



**Spring return
hydraulic actuators**

**DYNACTO 12, 25, 50 and 100:
rack and pinion kinematics**

**DYNACTO 200 and 400:
scotch-yoke kinematics**

Output torques up to 4000 Nm

General features

Designed for the operation of ¼ turn valves (butterfly valves, ball valves, ...), the DYNACTO series of spring return hydraulic actuators develop output torques up to 4000 Nm.

The production range consist of 7 units:

- DYNACTO 12, DYNACTO 25, DYNACTO 50 and DYNACTO 100, based on rack and pinion kinematics,
- DYNACTO 200 and DYNACTO 400, based on scotch-yoke kinematics.

In standard version, these actuators can be submerged under 30 m of water (soft water or sea water), in crude oil or other products (protection degree equivalent to IP 68).

They are equipped in standard version with a visual pointer.

Output torques

Output torques (in Nm) as a function of control fluid pressure and safety function.

In order to ensure the safety function (closing or opening) in case of missing control fluid, the DYNACTO single-acting actuators are fitted with a spring-loaded energy accumulator.

The energy accumulator is sized according to the control fluid pressure.

DYNACTO	Output torque delivered by energy accumulator (spring cartridges)		Output torque during compression phase of energy accumulator versus control fluid supply pressure						Chamber capacity in cm ³
	Springs		60 bar (oil)		90 bar (oil)		120 bar (oil)		
	Start	End	Start	End	Start	End	Start	End	
Rack and pinion kinematics (see curves and operation page 4)									
12	127	63	64	10	-	-	-	-	39,5
	168	98	-	-	96	35	-	-	
	210	133	-	-	-	-	132	62	
25	320	145	126	25	-	-	-	-	80,5
	373	188	-	-	192	55	-	-	
	444	250	-	-	-	-	252	120	
50	510	230	250	55	-	-	-	-	156,0
	690	370	-	-	375	128	-	-	
	830	510	-	-	-	-	500	255	
100	970	520	540	160	-	-	-	-	317,0
	1370	820	-	-	780	300	-	-	
	1660	1120	-	-	-	-	1030	520	
Scotch-yoke kinematics (see curves and operation pages 5 and 6)									
Closing by lack of control fluid (oil)									
200	800	1000	1200	700	-	-	-	-	964,6
	1000	1700	-	-	2400	1000	-	-	
	1000	2150	-	-	-	-	2200	1000	
400	1000	1500	2200	1000	-	-	-	-	2037,6
	1500	2700	-	-	3260	1400	-	-	
	2000	4000	-	-	-	-	4200	2080	
Opening by lack of control fluid (oil)									
200	1500	500	600	1100	600	1580	-	-	964,6
	2500	1000	-	-	-	-	1000	2080	
400	2300	900	800	2010	1000	3200	-	-	2037,6
	4400	1500	-	-	-	-	2000	4170	

The maximum oil pressure should not exceed 160 bar.

The hydraulic cylinder is equipped with a device including adjustable travel stops and purging.

Adaptation on valves

The interface for connection onto the valve meets the requirements of standard ISO 5211.

Generally adaptation is made directly, via an adaptation flange is required.

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°.

mm

Actuator	ISO 5211 mounting plate*	Maximal allowable dimensions for the shaft			
		Driving by square	Driving by flat	Driving by key	Height
DYNACTO 12	F07 et F10	19	19	Please, consult us	35
DYNACTO 25	F10 et F12	27	27		45
DYNACTO 50	F12	36	36		55
DYNACTO 100	F14	50	46		65
DYNACTO 200	F16	60	55		80
DYNACTO 400	F16 et F25	70	75		95

* Direct adaptation onto identical mounting plate.

Adaptation by intermediate flange onto different plate (different size or shape).

This range of single-acting hydraulic actuators is completed by the ACTO range of dual-acting hydraulic actuators and the ENNACTO range of single-acting hydraulic actuators with gas cartridge.

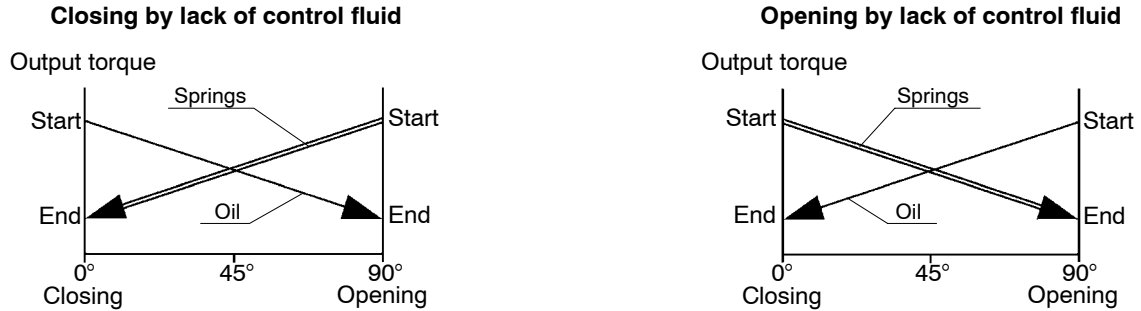
Consult the type series booklets for ACTO 25 to 1600 ref. 8506.1-10 and ENNACTO 200 to 12500 ref. 8560.11-10.

