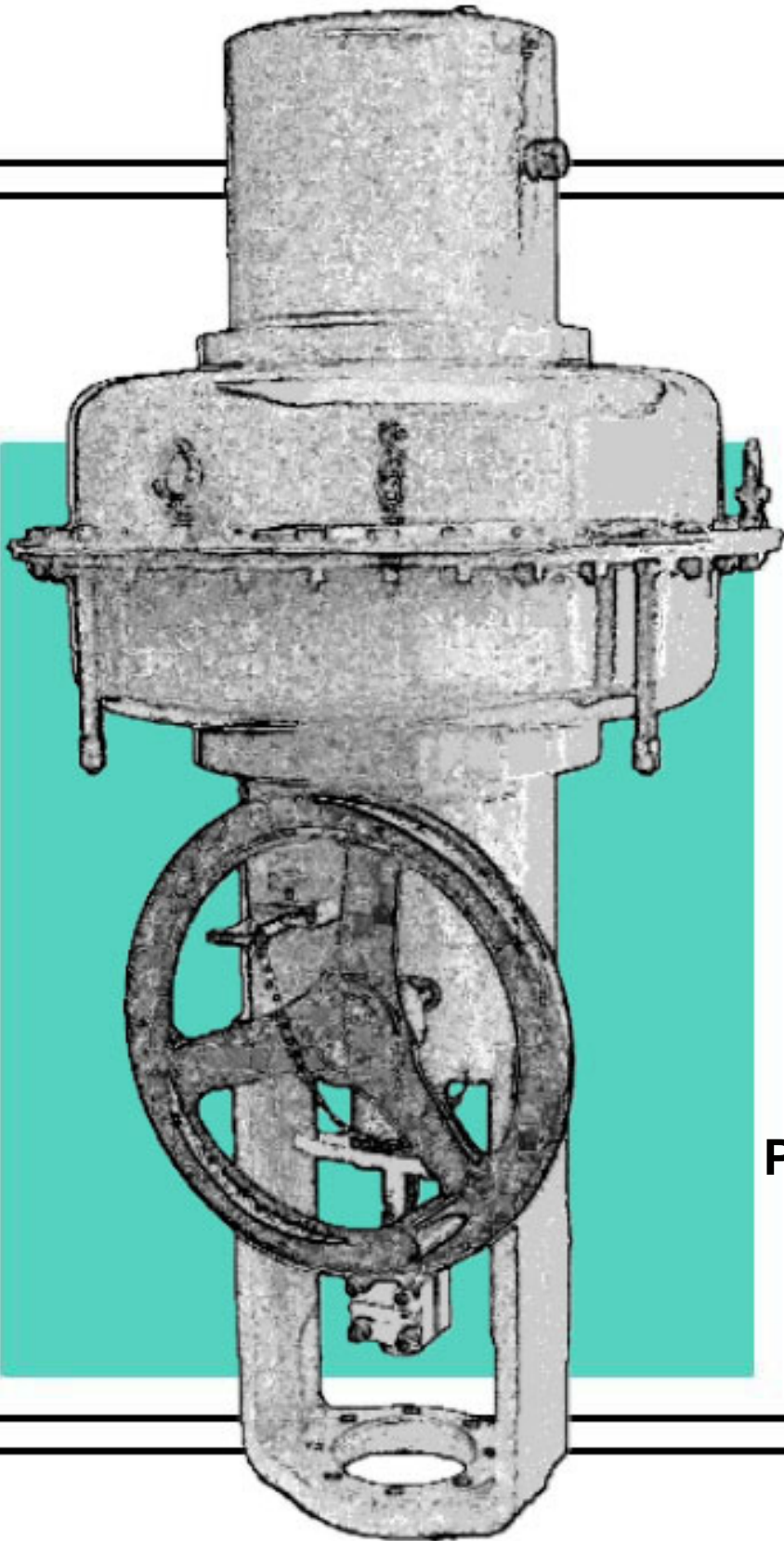


**KOSO** **PARCOL**



**PNEUMATIC ACTUATORS  
DIAPHRAGM  
1-X-250 SERIES**



# 1-X-250 SERIES DIAPHRAGM PNEUMATIC ACTUATORS



Model 1-X-252 type D63 reverse-acting actuator, equipped with an in-line fitted handwheel.

*1-X-250 Series pneumatic diaphragm actuators are designed to perform long strokes, usually covered by cylinder-operated actuators.*

*They are manufactured by PARCOL to suitably operate control valves both for throttling and on-off service.*

*The thrust is supplied by a rubber, air-loaded diaphragm and, in the opposite direction, by an helical spring.*

*Standard model can be delivered either as a direct-acting actuator (model 1-X-251) or, replacing a minimal number of parts, as a reverse-acting actuator (model 1-X-252).*

*Two actuator sizes are available: D46 and D63.*

*Special version double effect spring return D63 size is available for more critical applications.*

*Likewise other pneumatic PARCOL actuators, 1-X-250 Series is PED qualified under categories I and II where applicable.*

## MAIN FEATURES (standard model)

### DIAPHRAGM CASE

Two formed steel cases (upper and lower) clamp external edge of the diaphragm to get an air-proof sealing.

### YOKE

Actuator yokes are from castings or fabricated forged steel, depending on stroke. Standard material is A216WCB carbon steel. On request A350LF2 or A352LCB for low temperature service is available.

### DIAPHRAGM

Diaphragm is molded neoprene with a cloth fabric insert. It has an excellent resistance to aging, chemicals and to continuous deformations under load.

The particular design provides a remarkably constant efficiency throughout the travel (see table of net stem thrust).

### RATING P/T

Max operating pressure = 3.5 bar (50 psig). Over this pressure limit, internal parts of actuator can be permanently deformed.

Case and its joints can withstand a pressure of 10 bar at least without significant permanent deformations (PED certification: PS = 6 bar).

Bursting pressure = over 40 bar.

Ambient temperature = -29 °C ÷ +60 °C.

## SPRING

The spring is made of a high strength, nickel - chromium - silicium steel and is protected by a corrosion resistant coating.

A suitable spring can be delivered for each listed combination of actuator type, signal range and stroke.

Spring is top and bottom guided by slots in the spring housing and diaphragm plate.

Springs used are the same for direct and reverse acting types.

For 150 and 200 mm strokes, two in series springs are provided.

## STEM

Stem is made of AISI 316 stainless steel. Guiding (direct-acting type) or sealing (reverse-acting type) surfaces are ground and rolled. Stem is screwed into a bushing fastened to the diaphragm plate. A screw prevents loosening of the two parts.

## CONNECTIONS

Air supply connections are 1/2" and 3/4" NPT ANSI B 2.1 threaded for D46 and D63 types respectively.

Air is exhausted through a special plug which prevents liquid infiltration.

EFFECTIVE STEM THRUST – N/psi			
Type		D46	D63
Stroke – mm		76 ÷ 100	100 ÷ 200
Diaphragm position	Released spring	686	1569
	Compressed spring	618	1295

Standard materials for main components are listed in table "Materials of main components".

