 cst (mm^2/sec).
Cleanliness class: class 9 according to NAS 1638, equivalent to class 18/15 in accordance with ISO 4408 standard. Filtration is recommended.

Variant: Hydraulic fluid type HFD: Please, consult us.

Hydraulic connections

Standard version: direct connection

The oil connection is done directly onto the housing:
- ACTO 25 to 200: by means of two 1/4" Gas threaded ports,
- ACTO 400 to 1600: by means of two " Gas threaded ports.
- ACTO 3200 to 12500: by means of two 1/2" Gas threaded ports.

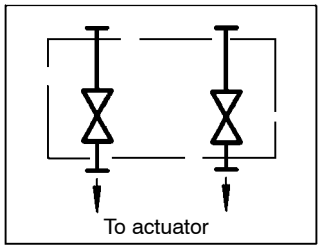
Caution : *In this case, the position holding of the actuator is achieved by the oil pressure holding. If the piloting accessories cannot ensure this function, the use of a distribution plate with piloted check valves (BSP) is recommended. See below.*

Optional version with distribution plate: ACTO 25 to 1600 application

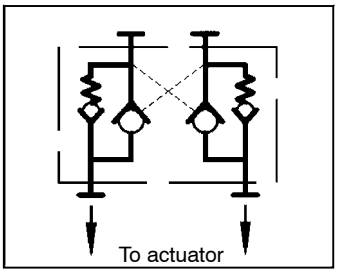
The oil connection is done by means of an hydraulic distribution box:
- ACTO 25 to 200: fitted directly onto the housing,
- ACTO 400 to 1600: fitted on a distribution bar.

The oil connection on the hydraulic box is via two 1/4" Gas threaded ports.
Faur distribution boxes are available, according to the diagrams below.

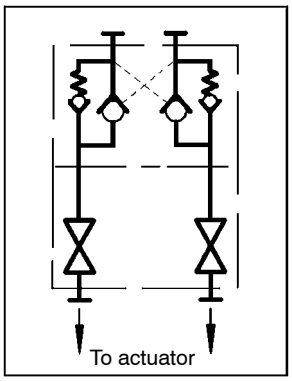
Distribution plate
with isolating valves
(RI)



Distribution plate
with piloted check valves
(BSP)

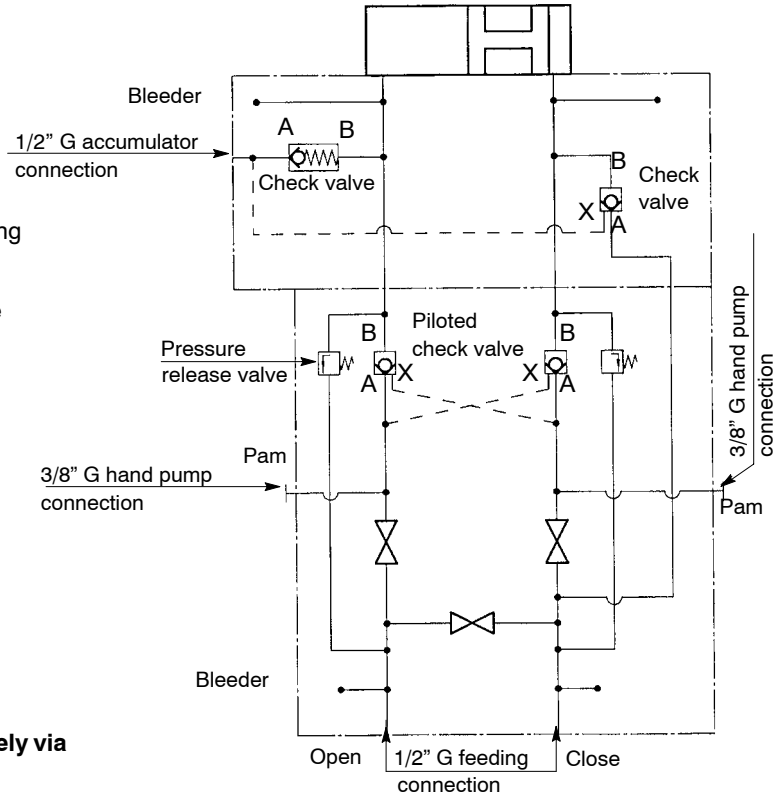


Distribution plate with
isolating valves and piloted check valves
(RI + BSP)



"ESD" block ("Emergency shut Down")

This block allows the emergency control in closing for the valve thanks to an oil accumulator under pressure.
In order to be effective, ESD control must not be enabled during opening operation.



Note: In all cases, control is performed remotely via an hydraulic power pack.

Hydraulic connection

Version with control via AMTRONIC PowerPack: ACTO 25 to 800 application

The micro-power pack system is fitted directly onto the actuator with direct hydraulic connections.
This system includes:
- A hydraulic pump driven by an electrical motor,
- An oil tank,
- Open/close detection and position feedback,
- Integrated System to control the electrical motor and monitor position,
- Communication via fieldbus (Option).

The hydraulic actuator fitted with the AMTRONIC PowerPack system doesn't need to be connected to a central PowerPack.