Operation

DYNACTO 12 to 100: rack and pinion kinematics

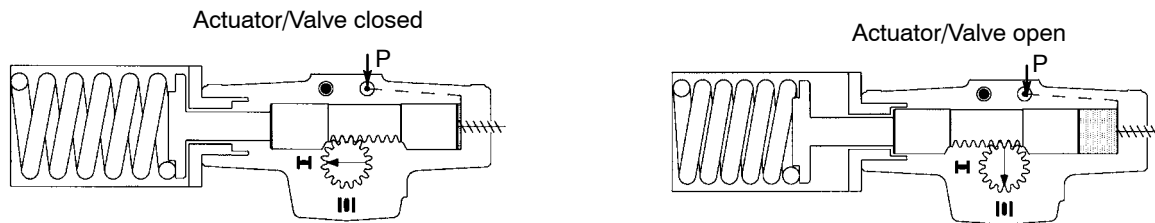
The rack and pinion kinematics develop a linear output torque. The movement of the rack/piston secured by the control fluid pressure causes a ¼ turn rotation of the pinion integral with the valve shaft: the pressure ensures at once the valve operation and the compression of the spring cartridges. The spring cartridges reset the valve in safety position when the pressure is cut-off.

Curve of the rack and pinion kinematics

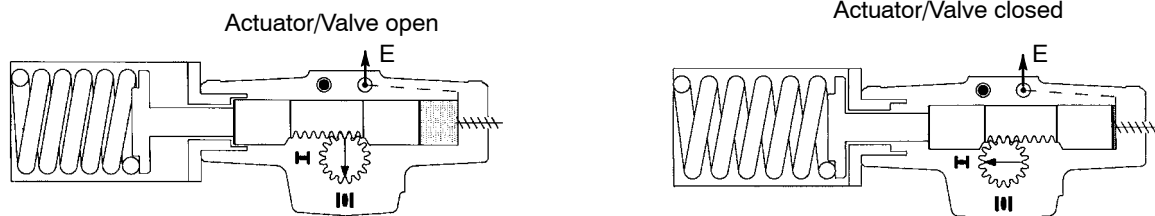


Version with closing upon missing oil pressure

Opening by control oil pressure

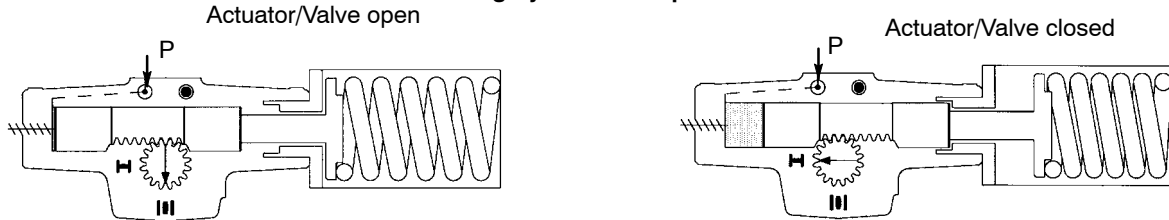


Closing operation under springs action

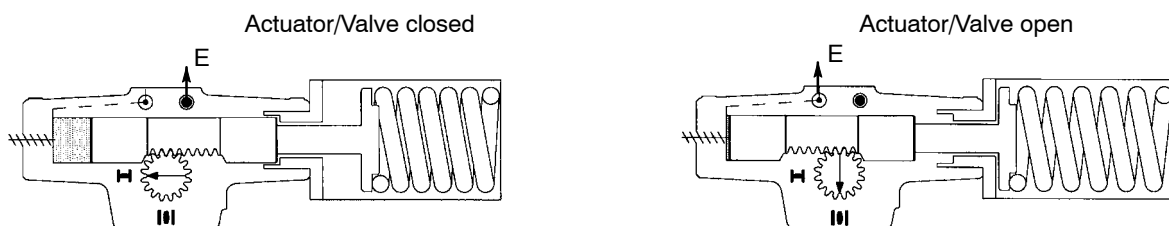


Version with opening upon missing oil pressure

Closing by control oil pressure



Opening operation under springs action



During the operation under control fluid pressure, the holding in position is only achieved by the pressure in the chambers.

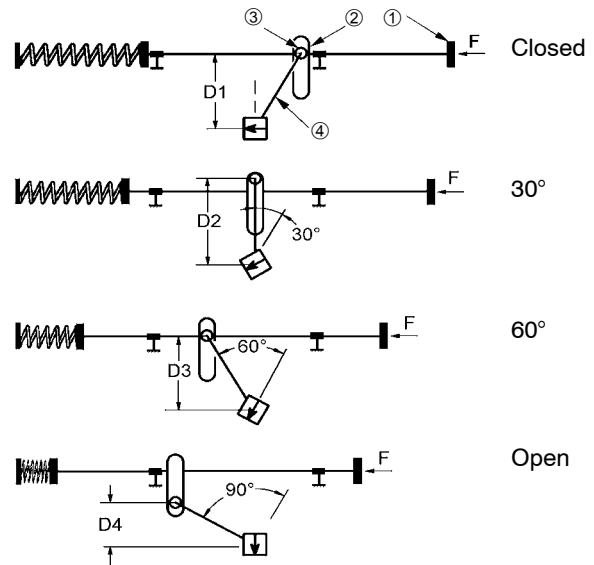
DYNACTO 200 and 400: yoke and slide kinematics

The yoke and slide kinematics develops variable output torque very well suited to the operation of 1/4 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 2 slides of the operating nut ② and allows the rotation of the yoke ④ integral with the valve shaft.