See next pages for explanatory drawings.

## HANDWHEEL

A handwheel, fitted on a pneumatic actuator, enables personnel to operate valve regardless of the air pressure loading the diaphragm.

This accessory is very useful during plant start of safe shut-off or simply every time an air-supply failure occurs.

For these diaphragm actuator series, PARCOL can deliver side operated handwheels fitted between yoke and diaphragm case.

These devices can operate valve stem either to open or to close the valve, just by rotating the handwheel in one direction or in the opposite.

In particular, these handwheel allows full stroke operation of valve by means of air when the lead screw (213) is positioned against the lower stop.

To manually operate the valve actuator stem and lead screw must be connected by means of the special key (210) after having turned the handwheel in order to align the stem groove to the screw slot.

Also, lead screw can be used as adjustable opening travel limiter.

See following pages for more details.

## HYDRAULIC MANUAL OPERATOR

Instead of mechanical handwheel a hydraulic manual operator with integrated speed adjustment system is available, on request.

The manual operator can be installed on field without modify actuator main components.

The speed adjustment function allows an accurate stroking time regulation during fast valve opening and closing without positioner.

Hydraulic fluid is usually mineral oil. Fire resistant fluid is available, on request.

Other benefits of hydraulic manual operator:

- manual operation time greatly reduced;
- time for engagement drastically reduced;
- limited operation force.

The built-in relief valve limits the maximum oil pressure in the cylinder to avoid mechanical damages.

<b>MATERIALS OF MAIN COMPONENTS</b>			
<b>COMPONENT</b>		<b>MATERIAL</b>	
<b>Position</b>	<b>Part name</b>	<b>Service temperature - 29 °C ÷ + 60 °C (1)</b>	
<b>Diaphragm</b>	100	Spring housing	Carbon steel (2)
	104	Lower diaphragm plate	UNI EN 10025-95 S235J2G3
	105	Top diaphragm plate	UNI EN 10025-95 S235J2G3
	106	Screw	AISI 304
	107	Nut	AISI 304
	108	Screw	AISI 304
	110	Nut	AISI 304
	118	Diaphragm	Neoprene
	119	Diaphragm plate	Carbon steel (3)
	125	Spring	52SiCrNi5 UNI 3545
	128	Top actuator stem	AISI 316
	129	Lower actuator stem	AISI 316 (4)
	300	Actuator yoke	ASTM A 216 WCB
<b>Handwheel</b>	200	Manual operator	Various
	201	Handwheel	Carbon steel + plastic
	209	Pin	AISI 304

(1) For different service temperatures, proper materials will be supplied

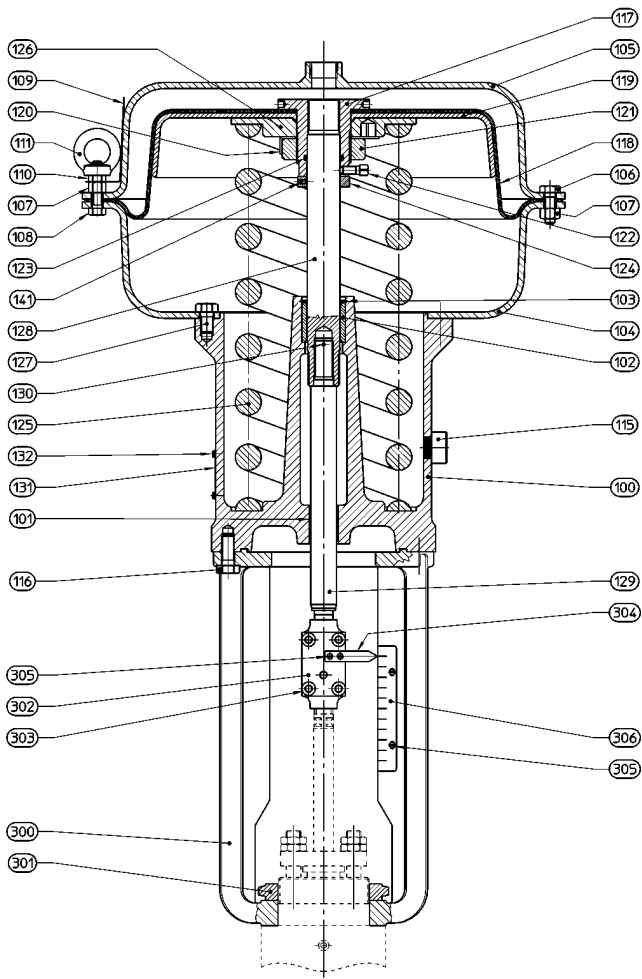
(2) D46 and D63 strokes 100 ÷ 120 mm = ASTM A216 WCB

(3) D46 = UNI EN 10025-95 S235J2G3; D63 = ASTM A105

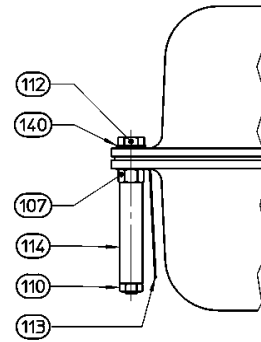
(4) D46 = 17-4-PH H1075

<b>D46 STANDARD - PART LIST</b>			
100	SPRING HOUSING	117	HUB
101	GUIDE BUSHING	118	DIAPHRAGM
102	GUIDE BUSHING	119	DIAPHRAGM PLATE
103	STOP RING	120	WASHER
104	LOWER DIAPHRAGM PLATE	121	RING NUT
105	TOP DIAPHRAGM PLATE	122	SCREW
106	SCREW	123	O-RING
107	NUT	124	TRAVEL LIMITER (if any)
108	SCREW	125	SPRING
109	WARNING PLATE	126	SPRING GUIDE
110	NUT	127	SCREW
111	EYEBOLT	128	TOP ACTUATOR STEM
112	SCREW	129	LOWER ACTUATOR STEM
113	WARNING PLATE	130	PIN
114	PROTECTIVE TUBE	131	ACTUATOR DATA PLATE
115	BREATHER	132	SCREW
116	SCREW	133	BOTTOM PLATE
		134	SEAL RING
		135	O-RING
		136	TRAVEL LIMITER (1)
		137	PROTECTION PLATE
		138	O-RING
		139	SCREW
		140	WASHER
		141	DOWEL (if any)
		300	ACTUATOR YOKE
		301	SCREW
		302	STEM CONNECTOR
		303	SCREW
		304	TRAVEL INDICATOR
		305	SCREW
		306	TRAVEL INDICATOR SCALE

Part list references can be used to order spares. Specify always type, model and action (direct, reverse).