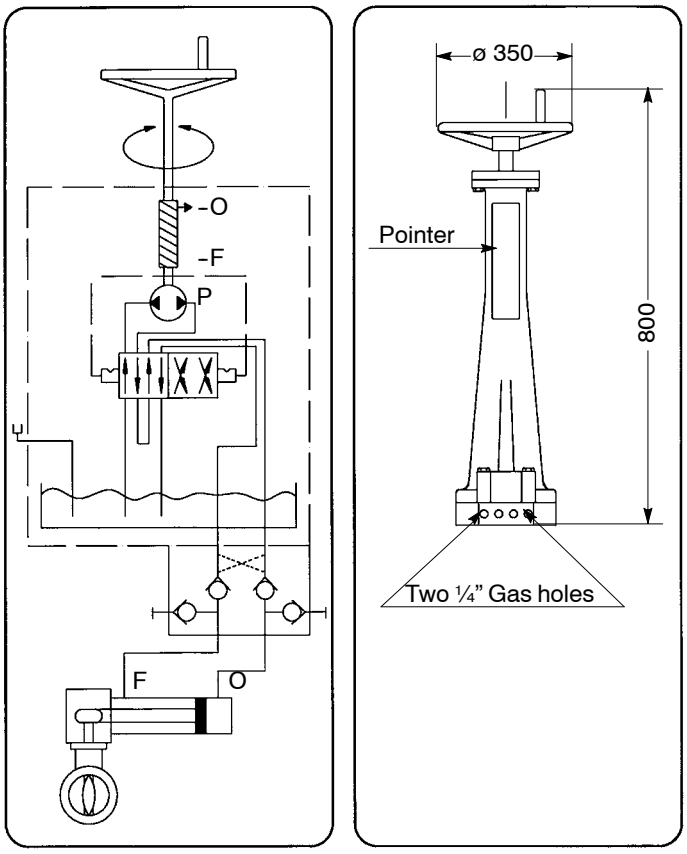
AMTRONIC PowerPack system may be used remotely. In such a case it is connected to the hydraulic actuator by means of tubes.

Consult Type series booklet AMTRONIC PowerPack ref. 8535.1-10

Version with remote actuation via a hydrostatic control: ACTO 25 to 12500 application

Manual remote control via a hydraulic system composed of:
- Deck stand with handwheel and actuating screw,
- Pump and hydraulic distributor,
- The deck stand also functions as the hydraulic fluid tank.

The hydraulic connections to the actuator are by means of flexible or rigid tubes.



Indication function: ACTO 25 to 12500 application

Limit switch box AMTROBOX-R

This limit switch box is made of cast iron with a suitable corrosion resistant coating.
Open/close detection and position feedback:
- On/off position detection by means of microswitches or inductive proximity detectors (1/O, 1/C, 1 on intermediate position on request).
- Proportional distribution for resistive angular position sensor, (voltage or 4–20 mA pilot).

Enclosure protection: IP 67

Options:
- Intrinsically safe version EEx-ia IICT6
- Visual indication of valve position by flag.

Consult Type series booklets ref. 8524.11–10 and 8525.11–10.

Explosion-proof limit switch box type EEx-d

Protection box: EEx-dIIBT6

Consult Type series booklet ref. 8526.11–10

Options for manual override

Declutchable manual override: ACTO 25 to 1600 application

The manual override using a declutchable gear box may be fitted between the valve mounting plate and the actuator.
This manual override will override with the pneumatic actuator and can be set in clutched or declutched positions.
This device is based on worm wheel and screw kinematics.
In this case, the hydraulic actuator is always fitted with a bypass system allowing the communication of the 2 chambers and the safe use of the disengageable control.
Please consult us.

Note: The manual override should only be used under the following recommendations:
- absence of air pressure in the actuator,
- Leakage to air free of all the cylinders of the actuator.
The manual override should not be declutched when pressure is in the actuator.

Construction:
- Housing, cover and extension in JL 1040 grey cast iron,
- Handwheel in welded iron,
- Screw in steel,
- Worm in JS 1030 spheroidal graphite cast iron,
- Drive shaft, clutch lever, locking pointer, adjustable mechanical travel stops (+/–5°) and external bolting in stainless steel.

Protection :
They are hose and fine dust proof (protection degree: IP 65).
Construction for protection degree IP 67 on request: please, consult us.

External coating:
Polyurethane paint (colour dark grey RAL 7016, 80 µm thickness).

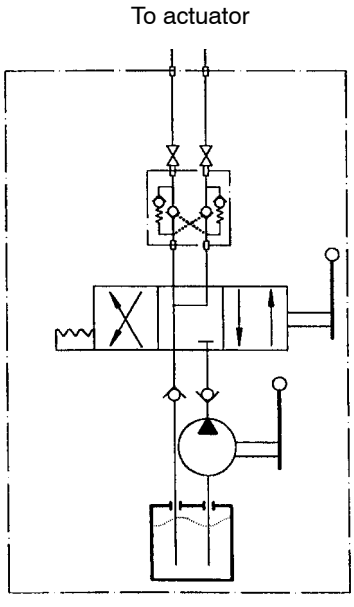
Working temperature range:
From –20° C to +80° C.

Consult Type series booklet ref 5350.1–10

Emergency control by hydraulic hand pump ACTO 25 to 12500 application

Emergency control system using a hand pump and manual control hydraulic distributor.

This control may be fixed or portable.



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