The control fluid pressure ensures at once the valve operation and the compression of the springs.

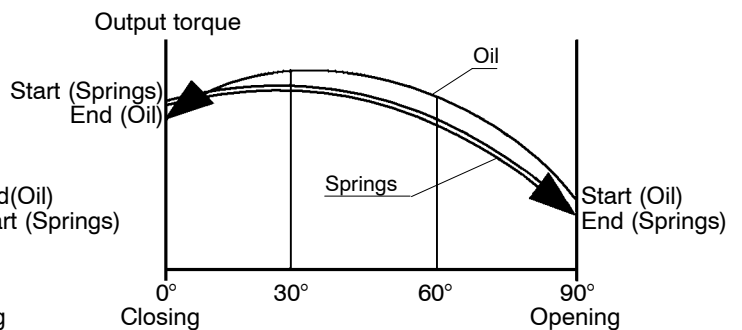
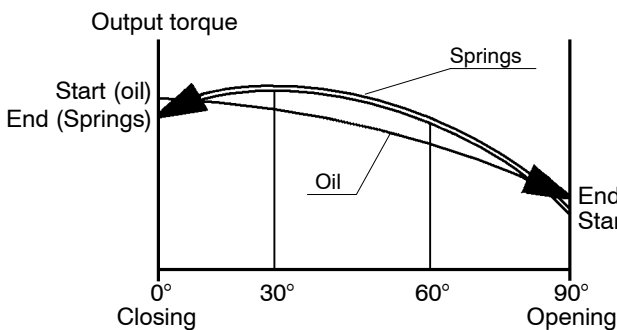
The springs reset the valve in safety position when the pressure is cut-off.



Curve of the yoke and slides kinematics

Closing by lack of control fluid

Opening by lack of control fluid

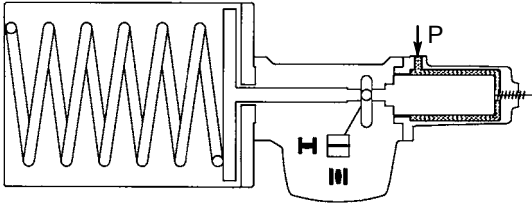


During the operation under control fluid pressure, the holding in position is only achieved by the pressure in the chambers.

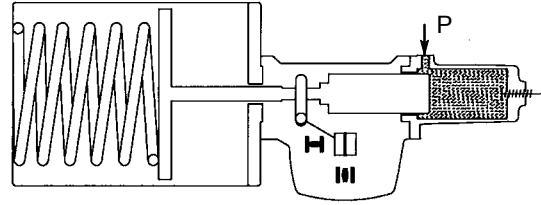
Version with closing upon missing oil pressure

Opening by control oil pressure

Actuator/Valve closed

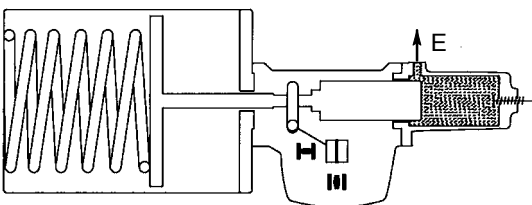


Actuator/Valve open

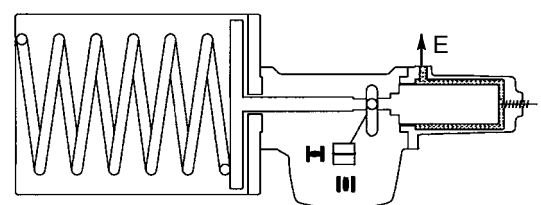


Closing operation under springs action

Actuator/Valve open



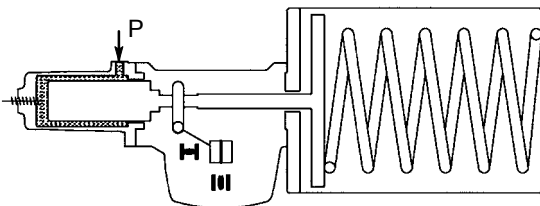
Actuator/Valve closed



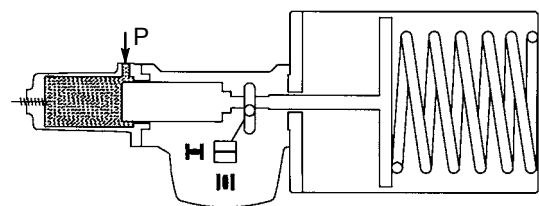
Version with opening upon missing oil pressure