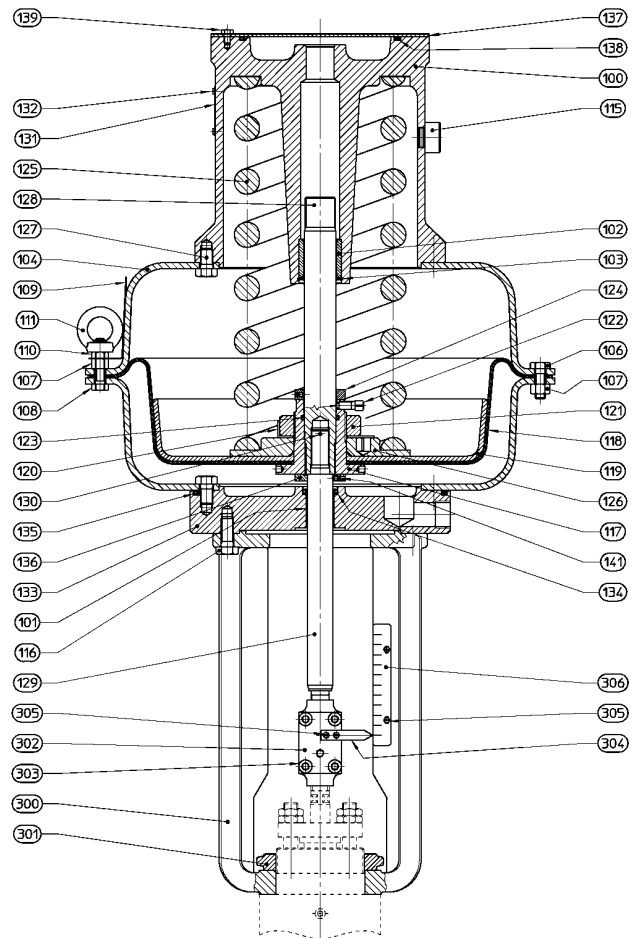


**MODEL 1-X-251 type D46 (direct-acting)**

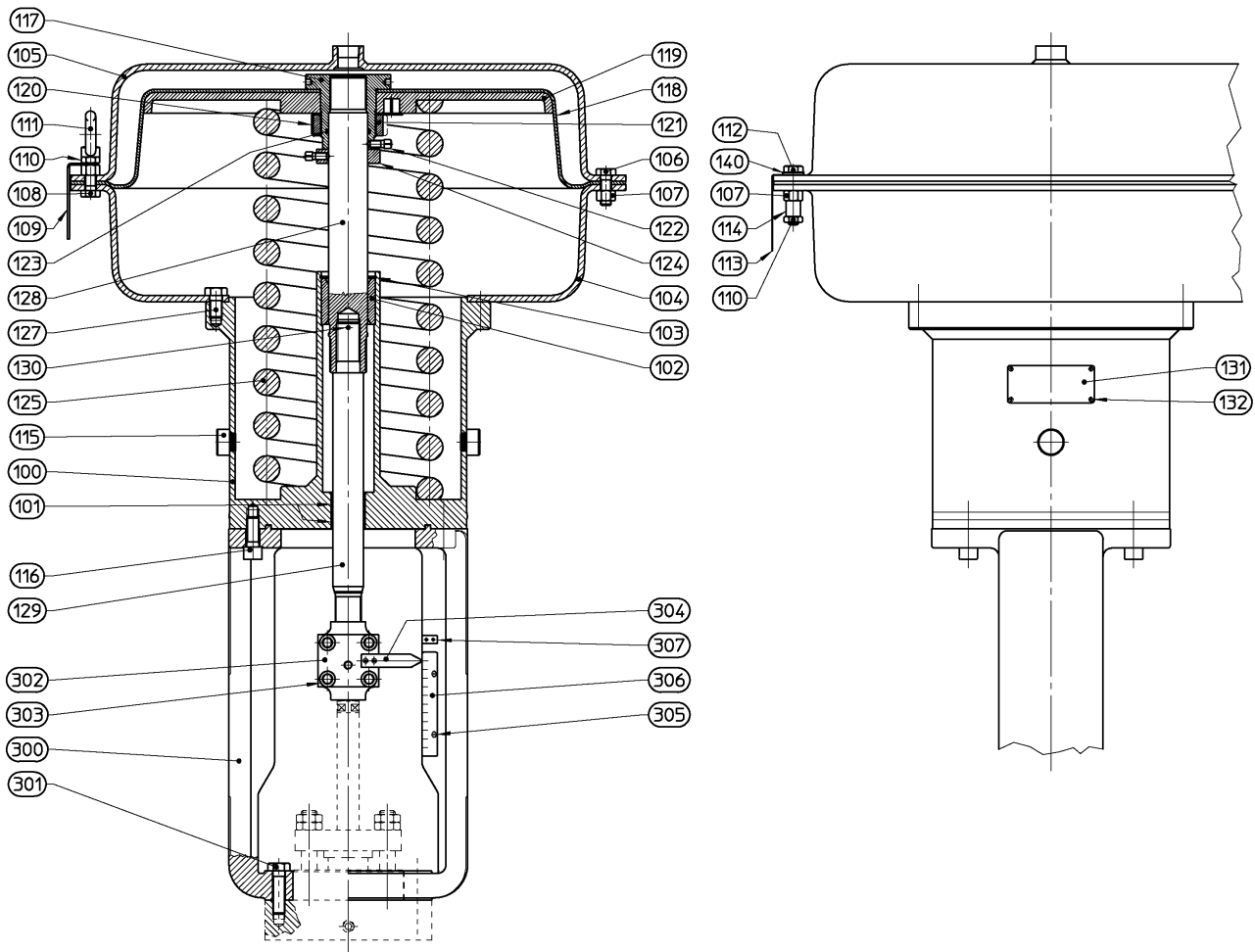


Type D46 actuator (both direct and reverse acting) is also available with handwheel (not shown in the figures).

**MODEL 1-X-252 type D46 (reverse-acting)**



## MODEL 1-X-251 type D63 (direct-acting)



### D63 STANDARD - PART LIST

100	SPRING HOUSING	116	SCREW	133	BOTTOM PLATE
101	GUIDE BUSHING	117	HUB	134	SEAL RING
102	GUIDE BUSHING	118	DIAPHRAGM	135	O-RING
103	STOP RING	119	DIAPHRAGM PLATE	137	PROTECTION PLATE
104	LOWER DIAPHRAGM PLATE	120	WASHER	138	O-RING
105	TOP DIAPHRAGM PLATE	121	RING NUT	139	SCREW
106	SCREW	122	SCREW	140	WASHER
107	NUT	123	O-RING	300	ACTUATOR YOKE
108	SCREW	125	SPRING (1)	301	SCREW
109	WARNING PLATE	126	INTERMEDIATE SPRING SEAT (2)	302	STEM CONNECTOR
110	NUT	127	SCREW	303	SCREW
111	EYEBOLT	128	TOP ACTUATOR STEM	304	TRAVEL INDICATOR
112	SCREW	129	LOWER ACTUATOR STEM	305	SCREW
113	WARNING PLATE	130	PIN	306	TRAVEL INDICATOR SCALE
114	PROTECTIVE TUBE	131	ACTUATOR DATA PLATE	307	LABEL (3)
115	BREATHER	132	SCREW		

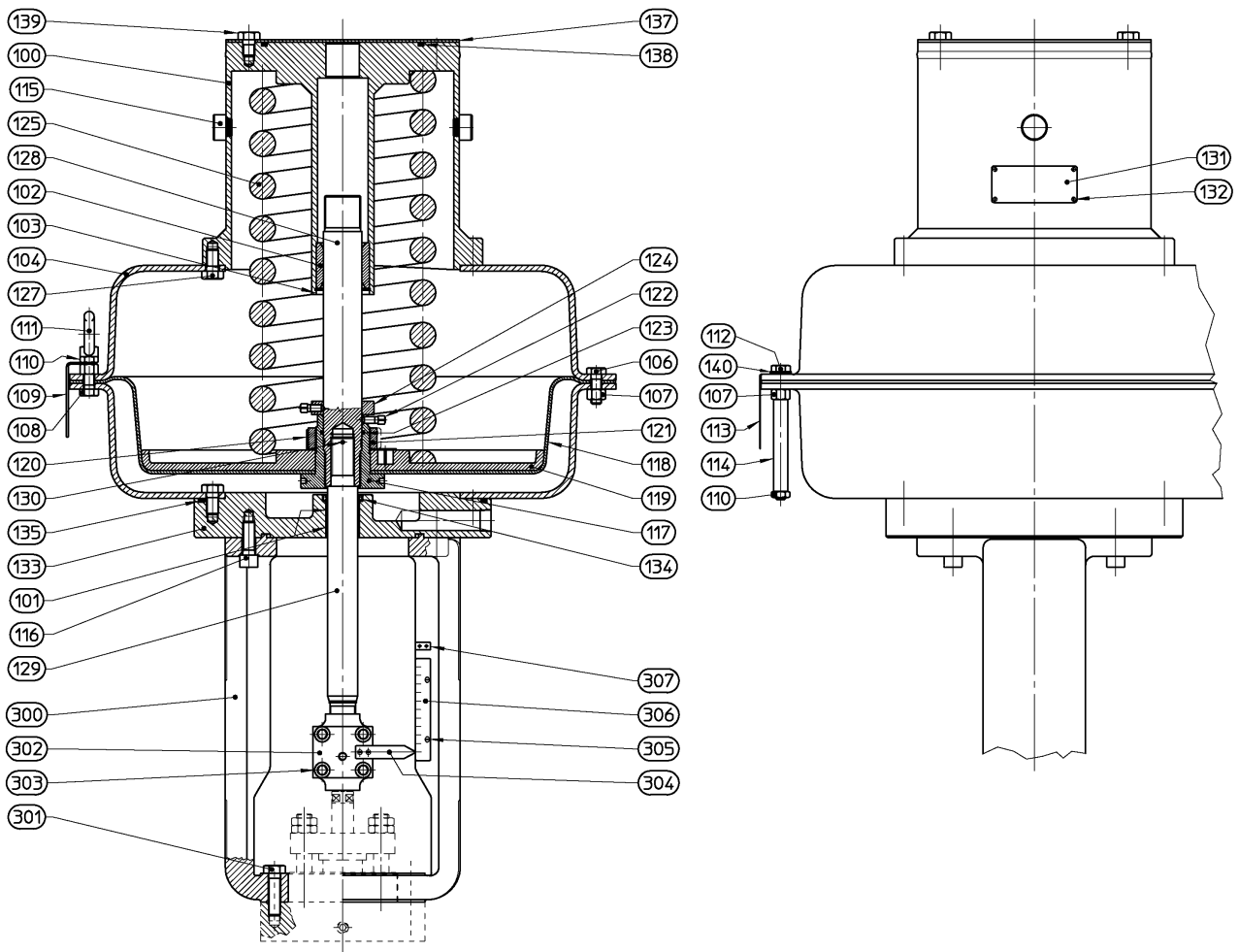
(1) One spring or two springs depending on actuator stroke

(2) Only for two springs version

(3) For stroke > 100 mm

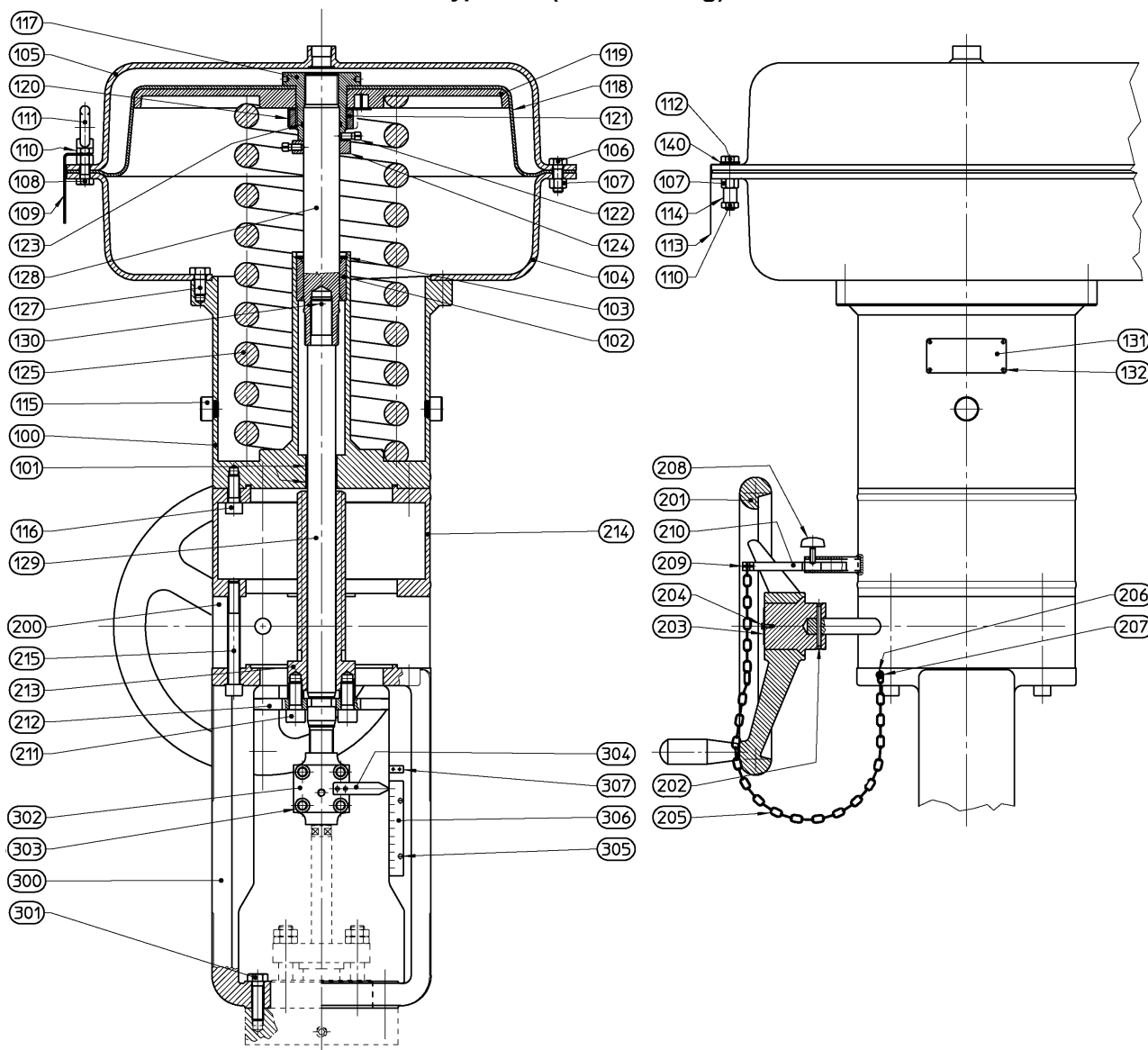
Part list references can be used to order spares. Specify always type, model and action (direct, reverse).