Closing by control oil pressure

Actuator/Valve open

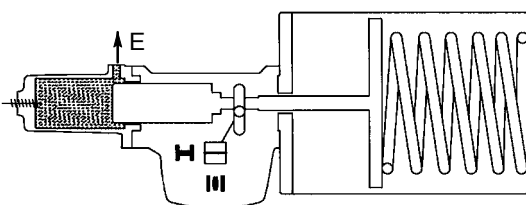


Actuator/Valve closed

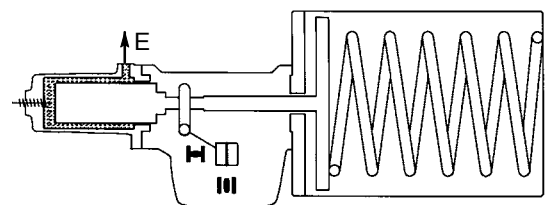


Opening operation under springs action

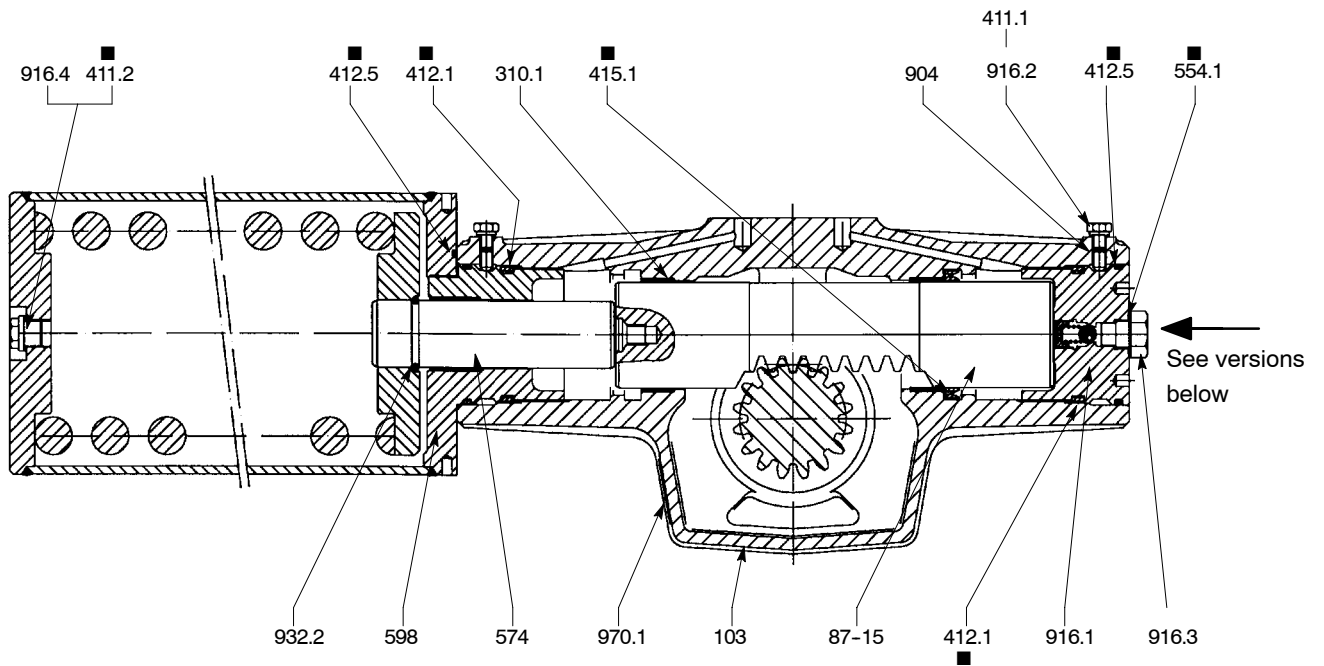
Actuator/Valve closed



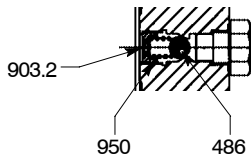
Actuator/Valve open



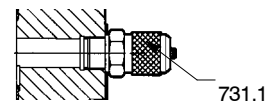
DYNACTO 12 to 100 – Construction



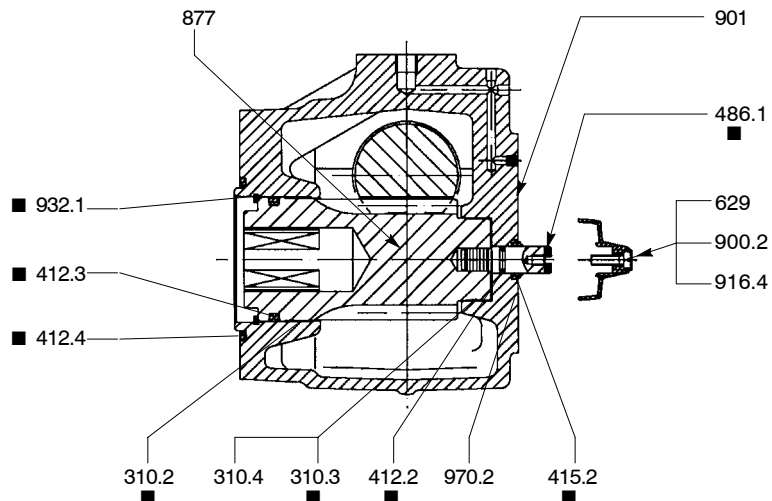
Version with ball check valve



Version with quick coupling



Section A-A



■ Parts included in the spare parts kit

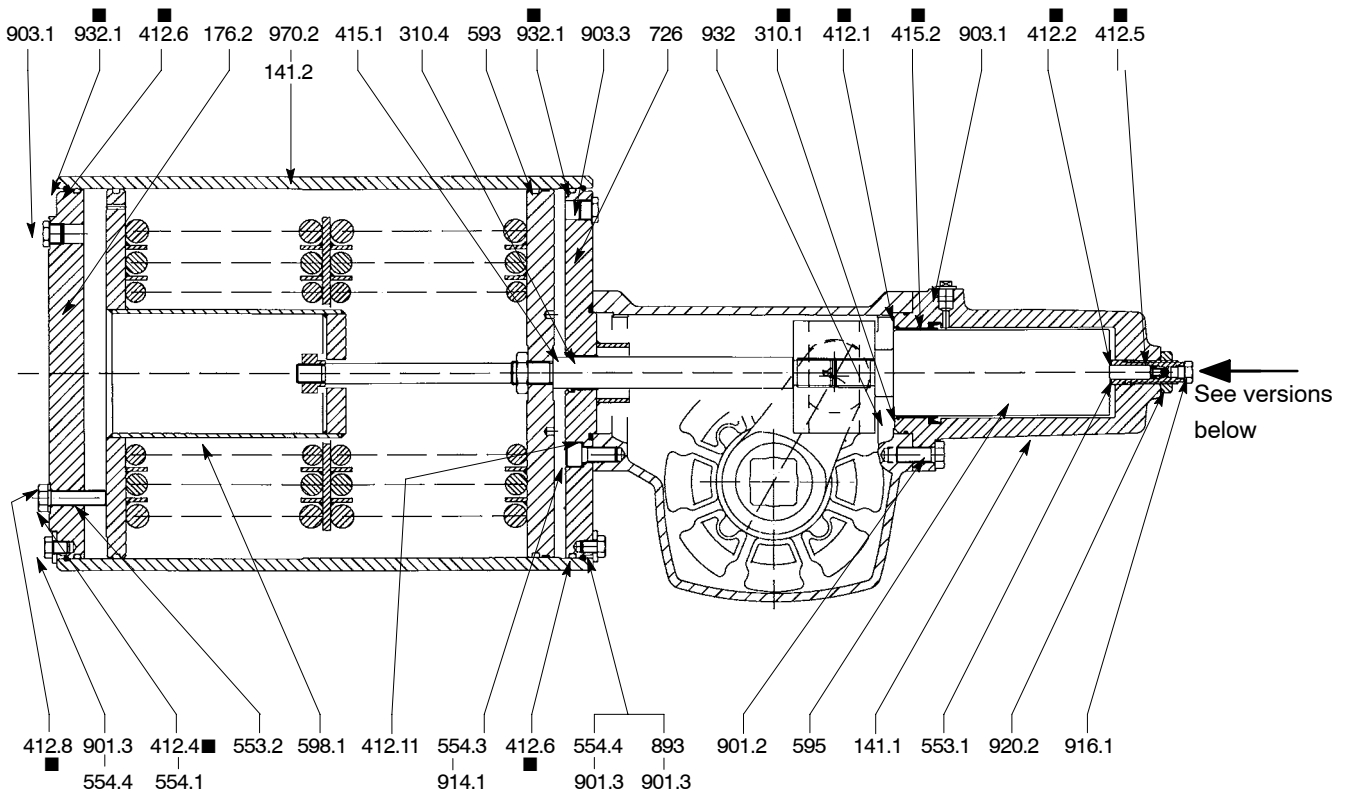
DYNACTO 12 to 100 – Construction

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 (25, 50 and 100 series)
310.4	Self-lubricating bearing	Stainless steel + PTFE (only 200 serie)
411.1	Sealing washer	Copper
411.2 ■	Sealing washer	Copper
412.1 ■	O-Ring	Nitrile
412.2 ■	O-Ring	Nitrile **
412.3 ■	O-Ring	Nitrile **
412.4 ■	O-Ring	Nitrile **(50, 100 and 200 serie)
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
574	Rod	Treated steel
598	Spring cartridge	Steel
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
932.1 ■	Ring	Phosphated steel
932.2	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

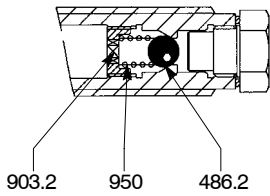
** VITON® for version submersible in white oil products.