MODEL 1-X-252 type D63 (reverse-acting)





### MODEL 1-X-251 type D63 (direct-acting) with handwheel



#### D63 WITH HANDWHEEL - PART LIST

100	SPRING HOUSING	115	BREATHER	131	ACTUATOR DATA PLATE
101	GUIDE BUSHING	116	SCREW	132	SCREW
102	GUIDE BUSHING	117	HUB	133	BOTTOM PLATE
103	STOP RING	118	DIAPHRAGM	134	SEAL RING
104	LOWER DIAPHRAGM PLATE	119	DIAPHRAGM PLATE	135	O-RING
105	TOP DIAPHRAGM PLATE	120	WASHER	137	PROTECTION PLATE
106	SCREW	121	RING NUT	138	O-RING
107	NUT	122	SCREW	139	SCREW
108	SCREW	123	O-RING	140	WASHER
109	WARNING PLATE	125	SPRING (1)	200	MANUAL OPERATOR
110	NUT	126	INTERMEDIATE SPRING SEAT (2)	201	HANDWHEEL
111	EYEBOLT	127	SCREW	202	PIN
112	SCREW	128	TOP ACTUATOR STEM	203	LABEL
113	WARNING PLATE	129	LOWER ACTUATOR STEM	204	SCREW
114	PROTECTIVE TUBE	130	PIN	205	CHAIN

Follows →

**D63 WITH HANDWHEEL - PART LIST - CONT'D**

206	SCREW	212	ANTI-ROTATION PLATE	302	STEM CONNECTOR
207	WASHER	213	LEAD SCREW	303	SCREW
208	LOCKING SCREW	214	INTERMEDIATE CASE	304	TRAVEL INDICATOR
209	PIN	215	SCREW	305	SCREW
210	CONNECTOR	300	ACTUATOR YOKE	306	TRAVEL INDICATOR SCALE
211	SCREW	301	SCREW	307	LABEL (3)

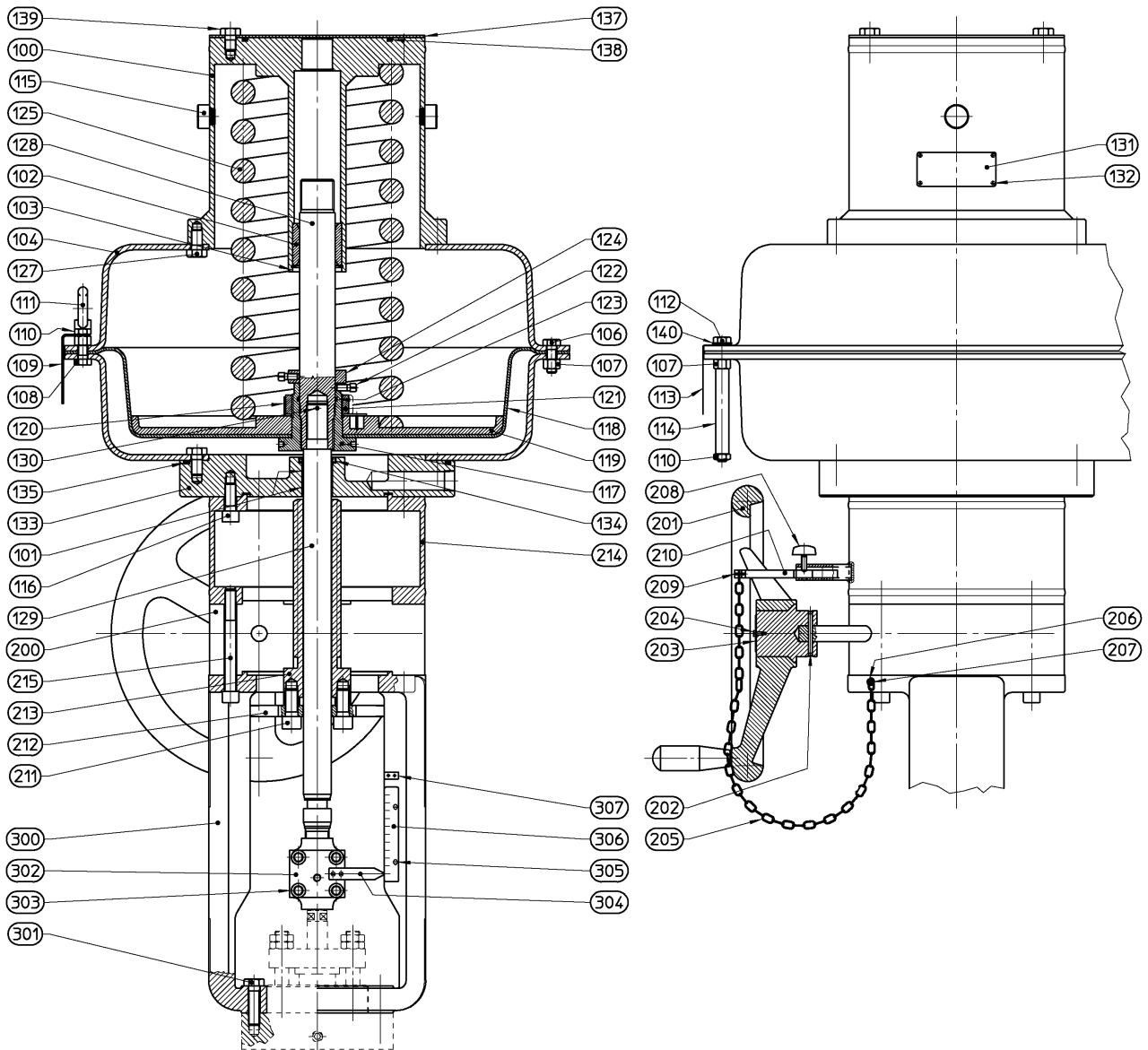
(1) One spring or two springs depending on actuator stroke

(2) Only for two springs version

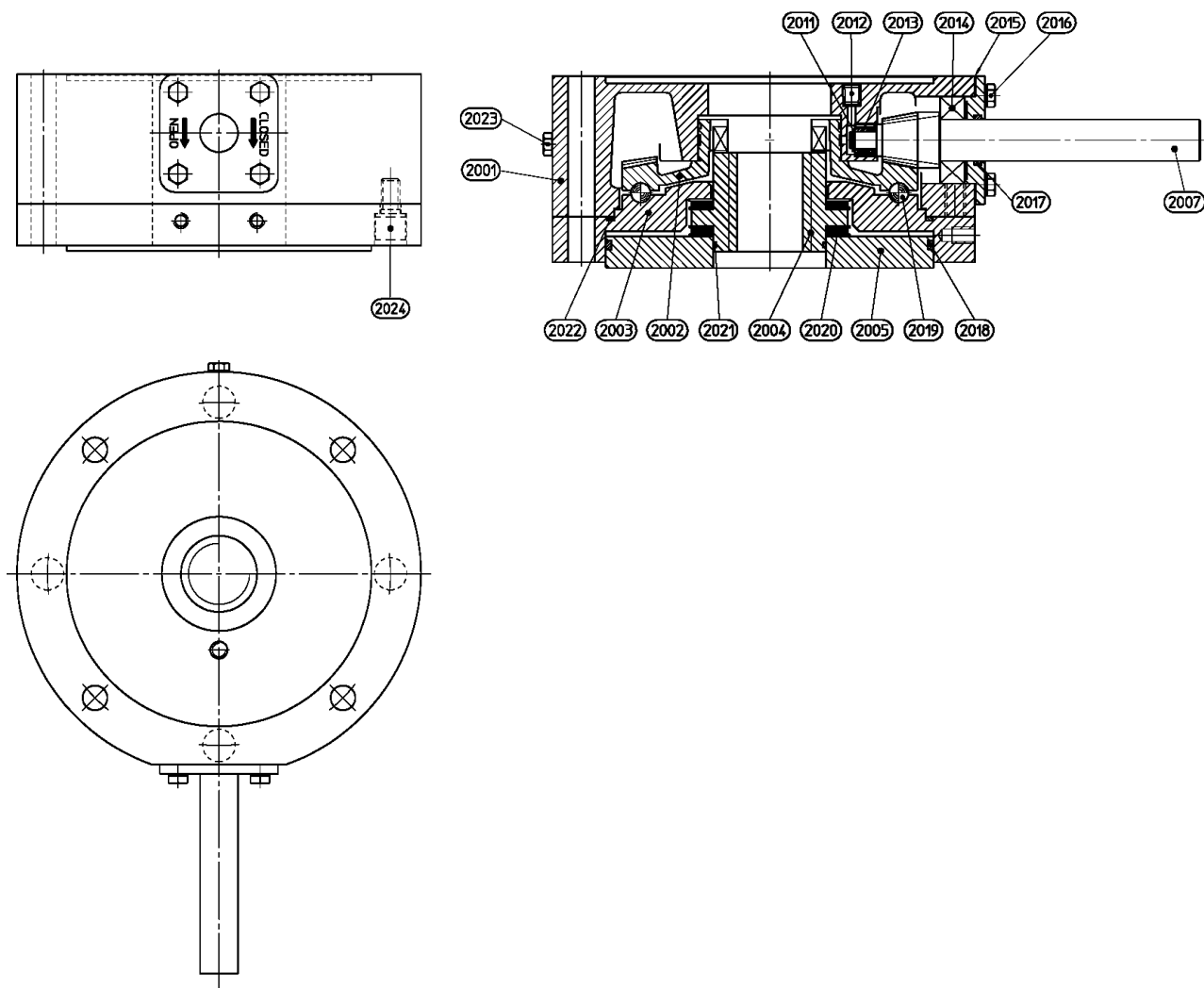
(3) For stroke > 100 mm

Part list references can be used to order spares. Specify always type, model and action (direct, reverse).

**MODEL 1-X-252 type D63 (reverse-acting) with handwheel**



## HANDWHEEL for type D46

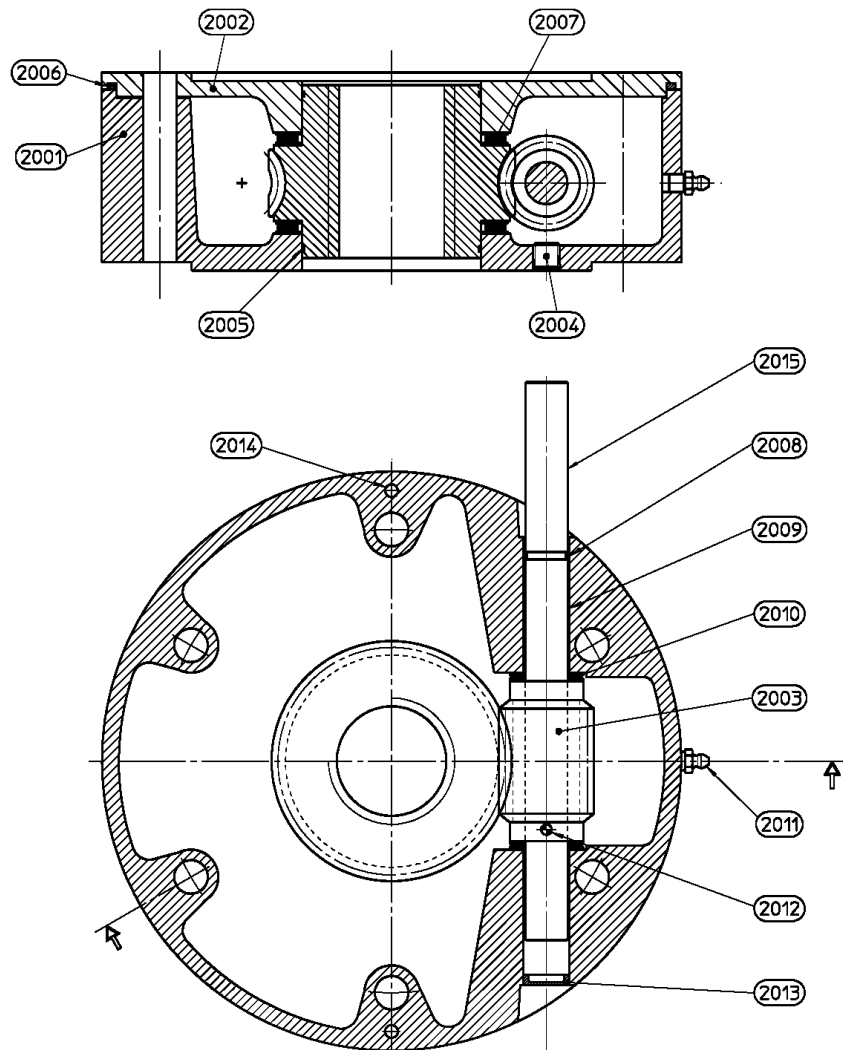


### D46 HANDWHEEL - PART LIST

2001	BODY	2012	CONICAL SCREWCAP	2019	BALLS 3/8"
2002	GEARWHEEL	2013	BEARING	2020	BEARING
2003	INTERNAL COVER	2014	BALL BEARING	2021	O-RING
2004	STEM GUIDE	2015	GASKET	2022	O-RING
2005	EXTERNAL COVER	2016	SCREW + WASHER	2023	SCREWCAP FOR LUBRICANT
2007	WORM SCREW	2017	O-RING	2024	SCREW + WASHER + GASKET
2011	ELASTIC RING	2018	O-RING		

Part list references can be used to order spares. Specify always type, model and action (direct, reverse).