DYNACTO 200 and 400 – Construction

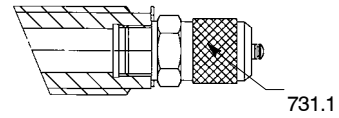


See versions below

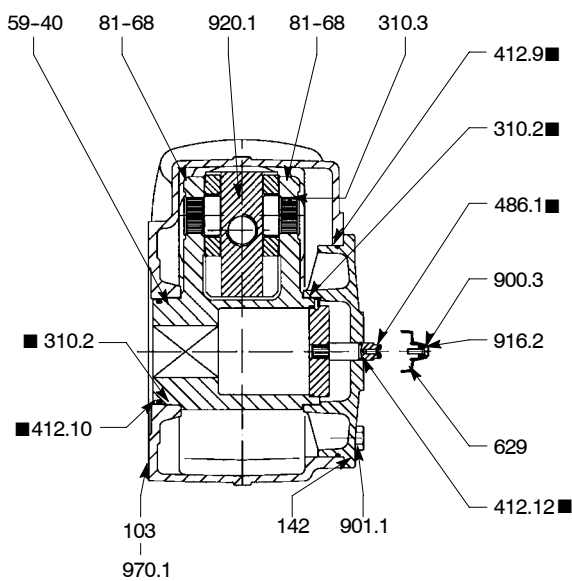
Version with ball check valve



Version with quick coupling



Section A-A



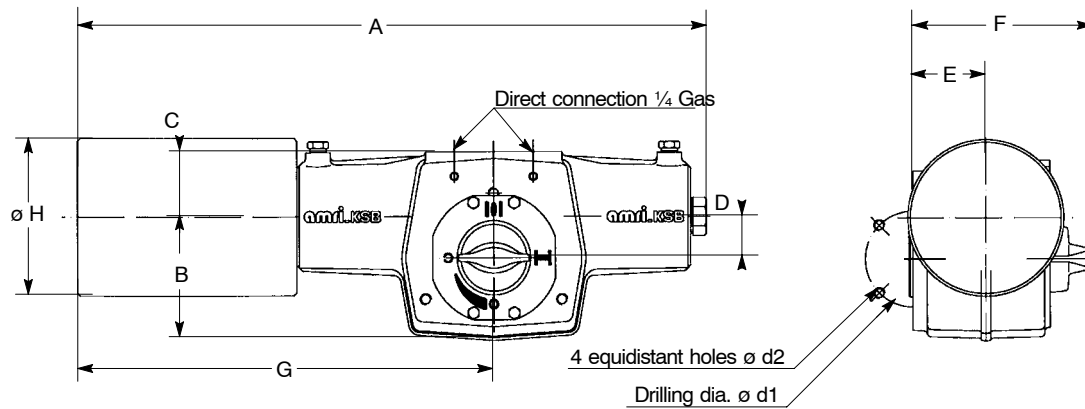
■ Parts included in the spare parts kit

DYNACTO 200 and 400 – Construction

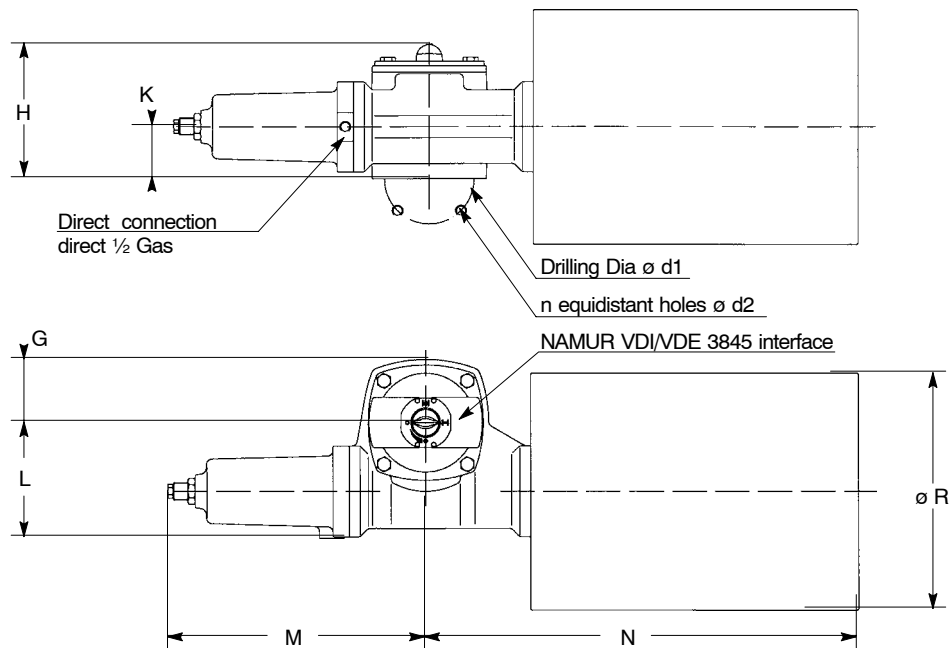
Item	Designation	Materials
103	Housing	JL 1040 cast iron or JS 1030 ductile iron
141.1	Cylinder	ASTM A536 gr.60-40-18 ductile iron
141.2	Cylinder	ASTM A536 gr.60-40-18 ductile iron
142	Cover	JL 1040 cast iron or JS 1030 ductile iron
176.2	Cylinder head	Steel
310.1 ■	Self-lubricating bearing	Stainless steel + PTFE
310.2 ■	Self-lubricating bearing	Stainless steel + PTFE
310.3	Self-lubricating bearing	Stainless steel + PTFE
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 *
412.8 ■	O-Ring	Nitrile *
412.9 ■	O-Ring	Nitrile *
412.10 ■	O-Ring	Nitrile *
412.11	O-Ring	Nitrile *
412.12	O-Ring	Nitrile *
415.1 ■	Leap seal ring	Nitrile *
415.2 ■	Leap seal ring	Nitrile *
486.1 ■	Ball	Stainless steel
486.2	Ball	Stainless steel
553.1	Thrust insert	Stainless steel type 316
553.2	Hexagon head screw	Stainless steel
554.1	Washer	Stainless steel A4
554.3	Washer	Nylon
554.4	Washer	Stainless steel
593	Guiding strip	PTFE
59-40	Chuck + pointer shaft	JS 1030 ductile iron + stainless steel
595	Piston	Steel
598.1	Spring cartridge	Steel
629	Pointer **	Polyamide 6-6 + treatment against U.V. rays
726	Guide flange	Steel
731.1	Quick coupling	Stainless steel type 316
81-68	Pressure pad	Nitrured steel
893	Soleplate	Stainless steel type 316
900.3	Cheese 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
903.1	Plug	Bronze
903.2	Plug	Bronze
903.3	Threaded plug	Bronze
914.1	Hexagon socket head cap screw	Steel
916.1	Check valve plug	Stainless steel A4
916.2	Protection plug **	Polyethylene
920.1	Operating nut	JS 1060 ductile iron
920.2	Hexagon nut	Stainless steel A4
932	Ring	Stainless steel
932.1 ■	Ring	Stainless steel
950	Check valve spring	Treated steel
970.1	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.