## HANDWHEEL for type D63

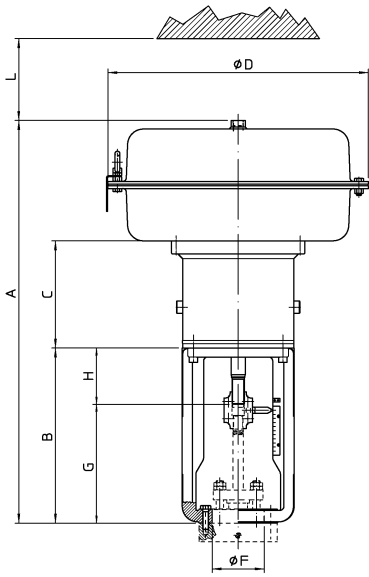


### D63 HANDWHEEL - PART LIST

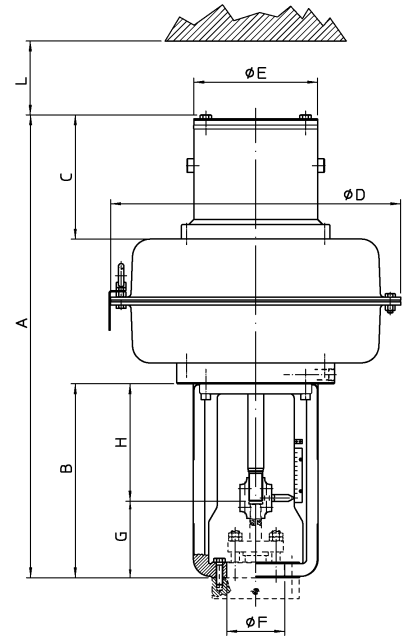
2001	BODY	2006	O-RING	2011	LUBRICATOR
2002	COVER	2007	BEARING	2012	ELASTIC PIN
2003	WORM SCREW	2008	O-RING	2013	CAP
2004	SCREW CAP	2009	BUSHING	2014	SCREW + WASHER
2005	O-RING	2010	AXIAL CAGE	2015	SHAFT

Part list references can be used to order spares. Specify always type, model and action (direct, reverse).

# OVERALL DIMENSIONS – mm

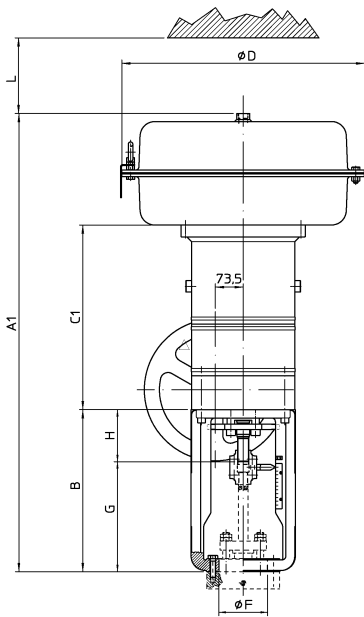


Standard version

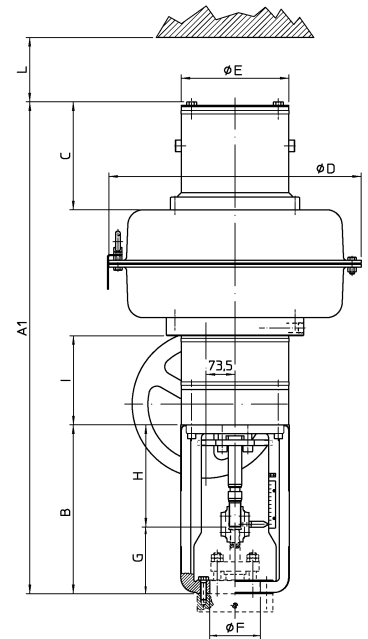
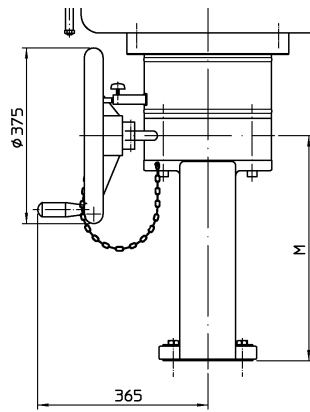


## MASS – kg

Type	Stroke [mm]	action	Configuration	
			standard	with handwheel
D46	76	Dir.	145	170
	100	Rev.	145	170
D63	100	Dir.	185	225
	120	Rev.	215	255
	150	Dir.	220	280
	200	Rev.	250	310



Handwheel version

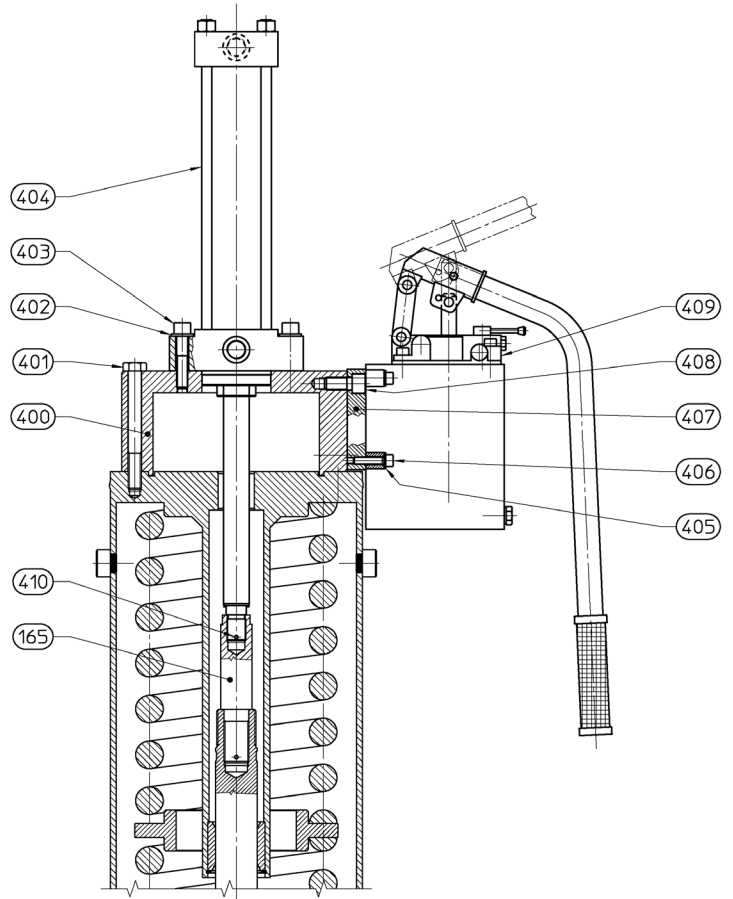


Type	Stroke [mm]	action	A	A1	B	C	C1	D	E	F	G	H	I	L	M
D46	76	Dir.	760	1120	280	225	523	465	-	(1)	228	52	-	250	400
	100	Rev.	930	1150	280	378	-	465	212		128	152	204	250	400
D63 (2)	100	Dir.	985	1211	428	262	488	640	-	128	289	139	-	350	481
	120	Rev.	1022	1248	428	274	-	640	273	128	169	259	226	350	481
	150	Dir.	1370	1686	558	517	833	640	-	128	389	169	-	450	611
	200	Rev.	1407	1723	558	529	-	640	273	128	189	369	316	450	611

(1) Coupling by ring nut

(2) Connections 3/4" NPT female

# HYDRAULIC MANUAL OPERATOR

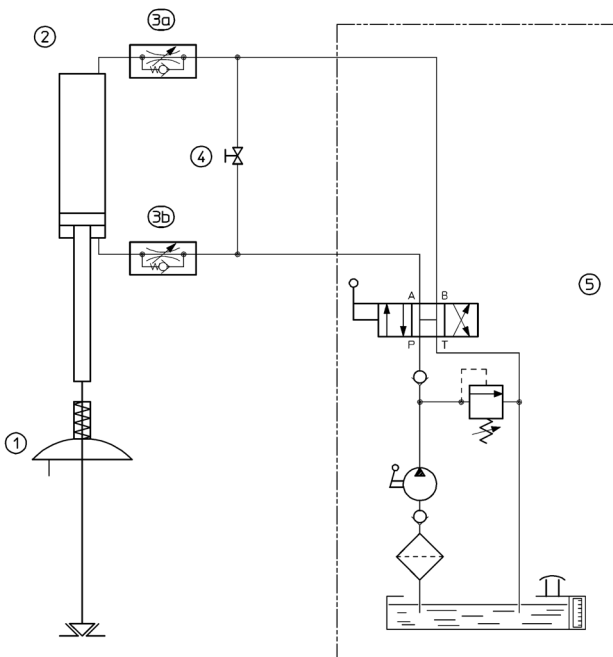


Hydraulic manual operator equipped with adjustable stroke limiter in open position installed on 1-X-252 type D63 reverse-acting actuator.

### PART LIST

165	Stem connector	405	Washer
400	Flange	406	Screw
401	Screw	407	Clamping plate
402	Washer	408	Screw
403	Screw	409	Manual pump
404	Cylinder	410	Pin

### HYDRAULIC SCHEMATIC



### COMPONENT DESCRIPTION

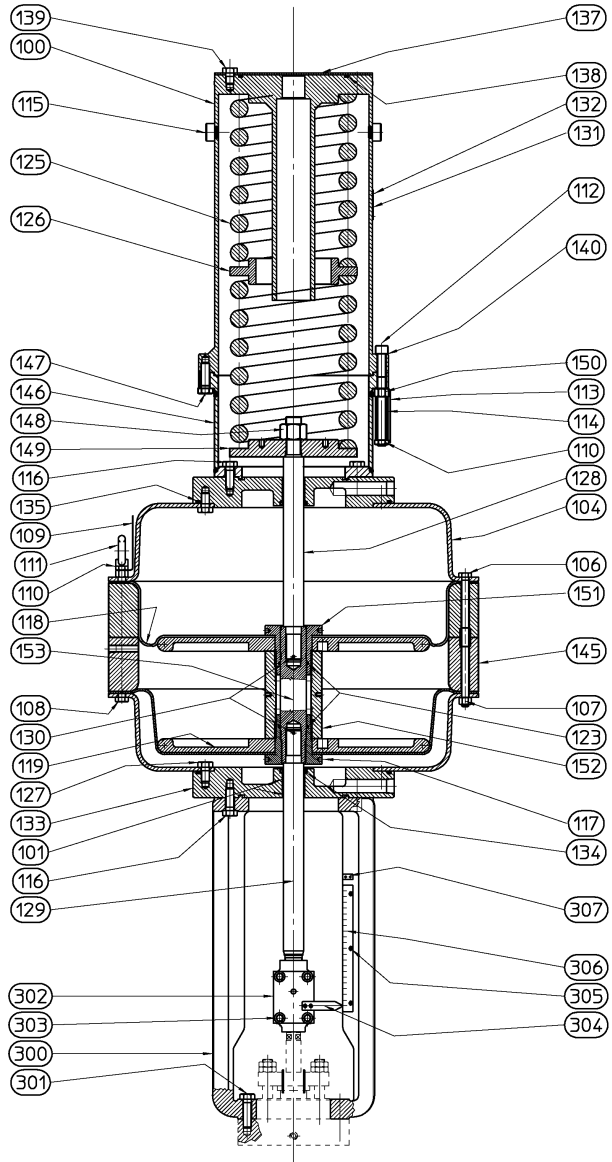
1	Pneumatic actuator
2	Hydraulic cylinder
3a-3b	Flow regulator
4	Ball valve
5	Manual pump

## DOUBLE EFFECT SPRING RETURN DESIGN

The double effect spring return actuator is available for size D63 both with spring to close and spring to open actions.

Double effect construction increases the actuator stiffness and allows to use diaphragm actuator for more severe services where pneumatic cylinders with higher air supply pressure are usually required.

The spring return function ensures the fail safe position also in case of air supply failure.



### D63 - DOUBLE EFFECT SPRING RETURN PART LIST

100 SPRING HOUSING	123 O-RING	147 SCREW
101 GUIDE BUSHING	125 SPRING (1)	148 NUT
104 LOWER DIAPHRAGM PLATE	126 INTERMEDIATE SPRING SEAT (2)	149 SPRING SEAT
106 SCREW	127 SCREW	150 NUT
107 NUT	128 TOP ACTUATOR STEM	151 UPPER HUB
108 SCREW	129 LOWER ACTUATOR STEM	152 SPACER
109 WARNING PLATE	130 PIN	153 INTERMEDIATE STEM
110 NUT	131 ACTUATOR DATA PLATE	300 ACTUATOR YOKE
111 EYEBOLT	133 BOTTOM PLATE	301 SCREW
112 SCREW	134 SEAL RING	302 STEM CONNECTOR
113 WARNING PLATE	135 O-RING	303 SCREW
114 PROTECTIVE TUBE	137 PROTECTION PLATE	304 TRAVEL INDICATOR
115 BREATHER	138 O-RING	305 SCREW
116 SCREW	139 SCREW	306 TRAVEL INDICATOR SCALE
117 HUB	140 WASHER	307 LABEL (3)
118 DIAPHRAGM	145 SPACER RING	
119 DIAPHRAGM PLATE	146 LOWER SPRING HOUSING	

(1) One spring or two springs depending on actuator stroke

(2) Only for two springs version

(3) For stroke > 100 mm

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