Dimensions (mm) and weight (kg)
DYNACTO 12 to 100


Type	A	B	C	D	E	F	G	ϕH	ISO 5211 interface			Weight
									réf.	$\phi d1$	$\phi d2$	
DYNACTO 12	585	90	47	30	54	121	441	95	F07	70	M8	19,0
									F10	102	M10	
DYNACTO 25	655	107	61	38	72	151	483	127	F10	102	M10	29,0
									F12	125	M12	
DYNACTO 50	726	132	73	50	100	187	523	169	F12	125	M12	55,0
DYNACTO 100	932	165	88	64	110	213	674	219	F14	140	M16	103,0

DYNACTO 200 and 400


Type	F	G	H	K	L	M	N	ϕR	ISO 5211 interface				Weight
									réf.	$\phi d1$	$\phi d2$	n	
DYNACTO 200	125	115	246	95	210	471	776	406	F16	165	M20	4	240,0
DYNACTO 400	140	154,5	280	108,5	248	525	927	508	F16	165	M20	4	515,0
									F25	254	M16	8	

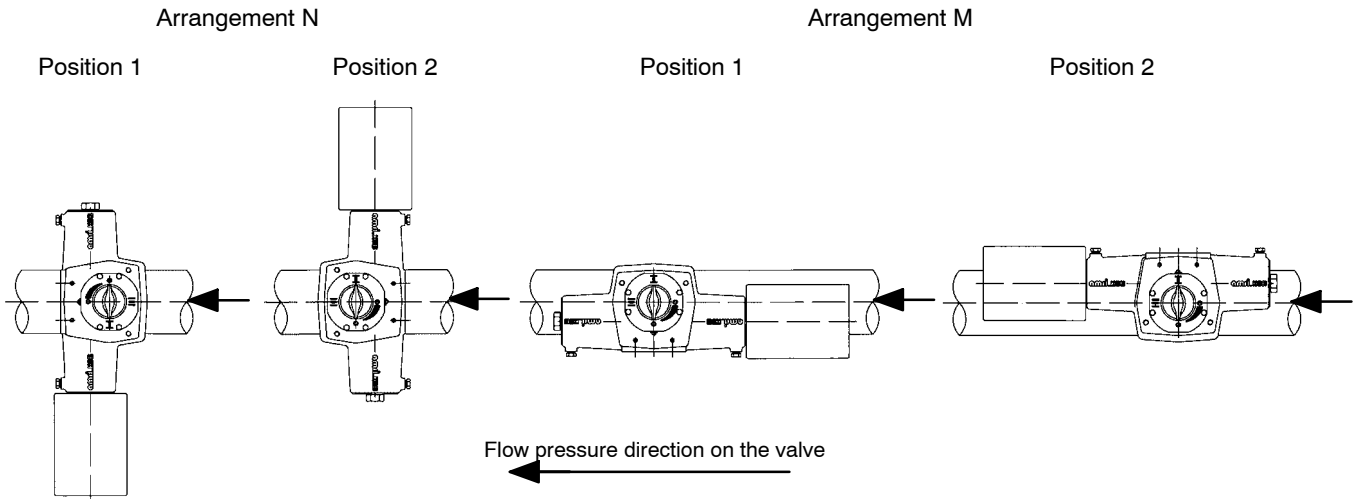
Mounting on valves

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

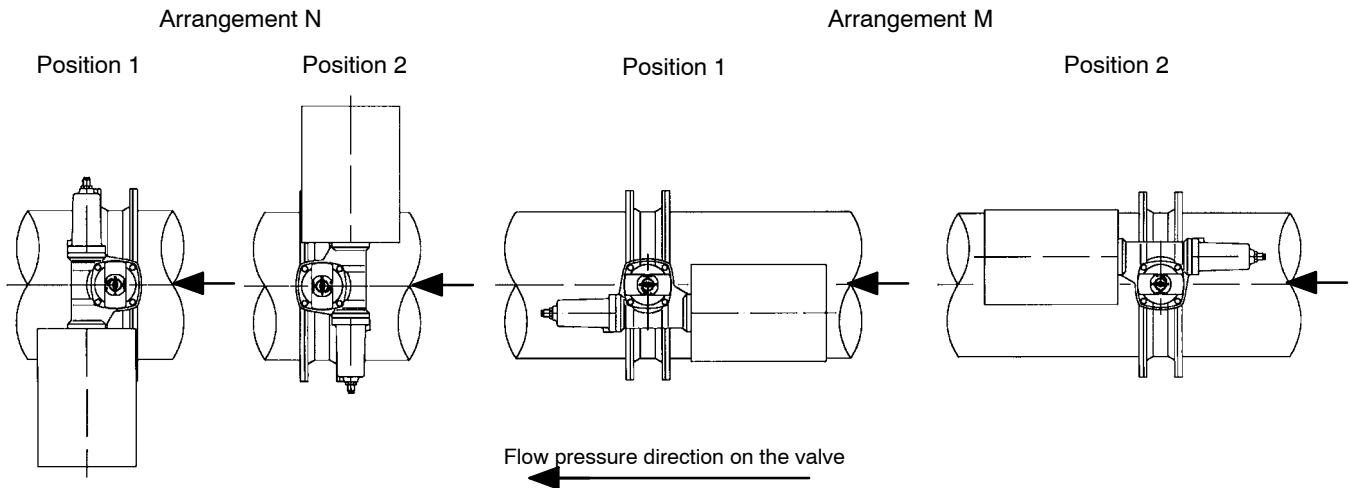
When the actuator is supplied on a valve and unless otherwise stated on the order, the actuator is mounted according to the arrangement N position 1.

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

DYNACTO 12 to 100



DYNACTO 200 and 400



Device adjustable travel stops, purging and hand pump connection

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

- mechanical adjustable travel stop on open and closed positions. The adjustment range is $\pm 2^\circ$ for DYNACTO 12 to 100 actuators and $\pm 2,5^\circ$ for DYNACTO 200 and 400 actuators. This travel stop are factory adjusted during the fitting of the actuator on the valve,
- purging of the cylinder chamber,
- connection of an emergency control by hydraulic hand pump.

2 versions are available for the draining and hydraulic hand pump connection functions (see pages 7 and 9):

- version with ball check valve,
- version with quick coupling.

External coating - Protection

Standard protection:

- anti-corrosion primary coating (cataphoresis), thickness 20–25 µm.
- anti-corrosion secondary coating by polyurethane paint, thickness 125 µ, 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 20–25 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.

Version adapted for an immersion in the refined petroleum products: "white products": 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 10 to 20 µm and ensures excellent corrosion resistance with:

- Excellent chemical inertness and outstanding corrosion resistance (neutral salt spray test per NFX 41002),
- Good solvent resistance, good insulation resistance,
- Good mechanical properties,...

This flexible coating can withstand scratches and impacts.

Other protections :

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

Oil characteristics

Mineral oil, biodegradable and non-flammable (HFA - HFB - HFC).

Viscosity: 10 cst (mm²/sec) to 100 cst (mm²/sec).

Cleanliness class: class 9 according to NAS 1638, equivalent to class 18/15 in accordance with ISO 4408 standard. Filtration is recommended.

Hydraulic connection

Standard version: direct connection

The oil connection is done directly onto the housing:

- DYNACTO 12 to 100: by means of two 1/4 Gas threaded ports,
- DYNACTO 200 and 400: 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.*

Note: In this case, control actuator is performed remotely via an hydraulic power pack.

Version with control via AMTRONIC PowerPack

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



Indication function

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 IIC T6
- Visual indication of valve position by flag.

Consult type series booklet ref. 8524.11-10.



Explosion-proof limit switch box type EEx-d

Protection box: EEx-dIIB T6

Consult type series booklet ref. 8526.11-10



Options for manual override

Declutchable manual override: DYNACTO 12 to 100 only

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.

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



Instructions for override operation

The manual override should only be used under the following recommendations:

- absence of air pressure in the actuator,
- the actuator chambers must be to the open air.

Check the actuator is not under air pressure before use the manual override.

Override clutch

- 1 – Unlock the unit by pulling the locking pointer,
- 2 – Keep the pointer in pulled position and turn the clutch lever to the clutched position,
- 3 – Release the pointer, it must bolt itself in low position.

Manual emergency control use

- 4 – Operate the valve by turning the handwheel.
 - Turns number for a complete operation
 - DYNACTO 12 : 10 turns
 - DYNACTO 25 and 50 : 12 turns
 - DYNACTO 100 : 13 turns
- 5 – Bring the emergency control back to its initial position by turning the handwheel in the opposite direction

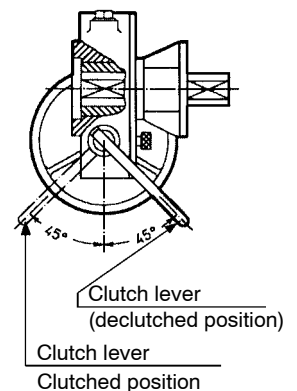
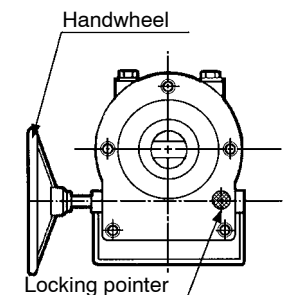
Override declutch

- 6 – Repeat the clutch operations in the opposite way.

Caution : *the clutch lever operation is not allowed when the springs are compressed, that causes damages to the override. The declutch operation can be done only with the actuator in safety position, i.e. springs decompressed.*

The operation no. 5 must be imperatively done before system declutch.

The actuator can be now pressurized.

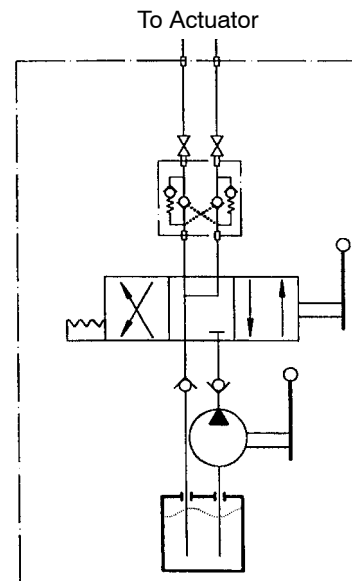


Options Manual override

Emergency control by hydraulic hand pump for DYNACTO 12 to 400

Emergency control system via hand pump and manually operated hydraulic distributor.

This control system can be stationary or portable. In this case, the actuator is fitted with quick couplings for direct connection of the hydraulic hand pump.



This leaflet is not contractual and may be amended without notice.

11.07.05

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